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CHRONIC KIDNEY DISEASE DATABASE IN TAMIL NADU - NEED OF THE HOUR

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Abstract

BACKGROUND : Chronic Kidney Disease (CKD) and Chronic Kidney Disease of Unknown Etiology (CKDu) are in the rising trend in Tamil Nadu especially in rural regions. It not only burdens on the mortality rate but also affects the quality of life of the people. At least Rs 1 of every Rs 10 claimed under the Tamil Nadu Chief Minister Health Insurance Scheme goes for Hemodialysis. . There is a wide knowledge gap in the disease's trend, distribution and other parameters affecting the course of the disease. CKDu is found to have multifactorial etiologies and is prevalent only in certain pockets all over the state. Our regular screening tools could not identify these patients early; hence they seek medical care only during the terminal stages of the disease.Formulating active screening for kidney injury and maintaining a CKD database will help us in the early identification and treatment of the disease. It will also help in identifying CKD Hotspots, which will help in a better understanding of the disease and may even help to formulate a scoring system using the risk factors for CKDu and subsequently design prevention strategies for the disease in a cost-effective manner.

KEYWORDS : Chronic Kidney Disease, Chronic Kidney Disease of Unknown Etiology, Database.

INTRODUCTION

According to recent guidelines of Kidney Disease Improving Global Outcomes (KDIGO, 2013), CKD is defined as abnormalities in kidney function and or structure, present for more than 3 months with implications on health.[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%).[2] The CKD prevalence in the Indian population was 10.2% (2018).[1]

CKD is associated with eight to tenfold increased cardiovascular mortality in 35.8 million disability-adjusted life years (DALYs). In 2017, CKD resulted in 1.2 million deaths and was the 12th leading cause of death worldwide.[1]

In recent times CKDu (Chronic Kidney Disease of Unknown Etiology) has been recognised as a separate entity and a major cause of Chronic Kidney Disease besides Diabetes or Hypertension. In the clinical context, a patient is labelled as CKDu after excluding all the known causes of CKD. The clinical features indicated to be consistent with the tubulointerstitial pattern of injury.[2]

Chronic Kidney Disease (CKD) and Chronic Kidney Disease of Unknown Etiology (CKDu) are in the rising trend in the past 20 years or so in various countries like Sri Lanka, Central America and India. It has also been documented or suspected in Nicaragua, El Salvador, Costa Rica, Guatemala, Mexico, Panama, Egypt, Tunisia, Cameroon, Egypt, South Africa, the Philippines, Taiwan, Indonesia, Thailand, the United States, and the United Kingdom.[2]

CKD AND CKDU IN SOUTH INDIA

In India, CKDu was first reported from Uddanam region of Andhra Pradesh in 2018.[1] Despite a long history of CKDu, only recently, studies on CKD were done in Uddanam region, Andhra Pradesh, which showed a prevalence of CKD as 18.3 % and 13% as CKDu. Clusters with high CKD burden have also been reported from other districts in Andhra Pradesh, in particular, Nalagonda, Prakasam, and Nellore, suggesting this problem is likely to be more widespread than was originally assumed.[2] Extensive studies are being conducted in Uddanam region which includes analyzing the water quality, fertilizers, heat stress, and personal behaviours The STOP-CKDu investigators in Uddanam are following up with their cohort studies to estimate the incidence of CKDu as well as its risk factors. Bio-banked samples collected by them allow exploration of additional hypotheses and ancillary studies are in progress. These studies paved way to define CKDu in Indian perspective and classify it as probable, possible and

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definite cases of CKDu for the ease of identification and screening.[3]

