Research article

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Non-dialysis-dependent chronic kidney disease in two tertiary referral centres in Sri Lanka: a renal registry based descriptive study

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Abstract

Introduction: Chronic kidney disease (CKD) is becoming a major public health issue in Sri Lanka. There is a regional variation in CKD prevalence due to CKD of unknown aetiology (CKDu). Significant attention is paid to CKDu, while CKD due to known causes is somewhat understudied as a public health problem. The objective of this study was to identify the aetiology, clinical stage, and associated co-morbid diseases in patients with CKD referred to nephrology services in Gampaha district.

Methods: A cross-sectional descriptive study was conducted over 18 months from May 2018 at Colombo North Teaching Hospital, Ragama, and District General Hospital, Negombo. All data was obtained from the two renal registries of the hospitals.

Results: A total of 1644 patients were studied. The mean age was 61.7 (SD 22.6) years, and 995 (60.5%) were males. Majority [1415 (86.0%)] were residents of Gampaha district. Primary renal disease was type 2 diabetes mellitus (T2DM) in 985 (59.9%), hypertension in 450 (27.4%) and chronic glomerulo-nephritis in 40 (2.4%). Only 29(1.8%) patients had CKD of unknown aetiology. Majority [833(50.7%)] were in CKD stage 3, 470(28.6%) in stage 4, and 238 (14.5%) in stage 5, with no significant difference in mean age of patients in each CKD stage. The commonest co-morbidity was hypertension, in 410 (24.9%), with coronary artery disease in 253 (15.4%).

Conclusions: The commonest cause of non-dialysis dependent CKD in Gampaha district was T2DM, followed by hypertension, with very few patients having CKD of unknown aetiology. Annual screening of patients with T2DM and hypertension for CKD and timely referral to tertiary care is recommended as CKD appears to be an emerging and under-appreciated public health problem in Sri Lanka.

Key words: non-dialysis dependent, chronic kidney disease, Sri Lanka, renal registry, diabetes

Introduction

Chronic kidney disease (CKD) currently affects over 800 million people globally, which is more than 10% of the world's population.[1] The growing prevalence of CKD, mostly caused by longstanding type 2 diabetes mellitus (T2DM) and hypertension is likely to pose a substantial challenge to healthcare systems, particularly in low-income countries, in the coming years.[2] The global burden of CKD by global disability-adjusted life years (DALY), witnessed a substantial surge of 62% from 21 million to 35 million between 1990 and 2016.[3] CKD is more prevalent among individuals over 65 years. The increasing incidence and prevalence of CKD all over the world probably reflect the increasing incidence of T2DM and hypertension and ageing populations.[4,5]

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CKD increases morbidity and mortality in affected individuals and is an independent risk factor for coronary artery disease (CAD). Patients with CKD are at a higher risk of death due to cardiovascular events.[6] Individuals in the early stages of CKD may not exhibit symptoms of vascular diseases but they are at a higher risk of developing CAD later in life.[6]

The epidemiological profile of CKD in certain regions of Sri Lanka diverges significantly from global patterns. The North Central Region is disproportionately affected by a CKD of unknown aetiology (CKDu), which has a substantial impact on the local population. Over the past two decades, CKDu has primarily affected paddy farmers, with a prevalence between 6% to 15% in endemic areas.[7,8] As renal research in Sri Lanka is mainly focused on CKDu, a significant knowledge gap exists on the incidence and prevalence of CKD due to known causes, especially in geographical areas not affected by CKDu.

A limited study conducted at the National Hospital of Sri Lanka identified T2DM and hypertension as the leading causes of CKD in the Western Province, accounting for 54% and 11.7% of all cases of CKD respectively.[9] The prevalence of T2DM has reached 23% among Sri Lankan adults as per recent estimates.[10] However, according to a systematic review conducted in 2021, the pooled occurrence of diabetes in Sri Lanka was 12.07%.[11] Based on the STEPS survey conducted in 2015, the prevalence of hypertension among Sri Lankan adults was 26.1%.[10]

Sri Lanka is a lower middle-income country with a limited annual health budget. The country offers free healthcare for all in the public sector. Management of patients with advanced CKD consumes nearly 4.5% of the annual health budget at present.[12] As the incidence of T2DM and hypertension is rising steeply, there will be more patients with CKD in the future. Catering to the increased number of complex CKD patients will be challenging with a limited health budget. Therefore, the best cost-effective interventions should be implemented promptly. Regular annual screening of patients with T2DM and hypertension for CKD with serum creatinine and urine microalbumin and early treatment of diabetic kidney disease with newer drugs are the most cost-effective interventions for Sri Lanka.[12]

The objectives of our study were to identify aetiology, clinical stage, and associated co-morbid diseases in patients with CKD referred to a nephrology service in the Gampaha district of Sri Lanka.

