Awareness of Chronic Kidney Disease among Tamil Nadu Population: A Cross-sectional Study

R CHANDAN BALA[1], M JAYABHARATHY[2], S SHEBA YESU PRIYA[3], S RAMYA[4]

ABSTRACT

Introduction: Chronic kidney failure in India and around the world is a significant health problem. The most effective and affordable treatment may require screening for early detection, intervention and prevention. Public awareness is a key determinant to overcome the burden of Chronic Kidney Disease (CKD). However, there is a lack of information on CKD among South Indian people.

Aim: To assess the awareness and knowledge of CKD among the South Indian population.

Materials and Methods: A questionnaire-based cross-sectional study was conducted through an online form; the questions were generally based on the physiological role of kidney and awareness questions related to CKD. The sample size was 500 participants, with age group of 18-70 years and snowball sampling method was implemented. Among the study population, 68 participants had a family history of CKD and they were excluded. The data were analysed through Pearson Chi-square test.

Results: The mean knowledge score was 13 (SD±5.0), with values ranging from 0 to 22. The mean age of the population was 23.92±8.49 years. Multiple regression on demographic data and knowledge yielded statistically negligible results. The study population included 432 participants and the result showed the realms that most responded incorrectly were physiology of kidney, CKD symptoms, risk factors and the domain of testing and diagnosis.

Conclusion: The participants had ample knowledge of the risk factors, signs and symptoms of CKD and insufficient knowledge of the physiological function of the kidney and the diagnosis of CKD. Therefore, efforts are necessary to create awareness and educate people about the early detection and prevention of CKD.

INTRODUCTION

The Chronic Kidney Disease (CKD) is a slow progressive and irreversible disease that is associated with a decline in the estimated Glomerular Filtration Rate (eGFR) (less than 60 mL/min/1.73 m²) for atleast 3 months duration [1]. The signs and symptoms associated with the disease are pulmonary and peripheral oedema, azotemia (which inevitably results in loss of appetite, vomiting, and nausea), anaemia [2]. The increased incidence of diabetes mellitus and hypertension are the major risk factors that account for about 40%-60% of the CKD cases in the Indian population [3].

India may have the world's largest population of diabetes patients by 2030 [4]. Due to difficulties in access to treatment, over 50 percent of patients with advanced CKD is first seen with an eGFR of 15 mL/min per 1.73 m². This sobering number highlights the need for comprehensive CKD screening services for those at risk. The estimated prevalence of CKD in various regions varies from 1% to 13%, and recently, results from the Kidney Disease Data Centre Review of the International Society of Nephrology reported a prevalence of 17% [5].

As the signs and symptoms of progressive kidney disease are similar to typical signs of body dysfunction, patients identify their symptoms at a late stage in developing countries. As many researchers have stated, this may have arisen from an insufficient knowledge and understanding of the disease [6]. Early diagnosis (with a simple blood test and urine test) and management can reduce the associated morbidity, mortality, and major public health and economic burden [7]. As lifestyle and environmental factors are key risk factors of CKD, the cheapest and best approach method is a population-based prevention strategies (such as a survey)[8]. Population understanding on health implications increases health habits, influences health determinants and has a positive impact on the effective treatment of kidney disease [9]. Awareness on CKD can lead to early detection and thus decrease the risk of progression of the disease [10].

In view of these profound challenges of inadequate care continuity, scarce health services and the socio-economic ramifications of CKD for poor resource countries, its delay in progression will add value to the quality of life and improve competitiveness by increasing awareness [11]. Therefore, the aim of the study was to assess the awareness of CKD among the general population of Chennai and Salem city of Tamil Nadu.

MATERIALS AND METHODS

A cross-sectional study was conducted through online Google forms from 17th May 2020 to 31st May 2020. The form was distributed in a snowball sampling method among various districts of Chennai and Salem (Tamil Nadu) by obtaining virtual ethics clearance (as the study was carried out during the period of national lockdown) from Institutional Ethics Committee (IEC).

