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EFFECT OF VITAMIN "A" ON HEALTH CARE WORKERS IN PRIMARY HEALTH CARE SYSTEM IN COVID 19 PANDEMIC IN SALEM DISTRICT 2020 - TAMIL NADU

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Abstract

Background : The severe acute respiratory syndrome (SARS) coronavirus-2 is a novel coronavirus belongs to the family of corona viridae and it originated in the Wuhan city of China in 2019. The disease caused by this virus, termed coronavirus disease 19 or simply COVID-19, has rapidly spread throughout the world at an alarming pace and has been declared a pandemic by the WHO on March 11, 2020.

Vitamin A is a multifunctional vitamin involved in the proliferation and maintenance of epithelial cells in the body, including those of the respiratory tract epithelium. The immune-mediating, antioxidant and antimicrobial roles of vitamin A was applied in the study. Because of its proven effectiveness in protecting against measles-associated pneumonia, Vitamin A supplementation in the healthcare workers has been investigated as a possible intervention to speed recovery, reduce the incidence and the severity of the covid 19 infections.

Objective : To estimate the incidence of covid 19 infection among the health care workers who received the vitamin" A" supplementation.

Methodology: An observational study was conducted for 6 months from month of May 2020 to November 2020 among the health care workers in primary care system of Salem district of Tamil Nadu. The sampling was a purposive sampling to supplement Vitamin A to all the primary health care workers. Vitamin A supplementation was given to the primary health care workers and the reports were documented.

Results: Among the primary healthcare workers, the positivity rate was 1.2% and 46% in the Vitamin A recipients and Vitamin A nonrecipients respectively. The mortality rate was 0.05 and 0.26 among the Vitamin A recipients and Vitamin A nonrecipients healthcare workers respectively.

Conclusion: There is a chance of reducing covid 19 infections among the health care workers. Possible reduction in death rate is also possible for which the study to be by assessing the complications.

Keywords: Vitamin A, Respiratory Epithelium, Corona virus, Immunity

INTRODUCTION

SARS-CoV2 infects the epithelium in the respiratory tract through the cellular receptor angiotensin-converting enzyme 2, and causes viral pneumonia with inflammation resulting in significant damage to the lungs and other organs in the body[3]. The symptoms and the severity of the covid disease are variable depending on the intensity of exposure and presence of underlying conditions that may affect the immune response[3].

Some patients progress from mild to more severe disease, characterized by tachypnoea and hypoxaemia and specific findings of decreased arterial oxygen concentration or a chest X-ray or chest CT showing pneumonia, indicating extensive lung inflammation.[3] Some patients with severe infection (approximately 5 % of all infections) develop renal failure and intravascular coagulation, require prolonged mechanical ventilation and may have multi organ system failure[3].

Vitamin A has immunomodulatory effects in inflammatory diseases. The possible mechanisms by which vitamin A act against SARS-CoV2 virus may include anti-inflammatory effects, cytoprotective effect, and immunomodulation[4]. It has been revealed that vitamin A plays a role in cellular and humoral immune processes, and its deficiency causes deterioration in immune system responses. Vitamin A is involved in the epithelial proliferation and maintenance of epithelial cells including those of the respiratory tract[2]. From a pulmonary perspective, retinoic acid has been implicated in modulating the pathogenesis of Acute Respiratory Distress syndrome, influencing the production of IL1-β and IL-1 receptor antagonist by alveolar macrophages, and the subsequent pulmonary infiltration of neutrophils[5].

Vitamin A deficiency causes squamous metaplasia of

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the respiratory epithelium and the ciliated epithelial cells are replaced by squamous epithelium which in turn causes decrease in mucus production. These factors increase the risk for invasive pathogens. The function of the resident macrophages, neutrophils and the natural killer cells and the development of T cells mediated antibody responses also impaired leading to a decreased protective mechanism at mucosal surfaces[5]. The viral infection and the vitamin A effects on respiratory epithelium has already been proven by reduced infection in the recipients of Vitamin A solution during measles.[7]

The respiratory infections are more frequent in persons with reduced plasma vitamin A levels and this constitutes one of the main health problems in developing countries. In addition, during infectious diseases and particularly of the respiratory tract, plasma retinol levels decline and this induces an increased susceptibility to infection creating a "vicious cycle". Since covid 19 is also a respiratory tract infection, Vit A supplementation during the covid 19 pandemic would be a greater weapon against the corona virus infection.

