

TO STUDY THE EPIDEMIOLOGY AND AETIOLOGY OF END STAGE KIDNEY DISEASE IN A TERTIARY CARE HOSPITAL

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Received July 2015
Accepted December 2015

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Abstract

Background: There is a rising incidence of chronic kidney disease (CKD) worldwide, that is likely to pose major problems for both healthcare and the economy in future years. In India, it has been recently estimated that the age-adjusted incidence rate of end stage renal disease (ESRD) is about 229 per million population (pmp), with more than 100,000 new patients requiring renal replacement therapy annually. Diabetes is replacing chronic glomerulonephritis as the leading etiology of CKD in our country.

Aim of Study: To study epidemiology and etiology of dialysis-treated end stage kidney disease in patients admitted in hemodialysis unit of department of medicine, Acharya Shri Chander Collage of Medical Sciences and Hospital, Jammu.

Material and Methods: A retrospective, hospital based descriptive study was carried out in haemodialysis unit, Department of Medicine, Acharya Shri Chander Collage of Medical Sciences and Hospital, Jammu. A total of 340 patients of ESRD presenting in the haemodialysis unit of our hospital were included in the study. All patients of acute renal failure and those presenting with acute on chronic renal failure were excluded by history, physical examination and with exclusion of reversible factors like infection, dehydration, nephrotoxic drugs, reversibility on treatment and follow up.

Conclusions: There is increasing incidence of chronic kidney disease, mainly because of rapidly increasing incidence of diabetes and hypertension. Thus planning for the preventive health policies and allocation of more resources for the treatment of CKD/ESRD patients are imperative in our state as is true for the rest of the country.

Key-words: Chronic Kidney Disease (CKD) End Stage Renal Disease (ESRD), Diabetes, Prevalence, Haemodialysis (HD)

JK-Practitioner 2016;21(1-2):12-18

Introduction

Chronic kidney disease (CKD) is becoming a major public health problem worldwide.¹ One reason is the rapidly increasing world wide incidence of diabetes and hypertension. In India, given its population of 1.25 billion, the rising incidence of CKD is likely to pose major problems for both healthcare and economy in future years.^{2,3,4} Chronic kidney disease encompasses a spectrum of pathophysiologic processes associated with abnormal kidney function, and progressive decline in

glomerular filtration rate (GFR).⁵ The term end stage renal disease (ESRD) represents a stage of CKD where the accumulation of toxins, fluid and electrolytes normally excreted by the kidneys results in uremic syndrome leading to death unless the toxins are removed by renal replacement therapy; using dialysis or renal transplantation.⁵

Background

Accurate estimation of the burden of CKD and End Stage Renal Disease (ESRD) in India is not known due to the lack of a comprehensive

CKD registry^{2,3,6,9}. The overall magnitude and pattern of chronic kidney disease (CKD) in India has been studied sporadically. Broad based systemic efforts have not been made to collect clinical and epidemiological data of CKD population. Lack of community based screening programs and access to healthcare services, especially in the rural regions, prevents or delays the diagnosis of CKD in many patients. There is lack of comprehensive national or regional reports on incidence or prevalence of either CKD or end-stage renal disease (ESRD). In a population based survey of approximately 570,000 individuals in the Central Indian city of Bhopal (2006), the crude and age-adjusted ESRD incidence rates were determined at 151 and 232 pmp, respectively.^{3,6} In a study, screening and early evaluation of kidney disease (SEEK-India), which was conducted between June 2005 to May 2007 in thirteen medical centres across India, involving a cohort of 5588 subjects; prevalence of CKD stage 1,2,3,4 and 5 was 7%, 4.3%, 4.3%, 0.8% and 0.8% respectively.² Also, the study reported a very important finding that despite the high prevalence (17.5%) of the disease, subjects in the cohort had a low awareness of CKD. Only 7.9% of subjects knew that they had CKD, thus highlighting the importance of early detection of the disease especially in patients of diabetes as the number of patients of diabetic nephropathy are increasing as incidence of the disease is on rise and people with the condition are living longer. Studies on prevalence of CKD also suffer from the use of divergent methodologies. These figures stand in contrast to data from the developed world, where large population-based surveys such as the NHANES have shown the prevalence of CKD to be about 12-18%; with reported prevalence of only 0.5% in population in the age group of 20-39 years with sharp rise in those above 60 years^{1,2,7}.

