VOL 3 | ISSUE 1 | JANUARY - APRIL | 2023

TNJPHMR

Vol 3 | Issue 1 | January - April | 2023

Tamil Nadu Journal of Public Health and Medical Research

www.tnjphmr.com

A Quarterly Journal from
Directorate of Public Health and Preventive Medicine

(Government of Tamil Nadu)

E-ISSN : 2583-1771

INDEXED WITH GOOGLE SCHOLAR AND INDIAN CITATION INDEX

Vol 3 | Issue 1 | January - April | 2023

TNJPHMR

TAMILNADU JOURNAL OF PUBLIC HEALTH AND MEDICAL RESEARCH

Vol 3 | Issue 1 | January - April | 2023

Letter from the Editor's Desk

We are happy to share with you the current edition of TN-JPHMR, which is growing steadily in quality and quantity. We will assure you to service your academic needs on continues basis..

From this issue onwards we are introducing the new format of article submission, "TN -Notes From The Field (TN- NFTF)" to share the field experiences. We are starting TN - NFTF with "Mega vaccination camp" , I hope this format will give the insights into field activities and it will be rich experience for everyone including academicians.. I hope it will be a reference point of information in the future..

100-100-100 format (100 articles in 100 days to commemorate 100 years of DPH) which we opened up in the last month had very good response from the field and we hope to come out with special edition if needed.

Best wishes

Dr. T.S.Selvavinayagam MD., DPH., DNB.,

Director of Public Health & Preventive Medicine

Tamil Nadu Journal of Public Health and Medical Research

Vol 3 | Issue 1 | January - April | 2023

CONTENTS

TNJPHMR2(4);2022

Original Article

Vol 3 | Issue 1 | January - April | 2023

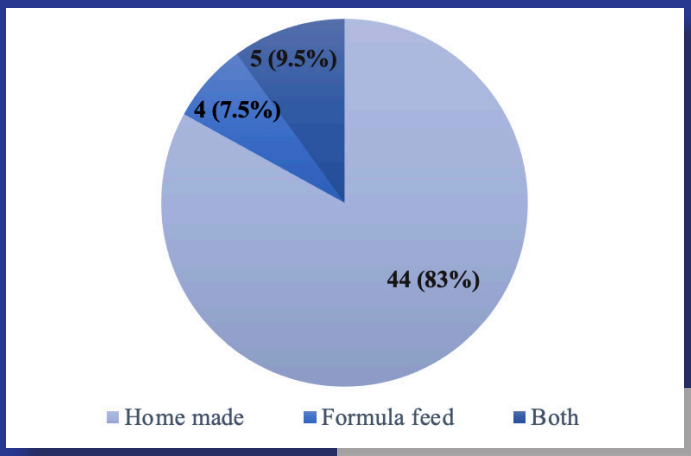
Scientific Letter

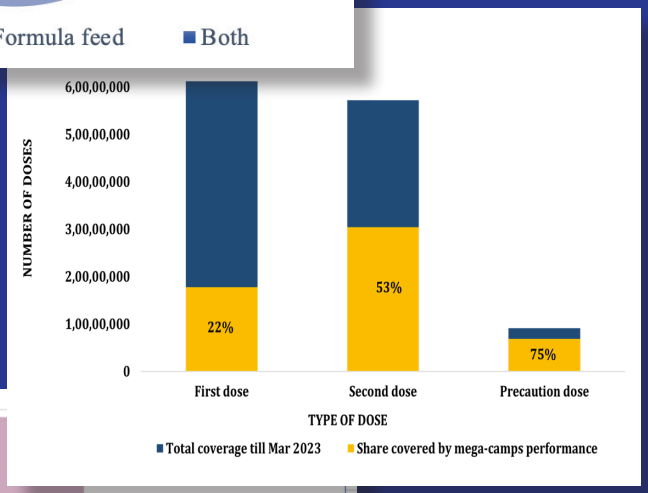
Review Article

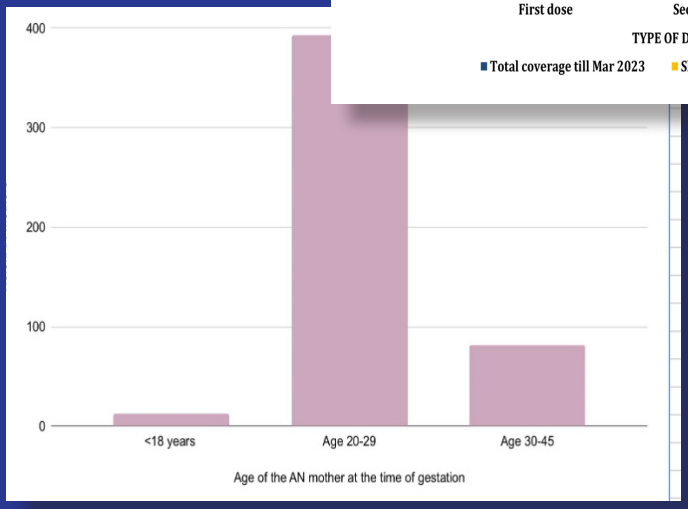
Notes From The Field

Vol 3 | Issue 1 | January - April | 2023

Why do we do basic research? To learn about ourselves.







RESEARCH IS TO SEE WHAT EVERYBODY ELSE HAS SEEN, AND TO THINK WHAT NOBODY ELSE HAS

Vol 3 | Issue 1 | January - April | 2023

ORIGINAL ARTICLE - PUBLIC HEALTH

VALIDATION OF EDINBURGH PERINATAL DEPRESSION SCALE (EPDS) TO SCREEN PRENATAL DEPRESSION AMONG RURAL TAMIL WOMEN

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Abstract

Introduction: Though all pregnant women got registered, prenatal depression was not looked for and treated. For the Government to undertake screening, locally validated screening scale was not available. Hence, this study was undertaken with primary objective of validating EPDS scale Tamil translation. Secondary objectives were to estimate prenatal depression prevalence and to arrive at shorter scale

Methods: Cross sectional study was conducted among rural Tamil speaking pregnant women. Mini International Neuro Psychiatric Interview was used to confirm diagnosis. ROC curve was constructed. Test retest reliability and internal consistency were calculated. Item based regression analysis was done to predict items to constitute short scale. ROC curve was constructed for short scale. Prevalence of prenatal depression was calculated.

Results : Best cut off for full scale was 9 or more. Sensitivity, specificity, positive & negative predictive values, positive and negative likelihood ratios were 92%, 77%, 34%, 99%, 4 and 0.1 respectively. Intra class correlation coefficient 0.86; Cronbach's alpha 0.77. Items 1, 6, 7 and 8 emerged as predictors for short scale; For best cut off of >=3, sensitivity, specificity, positive & negative predictive value, Positive and negative likelihood ratio were 87%, 80%, 35%, 98%, 4.37 and 0.16 respectively. Prevalence of prenatal depression was 11.1 % (8.1 to 15%).

Conclusions : EPDS Tamil translation could be a valid and reliable tool to screen for prenatal depression. Short scale could be of similar value. Prenatal depression was of considerable magnitude.

Key words : ROC curve, sensitivity, specificity, positive & negative predictive values, positive and negative likelihood ratios.

INTRODUCTION

Prenatal depression is one of the significant pregnancy related morbidities. It is typically defined as a nonpsychotic depressive episode of mild to major severity that occurs during pregnancy. In low and middle income countries, pooled prevalence estimate of antenatal depression was 25. 3%.[1] According to a bulletin released by WHO, it was in the range of 8.3% to 59.5%. Most of the studies quoted in the bulletin had been conducted during third trimester of pregnancy.[2] Studies conducted at various places of India brought out frequency of antenatal depression in the range between 8.7% and 36.75%.[3-6]

In Southern most part of Tamil Nadu, one study had been conducted by a Medical College team among it's community programme area, comprising antenatal mothers from coastal population of nearby state also, gave a prevalence of 16.3% for antenatal depression.[7] Another study conducted at Northern Tamil Nadu, among third trimester mothers who attended Antenatal Clinic at Health Sub Centres of a primary health centre brought out a prevalence/ frequency of 14.82%.[8]

Psychological morbidity during pregnancy had been a predictor of postpartum depression.[9] Untreated antenatal depression could have devastating effects on both mother and child; could lead on to unhealthy personal habits, poor weight gain, increased occurrence of surgical delivery interventions and extended post-delivery hospital admission in mother.[10,11] Regarding the offspring, there was a high chance for preterm birth, intra uterine growth retardation, low birth weight, small head circumference, admission at neonatal intensive care unit and behavioral & emotional problems in later life.[11-14]

The above literatures pointed out the need for screening and treatment of antenatal depression. Literature review suggested that there was paucity of scientific evidence regarding validated screening tools in Tamil to screen pregnant mothers for depression. Worldwide in low resource settings, Edinburgh Postnatal Depression scale(EPDS) had been used for antenatal depression screening.[15] It is a 10 item measure to screen women for depression during pregnancy and postpartum period; it's application in post natal and prenatal period could be quite different.[16,17] One study had validated EPDS Tamil version for use in postnatal women.

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But it had used Clinical Interview schedule Revised as a diagnostic tool for comparison.[18] In a validation study, Clinical Interview schedule Revised, had been found to have poor sensitivity of 44% in comparison with SCAN ICD-10.[19,20] Mini International Psychiatric Interview (MINI) had been a promising diagnostic tool for validating EPDS scale. It had been used in five out of eleven valid studies included in a systematic review for screening tools for low resource settings.[15] It had been validated against Structural Clinical Interview for Diagnosis (SCID) and Composite International Diagnostic Interview and found to have better efficiency.[21,22] It had been used during National Mental Health survey of India 2015-16.[23] Hence it was considered a diagnostic tool for validating EPDS scale in our setting.

A study conducted at South Africa had examined shorter versions of Edinburgh Postnatal Depression Scale using item based regression analysis.[24] Such an attempt if successful could deliver shorter versions which could be easily applied in field conditions by community health work force

Regarding Tamil Nadu, antenatal period is the time in which women are seeking health care on their own as well as by persuasive involvement of health care system. So there is an opportunity existing to screen for antenatal depression. Yet it had not been looked for and treated, currently, from programmatic point of view. There was paucity of data regarding screening tool validation and community prevalence of prenatal depression at Tamil Nadu. If Government should take up screening for antenatal depression, availability of scientific evidence regarding screening tool validation in local language (Tamil) could remain a bottleneck. For the mothers to be screened by Village Health Nurses (Female community health workforce in Tamil Nadu), user friendly shorter version(s) would be a boon. Hence it was decided to conduct a study which would validate EPDS Tamil version &bring out the burden of antenatal depression and to bring forth shorter versions if possible. Conducting a community based study would help validate the screening tool along with community prevalence data which would attract the attention of public health authorities and policy makers towards the problem of prenatal depression. The study was conducted at Kallandiri block which is one of the attached community programme areas of Institute of Community Medicine, Madurai Medical College.

OBJECTIVES

PRIMARY OBJECTIVE

To estimate the diagnostic accuracy and reliability of Edinburgh Postnatal Depression Scale Tamil version for screening antenatal depression among Tamil speaking rural women in comparison to Mini International Neuropsychiatric Interview.

SECONDARY OBJECTIVE

1. To design shorter screening tool(s) for application by community health workers.
2. To estimate the prevalence of antenatal depression among second and third trimester pregnant mothers .

METHODS

STUDY SETTING AND STUDY POPULATION

Study was conducted at Kallandiri block of Madurai District. Our study population was second and third trimester pregnant mothers.

INCLUSION CRITERIA

Second and third trimester pregnant mothers who could understand and speak Tamil; residing at villages of Kallandiri block at the time of data collection.

EXCLUSION CRITERIA

Pregnant mothers who are in labour; seriously ill; having any sensory deficits or mental retardation; known to have any preexisting medical or mental illness (prior to onset of pregnancy) irrespective of whether they took/ take treatment for that or not.

STUDY PERIOD

Study period was 2019 to 2020. Data was collected during February and March 2020.

STUDY DESIGN

Study design was cross sectional study.

OPERATIONAL DEFINITION

Antenatal depression was defined as clinical depression during pregnancy. Clinical depression was defined as persistent sadness and/ or loss of interest/ less ability to enjoy the things one use to enjoy most of the time.

SAMPLING PROCEDURE AND SAMPLE SIZE

Cluster sampling was adopted. Health Sub Centers were considered as clusters. Our sample size was 350; 14 clusters with cluster size of 25 each. Sample size was calculated with following assumptions: Expected sensitivity 0.94; specificity 0.90(18); Precision 0.065, and Prevalence 15%(8). The following formulas were used for calculating sample size and highest sample size of two calculations was adopted: Sample size based on sensitivity= {Z21-α/2 × SN × (1- SN)} ÷ {L2 × Prevalence}. It was 347. Sample size based on specificity= {Z21-α/2 × SP × (1- SP)} ÷ {L2 × (1-Prevalence)}. It was 97; where SN= anticipated sensitivity, SP= anticipated specificity, Z21-α/2= standard

normal deviate corresponding to the specified size of the critical region (α), L = absolute precision.

Fourteen Health Sub Centers (HSC) were selected by probability proportionate to size linear systematic sampling. The list of all antenatal mothers was obtained from VHNs for those 14 HSCs prior to data collection. For every HSC, 25 mothers were chosen from the list by simple random sampling. If the selected mother(s) was/ were unwilling or not available in the area or became ineligible because of exclusion criteria, replacement was made from the rest of mothers in the list by random selection. Two clusters (HSCs) among 14 clusters were selected randomly for repeating the screening scale for reliability assessment.

DATA COLLECTION PROCEDURE

Data was collected using a proforma to collect socio demographic data; Tamil translated version of Edinburgh Perinatal Depression scale was used for screening and Mini International Neuropsychiatric interview was used as diagnostic scale. All participants were interviewed with Tamil versions of Edinburgh Postnatal Depression Scale and Mini International Neuropsychiatric Interview (MINI). Screening scale was repeated for mothers from two randomly selected clusters;

INDEX TEST- EPDS

Tamil translation of EPDS scale was read to the mothers and their response was marked.

DIAGNOSTIC TEST- MINI

TMothers were interviewed with Mini International Neuropsychiatric Interview (MINI) for confirmatory diagnosis.

QUALITY ASSURANCE

The protocol including the Tamil versions of screening and diagnostic scales was submitted for review by faculty members/ experts of Community Medicine and Psychiatry. Mini International Neuropsychiatric Interview and Edinburgh Perinatal Depression Scale were translated into Tamil using simple words. Back translation was done into English for quality check. We got expert (in Psychiatry and Psychology) opinion regarding the translated versions. A pilot survey was conducted to test the instruments and necessary corrections were done in the scales in consultation with experts. Parallel form reliability was assessed by administering the three versions of EPDS scale (original, Tamil version and back translated English version) to volunteers who had proficiency in both Tamil and English. Reliability of scale was found to be 0.865 which is considered to be in better range (more than good). The principal investigator/ MD (Community Medicine) PG student got trained in using both scales during Psychiatry clinical posting.

ANALYSIS

Receiver Operating Characteristic (ROC) Curve was constructed. Best cut off was arrived by analyzing sensitivity, specificity, predictive values and likelihood ratios of various cut offs.

Twenty six participants were assessed at interval of one week by same rater. Test retest reliability (kappa and intra class correlation coefficient) and internal consistency (cronbach's alpha) were also calculated. Responses were coded dichotomously based on best cut off arrived at for kappa calculation. Responses were in ordinal scale for intra class correlation coefficient & Cronbach's Alpha calculation.

Item based regression analysis was done using logistic regression. To identify the best predictors among 10 items of EPDS scale, logistic regression was done in which dependent variable is presence or absence of depression and explanatory variables were 10 item responses of EPDS scale. Items with statistically significant coefficient were considered for constitution of short scale. ROC curve was constructed for short scale (short scale as screening scale and depression diagnosis by MINI interview as confirmed diagnosis) and best cut off was arrived by analysing sensitivity, specificity, predictive values and likelihood ratios of various cut offs.

Proportion of antenatal depression with 95% confidence interval was calculated based on confirmatory scale.

HUMAN PARTICIPANT PROTECTION

Permission was obtained from Institutional Ethics Committee of Madurai Medical College. Informed written consent was obtained from all participants after properly explaining potential risks and benefits of the study. Strict confidentiality was maintained; all personal identifiers were avoided in all documents including data entry; Mothers who were found to have depression during the interview, were referred to Psychiatrist for further management.

RESULTS

We had to approach 397 mothers in order to achieve a sample size of 350. Among total 350 mothers participated, lowest age was 17; highest age 36 & median age 24. Mothers with higher secondary school education were 24%, graduates 20%, less than or equal to high school 34%, diploma around 10% and post graduate & professional education around 12%. Majority mothers (81%) were home makers. Around 12% were salaried employees. Others were self-employed, professionals or labourers. Around 52% mothers' husbands had education level less than or equal to high school; rest more than or equal to higher secondary education. Around

42 % mothers' husbands were salaried employees, 31% self-employed and 25% labourers. Around 47% mothers were primi gravida, 35% second gravida and remaining were third and fourth gravida mothers. Around 47% mothers had at least one living child.

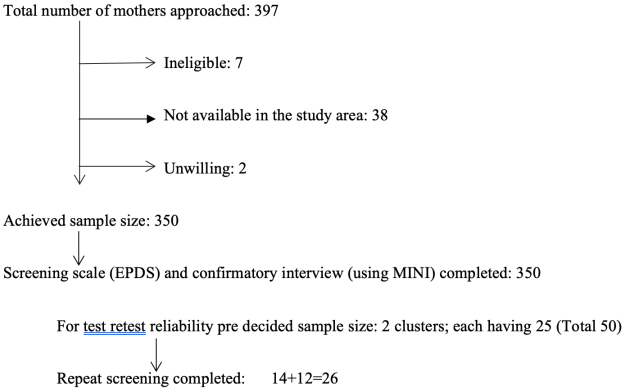

Figure 1: Flow of participants

ROC CURVE ANALYSIS OF WHOLE SCALE

For the cut off of more than 8, the sensitivity and specificity were 92.3 (79.1 - 98.4) and 77.1 (72.1 - 81.7) respectively. Positive and negative likelihood ratios were 4.0 (3.2 - 5.1) and 0.1 (0.03 - 0.3) respectively. Positive and negative predictive values were 33.6 (28.8 - 38.8) and 98.8 (96.4 - 99.6) respectively. In this cut off, likelihood ratios and predictive values were in good trade off. There was improvement in specificity also for which we could accept a little decrease in sensitivity.

Table 1: Criterion values and coordinates of the ROC curve of full scale (Tamil translation scale)

Criterion	Sensitivity	Specificity	Positive likelihood ratio	Negative likelihood ratio	Positive Predictive value	Negative Predictive value
≥0	100.00	0.00	1.00		11.1	
>0	100.00	8.04	1.09	0.00	12.0	100.0
>1	100.00	17.04	1.21	0.00	13.1	100.0
>2	100.00	27.33	1.38	0.00	14.7	100.0
>3	100.00	35.69	1.55	0.00	16.3	100.0
>4	100.00	46.30	1.86	0.00	18.9	100.0
>5	97.44	53.38	2.09	0.048	20.8	99.4
>6	97.44	61.41	2.53	0.042	24.1	99.5
>7	94.87	69.77	3.14	0.073	28.2	99.1
>8	92.31	77.17	4.04	0.100	33.6	98.8
>9	82.05	80.71	4.25	0.22	34.8	97.3
>10	79.49	84.89	5.26	0.24	39.7	97.1
>11	69.23	89.39	6.52	0.34	45.0	95.9
>12	61.54	92.60	8.32	0.42	51.1	95.0
>13	46.15	93.57	7.18	0.58	47.4	93.3
>14	28.21	95.50	6.27	0.75	44.0	91.4
>15	25.64	96.46	7.25	0.77	47.6	91.2
>16	23.08	97.75	10.25	0.79	56.3	91.0
>17	12.82	98.07	6.65	0.89	45.5	90.0
>18	7.69	99.04	7.97	0.93	50.0	89.5
>19	5.13	99.36	7.97	0.95	50.0	89.3
>20	0.00	99.36	0.00	1.01	0.0	88.8
>21	0.00	100.00		1.00		88.9

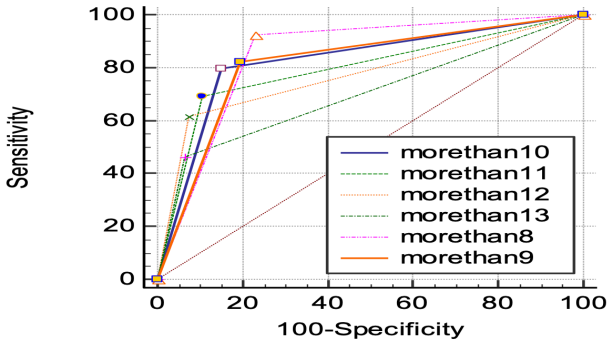

Figure 2: ROC curve of Tamil scale for various cut offs

We looked at next cut off of more than 9 to analyze whether it was better/ worse/ equal to cut off more than 8. For cut off more than 9, the sensitivity and specificity were 82.1 (66.5 - 92.5) and 80.7 (75.9 - 84.9) respectively. Positive and negative likelihood ratios were 4.3 (3.2 - 5.6) and 0.2 (0.1 - 0.4) respectively. Positive and negative predictive values were 34.8 (28.9 - 41.1) and 97.3 (94.8 - 98.6) respectively. In this cut off, for a little improvement of specificity, positive predictive value and positive likelihood ratio happened; but unfavourable shift in sensitivity and negative likelihood ratio made this cut off less appealing than the previous one.

RELIABILITY ANALYSIS OF WHOLE SCALE

Table 2: Test retest reliability- Cross tabulation of test positivity status for the cut off more than 8 (9 or more) during First time and Repeat screening

		Repeat screening		
		Positive	Negative	Total
First time screening	Positive	5	2	7
	Negative	0	19	19
	Total	5	21	26

kappa 0.79 P value < 0.001

Table 3: Test retest reliability- Intra class Correlation Coefficient between first and repeat screening

	Intra class Correlation Coefficient	95% Confidence Interval	P value
Considering single measures	0.85	0.70 to 0.93	<0.001
Considering average measures	0.92	0.83 to 0.97	<0.001

Internal consistency: Sample size 350 No of items 10
Cronbach's Alpha 0.77 P value <0.001

For the cut off of 9 or more, kappa was measured for repeat screening by the same rater. It was 0.79 with p value of < 0.001. Intraclass correlation coefficient was around 0.9. crohnbach's alpha was 0.77.

ITEM BASED REGRESSION ANALYSIS TO CONSTITUTE SMALL SCALE

Table 4: Items of EPDS scale with their statistical significance level emerged as predictors / non predictors by logistic regression analysis

Item number in EPDS scale	P value
Item 1	.006
Item 2	.780
Item 3	.392
Item 4	.339
Item 5	.553
Item 6	.013
Item 7	.003
Item 8	.006
Item 9	.120
Item 10	.149
Constant	.000

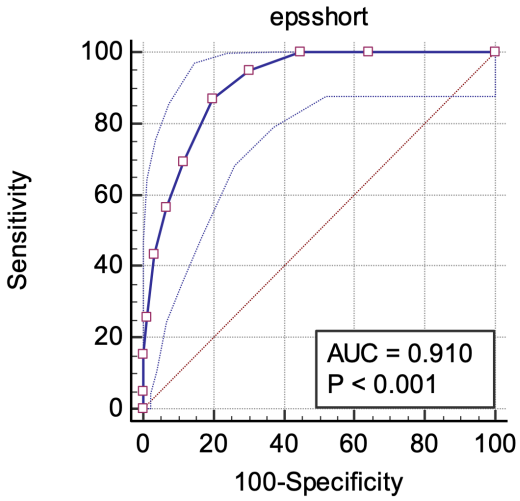

Figure 3: ROC curve of Short scale for various cut offs

Logistic regression was done by using Enter method. Dependent variable was depression/ no depression. Explanatory variables were scores (0, 1, 2, 3) of 10 items of EPDS scale. As per Hosmer and Lemeshow Test, the model had goodness of fit (chi square value:5.7 with degree of freedom 8 , P value: 0.68. Items 1(I have been able to laugh and see the funny side of things), 6 (Things have been getting on top of me), 7(I have been so unhappy that I have had difficulty sleeping) and 8 (I have felt sad or miserable) emerged as best predictors (P value < 0.05). These items (could be) were considered as components of short scale; subsequent analysis was done to validate the short scale. For cut off more than 3, sensitivity 87%, specificity 80%, positive & negative predictive values were 35% and 98%; positive and negative likelihood ratio were 4.37and 0.16. So this cut off was preferred.

Table 5: Criterion values and coordinates of the ROC curve of short scale

Criterion	Sensitivity	Specificity	Positive likelihood ratio	Negative likelihood ratio	Positive Predictive value	Negative Predictive value
≥0	100.00	0.00	1.00		11.1	
>0	100.00	35.69	1.55	0.00	16.3	100.0
>1	100.00	55.31	2.24	0.00	21.9	100.0
>2	94.87	69.77	3.14	0.073	28.2	99.1
>3	87.18	80.06	4.37	0.16	35.4	98.0
>4	69.23	88.42	5.98	0.35	42.9	95.8
>5	56.41	93.25	8.35	0.47	51.2	94.5
>6	43.59	96.78	13.56	0.58	63.0	93.2
>7	25.64	98.71	19.94	0.75	71.4	91.4
>8	15.38	99.68	47.85	0.85	85.7	90.4
>9	5.13	99.68	15.95	0.95	66.7	89.3
>10	0.00	100.00		1.00		88.9

PREVALENCE OF PRENATAL DEPRESSION

Proportion of mothers with prenatal depression was 11.1 % with 95% confidence interval of 8.1 to 15% (as per MINI scale based interview which is the confirmatory scale used in the study).

DISCUSSION

Mothers in the age group of 21 to 30 predominated in the sample. Nearly two third of the mothers had attended high school to Graduate level of education. Four fifth of mothers were home makers. Education level of husbands had been found to be somewhat similar to that of mothers. Nearly two third of the participants' husbands were either salaried employees or self-employed. Nearly half of mothers were primi gravida. Nearly half of mothers had at least one live child.

Coordinates of ROC curve revealed that a cut off more than 8 had been found to have reasonably better sensitivity of 92.31(79.1 - 98.4) and specificity of 77.17 (72.1 - 81.7). Likelihood ratios of this cut off got interpreted as positive test occurs 4 times frequently in depressed mothers in comparison to normal mothers & negative test occurs 0.1 times in depressed mothers in comparison to normal mothers. Positive predictive value was only 34% (only one in three test positive mothers would be having depression truly in the reference population) as it could be influenced by prevalence. Negative

predictive value was found to be better (99%) in this cut off. If the mother scored less than 9, she could be safely considered normal not warranting further work up for depression. A cut off of more than 9 had been found to have better specificity of 80.7(75.9 - 84.9). Even though specificity of this cut off was little more attractive, other coordinates namely likelihood ratios and predictive values were similar or less attractive in comparison to that of cut off of more than 8. As screening scale needs to be more sensitive, cut off more than 8 could be considered for positivity in screening for prenatal depression. Reliability statistics suggested that the Tamil scale was having good to better reliability.

Four items number one, six, seven and eight were significantly predictive to constitute a short scale; A cut off score of more than 3 could be suggested for positivity of screening based on criterian values trade off. Though sensitivity a little lower and specificity a little higher than full version of Tamil scale, other parameters namely likelihood ratios and predictive values were very much similar to the full version. As these things influence the practicality of a screening test, the short scale could be a time and effort saving alternative to full scale in the hands of community level health worker (Village Health Nurses). Roughly one among nine mothers in the second and third trimester had been having depression.

Benjamin D et all in their study titled "Validation of the Tamil version of Edinburgh post-partum depression scale", had suggested a cut off more than 8/9 for post natal mothers with sensitivity 94% and specificity 90%.[18] In a study conducted by Sea Kyung Choi et al, they validated a simplified version of EPDS scale consisting of item 5 and 8, which was found to have 92% sensitivity and 86% specificity for cut off score of 3.25 Tamsen J. Rochat et all arrived at short and ultra short versions of EPDS by item based regression analysis. Those short scales had poorer sensitivity but better specificity and positive predictive value than full scale.[24] Jane Phillips et al validated 7 item (items 1, 2, 6, 7, 8, 9 & 10) depression sub scale of EPDS among post natal women which was found to have a sensitivity of 88% and specificity of 62%.[26]

CONCLUSIONS

Tamil version of EPDS scale could be used to screen rural Tamil women for prenatal depression using the cut off score of more than 8 (9 or more) during second and third trimester. Short scale consisting of items 1, 6, 7, and 8 of original version of EPDS could be used with the cut off score of more than 3. Prenatal depression was a problem of significant magnitude among rural pregnant women.

RECOMMENDATIONS

Screening and subsequent management of prenatal depression among Tamil speaking pregnant women was highly recommended considering the magnitude of problem. Tamil version of EPDS with cut off score of more than eight (nine or more) as screening positive was recommended for use at rural PHCs for screening pregnant women in their second and third trimesters. Short scale having four items (items 1, 6, 7 and 8) with cut off score of more than 3 was recommended for use by village health Nurses during their outreach visit.

ACKNOWLEDGEMENT

I submit my heartfelt thanks to Dr. Kumanan, MD, Head of Department & Professor of Psychiatry and Dr. Geethanjali, MD, Professor of Psychiatry, Madurai Medical College for their kind support during protocol preparation stage and meticulous training in administering the screening and confirmatory scales of the study. It is time to convey my heart felt gratitude towards Dr. R. Muthukumar, MA (English), MSc (Psychology), Ph. D in Psychology, who is working as Principal, IID Community College, Chennai, for his valuable contribution during translation of screening and confirmatory scales whose practical experience and mastery in the field of psychology helped me a lot

REFERENCES

1. Fisher J, Meena Cabral de Mello, Vikram Patel, Atif Rahman, Thach Tran, Sara Holton, et al. Prevalence and determinants of common perinatal mental disorders in women in low- and lower-middle-income countries: a systematic review. Bull World Health Organ. 2012;90:139-149G.

2. Fisher J, Cabral de Mello M, Patel V, Rahman A, Tran T, Holton S, et al. Prevalence and determinants of common perinatal mental disorders in women in low- and lower-middle-income countries: a systematic review. Bull World Health Organ. 2012 Feb 1;90(2):139-149H.

3. Babu GR, Murthy GVS, Singh N, Nath A, Rathnaiah M, Saldanha N, et al. Sociodemographic and Medical Risk Factors Associated With Antepartum Depression. Front Public Health. 2018 May 2;6:127.

4. Ajinkya S, Jadhav PR, Srivastava NN. Depression during pregnancy: Prevalence and obstetric risk factors among pregnant women attending a tertiary care hospital in Navi Mumbai. Ind Psychiatry J. 2013;22(1):37–40.

5. Ali NS, Azam IS, Ali BS, Tabbusum G, Moin SS. Frequency and Associated Factors for Anxiety and Depression in Pregnant Women: A Hospital-Based Cross-Sectional Study. Sci World J. 2012;2012:1–9.

6. Hegde SS, Pai KK, * AHA, * SKR. Prevalence of antenatal depression and gender preference: A cross sectional study among mangalore population,Karnataka,India. J Pharm Biomed Sci. 2013 May;30(30):1011–4.

7. Christina George, Anoop RN lalitha, Abish Antony, Arun V Kumar, KS Jacob. Antenatal depression in coastal South India: Prevalence and risk factors in the community [Internet]. 2016 [cited 2020 Oct 24]. Available from: https://journals.sagepub.com/doi/10.1177/0020764015607919

8. Kamali R. A descriptive study on the prevalence of antenatal depression in a rural area in Tamilnadu. [Chennai]: THE TAMIL NADU DR.M.G.R. MEDICAL UNIVERSITY; 2018.

9. Stewart DE, Robertson E, Phil M, Dennis CL, Grace SL, Wallington T. Postpartum depression: Literature review of risk factors and interventions. 2003;

10. Kelsie Thelen1 & Katherine Lisa Rosenblum1 MM. Perinatal depression: detection and treatment. Neuropsychiatry. 2011;1(2):179–95.

11. Zuckerman B, Amaro H, Bauchner H, Cabral H. Depressive symptoms during pregnancy: Relationship to poor health behaviors. Am J Obstet Gynecol. 1989 May 1;160(5, Part 1):1107–11.

12. Bonari L, Pinto N, Ahn E, Einarson A, Steiner M, Koren G. Perinatal Risks of Untreated Depression during Pregnancy. Can J Psychiatry. 2004 Nov;49(11):726–35.

13. Wadhwa PD, Sandman CA, Porto M, Dunkel-Schetter C, Garite TJ. The association between prenatal stress and infant birth weight and gestational age at birth: A prospective investigation. Am J Obstet Gynecol. 1993 Oct 1;169(4):858–65.

14. Grote NK, Bridge JA, Gavin AR, Melville JL, Iyengar S, Katon WJ. A Meta-analysis of Depression During Pregnancy and the Risk of Preterm Birth, Low Birth Weight, and Intrauterine Growth Restriction. Arch Gen Psychiatry. 2010 Oct 4;67(10):1012.

15. Chorwe-Sungani G, Chipps J. A systematic review of screening instruments for depression for use in antenatal services in low resource settings. BMC Psychiatry. 2017 Mar 24;17(1):112.

16. Töreki A, Andó B, Keresztúri A, Sikovanyecz J, Dudas RB, Janka Z, et al. The Edinburgh Postnatal Depression Scale: Translation and antepartum validation for a Hungarian sample. Midwifery. 2013 Apr;29(4):308–15.

17. To¨reki A, Andó B, Dudas RB, Dweik D, Janka Z, Kozinszky Z, et al. Validation of the Edinburgh Postnatal Depression Scale as a screening tool for postpartum depression in a clinical sample in Hungary. Midwifery. 2014 Aug;30(8):911–8.

18. Benjamin D, Chandramohan A, Annie IK, Prasad J, Jacob KS. (PDF) Validation of the Tamil version of Edinburgh post-partum depression scale. J Obstet Gynecol India. 2005 Jun;55(3):241–3.

19. V. Jordanava, C. Wickramesinghe, C. Gerada, M. Prince. Validation of two survey diagnostic interviews among primary care attendees: A comparison of CIS-R and CIDI with SCAN ICD-10 diagnostic categories - ProQuest. [cited 2020 Oct 24]; Available from: https://search.proquest.com/openview/885e3011740aad669fbb225d925fd0dd/1?pq-origsite=gscholar&cbl=35753

20. T. S. Brugha, P. E. Bebbington, R. Jenkins, H. Meltzer, N. A. Taub, M. Janas, et al. Cross validation of a general population survey diagnostic interview: a comparison of CIS-R with SCAN ICD-10 diagnostic categories | Psychological Medicine | Cambridge Core [Internet]. [cited 2020 Oct 24]. Available from: https://www.cambridge.org/core/journals/psychological-medicine/article/cross-validation-of-a-general-population-survey-diagnostic-interview-a-comparison-of-cisr-with-scan-icd10-diagnostic-categories/F024D0128B474EAD84B9AE4FA059938C

21. Lecrubier Y, Sheehan D, Weiller E, Amorim P, Bonora I, Sheehan KH, et al. The Mini International Neuropsychiatric Interview (MINI). A short diagnostic structured interview: reliability and validity according to the CIDI. Eur psychiatr. 1997;12(5):224–31.

22. Sheehan D, Lecrubier Y, Harnett Sheehan K, Janavs J, Weiller E, Keskiner A, et al. The validity of the Mini International

Neuropsychiatric Interview (MINI) according to the SCID-P and its reliability. Eur Psychiatry. 1997 Jan 1;12(5):232–41.

23. Pradeep BS, Gururaj G, Varghese M, Benegal V, Rao GN, Sukumar GM, et al. National Mental Health Survey of India, 2016 - Rationale, design and methods. PLOS ONE. 2018 Oct 25;13(10):e0205096.

24. Tamsen J. Rochat, Mark Tomlinson, Marie -Louise Newell, Alan Stein. Detection of antenatal depression in rural HIV-affected populations with short and ultrashort versions of the Edinburgh Postnatal Depression Scale (EPDS) | SpringerLink. Arch Womens Ment Health. 2013;16:401–10.

25. Choi SK, Kim JJ, Park YG, Ko HS, Park IY, Shin JC. The Simplified Edinburgh Postnatal Depression Scale (EPDS) for Antenatal Depression: Is It a Valid Measure for Pre-Screening? Int J Med Sci. 2012;9(1):40.

26. Jane Phillips, Charles M, Sharpe L, Stephen Matthey. Validation of the subscales of the Edinburgh Postnatal Depression Scale in a sample of women with unsettled infants. J Affect Disord. 2009 Nov;118(1–3):101–12.

Vol 3 | Issue 1 | January - April | 2023

ORIGINAL ARTICLE - PUBLIC HEALTH

A CROSS SECTIONAL STUDY ON PERCEPTIONS AND ATTITUDES OF PATIENTS ABOUT ADULT VACCINATION AND THEIR VACCINATION STATUS

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Abstract

BACKGROUND : One of the most important and effective measures in public health to prevent a disease is vaccination. The attitudes of the physicians along with the patients regarding adult vaccination is very important. In adults, vaccine-preventable diseases such as pneumonia, hepatitis B, tetanus etc are a source of morbidity and mortality. However, in India, as like the rest of the world, children remain the focus of vaccination and its importance and need in adults is yet to be emphasized. In this study, we have aimed to assess the perceptions and attitudes of patients about adult vaccination and their vaccination status in a Primary Health Centre (PHC) in Tamilnadu.

OBJECTIVES : To assess the perceptions and attitudes about the adult vaccination and their vaccination status among patients attending OPD in Medavakkam PHC

METHODS : A cross sectional study was conducted from July to September 2021 among 165 adult patients attending OP in Medavakkam PHC using a pretested, semi structured questionnaire. Data was entered in Excel and analyzed using SPSS version 16.

RESULTS : Interview was conducted among 165 participants aged more then eighteen years, nearly 92.7% of the study participants thought that adults should be vaccinated, while only 7.3% thought adults should not be vaccinated. About 80% of the participants stated that vaccination was recommended to them in their adult life and only 83% were aware about adult vaccination.Nearly 30.9% of participants did not keep record of the vaccines they have taken and 65.5% believed in herd immunity. The most commonly received vaccine was covid -19 vaccines in general. While 94% of the patients to whom vaccination was recommended received the vaccine, 69.7% of patients received vaccine without any recommendation.

CONCLUSION : The vaccine coverage rates among adults in this study was relatively high, perceptions of patients about adult vaccination was really positive and most of the study participants reacted in a positive way while their physicians recommended a vaccine for them. In light of the success of childhood vaccinations, there is indeed room for increasing the reception of adult vaccines as well.

KEY WORDS : Adult vaccination, perception, attitudes

INTRODUCTION

Vaccination is an effective and one of the most important public health measures to curtail many infectious diseases in developing countries. Vaccination has been well acknowledged and the most valued preventive aspect in reducing mortality, morbidity and disability rates in adults as a result of communicable diseases.[1] Adults in general, are not the focus of vaccination campaigns. Childhood vaccination programs are well-accepted and widely used, but unfortunately awareness for adult vaccination is by far less prominent. Adult vaccination is to be highly considered in order to reduce the incidence rates of common infections that occur due to age factor, health conditions, lifestyle, travelling, and occupational risks. A number of reasons may account for the differences in adult and childhood vaccination rates such as the ignorance of primary care physicians towards adult vaccination schedules, lack of public awareness and knowledge.[2-4] Emphasis towards adult vaccination as a part of health care services is highly ignored in India. Thus the vaccination rates in adult populations still remain below the targets.

The immunization schedule for adults by CDC - Advisory Committee on Immunization Practices (ACIP 2020) recommends Seasonal influenza vaccine, Td vaccine, Pneumococcal vaccine (PCV13/PPSV23), Human Papilloma virus vaccine (HPV), Hepatitis A vaccine, Hepatitis B vaccine, Haemophilus influenza b(Hib), Meningococcal vaccine, Measles mumps rubella vaccine (MMR), Varicella zoster vaccine for all adults having no evidence of immunity.[5]

Vaccinating the adult population can be a powerful tool to

- reduce the disease burden of the countr.
- enhancing the productivity of the working class.
- increasing the longevity of life and ultimately uplifting the nation to a better state of well being.

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OBJECTIVES

To assess the perceptions and attitudes about the adult vaccination and their vaccination status among patients attending OPD in Medavakkam PHC

METHODOLOGY

STUDY AREA AND STUDY DURATION

A cross sectional study was conducted at Medavakkam Primary Health Centre, Rural Health Training Centre for Institute of Community Medicine, attached field practice area of Madras Medical College. The study was carried out for a period of three months from July to September 2021.

STUDY POPULATION, SAMPLE SIZE AND SAMPLING TECHNIQUE

The study population was all adult patients aged 18 years and above who attended Outpatient Department at Medavakkam PHC.

By assuming 50 % prevalence of perceptions and attitudes of adult vaccination, the sample size was calculated to be 165 including 10% of non response rate. Ethical clearance was obtained from the Institutional Ethical Committee, Madras Medical College.

Out of all Primary Health Centres in Tamilnadu, Medavakkam PHC was selected by simple random sampling method. Official permission to conduct the study was obtained from Directorate of Public Health and Preventive medicine, Deputy Director of Health Services, Chengelpet District for conducting the study. All adult patients aged 18 years and above attending OP in Medavakkam PHC was included in the study after obtaining written informed consent by universal sampling method.

STUDY TOOL AND DATA COLLECTION

A pretested, semi-structured questionnaire was used for data collection which had 2 sections.

Section I: Includes information on socio-demographic profile of the participants.

Section II: Includes questions regarding the perceptions and attitudes about adult vaccination and their respective vaccination status

The purpose of the study was briefed and rapport was established with the study participants. Questionnaires were distributed personally and informed consent was obtained. Participants were allowed a few minutes to read the questionnaire and ask any questions regarding the contents. Difficult terminologies were first explained and then the participants were told to give their response independently and unbiased way without any undue pressure, maintaining the strict confidentiality of their identity. The filled questionnaires by the respondents were collected after allowing adequate time to fill the response by the study participants. Those who were not willing to participate in the study were excluded from the study. Hence a total of 165 responses were obtained.

DATA ENTRY AND ANALYSIS

The data was entered in MS Excel and was analyzed using SPSS version 16. Descriptive statistics was expressed as proportions, mean, and standard deviation. Data were expressed in graphs, tables and charts wherever necessary.