Methods

This cross-sectional descriptive study was carried out over eighteen months from May 2018 at the Colombo North Teaching Hospital, Ragama, and District General Hospital, Negombo, Sri Lanka. All data was obtained from the renal registers of the two hospitals.

The collaborating nephrology centres of the two hospitals provided baseline data at the time of enrolment. All patients with CKD who were 18 years and older and not receiving renal replacement therapy were enlisted. Those with a previous history of renal transplantation were excluded. CKD was defined based on the KDIGO classification.[13] Demographic data and information on co-morbidities were obtained from renal registry data and clinic records of all persons enrolled in the renal clinics during the study period who fulfilled inclusion criteria.

Statistical analysis was performed using Statistical Package for Social Sciences (SPSS version 28). Prevalence data was analyzed using descriptive statistics. The Ethics Review Committee, Faculty of Medicine, University of Kelaniya, exempted this study from ethical approval because de-identified secondary data were used.

Results

During the 18 months of the study, 1644 patients diagnosed with CKD between the ages of 18 and 93 years were referred to the renal services of the two tertiary care hospitals in the Gampaha district. The mean (±SD) age of patients was 61.65 ± 22.63 years. There were more males with CKD [995 (60.52%)] than females. Most patients (1415/1644) were residents of the Gampaha district.

The aetiology of chronic kidney disease was T2DM in 985 (59.9%) and hypertension in 450 (27.4%) patients. No cause for CKD could be identified in only 29 (1.8%) patients (Table 1).

Table 1. Aetiology of chronic kidney disease (CKD) in the registry cohort

Primary aetiology of CKD	*Number of patients (%) n=1644*
Type 2 diabetes	985 (59.9)
Hypertension	450 (27.4)
Chronic glomerulonephritis	40 (2.4)
Not identified	29 (1.8)
Other*	140 (8.5)

*Congenital and inherited disorders, Genito-urinary disorders, Obstructive uropathy, Calculi, etc

Based on the KDIGO classification, 833 persons were in CKD stage 3, 470 in stage 4 and 238 in stage 5 (Table 2). There was no significant difference in the mean age of patients in each CKD stage.

Table 2. Stages of chronic kidney disease in the registry cohort

Stage	*Number of patients (%) n=1644*
1	20 (1.2)
2	83 (5.0)
3	833 (50.7)
4	470 (28.6)
5	238 (14.5)

A total of 817 patients (49.7%) had co-morbidities at the time of diagnosis of CKD. The most common co-morbidities were hypertension in 410 (24.9%) and CAD in 253 (15.4%) patients (Table 3).

Table 3. Co-morbidities in the registry cohort

Comorbidity	*Number of Patients (%) n=1644*
Hypertension	410 (24.9)
Coronary artery disease	253 (15.4)
Type 2 diabetes	59 (3.6)
Advanced chronic liver disease	31 (1.9)
Malignancy	27 (1.6)
Chronic lung disease	25 (1.5)
Peripheral vascular disease	12 (0.7)

Discussion

The escalating burden of CKD remains a primary concern in Sri Lanka. In the Annual Health Statistics Report of Sri Lanka in 2019, diseases in the urinary system including CKD were ranked as Sri Lanka's fourth most common cause of hospitalization and sixth most common cause of hospital death.[14] However, CKDu has been the primary focus of clinicians, researchers, and the government due to its high incidence in rural and agricultural provinces in Sri Lanka. Therefore, Sri Lanka needs to shift the focus of CKD in areas where CKDu is not common, as CKD of known aetiology is gaining importance as a significant cause of morbidity and mortality.

This cross-sectional study evaluated the aetiology, clinical stage, and relevant comorbidities of CKD patients in two tertiary care centres in the Gampaha district having approximately 2.5 million residents and a mix of urban, semi-urban, and rural areas.[15] In the current study, more men than women were referred to the tertiary care centres with CKD (60.52% and 39.47% respectively). This study analyzed registry data which may not reflect community prevalence rates of CKD, since patients were selectively referred to the renal services of the two tertiary care hospitals. The estimated worldwide prevalence of CKD is 10.4% in men and 11.8% in women.[16] The prevalence is higher in low- and middle-income countries compared to high-income countries for both genders.[16] In Asia, CKD prevalence is generally higher in females than males, with a pooled female: male prevalence ratio of 1.07.[17] However, there is considerable heterogeneity between countries and regions in Asia.[17] Globally, the male: female prevalence ratio varies substantially across countries and economic levels, with complex patterns observed.[18] These findings highlight the need for country-specific policies to address CKD in both sexes.[17]