Settings and designs/material and methods:

A hospital based descriptive study was carried out in haemodialysis unit, Department of Medicine, Acharaya Shri Chander College of Medical Sciences and Hospital, Sidhra, Jammu. A total of 340

patients presenting in dialysis unit of department of medicine, over a five year period extending from January 2009 to January 2014, were analysed in this study. All patients of acute renal failure and those presenting with acute on chronic renal failure were excluded by history, physical examination and with exclusion of reversible factors like infection, dehydration, nephrotoxic drugs, reversibility on treatment and follow up. A case record form was used to record socio-demographic variables and etiology in patients requiring hospitalisation. Sources of data included patient interviews, case records sheets, ultrasound reports and biopsy findings wherever available. Review of medical history, additional investigations and test whenever relevant; were employed in individual cases for making the diagnosis.

A diagnosis of diabetic nephropathy was made with the presence of clinically and biochemically confirmed diabetes and by taking into account factors like long duration of diabetes before the onset of CKD, normal sized kidneys by ultrasound and presence of diabetic retinopathy by fundus examination.^{2,11,12}

A diagnosis of hypertensive nephropathy was made by taking into account factors like long standing hypertension (minimum of 5 years), hypertension preceding renal dysfunction and no evidence of any other renal disease.^{2,11,12}

The other causes of CKD were established on available biopsy reports and ultrasound scan report findings.

Staging of the kidney disease was done according to the Kidney Disease Outcomes Quality Initiative (K/DOQI) guidelines. GFR was estimated by Cockcroft-Gault (CG) equation⁵ as follows-

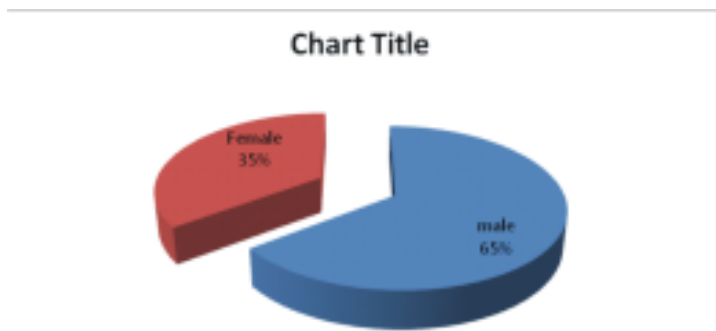
Estimated Creatinine Clearance (ml/min) = $(140 - \text{age}) / (\text{serum creatinine (mg/dl)} * (\text{weight}/72) * (0.85 \text{ if female}))$.

Consent: Informed written consent was obtained from the patients belonging to the study population.

Ethical approval: The ethical approval was obtained from the ethical review committee of Acharya Shri Chander College of Medical Sciences and Hospital Sidhra Jammu.

Results:

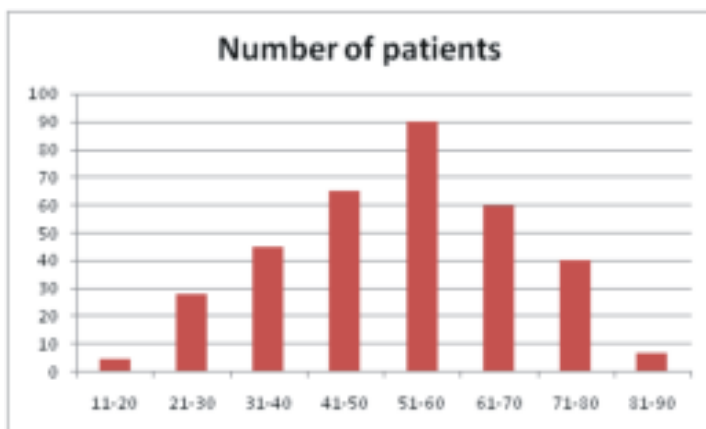
A total of 340 patients were included in this study with male and female ratio of 3:1(220



Pie-Chart showing Male and Female distribution of patients.

males and 120 females).The prevalence of dialysis treated ESRD is higher among males versus females at all age group.The mean age of population was 52 years with the minimum age being 17 and the oldest patient was 85 years old.