Inclusion and Exclusion criteria: Participants among the age group of 18-70 years were included in the survey following their consent. The study excluded participants with a history of CKD, which was assessed during the assessment of demographic details.

The study participants were the authors' co-workers, colleagues, and relatives and their friends, and the google form link was distributed to them via social media and official mail. The questionnaire consisted of demographic details and questions related to awareness and knowledge of CKD. Participants were asked to answer the questions based on their knowledge without accessing the Internet source. The question form was documented in British English.

The form included six separate sections- demographic data (age, gender, occupation, qualification, and classification of their location-based on rural and urban areas), general knowledge on CKD, physiological functions of kidney, diagnostic tool for CKD, risk

factors associated with renal failure, signs and symptoms of renal failure. The pre-validated questionnaire was taken from the research published by Gheewala PA et al., [12].

STATISTICAL ANALYSIS

The data was analysed by Chi-square and multiple regression through Statistical Package for the Social Science (SPSS) software version 24 and the significant p-value taken into consideration was 0.05.

RESULTS

The total number of participants in this study was 432, which included 180 (41.7%) males and 252 (58.3%) females [Table/Fig-1]. The link was circulated among 750 individuals, of which 500 had participated and 432 were taken into consideration as the remaining study population had family members diagnosed with CKD. Thereby, the response rate was 66.66%. The participant's mean knowledge score (SD) was 13 (±5.0), with a total score ranging from 0 to 22 [Table/Fig-2].

Variables	N (%)
Age (mean±SD) (Years)	23.92±8.49
Age range (Years)	
<30	374 (86.57)
≥30	58 (13.43)
Gender	
Female	252 (58.34)
Male	180 (41.66)
Qualification	
Higher secondary	73 (16.89)
Primary	359 (83.11)
Employment status	
Employed	294 (68.05)
Non-employed	138 (31.95)
Resident area	
Rural	129 (29.86)
Urban	303 (70.14)
Total	432

[Table/Fig-1]: Demographic details of the participants (N=432 participants).
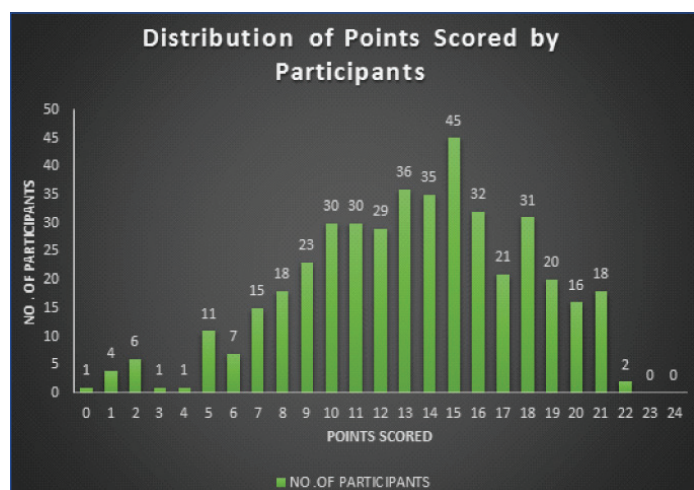
[Table/Fig-2]: Distribution of CKD knowledge score among population (n=432).

Amongst five realms of CKD knowledge, 333 participants (77%) correctly answered the anatomy part of the questionnaire that only one kidney is required to live a normal life. Only one fourth of the population (25%) was aware that the herbal supplements is not an effective treatment for CKD. A 127 (29.3%) participants knew that kidney helps to keep blood sugar level normal. Less than half of the population knew the fact that kidney helps to maintain blood pressure, helps in bone development, and enhances the metabolism of sugar and protein. A 389 (90%) of the participant

were aware about urine analysis as a diagnostic tool for renal function. In assessing the functioning of the kidney, around 50 percent of the participants had adequate knowledge based on score of above 14. More than half of the respondents correctly identified the risk factors and signs and symptoms of CKD. [Table/Fig-3] shows the percentages of patients who correctly answered the questions. Multiple regressions were used to assess which features of participants had an effect on their knowledge of CKD, and the results were statistically negligible [Table/Fig-4].