CKD AND CKDU IN TAMIL NADU

In Tamil Nadu, CKDu is reported in Villupuram, Cudallore, Vellore, Sivagangai, Virudhunagar, Tutucorin, Ariyalur, Thiruvannamalai, Perambalur. A recent report from a referral center at Puducherry reported 2424 consecutive CKD patients — of whom a disproportionate proportion (56%) came from the districts of Villupuram and Cuddalore in Tamil Nadu and approximately 52% were classified as CKDu. A subsequent community-based CKD screening program in those villages revealed a CKD prevalence of 19%[2]. A recent study in rural area in Virudhunagar district (2022) showed prevalence of CKD as 20.3 % and CKDu as 10.9%. In a study conducted by Tamil Nadu Government in 2022, the CKD prevalence of Tamil Nadu state was only 8.7% with majority in rural regions and most of the cases were silent as only 6.8% reported symptoms.[4] This wide range of CKD prevalence confirms that there are 'CKD hotspots' where CKD prevalence is high in some areas especially rural areas. Hence there is a dire need to identify these hotspots to compare etio-pathological patterns in different hotspots and non hotspot regions.[1]

FINANCIAL BURDEN OF THE DISEASE

The total number of patients relying on dialysis has risen up drastically in the past few years. As per Pradhan Mantri National Dialysis Program (PMNDP), as of June 2023, there are 9410 Hemodialysis machines and around 212.74 lakhs Hemodialysis sessions were conducted in India. Tamil Nadu has the 2nd highest number of functional dialysis machines of 932 next to Kerala which has 1025.[5] At least Rs 1 of every Rs 10 claimed under the Tamil Nadu Chief Minister Health Insurance Scheme goes for Hemodialysis. Between 2017 and 2018 the government approved Rs 1000 each to 216,923 claimants per dialysis cycle.[6] The Indian dialysis market is estimated to be growing at a rate of 31% per annum, compared with 8% in the rest of the world. Payment for dialysis is by a mixture of state funding, employment-based insurance, charity, and self-funding. Most patients pay for dialysis from their own pocket as they are not eligible for state funding and are not covered under insurance. This includes most of the rural population engaged in farming and those working in the unorganized sectors. The high rate of catastrophic healthcare spending, supported by distress financing, that pushes families into poverty is well documented.[7] Considering the cost of renal replacement and the magnitude of the problem it appears that the best way forward for our country would be to adopt the strategy for prevention.[1]

IMPORTANCE OF CKD DATABASE

Sri Lanka is the first country to identify and report CKDu. They have conducted numerous studies regarding CKD, to find out the cause. They have established a CKD registry portal in 2015.[8] Japan has a well-organized CKD database. The use of establishing these databases is very well documented and can be well appreciated with subsequent studies conducted using its data. Using the CKD database we can identify CKDu prevalent and non-prevalent areas and use this data to conduct cohort studies.

A study on Drinking water quality in CKDu prevalent and Non-prevalent areas in Gradurukotte, Sri Lanka (2016), showed significant difference in pH, EC(Electrical conductivity), TDS(Total dissolved solids), Potassium, Chloride and calcium levels between CKDu prevalent and Non prevalent areas.[9] In yet another study done in Sri Lanka (2015), the drinking water quality of four areas namely high CKDu prevalent areas, Low CKDu prevalent areas, CKDu isolated pockets and control areas were examined for Fluorine, Aluminium, Cadmium, Arsenic levels, and hardness of water. It was found that the peculiar distribution patterns of CKDu prevalence pointed to synergic effects of trace elements in water suggesting as probable etiology of the disease.[10] In another study in Sri Lanka in 2020, isotopic samples were collected in CKDu endemic areas, to identify the sources of the pollutants, especially Silica in groundwater. It emphasized the need for frequent sampling to capture the potential pollutants in future groundwater quality studies in endemic CKDu areas.[11] These studies would not have been possible without the proper establishment of CKD database. From these types of studies, we can understand that the CKDu has multifactorial causes like drinking water contamination, exposure to agrochemicals, heat stress, air pollution (not yet received consideration as a contributor to CKD in India, probably due to lack of supporting data), infections like Leptospirosis, and genetic association.[2]