RESULTS

A total of 165 study participants was interviewed for the study. The mean age of the study participants were 39.75 ±15.95 years, 47.9% were males and 52.1% were females. Regarding education only 4.2% were illiterates and the remaining study participants were literates. Socio demographic characteristics of the patients are given in Table 1.

Table 1: Socio demographic details of study participants (n = 165)

Socio demographic details		Frequency	Percentage (%)
Age	<30 years	69	41.8
	>30 years	96	58.2
Gender	Male	79	47.9
	Female	86	52.1
Education	Literate	158	95.8
	Illiterate	7	4.2
Occupation	Employed	120	72.7
	Unemployed	45	27.3

Out of 165 study participants, comorbid condition were present among 40 (24.3%) of them. The most common comorbid condition were Diabetes mellitus(17.5%), Hypertension(25%), both Diabetes mellitus and Hypertension(27.5%), patients on steroid therapy(7.5%), followed by coronary artery disease(5%).

About 83% of the study participants were aware about adult vaccination while the remaining 17% were not aware regarding adult vaccination. (Figure 1).

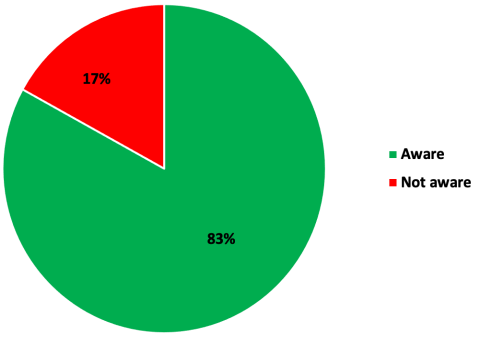

Figure 1: Participants awareness about adult vaccination (n = 165)

Nearly 77% of study participants responded that adult vaccines are given in government institutions and 23% responded that adult vaccines are not given in government institutions (Figure 2)

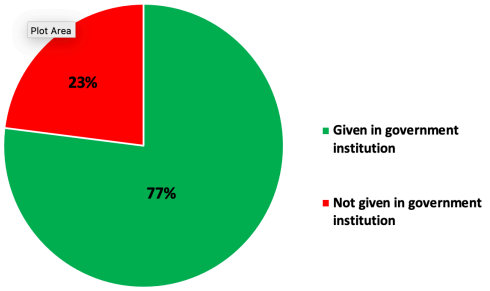

Figure 2: Participants perceptions about adult vaccination (n = 165)

While 92.7% of the patients responded that adults should get vaccines, 7.3% thought that adults do not need to be vaccinated (Figure 3)

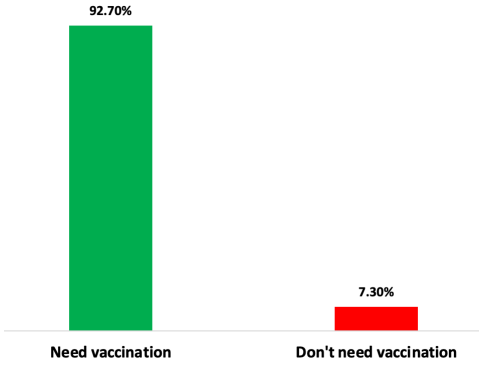

Figure 3: Participants perceptions about adult vaccination (n = 165)

Among those who thought that adults should not be vaccinated,38.5% stated that they were unaware of vaccines,30.8% stated that vaccines are not necessary for adults, 7.7% stated that only children need vaccines, 7.7% thought vaccines are not appropriate for adults,7.7% thought that vaccines were just a "money trap", 3.8% were afraid of the adverse effects, 3.8% avoided vaccines due to religious beliefs (Figure 4).

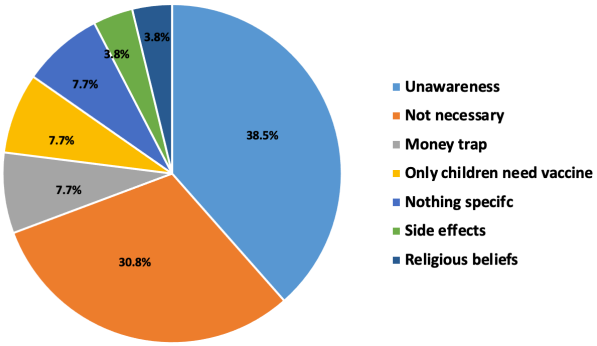

Figure 4: Participants perceptions about adult vaccination (n = 165)

95.1% of study participants believe that vaccine prevent illness in adults while 4.9% believe that vaccine does not prevent illness in adults (Figure 5)

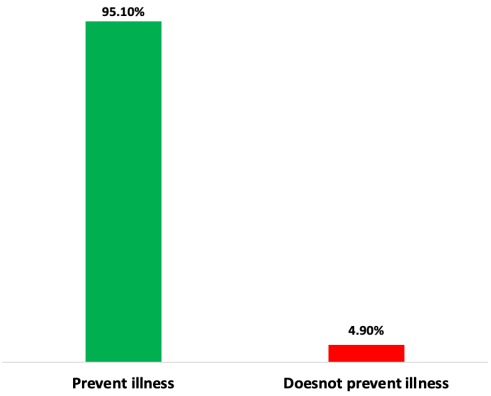

Figure 5: Participants perceptions about adult vaccination preventing illness(n = 165)

Regarding herd immunity,study participants were of the perception,nearly 65.5% of them believe that if a large number of people in a community is vaccinated,it could prevent the disease in non vaccinated people also,while 34.5% responded that if a large number of people in a community is vaccinated,it would not prevent the disease in non vaccinated people.Those who thought that adults should be vaccinated were asked about which vaccination should be given to adult patients. The top-ranking answers were covid 19 (88.2%),tetanus (39.2%), hepatitis B (30.7%),influenza (30.7%) (Figure 6).

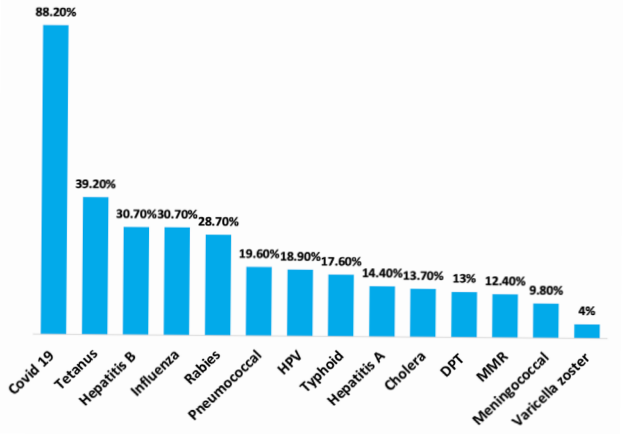

Figure 6: Patients attitude towards vaccines indicated in adult life (n = 165)

Maximum 80% of study participants have been recommended vaccine in their adult life and 20 % were not been recommended any adult vaccines. Nearly 80% of the patients stated that vaccination was recommended to them in their adult life, while 94% of the patients to whom vaccination was recommended received the vaccine, 69.7% of patients received vaccine without any recommendation. Recommendation was mostly made by the doctors from primary care doctors(45.5%), family(53%) and friends(42.4%) rather

than tertiary care(19%) or secondary care doctors(17.4%). The most commonly recommended vaccines were covid 19 vaccines(96.2%), tetanus(23.5%), hepatitis B(19.7%), rabies(15.1%).(Figure 7)

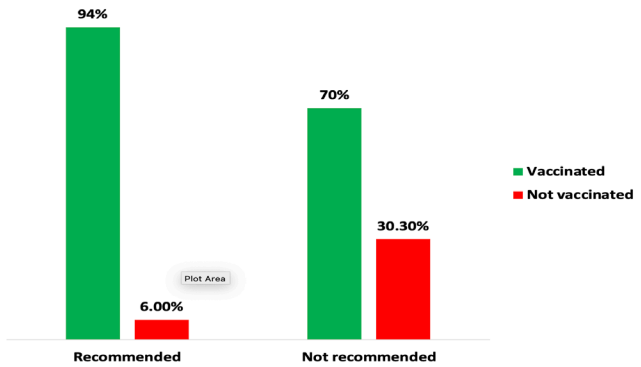

Figure 7: Health care providers recommendation of vaccination (n = 165)

Among 165 participants nearly 89% were vaccinated sum sort of adult vaccines in their adult life and 11% were not vaccinated with any of the adult vaccines. 72.7% of the study participants responded in a positive way that they would receive the vaccine if it were been reimbursed free of cost and 27.3% responded that they would not receive the vaccine even if it was reimbursed free of cost. The record of the vaccines received by the study participants were kept safely by 69% of the patients while 31% of them does not have the record of their vaccines they received. Overall, the most commonly received vaccine was covid 19 vaccines(95.2%), tetanus(30.6%), hepatitisB(18.4%), rabies(9.5%) and influenza(6.8%) (Figure 8)

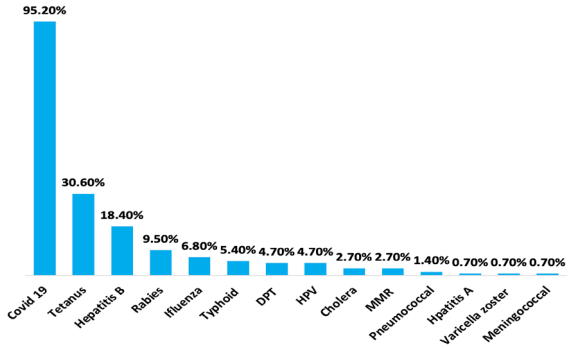

Figure 8: Participants vaccination status (n=147)

DISCUSSION

Adult vaccination is important and life saving. Immunization prevents illness, disability and death from vaccine preventable diseases. Global vaccination coverage is 86%. The top ten causes of death in India among adults are Heart disease, Chronic Obstructive Pulmonary Disease(COPD), Stroke, Diarrhealdiseases, Lowerrespiratoryinfection, Tuberculosis, Neonataldisorders, Asthma, Diabetes, Chronic Kidney disease. The routine vaccinations in adults expected to protect against SARSCoV2, Influenza, Measles, Rubella, Tetanus, Diphtheria, Poliomyelitis, Hepatitis, Rabies. Adult vaccinations is important since as we age, we become susceptible to serious diseases caused by common infections and the immunity also wanes over time.Proper Adult vaccination results in preventable morbidity and mortality.

In our study about 20% of adult patients were not recommended for any of the adult vaccines, 89% of adults received vaccine in their adulthood, the most common vaccine received was covid 19 vaccines followed by tetanus,hepatitis B,rabies and influenza vaccines, 94% of adults received vaccine on recommendation by healthcare providers,family,friends whereas 69.7% of adults received vaccine without any recommendations.This was similar to a study titled perceptions and attitudes of patients about adult vaccination and their vaccination status done by Lale Ozisik et al among adult patients aged 19 to 64 years in a University hospital in Turkey which revealed thet 36.1% of adults were not recommended of any adult vaccines,48% of them received vaccine in their adulthood,tetanus was the most common vaccine received,71.4% of adults received vaccines by recommendation and 34.9% of adults received vaccines without any recommendations.[6]

In a study done by Sanjana Chatana Shanmugappa et al on Perceptions and attitudes towards adult vaccination ,a cross sectional survey among individuals from IT sector companiesin Karnataka,India which revealed that 31.5% were aware of adult vaccines,6.43% of adults believed that vaccines does not prevent illness, 54.38% of adults believed in herd immunity and 70.76% of adults did not keep the record of the vaccines they have taken,the most common vaccine received was hepatitis B and varicella zoster and comparing to our study results emphasizing the fact that 83% of adults were aware of adult vaccines, 4.9% believed that vaccines does not prevent illness, 65.5% believed in herd immunity and 31% of adults did not keep record of the vaccines they have taken and the most common vaccine received was covid 19 vaccines and tetanus.[7]

Muneera Naz Baloch et al conducted a cross sectional study among adult citizens in Krachi pakistan which revealed that 80% of them considered adult vaccination is important whereas in our study quotes the fact that 92.7% of adults recognized the importance of adult vaccination on the whole.[8]

CONCLUSION

This study demonstrated that there are knowledge gaps

and misperceptions that might lead to low vaccine coverage rates in an adult population attending general outpatient clinics. The perceptions and the attitudes of the adult patients responding to this survey were basically positive and indeed showed that there is room for improvement. The findings of local surveys such as the current one can be used to improve adult vaccination strategies on a national basis.

LIMITATIONS

The major limitation of this study was that vaccines were self-reported and therefore might be subject to recall bias.

RECOMMENDATIONS

In India, recommendations on specific vaccines or strategies are made by National Technical Advisory Group on Immunization(NTAGI). Specific National Programmes exclusively for Adult Vaccination should be implemented including all recommended adult vaccines by ACIP. Information,Education,Communication (IEC) on Adult vaccination should be done. Adult vaccination coverage can be improved only through framing of proper National guidelines and implementing widely. Adult vaccination for free of cost to be given in all government institutions.

CONFLICTS OF INTEREST Nil

ACKNOWLEDGEMENT

We would like to express our sincere gratitude to the Dean, Madras Medical College and Directorate of Public Health & Preventive medicine, DDHS, Chengelpet district. We also acknowledge and express our thanks to the faculties and postgraduates of Institute of Community Medicine, MMC, Chennai for their guidance and suggestions in conducting this study.

REFERENCES

1. A cross-sectional study to assess the awareness and practices related to adult immunization among nursing students in a metropolitan city [Internet]. [cited 2020Oct3]. Availablefrom:https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6225393/

2. Limaye D, Limaye V, Fortwengel G. A study to assess the vaccination coverage of university students in Mumbai, India. 2017 [cited 2020 Oct 3]; Available from: https://serwiss.bib.hs-hannover.de/frontdoor/index/index/docId/1084

3. Verma R, Khanna P, Chawla S. Adult immunization in India: Importance and recommendations. Human Vaccines & Immunotherapeutics. 2015 Sep 2;11(9):2180–2.

4. Sevin AM, Romeo C, Gagne B, Brown NV, Rodis JL. Factors influencing adults' immunization practices: a pilot survey study of a diverse, urban community in central Ohio. BMC Public Health. 2016 May 23;16:424.

5. Pubmeddev, al RY et. Knowledge and awareness of hepatitis B among households in Malaysia: a community-based cross-sectional survey. - PubMed - NCBI [Internet]. [cited 2020 Apr 16]. Available from: https://www.ncbi.nlm.nih.gov/pubmed/30630464

6. Ozisik L, Basaran NC, Oz SG, Guven GS, Tanriover MD. Perceptions and Attitudes of Patients About Adult Vaccination and Their Vaccination Status: Still a Long Way to Go? Med Sci Monit. 2017 Jun 29;23:3178–84.

7. Shanmukhappa SC, Abraham RR, Chandan S. Perceptions and attitudes towards adult vaccinations: A cross sectional study from Karnataka, India. Int J Adv Community Med. 2020 Jan 1;3(1):164–7.

8. Baloch MN, Siddiqui NZ, Bano A, Siddiqui S, Kiran T, Khan MK, Asad W. A cross sectional survey: Attitude towards adult vaccination in Karachi-Pakistan. International Journal of Advanced Research. 2015;3(3):512-2.

9. Dash R, Agrawal A, Nagvekar V, Lele J, Di Pasquale A, Kolhapure S, Parikh R. Towards adult vaccination in India: a narrative literature review. Human vaccines & immunotherapeutics. 2020 Apr 2;16(4):991-1001.

10. Bali NK, Ashraf M, Ahmad F, Khan UH, Widdowson MA, Lal RB, Koul PA. Knowledge, attitude, and practices about the seasonal influenza vaccination among healthcare workers in Srinagar, India. Influenza and other respiratory viruses. 2013 Jul;7(4):540-5.

11. Harrison N, Brand A, Forstner C, Tobudic S, Burgmann K, Burgmann H. Knowledge, risk perception and attitudes toward vaccination among Austrian health care workers: A cross-sectional study. Human vaccines & immunotherapeutics. 2016 Sep 1;12(9):2459-63.

Vol 3 | Issue 1 | January - April | 2023

ORIGINAL ARTICLE - PUBLIC HEALTH

CAN ADOPTION OF SCHOOLS BY MBBS INTERNS STRENGTHEN SCHOOL HEALTH PROGRAMME? - AN INNOVATIVE APPROACH

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Abstract

BACKGROUND : One of the wisest investments developing nations can make in their quest for long-term economic and social development is in adolescent health education. Though Government is making its efforts to strengthen adolescents through school health programme, almost 25% of girls and boys do not receive any of the four school-based services (mid-day meal, biannual health checks, biannual deworming, and weekly iron folic acid supplementation) and none met the necessary 60 minutes of outdoor sports and exercise per day as per UNICEF India report, 2019. Closing this gap is crucial to ensure healthful impact on their lifestyles throughout their lives.

OBJECTIVE: To assess the effectiveness of school adoption intervention on health behaviors among the students of grade 8th.

METHODS: A theory-based interventional study was conducted among 80 students of grade 8th at a Gov. Zilla Prishad High school, Visakhapatnam. A 2 weeks health education intervention on knowledge, attitude, and practice of health behaviors were conducted by MBBS Interns. Attitudes & practice of students towards healthy behaviours was assessed before and after intervention using a self-administered validated questionnaire.

RESULTS : The post-test responses from the students showed significant ($p<0.05$) increase in intake of fruits (77%), vegetables (47.5%), milk (58.8%) and egg (66.7%). fast food and soft drink consumption pattern decreased around (80%). Around 50% of them adopted healthy physical activity patterns. Also, The students' attitudes toward obeying to road safety rules, first aid alcohol, tobacco, and sexual hygiene also showed beneficial changes.

CONCLUSION : The MBBS Interns' school adoption intervention enhances students' commitment to healthy behaviours by reinforcing the objectives of school health programme.

KEY WORDS : High school students , Health education , school adoption by MBBS Interns , Healthy lifestyle

INTRODUCTION

Adolescence as defined by WHO to be from 10-19 years of age[1] constitutes the phase of transition that includes puberty's biological changes, the drive to become more independent, a focus on the self, and experimentation.[2] A Variety of risky behaviors for one's health first emerge at this age. Some of these behaviors include being overweight or obese, suicidal thoughts, accidents, the dangers of unprotected sexual behavior, illnesses linked to tobacco or alcohol use, and are major contributors to adolescent mortality and future morbidity in their adulthood.[3-7]

According to WHO statistics, risky adolescent behavior, such as poor eating habits, is a major contributor to 70% of adult premature deaths. One of the best investments developing countries can make in their quest for long-term economic and social development is in adolescent health education because, if major chronic disease risk factors are eliminated in the short term, at least 80% of heart disease, stroke, type 2 diabetes, and 40% of cancer could be prevented in the long run.[8]

Worldwide it has been established that School health programs can reduce the prevalence of health risk behaviors among adolescents [9] and so have a positive effect on academic performance.[10] Also schools provide an opportunity to address multiple risk behaviours and it is most effective and cost benefit approach the developing nations can adopt.[11]

By incorporating school health in the Health and Wellness section of the government of India's Ayushman Bharat programme, which aims to improve the preventive and promotive components through health promotion activities, the School Health Program has received a boost. At the school level, these initiatives will integrate and systematize health promotion, health education, disease prevention, and improved access to health care. Emerging social morbidities including injury, aggression, substance misuse, unsafe sexual activity, and psychological and emotional illnesses are receiving more attention.[12]

Though Government is making its efforts to strengthen adolescents through school health programme, almost 25% of girls and boys do not receive any of the four school-based services (mid-day meal, biannual health checks, biannual

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deworming, and weekly iron folic acid supplementation) and none met the necessary 60 minutes of outdoor sports and exercise per day as per UNICEF India report, 2019.[13] Closing these gaps is crucial to ensure healthful impact on their lifestyles throughout their lives. We aimed to know the effectiveness of school adoption by MBBS Interns in filling these gaps and performed a health education interventional study.

OBJECTIVE

To assess the effectiveness of school adoption by MBBS interns on health behaviors among the students of grade 8th.

METHODS

PARTICIPANTS AND PROCEDURE

The school adoption programme was conducted by Department of Community Medicine, Andhra Medical College during October 2022. A group of MBBS Interns were involved in the development of health education modules. One school out of the five Zilla Parishad high schools under the rural field practice area of the college was randomly (simple random sampling-lottery method) selected and all the students from grade 8th were included in the study. All participants were informed of the study purpose and gave oral informed consent. This study was approved by the Institutional Ethics Committee, Andhra Medical College and Permission was obtained from Head master of the school to conduct the study.

INTERVENTION

All the students of grade 8th received a 2-week class-based and junior doctors-led health education course, targeting health behaviors .The topics of the course (2-hour per session and a total of 4 sessions over a period of 2 weeks) included: (1) Balanced diet (2) physical activity (3) healthy sleep; (4) Road safety rules (5) First aid and wound cleaning (6) mental health and stress reduction strategies; and (7) Harmful effects of alcohol and tobacco (8)Personal hygiene (9)Sexual Health (10) Menstrual Hygiene. The course was delivered through multiple modes of health education which combined chalk and talk method, audio visuals, and demonstrations on knowledge, attitude, and practice of healthful behaviors. Attention and active participation of the students was reaffirmed after each session through the feedback.

MEASURES

The attitudes and practices of students towards health related behaviors were measured through a self-administered Pre tested semi-structured questionnaire based on the services provided and indicators mentioned in the National school health programme document (Operational_guidelines_on_School_Health_Programme_under_Ayushman_Bharat.pdf (nhm.gov.in) in the classroom twice: before the intervention and immediately following the intervention. The reliability of the instrument was checked with Cronbach's Alpha (0.832).

The questionnaire included students health-related behavior outcomes (such as (1) Dietary Patterns (2) physical activity (3) healthy sleep; (4) Road safety rules (5) First aid and wound cleaning (6) mental health and stress reduction strategies; and (7) Harmful effects of alcohol and tobacco (8) Personal hygiene (9)Sexual Health (10) Menstrual Hygiene).

Dietary pattern was assessed by the question: "1) How many times a week do you usually eat or drink? "Categories included Fruits, vegetables, Sweets, snacks, fast foods, samosa, pani poori, noodles etc., Cool drinks (coke, maaza, Fanta etc.), milk, Egg, Non veg. The responses of the participants who reported Never, Less than once a week, were coded under poor, Once a week, 2-4 days a week,5-6 days a week, were coded as good and every day. Every day, more than once were coded as satisfactory. The coding was negative for fast foods and cool drinks.

Physical activity was assessed by the 3 questions:

1. "How many days were you physically for at least 60 minutes a day in the last seven days?" The responses of the participants who reported physical activity (for at least 60 min) less than 3 days per week were coded 0 and less than 5 days were coded 1.

2. "How do you spend your free time usually? "The responses of the participants who reported, Playing video games, Chatting with friends. Browsing internet were coded 0, Watching television with family were coded 1, Playing outdoor as 2.

3. "How much time do you spend during a typical or usual day sitting and watching television, playing computer games, talking with friends, or doing other sitting activities? "The responses of the participants who reported >4 hours, 3-4 hours were coded 0, 1-2 hours as 1, <1 hour as 2.

Healthy sleep was assessed by the question "Typically, how many hours do you sleep per day? "The responses of the participants who reported <4 hours and >10 hours were coded as 0, 6-8 hours and 8-10 hours as 1, 4-6 hours as 2.

Attitude towards road safety rules was evaluated based on the response to the question "Which of the following rules should one follow for safety on roads? "The responses of the participants who checked only go slowly, observe traffic lights were coded 1, who also checked zebra crossing Wear helmet were coded as 2 and who ever checked all the options

including wear seat belt, Pedestrian lanes, don't use mobile while driving were coded as 3.

Practice of first aid and wound cleaning was evaluated by the response to the question.

"What do you do when you or your friend is injured?" The responses of the participants who opted only wash with water and apply turmeric were coded as 1, who also opted wash with soap were coded as 2 ,whoever opted all the options including apply dettol, apply tincture iodine were coded as 3.

Mental health and coping stress were assessed by the questions:

1. "How often have do you feel disturbed due to the comments from your peers, family?" The responses of the participants who reported always and Most of the time were coded as 0, who reported sometimes were coded as 1, and rarely as 2.

2. "What do you do if you feel disturbed or stressed?" The responses of the participants who reported Watch mobile were coded as 0, who reported Talk to friends or Play outdoor games were coded as 1, and Talk to parents as 2Attitude towards alcohol and tobacco were assessed by the question "Do you think having alcohol & tobacco is right? "The responses of the participants who opted after becoming adults / parties with friends / When stressed were coded as 0, who opted in family functions were coded as 1 and never as 2.

Healthful hygienic practices were assessed by the question:

What do you to keep yourself healthy? The responses of the participants who opted maintaining self-hygiene like keep myself clean and washing hands were coded as 1, who also op0ted maintaining self-hygiene and maintaining clean surroundings like keep my house clean and keeping toilets clean were coded as 2 and whoever opted all the options including closed drainage/mosquito control and maintaining sexual hygiene were coded as 3.

Menstrual practices of girl students was assessed by the question

How many sanitary napkins do you change /day during menstrual cycle? The responses of the Participants who reported using 1 pad / day were coded as 0, 2 pads /day were coded as 1 and 3 or >3 were coded as 2.

Zero (0) is taken as poor practices /attitudes , one (1) as good and two (2) as satisfactory in all the questions except attitude towards road safety rules , practice of first aid and wound cleaning , healthful hygiene practices where one (1) is taken as poor practices /attitudes , two (2) as good and three (3) as satisfactory .

STATISTICAL ANALYSIS

Descriptive statistics were reported as mean (SD) for continuous variables like (age and body mass index (BMI) and Hemoglobin % (Hb %) and frequency (percentage) for categorical variables. mc nemar test were used to see the association between pre and post-test variables. These data were entered and analyzed using SPSS software (SPSS 21.0 Version).

RESULTS

A total of 80 students aged 13 (SD: 0.00) years completed the study, Demographic characteristics of participants was shown in Table 1.

Table 1. Characteristics of study participants

Demographic characteristics	Male	Female
Age	13± 0.0	13 ± 0.0
Gender	43 (53.7%)	37 (46.2%)
BMI	17.9±4.2	18.5±3.6

27.5% of girls and 35% of boys were underweight according to WHO-Asian BMI Classification changed to 2007-WHO Reference BMI-for age BOYS and Girls.Table 2.

Table 2. Distribution of study population according to 2007 - WHO Reference BMI-for age BOYS and Girls

Gender	AGE	Severe Thinness	Thinness	Normal	Overweight	Obese
BOYS (43)	13	4 9.3%	5 11.6%	26 60.4%	4 9.3%	4 9.3%
GIRLS (37)	13	1 2.7%	2 5.4%	26 70.2%	6 16.2%	2 5.4%

Table 3. Distribution of study population according to WHO classification of anemia for children 12-14 yrs. of age

	No anemia	Mild anemia	Moderate anemia	Severe anemia	Total
Female	2 (2.5%)	4 (5%)	30 (37.5%)	1 (1.25%)	37
Male	2 (2.5%)	6 (7.5%)	31 (38.75%)	4 (1.25%)	43
Total	4 (5%)	10 (12.5%)	61 (76.25%)	5 (6.25%)	80

Mean Hb% for boys was 9.84 + 1.2 and girls was 9.84+1.6 37% girls. 38.75% boys and 37.5% girls were moderately anemic according to the WHO Anemia severity categories for children aged 12-14yrs in Table 4.

Findings of the clinical examination of students and the remarks were shown in Table 5 around 75% were normal.

Table 4. Clinical examination findings

Skin & scalp	Eyes ,ears and nose	Mouth , neck and throat
75% normal	76% normal	77% normal
14% dandruff	14% excessive ear wax	17% decay tooth
3% pediculosis	3% refractory errors	2% dental caries
2% scabies	1% bitot spots	3% tonsillitis
1% skin allergy	1% eye squint	

Table 5 .Attitudes and practices of students towards health behaviours of pre and post intervention

Outcome variable	Practices	Pre intervention	Post intervention	Positive shift	p-value
Fruit consumption pattern	Poor	27	6	(0-1) 77.8%	0.000
	Good	23	43	(1-2) 4.3%	<0.001
	Satisfactory	30	31		
Vegetable consumption pattern	Poor	0	0	(0-1)47.1%, (0-2)52.9%	0.004
	Good	17	8	(1-2)100%	
	Satisfactory	63	72		
Fast foods and junk food consumption pattern	Poor	13	0	(0-1) 100%	a*
	Good	35	20	(1-2) 80%	
	Satisfactory	32	60		
Soft drink consumption pattern	Poor	13	0	(0-1) 100%	a*
	Good	45	18	(1-2) 88.9%	
	Satisfactory	22	62		
Milk consumption pattern	Poor	17	7	(0-1) 58.8%	0.002
	Good	10	18	(1-2) 20%	
	Satisfactory	53	55		
Egg consumption pattern	Poor	6	2	(0-1) 66.7%	0.001
	Good	31	25	(1-2) 32.3%	
	Satisfactory	43	53		
Non- veg consumption pattern	Poor	10	6	(0-1) 40%	0.007
	Good	23	21	(1-2) 26.1%	
	Satisfactory	47	53		
Physical activity	Poor	22	12	(0-1) 45.5%	<0.001
	Good	26	26	(1-2) 38.5%	
	Satisfactory	32	42		
Activities in free time	Poor	23	9	(0-1) 60.9%	<0.001
	Good	39	30	(1-2) 59.0%	
	Satisfactory	18	41		
Time spent sitting idle	Poor	14	3	(0-1) 78.6%	<0.001
	Good	31	28	(1-2) 45.2%	
	Satisfactory	35	49		
Hours of sleep	Poor	29	13	(01)44.8%, (02)10.3%	<0.001
	Good	13	15	(1-2) 84.6%	
	Satisfactory	38	52		
Practice of road safety rules	Poor	38	10	(1-2)34.2%, (13)39.5%	<0.001
	Good	41	13	(2-3) 100%	
	Satisfactory	1	57		
Practice of first aid	Poor	42	16	(1-2)16.7%, (1-3)45.2%	<0.001
	Good	4	7	(2-3) 100%	
	Satisfactory	34	57		
Mental health (depressed/stressed)	Poor	19	9	(0-1) 47.4%	<0.001
	Good	41	40	(1-2) 26.8%	
	Satisfactory	20	31		
Methods adopted to cope stress	Poor	13	5	(0-1) 61.5%	<0.001
	Good	48	33	(1-2) 47.9%	
	Satisfactory	19	42		
Attitude towards alcohol & tobacco	Poor	8	0	(0-1)62.5%, (0-2)37.5%	a*
	Good	1	5	(1-2)100%	
	Satisfactory	71	75		
Healthful hygienic practices	Poor	34	7	(1-2)50.0%, (1-3)29.4%	<0.001
	Good	42	23	(2-3) 85.7%	
	Satisfactory	4	50		
Menstrual hygiene (optional for girls)	Poor	0	0		b*
	Good	0	0		
	Satisfactory	29	29		

*Mcnemer test was used to find the significance between the outcome variable pre and post intervention

a* Mcnemer test couldn't be performed as it can be Computed only for a PxP tabl

b* no difference in the outcome variable of pre and post intervention.

Attitudes and practices of students towards health behaviours of pre and post intervention after intervention significant changes were observed in dietary intake patterns of fruits 77.8% shifted from poor to good practices, vegetable 47.1% shifted from poor to good practices, milk 58.8% increased their intake, egg 66.7% started including in regular diet and non-vegetarian foods, also 100% participants in fast foods and soft drinks categories have shifted their practices from poor to good and over 80% shifted their practices from good to satisfactory. 45% participants with poor practices of physical activity shifted to good and 38.5% with good practices upgraded to satisfactory, more than half of the participants with poor practices showed significant improvement towards good practices in the free time activities, also time spend sitting idle was decreased and healthy sleeping habits were adopted. Attitudes of students towards road safety rules and approaches to first aid and wound cleaning were significantly improved. Significant change in observed in participants approach towards handling mental health issues 61.5% with poor practices shifted towards good practice and 47.9% upgraded their practices from good to satisfactory. Attitudes, practices and approaches of the participants towards hygiene were significantly improved 50% from the poor practices adopted good practices and 85.9% with good practices upgraded to satisfactory approaches. All the girls in our study were using >2 sanitary napkins per day during their menstrual cycles.

REPORTING AND INTERVENTION PLANNING

All the results regarding the physical examination, nutritional status and clinical examination were discussed with Head Master, chief medical officer of the attached rural health centre, District coordinator of hospital services, Health visitor, ANM and ASHA workers and the children were treated.

A leader by name chinnari doctor was allotted for a group of every 10 students. Chinnari doctors were allotted with the responsibilities to examine the lunch boxes and maintain health diaries of their group which they would be reporting to the junior doctors during every visit.

PERSPECTIVES OF INTERNS

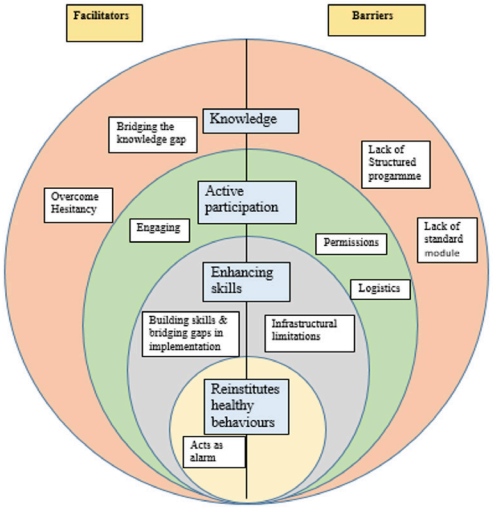

Figure 1: Perspectives of Interns

After the completion of the programme, a Focus Group Discussion (FGD) was conducted at Department of Community Medicine with 10 interns to know their reflections. After general introductions, icebreaking was done to make the participants comfortable. The key points of the FGD were being documented by a pre-identified note-taker. After seeking consent, audio recording was done. Debriefing was done at the end of the FGD. Any points that were missed were added. Thematic analysis was done for the FGD using descriptive analysis following an inductive and deductive approach. Data was analyzed by maintaining an "etic" perspective, familiarization was established by listening to the audiotapes and then transcribed by anonymizing sensitive data. Initial coding was done by the principal investigator and then was jointly coded by all the three investigators who were previously identified and had been trained in qualitative research. The codes were then grouped into subcategories and organized at a broader conceptual level into the following themes. 1) Knowledge 2) Active Participation 3) Enhancing skills 4) Reaffirming forgotten behaviours.

Facilitators:

Knowledge

The participants felt this kind of programme gives them an opportunity to bridge the knowledge gaps and overcoming the hesitancies in delivering health education

"An intern is more qualified to deliver health education" (intern 5)

"We are trained to speak silenced topics" (intern 8)

Active participation

Participants felt it gives an opportunity for active participation of both students and junior doctors. An intern said

"These activities are more engaging to both us and the students "(intern 3)

Enhancing skills

The participants felt it builds their skills and awareness of the ground level realities in implementation of National health programmes also acts as a bridge to interact with the families and fill service delivery gaps through students.

"Builds the skills on attitudes, ethics & communications" (intern 1)

"Gives an opportunity to gain knowledge on the ground level implementation of national health programmes" (intern 9)

"Gives an opportunity to influence families through students "(intern 4)

"Not all students comes to hospitals and get treated, we can bridge the gap" (intern 5)

"An opportunity to get exposure to working with the community. (Intern 2)

Reaffirming forgotten behaviours

The participants felt it reinstitutes their healthy behviours which were forgotten during their transition into the hectic life styles.

"We have almost forgotten the lessons we learnt, it givens an opportunity to correct our behaviours too" (intern 10)

Barriers:

Knowledge

Participants felt though they were knowledge they need structured programme and standardization of modules

"We don't have a standardized programme so building a module has been a little tough" intern 3

Active participation

To ensure active participation of students and them by themselves they need to have certain Permissions & logistics

"Schedules of schools has to be pre matched and it would have been easy if we have an teacher in this group" intern 9

Enhancing skills

To conduct meeting and to engage parents and community administrators' schools should have the facilities of meeting halls and proper Infrastructure

"There isn't a sufficient hall to conduct the classes." Intern 1

The schools don't have a seminar hall to project videos & presentations" intern 7

DISCUSSION

This study investigated the current health status of the students and effectiveness of a health education intervention on student's attitudes and practices towards health related behaviors. In this study, 70.2% of girls and 60.4% boys were normal due to ongoing DBT Scheme called "AMMA VODI" in Andhra Pradesh which mandates the school attendance of the students which in turn makes them benefited from all the school health services, This is in contrast to the report by UNICEF INDIA which states that 50% of Indian adolescents (10-19) were malnourished.[14]

In this study 2.5% of girls and boys were with no anemia and majority of both girls and boys were under the category of moderate anemia (over 40%). The report by UNICEF INDIA which stated In India, 40 per cent of girls and 18 per cent of boys (aged 10-19) are anemic. The increased prevalence of anemia among boys may be attributed to their during the times of COVID 19 pandemic and shortage of drugs.[15]

After the 2-week health education intervention, participants showed favorable changes and significant positive shift in the attitudes and practices towards healthy behaviors.

In this study, after intervention significant changes were observed in dietary intake patterns of fruits, vegetable, milk, egg and non-vegetarian foods, also 100% participants in fast foods and soft drinks categories have shifted their practices from poor to good and over 80% shifted their practices from good to satisfactory. This findings are similar to the findings of studies done by T.Vijayapushpam et[16,17] except they couldn't find significant improvement in milk consumption pattern and a systematic review by Wang D et al supports that school based nutrition programmes and health promotion through school could bring significant changes in the dietary patterns of adolescents.[18]

In this study, after the intervention, 45% participants with poor practices of physical activity shifted to good and 38.5% with good practices shifted to satisfactory, more than half of the participants with poor practices showed significant improvement towards good practices in the free time activities, also time spend sitting idle was decreased and healthy sleeping habits were adopted. Physical activity interventions in the school setting. These findings were supported by a systematic review by Demetrio Y et al.[19]

In this study, post intervention attitudes of students towards road safety rules were significantly improved. There isn't much literature on the success of road safety education programmes but if the attitudes of the students could be changed now, it would bring out more responsible drivers when they were licensed. More studies are need to explore the benefits of road safety education at schools.

In this study, following the intervention participants showed a significant change in approaches to first aid and wound cleaning with is similar to the study conducted by Mehreen et al.[20]

In this study, following the intervention participants showed a significant change in handling mental health issues 61.5% with poor practices shifted towards good practice and 47.9% upgraded their practices from good to satisfactory which were supported by the findings of systematic review by Ma KK et al which states school-based interventions effectively improve mental health literacy and reduce mental health stigma.[21]

In this study post intervention the attitudes of the participants towards harmful effects of alcohol and tobacco showed a significantly improved similar to the study by Radhakrishnan Jayakrishnan et al.[22]

In this study post intervention the attitudes, practices and approaches towards of the participants towards hygiene were significantly improved 50% from the poor practices adopted good practices and 85.9% with good practices upgraded to satisfactory approaches which were similar to the findings of the study by Shrestha A et al.[23]

According to UNICEF – India At least 42 per cent of girls in India use cloth rather than disposable sanitary napkins.[24] In contrast, all the girls in our study were using >2 sanitary napkins per day during their menstrual cycles. These hygiene practices can be attributed to the free sanitary napkin distribution programme at schools by Gov. of India.[25]

Therefore, this study provides evidence that a junior doctors led class-based health behaviors intervention may render an effective change on students in their early adolescence and the school health approach renders an opportunity for bringing long lasting changes in the attitudes and practices of students towards health promoting behaviors.

The findings of the focus group discussion with interns similar to the perspectives of CDC's perspective of health promotion through schools.[26] Though, there are several challenges regarding the exposure to get familiarized with the government national programme at ground level, lack of

standardized modules, structured programme, logistics and infrastructural limitations. These findings were similar to the study by Abdul Kadir et al.[27]

LIMITATIONS

It's important to acknowledge some of this study's limitations. First, this study was only conducted for a brief period of time. Future research with a longer intervention assessment is warranted. Second, this study wasn't conducted using a made standardized questionnaire. Finally, students were recruited from only one school hence it's not possible to generalize our study findings.

CONCLUSION

Our study found that the MBBS Interns' school adoption intervention effectively enhances students' commitment to healthy behaviours by reinforcing the objectives of school health programme.

More such studies are needed as there is huge lacuna in the availability of standardized questionnaires and programme structures to effectively involve interns in school health interventions.

There is a need for committed teams including teachers, parents and teachers and student representatives for the students of each grade in the schools to bring the holistic changes in student's behaviours.

CONFLICTS OF INTEREST

There are no conflicts of interest in this study.