Q. No.	Questions	N (%)
1	A person can lead a normal life with one healthy kidney	333 (77)
2	Herbal supplements can be effective in treating CKD	108 (25)
3	Certain medications can help to slow-down the worsening of chronic kidney disease	259 (60)
What functions do the kidneys perform in the body?		
4	The kidneys make urine	356 (82.4)
5	The kidneys clean blood	320 (74.1)
6	The kidneys help to keep blood sugar level normal	127 (29.3)
7	The kidneys help to maintain blood pressure	209 (48.3)
8	The kidneys help to breakdown protein in the body	152 (35.3)
9	The kidneys help to keep the bones healthy	134 (31.0)
Which of the following are commonly used to determine health of the kidneys?		
10	A blood test	249 (57.6)
11	A urine test	389 (90)
12	A faecal test	205 (47.4)
13	Blood pressure monitoring	207 (48.0)
What are the risk factors for Chronic Kidney Disease (CKD)?		
14	Diabetes	329 (76.1)
15	Being female	245 (56.7)
16	Hypertension	269 (62.2)
17	Heart problems such as heart failure or heart attack	169 (39.1)
18	Excess stress	106 (24.6)
19	Obesity	159 (37)
What are the signs and symptoms that a person might have if they have advanced Chronic Kidney Disease(CKD) or kidney failure?		
20	Water retention (excess water in the body)	317 (73.4)
21	Fever	226 (52.3)
22	Nausea/vomiting	242 (56)
23	Loss of appetite	264 (61.1)
24	Increased fatigue (tiredness)	307 (71.0)

[Table/Fig-3]: Percentage of each correct answer by the participants (N=432).

Characteristics	Odd's ratio (95% CI)	p-value
Age (<30 years/≥30 years)	0.977 (0.546 to 1.749)	0.937
Gender (Male/Female)	1.425 (0.954 to2.130)	0.083
Qualification	0.584 (0.329 to 1.036)	0.064
Occupation	0.790 (0.518 to 1.204)	0.272
Residence (Rural/Urban)	0.866 (0.558 to 1.344)	0.521

[Table/Fig-4]: Standard multiple regression analysis between CKD knowledge score and participant characteristics.

DISCUSSION

The awareness of CKD needs to be increased that could prevent the disease as there is lack of screening of these conditions in the primary health care [13]. CKD can be reversed and stopped from progressing to end-stage kidney failure, if detected at an early stage [14]. According to a research [15], the awareness of CKD is low in population dwelling with kidney disease and in the individuals engaged with the primary care of the disease. Similarly, Balwani MR et al., conducted a survey among school-going children [16]. The authors recommend that the paediatric population should

be educated on vital organs such kidney which would lead to improvement on awareness of the disease and reduces morbidity and mortality of the disease by early detection.

The aim of this study was to analyse the awareness and knowledge among the general population of Tamil Nadu and the study findings showed that the population had adequate knowledge on the basics of kidney function (such as urine formation) and CKD (such as, urine routine for testing and diabetes is the risk factor and water retention is the main symptom). On the other hand the population had less knowledge on the other physiological role of kidney, risk factors, signs and symptoms, diagnostic methods and the herbal supplements could be effective in treating CKD.

In a similar study, the Australian population [12] had significantly less knowledge on the physiological role of the kidney such as metabolism of glucose (22.6%) and protein breakdown (14.3%), blood pressure regulation (26.4%), and bone development (14.3%), whereas the participants of this study had varied knowledge on the physiological role of the kidney (29.2-82.4). In this study the participants had sufficient awareness on the diagnostic parameters in diagnosis of CKD.