IMPORTANCE OF CKD SCREENING AND CKD DATABASE IN TAMIL NADU

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 a developing country like India. Community surveys showed that the number of people with end-stage kidney disease was only tip of the CKD iceberg. Limited financial resources, lack of infrastructure

and inadequate human resources are putting severe strain on existing health policies with respect to increasing burden of CKD and its screening and management.[1]

Since our regular screening tools could not identify CKD patients, they seek medical care only during the terminal stages of the disease. It is clearly evident that the CKD database has much greater use , like identifying the multifactorial causes for CKDu, which can help in better screening, early identification and management and even formulating a scoring system for the same, which can be subsequently used for prevention of the disease in a cost and time effective manner. Hence the need of the hour is to create a CKD database which in addition to identifying new CKD patients, also record co-morbid factors like Diabetes (DM), Hypertension (HT), Obesity and possible etiological factors namely age, sex, socioeconomic status, source of drinking water, type of utensils used, family history for CKD, history of high osmolar drinks, history of dehydration and previous history of kidney injury. With the help of these data, further researches like case-control studies, cohort studies, and experimental studies can be planned for early identification and prevention of the disease.

ESTABLISHING CKD DATABASE USING EXISTING SCREENING TOOLS FOR DETECTION OF NON-COMMUNICABLE DISEASES (NCD) UNDER MAKALAI THEDUM MARUTHUVAM (MTM) SCHEME IN TAMIL NADU.

- Already we have Population Health Register Health (PHR) portal which collects all details of the patient including name, age, sex, ration card number, phone number, NCD details (DM, HT, cancer, Chronic Obstructive Pulmonary Disease), histories suggestive of kidney injury and anthropometric measurements. We also have NCD positive line list portal.
- We can design a kidney injury database by adding a column for serum creatinine value and urine protein value in the PHR portal which calculates eGFR and stage of the CKD. We can also add column for source of drinking water, type of utensils used and family history for CKD.
- From this, we can identify the positive CKD patients (urine protein 1+ or above/ CKD stage 3 or above) and add them to NCD positive line list portal.
- The creatinine / urine protein values along with patient details ration card or phone number should be shared by the lab technician to the concerned MLHP (Mid Level Health Provider) in a weekly basis as shown in the Figure 1. The creatinine values can also be obtained from online LIMS (Laboratory information management system) for authenticity.
- From this, we can calculate the prevalence of CKD, prevalence of probable cases of CKDu and CKD hotspots. This CKD database will be of tantamount importance for enumerating the probable etiological factors for CKDu.

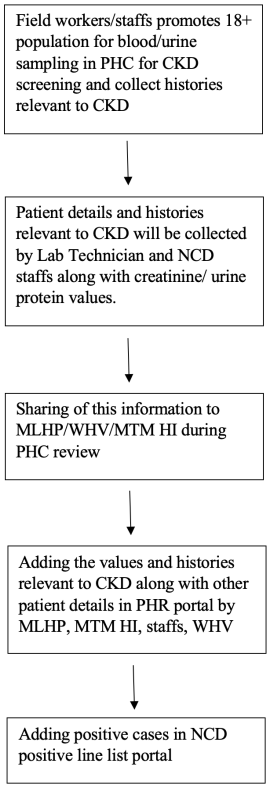

Fig 1. Working model of CKD database

Keywords: PHC- Primary health Centre; NCD- Non-Communicable Diseases; MLHP- Mid level Health Provider; MTM HI- Makalai Thedum Maruthuvam Health Inspector; WHV- Women Health Volunteers; LIMS- Laboratory Information Management System.

CONCLUSION

CKD and CKDu are in a rising trend especially in rural areas all over Tamil Nadu. The alarming fact is that we have poor knowledge of the trend, distribution of the disease and other parameters influencing the course of the disease. To bridge this knowledge gap CKD database is the next best step and it is feasible in an already well established health system we have in Tamil Nadu.

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