The health care workers in the primary care system are involved tracking the COVID-19 patients in the field and admitting them, participating in the fever camps, distributing the medicine to the needed patients, surveillance activities in the field levels in the containment area zones. The risk of exposure is more to the primary health care workers. Also, it is difficult for them to wear full PPE in field settings while getting exposed to positive persons. In the primary care setting, it will not be possible to ascertain the COVID status of persons all the times. To protect them from the hazardous infection and complications of infection, Vitamin A supplementation was identified as a public health intervention for the COVID warriors.

OJBECTIVE :

To assess the incidence of covid 19 infection among the health care workers who received the Vitamin" A" supplementation.

METHODOLOGY :

An observational study conducted during the month of 29th April 2020 to 30th November 2020 for a period of 7 months among the health care workers in primary care system of Salem district of Tamil Nadu.

SAMPLE SIZE: 2096 healthcare workers in primary care setting in Salem District were selected for the study.

SAMPLING: Purposive sampling to include all the primary health care workers.

EXCLUSION CRITERIA:

Seriously ill persons were excluded from the study Vitamin A supplementation of 2,00,000 IU was given to the primary health care workers on 29th April and followed up for a period of 7 months and the reports were documented. Among the Primary Health Care Workers, 1724 has taken the oral Vit A supplementation (2,00,000 I.U) and 372 workers did not take Vitamin A supplementation due to various reasons. All the study participants were followed up every month for RT-PCR positivity for Covid-19.

INFORMED CONSENT:

Informed consent was obtained for administering Vitamin A. Those who have not given consent to take Vitamin A were followed up for occurrence of infection without administering Vitamin A supplementation.

OPERATIONAL DEFINITION:

COVID POSITIVE- Those persons whose nasal or throat swab were tested positive by RT-PCR for SARS CoV-2 were taken as COVID positive.

RESULTS :

The demographic characteristics of the study participants is given in Table 1. Covid infection rate among Vitamin A recipients and Vitamin A nonrecipients during the 7 month follow up period was 1.2% and 46% respectively. The mortality rate was 0.05% and 0.26% among the Vitamin A recipients and Vitamin A nonrecipients respectively during the study period. Among the Vitamin A recipients, 9 medical officers, 4 staff nurses and 4 multipurpose health workers were positive for Covid. Among Vitamin A non-recipients, 41 medical officers,35 staff nurses and 46 multipurpose health workers had reported Covid-19 infection. The positivity rate is very low in the Vitamin A recipients.

transcriptase polymerase chain reaction) test using the oral and nasopharyngeal swab.

Table 1 : Socio-demographic profile of study participants

Socio-Demographic Variables	Vitamin A recipients N-1724	Vitamin A nonrecipients N=372
Age (Years)		
≤ 30	394 (22.85)	79(21.23)
31 – 40	613 (35.55)	127(34.13)
41 – 50	354 (20.53)	85(22.84)
>50	363 (21.05)	81(21.77)
Gender		
Men	558(32.36)	119(31.99)
Women	1166(67.64)	253(68.01)

Table 2 : Comparison of Covid -19 infection among Vitamin A recipients and non-recipients across demographic characteristics

Variable	VITAMIN A RECIPIENTS N=22(%)	VITAMINA NONRECIPIENTS N=173(%)
Positivity rate for covid 19	1.2%	46%
Age (Years)		
≤ 30	10(45.45)	55(31.79)
31 – 40	4(18.18)	52(30.05)
41 – 50	5(22.72)	39((22.54)
>50	3(13.65)	27(15.60)
Gender		
Men	10(45.45)	65(37.57)
Women	12(54.54)	108(62.42)
Health Care Worker Category		
Medical officers	9(40.90)	31(17.91)
Staff Nurses	4(18.18)	35(20.23)
Village health nurses	2(9.09)	8(4.62)
Multipurpose health worker	4(18.18)	46(26.58)
Lab Technician	1(4.54)	9(5.20)
Pharmacists	1(4.54)	3(1.73)
Block health supervisor	1(4.54)	-
Others (Drivers, hospital workers, Data entry operators, Block health statisticians)	-	41(23.69)

DISCUSSION :

The proportion of Covid-19 positives among Vitamin A recipients was very less compared to Vitamin A non-recipients. In a study done by Villamor, Vitamin A supplementation reduced the incidence of the respiratory tract infections among children[11]. In a survey with 684 Chinese children (age range 5 months to 12 years old), observed that vitamin A deficiency (retinol<0.05) was associated with increased respiratory infections[12].

In a study done by Kankala M et al Majority of the children (61%) in Vitamin A-received group had lesser number of Acute Lower Respiratory Tract Infections episodes (less than 3 episodes/year), whereas majority of the children (66%) in Vitamin A- not received group had recurrent Acute Lower Respiratory Tract Infections episodes e (3 or more episodes/year)[4].