A study conducted in India among the diabetics, only one third of the study participants identified that hypertension and diabetes mellitus are risk factors of CKD [17]. The current study participants knowledge on diabetes mellitus (76.1%) and hypertension (62.2%) as risk factors were higher than that of the Nigeria survey, which was 49.0% and 54.7%, respectively [18]. Conversely, in this analysis, the percentage of participants (75.4%) who correctly classified diabetes as a risk factor was high, compared to 8.6%, 12.7%, and 44.0 %, reported by White SL et al [19]. Chow KM et al., [20], and Roomizadeh P et al., [21], and respectively. In a public survey of 748 participants in Iran [21], only 14.4% selected 'unmanaged hypertension' as 'very likely to result in CKD'; while a study of 516 adults living in Hong Kong reported that 43.8% of participants knew that hypertension can cause kidney disease [20]. Furthermore, over 50% of the study population was aware of the signs and symptoms of kidney disease on the other side the general population of Indonesia [22], had inappropriate knowledge on the symptoms, risk factors, diagnostic tools of CKD.

Limitation(s)

As the questionnaire was circulated using snowball sampling method, hence there can be a chance of selection bias, so further study can be done with random sampling method.

CONCLUSION(S)

In this study, a clear and accurate questionnaire was implemented and deployed to assess the knowledge of CKD among the general population. The participants' knowledge of the physiological role of kidney and diagnosis of CKD was limited compared with the knowledge on CKD and its risk factors, signs, and symptoms regardless of socio-demographic and clinical characteristics. As for the population, their understanding of the kidney's function and knowledge on CKD needs to be improved by nationwide awareness programs. These efforts might enhance CKD's early detection and management.

REFERENCES

[1] Chronic Kidney Disease (CKD) Management in General Practice (2nd edition). Kidney Health Australia, Melbourne.

[2] Harsh Mohan, Textbook of Pathology, Sixth edition, Jaypee Brothers Medical Publishers; 2010.

[3] Kaveeshwar SA, Cornwall J. The current state of diabetes mellitus in India. Australas Med J. 2014;7(1):45-48.

[4] Varma PP. Prevalence of chronic kidney disease in India-Where are we heading? Indian J Nephrol. 2015;25(3):133-35.

[5] Obrador GT, García-García G, Villa AR, Rubilar X, Olvera N, Ferreira E, et al. Prevalence of chronic kidney disease in the Kidney Early Evaluation Program (KEEP) México and comparison with KEEP US. Kidney Int Suppl. 2010;(116):S02-08.

[6] Vassalotti JA, Li S, McCullough PA, Bakris GL. Kidney early evaluation program: A community-based screening approach to address disparities in chronic kidney disease. Semin Nephrol. 2010;30(1):66-73.

[7] Levey AS, Atkins R, Coresh J, Cohen EP, Collins AJ, Eckardt KU, et al. Chronic kidney disease as a global public health problem: Approaches and initiatives-A position statement from Kidney Disease Improving Global Outcomes. Kidney Int. 2007;72(3):247-59.

[8] Prochaska JO, DiClemente CC. Stages and processes of self-change of smoking: Toward an integrative model of change. J Consult Clin Psychol. 1983;51(3):390-95.

[9] Devins GM, Mendelssohn DC, Barré PE, Binik YM. Predialysis psychoeducational intervention and coping styles influence time to dialysis in chronic kidney disease. Am J Kidney Dis. 2003;42(4):693-703.

[10] Veluswamy SK, Maiya AG, Nair S, Guddattu V, Nair NS, Vidyasagar S. Awareness of chronic disease related health benefits of physical activity among residents of a rural South Indian region: A cross-sectional study. Int J BehavNutr Phys Act. 2014;11(1):27.

[11] Boulware LE, Carson KA, Troll MU, Powe NR, Cooper LA. Perceived susceptibility to chronic kidney disease among high-risk patients seen in primary care practices. J Gen Intern Med. 2009;24(10):1123-29.