REFERENCES

1. World Health Organization (WHO) [Internet]. Adolescent health; [cited 2022 Nov 22]. Available from: https://www.who.int/health-topics/adolescent-health

2. Berenbaum SA, Beltz AM, Corley R. The Importance of Puberty for Adolescent Development [Internet]. Advances in Child Development and Behavior. Elsevier; 2015. p. 53–92. Available from: http://dx.doi.org/10.1016/bs.acdb.2014.11.002

3. Farley JP, Kim-Spoon J. The development of adolescent self-regulation: Reviewing the role of parent, peer, friend, and romantic relationships [Internet]. Journal of Adolescence. Wiley; 2014. p. 433–440. Available from: http://dx.doi.org/10.1016/j.adolescence.2014.03.009

4. McPherson KE, Kerr S, Morgan A, McGee E, Cheater FM, McLean J, Egan J. The association between family and community social capital and health risk behaviours in young people: an integrative review [Internet]. BMC Public Health. Springer Science and Business Media LLC; 2013. Available from: http://dx.doi.org/10.1186/1471-2458-13-971

5. Rosario M, Corliss HL, Everett BG, Reisner SL, Austin SB, Buchting FO, Birkett M. Sexual Orientation Disparities in Cancer-Related Risk Behaviors of Tobacco, Alcohol, Sexual Behaviors, and Diet and Physical Activity: Pooled Youth Risk Behavior Surveys. American Journal of Public Health [Internet]. 2014 Feb [cited 2022 Nov 22];104(2):245-54. Available from: https://doi.org/10.2105/ajph.2013.301506

6. Collins J, Robin L, Wooley S, Fenley D, Hunt P, Taylor J, Haber D, Kolbe L. Programs-That-Work: CDC's Guide to Effective Programs That Reduce Health-Risk Behavior of Youth [Internet]. Journal of School Health. Wiley; 2002. p. 93–99. Available from: http://dx.doi.org/10.1111/j.1746-1561.2002.tb06523.x

7. Underwood JM, Brener N, Thornton J, Harris WA, Bryan LN, Shanklin SL, Deputy N, Roberts AM, Queen B, Chyen D, Whittle L, Lim C, Yamakawa Y, Leon-Nguyen M, Kilmer G, Smith-Grant J, Demissie Z, Jones SE, Clayton H, Dittus P. Overview and Methods for the Youth Risk Behavior Surveillance System — United States, 2019 [Internet]. MMWR Supplements. Centers for Disease Control MMWR Office; 2020. p. 1–10. Available from: http://dx.doi.org/10.15585/mmwr.su6901a1

8. Non communicable diseases [Internet]. World Health Organization. World Health Organization; [cited 2022 Nov 22]. Available from: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

9.Health Education in Schools [Internet]. Centers for Disease Control and Prevention. Centers for Disease Control and Prevention; 2021 [cited 2022 Nov 22]. Available from: https://www.cdc.gov/healthyyouth/health-education/index.htm

10. Hayek J, de Vries H, Tueni M, Lahoud N, Winkens B, Schneider F. Increased Adherence to the Mediterranean Diet and Higher Efficacy Beliefs Are Associated with Better Academic Achievement: A Longitudinal Study of High School Adolescents in Lebanon [Internet]. International Journal of Environmental Research and Public Health. MDPI AG; 2021. p. 6928. Available from: http://dx.doi.org/10.3390/

ijerph18136928

11. Home: National Health Mission [Internet]. » NHM Components » RMNCH+A» Adolescent Health » School Health & Wellness Programme:: National Health Mission; [cited 2022 Nov 22]. Available from: https://nhm.gov.in/index1.php?lang=1&level=3&sublinkid=1021&lid=391

12. Research to improve implementation and effectiveness of school health programmes [Internet]. World Health Organization. World Health Organization; 1996 [cited 2022 Nov 22]. Available from: https://apps.who.int/iris/handle/10665/63366

13. Adolescents, diets and nutrition [Internet]. UNICEF India. 2019 [cited 2022 Nov 22]. Available from: https://www.unicef.org/india/reports/adolescents-diets-and-nutrition

14. UNICEF [Internet]. Adolescents, diets and nutrition; 2019 Feb [cited 2022 Nov 22]. Available from: https://www.unicef.org/india/reports/adolescents-diets-and-nutrition

15. UNICEF [Internet]. Adolescent nutrition; [cited 2022 Nov 22]. Available from: https://www.unicef.org/india/what-we-do/adolescent-nutrition

16. Vijayapushpam T, Antony GM, Subba Rao G, Raghunatha Rao D. Nutrition and health education intervention for student volunteers: topic-wise assessment of impact using a non-parametric test. Public Health Nutrition [Internet]. 2009 Jun 23 [cited 2022 Nov 22];13(1):131-6. Available from: https://doi.org/10.1017/s1368980009990255

17. A qualitative assessment of nutrition knowledge levels and dietary intake of schoolchildren in Hyderabad
Authors:T. Vijayapushpam, Krishna Kumari Menon, D. Raghunatha Rao, Grace Maria AntonyJournal:Public Health NutritionVolume:6Issue:7Year:2003Pages:683—688http://dx.doi.org/10.1079/phn2003478

18. Wang D, Stewart D. The implementation and effectiveness of school-based nutrition promotion programmes using a health-promoting schools approach: a systematic review [Internet]. Public Health Nutrition. Cambridge University Press (CUP); 2012. p. 1082–1100. Available from: http://dx.doi.org/10.1017/s1368980012003497

19. Demetriou Y, Höner O. Physical activity interventions in the school setting: A systematic review. Psychology of Sport and Exercise [Internet]. 2012 Mar [cited 2022 Nov 22];13(2):186-96. Available from: https://doi.org/10.1016/j.psychsport.2011.11.006

20. Mehreen S, Mathur A, Jat J, Pathak A. Effectiveness of an Educational School-Based Intervention on Knowledge of Unintentional Injury Prevention and First Aid Among Students in Ujjain, India. Indian Pediatrics [Internet]. 2021 Jun [cited 2022 Nov 22];58(6):532-6. Available from: https://doi.org/10.1007/s13312-021-2235-1

21. Ma KK, Anderson JK, Burn A. Review: School-based interventions to improve mental health literacy and reduce mental health stigma – a systematic review. Child and Adolescent Mental Health [Internet]. 2022 Jan 10 [cited 2022 Nov 22]. Available from: https://doi.org/10.1111/camh.12543

22. Jayakrishnan R, Kumara Pillai Mohanan Nair JK, Seema G, Thomas G, Sebastian P. Effectiveness of School based Awareness Programmes against Tobacco among Users and Non- Users– A Cross- Sectional Study from Rural Kerala, India. Asian Pacific Journal of Cancer Prevention [Internet]. 2019 Jul 1 [cited 2022 Nov 22];20(7):2027-32. Available from: https://doi.org/10.31557/apjcp.2019.20.7.2027

23. Shrestha A, Angolkar M. Impact of Health Education on the Knowledge and Practice Regarding Personal Hygiene among Primary School Children in Urban Area of Karnataka, India. IOSR Journal of Dental and Medical Sciences [Internet]. 2014 [cited 2022 Nov 22];13(4):86-9. Available from: https://doi.org/10.9790/0853-13478689

24. UNICEF [Internet]. Adolescent development and participation; [cited 2022 Nov 22]. Available from: https://www.unicef.org/india/what-we-do/adolescent-development-participation

25. Home : National Health Mission [Internet]. Menstrual Hygiene Scheme(MHS) :: National Health Mission; [cited 2022 Nov 22]. Available from: https://nhm.gov.in/index1.php?lang=1&level=3&sublinkid=1021&lid=391

26. Centers for Disease Control and Prevention [Internet]. Health Education in Schools | Adolescent and School Health | CDC; [cited 2022 Nov 22]. Available from: https://www.cdc.gov/healthyyouth/health-education/index.ht

27. Abdul Kadir N, Schütze H. Medical educators' perspectives on the barriers and enablers of teaching public health in the undergraduate medical schools: a systematic review. Global Health Action [Internet]. 2022 Sep 5 [cited 2022 Nov 22];15(1). Available from: https://doi.org/10.1080/16549716.2022.2106052

ORIGINAL ARTICLE - PUBLIC HEALTH

A CROSS SECTIONAL STUDY ON CHRONIC KIDNEY DISEASE AMONG POPULATION OF 18 YEARS AND ABOVE IN ALAGAPURI MUKKULAM, VIRUDHUNAGAR

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Abstract

BACKGROUND: There were increased numbers of Chronic Kidney Disease (CKD) patients identified in and around Alagapuri Mukkulam field area, Virudhunagar District, TamilNadu. This study is to identify the prevalence of CKD and CKDu (CKD of unknown etiology) and its association with different risk factors in this area.

OBJECTIVE : To estimate the prevalence of Chronic Kidney Disease (CKD) among population 18 years and above.
1. To estimate the prevalence of possible cases of CKDu (CKD of unknown etiology) among the study population.
2. To determine the factors associated with CKD among our study population

METHODS : Observational/cross sectional study. Using Cluster Random sampling 339 subjects (>18 years) were selected. History, Demographic, Anthropometric data, Urine blood/protein, Serum Creatinine, blood glucose were measured. eGFR was measured using CKD-EPI formula. Subjects with suspected CKD were reviewed after 3 months to confirm the diagnosis.

RESULTS : The mean eGFR in this study was 98.5 ml/min/1.73 m2. 18% (61) had decreased eGFR (<60 ml/min/1.73 m2) alone. The prevalence of subjects with decreased eGFR and urine proteinuria/hematuria was 20.3% (69) with mean eGFR of 40.1 ml/min/1.73 m2. Risk factors like hypertension and outdoor occupation (dehydration) only showed significant association. The CKDu prevalence was 10.9% (37) which was 53.7% of total CKD. These show there are other unknown risk factors yet to be identified.

CONCLUSIONS : The prevalence of CKD and CKDu in A.Mukkulam rural area is higher than other CKD prevalence studies. Thus there is a compelling need to create CKD database, to identify CKD 'hotspots' by active screening and do analytical/ experimental studies to identify unknown risk factors of CKD. This will pave way for devising strategies for its primordial and primary prevention.

KEYWORDS : chronic kidney disease, chronic kidney disease of unknown etiology, chronic kidney disease epidemiology collaboration equation 2021(CKD-EPI)

INTRODUCTION

Non communicable diseases (NCDs) are the most common causes of morbidity, premature death and have a major impact on our health-care costs, productivity, and growth. Cardiovascular disease, cancer, diabetes, and chronic respiratory diseases are the major four NCDS that has been prioritized in the Global NCD Action Plan endorsed by the World Health Assembly (2013). Chronic kidney disease (CKD) is a key determinant of the poor health outcomes of Major NCDs.[1]

In 2017 the global prevalence of CKD was 9.1% (697.5 million cases). The age-standardized global prevalence of CKD was higher in women and girls (9.5%) than in men and boys (7.3%). Nearly one-third of all cases of CKD were in China (132.3 million) and India (115.1 million).[2]

Unfortunately, In India there are inadequate longitudinal studies and data on CKD prevalence.[3] A recent study in rural Pondicherry showed the prevalence of CKD to be 28.5%.[4] Another study in Andhra Pradesh showed prevalence rate of 32.2%.[5]

In recent times chronic kidney disease of unknown etiology (CKDu) has been in rise and is more prevalent in rural pockets of developing countries. CKDu has been reported from Nicaragua, El Salvador, Costa Rica, Sri Lanka, India, Egypt, and Tunisia.[6] In the clinical context, a patient is labelled as CKDu after excluding all the known causes of CKD.[7-8] In India, CKDu was first reported from Uddanam region of Andhra Pradesh state in 2018.[9]

The main causes for CKD worldwide are diabetes mellitus, hypertension, obesity, advancing age and behavioural risk factors. Well recognized heavy metals which are risk factors for CKD are lead, mercury, arsenic, cadmium, uranium. Non steroidal anti-inflammatory drugs (NSAIDs) are also an important risk factor of CKD. Other rare causes include heat stroke in mine workers and repeated episodes of rhambomyolysis[4, 8] and heavy metal exposure by

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consumption of ayurvedic medications.[10]

CKD is associated with eight to ten fold increased cardiovascular mortality,[10, 11] in 35.8 million disability-adjusted life years (DALYs).[12] In 2017, CKD resulted in 1.2 million deaths and was the 12th leading cause of death worldwide.[12] The absence of kidney registries in most of the low- and middle-income countries had made it difficult to understand the true burden of CKD especially in our country. Community surveys showed that the number of people with end-stage kidney disease was only tip of the CKD iceberg.[11] Limited financial resources, lack of infrastructure and inadequate manpower are putting severe strain on existing health policies with respect to increasing burden of CKD.[13]

Considering cost of renal replacement and magnitude of the problem it appears that the best way forward for our country would be to adopt the strategy for prevention.[4] So, it is of utmost need to find the true prevalence of CKD and CKDu.

This study was done in Alagapuri Mukkulam Primary health centre (PHC) field area where the major occupation of the people was agriculture and strenuous manual labour. There were increased number of CKD patients identified in outpatient basis in A.Mukkulam PHC during routine screening for Non Communicable Diseases .Also there were increased number of CKD cases referred to nearby tertiary care centres .But there were no previous studies regarding CKD in this area. This gave us the need for this cross sectional study to identify its prevalence in this area.

OPERATIONAL DEFINITION OF CKD

According to recent guidelines of KDIGO, CKD is defined as abnormalities in kidney function and or structure, present for more than 3 months with implication on health, with[7] Duration more than 3 months: In order to differentiate CKD from AKI, which have different etiologies and require different interventions;[7] Decreased GFR: Threshold of GFR less than 60 ml/min/1.73 m2 (GFR categories G3a-G5) to indicate CKD.[7] Kidney damage: Structural /Functional kidney damage which can be identified by proteinuria, albuminuria, urine sediment abnormalities, imaging studies and renal biopsy.[7]

OPERATIONAL DEFINITION OF CKDu

The case definition for chronic kidney disease of uncertain etiology (CKDu) was published in Indian journal of nephrology in 2020.[9] Suspected case of CKDu was defined as eGFR less than 60 mL/min/1.73 m2 by CKD-EPI formula and/or positive urine protein/blood by dipstick excluding those with history of diabetes mellitus and /or self-reported history of renal disease of known etiology such as polycystic kidney disease, renal stones, history suggestive of chronic glomerulonephritis, and congenital kidney disease. Possible case was defined as those satisfying criteria for suspected cases with persistently low eGFR for more than 3 months. Definite cases was defined as those possible cases without blood pressure more than 140/90 mm of Hg in stage 1, 2 CKD and BP >160/100 mm of Hg in stage 3, 4, 5 CKD and/ or patient requiring two or more types of antihypertensive medications for BP control and/or CKD documented by ultrasound examination/tests to be suggestive of renal disease of known cause and/ or Kidney biopsy suggestive of chronic tubule-interstitial nephritis with absence of immune deposits.[9]

SUBJECTS AND METHODS

This was a Cross- sectional study. Cluster random sampling method was used. The study was done in A. Mukkulam PHC field area. It comprised of 42 villages. It is a part of rural Virudhunagar. Total population in this field area was 18,182, of which 18 plus population was 12,005. The villages were grouped into 5 Health Sub Centres. Each village represented a cluster. 12 clusters were randomly selected. From each cluster 30 samples were randomly selected from the Family health records maintained in the Health sub centers. Total sample size was 360.

A Five, 4-member teams were organized comprising of Male health care workers, Female health care workers and Lab technician. Patients with acute severe illness and psychiatric patients were excluded. Ethical clearance for conducting the study was obtained from Institutional Ethics Committee, Directorate of Public Health and Preventive Medicine, Chennai.

Informed consent was obtained for data collection and blood/urine samples collection. Interview questionnaire was used for data collection which consisted of patient's demographic details, medical information, family history, personal and behavioural history, and anthropometric measurements. This was prepared from the reference questioner used in Tamil Nadu CKD prevalence study of 2022. All members involved were trained of their roles before starting the data collection.

Blood samples were collected and transported to Tamil Nadu Public Health Laboratory through proper cold chain. Creatinine, eGFR was calculated using CKD-EPI Creatinine Equation 2021. This formula was recommended by The National Kidney Foundation (2021) to estimate GFR.[9, 14]

Urine and blood proteins were checked with dip stick. Those who had positive findings in urine dipstick with eGFR less than 65 ml/min/1.73 m2 were evaluated again after 3 months.

SAMPLE CALCULATION

The overall pooled prevalence of Chronic Kidney Disease among Indian adult is 10.2 %.[15] The prevalence value p will be 10.2 % for calculation of sample size.

$$n = \frac{z^2 p(1-p)}{d^2} \times \text{deff}$$

Z = 1.96 (statistical significant constant for 95% CI);
p =10.2 %; d = 5% absolute precision;
Confidence level – 95%; Design effect – 2
Sample size is calculated to be 279
Adding 20% non-response rate
n = 335 (minimum sample size)
Accordingly, sample size was 360.

Analysis done using SPSS version 16. All Continuous variables expressed as Mean and Standard Deviation; Categorical variables expressed as Percentages and Proportions. Chi square test with Yates correction and Fisher's exact test was used to find association between two qualitative variables. The test considered Significant if P<0.05, at 95% Confidence Interval.

RESULTS

1. DEMOGRAPHIC CHARACTERISTICS

Data was collected from 339 patients. Population distribution among different age groups and gender are given in Table 1. Majority were married; farmers/labourers (62.2%) by occupation; Hindus by religion. Most of them belonged to Upper lower socioeconomic class [16] with education upto primary school. 84.4% (287) were using Panchayat/bore water for drinking purposes. 36(10.6%) were tobacco users and 64 (18.8%) had history of alcohol consumption.

2. CHARACTERISTICS OF CO MORBIDITIES / MEDICAL INFORMATION

Table 2 shows prevalence of Diabetes and Hypertension among different age groups and gender. Prevalence of Diabetes was 15.3% (52) and that of Hypertension was 33.6% (114). 21.2% (72) had high normal Blood Pressure, 15.6 % (53) stage I hypertension and 5.3% (18) had stage II hypertension according to recent guidelines of hypertension classification.[17]

History suggestive of prior kidney involvement like hematuria/proteinuria, edema/ facial puffiness, UTI, and renal stones were found in 75 (22.1%) patients. The prevalence of obesity / overweight in our study was 21.8% similar to latest ICMR-India B3 report of Tamilnadu.[18]

Table 1: Demographic Characteristics (N=339)

Variable	Category	Participants (n=339)	Percentage (%)
Age	18 – 29	75	22.1
	30 – 44	94	27.7
	45 – 59	78	23
	>60(n=91)	92	27.2
Gender	Male	157	46.3
	Female	182	53.7
Marital status	Unmarried	52	15.3
	Married	284	83.8
	Widow/widower	3	0.9
Outdoor occupation	Yes	106	31.3
	no	233	68.7
Religion	Hindus	338	99.7
	Muslim	1	0.3
Source of drinking water	Bore well	10	2.9
	Municipal /Panchayat water	287	84.7
	Can water	42	12.4
Socioeconomic status	Upper middle	14	4.1
	Middle	68	20.1
	Upper lower	244	72
	Lower	13	3.8

Table 2: Diabetes and Hypertension among Agegroup and Gender (N=339)

	Diabetes		Hypertension	
	Present (n=52; 15.3%%)	Absent(n=287)	Present (n=114; 33.6%)	Absent(n=225)
Males(n=157)	25(15.9%)	132(84.1%)	58(36.9%)	99(63.1%)
Females(n=182)	27(14.8%)	155(85.2%)	56(30.8%)	126(69.2%)
Age group(years)				
18-29(N=75)	2(2.7%)	73(97.3%)	13(17.3%)	62(82.7%)
30-44(N=87)	12(12.8%)	82(87.2%)	23(24.5%)	71(75.5%)
45-59(N=78)	16(20.5%)	62(79.5%)	31(39.7%)	47(60.3%)
>60(N=91)	22(23.9%)	70(76.1%)	47(51.1%)	45(48.9%)

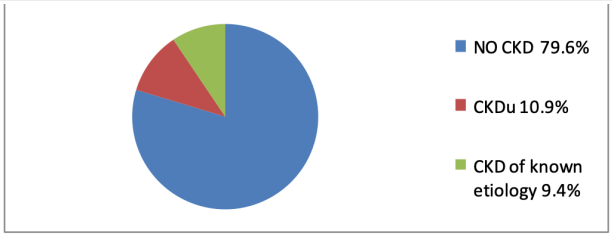

Figure 1: CKD Prevalence

The mean eGFR in my study was 98.5 ml/min/1.73 m2. Figure 1 depicts the prevalence of CKD which was 20.3% (69) with mean eGFR of 40.1 ml/min/1.73 m2. CKD patients with

Table 3: Proteinuria /Hematuria and CKD stage wise Prevalence of CKD of known Etilogy And CKDu (N=69)

CKD STAGE	eGFR (ml/min)	CKDu (N=37)N, %	CKD of known etiology (N=32) N, %	Total CKD(N=69) N, %
1	>90 (N=7)	3(8.1%)	4(12.5%)	7(10.1%)
2	60 – 89 (N=2)	0	2(6.2%)	2(2.9%)
3A	45 – 59 (N=20)	16(43.2%)	4(12.5%)	20(29%)
3B	30 – 44 (N=14)	8(21.6%)	6(18.8%)	14(20%)
4	15 – 29 (N=18)	8(21.6%)	10(31.2%)	18(26%)
5	<15 (N=8)	2(5.5%)	6(18.8%)	8(12%)
Proteinuria/Hematuria		8(21.6%)	13(40.6%)	21(30.4%)

CKD – Chronic Kidney Disease

Table 4: Association of CKD with Socio-Demogrraphic details (Ses) N=339

Age (years)	CKD (n=69) n (%)	Non CKD (n=270) n (%)	P and chi square value
18 – 44 (n=169)	6(3.5%)	163(96.5%)	68.882 P = .000*
45 – 59 (n=78)	21(27%)	57(73%)	
>60 (n=92)	42(45.7%)	50(54.3%)	
Gender			
Male (n=157)	35(22.2%)	122(77.8%)	.678 P=.410
Females (n= 182)	34(18.7%)	148(81.3%)	
SEC			
Upper middle (n=14)	0	14(100%)	FET- 6.803 P=0.066
Middle (n=68)	10(14.8%)	58(85.2%)	
Upper lower (n=244)	55(22.6%)	189(77.4%)	
Lower (n=13)	4(30.7%)	9 (69.3%)	
Marital status (married n=284)	64(22.5%)	220(7.5%)	11.626 *p=.003
Outdoor occupation (n=233)	56(24%)	177(76%)	6.226 *P=.013

*- significant p value; CKD – chronic kidney disease; SEC- Socio economic class; FET - Fisher's exact test.

proteinuria/ hematuria was 30.4% (21) among whom 11.5% (8) had preserved eGFR (>60 ml/min/1.73 m2). Table 3 shows CKD of known etiology and CKDu stage wise frequency with majority in stage 3A. It also shows proteinuria/hematuria prevalence among them. Table 4 describes the association between CKD and Socio demographic characteristics of my study population. In our study there were nil CKD among age groups of 18 to 30 years and CKD prevalence increased as age increased and CKD was common in farmers/labourers (79.7%).

Table 5: Association between CKD with Co Morbities and history suggestive of Prior Renal Damage N=339

Co morbidities	CKD(n=69)n,%	Non CKD (n=270)n, %	Chi square and p value
Hypertension (n=114)	34(29.8%)	80(70.2%)	9.503 *p= .002
Diabetes (n=52)	13(25%)	39(75%)	.818 P=.366
History suggestive of renal injury			
Proteinuria(n=18)	9(50%)	9(50%)	10.306 *p=.001
Edema(n= 4)	2(50%)	2(50%)	2.194 P=.139
Renal stones(n=16)	2(12.5%)	14(87.5%)	.639 P=.424
Facial puffiness(n=3)	2(66.7%)	1(33.3%)	4.005 *p=.045
Hematuria(n=8)	2(25%)	6(75%)	.109 P=.741
Urinary tract infection (n=26)	6(23.1%)	20(76.9%)	.129 P=.720

*- significant p value; CKD– chronic kidney disease.

Table 6: Association of CKD with risk factors (N=339)

Other factors	CKD (n=69)n, %	Non CKD (n=270)n, %	Chi square and p value
Smoking (n=36)	9(25%)	27(75%)	1.307 P=.520
Alcohol (n=64)	13(20.3%)	51(79.7%)	.394 P=.821
Snake bite (n=7)	4(57.1%)	3(42.9%)	5.967 *p=.015
BMI (overweight n= 48)	9(18.8%)	39(81.2%)	.675 P=.879
BMI (obesity n=26)	4(15.4%)	22(84.6%)	.675 P=.879

*- significant p value; CKD – chronic kidney disease.; BMI- body mass index

Table 5 represents association between CKD and Co morbidities. 29.8% of CKD had hypertension. Hypertension, history of proteinuria, facial puffiness showed significant association. Table 6 shows association of CKD with other etiological factors among which snake bite (4 of 7 had CKD); outdoor occupation (dehydration) showed significant association as 56 patients diagnosed as CKD had outdoor

occupation.

Table 7: Association between CKD And Family history of Comorbidities (N=339)

Family history of	CKD(n=69)n,%	Non CKD(n=270)n,%	Chi square and p value
Hypertension (n=59)	12(20.3%)	47(79.7%)	.000 P=.997
Diabetes(n=43)	8(18.6%)	35(81.4%)	.093 P=.760
Kidney disease(n=17)	3(17.6%)	14(82.4%)	.081 P=.776
Kidney disease requiring dialysis(n=1)	1(100%)	0	3.925 *p=.048
Heart disease(n=1)	1(100%)	0	3.925 *p=.048

Table 8: Association of CKDu with Gender, Age, Socioeconomic Status (Ses) N=69

Age (years)	CKDu (n=37) N %	CKD of known etiology (n=32) N %	P and chi square value
18 – 44 (n=6)	3(50%)	3(50%)	FET- 0.268 P = .933
45 – 59 (n=21)	12(57.1%)	9(42.9%)	
>60 (n=42)	22(52.4%)	20(47.6%)	
Gender			
Male (n=35)	18(51.4%)	17(48.6%)	.091 P=.763
Females (n= 34)	19(55.9%)	15(44.1%)	
SEC			
Middle (n=10)	6(60%)	4(40%)	FET – 1.022 P=.730
Upper lower (n=55)	28(51%)	27(49%)	
Lower (n=4)	3(75%)	1(25%)	
Marital status (married n=64)	34(53.1%)	30(46.9%)	2.233 P=.327
Outdoor occupation (n=56)	30(53.6%)	26(46.4%)	.000 P=.986

CKD – Chronic Kidney Disease; BMI- Body mass index; CKDu- CKD of unknown etiology; SEC- Socio economic vclass; FET - Fisher's exact test.

No significant association was seen with Diabetes, smoking, alcohol, obesity, stroke, heart disease, traditional/ pain medications or diet. Table 7 shows association between CKD and family history of co morbidities where family history of Kidney disease requiring dialysis and heart disease showed significant association.

Multiple logistic regression analysis of the study population for CKD showed no significance for risk factors such as age, hypertension, outdoor occupation, snake bite, history of proteinuria/edema, and family history of dialysis/ heart disease.

Table 9: Association of CKDu with risk factors (N=69)

Other factors	CKDu (n=37)n,%	CKD of known etiology(n=32)n,%	Chi square and p value
Smoking (n=9)	4(44.4%)	5(55.6%)	3.054 P=.217
Alcohol (n=13)	8(61.5%)	5(38.5%)	1.919 P=.383
Snake bite (n=4)	1(25%)	3(75%)	1.399 P=.237
Urinary tract infection (n=6)	1(16.7%)	5(83.3%)	3.609 P=.057
BMI (overweight N=9)	5(55.6%)	4(44.4%)	1.088 P=.780
BMI (obesity N=4)	2(50%)	2(50%)	1.088 P=.780

CKD – Chronic Kidney Disease; BMI- Body mass index

4. CHARACTERISTICS OF CKDU AND ITS ASSOCIATION

CHRONIC KIDNEY DISEASE OF UNKNOWN ETIOLOGY (CKDu)

Prevalence of Possible cases of CKDu was 13.9% (47) in our study with no CKDu cases between 18 and 30 years shown in Table 8. Since CKD itself causes mild hypertension, as per operational definition we excluded patients with blood pressure of more than 140/90 mm of Hg in patients with stage I & II CKD and blood pressure more than 160/100 mm of Hg in stage III, IV & V CKD or patients who are on two or more types of antihypertensives. This showed CKDu prevalence of 10.9% (37). Table 8 shows association between CKDu, CKD of known etiology and Socio demographic factors. This showed no significant association. Table 9 shows association between CKDu, CKD of known etiology and other risk factors. This also showed no significant association. Out of 37 CKDu patients 21.6% had proteinuria/hematuria, among which 0.8% had preserved eGFR (> 60 ml/min/1.73 m2). This signifies that proteinuria/hematuria is significantly low in CKDu population in our study.

DISCUSSION

Over the past few years, the number of CKD patients referred to higher centre was increasing in Mukkulam region. CKD was also a main health concern among this rural population.

In this study, the prevalence of CKD was 20.3 % and CKD with low eGFR (<60 ml/min/1.73 m2) was 17.9% which was very high compared to other CKD prevalence studies done in other regions. This was higher than Uddanam prevalence study done in the year 2018 which, like Mukkulam, is a rural area with predominant population being farmers.[19]

Likewise the prevalence of CKDu was 10.9% (53.6% of CKD population) which was also very high compared to other studies.

The CKD prevalence is rising in developing countries and there are only few prevalence studies. The CKD prevalence in Indian population was 10.2% (2018) [15] using MDRD formula for eGFR calculation. In another study in Northern Peru, the prevalence was only 1.7%.[20]

In Srilanka, where CKDu was first reported (also in Central America) the prevalence of CKDu was 15.1 – 22.9% in some districts.[21-22]

In another study of CKDu in South India (Tondaimandalam Nephropathy) 51.7% of the CKD patients were identified as CKDu which has striking resemblance to our study where 53.6 % of CKD were CKDu.[23] In yet another study, the prevalence of eGFR < 60 ml/min/1.73 m2 was between 1.6% and 4.8%, highest in rural south India.[24]

The wide range of CKD prevalence indicates that there are 'CKD hotspots' where CKD prevalence is high in some areas and there is a need to identify these hotspots to compare etio-pathological patterns in different hotspots.

CKDu is distinct by its clinicopathologic characteristics and has multifactorial etiology like toxins, dehydration, water contamination and heavy metals.[9] Heat/dehydration, inflammation, male sex and pesticides are the main hypotheses proposed for Central America, whereas in South Asia the emphasis has been on the possible roles of water contamination/metals and/or pesticides.[25] In this study males are predominantly affected and are more common in 4th decade of life and older. There was a mild difference from CKDu in Sri Lanka where females were predominantly affected and proteinuria was more common. There was also a difference from CKDu from Central America where young adults 20 – 40 years where affected. The clinical presentation of CKDu in this study was similar to that of CKDu of Uddanam area, Narasinghapur block in Odisha, Akola district in Maharashtra, Canacona district in Goa.[9] This tendency shows there might be different and multiple etiologies causing rising trend of CKDu in India.

Proteinuria/hematuria in CKD of known etiology was 40.6% in this study, whereas in CKDu it was only 21.6% (Table 3). This difference in proteinuria may be due to the difference in pathology of CKD and CKDu where CKDu is a tubulointerstitial disease which has low proteinuria and that of CKD of known etiology has significant proteinuria due to glomerular pathology.

The prevalence of Diabetes was 15.3% in this study (Table 2). A systematic review (1992-2018) prevalence of Diabetes in India showed a wide range from 1.9 – 25.2% with its highest in South India.[26] Another article showed that there was huge rise in diabetes in rural population from 8% in 2011 to 13.5% in 2020(TREND project).[27] Diabetics with proteinuria were seen in 16 patients in this study (30.7%) and were similar to a study where the prevalence was 15- 40% (2005).[28]

Diabetes is a proven etiology for CKD. In a study done on 2012, the prevalence of diabetic nephropathy was 31%.[29] Surprisingly total CKD and diabetes showed no significance in this study as only 13 (18.8%) diabetics had CKD. But, CKD of known etiology showed significant association with diabetes. This may be due to the rising trend of CKDu in this population. This clearly shows there are other factors for CKD in this population.

The prevalence of hypertension in this study was 33.6% (Table 2). The prevalence was high compared to the recent article (2018) in rural adults of TN, Kanchipuram district which was 26.2 %.[30] This high prevalence could be attributed to the high prevalence of CKD, as CKD itself caused mild hypertension.[9] This can be substantiated with the fact that stage 2 Hypertension was seen only in 5.3% of total population and stage 1 was seen in 15.6%. But the hypertension prevalence was not similarly high in other CKD hotspots like Uddanam CKD, where it was only 16.7 %.

In this study, the outdoor work history showed significant association. This shows that dehydration as hypothesized in other studies may be one of the factors associated with the development of CKDu and awareness about importance of adequate hydration may be a simple but effective step in reducing kidney injury. Out of 7 Snake bite history 4 had CKD with significant association showing snake bite as risk factor for CKD. Family history of chronic kidney disease and heart disease also showed significant association to CKD.

In short, this study showed that CKD and CKDu are high in Mukkulam area and there is a dire need to identify the causes for CKDu. There is a compelling need to identify CKD hotspots and carry out cohort/case control studies to

plan the next step. We could open a CKD database in all hospitals (from primary to tertiary level), actively identify and monitor CKD cases. This will help in identifying CKD hotspots. Further, follow up of the patients, performing renal biopsy; Ultrasonography may help in identifying the etiology. By surveillance and management of CKD we could improve the quality of life and decrease the burden of this disease.

STRENGTHS AND LIMITATIONS

In this study CKD and CKDu was identified by following the latest guidelines. Random cluster sampling was adopted and door to door survey was done. Questionnaire used was with reference to standard questionnaire used in TN CKD prevalence study 2022. Serum creatinine was done in TN Public Health Laboratory.

There are certain limitations in this study. To assess the function of kidney, urine dipstick test was used whose role in identification of microalbiminuria is limited. Urine PCR could have been a better modality but could not be done due to less feasibility. Renal biopsy, USG KUB could not be done due to non availability of resources.

Other factors hypothesized on etiology of CKDu like agrochemicals, heavy metals from ground waters were not analyzed.

ACKNOWLEDGEMENT

I sincerely extend my thanks to The Director of Public Health and Preventive Medicine, Dr. T. S. Selvavinayagam, MD, DPH, DNB, Joint Director, Government of Tamil Nadu for his concern and support in conducting this study. I also thank Additional director, Directorate of Public Health, Dr.A.Somasundharam MBBS,DPH,MD,MAE for his timely guidance and support throughout the course of this study. Also I heartily thank Dr. Sudharshini MD community medicine, Madras medical college for her guidance and support.

I'm extremely grateful for Dr. A.Palanichamy MBBS,DPH Principle of Health and Family Welfare Training Centre, Madurai, Dr.V.Yashodhamani MBBS DPH Deputy Director of Health, Virudhunagar, Dr. M. Mohammed Nizar MBBS, Block Medical Officer, Narikudi for permitting and supporting me in conducting this study in an efficient manner.

I'm immensely thankful to my Guide, Assistant Professor of community medicine, Virudhunagar medical college, Dr.M.Selva meena , M.D. Community Medicine for her motivation, valuable suggestion, guidance and expert advice without whom this study would not have achieved its final shape.

I'm forever indebted to my Mukkulam primary centre health team comprising of Staff nurses, Lab technicians, Village health Nurses, Midlevel health providers, Health inspectors, Women Health Volunteers and Multipurpose health workers, without whom the idea for this study would not have become a reality.

This acknowledgement would be incomplete if I don't thank all the subjects who gave their consent and cooperation for this study.

REFERENCES

1. William G.Couser1 Giuseppe Remuzzi 2ShanthiMendis3 MarcelloTonelli2;The contribution of chronic kidney disease to the global burden of major non communicable diseases. 2011 International Society of Nephrology

2. Ellen F. Carney ,The impact of chronic kidney disease on global healthNature Reviews Nephrology volume 16, page251 (2020)

3. P. Varma1 Prevalence of chronic kidney disease in India - Where are we heading? Indian J Nephrology. 2015 May-Jun.

4. Ravi Kumar P1 ,Amol Dongre2 , R. Muruganandham3 , Pradeep Deshmukh4 and D. Rajagovindan5 ; Prevalence of Chronic Kidney Disease and Its Determinants in Rural Pondicherry, India-A Community Based Cross-Sectional Study; The Open Urology & Nephrology Journal, 2019, Volume 12.

5. YoussefMKFarag1,Kuyilan KaraiSubramanian2,VikrumA. Singh3,RaviRajuTatapudi4Ajay K. Singh5 ; Occupational risk factors for chronic kidney disease in Andhra Pradesh: 'Uddanam Nephropathy' Published online: 12 Oct 2020.

6. Gifford FJ1 Gifford RM2 Eddleston M3 Dhaun N4 ; Endemic nephropathy around the world. Kidney Int Rep. 2017; 2:282–92.

7. Definition and classification of CKD Kidney International Supplements (2013) 3, 19–62; doi:10.1038/kisup.2012.64 & 2013 KDIGO.

8. Emily C. Moody,1 Steven G. Coca,2 and Alison P. Sanders3 ; Toxic metals and chronic kidney disease: A systematic review of recent literature PMC 2019 Dec 1.

9. Y. J. Anupama 1, Suresh Sankarasubbaiyan2 Gangadhar Taduri3 ; Chronic Kidney Disease of Unknown Etiology: Case Definition for India – A Perspective; Indian J Nephrology. 2020 Jul-Aug.

10. Sujiv Akkilagunta, 1 K. C. Premarajan, 2 Sreejith Parameswaran, 3 and Sitanshu Sekhar Kar4 ; Association of non-allopathic drugs and dietary factors with chronic kidney disease: A matched case–control study in South India J Family Med Prim Care. 2018 Nov-Dec; 7(6): 1346–1352.

11. OlugbengaE1.AyodeleC2 Olutayo3 Alebiosu4 ; Burden of Chronic Kidney Disease: An International Perspective; https://doi.org/10.1053/j.ackd.2010.02.001.

12. Gifford FJ1 Gifford RM2 Eddleston M3 Dhaun N4 ; Endemic nephropathy around the world. Kidney Int Rep. 2017;2:282–92.

13. M. Rajapurkar 1 M. Dabhi2 ; Burden of disease – prevalence and incidence of renal disease in India Clinical Nephrology, Vol. 74 – Suppl. 1/2010 (S9-S12).

14. https://www.kidney.org/professionals/kdoqi/gfr

15. Mehedi Hasan1, Ipsita Sutradhar2, Rajat Das Gupta3, Malabika Sarker4 ; Prevalence of chronic kidney disease in South Asia: a systematic review : Hasan et al. BMC Nephrology (2018)

16.https://ihatepsm.com/blog/modified-kuppuswamy-scale9

17. Dwaipayan Sarathi Chakraborty, a ,Sandeep Lahiry, b and Shouvik Choudhury c Hypertension Clinical Practice Guidelines (ISH, 2020): What Is New? 2021 Aug 2. doi: 10.1159/000518812

18. Rajendra Pradeepa et al ; Prevalence of generalized & abdominal obesity in urban & rural India- the ICMR - INDIAB Study (Phase-I) [ICMR - INDIAB-3] The ICMR-INDIAB Collaborative Study Group .Indian J Med Res. 2015 Aug; 142(2): 139–150.doi: 10.4103/0971-5916.164234

19. RaviRajuTatapudi1 et al ; High Prevalence of CKD of Unknown Etiology in Uddanam, India 16 October 2018.

20. Andrea Ruiz-Alejos et al ; CKD and CKDu in northern Peru: a cross-sectional analysis under the DEGREE protocol BMC Nephrology. 2021; 22: 37.Published online 2021 Jan 21. doi: 10.1186/s12882-021-02239-8

21. Rajapakse S1 Shivanthan MC2 Selvarajah M3 ; Chronic kidney disease of unknown etiology in Sri Lanka. Int J Occup Environ Health. 2016;22:259–64.

22. Correa-Rotter R1 Wesseling C2 Johnson RJ3 ; CKD of unknown origin in Central America: The case for a Mesoamerican nephropathy. Am J Kidney Dis. 2014;63:506–20.

23. SreejithParameswaran1 et al ; A Newly Recognized Endemic Region of CKD of Undetermined Etiology (CKDu) in South India—"Tondaimandalam Nephropathy" Kidney International Reports November 2020

24. Cristina O Callaghan., et al ; .Prevalence of and risk factors for chronic kidney disease of unknown aetiology in India: secondary data analysis of three population-based cross-sectional studies 2019.BMJ Journal.

25. Let's take the heat out of the CKDu debate: more evidence is needed Neil Pearce and Ben Caplin Published in final edited form as: Occup Environ Med. 2019 June ; 76(6): 357–359. doi:10.1136/oemed-2018-105427

26. SachinAtre 1 SonaDeshmukh2 ManjushaKulkarni3 ; Prevalence of type 2 diabetes mellitus (T2DM) in India: A systematic review (1994–2018)Author links open overlay panel Volume 14, Issue 5, September–October 2020, Pages 897-906

27. https://sites.dundee.ac.uk/inspired-nihr/wp-content/uploads/sites/113/2020/04/Press-release-25.2.2020.pdf

28. Jorge L. Gross, MD et al ; Diabetic Nephropathy: Diagnosis, Prevention, and Treatment.

29. Mohan M Rajapurkar et al ; What do we know about chronic kidney disease in India: first report of the Indian CKD registry.

30. T. K. Raja1 1, T. Muthukumar2 , Anisha Mohan P3 A cross sectional study on prevalence of hypertension and its associated risk factors among rural adults in Kanchipuram district, Tamil Nadu International Journal of Community Medicine and Public Health Raja TK et al. Int J Community Med Public Health. 2018 Jan;5(1):249-253.

Vol 3 | Issue 1 | January - April | 2023

ORIGINAL ARTICLE - PUBLIC HEALTH

A STUDY TO ASSESS THE PREVALENCE OF EXCLUSIVE BREASTFEEDING PRACTICES AMONG MOTHERS AT THE VILLAGES OF PUDHUR NADU, JAWADHU HILLS, TIRUPATHUR DISTRICT, TAMIL NADU, 2022

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Abstract

BACKGROUND: Exclusive Breastfeeding (EBF) should be continued for the first 6 months of child's life with early initiation, may be continued 2 years or more (WHO). The prevalence of EBF is globally 44% (WHO), in India 63% & Tamil Nadu 55% (NFHS-5, 2019-21). EBF for 6 months is a challenge for women everywhere, especially mothers living in hilly rural areas and we need to explore the EBF practices among them.

OBJECTIVES : To estimate the prevalence of EBF & assess BF practices among mothers at the villages of Pudhur Nadu.

METHODS : Cross sectional study was conducted among the mothers, who had delivered baby in past one year at Pudhur Nadu. Simple random sampling done. Sample size was 186. Pretested questionnaire used by ASHAs (trained interviewers). Descriptive analysis done by proportions, Chi-square tests by MS Excel, Epi info 7.2.5. Permissions obtained from Ethics committee, DPH & PM.

RESULTS : 185 mothers responded, mean age 21(sd 3.7), 97.8% Hindus & 99% Scheduled Tribes. Prevalence of EBF was 71% & EBF for 6 months duration from birth was 63%. Prelacteal feed given in 13% & Colostrum in 96% children. BF initiated within 1 hour of birth was 91%. Non EBF among 1st & 2nd order children was 32% & 3rd & higher order was 14% (P 0.04). EBF among mothers had 3 or more home visits during pregnancy (P 0.01) and after delivery (P 0.02) by VHN/ASHA was twice compared to those who had less than 3 visits.

CONCLUSION : Among mothers of Pudhur Nadu, EBF is higher than expected. Further studies by in-depth interviews can be conducted as each mother's experience of Breastfeeding is important.

KEYWORDS : Exclusive Breastfeeding, colostrum, pregnancy.