In a randomized double-blinded controlled trial performed by Si et al, moderately malnourished children with pneumonia who received vitamin A supplementation significantly had a shorter time of hospitalization after admission for pneumonia (p=0.04).13

In the Vitamin A recipients ,the male and female health care workers affected were 45.5% and 54.5% respectively. In the Vitamin A nonrecipients the male and female health workers affected were 37.6 % and 62.4% respectively.

In the vitamin A recipients, the death among the covid positive patients was one and it was also associated with comorbidities. In the control group in present study, the death was one and it was not associated with comorbidities.

Since Vitamin A supplementation was planned as a preventive intervention strategy during the 1st wave of the pandemic, it was offered for all the Health Care Workers. Hence, the distribution of participants in the two groups were not equal. Since the participants were not followed up for symptoms, there is a possibility of under reporting of COVID positivity.

CONCLUSION :

The Vitamin A recipient group healthcare workers proportion of turning out to be covid positive was very less compared to the Non recipient group. There is a chance of reducing covid 19 infections among the health care workers. Possible reduction in death rate is also possible by supplementing with Vitamin A solution for which the study to be done assessing the complications.

The antioxidant, anti-inflammatory effect of vitamin A has a major protective role in the community in decreasing the morbidity due to corona virus and viral infections affecting the respiratory tract.

RECOMMENDATIONS :

Vitamin A supplementation to the health care workers all over the state as well as to the public has the chance of reducing the covid 19 infections.

REFERENCES :

1. Thomas H Jovic Stephen R Ali, Nader Ibrahim Zita M Jessop, Sam P Tarassoli Thomas D Dobbs Patrick Holford Catherine A Thorntonand Iain S Whitaker. Could Vitamins Help in the Fight Against COVID-19? [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7551685/]

2. Vitamin A deficiency and the Lung Joaquín Timoneda , Lucia Rodriguez-Fernandez Rosa Zaragoza , M. Pilar Marín , M. Teresa Cabezuelo Luis Torres , Juan R. Vina and Teresa Barber

3. Vitamin A in resistance to and recovery from infection: relevance to SARS-CoV2 C. B. Stephensen and G. Lietz

4. Effect of Vitamin A supplementation on preventing recurrent acute lower respiratory tract infections in children Murthy Kanakala, Karunakar Pediredla, Natarajan Pachiappan Rajendran Ramachari Ramayi , Tanveer Rehman

5. The Airway Epithelium: Soldier in the Fight against Respiratory Viruses Marjolaine Vareille, Elisabeth Kieninger, Michael R. Edwards, and Nicolas Regamey [cited on 26.10.21]

6. Serum Vitamin A and Inflammatory Markers in Individuals with and without Chronic Obstructive Pulmonary Disease L.M.O.Caram, R.A.F.Amaral, R.Ferrari, S.E.Tanni, C.R.Correa, S.A.R.Paiva, and I.Godoy

7. Zhang X, Ding E, Li H, Zhao W, Jing H, Yan Y. Low serum

levels of vitamins A, D, and E are associated with recurrent respiratory tract infections in children living in Northern China: a case control study. Plos One. 2016;11: e0167689. 23. Si NV, Grytter C, Vy NN, Hue NB, Ped

8. Vitamin A supplementation and childhood morbidity from diarrhea and respiratory infections: a meta-analysis

9. Association between micronutrient deficiency and acute respiratory infections in healthy adults: a systematic review of observational studies Min Xian Wang, Jiayun Koh and Junxiong Pang

10. Effect of daily low dose of vitamin A compared with single high dose on morbidity and mortality of hospitalized mainly malnourished children in senegal: a randomized controlled clinical trial P Donnen, A sylla, M Dramaix, G Sall, NKuakavi , P Hennert[cited on17.11.2021]

11. Vitamin A supplementation: implications for morbidity and mortality in children E Villamor WW Fawzi [cited on 18.11.21]

12. Qi YJ, Niu QL, Zhu XL, Zhao XZ, Yang WW, Wang XJ. Relationship between deficiencies in vitamin A and E and occurrence of infectious diseases among children. Eur Rev Med Pharmacol Sci. 2016; 20(23):5009-5012.[Cited on 20.10.21]

13. Si NV, Grytter C, Vy NN, Hue NB, Pedersen FK. High dose vitamin A supplementation in the course of pneumonia in Vietnamese children. Acta Paediatr. 1997; 86:1052-5.