The common causes of CKD identified in



Distribution of Patients according to the age group.

these patients included diabetic nephropathy in 130(38%) patients, hypertensive nephrosclerosis in 70 patients(21%) and chronic glomerulonephritis in 55 patients (16%); obstructive uropathy was the cause of ESRD in 30(9%) patients ;HIV nephropathy in 5(1%) patients ,autosomal dominant polycystic kidney disease

(ADPKD) in 10 (3%)patients and cause was unknown in rest of 40 (12%) patients.

There were 143 patients below the age of 50 years. The most common cause of CKD in this age group was chronic glomerulonephritis , followed by diabetes. In 197 patients who were more than 50 years of age , the most common cause was diabetic nephropathy followed by hypertensive nephrosclerosis.

Out of 340 patients, 30 patients opted for CAPD after the few emergency sessions of hemodialysis.20 patients refused hemodialysis; due to financial or other personal reasons and were managed conservatively. Follow up of the patients revealed that out of all the patients who presented as ESRD and were initiated on hemodialysis, only 120 patients could continue maintaince hemodialysis beyond 3 months.

The most common presenting symptom of ESRD patients was refractory fluid overload (28%),followed by uraemic encephalopathy (25%) and severe symptomatic metabolic acidosis(18%). The anuria,persistent nausea and vomiting and electrolytes abnormalities were the other symptoms which resulted in emergency initiation of hemodialysis.

Discussion:

Chronic Kidney disease (CKD) is characterised by progressive destruction of renal mass with irreversible sclerosis and loss of nephrons over a period of months to years, depending on the underlying etiology. It is now well recognised that prevalence of CKD is increasing all over the world. The global annual growth of patients requiring dialysis is reported to in range of 7 to 8%.^{1,2,3,7}

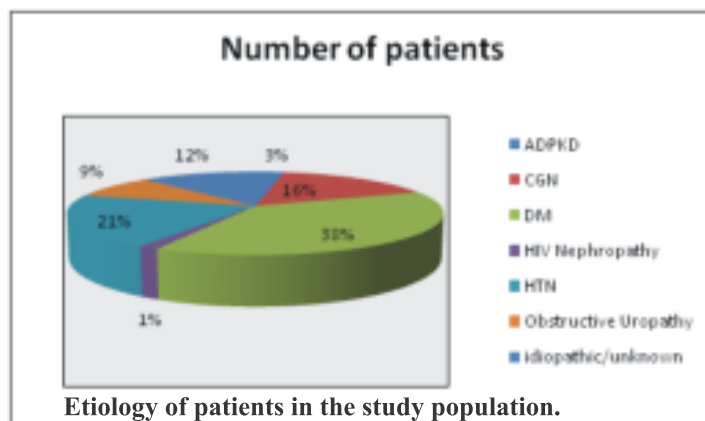
The accurate estimation of burden of CKD and ESRD in India is not known due to lack of comprehensive CKD registry.^{6,7,9,11} On the other hand in countries with well established reporting systems and registries as for example in United States, it was reported that during 1990-2001,the prevalence of chronic kidney disease increased by 104%,from 697 to 1424 cases /million population ; with the largest increase being in the prevalence of diabetes related chronic kidney disease.(increased

to 194%, from 171 to 503 cases/million population). The prevalence of hypertension related chronic kidney disease increased by 99% (from 166 to 331 cases/million population^{1,2,7,12}). Thus based on the current Indian population of 1.25 billion, even a conservative estimate of ESRD burden in India would suggest that about 1,650,000 to 2,200,000 new patients need renal replacement therapy every year. However, out of these; it has been estimated that only 10% or less actually receive renal replacement therapy^{4,8,12}. In view of high disease burden and expensive treatment and because of the fact that organised preventive strategies are not in place in most countries, CKD has assumed the proportions of a significant public health problem.

Thus, we can conclude that attention paid globally to CKD in last decade can be attributed to factors like rapid increase in its prevalence, the enormous cost of the treatment, various studies indicating that overt disease is tip of the iceberg of covert disease, an appreciation of its major role in increasing the risk of cardiovascular disease and better understanding of measures to prevent its progression⁷.