[12] Gheewala PA, Peterson GM, Zaidi STR, Jose MD, Castelino RL. Public knowledge of chronic kidney disease evaluated using a validated questionnaire: A cross-sectional study. BMC Public Health. 2018;18(1):371.

[13] Varughese S, Abraham G. Chronic Kidney Disease in India: A clarion call for change. Clin J Am Soc Nephrol. 2018;13(5):802-04.

[14] Sarnak MJ, Levey AS, Schoolwerth AC, Coresh J, Culleton B, Hamm LL, et al; American Heart Association Councils on Kidney in Cardiovascular Disease, High Blood Pressure Research, Clinical Cardiology, and Epidemiology and Prevention. Kidney disease as a risk factor for development of cardiovascular disease: A statement from the American Heart Association Councils on Kidney in Cardiovascular Disease, High Blood Pressure Research, Clinical Cardiology, and Epidemiology and Prevention. Hypertension. 2003;42(5):1050-65.

[15] Tuot DS, Wong KK, Velasquez A, Crews DC, Zonderman AB, Evans MK, et al. CKD awareness in the general population: Performance of CKD-specific questions. Kidney Med. 2019;1(2):43-50.

[16] Balwani MR, Bawankule CP, Khetan P, Pasari A. Awareness about Kidney and its related function/dysfunction in school going children: A survey from the central India. Saudi J Kidney Dis Transpl. 2019;30(1):202-07.

[17] Hussain S, Habib A, Najmi AK. Limited knowledge of chronic kidney disease among type 2 diabetes mellitus patients in India. Int J Environ Res Public Health. 2019;16(8):1443.

[18] Oluyombo R, Ayodele OE, Akinwusi PO, Okunola OO, Gbadegesin BA, Soje MO, et al. Awareness, knowledge and perception of chronic kidney disease in a rural community of South-West Nigeria. Niger J Clin Pract. 2016;19:161-69.

[19] White SL, Polkinghorne KR, Cass A, Shaw J, Atkins RC, Chadban SJ. Limited knowledge of kidney disease in a survey of AusDiab study participants. Med J Aust. 2008;188(4):204-08. Doi: 10.5694/j.1326-5377.2008.tb01585.x. PMID: 18279125.

[20] Chow KM, Szeto CC, Kwan B, Leung CB, Li PK. Public lacks knowledge on chronic kidney disease: Telephone survey. Hong Kong Med J. 2014;20(2):139-44.

[21] Roomizadeh P, Taheri D, Abedini A, Mortazavi M, Larry M, Mehdikhani B, et al. Limited knowledge of chronic kidney disease and its main risk factors among Iranian community: An appeal for promoting national public health education programs. Int J Health Policy Manag. 2014;2(4):161-66.

[22] Ari KS, Anggun LL, Suci H. Awareness of chronic kidney disease among general adult population in Indonesia. Journal of Global Pharma Technology. 2020;12(06):560-66.

PARTICULARS OF CONTRIBUTORS:
1. Tutor, Department of AHS (Renal Dialysis Technology), Dr. M.G.R. Educational and Research Institute, Chennai, Tamil Nadu, India.
2. Tutor, Department of AHS (Renal Dialysis Technology), Dr. M.G.R. Educational and Research Institute, Chennai, Tamil Nadu, India.
3. Tutor, Department of AHS (Renal Dialysis Technology), Dr. M.G.R. Educational and Research Institute, Chennai, Tamil Nadu, India.
4. Assistant Professor, Department of Physiology, VELS Medical College and Hospital, VELS Institute of Science, Technology and Advanced Studies (VISTAS), Thiruvallur, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
R Chandan Bala,
No: 1/472, Bazaar Street, Kadambathur, Trivallur District, Chennai, Tamil Nadu, India.
E-mail: chandanbala.cbk@gmail.com