The mean age of patients was 61.65 ± 22.63 years in the study cohort. A recent observational study in the UK reported a higher mean age (66.3±14 years), indicating a slightly older demographic compared to the current study population.[19] However, a systematic review of CKD prevalence in Asia reported a mean age of 62.9 years.[17] The burden of CKD is felt far and wide within countries in South Asia, with prevalence rates of 6-32% in India, 6-11% in Nepal, and 13-17% in Bangladesh.[20]

T2DM was identified as the leading aetiological factor for CKD, followed by hypertension, in the current study. T2DM accounts for approximately 30-50% of CKD cases globally and is the leading cause in most high-income countries.[21] The prevalence of diabetic kidney disease varies significantly by region, with 40-45% in North America, 15-35% in Europe, and 30-50% in the Asia-Pacific with significant variation among countries.[22,23] Hypertension is responsible for 25-30% of CKD cases worldwide and is both a cause and consequence of kidney disease.[21] Hypertension is more prevalent as primary cause in Sub-Saharan Africa (25-45% of cases of CKD), Eastern Medi-

terranean regions (30-35% of cases of CKD) and Southeast Asia (20-30% of cases of CKD).[22,23] Chronic glomerulonephritis contributes to approximately 10-20% of CKD globally with a higher prevalence in less developed regions of Asia and Africa, accounting for 15-25% of CKD.[21,22,23]

The aetiology of CKD was not identified in 29 (1.8%) patients, including 17 persons from the Gampaha district and 12 persons from CKDu-endemic regions of Sri Lanka. In contrast, a previous study from the National Hospital of Sri Lanka in 2011 reported a prevalence of 9.5% of CKD with no identifiable aetiology.[9] The higher number found in the previous study probably represents referrals as well as economic migrants from CKDu endemic areas to Colombo.

Most of the patients in the current study were in CKD stage 3 (n=833; 50.66%), 4 (n=470; 28.58%), and 5 (n=238; 14.47%), with stages 1 (14) and 2 (83), accounting for only 5.62% of the study population. This is probably because the diagnosis of stage 1 and 2 CKD requires urine microalbumin assay which is not freely available in public hospitals and referral of such CKD patients to nephrology services happens late in many situations. This demographic pattern of CKD distribution is commonly seen in many epidemiological studies of CKD in various communities.[22,25]

Associated comorbidities further complicate the treatment and progression of CKD, and influence physical, psychological, and social well-being of the patient, leading to low quality of life.[26] The most common comorbidity identified in the current study was hypertension (24.93%), followed by CAD (15.32%). These findings support previous research demonstrating the close interaction between hypertension and CKD.[2,26,27] A decade-long cohort analysis reported several comorbidities of CKD including hypertension (66.4%), T2DM (33.2%) and cerebrovascular disease (6.2%).[28]

There are several limitations to the current study. The study population mainly comprises patients in more advanced stages of CKD. The sample size is relatively small. The data was obtained retrospectively from the renal registry and clinic records of patients, and not from direct interviews. The sample is limited to two large hospitals from a single district in Sri Lanka, and generalizability of conclusions may be limited.

The current study offers insight into the size of the problem of non-dialysis-dependent CKD in areas outside the CKDu region. Due to the rapid increase of T2DM, hypertension and the elderly population CKD is likely to become a future healthcare challenge. This study may form the basis for further studies so that relevant authorities can implement strategies to overcome the disease burden of CKD.

Slowing or halting the progression of CKD requires the implementation of an array of lifestyle modifications, dietary adjustments, and pharmacological interventions.[31] These interventions include weight management and control of blood pressure and blood glucose levels. Strengthening T2DM and hypertension care at all levels of hospitals and training staff in early detection and management of CKD in patients being followed up for non-communicable diseases will decrease the burden of CKD in Sri Lanka.

This study also reveals that patients with early stages of CKD are not attending tertiary care renal centres, probably because such patients are not routinely detected or have not been referred. However, early detection is vital in the prevention of CKD.

Conclusion

The commonest cause of non-dialysis-dependent CKD in the Gampaha district was T2DM, followed by hypertension, with very few patients having CKDu. Annual screening of patients with T2DM and hypertension for CKD and timely referral to tertiary care is recommended, as CKD appears to be an emerging and under-appreciated public health problem in Sri Lanka.

Author declaration

Ethics approval

This study was exempted from requiring ethical approval by the Ethics Review Committee, Faculty of Medicine, University of Kelaniya, since de-identified secondary data was used.

Availability of data and material

The dataset used and analyzed during the current study is available from the corresponding author upon reasonable request.

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This study was self-funded.

Conflict of interests

The authors declare that they have no conflicts of interests.

Criteria for Authorship

STDS and NJH conceptualized and designed the study. SSP, BBK, MSP, PBP and SNS collected data. STDS, NJH and SNS analyzed the data. STDS and DSF prepared and revised the manuscript together with NJH. All authors read and agreed to the final version of the manuscript.

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