INTRODUCTION

Breastmilk is the ideal food for infants. It is safe, clean and contains antibodies which help protect against many common childhood illnesses. Breastmilk provides all the energy and nutrients that the infant needs for the first months of life, it continues to provide up to half or more of a child's nutritional needs during the second half of the first year and up to one third during the second year of life. Breastfed children perform better on intelligence tests, are less likely to be overweight or obese and less prone to diabetes later in life. Women who breastfeed also have a reduced risk of breast and ovarian cancers.[1]

Breastfeeding is a critical first step on a child's path to a healthy future. As a foundation of nutrition and health, breastfeeding contributes to the achievement of a more prosperous and sustainable future for people and planet. Breastfeeding can help achieve many of the 17 Sustainable Development Goals including goals on poverty, hunger, health, education, gender equality and sustainable consumption. Increased breastfeeding is associated with US$302 billion annually in additional income – nearly 0.5 per cent of world gross national income. Breastfeeding is linked to critical gender equality issues including workplace rights. Breastmilk does not require industry for production and is created and consumed with a minimal ecological footprint. As Breastfeeding is a well-established and recommended intervention for the improvement of child nutrition, the World Health Organization (WHO) recommends that Exclusive Breastfeeding (EBF) should be continued for the first 6 months of child's life. WHO states that over 8,20,000 children's lives are lost every year among children under five years of age. Breastfeeding is potentially one of the top nutrition interventions for reducing under-five mortality. Undernutrition is estimated to be associated with 2. 7 million child deaths annually or 45% of all child deaths. Infant and young child feeding is a key area to improve child survival and promote healthy growth and development. The first 2 years of a child's life are particularly important, as optimal nutrition

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during this period lowers morbidity and mortality, reduces the risk of chronic disease, and fosters better development overall. Globally, less than one in two new-borns receive the benefits of early initiation of breastfeeding and only two in five infants under six months of age are exclusively breastfed.[2]

EBF for 6 months is a challenge for women everywhere, especially mothers living in hilly rural areas, who are social group specially characterized by distinctive culture and influences of the community, religion, traits, beliefs, availability of health facilities and territorial affliction. Prevalence of Exclusive Breastfeeding among women of hilly areas, knowledge and practices of Breastfeeding among them need to be explored.

OBJECTIVES

1.To estimate the Prevalence of Exclusive Breastfeeding practices among mothers at the villages of Pudhur Nadu, Jawadhu Hills

2.To assess the knowledge and practices of Breastfeeding among mothers at the villages of Pudhur Nadu, Jawadhu Hills

METHODOLOGY

STUDY DESIGN: Cross sectional study

STUDY DURATION: 10th to 31st October, 2022

STUDY AREA & POPULATION: The mothers, who had delivered baby (live birth) from October 2021 to September 2022 (1 year), residing in the villages of Pudhur Nadu, Jawadhu Hills, Tirupathur District, Tamil Nadu

INCLUSION CRITERIA: Mothers, who had delivered baby (live birth) from October 2021 to September 2022

EXCLUSION CRITERIA: Mothers in admission at hospital & mothers not willing to participate are not included in the study

SAMPLING PROCEDURE: List of mothers who had child birth during the reference period was obtained from District Public Health department and simple random sampling was done using Microsoft Excel 2011.

SAMPLE SIZE: Based on NFHS 5 (National Family Health Survey), assumption of Exclusive Breastfeeding as 50% (P = expected proportion), confidence interval 95% (Z value ± 1.96), relative precision (d) 5%, with expected non-response of 10%, population size (N) is 297 mothers, the required sample size (n') was calculated using the formula:

$n' = NZ^2P(1-P) / d^2(N-1) + Z^2P(1-P)$

the sample size was 186.

OPERATIONAL DEFINITION

EXCLUSIVE BREASTFEEDING: A child is considered Exclusively Breastfed when he or she receives only breast milk, without any additional food or liquid, even water, with the exception of oral rehydration solution, drops, syrups of vitamins, minerals or medicines (WHO). Exclusively Breastfeeding for six months duration from birth of the child (from first feeding) is defined as EBF for six months.

PRELACTEAL FEED: Prelacteal feeding is any fluid given to a child before Breastfeeding starts (WHO).

DATA COLLECTION: Data was collected by face-to-face interview of the participants by using interviewer administered questionnaire. ASHAs (Accredited Social Health Activists) were trained as interviewers and reliability checked before data collection. Questionnaire was in native language Tamil and pretested for responses & data flow with 10 mothers in study population (not included in study sample). Interviewers were supervised by the Investigators. Information on Demography & Breastfeeding practices was collected.

DATA ANALYSIS: Data collected was entered in Epicollect5. Double entries were checked. Analysis was done using Microsoft Excel 2011, Epi Info 7.2.5. Proportion analysis was done and Chi square test, P value of < 0.05 were used to test statistical significance.

ETHICAL CONSIDERATIONS: All the participants were explained about the purpose of the study, participant information sheet in native language was provided. Written informed consent was obtained. Strict confidentiality maintained towards the responses & participant identity. Assured that any scientific presentation or publication will not reveal the individual identity of the participants.

Prior permission & approval was obtained from Ethics committee, Directorate of Public Health & Preventive Medicine, Chennai.

RESULTS

Total participants were 185 with 1 non response. 102 mothers with ≥ 6 months old baby (denominator for EBF for six months), 83 with < 6 months old baby and all were assessed for Breastfeeding practices.

SOCIODEMOGRAPHIC CHARACTERISTICS: Mean age of participants was 23 years (sd ± 3.7), Mean age at marriage was 20 years (sd ± 2.4). Among them 98% were Hindus, 2% other religions and 99% were Scheduled Tribes. Less than 1% of participants had no school education, 24% had higher secondary school education. Occupation of mothers was 38% had daily waged work, 35% agriculture, 4% others & 23% were not working and the details are presented in Table 1.

Table 1: Frequencies of Socio demographic characteristics (N=185)

Characteristics	Category	n	%
a. Education of participant	Illiterate	1	1
	Class 1-5	29	16
	Class 6-10	110	59
	Class 11-12	36	19
	Graduate	9	5
b. Education of spouse	Illiterate	8	4
	Class 1-5	21	11
	Class 6-10	68	37
	Class 11-12	38	21
	Graduate	50	27
c. Occupation of participant	Agriculture	64	35
	Daily waged worker	71	38
	Govt Job	4	2
	Not Working	42	23
	Own Business	2	1
	Working in private concern	2	1
d. Occupation of spouse	Agriculture	72	39
	Daily waged worker	91	49
	Govt Job	10	5
	Not Working	2	1
	Own Business	4	2
	Working in private concern	6	3
e. Religion	Hindu	181	98
	Others	4	2
f. Social category	Scheduled Tribes	183	99
	Others	2	1

PERSONAL & TREATMENT PROFILE: No participant had history of comorbidities like Diabetes mellitus, Hypertension, Cancers or were on treatment for any other chronic conditions. No history of tobacco use, smoking, alcohol use.

FEEDING PRACTICES: Prevalence of Exclusive Breastfeeding is 71% and EBF for six months was 63%. Colostrum feeding was 96% and details on Breastfeeding practices is presented in Table 2. Major reasons for not giving Colostrum were indigestion & family advice and other reasons presented in Table 3. Supplements in < 6 months children was 83% homemade food, described in Figure 1. Prelacteal feeds given were Water 83%, Cow's milk 71% and 66% mothers' work stand as the reason for not Exclusively Breastfeeding and described in Figures 2,3 respectively.

FACTORS INFLUENCING EXCLUSIVE BREASTFEEDING

Reasons studied were as follows:

SOCIO DEMOGRAPHIC CHARACTERISTICS: namely Age, Age at marriage, Education, Living alone or with parents or in laws & Type of family.

Table 2: Proportions of Breastfeeding practices (N=185, for b N=102)

Indicators	%
a. Prevalence of EBF	71
b. Prevalence of EBF for 6 months	63
c. Breastfed within 1 hour after birth	91
d. Colostrum feed given	96
e. Prelacteal feed given	13

Table 3: Reasons for not feeding with Colostrum (N=8)

Reasons	%
a. Indigestion	75
b. Family advice	70
c. Harmful to mother	53
d. Color is different	38

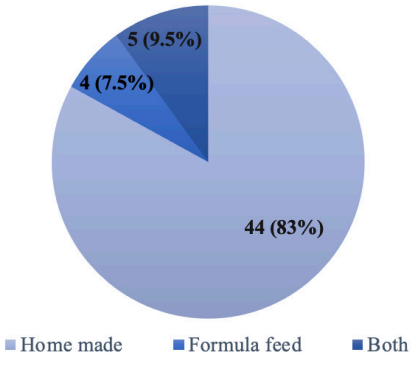

Figure 1: Supplements given for less than 6 months children (N=53)

Table 4: Reasons influencing EBF (N=185)

No	Reasons	Type	non EBF(n)	Total (N)	% Non EBF	P value X^2 test
A	**Socio demographic characteristics**					
1	Age (years)	less than 21	15	40	37.5	0.02
		21 - 25	33	101	32.7	(Trend X^2 0.1)
		26- 30	5	37	13.5	
		more than 30	0	7	0	
2	Age at marriage	less than 21	44	137	32	0.3
		21 - 25	8	42	19	(Trend X^2 0.08)
		26- 30	1	4	25	
		more than 30	0	2	0	
3	Education	less than 10	32	113	28	0.9
		10 & above	21	72	29	
4	Education of spouse	less than 10	28	97	29	0.94
		10 & above	25	88	28	
5	Occupation	No job, daily waged, agriculture	29	113	26	0.26
		Own business, Govt	24	72	33	
6	Occupation of spouse	No job, daily waged, agriculture	25	92	27	
		Own business, Govt	28	93	30	
7	Type of family	Nuclear	39	139	28	0.75
		Joint	14	46	30	
8	Living with	Parents & both	18	59	31	0.37
		In laws	25	100	25	
		Alone	10	26	38	
B	**Baby characteristics**					
9	Gestational age	less than 37 weeks	5	20	25	0.7
		37 & above weeks	48	165	29	
10	Sex of baby	Boy	27	102	26	0.46
		Girl	26	83	31	
11	Birth weight	< 2.5 kg weight	18	61	30	0.85
		2.5 & more weight	35	124	28	
12	Spacing (N=93)	< 18 months	4	22	18	0.41
		18 & above months	19	71	27	
13	Order of birth*	1 & 2nd	48	150	32	0.036
		3rd & higher	5	35	14	(Trend X^2 0.04)
C	**Institutional characteristics**					
14	Place of delivery	Govt	52	176	30	0.23
		Private	1	9	11	
15	Type of delivery	Vaginal	48	159	30	0.25
		LSCS	5	26	19	
16	# Days of hospital stay during delivery	less than 3 days	31	99	31	0.38
		3 & more days	22	86	26	
17	Visit of mother during pregnancy (Ante natal)					
a	To Home by VHN/ASHA*	less than 3 visits	12	24	50	0.01
		3 & more visits	41	161	25	
b	To Health Sub Centre	less than 3 visits	3	10	30	0.9
		3 & more visits	50	175	29	
c	To Primary Health Centre / Govt Hospital	less than 3 visits	14	38	37	0.2
		3 & more visits	39	147	27	
d	To Private Hospital	less than 3 visits	47	172	27	0.14
		3 & more visits	6	13	46	
18	Visit of mother after child birth (Post Natal)					
a	To Home by VHN/ASHA*	less than 3 visits	11	26	42	0.02
		3 & more visits	42	159	26	
b	To Health Sub Centre	less than 3 visits	23	79	29	0.9
		3 & more visits	30	106	28	
c	To Primary Health Centre / Govt Hospital	less than 3 visits	29	110	26	0.4
		3 & more visits	24	75	32	
d	To Private Hospital	less than 3 visits	50	172	29	0.64
		3 & more visits	3	13	23	

*Statistically significant factors associated with non EBF (P < 0.05), % of non EBF is (n/N) *100

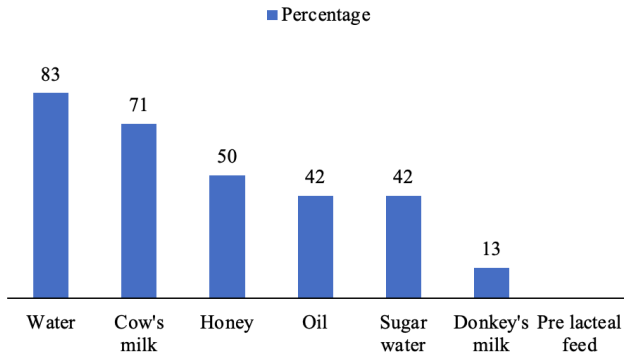

Figure 2: Prelacteal feeds given to children (N = 24)

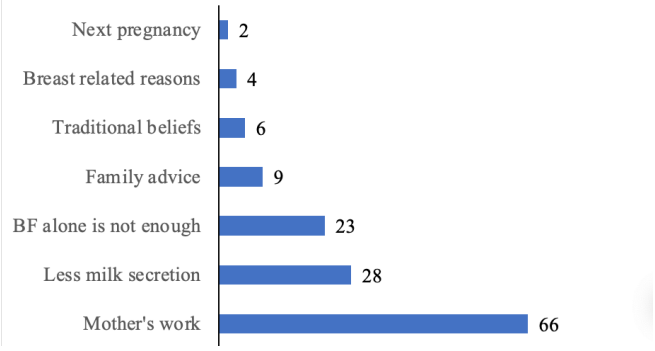

Figure 3: Reasons for EBF not given to children

BABY CHARACTERISTICS: Sex of baby, Baby weight, Order of birth, Spacing from previous child, Gestational age at birth.

INSTITUTIONAL CHARACTERISTICS: Place of birth, Number of days hospital stay during child birth, Visits to Health Sub Centre, Primary Health Centre/General Hospital/ Private Hospital and Home visits during pregnancy and after child birth

FACTORS ASSOCIATED WITH NON EBF: By Order of birth non EBF among 1st & 2nd order is 32% and 3rd & higher order is 14%. By Number of home visits by Village Health Nurse / ASHA non EBF among mothers who had less than 3 visits is 50% & more than 3 visits is 25% during pregnancy and after delivery is 42% & 26% respectively. And were statistically significant. The reasons studied and their proportions are described in Table 4.

DISCUSSION

Only about 44% of infants aged 0–6 months worldwide were Exclusively Breastfed over the period 2015-2020.[3–5] The prevalence of EBF varies in different developing countries mostly hovering around 50% in best scenario and around 35% in most of the countries.[5]

According to NFHS-5, the prevalence of the early initiation of Breastfeeding is 41% and EBF is 63% at National level. Even though EBF is increasing in trend at national level, infants are

introduced supplementary food at the age of 3 months itself instead of Exclusive Breastfeeding[6] and new-borns had been fed with Prelacteal feeds and avoided colostrum.[7–9]

In Tamil Nadu, according to NFHS-5, early initiation of Breastfeeding is 60% and the prevalence of EBF is 55%. With various studies of rural areas of this state, EBF varies from 50 to 70 % and at some areas it is lower than 50%.[10–14]

In this study, Exclusive Breastfeeding among mothers at Pudhur Nadu, Jawadhu hills was 71% that is higher than Tamil Nadu and Exclusive Breastfeeding for six months was 63% is similar to the state. Initiation of Breastfeeding within 1 hour after birth was 91% and 13% Prelacteal feed given & most of them around 80% was Water, Cow's milk and practice of feeding new born child with Donkey's milk exists and accounts for 10% of children who are given Prelacteal feeds. Though Colostrum feed is given by 96% mothers there are beliefs of mothers why they don't feed on Colostrum and the reasons are that it causes indigestion 75%, on family advice 70% & also believe that its harmful to health and the colour of milk is different.

There are factors which may affect feeding practices such as Socioeconomic status, Inadequate knowledge, Maternal education, Cultural variations, Place of living and many other factors.[11,15–17] Here there is no significant difference in EBF among the Sociodemographic characteristics. School education is optimal, Religion & Community is common in the population and seems it has no difference with the EBF practices. Major occupation is agriculture and daily waged work it constitutes more than 50% mothers and 65% mothers state their work as a reason for non EBF of children. By baby characteristics EBF is high among higher order birth babies and by health care facilities / institutional characteristics EBF is high among mothers who had more home visits by health care providers during pregnancy and after child birth.

STRENGTHS

Participants were from all 30 villages of Pudhur Nadu.

LIMITATIONS

Interview of mothers by ASHAs might have led to information bias & reporting bias that might have led to an overestimate of the outcome.

CONCLUSIONS

Among mothers of Pudhur Nadu village Exclusive Breastfeeding practice is higher than expected. In spite of state wide campaign for promotion of breastfeeding, achievements are not up to the desired target. Yet to reach 100% of Exclusive Breastfeeding of babies and for 6 months. Initiation of Breastfeeding, Colostrum feeding is optimal but we see supplements are started before 6 months. Work of mother is the major reason studied for not Exclusively Breastfeeding children. Home visits by health care providers have good impact in higher EBF practices.

RECOMMENDATIONS

To focus on Home visits by health care providers VHN/ ASHA and improve on health education on Breastfeeding and EBF for 6 months.

Study by in-depth interviews with mothers may better find the factors for lack of Exclusive Breastfeeding. MAA (Mother's Absolute Affection) Programme can be evaluated.

Further studies can be conducted including rural & urban population, may give more evidence to plan overall steps to achieve 100% Exclusive Breastfeeding for 6 months to all the children.

REFERENCES

1. Breastfeeding [Internet]. [cited 2023 Mar 8]. Available from: https://www.who.int/health-topics/breastfeeding

2. Breast feeding and SDGs Messaging WBW2016 Shared.pdf [Internet]. [cited 2023 Mar 8]. Available from: https://worldbreastfeedingweek.org/2016/pdf/BreastfeedingandSDGsMessaging%20WBW2016%20Shared.pdf

3. Infant and young child feeding [Internet]. [cited 2023 Mar 8]. Available from: https://www.who.int/news-room/fact-sheets/detail/infant-and-young-child-feeding

4. Afroze S, Biswas A, Begum NA, Ng YPM. Exclusive Breast feeding in the 21st Century: a Roadmap to success in South Asia. Bangladesh J Med Sci. 2021 Jun 18;20(4):725–31.

5. Rahman N, Kabir MR, Sultana M, Islam MM, Alam MR, Dey M, et al. Exclusive Breastfeeding Practice (EBF), Survival Function and Factors Associated with the Early Cessation of EBF in Developing Countries. Asian J Pregnancy Childbirth. 2020 May 2;38–49.

6. Koya S, Babu GR, Deepa R, Iyer V, Yamuna A, Lobo E, et al. Determinants of Breastfeeding Practices and Its Association With Infant Anthropometry: Results From a Prospective Cohort Study in South India. Front Public Health. 2020 Oct 14;8:492596.

7. Srikanth L, Subbiah K, Srinivasan S. Beliefs and practices of newborn feeding in tribal areas of India: a decennary review. Int J Community Med Public Health. 2017 Jan 25;4(2):281–5.

8. Mahmood SE, Srivastava A, Shrotriya VP, Mishra P. Infant feeding practices in the rural population of north India. J Fam Community Med. 2012;19(2):130–5.

9. Bhanderi DJ, Pandya YP, Sharma DB. Barriers to exclusive breastfeeding in rural community of central Gujarat, India. J Fam Med Prim Care. 2019 Jan;8(1):54–61.

10. Saravanakumar P, Anantharaman DVV, Suresh DS, Rajendran DAK. Prevalence of Exclusive Breastfeeding Practices among the Irular tribes in Tamil Nadu. 6(1).

11. Thresa S, D J, Shrivastav S. A cross-sectional study to assess the knowledge and practices about breastfeeding among women in Sembakkam village, Kancheepuram District. Int J Med Sci Public Health. 2017;6(4):1.

12. R R, P U, N S, V I. Optimal feeding practices in Tamilnadu, breast feeding and complementary feeding: the reality. Int J Contemp Pediatr. 2020 Jan 23;7(2):243–7.

13. Liaquathali F, Maruthupandian J, Govindasamy R. An assessment of age-appropriate infant and young child feeding practices among children in Kancheepuram district, Tamil Nadu, India. J Fam Med Prim Care. 2020 Sep;9(9):4692–8.

14. Venugopal DS, Srivijayan DA, Ramanath DAK. Study on breast feeding and complementary feeding practices in rural mothers, Tamilnadu, India. Pediatr Rev Int J Pediatr Res. 2019 Feb 28;6(2):97–102.

15. Ramraj B, Satisan A, Hussain A. Breastfeeding Practices in Field Practice Area of SRM Medical College and its association with Hospitalisation due to ARI and diarrhoea among Under Five children. Ann Trop Med Public Health [Internet]. 2020 [cited 2023 Mar 8];23(19). Available from: https://www.academia.edu/56607069/Breastfeeding_Practices_in_Field_Practice_Area_of_SRM_Medical_College_and_its_association_with_Hospitalisation_due_to_ARI_and_diarrhoea_among_Under_Five_children

16. Thanigavel PT, Priya FMH. A Cross Sectional Study on Knowledge and Attitude Regarding Exclusive Breast Feeding among Women of Reproductive Age Group in Chennai, Tamil Nadu. J Pharm Res Int. 2021 Dec 19;282–92.

17. Rushender R, Krishnamoorthy Y, Hussain Siraja AA. Factors associated with the knowledge about breastfeeding among antenatal and postnatal women in selected rural villages of Chengalpattu, Tamil Nadu: A community-based cross-sectional study. J Educ Health Promot. 2022;11:72.

Vol 3 | Issue 1 | January - April | 2023

ORIGINAL ARTICLE - PUBLIC HEALTH

HAS THE POPULATION LEVEL MORTALITY EXPERIENCE CHANGED AFTER COVID 19 PANDEMIC?

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Abstract

INTRODUCTION : Human history suggested that different diseases had influenced the mortality patterns of population. Analysing the mortality data could bring out valuable insights regarding the influence of COVID 19 in the population. Hence we conducted this study to determine whether there was any difference in all-cause mortality in Pre COVID and Post COVID Time; whether there is any difference in mortality among various age groups and for important causes of death

METHODS : We did a secondary data analysis by obtaining data from Civil Registration System software of Kanyakumari district pertaining to April to September of 2019 (Pre COVID) and 2022 (Post COVID). We calculated mortality rates with confidence intervals for total population, both genders, different age groups and causes.

RESULTS : In comparison to Pre COVID period, mortality rate during Post COVID period had increased (statistically significant) in the following groups: total population, females, above 60 years; cause specific mortality rates had increased for heart disease & heart attacks and senility and decreased for bronchial asthma and pneumonia; gender wise analysis for heart disease revealed that increase among females were statistically significant; for senility statistically significant increase was noted in both genders

CONCLUSION : Mortality experience of Kanyakumari District had a significant change in post COVID period; old age population and females had been dying more; heart disease deaths had been noted higher in post COVID period especially for females; death due to bronchial asthma and pneumonia had decreased. We recommended further studies before attributing the difference in mortality experience to COVID 19 exposure of population such as similar study in different population & different data periods of same population; studies to identify factors associated with increase in mortality among female in Post COVIID period; to identify factors associated with increased cardiovascular mortality among females; studies to identify factors contributing to decrease in mortality due to pneumonia and bronchial asthma after COVID 19 Pandemic.

KEYWORDS : COVID 19, death, cause of death, heart diseases

INTRODUCTION

Mortality experience of population used to vary between geographic regions; same region may have different mortality experience during different time periods. Human history reveals that different diseases have influenced the mortality patterns of population.[1] COVID 19 is the emerging infection of this decade. The pandemic started during end of 2019 at China and still continues to torment the world.[2]

India's first reported case was a woman returnee of Kerala from Wuhan, China on January 27th, 2020.[3] Tamil Nadu had its first confirmed COVID-19 case on March 7, 2020.[4] As per data available at office of Deputy Director of Health Services, Kanniyakumari district of Tamil Nadu, this district had its first case reported on 31st march 2020; first wave of COVID pandemic went on till January 2021. After that, Kanniyakumari district had met another two COVID waves during middle and last part of 2021. After February 2022, cases were getting reported in a low level.

Literature review suggested that studies examining the mortality patterns in pre and post COVID period were scarce. One Japanese study had analysed that in Japanese and immigrant population.[5] As different races could respond in a different manner towards a new microbe, study of mortality pattern in our region could well be different. Analysing that would help us by giving valuable insights for shaping the future public health interventions. Hence we conducted this study with following objectives.

OBJECTIVES

To determine whether there is any difference in all-cause mortality between Pre COVID and Post COVID times among total population

To determine whether there is any difference in mortality among different age groups and two genders between Pre COVID and Post COVID times

To determine whether there is any difference in any of

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important Cause Specific Mortality Rates between Pre and Post COVID Times

METHODS

STUDY POPULATION AND STUDY DATA PERIOD :

Our Study population was all reported deaths in Civil Registration System (CRS) of Kanniyakumari District. We considered data of two six months period for analysis- April to September of 2019 (as Pre COVID period) and April to September of 2022 (as Post COVID period). We analysed both period data sets in a cross sectional manner.

INCLUSION AND EXCLUSION CRITERIA :

We included all deaths reported in Civil Registration System during the two (data) periods. We had planned to exclude deaths with incomplete data regarding age/ sex/ cause of death during protocol stage

OPERATIONAL DEFINITIONS :

We defined all-cause mortality rate as deaths during data period (six months) due to all causes divided by total population

We defined gender specific mortality rate as deaths during data period (six months) due to all causes of the particular gender divided by population of the same gender

We defined age group specific mortality rate as deaths during data period (six months) due to all causes of the particular age group divided by population of the same age group

We defined cause specific mortality rate as deaths during data period (six months) due to the particular cause divided by total population; defined gender wise cause specific mortality rate as deaths during data period (six months) due to the particular cause among the specific gender divided by population of the same gender

We defined cause of death as that mentioned in Civil Registration System software based on the report given by the physician who treated the individual before death either as outpatient or inpatient

We defined Pre COVID period as the six months period of April2019 to September 2019

We defined the Post COVID period as the six months period of April2022 to September 2022. (This period was taken as it was the one following the third wave of COVID 19 epidemic touched the baseline in the District; to nullify the effect of month specific events in the mortality data, similar six months periods were taken).

SAMPLING PROCEDURE AND SAMPLE SIZE :

We considered all deaths reported during the study data periods for analysis.

DATA COLLECTION PROCEDURE :

We collected the mortality data from Civil Registration System software & population data maintained at statistical division of Public Health Department (Office of Deputy Director of Health services) of Kanniyakumari District.

ANALYSIS :

We considered following age groups for analysis: 0 to 18, 19 to 30, 31 to 45, 46 to 60 and above 60. In Tamil Nadu, Makkalai Thedi Maruthuvam program is being implemented since September 2021. It is a population based Non Communicable Diseases (NCD) screening programme with a component of distribution of NCD medicines at home for above 45 years population. Screening for Hypertension starts at completion of 18 years and screening for Diabetes risk factors at completion of 18 years and blood sugar testing by glucometer at completion of 30 years. This was the rationale behind dividing the age group in the above manner. This could facilitate use of results by Tamil Nadu Public Health Department. As generally above 60 are being considered as old age and this age group was prioritised during COVID vaccination, we considered above 60 as the high end age group.

We calculated all-cause mortality, cause wise & Age group wise mortality for the two six months periods; we calculated proportions with confidence intervals for each category of mortality; we examined the confidence intervals for comparison of mortality rates of the two data periods; we considered the mortality rates of two periods as having statistically significant difference when the confidence interval were not overlapping. We used Excel software and open epi online software for analysis

HUMAN SUBJECT PROTECTION :

Our study got approved by Institutional Ethics Committee of Tamil Nadu Public Health department; we maintained privacy and confidentiality in such a way that no personal data was used or revealed during analysis or report preparation & presentation

RESULTS

There were 7931 death records (line lists) for the period April to September 2019 and 8665 records for the period April to September 2022. All records had the information regarding age, sex and cause of death. So we considered all records for analysis.

All-cause mortality rate of total population was 3.97 per 1000 population during Pre COVID period and 4.28 per 1000 during the Post COVID period; the increase was statistically significant. All-cause mortality of male gender

was 4.52 per 1000 & 4.78 per 1000 during Pre COVID and Post COVID period respectively and the increase was not statistically significant. All-cause mortality of females was 3.40 & 3.79 per 1000 during the Pre and Post COVID periods respectively and the increase was statistically significant. (Table 1)

Table 1: All-cause mortality of total population and both genders during Pre COVID (April to September 2019) and Post COVID (April to September 2022) periods, Kanniyakumari District

	2019				2022			
Population type	Deaths	Population	Mortality rate per 1000 for six months	Confidence Interval	Deaths	Population	Mortality rate per 1000 for six months	Confidence Interval
Total	7931	1999032	3.97	3.88 to 4.05	8665	2022817	4.28	4.20 to 4.38
Male	4549	1005617	4.52	4.39 to 4.66	4847	1014373	4.78	4.65 to 4.91
Female	3382	993415	3.40	3.29 to 3.52	3818	1008444	3.79	3.67 to 3.91

Age group specific mortality of 0 to 18 years was 0.23 per 1000 & 0.21 per 1000, that of 19 to 30 years was 0.49 & 0.44 per 1000, that of 31 to 45 years had been 1.19 & 1.08 per 1000 and that of 46 to 60 years was 4.31 & 4.42 per 1000 during Pre and Post COVID periods respectively. The noted differences were not statistically significant for the above four age groups. Above 60 years specific mortality was 26.10 per 1000 during pre COVID period and 29.27 per 1000 during Post COVID period; the increase was statistically significant. (Table 2)

Table 2: Mortality rate among various age groups during Pre COVID (April to September 2019) and Post COVID (April to September 2022) periods, Kanniyakumari District

	2019				2022			
Mortality of	Deaths	Population	Mortality rate per 1000 for six months	Confidence Interval	Deaths	Population	Mortality rate per 1000 for six months	Confidence Interval
0-18 Years	131	573922	0.23	0.19 to 0.27	120	580751	0.21	0.17 to 0.25
19-30 Years	202	413800	0.49	0.43 to 0.56	186	418723	0.44	0.38 to 0.51
31-45 Years	545	458578	1.19	1.09 to 1.29	500	464034	1.08	0.99 to 1.18
46-60 Years	1460	338436	4.31	4.1 to 4.54	1512	342463	4.42	4.20 to 4.64
Above 60 Years	5593	214296	26.10	25.43 to 26.78	6347	216846	29.27	28.57 to 29.99

Cause specific mortality rate due to heart disease and heart attacks was 1.35 & 1.48 per 1000 during Pre and Post COVID periods respectively; that due to senility was 0.46 & 0.66 per 1000 during Pre and Post COVID periods respectively. Above two cause specific mortality rates had statistically significant increase during Post COVID period. Bronchial asthma specific mortality rate was 0.29 & 0.18 per 1000 during Pre and Post COVID Periods respectively. Mortality rate due to pneumonia was 0.05 & 0.02 per 1000 during Pre and Post COVID periods. The decrease noted in Post COVID period mortality rates due to above two causes was statistically significant. Cause specific mortality rates due to other common causes such as chronic liver disease & cirrhosis, suicide, cerebrovascular accidents, Diabetes Mellitus, traffic accidents and Tuberculosis were not having any statistically significant difference between Pre and Post COVID periods. (Table 3)

Table 3: Cause Specific Mortality Rates during Pre COVID (April to September 2019) and Post COVID(April to September 2022) periods, Kanniyakumari District

	2019				2022			
Mortality due to	Deaths	Population	Mortality rate per 1000 for six months	Confidence Interval	Deaths	Population	Mortality rate per 1000 for six months	Confidence Interval
Bronchitis Asthma	574	1999032	0.287	0.26 to 0.31	364	2022817	0.180	0.16 to 0.20
Pneumonia	103	1999032	0.052	0.04 to 0.06	35	2022817	0.017	0.01 to 0.02
Heart Disease and Heart Attacks	2697	1999032	1.349	1.30 to 1.40	3001	2022817	1.484	1.43 to 1.54
Senility	913	1999032	0.457	0.43 to 0.49	1335	2022817	0.660	0.63 to 0.70
Chronic Liver disease and Cirrhosis	176	1999032	0.088	0.08 to 0.10	223	2022817	0.11	0.10 to 0.13
Suicide	170	1999032	0.085	0.07 to 0.10	234	2022817	0.116	0.10 to 0.13
Cancer	383	1999032	0.192	0.17 to 0.21	447	2022817	0.221	0.20 to 0.24
Cerebro Vascular accidents	414	1999032	0.207	0.19 to 0.23	487	2022817	0.241	0.22 to 0.26
Diabetes Mellitus	613	1999032	0.307	0.28 to 0.33	692	2022817	0.342	0.32 to 0.37
Transport (Traffic) accidents	188	1999032	0.094	0.08 to 0.11	148	2022817	0.073	0.06 to 0.09
Tuberculosis	25	1999032	0.013	0.008 to 0.018	31	2022817	0.015	0.011 to 0.022

Cause specific mortality rate due to heart disease and heart attacks in males was 1.59 and 1.70 per 1000 during the two study periods; but the increase in Post COVID period was not statistically significant; the same analysis in females showed a statistically significant increase during Post COVID period; the statistics was 1.11 and 1.27 per 1000 respectively. Mortality rate due to senility among males was 0.43 & 0.56 and that among females was 0.48 & 0.76 during Pre & Post COVID periods respectively. Senility specific mortality rates had a statistically significant increase during Post COVID period in both genders. (Table 4)

Table 4: Gender wise Cause Specific Mortality Rates for selected diseases during Pre COVID (April to September 2019) and Post COVID (April to September 2022) periods, Kanniyakumari District

	2019				2022			
Mortality due to	Deaths	Population	Mortality rate per 1000 for six months	Confidence Interval	Deaths	Population	Mortality rate per 1000 for six months	Confidence Interval
Heart disease and Heart Attacks in males	1599	1005617	1.59	1.51 to 1.67	1724	1014373	1.70	1.62 to 1.78
Heart disease and Heart Attacks in females	1098	993415	1.11	1.04 to 1.17	1277	1008444	1.27	1.20 to 1.34
Senility in males	435	1005617	0.43	0.39 to 0.48	573	1014373	0.56	0.52 to 0.61
Senility in females	478	993415	0.48	0.44 to 0.53	762	1008444	0.76	0.71 to 0.81

DISCUSSION

In comparison to pre COVID period, all-cause mortality rate of total population and all age group female

population had a statistically significant increase in the Post COVID period; mortality rate of males had also increased in Post COVID period, but there was a mild overlapping of confidence intervals of mortality rates of two periods. Comparison of various age group specific mortality rates indicated that there was a statistically significant increase in the mortality rate of above 60 years age group in the Post COVID period. Comparison of cause specific mortality rates of two periods brought forth a statistically significant increase in the Post COVID period mortality rates for the following causes: heart disease & heart attacks and senility; there was a statistically significant decrease of mortality rates due to bronchial asthma and pneumonia. Gender wise analysis for heart disease & heart attacks revealed that increase among females was statistically significant; for the cause mentioned as senility, statistically significant increase was found in both genders.

Lee et al had done a study in United States in which they did estimation of deaths happening in excess of expected seasonal range. That study had showed an increase in all-cause mortality and mortality due to causes like respiratory diseases and cardiac diseases in their latter part of period. The study period was March 2020 to April 2021 which was the time in which COVID Pandemic was in full blown scale.[6] Ayoubkhani et al had conducted a study in United Kingdom to know the rates of post COVID syndrome among discharged patients who were treated for COVID 19. Their results showed that in a period of nearly five months period, more than 10 per cent of them had died.[7] Above studies supported the view that COVID viral influence could have increased population mortality.

Review article by Gao et al mentioned that women used to have a higher level of mortality and poor prognosis following acute cardiovascular events; this study had been published at the end of 2019.[8] This study supported the view that increase in female mortality could have happened even if there was no COVID Pandemic. Lopez and Adair had documented an increase in cardio vascular deaths among US males and females and Canada females in a vital statistics based study done in 2017.[9] Special article by Timmis et al had discussed that Cardio vascular disease burden was greater and procedure rates were lower in middle income countries.[10] The above points had been cautioning us against causal attribution of increased mortality especially mortality due to cardio vascular causes to COVID Pandemic alone; it could have happened even otherwise

Our study clearly showed some changes in mortality experience of study population after COVID pandemic; but with available data, the seen change in mortality could not be causally attributed to the COVID 19 viral influence in the biology of population.

The study had suggested following research questions:

1. Could the increase in mortality of study population have happened in the absence of COVID Pandemic too?
2. Could same change be seen in mortality experience of some other study population also?
3. Why mortality rate of females had increased after COVID Pandemic?
4. Why heart disease specific mortality rate had increased in females after COVID Pandemic?
5. What are all the factors contributing to the increase in death due to senility?
6. What are the factors contributing to the decrease in mortality rate due to pneumonia and bronchial asthma?

CONCLUSIONS & RECOMMENDATIONS

All-cause Mortality had a significant increase in post COVID period; old age population and females had been dying more in post COVID period. Mortality due to heart disease and heart attacks had been higher in post COVID period. Mortality due to bronchial asthma and pneumonia had decreased in post COVID period. We recommended further studies before attributing the difference in mortality experience to COVID 19 exposure of population.

REFERENCES

1. DR. K. PARK. Demography and Family planning. In: Park's Text book of preventive Medicine. 25th ed. M/s BANARSIDAS BHANOT; p. 530–71.

2. WHO. COVID-19 - China [Internet]. WHO; [cited 2022 Oct 8]. Available from: https://www.who.int/emergencies/disease-outbreak-news/item/2020-DON229

3. Andrews M, Areekal B, Rajesh K, Krishnan J, Suryakala A, Krishnan B, et al. First cinfirmed case of COVID 19 infection in India: a case report. Wolters Kluwer. 151:490–2.

4. Tamil nadu reports first case of corona virus. The economic times Politics [Internet]. [cited 2022 Oct 8]; Available from: https://economictimes.indiatimes.com/news/politics-and-nation/tamil-nadu-reports-first-case-of-coronavirus-patient-quarantined-in-government-hospital-in-chennai/articleshow/74529929.cms

5. Cyrus Ghaznavi, Akifumi Eguchi, Yuta Tanoue, Daisuke

Yoneoka, Takayuki Kawashima, Motoi Suzuki. Pre- and post-COVID-19 all-cause mortality of Japanese citizens versus foreign residents living in Japan, 2015–2021. Elsevier. 2022;18.

6. Lee WE, Park SW, Weinberger DM, Olson D, Simonsen L, Grenfell BT, et al. Direct and indirect mortality impacts of the COVID-19 pandemic in the US, March 2020-April 2021 [Internet]. Epidemiology; 2022 Feb [cited 2023 Mar 22]. Available from: http://medrxiv.org/lookup/doi/10.1101/2022.02.10.22270721

7. Ayoubkhani D, Khunti K, Nafilyan V, Maddox T, Humberstone B, Diamond I, et al. Post-COVID syndrome in individuals admitted to hospital with COVID-19: retrospective cohort study. BMJ. 2021 Mar 31;n693.

8. Gao Z, Chen Z, Sun A, Deng X. Gender differences in cardiovascular disease. Med Nov Technol Devices. 2019 Dec;4:100025.

9. Lopez AD, Adair T. Is the long-term decline in cardiovascular-disease mortality in high-income countries over? Evidence from national vital statistics. Int J Epidemiol. 2019 Dec 1;48(6):1815–23.

10. Timmis A, Vardas P, Townsend N, Torbica A, Katus H, De Smedt D, et al. European Society of Cardiology: cardiovascular disease statistics 2021. Eur Heart J. 2022 Feb 21;43(8):716–99.

Vol 3 | Issue 1 | January - April | 2023

ORIGINAL ARTICLE - PUBLIC HEALTH

A STUDY TO ASSESS THE WEANING AND ITS KNOWLEDGE AMONG POSTNATAL MOTHERS IN PARAMAKUDI HEALTH UNIT DISTRICT

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Abstract

BACKGROUND: Knowledge about weaning is essential for mothers as it marks an important stage in a child's development. Weaning is the process of introducing a baby to solid foods and gradually reducing their dependency on breast milk or formula. It is a crucial phase in a child's growth and development as it provides them with the necessary nutrients required for their physical and mental development.

OBJECTIVE : To assess the knowledge about weaning practices among Postnatal mothers in Paramakudi.

SETTINGS AND DESIGN : A descriptive study was conducted in the selected area, selecting the mothers who have children of age 4-6 months. Mothers who can read Tamil were included in the study. Mothers who had Visual and Auditory impairment, who can't read Tamil, Not willing mothers, women who had children diagnosed with inborn metabolic disorders, diabetes, heart disease, and infants who were on special feeds or diets were excluded from the study.

METHODS AND MATERIAL : The Parthian block was selected randomly among six blocks of Paramakudi HUD. A self-administered questionnaire was given to all the mothers with children between 4 to 6 months of age. Totally 60 mothers' response was collected and analyzed. A pre-validated questionnaire was used to collect the data from all the study participants. The data included were socio-demographic details and information regarding knowledge, timing, and practices of breastfeeding and weaning, and the nutritional importance of complementary food.

RESULTS : In our study, the Mean age of the participants was 25.6 + 3.7 years, with a minimum age of 20 and a maximum of 35 years. Occupation-wise, 23% were self-employed, 95% had own houses, and 47% were in a joint family. 60% of the participants had children aged 6 months and 33% had children of 5 months age. 93% of participants are aware of weaning and 97% of them known about weaning preparation and methods. About 87% of mothers were aware of the correct period to start weaning (6 months).About 75% of mothers are afraid of allergic reactions while starting weaning.

CONCLUSION : The majority of mothers followed exclusive breastfeeding and introduced complementary foods to their infant's diet at the recommended age of six months. However, the quality of complementary food, composition, quantity, and frequency was found to be inadequate. Moreover, the majority of the uneducated mothers withheld complementary food from their babies which was attributed to their lack of education and knowledge. The present study will help mothers to prevent malnutrition and nutritional deficiency diseases. Knowledge about weaning methods and practices was found to be satisfactory. Teaching mothers about good weaning practices will help to promote the growth and development of the child, to realize its full genetic potential.

KEYWORDS : Weaning, Postnatal mothers, Paramakudi.

INTRODUCTION

Breastfeeding children exclusively during the first six months of birth confers the baby with a passive immunity that is essential in the absence of a well-developed immune system. Moreover, the children are supplemented with complementary food after six months to meet the increasing nutritional requirements necessary for growth and development. This process is defined as weaning, and mothers who carry out weaning must be well informed about the timing and types of complementary food along with other aspects of nutrition.[1]

Weaning is important as breast milk is insufficient to meet the nutritional requirements of Infants after six months of birth. It helps to address the increasing nutritional requirements of the baby for its growth and development to realize its full genetical potential.

Breastfeeding for the first six months of life, appropriate time for weaning, and the quality of complementary food during weaning significantly affect the lifelong eating behaviors and health status of children. However, people belonging to low socioeconomic classes, illiterates, and those who reside in rural areas with minimal access to healthcare do not have adequate knowledge of weaning practices and the nutritional requirements of children.[2]

Improper nutrition could predispose children to irreversible cognitive damage and affects their physical and psychological health. Considering the importance

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of complementary food and because there is no specific guideline about the composition and quality of such food, mothers need to improve their knowledge. Moreover, the low nutritional value of complementary food predisposes children to stunted growth, low immune responses, and cardiovascular diseases. Recent research has pointed toward the positive effects of nutrition-rich complementary food in the development of a beneficial gut microbiome and a healthier respiratory system. The withdrawal of breastfeeding, time to weaning, and the nature of complementary feeding differ with the social, cultural, economic, and geographical patterns globally.[3]

Proper knowledge and training are required to perform effective weaning. Many studies conducted on Weaning practices in India and abroad reveal that most mothers, especially primipara mothers have inadequate knowledge regarding effective weaning practices they are following traditional feeding practices. Effective weaning in the child requires proper knowledge and good technical skills in the mothers.

JUSTIFICATION

Weaning is one of the many milestones in a baby's process of development. It is very important for a baby's health and development. Weaning can be a very emotional time for the woman and child. It is not just a transition to another feeding method, but start of an end to the special relationship between mother and child. During this process, a child may need more attention and cuddle time to take the place of the nurse.[4]

Today's children are the wealth of tomorrow. They are regarded as a future citizen of the nation. Every child has the right to have healthy growth. Hence it is essential to nurture them to strive for their well-being. When a baby reaches four to six months of age, milk alone is no longer sufficient to meet its nutritional requirements. Calories and other nutrients are needed to supplement milk until the child is ready to eat only adult foods. This is the weaning stage. Weaning is the process of expanding the diet to include food and drinks other than breast milk or infant formula.[4]

Weaning is a time of nutritional vulnerability. According to the World Health Organization (WHO), infant mortality rates are high in African (43%), Central, and South-East Asian (36%) countries.[5] The infant mortality rate in India is 69 per 1000, in Tamil Nadu 44/1000 live births, and in Salem 52 per 1000 live births.[2] One of the major causes of infant mortality is malnutrition. It is high at the time of weaning due to the rapid onset of infection and diarrhea. Weaning is a gradual and difficult process. It is psychologically significant because the infant is required to give up major oral pleasure. They learn good things come from a cup. If an adequate amount is not provided, it leads to malnutrition diarrhea, and growth failure leading to kwashiorkor, marasmus, immunodeficiency, and persistent infection that may be fatal. A nutritionally adequate weaning diet is essential for achieving optimal growth in the first year. Growth in the first year influences both the well-being of the child and the long-term health of the adult.[6]

OBJECTIVE

The objective of this study is to assess the knowledge about weaning practices among Postnatal mothers.

SUBJECTS AND METHODS

Parthibanur block was selected randomly among six blocks of Paramakudi HUD. A self-administered questionnaire was given to all the mothers with children aged between 4 to 6 months. Totally 60 mothers' response was collected and analyzed. The study was carried out for a period of two weeks. After taking informed consent, PN mothers with 4 to 6 months old children, Mothers who can read Tamil were included in the study.

Mothers who had Visual and Auditory impairment, who can't read Tamil, Not willing mothers, women who had children diagnosed with inborn metabolic disorders, diabetes, heart disease, and infants who were on special feeds or diets were excluded from the study. A pre-validated questionnaire was used to collect the data from all the study participants. The data included were socio-demographic details and information regarding knowledge, timing, and practices of breastfeeding and weaning, and the nutritional importance of complementary food.

RESULTS

The mean age of the study participants was 25.6 + 3.7 years, with a minimum age of 20 and a maximum of 35 years.

Table 1 shows the descriptive details of the demographic characteristics of the study participants such as age category, Educational qualification, Occupation of the PN mother, Type of family and the type of house.

It infers that 53% of the study participants had educational qualification of 10th-12th, 71% of the participants were home-maker. 53% of the participants belonged to nuclear family, and 95% participants had own houses.

60% of the participants had children aged 6 months and 33% had children of 5 months age.

Vol 3 | Issue 1 | January - April | 2023

Table 1:Distribution of Demographic data

Variable	Frequency	Percentage
Mothers Age		
≤20 years	21	35
21-25 years	34	56
26-30 years	4	6
>30 years	1	1
Educational Qualification		
<10th	20	33
10th to 12th	32	53
>12th / Graduate	8	13
Occupation		
Govt/Pvt Employee	3	5
Self-employed	14	23
Homemaker	43	71
Types of Family		
Joint Family	28	47
Nuclear family	32	53
Type of House		
Own house	57	95
Rented houses	3	5

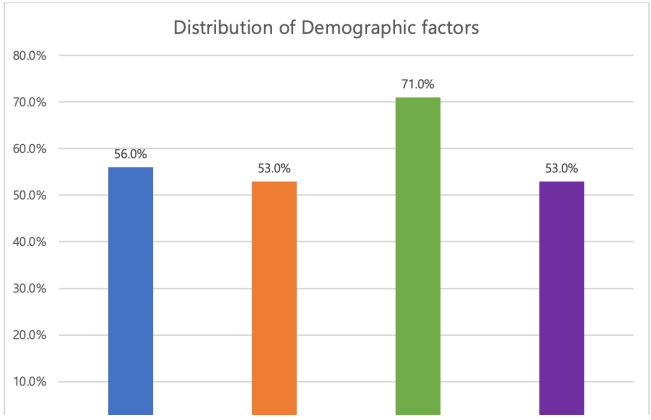

Figure 2: Prevalence of Social and emotional Problems

Table:2 Weaning Knowledge Assessment

S.No	Knowledge on weaning	Percentage
1	Do you know, What is weaning?	
	Yes	93
	No	7
2	Should hands be washed before preparation for weaning?	
	Yes	93
	No	7
3	Can weaning foods be prepared at home?	
	Yes	97
	No	3
4	Should clean vessel be used to prepare weaning foods?	
	Yes	97
	No	3
5	Can breastfeeding be continued along with weaning?	
	Yes	100
	No	0
6	Can unhygienic weaning practices cause diarrhea?	
	Yes	100
	No	
7	Can first time weaning cause allergy?	
	Yes	78
	No	22
8	Can weaning be started with semi-solid food?	
	Yes	96
	No	4
9	Does weaning increase the baby's weight?	
	Yes	97
	No	3
10	Can weaning be started with foods one by one	
	Yes	92
	No	8
11	Can weaning be gradually increased?	
	Yes	97
	No	3

12	At which month can weaning be started?	
	6 months	87
	>6 months	13
13	Till which month breast milk is enough for babies?	
	6 months	72
	>6 months	28
14	Whether home-made weaning foods are good for babies?	
	Yes	100
	No	0
15	At which month can egg be started for babies?	
	9^{th} -10^{th} month	60
	Not aware	40
16	At which month can meat be started for babies?	
	1year	60
	>2 years	40
17	From which month, the baby can eat all home foods?	
	2 years	90
	>3 years	10
18	After 9 months, can we give 1/2 bowl of food 3-4 times per day?	
	Yes	97
	No	3
19	At the start of the weaning, If the baby hesitates to take, can we continue weaning?	
	Yes	87
	No	13

Table 2 shows the response to weaning knowledge assessment questionnaire.

93% of participants are aware of weaning and 97% of them known about weaning preparation and methods. About 87% of mothers were aware of the correct period to start weaning (6 months).

100% of mothers were aware that breast feeding can be continued along with weaning and unhygienic weaning practices can cause diarrhoea. More than 60% of mothers were aware of the correct age to start egg and meat.

About 75% of mothers are afraid of allergic reactions while starting weaning.

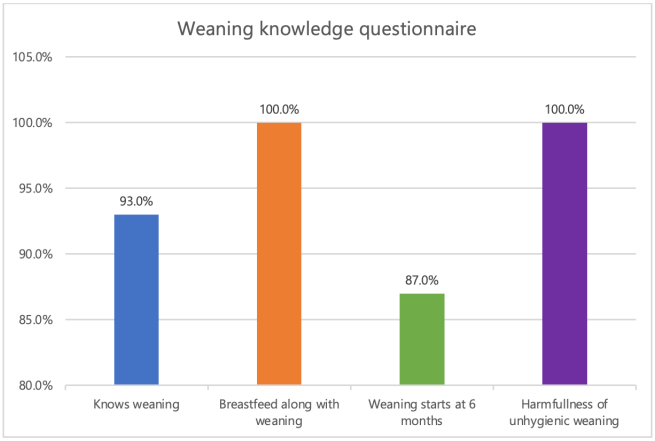

Figure 2: Level of Weaning Knowledge

DISCUSSION

The physiological process of weaning is complex and involves biochemical, nutritional, immunological, and psychological adjustments. The introduction of new food is important both socially and nutritionally. The beginning of weaning is the beginning of a time of great change for both the mother and the child. Additional protein becomes necessary toward the end of the first year in the child and the infant also needs the bulk of roughage about this time. The ability to handle foods other than milk also depends on the physiological development of the infant.[7]

The appearance of salivary amylase in the saliva between two and three months of age marks the time when the infant is ready to handle more complex carbohydrates, such as starch in cereals. By four to six months of age, most infants can handle most proteins. The kidney tubules become efficient by six to eight weeks, after which there is less concern over the use of a high-protein, high-sodium diet.[8]

Eating solids and learning to drink from a cup are important social achievements. The optimal approach of weaning matches the needs and requirements of a given child with the function and capacities of his body.[7]

In a study from Malawi, 30.8% of children were noted to suffer from stunted growth. This was associated with lower rates of exclusive breastfeeding practice as evidenced by the Malawi Demographic Health Survey (2015-2016) study that assessed 2294 children aged between 0-23 months. This study also noted that women in urban areas are less likely to breastfeed infants immediately after birth. However, they follow better complementary feeding practices.[9]

Poor knowledge of weaning (6.2%) and complementary feeding practices was observed in a study that was reported from Nigeria. It was noted that the age of the mother and the family settings significantly influenced the knowledge and practice of weaning and complementary feeding.[10]

The knowledge of weaning was noted to be unsatisfactory among the women from Saudi Arabia. Moreover, women were not adequately educated about the symptoms of weaning among infants. Despite adequate educational qualifications, the infants were underfed. This was attributed to the fact that women preferred to follow local customs instead of seeking doctors' advice.[11]

CONCLUSION

In our study, Demographic characteristics reveal highest percentage (52%) of mothers were between the age group of 21 – 25 years. It might be associated with the early reproductive age group as the mothers selected for the study were infants below 6 months of age and the average marriage in India for females is 21 years. In our study, the Minimum age is 20, Maximum age is 25. Occupation-wise, 23% were self-employed, 95% had own houses, and 47% were in a joint family. Mothers with 6month old child were 60%, 5month old child was 33%.

In the weaning knowledge assessment questionnaire 93% to 97% of mothers had known about weaning preparation and methods. About 87% of mothers were aware of the correct weaning starting month of 6 months, and 10% are not aware. More than 60% of mothers were aware of the correct age to start egg and meat. About 75% of mothers are afraid of allergic reactions while starting weaning.

The study results have demonstrated that the women from this geographical region have a moderate level of knowledge of breastfeeding, weaning, and complementary feeding practices. The levels of awareness among this population has significantly improved with the briefing of standard and recommended breastfeeding, weaning, and complementary food practices

LIMITATIONS

Sample size estimation was not done following statistical methods and hence may not be representative of the study population.

ACKNOWLEDGEMENT

Our sincere thanks to our DDHS Dr.P.Prathap sir, for his continuous support and motivation. We would like to thank DMCHO Mrs.S.K.Vijipriya mam for her constant supervision and support. Our grateful thanks to Dr.K.N.Ponnien selvan sir AP., Krishnagiri medical College for his guidance and support. We express our sincere gratitude to all the mothers who participated in the study and contributed to their fullest to make this work possible.

REFERENCES

1. Naigulevu A. Ghai Essential Paediatrics [Internet]. [cited 2023 Apr 13]. Available from: https://www.academia.edu/40714664/Ghai_Essential_Paediatrics

2. Zeleke LB, Gebremihael MW, Mehretie Adinew Y, Abebe K. Appropriate Weaning Practice and Associated Factors among Infants and Young Children in Northwest Ethiopia. J Nutr Metab. 2017 Jul 20;2017:1–7.

3. indianwomenhealth-blog. Indian Womens Health India [Internet]. Find online all about women heath care and women health tips in India. [cited 2023 Apr 13]. Available from: https://indianwomenhealth-blog.tumblr.com/

4. Rajiv Gandhi University of Health Sciences Karnataka [Internet]. [cited 2023 Apr 13]. Available from: http://www.rguhs.ac.in/

5. Cureus | Assessment of Breastfeeding, Weaning, and Complementary Feeding Practices Among Women Attending a Tertiary Care Teaching Hospital in South India | Article [Internet]. [cited 2023 Apr 13]. Available from: https://www.cureus.com/articles/111740-assessment-of-breastfeeding-weaning-and-complementary-feeding-practices-among-women-attending-a-tertiary-care-teaching-hospital-in-south-india#!/

6. National Center for Biotechnology Information [Internet]. [cited 2023 Apr 13]. Available from: https://www.ncbi.nlm.nih.gov/

7. Dhanasekaran N. Knowledge on practice of weaning among the mothers with infant below six months of age in Salem, Tamilnadu. J Coll Med Sci-Nepal. 2015 Sep 18;11(1):12–6.

8. Sajilata G, Singhal RS, Kulkarni PR. Weaning foods: a review of the Indian experience. Food Nutr Bull. 2002 Jun;23(2):208–26.

9. Walters CN, Rakotomanana H, Komakech JJ, Stoecker BJ. Maternal determinants of optimal breastfeeding and complementary feeding and their association with child undernutrition in Malawi (2015–2016). BMC Public Health. 2019 Nov 11;19(1):1503.

10. Factors influencing complementary and weaning

practices among women in rural communities of Sokoto state, Nigeria - PubMed [Internet]. [cited 2023 Apr 13]. Available from: https://pubmed.ncbi.nlm.nih.gov/29881498/

11. Knowledge, Attitude, and Practice of Weaning among Mothers in Najran Region, Saudi Arabia, 2021 - PubMed [Internet]. [cited 2023 Apr 13]. Available from: https://pubmed.ncbi.nlm.nih.gov/35284142/

Vol 3 | Issue 1 | January - April | 2023

Vol 3 | Issue 1 | January - April | 2023

ORIGINAL ARTICLE - PUBLIC HEALTH

A CROSS-SECTIONAL STUDY ON AWARENESS AND PERCEPTION OF HEALTH INSURANCE AMONG RURAL POPULATION IN NAGAPATTINAM DISTRICT, TAMILNADU

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Abstract

BACKGROUND : Awareness and recognition of health insurance is still very preliminary. Health insurance is not a new concept and people are getting used to it, but this awareness has not yet reached the level of universal subscription to health insurance products. Insurance has not been widespread in rural areas for important reasons such as high delivery costs and low rural awareness of private and government insurance products. There is a need to provide rural families with financial security for the treatment of serious illnesses requiring hospitalization or surgery. This study is an attempt to raise individual awareness and awareness in the field of health insurance.

METHODOLOGY : A community-based cross-sectional study was conducted with 412 participants in a rural area of Nagapattinam, Tamil Nadu. A predesigned semi-structured questionnaire was used to interview them. Data were entered into Ms Excel and analyzed with SPSS 16.

RESULT : The study population consisted of 227 (55.1%) males and 185 (44.9%) females. Awareness was higher among women (74.6%) than among men (56.8%). 46-55 years (31.8%) was the largest, 36-45 years (26.2%), 56-65 years (24.5%), 26-35 years (12.1%), >66 (5.3%). There was a statistically significant association between education and health insurance perceptions (p=0.010). The most important sources were family members (241 (58.5%)), followed by friends (21) (5.1%) and insurance agents (1.9%). 14 (3.4%) knew about the eligibility requirements and 72 (17.5%) knew about the services provided by the health system.

CONCLUSION : In this survey, 267 people (64.8%) surveyed had public awareness of health insurance. About 62.86% of the participants had a Prime Minister's Comprehensive Health Insurance Card (CMCHIS), 1.94% of the survey participants had a private insurance card, while 35.15% of the survey participants had no insurance card. I didn't have it. Only 3.39% of study participants were aware of their health insurance requirements. 17.4% of participants were aware of the various benefits of health insurance. 93.3% of the participants knew how to use their health insurance cards only in public hospitals, but did not know how to use their cards in private hospitals. Only 2.42% of survey participants knew their health insurance coverage. 1.45% (n=6) of participants were aware of the age restriction criteria. 1.69% (n=7) of participants were familiar with various diagnostic tests paid for by health insurance. Only 1.21% (n=5) of survey participants had knowledge of call centers.

KEYWORD : Universal Health Insurance, Health Insurance Recognition and Recognition, CMCHIS.

INTRODUCTION

"Health insurance" is still an unfamiliar word to most people in developing countries, especially in rural areas. It is generally believed that people, except for the upper class, cannot afford such social security. Disease remains a permanent threat to earning capacity for most people in poor developing countries.

India, her second most populous country in the world, is poised to change the socio-political, demographic and morbidity patterns that have received global attention in recent years. Communicable diseases, infectious diseases, waterborne diseases, respiratory infections, pneumonia and genital infections dominate the morbidity patterns, especially in rural areas. However, non-communicable diseases such as cancer, blindness, mental illness, hypertension, diabetes, HIV/AIDS, accidents and injuries are increasing among rural populations facing the same risks as urban populations., leading to death, illness, injury and accidents. [1-2]

People in rural areas are at such risk due to their social and economic situation. There is a need to provide rural families with financial security for the treatment of serious illnesses requiring hospitalization or surgery. The government has taken many initiatives to fill the shortage of health facilities, especially in rural areas. Health insurance is both a way to remove economic barriers and increase access to quality health care for the poor, as well as an effective social protection mechanism.

India spends less than 5% of her GDP on healthcare, making her one of the countries with the lowest healthcare

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expenditures. According to the World Health Organization's Global Health Expenditure Database 2014, 89% of India's population pays out-of-pocket medical costs. With about 70% of India's population living in rural areas and about 28% of the population living below the poverty line, out-of-pocket health care costs put significant pressure on the budget.[3]

According to a 2015 national sample survey, 41.9% of the rural population rely on public healthcare over private healthcare due to financial constraints. The Government of India has introduced several Government Sponsored Health Insurance Schemes (GSHIS).[4] Sponsored private health insurance companies have offered a glimmer of hope in reducing out-of-pocket costs for rural residents and providing affordable tertiary care. According to NFHS-4, only 57% of households had access to various health plans in 2015-2016.[5]

In Nagapattinam District, only 58% of households have multiple health insurance plans. Therefore, there is a need for research on health insurance perceptions and perceptions of rural residents in Nagapattinam district, Tamil Nadu.

METHODOLOGY

A community-based cross-sectional study was conducted in September-November 2021 with the approval of the Institutional Ethics Committee of Madras Medical College, Chennai, among people living in rural areas of Nagapattinam. The sample size was calculated from previous studies showing 42.6% of the Prime Minister's prevalence awareness of health insurance using the formula (N = Z2 PQ/d2). Out of 42 HUDs, Nagapattinam HUD was selected by simple random sampling, and in this HUD, Kariyapattinam blocks were selected by simple random sampling from 35 villages. random selection. In selected villages, individual lists were obtained from household registers maintained by village public health nurses. Eligible study participants were selected by simple random sampling and included in the study after obtaining written informed consent. A pre-tested, semi-structured questionnaire was used to ask study participants about their health awareness and perceptions. The data were entered into MS Excel. We performed descriptive and inferential analysis using SPSS version 16.

RESULTS

Results of a survey conducted to assess health insurance perceptions and perceptions of his 412 participants in Nagapattinam District, Tamil Nadu.

The study population consisted of 227 (55.1%) males and 185 (44.9%) females. 46-55 years (31.8%) was the largest, 36-45 years (26.2%), 56-65 years (24.5%), 26-35 years (12.1%), >66 (5.3%).

Of the study participants, 231 (56.1%) had a primary education, 83 (20.1%) had a higher education, 82 (19.9%) had a secondary education, and 16 (3.9%) had a college degree. and was a graduate student. There was a statistically significant association between high school education and health insurance awareness (p=0.010). 16% (n=66) of study participants belonged to the lower middle socioeconomic class, and there was a statistically significant association between socioeconomic status and insurance (p=0.001) . 267 (64.8%) belonged to nuclear families. There was no statistically significant relationship between family type and health insurance awareness. 387 (93.9%) were married, and marital status was significantly associated with health insurance awareness (p-value = 0.002).

Awareness of health insurance among study participants was 267 (64.8%). In this study, 62.86% of the participants had a Prime Minister's Comprehensive Health Insurance Card (CMCHIS), 1.94% of the study participants had a private insurance card, and 35.15% of the study participants had no insurance card. did not have (Table 1).

Table1: Awareness of health insurance based on socio – demographic profile

Variables	Category	Frequency (N=412)	Health insurance awareness		Chi square value	P value
			Yes (%)	No (%)		
Gender	Male	227	129	98	14.106	0.001
	Female	185	138	47		
Age group	26-35	50	17	33		
	36-45	108	71	37	27.936	0.001
	46-55	131	91	40		
	56-65	101	76	25		
	> 66	22	12	10		
Education	Primary	231	147	84		
	Middle	82	16	0		
	High/higher	83	57	26	11.389	0.010
	Graduate	16	47	35		
SEC	Upper class	71	46	25		
	Upper middle	119	61	58	20.612	0.001
	Middle	89	62	27		
	Lower middle	81	66	15		
	Lower	52	32	20		
Type of family	Joint	114	87	57		
	Nuclear	267	179	88	2.334	0.30
	3 Generation	1	1	0		
Marital status	Married	387	256	131		
	Unmarried	16	4	12	12.086	0.002
	Widow	9	7	2		

Only 3.39% (n=14) of study participants knew about health insurance eligibility requirements. 17.4% (n=72) of participants were aware of various health insurance benefits,

and 93.3% (n=387) of participants were only aware of the use of health insurance cards in public hospitals, I didn't have that knowledge. Card use in private hospitals. Only 2.42% (n=10) of survey participants knew their health insurance coverage. 1.45% (n=6) of participants were aware of the age restriction criteria. 1.69% (n=7) of participants were familiar with various diagnostic tests paid for by health insurance. Only 1.21% (n=5) of survey participants knew about call centers and 1.45% (n=6) knew only the admission criteria (Figure 1).

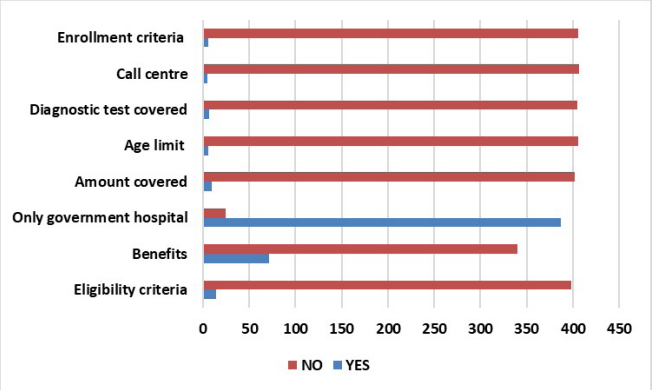

Figure 1: Awareness about health insurance scheme

In this current survey, only 276 people had knowledge of health insurance. Of these, the most important sources were family members 241 (87.31%), followed by friends 21 (7.60%), insurance agents 8 (2.89%), television 5 (1.81%) and newspapers 1 (0.36%) (Figure 2).

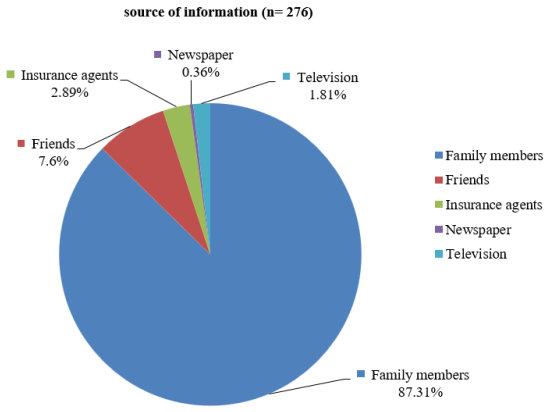

Figure 2: Source of information about health insurance

DISCUSSION

Awareness of health insurance companies:

Health insurance is now seen as an important way to meet people's medical needs and make better use of existing medical facilities. In the past, health insurance was always seen as the wealthy part of society, so governments were responsible for providing health insurance to the poor.In most countries, public health coverage is inadequate. Health insurance is recognized as an important way to promote health equity in all sectors of society. Health insurance awareness has not yet reached the roots of rural residents6. The study populations included 227 (55.1%) males and 185 (44.9%) females. Awareness was higher in women than in men, and this difference was statistically significant (p=0.001). Awareness was also higher in men in his study by Madhukumar et al.6 in Bangalore. With regard to education and socioeconomic status, study participants had completed tertiary education (p=0.010), belonged to the lower middle group (p=0.001), and had improved knowledge of health insurance awareness. rice field. This difference was statistically significant, and a similar statistically significant difference was seen in the study by Reshmi et al.[7] From this, it can be concluded that educational status and socioeconomic status play an important role in health insurance perception. In contrast to our findings on family type, there was no significant association between family type and health insurance. A study conducted by Madhukumar et al.[6] found a significant association between family type and health insurance awareness.

In this current study, only 3.39% (n = 14) of study participants had knowledge of health insurance eligibility requirements. 17.4% (n=72) of participants were aware of various health insurance benefits, and 93.3% (n=387) of participants were only aware of the use of health insurance cards in public hospitals, I didn't have that knowledge. Card use in private hospitals. Only 2.42% (n=10) of survey participants knew their health insurance coverage. 1.45% (n=6) of participants were aware of the age restriction criteria. 1.69% (n=7) of participants were familiar with various diagnostic tests paid for by health insurance. Only 1.21% (n=5) of survey participants knew about call centers and 1.45% (n=6) knew only the admission criteria. In a study by Madhukumar et al. 6, only 35.3% of study participants knew him. It was even lower than in the current survey.

Health Insurance Knowledge Sources :

In this survey, the most important sources of health insurance information were family members 241 (87.31%), followed by friends 21 (7.60%), insurance agents 8 (2.89%), television 5 (1.81%) and newspapers 1 (0.36%). was. %). A study by Madhukumar et al. and Reshmi et al.[6,7]

Media and television play a major role in spreading awareness of health insurance. A study by Raja Tk et al. Fifty-one percent (159) knew about health insurance, with television (38.3%) and insurance agents (37.2%)[8] being the most important sources of information8. The majority of respondents had a good knowledge of the program's benefits, but relatively little knowledge of how to use the service. More

efforts are needed to spread the message through television, short films, role-plays and social dramas. Public health agencies and staff play a key role in taking every opportunity to educate communities about existing programs.

In a study by Panda et al. An assessment of community health insurance awareness found that interactive, contextual, and cognitive tools can help improve insurance understanding.[9] In addition to awareness and knowledge penetration with appropriate health communication more cost friendly schemes that will help reduce the premium paid, contributed majorly by the public sector and innovative ways to reducing the existing out of pocket expenditure are the need of the hour. Developing policies that will be available, accessible, acceptable and affordable to all sections of the society is the way to go.[10]

CONCLUSION

In this current study, only participants' attitudes to health insurance perceptions are presented. Awareness of health insurance among study participants was 267 (64.8%). 62.86% of the participants had a Prime Minister's Com9prehensive Health Insurance Card (CMCHIS), 1.94% of the survey participants had a private insurance card, while 35.15% of the survey participants had no insurance card. was not Only 3.39% of study participants knew about health insurance eligibility requirements. 17.4% of participants knew about the various benefits of health insurance, and 93.3% of participants knew how to use their health insurance cards only in public hospitals and did not know how to use them in private hospitals. Only 2.42% of survey participants knew their health insurance coverage. 1.45% (n=6) of participants were aware of age restriction criteria. 1.69% (n=7) of participants were familiar with various diagnostic tests paid for by health insurance. Only 1.21% (n=5) of survey participants had knowledge of call centers.

LIMITATION

In the current study, he excluded UHC awareness and perceptions in only one village, so the results could not be extrapolated to other regions. Also, no detailed analyzes were performed on the difficulty of applying for insurance cards, the use of these insurance schemes, and the difficulty of claiming health insurance benefits. Barriers faced by those who do not have health insurance have not been considered.

RECOMMENDATION

In the current survey, about 40% were unaware of their health insurance company. Many were unaware of eligibility criteria, eligible benefits, and financial benefits. To that end, it is necessary to increase awareness of the health insurance system through various channels such as mass media and social media. In addition, beneficiaries will be made aware of various benefits at any time through individual calls/SMS. About 35% of the survey did not have a health insurance card. We've taken steps to raise awareness of these systems and make health insurance easier to access so everyone can avoid devastating medical costs.

CONFLICT OF INTEREST : Nil

ACKNOWLEDGEMENT

We would like to express our sincere gratitude to the people of Kodiyakarai village for their cooperation in this survey. We would also like to thank the village nurses of Kodiyakarai HSC for supporting this research by providing their register.

REFERENCES

1. The world health report 2000: health systems—improving performance. Geneva: WHO, 2000

2. Health expenditure. World Bank. Available at http://data.worldbank.org/indicator/SH.XPD.TOTL. ZS?end=2014&start=2014&view=map. Accessed 11 November 2021.

3. India Overview. Available at https://www.World bank.org/en/country/india/overview. Accessed 11 November 2021.

4. National Family Health Survey 4-Tamil Nadu. Fact sheet: Ministry of Health and Family Welfare, 2015-2016: 6.

5. Sundararaman T, Muraleedharan VR. Falling sick, paying the price. Econ Polit Wkly. 2015;50(1):17.

6. Madhukumar S, Sudeepa D, Gaikwad V. Awareness and perception regarding health insurance inBangalore rural population. Int J Med Public Health. 2012;2(2):18-22.

7. Reshmi B, Nair NS, Sabu KM, Unnikrishan B. Awareness of health insurance in a South Indian population–a community-based study. Health Population Perspec and Issues. 2007;30(3):177-88.

8. Raja TK, Kumar BM, Muthukumar T, Mohan AP. Awareness and perception of health insurance among rural population in Kancheepuram District, Tamil Nadu. Int J

Community Med Public Health 2019;6:3808-12.

9. Panda P, Chakraborty A, Dror DM. Building awareness to health insurance among the target population of community-based health insurance schemes in rural India. Trop Med Int Health. 2015;20(8):1093-107.

10. Reddy S, Selvaraj S. A Critical Assessment of the Existing Health Insurance Models in India. Public Health Foundation of India; 2011.
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Vol 3 | Issue 1 | January - April | 2023

ORIGINAL ARTICLE - PUBLIC HEALTH

A STUDY ON THE LONGEVITY OF NICU DISCHARGED LOW BIRTH WEIGHT BABIES FROM SECONDARY LEVEL OF CARE INSTITUTIONS IN MAYILADUTHURAI DISTRICT DURING 2021-2022.

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Abstract

BACKGROUND : The low birth babies especially weighing less than 2000 gms admitted at NICU are more at risk for morbidity & mortality during the first year of life after discharged from the NICU due to social, cultural, economic, familial, maternal factors, length of stay etc.

OBJECTIVE : To assess the 'longevity' of low birth weight NICU discharged babies at secondary level of care institutions in Mayiladuthurai district till their first year of life.

METHODS : A Retrospective study was conducted using purposive sampling and the study setting was Hospitals (secondary level of care institutions in Mayiladuthurai GH & Sirkali GH) and Community (Data from the obstetrical records and immunization records). Sample size was 102. Data were collected and analyzed using the Descriptive and Inferential Statistics such as percentage and chi square.

RESULTS : The study shows that 98 were alive and there is a significant association between the Duration of stay, Readmission after NICU discharge, Immunisation with Hepatitis B vaccine, Immunisation with all vaccines up to the age and the Longevity of the NICU discharged babies. There was a significant association between the Duration of Stay at NICU, Readmission after discharge from NICU, Immunisation status with Hepatitis B vaccine, Immunisation status with all vaccines (Except Hepatitis B) up to the age and the Longevity of the NICU discharge babies. But there was no significant association between the Maternal Age, High-Risk status of the mother, Nature of Birth, Gestational Age at Birth, Birth Weight of the baby, Sex of the Baby and the Longevity of the NICU discharge babies.

CONCLUSION : The study reveals that the longevity of NICU discharged low birth weight babies for the period of one year after birth was high (96.1%) than the mortality (3.9%). There was association between the longevity and the duration of stay at NICU, Readmission after NICU discharge, Immunisation status of the NISU discharged babies. There was no significant association between the longevity and the maternal age, High-Risk status of the mother, Nature of birth, Gestational age at birth, Birth weight and the Sex of the NICU discharged babies.

KEYWORDS :

INTRODUCTION

The world has made substantial progress in child survival since 1990. Globally, the number of neonatal deaths declined from 5 million in 1990 to 2.4 million in 2020.

Globally 2.4 million children died in the first month of life in 2020. According to World Health Organisation, the Neonatal mortality is Number of deaths during the first 28 completed days of life per 1000 live births in a given year or another period. "Number of deaths during the first 28 completed days of life per 1000 live births in a given year or other period". The infant mortality rate is the number of infant deaths for every 1,000 live births.

In India, Neonatal Mortality Rate (NMR) has been declined from 52 to 28 in 2020 and IN Tamilnadu, it has been declined to 9 in 2020 as per Sample Registration System. The SDG (Sustainable Development Goals) says in its Goal 3.2: By 2030, end preventable deaths of newborn and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1000 live births and under-5 mortality to at least as low as 25 per 1000 live births.

The IMR in India is 28 (as per SRS 2020) and in Tamilnadu, IMR is 13 (Rural – 15 and urban -10).

The survival is more endangered during the first year if life among the low birth weight babies[1] and that was evoked the authors of this study to d investigation about the longevity for a period of one year after birth of low birth weight babies who were discharged from NICU.[2]

OBJECTIVES

1. To assess the 'longevity' of low birth weight NICU babies at secondary level of care institutions in Mayiladuthurai district till their first year of life.

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2. To determine the association between the Maternal Age, High-Risk status of the mother, Nature of Birth, Gestational Age at Birth, Birth Weight of the baby, Sex of the Baby, Duration of Stay at NICU, Readmission after discharge from NICU, Immunisation status with all vaccines up to the age and the Longevity of the NICU discharged babies.

METHODOLOGY

STUDY DESIGN: A Descriptive Retrospective Study.

STUDY DURATION: 01.09.2020 to 31.08.2021

STUDY POPULATION: Low birth weight babies discharged from NICU at Mayiladuthurai GH & Sirkali GH with inclusion criteria.

STUDY AREA: Secondary care institutions in Mayiladuthurai District (Mayiladuthurai GH & Sirkali GH) and Community (Community based Data from PHC Registers, RCH registers, Immunization records, PICME online entry and discharge summary)

SAMPLE SIZE: 102

SAMPLING TECHNIQUE: : Purposive Sampling – After collecting the line list of NICU discharged babies from hospitals, the babies who met the inclusion criteria (102) were taken for the study.

INCLUSION CRITERIA:

1. Low birth weight babies who were admitted at NICU and discharged from Mayiladuthurai GH & Sirkali GH.
2. Low birth weight babies whose birth weight is less than 2000 gms at birth.
3. Low birth weight babies were admitted in NICU of Mayiladuthurai GH and Sirkali GH irrespective of their birth place and discharged during the period taken for the study.
4. The parents of low birth weight babies who accepted to participate in the study and gave informed consent.
5. The NICU discharged babies who are resident of Mayiladuthurai district only were included in the study.

EXCLUSION CRITERIA:

1. Low birth weight babies whose birth weight was more than 2000 gms.
2. The parents of low birth weight babies who were not willing to participate in the study.

METHOD OF DATA COLLECTION

Written Permission was obtained from the JDHS and DDHS for the line list of NICU discharged babies during 01.09.2020 to 31.08.2021. The line list and necessary details of all the low birth weight babies who were admitted at NICU of Mayiladuthurai GH and Sirkazhi GH was taken. A total of 616 NICU discharged babies from Mayiladuthurai GH and 172 from Sirkazhi GH were line listed and only total of 102 low birth weight babies were taken for the study who met the inclusion criteria. The data needed for the study were collected from the NICU discharged line list and Community based Data were collected from Primary Health Centres (PHC) Registers, Reproductive Child Health (RCH) Registers, Immunization records, Pregnancy Infant Cohort Monitoring and Evaluation (PICME) online entry and discharge summary to know about the survival status. In this study, the authors verified the survival status through telephonic interview and also through the direct visit to their homes to know about the longevity. The associated factors were collected from the NICU discharged line list, summary report of the NICU discharged babies, the immunisation registers at the PHC, RCH registers maintained by the Village Health Nurses and the PICME (Pregnancy Infant Cohort Monitoring and Evaluation) online portal data.

PICME :

PICME is the Pregnancy Infant Cohort Monitoring and Evaluation PICME is an online portal which is used for the pregnancy registration at Tamilnadu. The Tamil Nadu Government is trying to provide special care to the mothers as well as newborns by registering the pregnant mothers. As per PICME registration, an RCH ID (Reproductive and Child Health Identification Number) is provided to the pregnant mothers once they register their pregnancy in PICME online web portal through self-registration or registration at Common Service Centres or at Government hospital such as GH, Medical college hospitals and Primary Health Centres or through Village Health Nurses (VHN). It is a must for every pregnant woman in the state. After successful registration, one will get a PICME /RCH ID number. PICME number is a 12 digit number specific to every pregnant woman. The healthcare assistants (VHN) will soon get in touch with the pregnant mothers and provide them with RCH ID which can only be acquired through PICME number. And it is mandatory to register the pregnancy in Tamilnadu to get birth certificate in Tamilnadu.

All these modes were used to collect the data of longevity and the associated factors in this study. The study proforma included the residential status, contact details of the parents, Survival of those babies till the completion of first year of their life, maternal age, High-Risk status of the mother, nature of birth, gestational age at birth, birth weight of the baby, sex of the baby, duration of stay at NICU, readmission at any health facility after NICU discharge and Immunisation status of the baby.

The sample was calculated by the formula as follows;

Sample size $n = \frac{Z^2 \times P \times (1 - P)}{d^2}$

Z is the standard normal z-value for a significance level α = 0.05 (95% confidence), which is 1.96. d = Error < 5in this study. P= Prevalence and it was taken as 95.

$$= \frac{1.96 \times 1.96 \times 93.4 \times 6.6}{5 \times 5}$$

$$= 94.72$$

$$= 95 \text{ (Rounded value)}$$

In this study, sample size was 102. Hence the study sample size is more than the calculated sample size.

EXCLUSION CRITERIA:

Data was entered in MS EXCEL and analysed using Despricitive statistics (percentage) was used to describe. A Chi-square test was used to determine the statistical significance.

OPERATIONAL DEFINITIONS:

NICU Discharged low birth weight Babies: The low birth weight babies who were born at any health facility and were admitted in NICU and discharged from Mayiladuthurai GH and Sirkazhi GH.

Low Birth Weight Babies: As per WHO, low birth weight babies are who weigh less than 2500gms at birth. But in this study, the babies who weighed less than 2000 gms at birth only taken as they need intensive care at secondary level than the babies weigh between 2000gms and 2500 gms.

Longevity: The living status of the babies discharged from NICU for the period of one year (01.09.2021 to 31.08.2022).

RESULTS

Table 1: Association between maternal age at delivery and the longevity of NICU Discharged Babies

MATERNAL AGE AT DELIVERY					
	TEENAGE	**20-29YRS**	**>30YRS**	**TOTAL**	**CHI SQUARE VALUE**
LIVE CHILDREN	2 (2%)	80 (81.6%)	16 (16.3%)	98 (96.1%)	0.0108
DEAD CHILDREN	0	3 (75%)	1(25%)	4 (3.9%)	0.2651
TOTAL	**2 (1.9%)**	**83 (81.3%)**	**17 (16.8%)**	**102 (100%)**	**0.2759**

The P value at < 0.05 level of significance,

The Calculated value is less than the table value (0.2759<3.84).

That there is no significant difference between the Mother's Age and the Longevity of the NICU discharged babies.

Table 2 :Association between high-risk status of the mother and the longevity of NICU Discharged Babies

HIGH RISK STATUS OF THE MOTHER				
	HIGH RISK	**NON-HIGH RISK**	**TOTAL**	**CHI SQUARE VALUE**
LIVE CHILDREN	36(36.7%)	62 (63.3%)	98 (96.1%)	0.0934
DEAD CHILDREN	3(75%)	1(25%)	4 (3.9%)	2.2894
TOTAL	**39 (38.2%)**	**63 (61.8%)**	**102 (100%)**	**2.3828**

The P value at < 0.05 level of significance,

The Calculated value is less than the table value (2.3828 <3.84).

That there is no significant difference between the HIGH-RISK status and the Longevity of the NICU discharged babies.

Table 3 :Association between nature of birth and The longevity of NICU Discharged Babies

NATURE OF BIRTH				
	LSCS	**NORMAL**	**TOTAL**	**CHI SQUARE VALUE**
LIVE CHILDREN	57 (58.2%)	41 (41.8%)	98 (96.1%)	0.0041
DEAD CHILDREN	2 (50%)	2 (50%)	4 (3.9%)	0.1009
TOTAL	**59 (57.8%)**	**43 (42.2%)**	**102 (100%)**	**0.1050**

The P value at < 0.05 level of significance,

The Calculated value is less than the table value (0.1050<3.84).

That there is no significant difference between the Nature of Birth and the Longevity of the NICU discharged babies.

Table 4 :Association between gestational age at birth(weeks) and The longevity of NICU Discharged Babies

GESTATIONAL AGE AT BIRTH(WEEKS)					
	<28WEEKS	**29-36WEEKS**	**>36WEEKS**	**TOTAL**	**CHI SQUARE VALUE**
LIVE CHILDREN	2 (2%)	90 (91.3%)	6 (6.1%)	98 (96.1%)	0.086147
DEAD CHILDREN	0	3 (75%)	1 (25%)	4 (3.9%)	2.110599
TOTAL	**2 (2%)**	**93 (91.2%)**	**7 (6.8%)**	**102 (100%)**	**2.196746**

The P value at < 0.05 level of significance,

The Calculated value is less than the table value (2.1967 < 5.99).

That there is no significant difference between Gestational Age at Birth and the Longevity of the NICU discharged babies.

Table 5 :Association between birth weight at delivery and The longevity of NICU Discharged Babies

BIRTH WT (GMS)				
	<1500	**1500-2000**	**TOTAL**	**CHI SQUARE VALUE**
LIVE CHILDREN	24 (24.5%)	74 (75.5%)	98 (96.1%)	0.0000
DEAD CHILDREN	1 (25%)	3 (75%)	4 (3.9%)	0.0005
TOTAL	**25 (24.5%)**	**77 (75.5%)**	**102 (100%)**	**0.0005**

The P value at < 0.05 level of significance,

The Calculated value is less than the table value (0.0005 <3.84).

That there is no significant difference between the Birth of the baby and the Longevity of the NICU discharged babies.

Table 6 :Association between sex of the baby and The longevity of NICU Discharged Babies

SEX OF THE BABY				
	MALE	FEMALE	TOTAL	CHI SQUARE .UE
LIVE CHILDREN	47 (48%)	51 (52%)	98 (96.1%)	0.0441
DEAD CHILDREN	3 (75%)	1 (25%)	4 (3.9%)	1.0804
TOTAL	**50 (49%)**	**52 (51%)**	**102 (100%)**	**1.1245**

The P value at < 0.05 level of significance,

The Calculated value is less than the table value (1.1245 <3.84).

That there is no significant difference between the Sex of the Baby and the Longevity of the NICU discharged babies.

Table 7 :Association between duration of stay at NICU and The longevity of NICU Discharged Babies

DURATION OF STAY AT NICU				
	<10 DAYS	> 10 DAYS	TOTAL	CHI SQUARE VALUE
LIVE CHILDREN	78 (79.6%)	20 (29.4%)	98 (96.1%)	0.2572
DEAD CHILDREN	1 (25%)	3 (75%)	4 (3.9%)	6.3010
TOTAL	**79 (77.5%)**	**23 (22.5%)**	**102 (100%)**	**6.5582**

The P value at < 0.05 level of significance,

The Calculated value is more than the table value (6.5582 > 3.84).

That there is a significant difference between the Duration of stay at NICU and the Longevity of the NICU discharged babies.

Table 8 :Association between Readmission and The longevity of NICU Discharged Babies

READMISSION				
	READMISSION	NO READMISSION	TOTAL	CHI SQUARE VALUE
LIVE CHILDREN	13 (13.3%)	85 (86.7%)	98 (96.1%)	0.1621
DEAD CHILDREN	2 (50%)	2 (50%)	4 (3.9%)	3.9724
TOTAL	**15 (14.7%)**	**87 (85.3%)**	**102 (100%)**	**4.1346**

The Calculated value is more than the table value (4.1346 >3.84).

That *there is a significant difference* between the Readmission and the Longevity of the NICU discharged babies

Table 9 :Association between Immunisation status and The longevity of NICU Discharged Babies

IMMUNISATION STATUS (all vaccines up to age except Hep B)				
	IMMUNISED	NOT IMMUNISED	TOTAL	CHI SQUARE VALUE
LIVE CHILDREN	98 (100%)	0	98 (96.1%)	2.969697
DEAD CHILDREN	1 (25%)	3 (75%)	4 (3.9%)	72.75758
TOTAL	**99(97.1%)**	**3 (2.9%)**	**102 (100%)**	**75.72727**

The P value at < 0.05 level of significance,

The Calculated value is more than the table value (75.7273>3.84).

That there is a significant difference between the IMMUNISATION STATUS (all vaccines up to age except Hep B) and the Longevity of the NICU discharged babies

Table 10 :The percentage of longevity of the NICU Discharged Babies

SEX OF THE NICU DISCHARGED BABIES	NO. OF DEATH AMONG NICU DISCHARGED BABIES	NO. OF LIVING CHILDREN AMONG NICU DISCHARGED BABIES
MALE	3 (6%)	47 (94%)
FEMALE	1 (1.9%)	51 (98.1%)
TOTAL	**4 (3.9%)**	**98 (96.1%)**

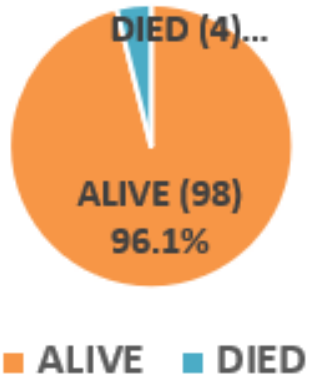

Figure 1 :Survival rate of NICU Discharged Babies

The figure no. 1 shows that the survival rate of the NICU discharged babies was 96.1% (98) and Death rate of the NICU discharged babies was 3.9% (4) out of 102 babies.

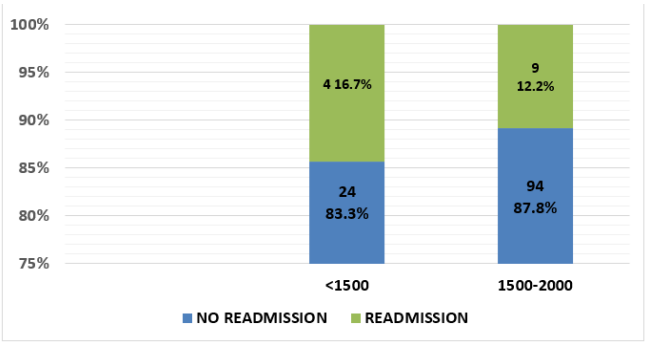

Figure 2 : Birth weight vs Readmission

The table 11 and figure no. 2 shows that the Birth Weight plays a vital role in Readmission for after Discharge from NICU. There was 16.7% (4) of NICU discharged babies who weighed <1500 gms at birth were readmitted and comparatively less number (9) 12.2% of NICU discharged

babies were readmitted among the babies who weighed >1500gms of birth weight.

DISCUSSION

The figure no. 1 shows that the survival rate of the NICU discharged babies was 96.1% (98) and Death rate of the NICU discharged babies was 3.9% (4) out of 102 babies. In this study, 4 NICU discharged babies died out of 102 discharged babies. Two babies died on the 20th day due to Aspiration, another one baby died on the 43rd day due to Sepsis and another one baby died on the 89th day due to Aspiration. The Major cause of death was due to Aspiration than the other causes among the LBW NICU discharged babies. Three babies died of Aspiration and One baby died of Sepsis after the discharge from NICU.

The similar study conducted by Andegiorgish, A.K., Andemariam, M., Temesghen, S. et al. and found that among the 1204 neonates, 79 (6.6%) died and 1125 (93.4%) were alive6 and another similar study conducted at North India by Rajender Singh, Mangla Sood, Parveen Bhardwaj, et al revealed that the death rate was 6.4% in their study.[3]

The figure.2 shows that the Birth weight of the NICU discharged babies have a significant impact on the survival of those babies. The study shows that there is a significant association between the Readmission after NICU discharge and the Longevity of the NICU discharged babies. If there is a smaller number of readmissions, the Longevity is more. The NICU discharged babies who weighed <1500 were readmitted after discharge from NICU during their first year of life was 16.7% and it was only 12.2% among the babies whose birth weight was >1500.

The similar study conducted by Tamiru Alene Woelile, Getasew Tesfa Kibret, Hailemariam Mekonnen Workie, et al reveals the other predictor variable for the survival rate of LBW was birth weight. Neonates with birth weights of less than 1000 gm were three-point six times the hazard of death compared with neonates with birth weights of 1500–2500 gms[4]. The overall probability of survival decreases as birth weight decreases. Similar to that statement, in this study, it was noted that the readmissions were more among the babies whose weight was less than 1500gms.

In this study, the authors found that 98 were alive and there is a significant association between the Duration of stay at NICU and the Longevity of the NICU discharged babies. The less in number of stay at NICU shows the Longevity which is more.

But, the study conducted by Kanimozhi P., Kumaravel K.S.*, Velmurugan K et al contradicts the present study as follows; the recent advancements in the neonatal care and a massive thrust to neonatal care under the auspices of National Rural Health Mission in India have led to improvement in the survival of premature infants. Following an early discharge from NICU, babies may need readmission to a paediatric intensive care within a few days, whereas keeping them in the NICU a little longer may reduce the mortality.[5]

The present study shows that there is a significant association between the Immunisation status with the vaccines administered during the first year of life as per the Universal Immunisation Programme (UIP) and the Longevity of the NICU discharged babies.

The similar study conducted by Santosh Soans, Attila Mihalyi, Valerie Berlaimont, et al reveals that the routine childhood vaccinations can help reduce or eliminate the burden of VPDs and should be given to preterm and LBW babies, regardless of prematurity or birth weight.[7]

There is no significant difference between the Mother's age, High-Risk status of the Mother, Nature of Birth, Birth Weight, Gestational Age at Birth and the Sex of the Baby and the Longevity of the NICU discharged babies.

The study conducted by Ghana Alhassan Abdul-Mumin , Sheila Agyeiwaa Owusu, Abdulai Abubakari supports this present study as follows: there was no significant association with the maternal age and contradicts the present study as follows; there was a significant association with the gestational age and the birth weight.[8]

CONCLUSION

The present study says that the longevity (96.1%) is more among the low birth weight NICU discharged babies and the mortality (3.9%) was less. And there was a significant association between the longevity and the duration of stay at NICU. The lesser the duration of stay, the more the longevity. There was less a significant association between readmission and the longevity and also the found a significant association with Immunisation status of the low birth weight NICU discharged babies.

The other variables such as maternal age, High-Risk status of the mother, nature of birth, gestational age at birth, sex of the baby, birth weight was not associated significantly.

This study shows that intensive and immediate quality care at birth and the follow up at their homes furtherly for immunisation which usually done after verifying the health status of the babies improves the longevity irrespective of maternal age, high risk status, nature of birth, gestational age at birth, sex of the baby and the birth weight.

RECOMMENDATIONS

We recommend that the studies can be extended by analysing many other factors which may affect the Longevity such as place of birth, treatment modalities, Growth and Development of the babies, Breast feeding practices, Weaning, etc., And it can be done as a Prospective study for monitoring the Babies' survival and other factors influence the morbidity and mortality of these children.

The chances of survival from birth varies widely depending on several factors such as Maternal Age, High-Risk status of the mother, Nature Of Delivery, Birth Weight, Length Of Stay at NICU, Readmission After NICU discharge and Immunization Status of those babies.

The existing child welfare programmes like HBNC, HBYC, SAANS, UIP, etc., are being implemented in a successful way to monitor the low birth weight NICU discharged babies at their homes. Thus, the babies discharged from NICU are to be monitored vigilantly at the field by ASHA/VHN(ANM) to prevent mortality in first year of life. The studies can be conducted to analyse the effectiveness of reorientation and strengthening of the existing child welfare programmes by the field functionaries.

REFERENCES

1. Dhawale Padmaja, Mohanty.c , "Morbidity And Mortality Of NICU Graduates – One Year Follow-Up", New Indian Journal of Pediatrics, April-June 2016, Vol.5.2, Pg.No. 61-66.

2. B.Mondal, "Low birth weight in relation to sex of baby, maternal age and parity: a hospital based study on Tangsa tribe from Arunachal Pradesh", The Journal of indian Medical Association, 1998 Dec;96(12):362-4.

3. Rajender Singh, Mangla Sood, Parveen Bhardwaj, et al, "Burden of disease and survival rate amongst hospitalized newborns in Himalayan region in North India", Journal of Famil; Medicine and Primary Care, 2022 Jun; 11(6): 3058–3065.

4. Tamiru Alene Woelile, 1 Getasew Tesfa Kibret, 2 Hailemariam Mekonnen Workie, et al., Survival Status and Predictors of Mortality Among Low-Birth-Weight Neonates Admitted to the Neonatal Intensive Care Unit at Felege Hiwot Comprehensive Specialized Hospital, Bahir Dar, Ethiopia, 2020, Pediatric Health, Medicine and Therapeutics, Vol. 12, 2021, 451-466.

5. Kanimozhi P., Kumaravel K. S., Velmurugan K., "A study on the length of stay of neonates in neonatal intensive care unit in a referral hospital in India", International Journal of Contemporary Pediatrics, Mar;6(2): 2019, Pg.No.746-749. Available from: file:///C:/Users/My%20pc/Desktop/DMCHO%20NICU%20RES%20DPHICON/2a.LOSStudy.pdf

6. Andegiorgish, A.K., Andemariam, M., Temesghen, S. et al. Neonatal mortality and associated factors in the specialized neonatal care unit Asmara, Eritrea. BMC Public Health 20, 10 (2020). https://doi.org/10.1186/s12889-019-8118-x.

7. Santosh Soans, Attila Mihalyi, Valerie Berlaimont, et al, " Vaccination in preterm and low birth weight infants in India", Hum Vaccin Immunother. 2022; 18(1): 1–12.

8. Ghana Alhassan Abdul-Mumin , Sheila Agyeiwaa Owusu, and Abdulai Abubakari, "Factors Associated with Treatment Outcome of Preterm Babies at Discharge from the Neonatal Intensive Care Unit (NICU) of the Tamale Teaching Hospital", International Journal of Pediatrics, Volume 2020: 2020, Pg. No. 1-7.

9. Behera J R, Behera G, Sahu S , Factors Influencing the Age at Discharge of Very Low Birth Weight Preterm Neonates From a Neonatal Intensive Care Unit in Eastern India: A Cohort Study", Cureus 12(12), e11889. doi:10.7759/cureus.11889, December 03, 2020, Available from: https://www.cureus.com/articles/46548-factors-influencing-the-age-at-discharge-of-very-low-birth-weight-preterm-neonates-from-a-neonatal-intensive-care-unit-in-eastern-india-a-cohort-study#!/

10. Seung Hyun Shin a, Jin A Sohn a,b,, Ee-Kyung Kim a, etal., "Factors associated with the follow-up of high risk infants discharged from a neonatal intensive care unit", Pediatrics & Neonatology, Volume 63, Issue 4, July 2022, Pages 373-379. Available from: https://www.sciencedirect.com/science/article/pii/S1875957222000547.

11. Ankit Soni, Sandeep Kadam, Anand Pandit,etal., "Early Discharge of Preterm Infants- An Indian Perspective", Journal of Clinical & Diagnostic Research, volume 10(12); Dec, 2016, Pg.No. SC21-23. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5296540/.

Vol 3 | Issue 1 | January - April | 2023

ORIGINAL ARTICLE - PUBLIC HEALTH

TREND OF SEVERE ANAEMIA AMONG THE ANTENATAL MOTHERS IN MAYILADUTHURAI DISTRICT, TAMIL NADU , INDIA -2022

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Abstract

BACKGROUND : Anaemia is the major preventable cause and it warrants a public health concern in antenatal mothers since it affects both the mother and child and to the extreme it leads to death. Improper nutritional intake, poor socio-economic status and varied compliance to the oral iron therapy are the major preventable causes for anaemia in pregnant mothers.

OBJECTIVES : To describe the Trends of Severe Anemia among Antenatal Mother with respect to age, parity, in Mayiladuthurai district, Tamil Nadu during 1st April 2018 to 31st March 2022, Tamil Nadu, India

METHODS : The data will be collected and entered in excel sheets. Proportion and means will be calculated. The quantitative data will be analysed. All the data will be obtained from PICME portal (Pregnancy Infant Cohort Monitoring Evaluation)

RESULTS : There is a increase in antenatal registration through PICME platform from 2018 through 2022 (51.24% to 95.62%). Screening of Antenatal Mothers increased gradually from 60.06% – 95.41%.Detection of severe Anaemia cases increased from 42 cases to 103 cases (of 6993 and 10796 respectively) warrants for effective management and prevention of complications.

CONCLUSION : In this study Detection of severe anaemia in antenatal mothers is increased because of the effective screening of anaemia is increased in the antenatal mothers from 60% to 95%.

RECOMMENDATIONS : Early detection and identification of severe anaemia warrants needful implementation of services plays a major role maintenance of maternal and child health indicators in satisfactory limit which again reinforces the effectiveness of ongoing programme Severe anaemia is having morbidity and mortality risk in both mother and infant vs POST PARTUM HEMORRHAGE, INFECTION, SEPSIS & LOW BIRTHWEIGHT, PREMAURITY, STILL BIRTHS AND NEURAL TUBE DEFECT, LBW, PRETERM DELEVARIES, STILL BIRTH, NTD. With proper implementation of Anaemia Mukt Bharath, Intensified Iron Plus Initiative, WIFS Adolescent WIFS , National Deworming Programme we can prevent the anaemia.

KEYWORDS : Anaemia, Antenatal Mother, Trends of Severe Anemia, screening of anaemia, child health indicators, maternal health indicators

INTRODUCTION

Gestation, a physiological state, is an anabolic process that demands higher input to meet the needs of the growing foetus and supporting tissue. This mismatch between resources and consumption adds to nutritional deficiencies in mothers. Iron deficiency anaemia (IDA) is the most prevalent form and ranked as the third leading cause of disability adjusted life years lost for females aged 15–44 years by the World Health Organization (WHO).[1] Physiological changes like hemodilution, intended for saving quality blood losses at the time of delivery, also lead to anaemia. It is after consideration of these physiological factors that haemoglobin concentration less than 11 gm/dl and hematocrit less than 33 gm% has been defined as anaemia by WHO. Furthermore, for diagnosis of anaemia during the second trimester of pregnancy, the haemoglobin cut-off reduces to 10.5.[2] Total iron demand in pregnancy is about 900 mg (with a range of 700–1400 mg), of which about 500– contribution to maternal deaths due to anaemia in South Asian countries, which constitutes half of the global maternal deaths.[3]

Severe anaemia has innumerable maternal and foetal complications like low birth weight, premature delivery, intrauterine growth restriction, increased risk of 600 mg is accounted by the uterus and its contents. Around 150–200 mg is lost in the blood loss at delivery and a similar amount is expended in lactation.[4] Anaemia in pregnant women remains unacceptably high in developing countries as compared to developed countries. Our country is under a heavy burden of this disease, with 50.4% of pregnant women suffering from anaemia as per NFHS-4. There is an 80% birth asphyxia, low APGAR score at birth, increased perinatal and maternal mortality. Those with moderate anaemia experience decreased working efficiency and are prone to infections. Eclampsia, antepartum and postpartum haemorrhage are frequently

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associated. Screening , early detection and treatment of anemia improves the quality of overall pregnancy outcome in the mother and child. The purpose of this study is to foresee the importance of screening of antenatal mothers for anemia, especially severe anemia .

AIMS & OBJECTIVE

To describe the Trends of Severe Anemia among Antenatal Mother with respect to age, parity, in Mayiladuthurai district, Tamil Nadu during 1st April, 2018 to 31st march 2022, Tamil Nadu, India.

METHODOLOGY

STUDY DESIGN DURATION AND SOURCE OF THE DATA

A cross sectional study on screening of anemia is done on 62,467 Ante natal mothers, who were registered in PICME platform in the district of Mayiladuthurai during the period of 1-3-2018 to 31-03-2022. Data on their Hemoglobin values during their antenatal period were collected through Reproductive and Child Health (RCH) and Laboratory registers that were maintained in the PHC's. Screening and early detection of anemia is compared for each year and analysed and plotted in a simple bar diagram for easy understanding.

Collected from AN registers, RCH Registers, High Risk AN Registers and also Haemoglobin values confirmed with Iron Sucrose registers and Laboratory registers from PHCs.

ETHICAL CONSIDERATIONS

The study was approved by Institutional Ethical Committee, Directorate of Public Health & Preventive Medicine, Chennai.

STATISTICAL ANALYSIS

1. All the data will be obtained from PICME (Pregnancy Infant Cohort Monitoring Evaluation)

2. The data will be collected and entered in excel sheets. Proportion and means will be calculated. The quantitative data will be analysed

RESULTS

1. There is an increase in antenatal registration through PICME platform from 2018 to 2022 (51.24% to 95.62%).

2. Screening of Antenatal Mothers increased gradually from 60.06% – 95.41%.

3. Detection of severe Anaemia cases increased from 42 cases to 103 cases of (6693 and 10796 respectively) warrants for effective management and prevention of complications

Table 1. Proportion (%) of Severe Anemia

Year	2018	2019	2020	2021	2022
TOTAL NO. OF AN MOTHER REGISTERED IN PICME	13646	12922	12061	12548	11290
TOTAL NO. OF ANAEMIA	6993	8031	6623	9889	10796
TOTAL NO. OF SEVERE ANAEMIA	42	61	48	88	103
Proportion of Severe Anaemia	0.5	0.7	0.9	0.9	1.5

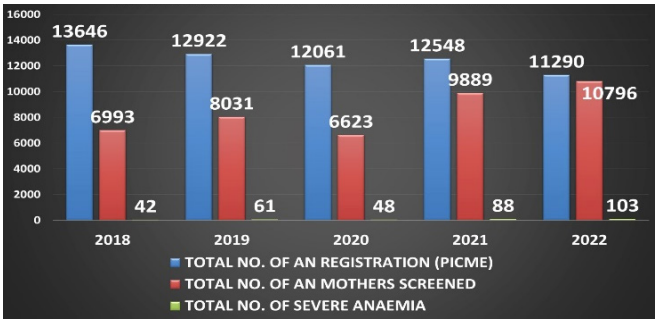

Figure 1 :Total Antenatal Mothers Registered Vs Severe Anaemia

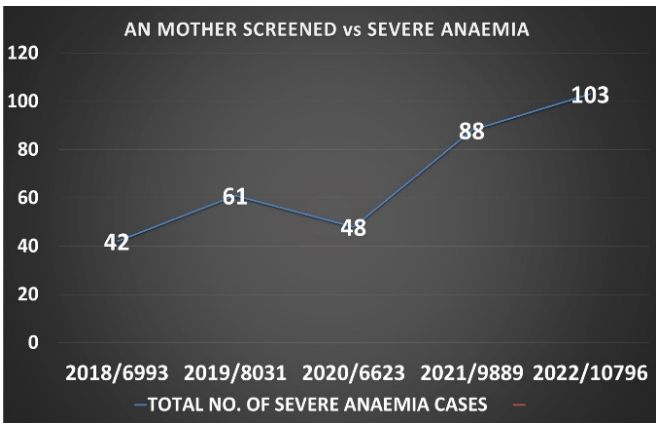

Figure 2. Total No. of Severe Anaemia Cases from 2018 – 2022

In Figure 1 Explains about increasing trend of severe Anaemia cases with increasing in screening, In the year 2021 among the 12,548 ante natal mothers who were screened for anemia 9,889 mothers were diagnosed with anemia out of which 88 mothers were diagnosed with severe anemia. In the year 2022, 11,290 antenatal mothers were registered in PICME till 31-10-22, out of which 10,796 were screened for anemia out of which 103 mothers turned out to have severe anemia. 10-03-2023

With increased screening there is increasing incidence

of severe anemia among the study population which clearly states the significance of screening of anemia.

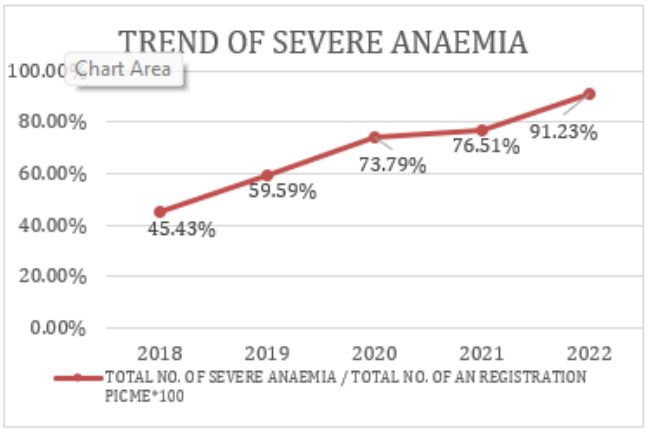

Figure 3: Percentage of Severe Anemia cases from 2018 to 2022 vs AN Registration

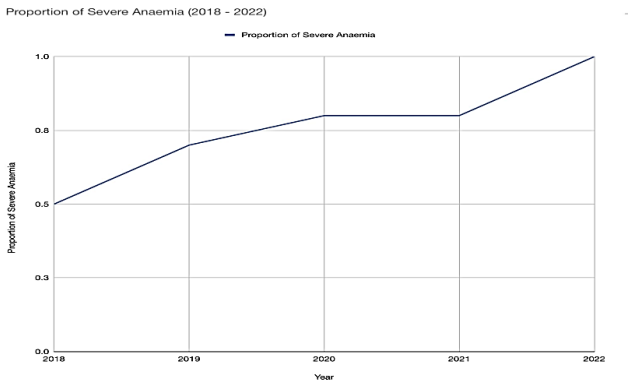

Figure 4 : Proportion of severe anaemia (2018 -2022)

In Figure 3 Explains the proportion of severe anaemia cases increases from 2018 to 2022 among the number of antenatal mothers Screened is also increases from 2018 to 2022. This also Conforms the effectiveness of screening in Anaemia in Antenatal mothers and early detection of severe anaemia Among antenatal mothers.

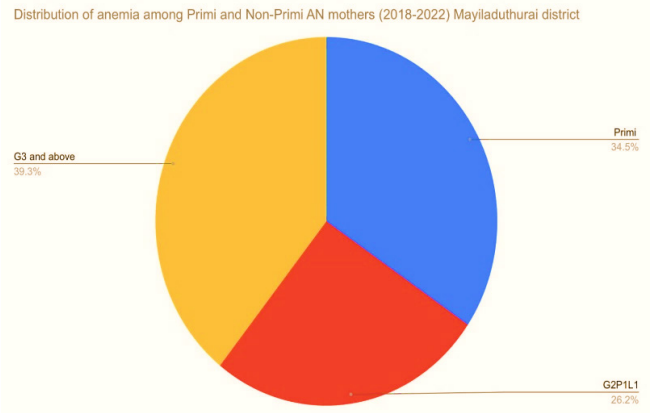

Figure 5 : Depicts gravida wise distribution in antenatal mothers

In Figure 4 Expain The pie chart shows the percentage of distribution of Severe anaemia among the pregnant mothers. The percentage of PRIMI Gravida is 34.5%. Percentage of second gravida 26.2%. Percentage of gravida 3 and above is 39.3%.

These results warrents an health education about the iron rich food, nutritional intake Iron folic acid sublimentation during pregnancy. Birth interval more than 3 years. A Study constituent of gravid 3 and above more risk of severe anaemia

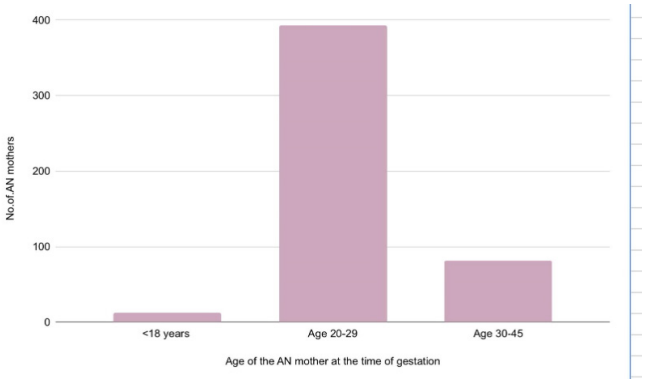

Figure 6 : shows the age wise distribution of severe anaemia Cases among the antenatal mothers

Figure 4 Explains Severe anaemia is more the 20 - 29 Age group population and also in this age group only Maximum number of ANC registration will be seen. So proper dietry advice and checking the compliance for regular intake of IFA tablets early detection and management of anemia cases will reduce the adverse events in pregnancy outcome. Anemia is more common in the women with birth interval less than < 1 year.

DISCUSSION

The purpose of this cross Sectional study is to find the prevalence of anemia in pregnant women correlate with indices and study the significance of identification of severe anemia. Of the 13,646 ante natal mothers registered in PICME in the year 2018, 6,993 were screened for anemia out of which 42 mothers were diagnosed with severe anemia. In the year 2019 among 12,922 ante natal mothers registered in PICME, 8031 were screened for anemia out of which 61 was diagnosed with severe anemia. Among 12,061 ante natal mothers registered in PICME in the year 2020 6,623 mothers were screened for anemia, of which 48 mothers were diagnosed with severe anemia. High order birth mothers uncovered mother found to be more severe anaemia and constitute more maternal Mortality Rate

The primary care physician who is the first contact point for an AN Mother, plays a crucial role in the early identification and management of anemia.

CONCLUSION

Detection of severe anaemia in AN mothers is increased because of the effective screening of anaemia is increased in the AN mothers from 60% in 2018 to 95%in 2022

Early detection and identification of severe anaemia warrants needful implementation of services plays a major role maintenance of Maternal Health indicators in satisfactory limit which again reinforces the effectiveness of on going Programme

Severe anaemia is having MORBIDITY AND MORTALITY risk in both mother and infant viz., PPH,INFECTION, SEPSIS, LBW, PRETERM DELEVAIRIES, STILL BIRTH, NTD With proper implementation of ANAEMIA MUKTH BHARATH, INTENSIFIED IRON PLUS INITIATIVE, WIFS,ADOLESCENT WIFS we can prevent the complication due to anaemia

REFERENCE

1. Tolentino K, Friedman JF. An update on anemia in less developed countries. Am J Trop Med Hyg. 2007;77:44–51. [PubMed] [Google Scholar]

2. Tandon R, Jain A, Malhotra P. Management of iron deficiency anemia in pregnancy in India. Indian J Hematol Blood Transfus. 2018;34:204–15. [PMC free article] [PubMed] [Google Scholar]

3. Bivalkar Neha Y, Wingkar KC, Joshi AG, Swati J Assessment of severity and type of anemia during pregnancy in rural population in western Maharashtra. Indian J Basic Appl Med Res. 2014;4:160–3. [Google Scholar]

4. https://aujmsr.com/prevalence-and-factors-associated-with-anemia-among-pregnant-women-attending-antenatal-clinic

5. Marahatta R. Study of anaemia in pregnancy and its outcome in Nepal medical college teaching hospital, Kathmandu, Nepal. Nepal Med Coll J. 2007;9:270–4. [PubMed] [Google Scholar]

6. Kalaivani K. Prevalence and consequences of anaemia in pregnancy. Indian J Med Res. 2009;130:627–33. [PubMed] [Google Scholar]

7. Mbule MA, Byaruhanga YB, Kabahenda M, Lubowa A. Determinants of anaemia among pregnant women in rural Uganda. Rural Remote Health. 2013;13:2259. [PubMed] [Google Scholar]

8. Viveki RG, Halappanavar AB, Viveki PR, Halki SB, Maled VS. Prevalence of anaemia and its epidemiological determinants in pregnant women. Al Ameen J Med Sci. 2012;5:216–23. [Google Scholar]

9. Ahmad N. The prevalence of anaemia and associated factors in rural Indian community. Australas Med J. 2010;1:276–80. [Google Scholar]

10. Sangeetha VB, Pushpalatha S. Severe maternal anemia and neonatal outcome. Sch J Appl Med Sci. 2014;2:303–9. [Google Scholar]

11. Gautam VP, Bansal Y, Taneja DK, Saha R, Shah B, Marg Z, et al. Prevalence of anaemia amongst pregnant women and its sociodemographic associates in a rural area of Delhi. IJCM. 2002;27:157–60. [Google Scholar]

12. Iyengar K. Early postpartum maternal morbidity among rural women of Rajasthan, India: A community-based study. J Health Popul Nutr. 2012;30:213–25. [PMC free article] [PubMed] [Google Scholar]

Vol 3 | Issue 1 | January - April | 2023

SCIENTIFIC LETTER - PUBLIC HEALTH

COVID VACCINATION AND AIRPORT SURVEILLANCE UNDER PUBLIC PRIVATE PARTNERSHIP (PPP) IN CHENGALPATTU DISTRICT, TAMILNADU, INDIA.

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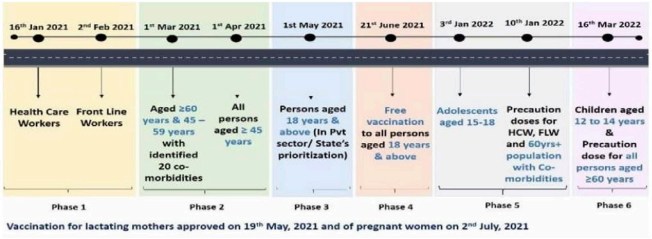
INTRODUCTION

Covid vaccination in India began on January 16, 2021. The vaccination was launched in phased manner. The first phase of the roll out was in January 2021 involved health workers and front line workers. The next phase of the vaccine roll out on 1st March 2021 covered all residents over the age of 60 and residents between the ages 45 and 60 with co morbidities. From 1st April 2021, eligibility was extended to all residents over the age 45. From 21st June 2021, the vaccination was extended to all above 18 yrs. The next phase of the roll out on 3rd January 2022 for all the adolescents under the age group of 15 – 18 yrs and on 10th January 2022 precaution dose for the health workers, front line workers and 60 + population with co morbidities. The phase six roll out was on 16th March 2022 for the children ages 12 – 14 years and precaution dos for all persons ages more than 60 years..

There were challenges in the implementation of covid vaccination programme all over India. During the initial period of roll out (January 2021) vaccine hesitancy was there. Later during the post peak of 1st wave and 2nd wave of covid pandemic vaccine avoidance was the challenge faced. There was also inequity in vaccine supply also. The Departments adopted various innovations for the coverage of covid vaccination. One among those innovations was the standalone vaccination centre.



There was emergence of variants of corona virus all over the world too. Since the District had International Airport it was a great challenge for the District. The need for Airport surveillance was crucial for the District. Under Public Private Partnership Airport surveillance was initiated at Chennai International Airport.

CARE INDIA

CARE India is a Non Governmental organization which works for Health system strengthening, women health adolescent health and Child health. They have established covid care centre in various states, supported covid vaccination in various states and IEC activities on Covid in various staes of India.

1. STANDALONE VACCINATION CENTRE

Standalone vaccination centres are those centres which functions exclusively for the covid vaccination. In Chengalpattu District, the public Health Department along with CARE, India under Public Private Partnership established a standalone covid vaccination centre at Govt. upgraded Primary health centre, Nandhivaram on 24th September, 2021 and at National Institute of Siddha, Tambaram on 4th October 2021. The Vaccination centre was functioning from 6am to 9pm on all days. The vaccination centre was designed as per the guidelines of Govt. of India for covid vaccination centre.

WAITING AREA: Demarcated waiting area with seating location 1 foot apart with adequate arrangement of chairs, drinking water was made. The waiting area had 4 counters for registration of beneficiaries. Special counters were

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there for elderly, female and person with special needs. The beneficiaries who walk in for covid vaccination were screened using thermal scanners and let in the vaccination centre. The Date Entry Operators will enter the details in Cowin app and do photo verification using the valid documents produced by the beneficiary. After verification the beneficiary will be allowed to go for vaccination. Without entering in the cowin app no beneficiary was allowed for covid vaccination.

VACCINATION AREA: There were dedicated rooms for vaccination with one table, two chairs, sanitizer arrangement and all other logistics for vaccination. Totally 4 such vaccination rooms for covishield first dose, covishield second dose, Covaxin and pink booth for women folks.

OBSERVATION ROOM: After vaccination, the beneficiary has to wait for 30 minutes for observation. Dedicated observation room with emergency corner for management of AEFI was there. There was a medical officer and staff nurse posted in observation room for the observation of beneficiaries post covid vaccination. The observation hall also had Television, Selfie corner etc for the entertainment of the beneficiaries. QR code scanning facility was also available, where the beneficiaries can download the vaccination certificate.

Adequate IEC Materials like banner, poster, and leaflets about Covid 19 vaccination was available in the waiting area and observation area.

COMMUNITY ENGAGEMENT:

A wide publicity was made about the standalone vaccination centre. The local bodies, influcers and mobilizers were sensitized about the vaccination centre. Since, the vaccination centre was on GST, it also added publicity about this centre.

COLD CHAIN MAINTENANCE:

As there was no VVM on the vial of the vaccine, cold Chain maintenance was a prime importance. All Vaccination teams was supplied with an extra vaccine carrier with conditional icepack for replenishment of icepacks in the vaccine carrier with vaccine vials. Every morning vaccines will be received from the cold chain point (Nandhivaram UGPHC) in a vaccine carrier with conditioned icepacks. At the session, vaccine carrier will all icepacks, used vials and unopened vials was sent back to the distributing cold chain point. Intact sealed vials returned on the previous session day, was used first the next day.

INFECTION PREVENTION AND CONTROL PRACTICES:

Any beneficiary on workers with ILI symptoms was not allowed in the vaccination centre. Hand Hygiene was followed by all workers with hand sanitizer. All beneficiaries and workers were wearing three layered surgical mask ensured. The environmental surfaces and the rooms were cleaned and disinfected three times a day. Hand sanitizer was made available for use by beneficiaries and their companion at the entrance of vaccination centre. All immunization waste was disposed as per protocols.

MANAGEMENT OF AEFI:

For management of Adverse Event Following Immunization (AEFI), a dedicated room was available with AEFI kit containing of Inj. adrenaline, Inj. Hydrocortisone, RL/NS-1, 5% Dextrose, IV Cannula / Scalp vein-2, IV drip set-2, Disposable syringes -5 Nos and adhesive taps. The room was also equipped with O2 concentrator, IV stand, Cot with mattress and AEFI Registers.

2. DRIVE THROUGH VACCINATION

The standalone vaccination centre had a counter for Drive through vaccination. Drive through vaccination, the beneficiaries who are not able to reach the regular vaccination counter like elderly people, physically challenged were vaccinated. The beneficiaries were bought to the drive through vaccination site in the car/auto by their family members. The beneficiary will be registered and verified by the data entry operator in cowin app. After verification the staff nurse will take the vaccine carrier with vaccines and other logistics to the drive through vaccination site and do vaccination in the car/auto itself. After vaccination the beneficiary will be waiting in the site for 30 minutes for observation.

3. HOUSE TO HOUSE VACCINATION USING MOBILE VACCINATION TEAM

The District initiated House to House vaccination using Mobile Vaccination team under Public Private Partnership. This was launched in a remote village Saravambakkam of Madhuranthagam Block on November 2nd 2021 by Honorable Health Minister of Tamilnadu. Under PPP 13 Vehicles was deployed by CARE, India for House to House vaccination. One mobile vehicle per Block/Municipality was allotted for House to House Vaccination. The Mobile Vaccination team consists of a Staff Nurse, Data Entry Operator and a Driver. The team visits the village with all the logistics needed for vaccination including Anaphylaxis kit. The team prepares an ATP in coordination with the Block Medical Officer (BMO) and the Child Development Project Officer (CDPO). The ATP is shared to the field functionaries and local bodies for coverage of all beneficiaries in the village. The team also coordinated with District Differently Abled Welfare Officer and got the list of beneficiaries who are bedridden and the physically challenged beneficiaries. The team during visit to that village vaccinated these beneficiaries with special needs in their house itself, which were a boon to them.

4. VACCINATION AT INTERNATIONAL AIRPORT

Covid vaccination site was established at Chennai International and Domestic Terminals. The site was equipped with a Data Entry Operator, Staff Nurse and a Medical Officer with adequate vaccines and logistics. QR code scanning facility was also made available in the Covid vaccination site; so that the beneficiaries can download their vaccination certificat

VACCINATION COVERAGE: The total vaccination coverage by the standalone vaccination centre is 249314. The vaccination coverage was collected every hourly by CARE India and DDHS Office using a link https://tiny.one/tnmvcdashboard. This link helped us to monitor the daily performance of vaccination at standalone, House to House and Airport covid vaccination centres.

5. AIRPORT SURVEILLANCE

Since there was emergence of new variants of corona virus from other countries in India, the Airport surveillance was strengthened. In Chennai International Airport along with Airport Authority of India Airport surveillance was initiated. The Airport surveillance team was conducting fever screening and Covid sample collection at the Airport. The surveillance was done round the clock (24/7) in three shifts. The surveillance team consists of Medical Officer, Health Inspector, Lab Technician and staff nurse. Due to the new Covid 19 variant, Omicron new testing guidelines was released on December 2021. According to this guidelines all passengers from high risk countries like South Africa, China, New Zealand, Hong Kong, Brazil, Bangladesh, Botswana, Mauritius, Zimbabwe, Singapore, Israel and European countries including UK were compulsorily tested for covid, irrespective of the vaccination status. The International passengers from above countries were not allowed to leave the Airport till they get their RTPCR test results. If such travelers test positive, their samples was sent for genomic testing to INSACOG laboratory network, and they are shifted to King Institute in 108 Ambulance for further management and treatment. Later the guidelines were modified and only

2 percentage of the International passengers were randomly tested for RTPCR. Health Inspectors for the Airport surveillance team was deployed by CARE, India under Public Private Partnership.

HUMAN RESOURCES INVOLVED:

Human Resources - Chengalpet Vaccination Point

S.No	Location	Manager	Medical Officer	Vaccinator	Health Inspectors	Data Entery Operator	Security	House Keeping	Vechiles
1	Nandhivaram Vaccination Center	1	2	10	-	15	4	6	-
2	Thambaram Vaccination Center		2	6	-	8	4	6	-
3	Airport- Vaccination Center		Supported by DPH	2	-	2	0	0	-
4	Mobile Vaccination Team - Chengalpet		-	-	-	4	-	-	15
5	Airport Surveillance		-	4	8	-	-	-	-

Visits by

CONCLUSION

Public Private Partnership (PPP) is commonly used for the upgrading and maintenance of facilities in the public health sector. This model was used by Chengalpattu District for the vaccination coverage during the vaccine avoidance and vaccine hesitancy period and also for Airport surveillance during the emergence of variants of corona virus. This helped the District to cover many beneficiaries as the ambience of the standalone vaccination centre was excellent with selfie corners, neat and tidy environment. This model can be replicated for other National Health Programmes too, especially for Routine Immunization which eventually help in the reduction of drop outs and left outs of Immunization.

Vol 3 | Issue 1 | January - April | 2023

REVIEW ARTICLE - PUBLIC HEALTH

Two novel SNPs, rs1545 and rs1547, in the BBS6/MKKS gene of Bardet Biedl syndrome have been linked to metabolic syndrome: Review

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Abstract

BACKGROUND AND AIMS: The metabolic syndrome is a multifactorial disorder, and the urban Indian population is at high risk for diabetes mellitus and cardiovascular disorders, with numbers consistently rising. Hence, we aim to scrutinize the frequent mutations, predominantly single-nucleotide polymorphisms (SNPs), of complex disorders like Bardet-Biedl syndrome (BBS).

METHOD AND DESIGN: A greater knowledge of the metabolic syndrome is needed to determine the inheritability of complex disorders. Multiple genome-wide association studies with case-control, meta-analysis, haplotype, and genotype analysis and investigations on mutation screening in obese, metabolic syndrome, and BBS subjects demonstrated that including disease-associated polymorphisms (or) SNPs (or) common mutations might suffice as an efficacious tool in disease prognostication. In a wide range of populations, mutational profiling and analysis of *BBS* genes revealed that certain disease-correlated SNPs of these genes were linked to metabolic syndrome. Hence, we have inspected multiple research and review articles about genetic mutations, particularly SNPs in the *BBS* genes and their association with metabolic syndrome.

RESULTS : The two reported SNPs, rs1545 and rs1547, which are present in the exonic region of the *BBS6/MKKS* gene, have been integrated to be related to obesity and metabolic syndrome in a substantially diverse population.

CONCLUSION : The roles of the varied genotypes observed in Bardet-Biedl syndrome and diabetic retinopathy, which falls under metabolic syndrome, are much needed to understand their interconnection and etiology. The recurrent SNPs rs1545 and rs1547 of the *BBS6/MKKS* gene might perform as a candidate diagnostic tool to envisage obesity.

KEYWORDS : rs1545, rs1547, Single-nucleotide polymorphisms, Bardet-Biedl syndrome, *BBS6/MKKS* gene, metabolic syndrome

INTRODUCTION

INTRODUCTION TO METABOLIC SYNDROME:

Metabolic syndrome is a compendium of risk factors possibly influenced by central obesity and insulin resistance.[1] The International Diabetes Federation (IDF) elucidated that "metabolic syndrome" is significantly associated with high-normal urinary albumin excretion (UAE), polyneuropathy, and retinopathy.[1, 2] Also, there are multiple definitions stated by other bodies like the World Health Organization (WHO), the National Cholesterol Education Program—Third Adult Treatment Panel (NCEP ATP III), and the European Group for the Study of Insulin Resistance (EGIR).[1] During the years 1998[3] and 1999[4], WHO put forth that diabetes or insulin resistance, or impaired glucose tolerance (IGT) were the benefactors of the metabolic syndrome. Later additional

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criteria like obesity (waist-hip ratio for women > 0.85, men > 0.90 (or) body mass index > 30 kg/m^2), blood pressure (≥ 140/90 mmHg), high-density lipoprotein (HDL) cholesterol (women – 39 mg/dl (or) < 1.0 mmol/l, men 35 mg/dl (or) < 0.9 mmol/l), and microalbuminuria (creatinine: albumin ≥ 30mg/g or ≥ 20 µg/min of excretion rate of urinary albumin) have been considered as supplementary risk factors.[1,3,4] In the same year 1999, EGIR propounded the criteria for euglycemic subjects with varied cut-points for obesity (waist circumference of women ≥ 80 cm and men ≥ 94 cm), HDL cholesterol (39 mg/dl (or) < 1.0 mmol/l), hypertension (≥ 140/90 mmHg), triglycerides (178 mg/dl (or) > 2.0 mmol/l) and the utilization of fasting insulin (110 mg/dl (or) ≥ 6.1 mmol/l) as an alternative for IGT.[1, 5] In the year 2001, NCEP ATP III postulated metabolic syndrome as a combination of more than three medical criteria like obesity (waist circumference of women > 88 cm and men > 102 cm), declined levels of HDL cholesterol (women 50 mg/dl (or) < 1.29 mmol/l and men 40 mg/dl (or) < 1.03 mmol/l), escalated blood pressure (≥ 130/ ≥ 85 mmHg), fasting glucose (100 mg/dl (or) ≥ 5.6 mmol/l) and triglycerides (150 mg/dl (or) ≥ 1.7 mmol/l).[1, 6] Also, the interpretation of the metabolic syndrome by NCEP ATP III was not glucose-centric.[6] On a whole, the universally recognized vital and distinguishable aspects of metabolic syndrome include obesity, hypertension, dyslipidemia, and insulin resistance.[1, 7] Globally, the threat of non-communicable diseases like diabetes, obesity, and coronary heart disease is aggravating, and it is reported that about 25% of the US population[8] and 19.52% of the Indian urban population, have the prevalence of metabolic syndrome.[9, 10] According to different bodies, the percentage of metabolic syndrome differs.[11, 12] As in the USA Texas (WHO – 25%, NCEP ATP III - 25%),[13] USA National (IDF - 39%, NCEP ATP III - 35%),[14] Australia (WHO - 21%, IDF - 16%, NCEP ATP III - 19%),[11, 12] Mainland China (NCEP ATP III - 14%),[15] France (WHO - 18%, IDF - 13%, NCEP ATP III - 9%),[11, 12] Italy (WHO - 34%, NCEP ATP III - 18%),[11, 12] South Asia (WHO - 23%, IDF - 18%, NCEP ATP III - 26%).[11, 12] The Indian urban population (age-adjusted analysis) has been promulgated to have 25% ubiquity in metabolic syndrome rate with women (31%) affected more than men (18.5%) population. Also, the frequency of incidence of metabolic syndrome in India is relentlessly escalating in adolescents and adults (20% – 25%) and aggravates with higher age.[7, 16]

PATHOPHYSIOLOGY OF METABOLIC SYNDROME:

Metabolic disorders originate when a group of risk factors like obesity, hyperglycemia, etc., co-occur, which increases the occurrence of cardiovascular disorders, type 2 diabetes, and hepatic fibrosis. Other characteristics comprise obesity with expanded waist circumference, hypertension, escalated C-reactive protein (CRP), and elevated triglyceride levels.[17, 18] The prime risk factors for metabolic syndrome may include insulin resistance and obesity, which often account for the etiology and pathogenesis.[19] The foremost physiologic features include insulin resistance, which enhances atherosclerotic cardiovascular disease, hyperglycemia, hypertension, which occurs routinely in people with insulin resistance, fatty liver (produced due to obesity) and stress-metabolic syndrome, disorganizing the hormonal equilibrium of the hypothalamic-pituitary-adrenal axis (HPA-axis), causing prolonged stress.[20, 21] Obesity being a predominant attribute of metabolic syndrome, which is defined by adiposity with increased waist-to-hip circumference and accumulated adipocytes. Sometimes, patients may be insulin-resistant and have a complex disorder with normal weight.[20, 21, 22] Other risk liability involves hyperadiponectinemia, which plays a crucial role in the emergence of insulin resistance and chronic inflammation, hyperuricemia, lipodystrophy, atherogenic dyslipidemia denoted by elevation in triglycerides level and small dense low-density lipoprotein (sdLDL) particles, decreased high-density lipoprotein (HDL) cholesterol; a proinflammatory state with an increase in C-reactive protein (CRP) ; and a prothrombotic state, with an increase in plasminogen activator inhibitor (PAI-1) and fibrinogen levels.[22, 23] Also, monocyte/macrophage and adipocyte-derived factors induce atherothrombotic effects, which progress into cardiovascular disorders. Genetic variants and environmental factors may contribute to atherosclerosis and influence central obesity, dysfunction in innate immunity, glucose and lipoprotein metabolism, and vascular function.[23, 24] Multiple diseases, like diabetic retinopathy and Bardet-Biedl syndrome (BBS), are classified under the metabolic syndrome. Diabetic retinopathy is effected due to the complications of diabetes, microvascular retinal alterations, and hyperglycemia, which can eventually lead to blindness. Diabetic retinopathy might have precedence over proliferative diabetic retinopathy (PDR) or non-proliferative diabetic retinopathy (NPDR).[25] BBS is a complex pleiotropic and ciliopathy disorder with divergent effects.[26, 2, 27, 28] Approximately 26 *BBS* genes have been identified and cloned to date. [27, 29, 30, 31]

DIABETIC RETINOPATHY:

Diabetic retinopathy occurs due to complications caused by diabetes, microvascular retinal abnormalities, hyperglycemia, and affects people who have had diabetes for a prolonged time and can eventually reverberate into

blindness. It is caused by sustained excessive blood glucose levels, which affect the small blood vessels within the retina, causing damage to the retina. This current condition may lead to hemorrhage and swelling of the retina, such that the retina starves for oxygen, and abnormal vessels may grow, and are termed proliferative diabetic retinopathy (PDR).[32, 33] Diabetic retinopathy can be proliferative when the retina becomes blocked, causing the dilation of abnormal blood vessels that bleed into the eyes, then causing the retina to detach, and seriously damaging vision. It can flourish and evolve in anyone who has either type-1 diabetes or type-2 diabetes and may be distinct in origin.[33] Hyperglycemia causes intramural pericyte death by activating p38 mitogen-activated protein kinase (MAPK) and protein kinase to amplify the expression of a target Src homology-2 domain–containing phosphatase-1 (SHP-1), PKC-δ signaling, which genesis dephosphorylation of the signaling protein and induces pericyte apoptosis.[34, 35, 36] Patients with diabetic retinopathy are more susceptible to complex disorders since excessive sugar and blood pressure levels upsurge the blood flow and thicken the retina, often leading to visual impairment and the prevalence of other metabolic disorders. But patients without retinopathy have a flourishing retina, and when appropriate control of diabetes is achieved, it can be prevented from other complex disorders.[34]

HERITABILITY OF OCULAR TRAITS:

Genetic factors play a significant part in numerous kinds of eye diseases. Hereditary ophthalmic disorders emerge due to defects in more than 800 different genes and can either arise as an isolated condition or be correlated with a syndrome. Like other hereditary diseases, ocular diseases are inherited as single gene, chromosomal, complex, and mitochondrial diseases.[8, 37] Some examples of inherited ocular disorders are as follows: Retinitis Pigmentosa - Autosomal recessive, Color blindness - X-linked disorder, Diabetic Retinopathy - Metabolic disorder, Stargardt's disease - Single gene disorder, Leber's Hereditary Optic Neuropathy (LHON) - caused by mutation in mitochondrial DNA. Eye abnormalities are contemporary in one-third of inherited systemic diseases.[37] These autoinflammatory syndromes (AIS) are rarely inherited disorders, whose expression stimulates ocular diseases.[38] In diabetic retinopathy, it's reported that patients with BBS and photoreceptor degeneration are commonly blind in their 3rd decade of life. According to the WHO, the predominant causes of blindness are glaucoma, age-related macular dystrophy (AMD), optic atrophy, eye malformations, and diabetic retinopathy.[37, 39] The molecular basis of an ocular disease is studied diligently using techniques of gene mapping and isolation to excel in understanding the ocular pathophysiology and to classify the eye disease.[21, 40] About 60% of the studies deployed variance component methods and structural equation modelling (SEM) to study the heritability of the ocular traits, which evaluated heritability better than the family data to derive heritability values. And these ocular disorders are often inherited as complex disorders. Knowledge of the genotype of an ocular disorder can help in classifying its apparent phenotype and can help to cure ocular disorders. [22, 37, 39]

BARDET-BIEDL SYNDROME:

Bardet-Biedl syndrome is a pleiotropic ciliopathy disorder with a composite autosomal recessive inheritance trait having heterogeneous effects.[25, 40, 41] It has the following primary characteristics: obesity, postaxial polydactyly, hypogonadism, retinal pigmentary dystrophy, and renal dysplasia. The distinctive secondary characteristics include: cardiovascular disorder, type-2 diabetes, polyuria, hearing loss, speech impairment, hypertension, cognitive impairment, anosmia, hypertonia, ataxia, dysfunctional thyroid and hypodontia.[41] Earlier in 1866, BBS was communicated as "Laurence–Moon syndrome" from an ophthalmic hospital situated in South London by Laurence and Moon .[42] It is an autosomal dominant disorder. Laurence-Moon-Biedl-Bardet syndrome was not anymore considered an appropriate terminology for patients suffering from Laurence and Moon syndrome, because they had paraplegia and no polydactyly or obesity, which are predominant features of the Bardet–Biedl syndrome.[43, 44, 45] Being classified as an unusual disorder, BBS prevails in the ratio of 1:140,000 – 160,000 in the European and North American populations,[44, 46, 47] 1: 160,000 in Switzerland,[48] 1:156,000 in Tunisia,[49] 1:59,000 in Denmark,[50] 1:18,000 in Newfoundland, and 1:17,000 in Kuwait. The consanguinity in births may be the vindication of elevated cases of BBS in Newfoundland and Kuwait.[44, 46, 47]

BBS GENES:

Bardet-Biedl syndrome is an uncommon developmental defect disorder that is inherited due to mutations in diverse genes that cause "Bardet-Biedl syndrome". Till date, 26 *BBS* genes (Table 1) have been identified.[27, 29, 30, 31, 51]

FUNCTION OF BBS PROTEINS:

BBS genes play a significant role in the genesis of cell structures called cilia.[44, 47] The BBS proteins are segments of primary cilia emerging from the basal body and assist in the maintenance of homeostasis in diverse tissues and BBSome protein assembly. This BBSome is formed by a complex group of *BBS* genes, comprising *BBS1, BBS2, BBS3, BBS5, BBS7, BBS8, BBS9,* and *BBS18*. The fundamental

responsibility of the BBSome involves ciliary membrane biogenesis and interacts to facilitate the pathways consisting of intraflagellar transportation to modulate sonic hedgehog signal transduction.[27, 29, 41, 45] *BBS1, BBS2, BBS7*, and *BBS9* incorporate β propeller domains; whereas *BBS4* and *BBS8* accommodate numerous tetratricopeptide domains; and *BBS5* carries around two pleckstrin homology domains and configures a complex (Figure 1). *BBS3/ARL6* is mandatory for localization of cilia of the BBSome and a Ras superfamily member.[52, 53] About three genes of *BBS - BBS6, BBS10*, and *BBS12* - have a systemic homology to type II chaperonin and intercommunicate with proteins like chaperonin containing tailless complex polypeptide 1/ tailless complex polypeptide 1 ring complex *(CCT/TRiC)* and *BBS7* to construct a complex, entitled the "BBS chaperonin complex", which configures as a prerequisite fundamental component for the gene formation assemblage and accumulation of BBSome complex clusters.[29, 51, 53] Other *BBS* genes like *BBS16/SDCCAG8, BBS17/LZTFL1, BBS19/IFT27, BBS20/ IFT172, BBS21/C8orf37, BBS22/ IFT74,* and *BBS23/CEP19* were a necessitate constituent of intraflagellar trafficking (IFT), especially IFT-B and pathways comprising Sonic Hedgehog signaling. For degradation by *BBS11/TRIM32*, an E3 ubiquitin ligase is utilized in process of ubiquitination to catalyze the targets.

Table 1: BBS genes with their corresponding locus

Locus Name	Gene	Locus of Chromosome	Protein Name
BBS1	*BBS1*	11q13.2	Bardet-Biedl syndrome1 protein
BBS2	*BBS2*	16q12.2	Bardet-Biedl syndrome 2 protein
BBS3	*ARL6*	3q11.2	ADP-ribosylation factor-like protein 6
BBS4	*BBS4*	15q24.1	Bardet-Biedl syndrome 4 protein
BBS5	*BBS5*	2q31.1	Bardet-Biedl syndrome 5 protein
BBS6	*MKKS*	20p12.2	McKusick-Kaufman syndrome (or) Bardet-Biedl syndrome putative chaperonin
BBS7	*BBS7*	4q27	Bardet-Biedl syndrome 7 protein
BBS8	*TTC8*	14q31.3	Tetratricopeptide repeat protein 8
BBS9	*PTHB1*	7p14.3	Protein PTHB1/ PTH-Responsive Osteosarcoma B1 Protein/ Parathyroid Hormone Responsive B1 Gene
BBS10	*BBS10*	12q21.2	Bardet-Biedl syndrome 10 protein
BBS11	*TRIM32*	9q33.1	E3 ubiquitin-protein ligase TRIM32
BBS12	*BBS12*	4q27	Bardet-Biedl syndrome 12 protein
BBS13	*MKS1*	17q22	Meckel syndrome type 1 protein
BBS14	*CEP290*	12q21.32	Centrosomal protein of 290 kDa
BBS15	*WDPCP*	2p15	WD repeat containing Planar cell Polarity effector protein
BBS16	*SDCCAG8*	1q43	Serologically Defined Colon Cancer Antigen 8 protein
BBS17	*LZTFL1*	3p21.31	Leucine zipper transcription factor like 1
BBS18	*BBIP1*	10q25.2	BBSome-Interacting Protein 1
BBS19	*IFT27*	22q12.3	Intraflagellar transport protein 27 Homolog
BBS20	*IFT172*	2p23.3	Intraflagellar transport protein 172 Homolog
BBS21	*C8ORF37*	8q22.1	Chromosome 8 Open Reading Frame 37
BBS22	*IFT74*	9p21.2	Intraflagellar transport protein 74 Homolog
BBS23	*CEP19*	3q29	Centrosomal protein 19
BBS24	*NPHP1*	2q13	Nephrocystin 1
BBS25	*SCAPER*	15q24.3	S-phase cyclin A associated protein in the endoplasmic reticulum
BBS26	*SCLT1*	4q28.2	Sodium channel and clathrin linker 1

During ciliogenesis, cell-cell adhesions and cell-matrix signaling were assisted by *BBS24/NPHP1, BBS25/SCAPER*, and *BBS26/SCLT1*.[51, 53] *BBS6/MKKS, BBS10,* and *BBS12* genes were non-specific to invertebrates and specific to vertebrates, as there were no traces of their gene homologs in invertebrates.[54, 55]

MUTATIONS IN THE BBS PROTEINS:

One of the crucial features of Bardet-Biedl syndrome is obesity (72% - 92%).[44, 47, 49, 51] Multiple complications of obesity can comprise type-2 diabetes, high blood pressure (hypertension), and unusually high cholesterol levels (hypercholesterolemia).[29, 41, 56] Important abnormal trafficking of leptin receptor mediators was aggregated due to BBS proteins.[41] Also, the loss or reduction of the *BBS* gene intensifies leptin resistance, which leads to non-syndromic customary obesity in patients. Defects in BBS proteins can reorganize the morphology and function of motile cilia,[57] hence the name "ciliopathy disorders". This defective and faulty cilia emerge into primary ciliary dyskinesia, which manifests into infertility and bronchiectasis.[58] Deformities originated in immotile cilia were indicated by polydactyly, learning difficulties, retinitis pigmentosa, and cystic liver, pancreas, and kidneys.[59] The obesity noticed in BBS is multifactorial in nature[25] and has aggravated the risk and proliferation of cardiovascular diseases.[25, 24, 60, 61] Multitudinous disease oriented gene mutations and their interconnection have expedited the characterization of unique polymorphisms and SNPs in *BBS* gene and their association with metabolic syndrome. These enactments via high-throughput sequencing, employing SNPs arrays for homozygosity mapping.[62] Divergent populations have discrete *BBS* gene mutations. For instance, in Meckel syndrome *(BBS13, BBS15, BBS16 (SDCCAG8)* have been communicated,[63, 64] Tunisian population (*BBS1, BBS2* - p.R189, *BBS8* - c.459 + 1G>A),[49, 65] Saudi Arabia population (*BBS1* – 33%, *BBS3* – 17%, *BBS4* – 17%),[66, 67] North European population (*BBS1* - p.M390R (causative of 50% cases in *BBS1*), *BBS10* - p.C91Lfs),[68] Caucasian and European population (*BBS1* and *BBS10* – 21-30%),[69, 70] Hutterite population (*BBS2* - c.472 – 2A>G),[71] Faroe Islands population (*BBS1* - c.1091 + 3G>C),[72] Chinese population (*BBS6/MKKS* gene with 2 disease causing pathogenic variants - c.635C>T and c.1664C>G, and *TMEM67* gene with 1 pathogenic variant) [73]. In some cases of BBS, during the year 2001, triallelic inheritance (lower frequency) was detected in a child with a 3rd mutation observed in *BBS1* (or) *BBS6/MKKS* (added heterozygous missense mutation) gene. These patients had a drastic phenotype with mental retardation and obesity in an

earlier outbreak.[62, 74] *BBS6/MKKS, BBS10* and *BBS12* genes effectuate genetic heterogeneity, and the absence of ATPase enzyme activity adds up to the genesis of around 30% of BBS mutations.[30, 51, 74] Several chaperonopathies like McKusick-Kaufman Syndrome, X-linked retinitis pigmentosa, motor neuropathies, and multifarious neurological disorders were all linked with the *BBS6/MKKS* gene, with mostly interpreting for nonsense and missense mutations, which accounts for nearly 50 predisposition deleterious variants. Multinucleated cells and multi-centrosomal clustering cells emerged and transpired upon disruption of *BBS6/MKKS* gene.[51, 54, 62, 74, 75]

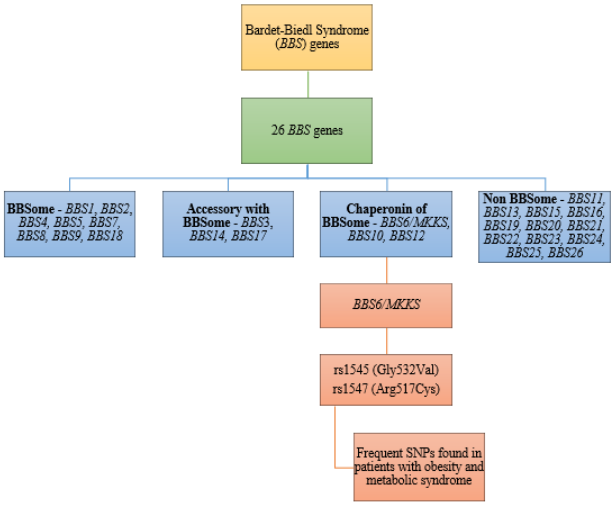

Figure 1: Schematic representation of the entire BBS gene family with their integral functional profile and role in the formation of the "BBSome protein complex" as well as the prevalence of non-synonymous SNPs rs1545 and rs1547 of the BBS6/MKKS gene in obese and metabolic syndrome sufferers

BBS6/MKKS GENE:

BBS6/MKKS encodes a 570-amino acid protein and comprises six exons, which are located at the 20p12.2 arm.[35, 76, 77] It is a chaperonin-like protein with a resemblance to the type II class of chaperonins like eukaryotic T-complex-related proteins (TCPs) and plays a prime role in cytokinesis. This BBS6/MKKS protein has a predominant function in the processing of proteins in limb, cardiac, and reproductive system development. It is often confined within a proteinaceous tube that surrounds centrioles called the Pericentriolar Material (PCM), but it is also found at intercellular bridges during mitosis.[78, 79, 80] *BBS6/MKKS* gene swiftly transports across cytoplasm and nucleus and is primarily expressed in olfactory epithelia, renal tubule, retina ciliated epithelial cells and regulates *SMARCC1* gene subcellular localization.[30, 54, 81] Multiple genetic variations located in this gene might initiate an extensive role in contributing to the emergence of metabolic syndrome and obesity.[28, 51] The SNPs associated with this gene are considerable for common adult morbid obesity, and *BBS6/MKKS* variants show evidence for the metabolic syndrome components (e.g., obesity, dyslipidemia, hyperglycemia, and hyperuricemia), a previously disclosed complication in BBS patients (Figure 1).[28, 51, 82]

SNPs rs1545 AND rs1547 OF *BBS6/ MKKS*:

SNPs emerge due to the swapping of single or lone nucleotides, and it has been communicated that these SNPs technologies have a wider perspective in recognizing disease-incorporated genes and the onset or evolution of a disorder [83] and may be utilized in developing a biomarker for metabolic syndrome.[84] It was outlined that around 30% of multitudinous BBS mutations were caused by these three *BBS* genes - *BBS6/MKKS*, *BBS10*, and *BBS12*. Among this *BBS6/MKKS*, which is a chaperonin protein, have been reported with heterozygous mutation (locus heterogeneity), triallelic inheritance, obesity, and have been integrated with several chaperonopathies of BBS in different populations.[30, 51, 74, 75, 85] Disparate and divergent populations have been analyzed for common *BBS* gene mutations, whereas in the year 2000, Slavotinek *et al.,* published that numerous mutations in *BBS6/MKKS* gene were accountable for the development of BBS. They investigated 34 probands (predominantly from Hispanic and Newfoundland populations), which were completely unrelated, and had familiar symptoms of BBS like, polydactyly, retinitis pigmentosa, mental retardation, either hydrometrocolpos (or) vaginal atresia, diabetes, obesity, and congenital heart disease. Among these, four probands carried mutations in the *BBS6/MKKS* genes, with the first proband having a heterozygous nonsense mutation (1679TA, Y264stop), missense mutation (1042GA, G52D) and obesity (with BMI > 40 kg/m^2) in a Hispanic girl (13 years old). The second proband had a homozygous, frameshift mutation (two deletions - 1324-1326delGTA and 1316delC), obesity (with BMI > 50 kg/m^2) in a Newfoundland female (33 years old). The maternal grandfather and parents of the second proband had heterozygous deletions, and her brother, who had the same BBS symptoms with a homozygous deletion. The third proband (4 years old, male from Newfoundland) was born to a consanguineous marriage whose parents had a heterozygous mutation, and the fourth proband (5 years old, female from Newfoundland) had a heterozygous mutation detected in her mother. Both the third and fourth families have an apportionment of 5 SNPs, 5 short tandem repeat polymorphisms (STRPs), and a frameshift homozygous

mutation (1167 delT) in the *BBS6/MKKS* genes (with a frequency of 11.8%). They hypothesized that the emergence of all the typical traits and BBS features, might be due to the loss of chaperonin protein integrity of *BBS6/MKKS* genes [85]. Another study in the Newfoundland population by Katsanis *et al.*, in the year 2000, speculated that the *BBS6/MKKS* gene might play a drastic role in BBS pathogenesis, as they suggest that, the mutated gene reverberates in the multimeric chaperone, causing retinal dystrophy, kidney malfunction, and obesity. This *BBS6/MKKS* gene mutation (heterozygous Y37C, delGG (exon 5), BBS$^{6H84Y;\ A242S,}$ T57A, L277P) is the second most widespread after *BBS1* (6/17 with 35%) on that island, with 5/17 cases accounting for 34% frequency.[47] In a Chinese proband, two heterozygous pathogenic variants, c.1664C>G and c.635C>T, have been detected apart from the usual polymorphisms of the *BBS6/MKKS* gene, constituting to the disease and obesity.[73] The *BBS6/MKKS* gene as a secondary deformity causes cardiovascular diseases, obesity, and polydactyly, which have been associated with metabolic syndrome since two reported SNPs, rs1545 and rs1547, were investigated in a few populations. According to Hotta (2009),[76] about 336 SNPs in 85 obesity-related genes were chosen for the investigation from the Japanese Single Nucleotide Polymorphism (JSNP) database. They performed an association study with a case-control analysis utilizing patient samples with metabolic syndrome (control – 528, metabolic syndrome patients – 1080) from the Japanese population and found that three SNPs, rs1545 (P = 0.000043, odds ratio (OR) age, gender adjusted 1.45 and confidence interval (95% CI) = 1.21-1.74), rs1547 (P = 0.000041, odds ratio (OR) age, gender adjusted 1.45 and confidence interval (95% CI) = 1.21-1.74) and rs2294901 (P = 0.000033, odds ratio (OR) age, gender adjusted 1.46 and confidence interval (95% CI) = 1.22-1.75) are related to metabolic syndrome, hence stating the fact that variation in this gene influences the risk of obesity and complex disorder manifestations.[76] In French Caucasian populations, they demonstrated the interconnection between the *BBS6/MKKS* gene and the metabolic syndrome (obesity, hyperglycemia, dyslipidemia) by scrutinizing four genes, *BBS1, BBS2, BBS4, BBS6/MKKS* in 12 genotyped variants (from 36 recognized variants in 48 individuals). By analyzing 1,299 French Caucasian normal control subjects (non-diabetic, non-obese) with 1,943 French Caucasian affected subjects, heterogeneous frequency of SNPs were detected in an age dependent manner. As in the case of *BBS6/MKKS* SNPs, rs221667 (P = 0.01, odds ratio (OR) 1.23 and confidence interval (95% CI) = 1.05–1.44) was observed in adult morbid obesity. And in the case of childhood obesity, especially early-onset, two SNPs were related, rs221667 (P = 0.0007, odds ratio (OR) 1.33 and confidence interval (95% CI) = 1.13–1.56) and rs6108572 (P = 0.007, odds ratio (OR) 1.21 and confidence interval (95% CI) = 1.05–1.39). The children assigned under childhood obesity had both of the SNPs (rs6108572 and rs221667) variants in homozygous conditions, which manifested into constrained BBS characteristics like dyslipidemia (atherogenic), elevated fasting triglycerides, and apolipoprotein B and had excessive postprandial glycaemia (P = 0.006) in children with homozygous rs221667 variant. Also, people with a heterozygous *BBS* gene mutation are extremely obese. Other recurrent polymorphisms of *BBS6/MKKS* genes, SNPs in the exonic region, rs1545 (Gly532Val), rs1547 (Arg517Cys), were present in the obese subjects (24 number) and non-diabetic non-obese subjects (24 number), and might render in the progression of common obesity. These SNPs were fewer in frequency compared to other variants and were not pervasive in obese subjects in contrast to lean individuals.[77] In the Danish population, an intense investigation was conducted on juvenile obese subjects (60 white Danish men) to validate the connection of *BBS6/MKKS* gene mutations (or) variations in correlation with typical polygenic obesity forms. There were three non-synonymous variants, Arg517Cys (rs1547), Gly532Val (rs1545) and Ala242Ser, two synonymous variants, Ile178Ile and Pro39Pro and one rare variant, Ala242Ser. During the analysis of the *BBS6/MKKS* coding region in those 60 white Danish men, Arg517Cys (16 out of 60 obese cases) was the most highly expressed variant, followed by Ala242Ser (2 out of 60 obese cases) and Gly532Val (1 out of 60 obese cases). Other variants prevalence probing was analyzed to be in linkage disequilibrium. The non-synonymous haplotype variant Arg517Cys (rs1547) was also found to be in complete linkage disequilibrium. In a case-control association study, there was an 11.4% prevalence of the allele polymorphism of Arg517Cys in the early childhood onset obesity group, which examined 744 men (confidence interval (95% CI) = 9.7–13.0) and a control group with a 9.5% prevalence of allele, which examined 867 subjects (confidence interval (95% CI) = 7.9–10.7) with P = 0.048. Another case-control study in middle-aged men, perceived a 9.7% prevalence of the allele, in the obese group, which examined 523 obese men (confidence interval (95% CI) = 7.9–11.4) and a control group with a 12.2% prevalence of the allele, which examined 1051 lean men (confidence interval (95% CI) = 10.8–13.6) with P = 0.037. They concluded that *BBS6/MKKS* mutation variants might take part an important function in the development of

juvenile onset obesity and non-syndromic obesity pathogenesis.[86] In the Greek population, an investigation of haplotype and genotype interpretation was performed in 220 cases (obese subjects with body mass index ≥ 30 kg/m^2) compared with 330 controls (non-obese subjects). Familiar polymorphisms like 986-29A>T (P = 0.0196), 985+33C>G, 985+16T>G (P = 0.0016), 1161+58A>G, 534C>T (or) I178I, 1595G>T (P = 0.0069) (or) G532V (rs1545 of the coding region) were exacerbated in diabetes mellitus type-2, arterial hypertension, and metabolic syndrome subjects. In French Caucasians and Danish, two SNPs of the exonic region, rs1545 (Gly532Val) and rs1547 (Arg517Cys), were communicated in obese cases, but due to their unfavorable frequency and linkage disequilibrium in the obesity affected and control groups, the association analysis was unattainable. In the 1595G>T polymorphism, the carriers (90.9%) of the T allele had increased arterial hypertension than non-carriers (67%, P = 0.007), and the obese subjects furthermore had magnified T allele polymorphism than non-obese controls (odds ratio (OR) = 1.63, P = 0.0127) and have outrageous risks of obesity and metabolic syndrome. In the Greek population, SNPs G532V (rs1545) were remarkably at elevated frequencies in the obese cases than at lower occurrences in non-obese subjects.[87] It was also communicated for the first time in Indian cohorts that were reported for a divergent ciliopathy gene mutation having *BBS6/MKKS* associated SNPs rs1545 and rs1547 in patients (pedigree with an autosomal recessive clinical aspect) suffering from BBS disorder. In an investigation conducted amidst 30 families (23 non-consanguineous and 7 consanguineous), chosen as the study observation group under distinct diagnostic criteria for BBS, almost 80% constituted the known *BBS* gene alterations along with metabolic syndrome integrated with SNPs of the *BBS6/MKKS* gene, rs1547 (p.R517C) and rs1545 (p.G532V). Another work conducted in North India, to analyze the *MKKS/BBS6* gene novel mutation connected with polydactyly and autosomal recessive retinitis pigmentosa, postulated that amidst the 300 outlined missense variants of the *MKKS/BBS6* gene, only three frequent homozygous variants exist in South Asians. The allele frequencies of these three homozygous variants in South Asian populations are p.Gly532Val (0.2473), p.Ile339Val (0.005852), and p.Arg517Cys (0.2471) subsequently.[88, 89]

To culminate the fact that the *BBS6/MKKS* gene is one of the prominent chaperonin proteins necessitated for BBSome assembly and various investigations suggest the fact that mutations in this gene causes numerous chaperonopathies and have been linked with diabetes and obesity. Nearly, *BBS6/MKKS, BBS10,* and *BBS12* genes alone comprise 30% of BBS mutations. Among these many disease-associated mutations, frameshift mutations, polymorphisms, and SNPs of the *BBS6/MKKS* genes were mostly affixed with obesity and metabolic syndrome. In multiple population-inspected studies, a few recurrent SNPs rs1547 and rs1545 were observed. They exist in the coding or exonic region, and these two SNPs, rs1545 (Gly532Val) and rs1547 (Arg517Cys), can hinder with the functional activities, developmental processes, and primarily in the burgeoning and progression of obesity with metabolic syndrome.[76, 88, 89] These SNPs were substantially in triallelic inheritance, missense mutations, both in heterozygous (locus) and homozygous conditions in diverse populations. It is confined to either juvenile or childhood obesity, non-syndromic obesity, and adult morbid obesity in contrasting probands and sometimes with linkage disequilibrium and inappropriate frequency. The subjects with heterozygous conditions of these *BBS6/MKKS* genes and SNPs were exceedingly diabetic and obese. Even though Hotta *et al.,* (2009), Sathya Priya *et al.,* (2015), and Goyal *et al.,* (2020) enunciated the significance of these two SNPs, our review has specific limitations. First and foremost, all the populations that reported the SNPs rs1547 and rs1545 insisted on their occurrence in most of the subjects, but they might be in linkage disequilibrium, in certain cases these SNPs were found both in control and cases. Secondly, immensely few populations and a very small but sizeable number of cohorts were included in the research and have carried out the *BBS* gene (especially *BBS6/MKKS*) mutational analyses studies, hence, with this relatively little data, it's not suffice to commence only rs1547 and rs1545 as the impetus, objective cause, or linkage of metabolic syndrome. We conclude that the two SNPs of the *BBS6/MKKS* gene, rs1547 and rs1545, have been disclosed in most of the studied populations and are certainly associated with chaperonopathies, obesity, and metabolic syndrome, but are assuredly not the only polymorphisms responsible for the disease pathogenesis. Further additional inclusion of a wide population group and by enlarging the study number might add more precedence and reliability to these SNPs and improve our cognizance about metabolic syndrome.

OBJECTIVE AND METHODOLOGY

The origination of the metabolic syndrome still needs better elucidation. Multiple complex disorders like obesity, diabetes, diabetic retinopathy, Bardet-Biedl syndrome (BBS), and polycystic ovary syndrome (PCOS) are categorized

under the metabolic syndrome. Several bodies, like WHO, IDF, EGIR, etc., have different evaluation criteria for the disease, but there is no deciphering idea of the disease's pathogenesis. Innumerable pathways were investigated to recognize an early onset, common progenitor gene, or frequent disorder interrelationship or occurrence, yet there is a gap in the perception of metabolic syndrome. In 2009, Hotta *et al.,* published that in a case-control association study of nearly 85 genes from the Japanese Single Nucleotide Polymorphism (JSNP) database, from around 336 genotyped SNPs, three SNPs rs1547, rs1545, and rs2294901 in the *BBS6/MKKS* gene were interconnected with metabolic syndrome (referenced in the text). This article served as the starting point of our paper. Hence, our prime objective was to execute a review search to ascertain whether the same SNPs were analyzed and disclosed in other populations. The method of intervention and data sourcing were completely from online resources like Google Scholar, SCOPUS, MEDLINE, PubMed, SCINDEX, Embase, Wiley, and EBSCO. We scrutinized multiple case studies, population reports, meta-analysis, research, and review articles about the SNPs of *BBS* genes and their connection with metabolic syndrome. The online search strategy keywords included, metabolic syndrome, obesity, BBS, diabetes, diabetic retinopathy, SNPs of BBS, *BBS6/MKKS* gene, rs1547, rs1545, rs2294901, and relevant articles with coverage till date or the latest evaluations were selected for our work. Divergent eligibility criteria were stipulated by various study groups in their reports, which incorporated obesity cases (varied BMI and computing gene polymorphisms and SNPs), cohort observational studies of BBS subjects (SNPs inspected), case-control association studies (SNPs examined), and the subjects had morphological changes in both genders, and mixed age groups. The investigations and outcomes of our review article were further narrated and discussed

CONCLUSION

Bardet-Biedl syndrome and diabetic retinopathy are metabolic syndrome since they have common characteristics and hallmarks like obesity, hyperglycemia, cardiovascular disorders, etc. These SNPs and polymorphisms of the *BBS6/MKKS* gene were reported in the Japanese, French Caucasian, Hispanic, Newfoundland, Chinese, Danish, Greek, and Indian populations to be analogous with obesity and metabolic syndrome. Due to the exorbitant prevalence of this disorder in the world population, further additional population-based studies may be carried out for better insight. SNPs are also so unique with respect to a single individual, and they happen due to a genetic variation in a single nucleotide of a genome when it is altered or transmuted in a DNA sequence. It falls within the coding sequence of genes or intermittently in the non-coding regions of genes, or sometimes in the intergenic regions. Most of these SNPs are present within a gene, in the regulatory region situated near a gene. Therefore, they can contribute directly to disease development. Also, we can speculate about how humans progress and respond to diseases, chemicals, pathogens, vaccines, drugs, and other factors by screening the variations in their DNA sequences. So, these SNPs may act as markers for lifestyle diseases like heart disease, diabetes, and cancer in the near future. Hence, these two reported SNPs, rs1545 and rs1547, which are present in the exonic region of the *BBS6/MKKS* gene, must be chosen for screening in patients with obesity and metabolic syndrome in disparate and heterogeneous communities. The frequency distribution of rs1545 and rs1547 in the world population might contribute to the interpretation of metabolic syndrome pathogenesis.

ACKNOWLEDGEMENT AND FUNDING

I acknowledge Dr. S. Meenakumari, Assistant Professor, Department of Biotechnology, SRM Institute of Science and Technology, Kattankulathur, and Dr. B. Ravi Sankar, HOD, Dr. ALM. PG. Institute of Basic Medical Sciences, Department of Endocrinology, University of Madras, Chennai, for their unfailing help, persistent support, and creating an exceptional scientific environment for outsiders to work in. My heartfelt gratitude to Dr. M. Sangeetha, Lecturer, Department of Biotechnology, Valliammal College for Women, Chennai, for her encouragement and support. And I also thank all staff members of the Department of Genetics and Molecular Biology, Vidyasagar Institute of Biomedical Technology and Science (VIBS), Medical Research Foundation, Sankara Nethralaya, Chennai, for their immense training.

REFERENCES

1. Alberti KG, Zimmet P, Shaw J. Metabolic syndrome--a new world-wide definition. A Consensus Statement from the International Diabetes Federation. Diabet Med. 2006 May; 23(5):469-80. https://pubmed.ncbi.nlm.nih.gov/16681555/

2. Brunner EJ, Hemingway H, Walker BR, Page M, Clarke P, Juneja M, Shipley MJ, Kumari M, Andrew R, Seckl JR, Papadopoulos A, Checkley S, Rumley A, Lowe GD, Stansfeld SA, Marmot MG. Adrenocortical, autonomic, and inflammatory causes of the metabolic syndrome: nested case-control study. Circulation. 2002 Nov 19; 106(21):2659-65.

https://pubmed.ncbi.nlm.nih.gov/12438290/

3. Alberti KG, Zimmet PZ. Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus provisional report of a WHO consultation. Diabet Med. 1998 Jul; 15(7):539-53. https://pubmed.ncbi.nlm.nih.gov/9686693/

4. World Health Organization. Definition, Diagnosis and Classifica- tion of Diabetes Mellitus and its Complications. Report of a WHO consultation. Geneva: World Health Organization 1999.

5. Balkau B, Charles MA. Comment on the provisional report from the WHO consultation. European Group for the Study of Insulin Resistance (EGIR). Diabet Med. 1999 May; 16(5):442-3. https://pubmed.ncbi.nlm.nih.gov/10342346/

6. Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. Executive Summary of The Third Report of The National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, And Treatment of High Blood Cholesterol In Adults (Adult Treatment Panel III). JAMA. 2001 May 16; 285(19):2486-97. https://pubmed.ncbi.nlm.nih.gov/11368702/

7. Bhalwar R. Metabolic syndrome: The Indian public health perspective. Med J Armed Forces India. 2020 Jan; 76(1):8-16. https://pubmed.ncbi.nlm.nih.gov/32020962/

8. Ford ES, Giles WH, Dietz WH. Prevalence of the metabolic syndrome among US adults: findings from the third National Health and Nutrition Examination Survey. JAMA. 2002 Jan 16; 287(3):356-9. https://pubmesd.ncbi.nlm.nih.gov/11790215/

9. Sawant A, Mankeshwar R, Shah S, Raghavan R, Dhongde G, Raje H, D'souza S, Subramanium A, Dhairyawan P, Todur S, Ashavaid TF. Prevalence of metabolic syndrome in urban India. Cholesterol. 2011; 2011:920983. https://pubmed.ncbi.nlm.nih.gov/21687582/

10. Rosenzweig JL, Ferrannini E, Grundy SM, Haffner SM, Heine RJ, Horton ES, Kawamori R; Endocrine Society. Primary prevention of cardiovascular disease and type 2 diabetes in patients at metabolic risk: an endocrine society clinical practice guideline. J Clin Endocrinol Metab. 2008 Oct; 93(10):3671-89. https://pubmed.ncbi.nlm.nih.gov/18664543/

11. McCullough AJ. Epidemiology of the metabolic syndrome in the USA. J Dig Dis. 2011 Oct; 12(5):333-40. https://pubmed.ncbi.nlm.nih.gov/21091931/

12. Kahn R, Buse J, Ferrannini E, Stern M; American Diabetes Association; European Association for the Study of Diabetes. The metabolic syndrome: time for a critical appraisal: joint statement from the American Diabetes Association and the European Association for the Study of Diabetes. Diabetes Care. 2005 Sep; 28(9):2289-304. https://pubmed.ncbi.nlm.nih.gov/16123508/

13. Hunt KJ, Resendez RG, Williams K, Haffner SM, Stern MP; San Antonio Heart Study. National Cholesterol Education Program versus World Health Organization metabolic syndrome in relation to all-cause and cardiovascular mortality in the San Antonio Heart Study. Circulation. 2004 Sep 7; 110(10):1251-7. https://pubmed.ncbi.nlm.nih.gov/15326061/

14. Ford ES. Prevalence of the metabolic syndrome defined by the International Diabetes Federation among adults in the U.S. Diabetes Care. 2005 Nov; 28(11):2745-9. https://pubmed.ncbi.nlm.nih.gov/16249550/

15. Gu D, Reynolds K, Wu X, Chen J, Duan X, Reynolds RF, Whelton PK, He J; InterASIA Collaborative Group. Prevalence of the metabolic syndrome and overweight among adults in China. Lancet. 2005 Apr 16-22; 365(9468):1398-405. https://pubmed.ncbi.nlm.nih.gov/15836888/

16. Krishnamoorthy Y, Rajaa S, Murali S, Rehman T, Sahoo J, Kar SS. Prevalence of metabolic syndrome among adult population in India: A systematic review and meta-analysis. PLoS One. 2020 Oct 19; 15(10):e0240971. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7571716/

17. Lemieux I, Després JP. Metabolic Syndrome: Past, Present and Future. Nutrients. 2020 Nov 14; 12(11):3501. https://pubmed.ncbi.nlm.nih.gov/33202550/

18. Devaraj S, Singh U, Jialal I. Human C-reactive protein and the metabolic syndrome. Curr Opin Lipidol. 2009 Jun; 20(3):182-9. https://pubmed.ncbi.nlm.nih.gov/19369869/

19. Saklayen MG. The Global Epidemic of the Metabolic

Syndrome. Curr Hypertens Rep. 2018 Feb 26; 20(2):12. https://pubmed.ncbi.nlm.nih.gov/29480368/

20. Renaldi O, Pramono B, Sinorita H, Purnomo LB, Asdie RH, Asdie AH. Hypoadiponectinemia: a risk factor for metabolic syndrome. Acta Med Indones. 2009 Jan; 41(1):20-4. https://pubmed.ncbi.nlm.nih.gov/19258676/

21. Sanfilippo PG, Hewitt AW, Hammond CJ, Mackey DA. The heritability of ocular traits. Surv Ophthalmol. 2010 Nov-Dec; 55(6):561-83. https://pubmed.ncbi.nlm.nih.gov/20851442/

22. Haines JL, Hauser MA, Schmidt S, Scott WK, Olson LM, Gallins P, Spencer KL, Kwan SY, Noureddine M, Gilbert JR, Schnetz-Boutaud N, Agarwal A, Postel EA, Pericak-Vance MA. Complement factor H variant increases the risk of age-related macular degeneration. Science. 2005 Apr 15; 308(5720):419-21. https://pubmed.ncbi.nlm.nih.gov/15761120/

23. Stone DL, Slavotinek A, Bouffard GG, Banerjee-Basu S, Baxevanis AD, Barr M, Biesecker LG. Mutation of a gene encoding a putative chaperonin causes McKusick-Kaufman syndrome. Nat Genet. 2000 May; 25(1):79-82. https://pubmed.ncbi.nlm.nih.gov/10802661/

24. Pradhan AD, Manson JE, Rifai N, Buring JE, Ridker PM. C-reactive protein, interleukin 6, and risk of developing type 2 diabetes mellitus. JAMA. 2001 Jul 18; 286(3):327-34. https://pubmed.ncbi.nlm.nih.gov/11466099/

25. Beales PL, Elcioglu N, Woolf AS, Parker D, Flinter FA. New criteria for improved diagnosis of Bardet-Biedl syndrome: results of a population survey. J Med Genet. 1999 Jun; 36(6):437-46. https://pubmed.ncbi.nlm.nih.gov/10874630/

26. Grundy SM, Brewer HB Jr, Cleeman JI, Smith SC Jr, Lenfant C; American Heart Association; National Heart, Lung, and Blood Institute. Definition of metabolic syndrome: Report of the National Heart, Lung, and Blood Institute/American Heart Association conference on scientific issues related to definition. Circulation. 2004 Jan 27; 109(3):433-8. https://pubmed.ncbi.nlm.nih.gov/14744958/

27. Nachury MV, Loktev AV, Zhang Q, Westlake CJ, Peränen J, Merdes A, Slusarski DC, Scheller RH, Bazan JF, Sheffield VC, Jackson PK. A core complex of BBS proteins cooperates with the GTPase Rab8 to promote ciliary membrane biogenesis. Cell. 2007 Jun 15; 129(6):1201-13. https://pubmed.ncbi.nlm.nih.gov/17574030/

28. Qi Z, Shen Y, Fu Q, Li W, Yang W, Xu W, Chu P, Zhang Y, Wang H. Whole-exome sequencing identified compound heterozygous variants in MMKS in a Chinese pedigree with Bardet-Biedl syndrome. Sci China Life Sci. 2017 Jul; 60(7):739-745. https://pubmed.ncbi.nlm.nih.gov/28624958/

29. Weihbrecht K, Goar WA, Pak T, Garrison JE, DeLuca AP, Stone EM, Scheetz TE, Sheffield VC. Keeping an Eye on Bardet-Biedl Syndrome: A Comprehensive Review of the Role of Bardet-Biedl Syndrome Genes in the Eye. Med Res Arch. 2017 Sep; 5(9):10.18103/mra.v5i9.1526. https://pubmed.ncbi.nlm.nih.gov/29457131/

30. Gupta N, D'Acierno M, Zona E, Capasso G, Zacchia M. Bardet-Biedl syndrome: The pleiotropic role of the chaperonin-like BBS6, 10, and 12 proteins. Am J Med Genet C Semin Med Genet. 2022 Mar; 190(1):9-19. https://pubmed.ncbi.nlm.nih.gov/35373910/

31. Forsyth RL, Gunay-Aygun M. Bardet-Biedl Syndrome Overview. 2003 Jul 14 [Updated 2023 Mar 23]. In: Adam MP, Mirzaa GM, Pagon RA, et al., editors. GeneReviews® [Internet]. Seattle (WA): University of Washington, Seattle; 1993-2023. Available from: https://www.ncbi.nlm.nih.gov/books/NBK1363/

32. Wong TY, Cheung CM, Larsen M, Sharma S, Simó R. Diabetic retinopathy. Nat Rev Dis Primers. 2016 Mar 17; 2:16012. https://pubmed.ncbi.nlm.nih.gov/27159554/

33. Nawaz IM, Rezzola S, Cancarini A, Russo A, Costagliola C, Semeraro F, Presta M. Human vitreous in proliferative diabetic retinopathy: Characterization and translational implications. Prog Retin Eye Res. 2019 Sep; 72:100756. https://pubmed.ncbi.nlm.nih.gov/30951889/

34. Geraldes P, Hiraoka-Yamamoto J, Matsumoto M, Clermont A, Leitges M, Marette A, Aiello LP, Kern TS, King GL. Activation of PKC-delta and SHP-1 by hyperglycemia causes vascular cell apoptosis and diabetic retinopathy. Nat Med. 2009 Nov; 15(11):1298-306. https://pubmed.ncbi.nlm.nih.gov/19881493/

35. Hotta K. [New insights about obesity-related genes]. Nihon Rinsho. 2009 Feb; 67(2):253-6. https://pubmed.ncbi.

nlm.nih.gov/19202896/

36. Ayala TS, Tessaro FHG, Jannuzzi GP, Bella LM, Ferreira KS, Martins JO. High Glucose Environments Interfere with Bone Marrow-Derived Macrophage Inflammatory Mediator Release, the TLR4 Pathway and Glucose Metabolism. Sci Rep. 2019 Aug 7; 9(1):11447. https://pubmed.ncbi.nlm.nih.gov/31391499/

37. Singh M, Tyagi SC. Genes and genetics in eye diseases: a genomic medicine approach for investigating hereditary and inflammatory ocular disorders. Int J Ophthalmol. 2018 Jan 18; 11(1):117-134. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5767668/

38. Generali E, Cantarini L, Selmi C. Ocular Involvement in Systemic Autoimmune Diseases. Clin Rev Allergy Immunol. 2015 Dec; 49(3):263-70. https://pubmed.ncbi.nlm.nih.gov/26494481/

39. Sheffield VC, Stone EM. Genomics and the eye. N Engl J Med. 2011 May 19; 364(20):1932-42. https://pubmed.ncbi.nlm.nih.gov/21591945/

40. Mitchell KJ. What is complex about complex disorders? Genome Biol. 2012 Jan 23; 13(1):237. https://pubmed.ncbi.nlm.nih.gov/22269335/

41. Ross Allison, Beales PL, Hill J. "The Clinical, Molecular, and Functional Genetics of Bardet–Biedl Syndrome," Genetics of Obesity Syndromes- Oxford University Press. pp. 153–154, 2008. https://oxfordmedicine.com/view/10.1093/med/9780195300161.001.0001/med-9780195300161-chapter-9

42. Laurence JZ, Moon RC. Four cases of "retinitis pigmentosa" occurring in the same family, and accompanied by general imperfections of development. 1866. Obes Res. 1995 Jul; 3(4):400-3. https://pubmed.ncbi.nlm.nih.gov/8521157/

43. Farag TI, Teebi AS. Bardet-Biedl and Laurence-Moon syndromes in a mixed Arab population. Clin Genet. 1988 Feb; 33(2):78-82. https://pubmed.ncbi.nlm.nih.gov/3359670/

44. Moore SJ, Green JS, Fan Y, Bhogal AK, Dicks E, Fernandez BA, Stefanelli M, Murphy C, Cramer BC, Dean JC, Beales PL, Katsanis N, Bassett AS, Davidson WS, Parfrey PS. Clinical and genetic epidemiology of Bardet-Biedl syndrome in Newfoundland: a 22-year prospective, population-based, cohort study. Am J Med Genet A. 2005 Feb 1; 132A(4):352-60. https://pubmed.ncbi.nlm.nih.gov/15637713/

45. Jin H, White SR, Shida T, Schulz S, Aguiar M, Gygi SP, Bazan JF, Nachury MV. The conserved Bardet-Biedl syndrome proteins assemble a coat that traffics membrane proteins to cilia. Cell. 2010 Jun 25; 141(7):1208-19. https://pubmed.ncbi.nlm.nih.gov/20603001/

46. Farag TI, Teebi AS. High incidence of Bardet Biedl syndrome among the Bedouin. Clin Genet. 1989 Dec; 36(6):463-4. https://pubmed.ncbi.nlm.nih.gov/2591073/

47. Katsanis N, Beales PL, Woods MO, Lewis RA, Green JS, Parfrey PS, Ansley SJ, Davidson WS, Lupski JR. Mutations in MKKS cause obesity, retinal dystrophy and renal malformations associated with Bardet-Biedl syndrome. Nat Genet. 2000 Sep; 26(1):67-70. https://pubmed.ncbi.nlm.nih.gov/10973251/

48. Klein D, Ammann F. The syndrome of Laurence-Moon-Bardet-Biedl and allied diseases in Switzerland. Clinical, genetic and epidemiological studies. J Neurol Sci. 1969 Nov-Dec; 9(3):479-513. https://doi.org/10.1016/0022-510X(69)90091-4

49. M'hamdi O, Ouertani I, Maazoul F, Chaabouni-Bouhamed H. Prevalence of Bardet-Biedl syndrome in Tunisia. J Community Genet. 2011 Jun; 2(2):97-9. https://pubmed.ncbi.nlm.nih.gov/22109794/

50. Hjortshøj TD, Grønskov K, Philp AR, Nishimura DY, Riise R, Sheffield VC, Rosenberg T, Brøndum-Nielsen K. Bardet-Biedl syndrome in Denmark--report of 13 novel sequence variations in six genes. Hum Mutat. 2010 Apr; 31(4):429-36. https://pubmed.ncbi.nlm.nih.gov/20120035/

51. Melluso A, Secondulfo F, Capolongo G, Capasso G, Zacchia M. Bardet-Biedl Syndrome: Current Perspectives and Clinical Outlook. Ther Clin Risk Manag. 2023 Jan 30; 19:115-132. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9896974/

52. Wiens CJ, Tong Y, Esmail MA, Oh E, Gerdes JM, Wang J, Tempel W, Rattner JB, Katsanis N, Park HW, Leroux MR. Bardet-Biedl syndrome-associated small GTPase ARL6 (BBS3) functions at or near the ciliary gate and modulates

Wnt signaling. J Biol Chem. 2010 May 21; 285(21):16218-30. https://pubmed.ncbi.nlm.nih.gov/20207729/

53. Zhang Q, Yu D, Seo S, Stone EM, Sheffield VC. Intrinsic protein-protein interaction-mediated and chaperonin-assisted sequential assembly of stable bardet-biedl syndrome protein complex, the BBSome. J Biol Chem. 2012 Jun 8; 287(24):20625-35. https://pubmed.ncbi.nlm.nih.gov/22500027/

54. Seo S, Baye LM, Schulz NP, Beck JS, Zhang Q, Slusarski DC, Sheffield VC. BBS6, BBS10, and BBS12 form a complex with CCT/TRiC family chaperonins and mediate BBSome assembly. Proc Natl Acad Sci U S A. 2010 Jan 26; 107(4):1488-93. https://pubmed.ncbi.nlm.nih.gov/20080638/

55. Imhoff O, Marion V, Stoetzel C, Durand M, Holder M, Sigaudy S, Sarda P, Hamel CP, Brandt C, Dollfus H, Moulin B. Bardet-Biedl syndrome: a study of the renal and cardiovascular phenotypes in a French cohort. Clin J Am Soc Nephrol. 2011 Jan; 6(1):22-9. PMC3022245. https://pubmed.ncbi.nlm.nih.gov/20876674/

56. Soliman AT, Rajab A, AlSalmi I, Asfour MG. Empty sellae, impaired testosterone secretion, and defective hypothalamic-pituitary growth and gonadal axes in children with Bardet-Biedl syndrome. Metabolism. 1996 Oct; 45(10):1230-4. https://pubmed.ncbi.nlm.nih.gov/8843177/

57. Waters AM, Beales PL. Ciliopathies: an expanding disease spectrum. Pediatr Nephrol. 2011 Jul; 26(7):1039-56. https://pubmed.ncbi.nlm.nih.gov/21210154/

58. Gerdes JM, Davis EE, Katsanis N. The vertebrate primary cilium in development, homeostasis, and disease. Cell. 2009 Apr 3; 137(1):32-45. https://pubmed.ncbi.nlm.nih.gov/19345185/

59. Guo DF, Rahmouni K. Molecular basis of the obesity associated with Bardet-Biedl syndrome. Trends Endocrinol Metab. 2011 Jul; 22(7):286-93. https://pubmed.ncbi.nlm.nih.gov/21514177/

60. Schmidt MI, Duncan BB, Sharrett AR, Lindberg G, Savage PJ, Offenbacher S, Azambuja MI, Tracy RP, Heiss G. Markers of inflammation and prediction of diabetes mellitus in adults (Atherosclerosis Risk in Communities study): a cohort study. Lancet. 1999 May 15; 353(9165):1649-52. https://pubmed.ncbi.nlm.nih.gov/10335783/

61. Javn SB, Thomas S, Ramachandran S, Loganathan S, Sundari M, Mala K. Polycystic ovarian syndrome-associated cardiovascular complications: An overview of the association between the biochemical markers and potential strategies for their prevention and elimination. Diabetes Metab Syndr. 2017 Dec; 11 Suppl 2:S841-S851. https://pubmed.ncbi.nlm.nih.gov/28711514/

62. M'hamdi O, Ouertani I, Chaabouni-Bouhamed H. Update on the genetics of bardet-biedl syndrome. Mol Syndromol. 2014 Feb; 5(2):51-6. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3977223/

63. Schaefer E, Zaloszyc A, Lauer J, Durand M, Stutzmann F, Perdomo-Trujillo Y, Redin C, Bennouna Greene V, Toutain A, Perrin L, Gérard M, Caillard S, Bei X, Lewis RA, Christmann D, Letsch J, Kribs M, Mutter C, Muller J, Stoetzel C, Fischbach M, Marion V, Katsanis N, Dollfus H. Mutations in SDCCAG8/NPHP10 Cause Bardet-Biedl Syndrome and Are Associated with Penetrant Renal Disease and Absent Polydactyly. Mol Syndromol. 2011 Sep; 1(6):273-281. https://pubmed.ncbi.nlm.nih.gov/22190896/

64. Billingsley G, Vincent A, Deveault C, Héon E. Mutational analysis of SDCCAG8 in Bardet-Biedl syndrome patients with renal involvement and absent polydactyly. Ophthalmic Genet. 2012 Sep; 33(3):150-4. https://pubmed.ncbi.nlm.nih.gov/22626039/

65. Smaoui N, Chaabouni M, Sergeev YV, Kallel H, Li S, Mahfoudh N, Maazoul F, Kammoun H, Gandoura N, Bouaziz A, Nouiri E, M'Rad R, Chaabouni H, Hejtmancik JF. Screening of the eight BBS genes in Tunisian families: no evidence of triallelism. Invest Ophthalmol Vis Sci. 2006 Aug; 47(8):3487-95. https://pubmed.ncbi.nlm.nih.gov/16877420/

66. Abu Safieh L, Aldahmesh MA, Shamseldin H, Hashem M, Shaheen R, Alkuraya H, Al Hazzaa SA, Al-Rajhi A, Alkuraya FS. Clinical and molecular characterisation of Bardet-Biedl syndrome in consanguineous populations: the power of homozygosity mapping. J Med Genet. 2010 Apr; 47(4):236-41. https://pubmed.ncbi.nlm.nih.gov/19858128/

67. Abu-Safieh L, Al-Anazi S, Al-Abdi L, Hashem M, Alkuraya H, Alamr M, Sirelkhatim MO, Al-Hassnan Z, Alkuraya B, Mohamed JY, Al-Salem A, Alrashed M, Faqeih

E, Softah A, Al-Hashem A, Wali S, Rahbeeni Z, Alsayed M, Khan AO, Al-Gazali L, Taschner PE, Al-Hazzaa S, Alkuraya FS. In search of triallelism in Bardet-Biedl syndrome. Eur J Hum Genet. 2012 Apr; 20(4):420-7. https://pubmed.ncbi.nlm.nih.gov/22353939/

68. Kim SK, Shindo A, Park TJ, Oh EC, Ghosh S, Gray RS, Lewis RA, Johnson CA, Attie-Bittach T, Katsanis N, Wallingford JB. Planar cell polarity acts through septins to control collective cell movement and ciliogenesis. Science. 2010 Sep 10; 329(5997):1337-40. https://pubmed.ncbi.nlm.nih.gov/20671153/

69. Badano JL, Kim JC, Hoskins BE, Lewis RA, Ansley SJ, Cutler DJ, Castellan C, Beales PL, Leroux MR, Katsanis N. Heterozygous mutations in BBS1, BBS2 and BBS6 have a potential epistatic effect on Bardet-Biedl patients with two mutations at a second BBS locus. Hum Mol Genet. 2003 Jul 15; 12(14):1651-9. https://pubmed.ncbi.nlm.nih.gov/12837689/

70. Janssen S, Ramaswami G, Davis EE, Hurd T, Airik R, Kasanuki JM, Van Der Kraak L, Allen SJ, Beales PL, Katsanis N, Otto EA, Hildebrandt F. Mutation analysis in Bardet-Biedl syndrome by DNA pooling and massively parallel resequencing in 105 individuals. Hum Genet. 2011 Jan; 129(1):79-90. https://pubmed.ncbi.nlm.nih.gov/21052717/

71. Innes AM, Boycott KM, Puffenberger EG, Redl D, MacDonald IM, Chudley AE, Beaulieu C, Perrier R, Gillan T, Wade A, Parboosingh JS. A founder mutation in BBS2 is responsible for Bardet-Biedl syndrome in the Hutterite population: utility of SNP arrays in genetically heterogeneous disorders. Clin Genet. 2010 Nov; 78(5):424-31. https://pubmed.ncbi.nlm.nih.gov/20618352/

72. Hjortshøj TD, Grønskov K, Brøndum-Nielsen K, Rosenberg T. A novel founder BBS1 mutation explains a unique high prevalence of Bardet-Biedl syndrome in the Faroe Islands. Br J Ophthalmol. 2009 Mar; 93(3):409-13. https://pubmed.ncbi.nlm.nih.gov/18669544/

73. Li H, Hu Z. [Genetic analysis of novel MKKS variants in a Chinese patient with Bardet-Biedl syndrome]. Zhonghua Yi Xue Yi Chuan Xue Za Zhi. 2022 Jul 10; 39(7):754-758. Chinese. https://pubmed.ncbi.nlm.nih.gov/35810436/

74. Katsanis N, Ansley SJ, Badano JL, Eichers ER, Lewis RA, Hoskins BE, Scambler PJ, Davidson WS, Beales PL, Lupski JR. Triallelic inheritance in Bardet-Biedl syndrome, a Mendelian recessive disorder. Science. 2001 Sep 21; 293(5538):2256-9. https://pubmed.ncbi.nlm.nih.gov/11567139/

75. Stenson PD, Mort M, Ball EV, Evans K, Hayden M, Heywood S, Hussain M, Phillips AD, Cooper DN. The Human Gene Mutation Database: towards a comprehensive repository of inherited mutation data for medical research, genetic diagnosis and next-generation sequencing studies. Hum Genet. 2017 Jun; 136(6):665-677. https://pubmed.ncbi.nlm.nih.gov/28349240/

76. Hotta K, Nakamura T, Takasaki J, Takahashi H, Takahashi A, Nakata Y, Kamohara S, Kotani K, Komatsu R, Itoh N, Mineo I, Wada J, Masuzaki H, Yoneda M, Nakajima A, Funahashi T, Miyazaki S, Tokunaga K, Hamaguchi K, Tanaka K, Yamada K, Hanafusa T, Oikawa S, Yoshimatsu H, Nakao K, Sakata T, Matsuzawa Y, Kamatani N, Nakamura Y. Screening of 336 single-nucleotide polymorphisms in 85 obesity-related genes revealed McKusick-Kaufman syndrome gene variants are associated with metabolic syndrome. J Hum Genet. 2009 Apr; 54(4):230-5. https://pubmed.ncbi.nlm.nih.gov/19247371/

77. Benzinou M, Walley A, Lobbens S, Charles MA, Jouret B, Fumeron F, Balkau B, Meyre D, Froguel P. Bardet-Biedl syndrome gene variants are associated with both childhood and adult common obesity in French Caucasians. Diabetes. 2006 Oct; 55(10):2876-82. https://pubmed.ncbi.nlm.nih.gov/17003356/

78. Stone DL, Agarwala R, Schäffer AA, Weber JL, Vaske D, Oda T, Chandrasekharappa SC, Francomano CA, Biesecker LG. Genetic and physical mapping of the McKusick-Kaufman syndrome. Hum Mol Genet. 1998 Mar; 7(3):475-81. https://pubmed.ncbi.nlm.nih.gov/9467007/

79. Kim JC, Ou YY, Badano JL, Esmail MA, Leitch CC, Fiedrich E, Beales PL, Archibald JM, Katsanis N, Rattner JB, Leroux MR. MKKS/BBS6, a divergent chaperonin-like protein linked to the obesity disorder Bardet-Biedl syndrome, is a novel centrosomal component required for cytokinesis. J Cell Sci. 2005 Mar 1; 118(Pt 5):1007-20. https://pubmed.ncbi.nlm.nih.gov/15731008/

80. Fath MA, Mullins RF, Searby C, Nishimura DY, Wei J, Rahmouni K, Davis RE, Tayeh MK, Andrews M, Yang B, Sigmund CD, Stone EM, Sheffield VC. Mkks-null mice have a phenotype resembling Bardet-Biedl syndrome. Hum Mol

Genet. 2005 May 1; 14(9):1109-18. https://pubmed.ncbi.nlm.nih.gov/15772095/

81. Scott CA, Marsden AN, Rebagliati MR, Zhang Q, Chamling X, Searby CC, Baye LM, Sheffield VC, Slusarski DC. Nuclear/cytoplasmic transport defects in BBS6 underlie congenital heart disease through perturbation of a chromatin remodeling protein. PLoS Genet. 2017 Jul 28; 13(7):e1006936. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5550010/

82. Schaefer E, Durand M, Stoetzel C, Doray B, Viville B, Hellé S, Danse JM, Hamel C, Bitoun P, Goldenberg A, Finck S, Faivre L, Sigaudy S, Holder M, Vincent MC, Marion V, Bonneau D, Verloes A, Nisand I, Mandel JL, Dollfus H. Molecular diagnosis reveals genetic heterogeneity for the overlapping MKKS and BBS phenotypes. Eur J Med Genet. 2011 Mar-Apr; 54(2):157-60. https://pubmed.ncbi.nlm.nih.gov/21044901/

83. Shastry BS. SNPs in disease gene mapping, medicinal drug development and evolution. J Hum Genet. 2007; 52(11):871-880. https://pubmed.ncbi.nlm.nih.gov/17928948/

84. Povel CM, Boer JM, Onland-Moret NC, Dollé ME, Feskens EJ, van der Schouw YT. Single nucleotide polymorphisms (SNPs) involved in insulin resistance, weight regulation, lipid metabolism and inflammation in relation to metabolic syndrome: an epidemiological study. Cardiovasc Diabetol. 2012 Oct 29; 11:133. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3507796/

85. Slavotinek AM, Stone EM, Mykytyn K, Heckenlively JR, Green JS, Heon E, Musarella MA, Parfrey PS, Sheffield VC, Biesecker LG. Mutations in MKKS cause Bardet-Biedl syndrome. Nat Genet. 2000 Sep; 26(1):15-6. https://pubmed.ncbi.nlm.nih.gov/10973238/

86. Andersen KL, Echwald SM, Larsen LH, Hamid YH, Glümer C, Jørgensen T, Borch-Johnsen K, Andersen T, Sørensen TI, Hansen T, Pedersen O. Variation of the McKusick-Kaufman gene and studies of relationships with common forms of obesity. J Clin Endocrinol Metab. 2005 Jan; 90(1):225-30. https://pubmed.ncbi.nlm.nih.gov/15483080/

87. Rouskas K, Paletas K, Kalogeridis A, Sarigianni M, Ioannidou-Papagiannaki E, Tsapas A, Kouvatsi A. Association between BBS6/MKKS gene polymorphisms, obesity and metabolic syndrome in the Greek population. Int J Obes (Lond). 2008 Nov; 32(11):1618-25. https://pubmed.ncbi.nlm.nih.gov/18813213/

88. Sathya Priya C, Sen P, Umashankar V, Gupta N, Kabra M, Kumaramanickavel G, Stoetzel C, Dollfus H, Sripriya S. Mutation spectrum in BBS genes guided by homozygosity mapping in an Indian cohort. Clin Genet. 2015 Feb; 87(2):161-6. https://pubmed.ncbi.nlm.nih.gov/24400638/

89. Goyal S, Singh IR, Vanita V. Novel mutation in MKKS/BBS6 linked with arRP and polydactyly in a family of North Indian origin. Clin Exp Ophthalmol. 2020 Apr; 48(3):343-355. https://pubmed.ncbi.nlm.nih.gov/31989739/

Vol 3 | Issue 1 | January - April | 2023

NOTES FROM THE FIELD - PUBLIC HEALTH

PUBLIC HEALTH RESPONSE TO COVID-19: VACCINATION COVERAGE ACHIEVED THROUGH CAMPAIGN MODE – "MEGA-CAMPS", TAMIL NADU, INDIA 2021-22

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Abstract

ABSTRACT : To overcome the growing burden of COVID-19, Tamil Nadu, a southern state in India with a population of 76 million, introduced a strategy for COVID-19 vaccination by campaign mode on a large scale named as "mega-camps". 38 mega-camps were conducted every weekend for a period of one-year from 2021-22 with 1,108,557 vaccination sessions. Of the total first, second and precaution doses provided, 29%, 53%, 75% were achieved through mega-camps. Also, it helped in reducing vaccine wastages drastically from 6% to -0.30%. In situations, where large vaccination coverage is desired over short period, campaign mode may be preferred in achieving maximum coverage.

KEYWORDS : Mega camps, Mass vaccination, Innovation in Public Health.

MAIN ARTICLE

Covid-19 pandemic has resulted in devastating impacts causing huge social and economic disruption. Nearly 15 million excess deaths have occurred globally in 2020-21.[1] Of the 1.41 billion population in India, a total of 530,824 deaths have occurred due to COVID-19 till March 2023.[2] Tamil Nadu, a southern State in India, faced the pandemic in three waves from 2020-22 with average daily death of 83 in first wave, 340 in second wave and 34 in third wave during the peak period.[3]

With the aim to provide strong protection againtst serious illness, hospitalization, and deaths from Covid-19, WHO have published strategy for achieving Covid-19 vaccination recommending all countries to vaccinate 10% of their population by September 2021, 40% and 70% by end of December 2021 and June 2022.[4-5] India rolled out the world's largest vaccination drive on 16 January, 2021 in 3,006 sites in all states and union territories to vaccinate around 300 million priority groups.[6-7]

With 76 million population, the state adopted the national guidelines without any deviation for preventing pandemic spread including case management, containment measures, and, enforcing lockdown, compliance to wearing masks, and social distancing. State-wide vaccination drive was initiated on 16 January 2021 adopting the SOPs prescribed under the country guidelines in 160 Covishield and 6 Covaxin sites.[8] The drive began with a focus on HealthCare Workers (HCW) and Frontline Workers (FLW) and extended to the old age population, then to persons aged 45 and above, adult population and to adolescents in phases. Nearly a year after the initiation, precaution doses were taken up.

After battling first and second wave of COVID-19 pandemic, in the mid-year of 2021, to overcome the growing burden of COVID-19 cases requiring hospitalization and deaths, and more importantly to overcome the challenges such as vaccine hesitancy and vaccine avoidance, the State took on different vaccination strategies to increase the coverage viz., vaccination at workplaces, schools and colleges, focusing migrants, reaching differently abled persons through Department of disability and house to house vaccination. Till August 2021, 91,67,198 doses were given which is only 8% of the total doses given as on 31 March 2023. In September 2021, a strategy named "mega-camps" was initiated across the state which were the campaign mode of vaccination planned on every weekend, either Saturday or Sunday involving the entire public health team from 7am to 7pm accessible to the public even on holidays. Camps were placed at all the conventional booth locations allocated for Intensive Pulse Polio Immunization (IPPI) which has been

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happening since 1995.

Tamil Nadu Government was very much keen on improving the vaccination coverage and supported the mega-camps through ensuring coordination and sharing of responsibilities from other government departments, private players, industries, and motivating public through media. Directorate of Public Health and Preventive Medicine, with 100 years of its existence formulated the operational strategies and implemented mega-camps across the state involving all its field strength.

District Task Force meetings were convened under the chairmanship of the District Magistrate to bring in intersectoral coordination. Microplanning with manpower to be involved, training plans, setting up booths, camp sessions, fixing targets, supervision, monitoring, providing police protection for maintenance of queue and IEC, were communicated from the state to all district teams. District Immunization Officers (DIOs) were responsible for the planning and smooth conduct of the sessions under the overall guidance of State Immunization Officer (SIO). DIOs ensured the availability of vaccines and syringes at cold chain points well in advance and supplied necessary vaccine logistics including syringes as per the target beneficiaries identified in the micro plan for each booth. Pharmacists maintained enough number of ice packs, vaccine carriers, cold box, etc. to be used for conducting the camps. The vaccination booths were set at railway stations, bus stands, schools, Anganwadi centers, religious places, Primary Health Centers (PHCs), secondary and tertiary care hospitals, and other fixed polio booths but without compromising the effective Cold Chain Management.

The arrangements at booths such as seating, drinking water facilities, signage board and IEC materials for display etc. were supported by local elected representatives or revenue departments. Each booth had micro plan with number of eligible beneficiaries in the respective area and number of days required, and conducted sessions on morning, afternoon, and evening at three different places as camp sites. In each booth or camp site, a minimum of 4 personnel was involved – a vaccinator, a person for data entry and two supporting staff for mobilization. Vaccinators were the Village Health Nurses, Urban Health Nurses from field level, and staff Nurses, ANMs from PHCs. Nursing staff from secondary and tertiary hospitals, nursing students from both Government and private were also deputed as vaccinators. Data entry persons in PHCs and from other departments were deputed for data capturing and, for mobilizing beneficiaries, Anganwadi workers were involved through the support of ICDS. Anaphylaxis kits were kept in the booths to manage AEFI cases. 108 Emergency Ambulance Services were stationed at strategic places during the camp timings. Booths were functioning the whole day and separate plan for vaccine distribution and cold chain maintenance with vaccine delivery route chart were formulated, for which vehicles from all departments were diverted and used. Independent mobility arrangements were also made for delivery of food and refreshments for the workforce involved.

Performance of the camp sessions were reported through Google Sheet on real time including vaccine utilization, in addition to prompt entries in the Co-WIN portal by concerned vaccinator, Data Entry Operators and volunteers. One supervisor at block level was assigned for 5-8 booths. District level Supervision was also ensured by second level officials from the Public Health department and officials from other Departments. Independent transport arrangements were made for each of the supervisors and were a part of the micro-plan.

Social Mobilization and IEC activities were initiated much prior to the campaign such as public announcements in streets, marketplaces, festivals, fairs, schools, issuance of banners, leaflets, usage of local cable TV and social media like twitter, website for informing on the sites and timings of sessions to public. In addition, press news appealing the public to take vaccination were issued by the District Collector. Elected representatives like Panchayat President and other members were approached for sponsorship of IEC activities. NGOs, Rotary, professional bodies like IMA, IAP, religious leaders, community leaders, local influencers and resident welfare associations were approached and involved in motivating public to get vaccinated. Special efforts were given to high-risk areas like urban slums, peri urban, remote, sparse, and inaccessible population settlements.

National Health Mission, Tamil Nadu supported this initiative of Mega-camps with funds of Rs.14.33 Crores towards contingency and incidental expenses for the camps. UNICEF supported magnanimously with all IEC such as Audio Jingles, Video Jingles, posters, and rallies disseminating the importance of COVID Vaccination.

Since the launch of COVID-19 vaccination in January 2021, among all states in India, TN had shown a slow pace in coverage and was ranked as "very low performing state" with 55% coverage for 1st dose and 30% for 2nd dose till August 2021. So, to make the vaccination accessible both in terms of place and time, vaccination was converted as a "People Movement" through mega vaccination camps. Mega-camps were started from September 2021, eight months after the

initiation of COVID-19 vaccination and was implemented for a year till September 2022 across the state. All the eligible population aged 12 years and above were covered in the camps.

Totally 38 mega-camps were conducted with 1,108,557 vaccination booth sessions in one-year period. Through mega-camps, 17,798,199 first doses, 30,421,674 second doses and 6,910,703 precaution doses were provided which shares about 29%, 53% and 75% of the total first, second and precaution doses respectively, provided in the state till March 2023. Of the overall first and second doses, 41% of the doses were achieved through mega-camps only. In addition to achieving coverage, mega-camps helped to reduce the vaccine wastages drastically from 6% in August 2021 to -0.30% in September 2022.[9–11]

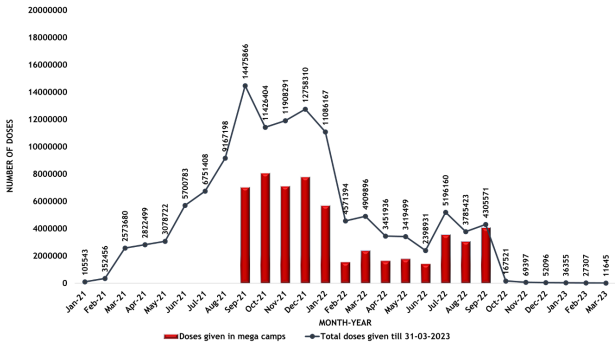

Figure 1: COVID-19 vaccination performance achieved overall till Mar 2023 and contribution of mega-camps f rom Sept 2021-Sept 2022, Tamil Nadu, India

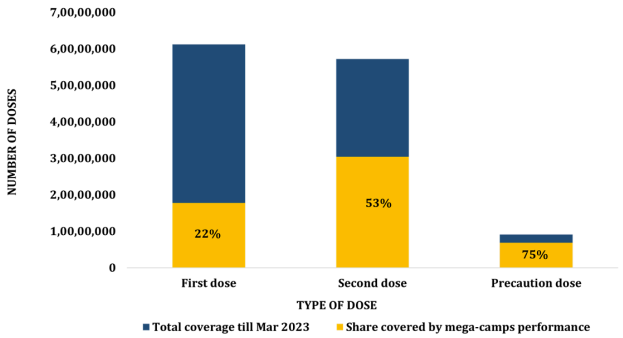

Figure 2: Vaccination coverage among target population by doses and proportion achieved through mega-camps, 2021-23, Tamil Nadu, India

Few challenges were faced like difficulties in bringing the workforces both from within the department and from other departments, short supplies in the initial periods and since the entire team had to work for 12 hours, staff became fatigued and exhausted. Fund support was provided only for the initial few camps. Poor internet connectivity in rural and tribal areas hindered updating the COWIN portal in time. Vaccine hesitancy in few pockets and vaccine avoidance by the due beneficiaries during the post peak period affected the coverage.

In three years of the COVID-19 vaccination journey, nearly two-fifths of the state coverage of first and second doses were through mega-camps, using existing resources with no additional workforce and with limited funding. Thus, this intervention is sustainable and can be replicated in similar settings and situations. Mega-camps helped to overcome vaccine avoidance and hesitancy by creating mass awareness. Since conducted on weekends, it not only made the vaccines available at the doorsteps but also helped the working population to take the jabs without affecting their working schedule. Daily wagers benefited much without loss of their wages.

In circumstances such as pandemics, where large coverage vaccination is desired over a short period of time, campaign mode of vaccination may be preferred in achieving the maximum coverage.

REFERENCES

1. World Population Data Sheet 2022 Highlights Excess Deaths Due to COVID-19 | News | SDG Knowledge Hub | IISD [Internet]. [cited 2023 Apr 7]. Available from: http://sdg.iisd.org/news/world-population-data-sheet-2022-highlights-excess-deaths-due-to-covid-19/

2. Total confirmed deaths due to COVID-19 vs. population, Feb 28, 2023 [Internet]. [cited 2023 Apr 7]. Available from: https://ourworldindata.org/grapher/total-confirmed-deaths-due-to-covid-19-vs-population?country=TZA~IND

3. Media-Bulletin-31-08-21-COVID-19.pdf [Internet]. [cited 2023 Apr 7]. Available from: https://stopcorona.tn.gov.in/wp-content/uploads/2020/03/Media-Bulletin-31-08-21-COVID-19.pdf

4. WHO Strategy-to-achieve-global-covid-19-vaccination-by-mid-2022.pdf.

5. Watson OJ, Barnsley G, Toor J, Hogan AB, Winskill P, Ghani AC. Global impact of the first year of COVID-19 vaccination: a mathematical modelling study. Lancet Infect Dis. 2022 Sep;22(9):1293–302.

6. Juyal D, Pal S, Thaledi S, Pandey H. COVID-19: The

vaccination drive in India and the Peltzman effect. J Fam Med Prim Care. 2021;10(11):3945.

7. India rolls out the world's largest COVID-19 vaccination drive [Internet]. [cited 2023 Apr 7]. Available from: https://www.who.int/india/news/feature-stories/detail/india-rolls-out-the-world-s-largest-covid-19-vaccination-drive

8. Covid Vaccines -operational guidelines by ministry of health and family welfare.pdf

9. Directorate of Public Health & Preventive Medicine; Immunization; Press meet report Tamil -30-09-2022.pdf.

10. Directorate of Public Health & Preventive Medicine; Immunization; Press meet report Tamil_31-03-2023.pdf.

11. CoWIN Dashboard [Internet]. [cited 2023 Apr 7]. Available from: https://dashboard.cowin.gov.in/

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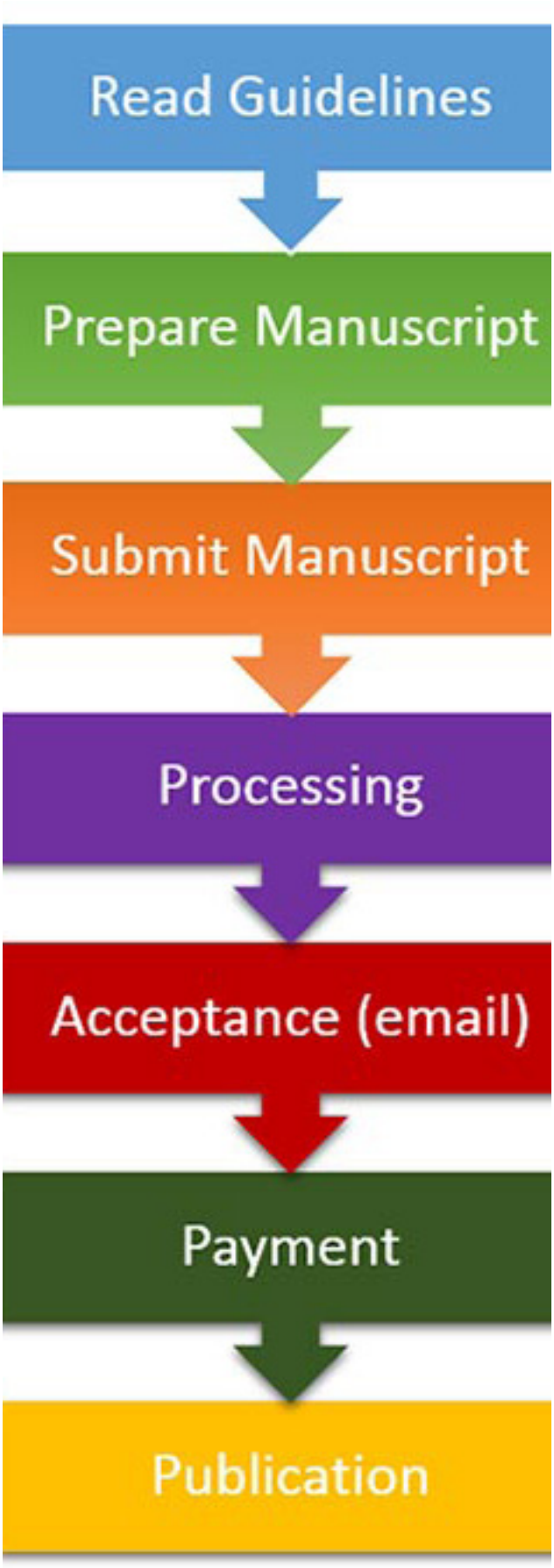

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