Chronic glomerulonephritis and chronic interstitial nephritis were reported to be most common cause of ESRD in India in older, single centre based studies reflecting the high prevalence of infectious and communicable diseases.^{8,13} The spectrum however seems to be changing with more recent literature reporting diabetic nephropathy as the commonest cause of ESRD in India, similar to the epidemiological trends seen in the rest of the world^{7,10}. Indeed whatever data is available from the CKD registry of India, the diabetic nephropathy accounts for majority of cases of chronic kidney disease in India.¹⁰ The prevalence of diabetes has reached epidemic proportions because of many factors like population growth, aging and urbanisation. The World Health Organisation predicts that number of people with diabetes in the world is expected to approximately double by 2030; and the greatest absolute increase in people with the diabetes will be in India.

Thus, it is evident that an epidemiologic transition is taking place in India with decline in burden of infectious diseases along with a significant rise in non-communicable diseases. This epidemiologic transition has been fuelled by economic development and globalisation leading to major lifestyle



changes and altered eating habits¹².

It is important to appreciate that clinical spectrum of CKD in India is different from the western world. The average age of ESRD population in India is 50 years; this is approximately 20 years less than that reported in US and some European countries^{8,12,14}. It has been suggested that diabetes, the commonest cause of CKD, sets in at a younger age and its complications appear earlier in the patients residing in Indian subcontinent. More rapid progression of CKD due to lack of access to medical facilities and poor management of risk factors may be another reason.^{12,15-19}

High incidence of CKD of unknown aetiology has been reported from many parts of India¹⁷⁻¹⁹. The CKD of unknown aetiology seems to be more prevalent in a younger age group¹². The possible explanation for this may be presence of certain environmental factors and missed childhood infections. One of the important factor is again late presentation of patients in a state where diagnosis is difficult because of difficulty in either performing or interpreting the findings of renal biopsy. Similar findings have been seen in studies from other centres in India and some other

developing countries like Sri Lanka and Nepal^{20,21}

Majority of patients of ESRD presented to us with symptoms of refractory fluid overload, uraemic encephalopathy and metabolic acidosis. It has been noticed in almost in all parts of the country that the patient would present themselves in nephrology services in a very late stage; when they had already developed the advanced uraemia and related metabolic complications; necessitating emergency initiation of dialysis by placing the temporary central venous catheter⁸. It has been seen that majority of the patients are not visiting the doctors or hospitals regularly; thus preparation for RRT is not possible in many patients. Again we can conclude that factors like financial constraints, lack of awareness in mostly uneducated patients and proper counselling and also various misconceptions about the dialysis treatment, result in patients and

resulting in poor outcome. It has been a consistent finding in almost all the studies carried out in different hospitals across India that more than 60% of patients started on HD drop out within in first few months, presumably due to inability to afford long term treatment. Thus only a small minority remain on dialysis for 24 months or more^{3,8,12,14}. In a similar study from a hospital in Nepal, another developing country with limited healthcare facilities; only 13% patients could continue dialysis beyond three months²¹.

Despite availability since the 90s, only a small proportion of ESRD patients are started on peritoneal dialysis (PD) in India¹². In our study only 30 patients opted for continuous ambulatory peritoneal dialysis (CAPD) after the initial few emergency sessions of hemodialysis. It was initial RRT of choice in just 0.24% of the patients in a study from Nepal²¹. There is

Etiology of CKD in different countries¹²

	India	Sri Lanka	USA	Australia
DN	31.2%	30.6%	45%	35%
UD	16.4%	25.6%		6%
CGN	13.8%	9.9%	12.3%	22%
HT	12.8%	13.2%	28%	14%
TID	7%	2.5%		5%
Obst	3.4%	8.3%		7%
ADPKD	2.5%	5.8%		
RVD	0.8%	-		
Graft Loss	0.3%	-		
Others	11.7%	-		12%

DN: Diabetic Nephropathy, UD: Undetermined, CGN: Chronic Glomerulonephritis, HT: Hypertension, TID: Tubulo-interstitial disease, Obst. Obstructive Uropathy, ADPKD: Autosomal Dominant Polycystic Kidney disease, RVD: Reno vascular disease, Graft Loss: Kidney transplant graft loss

family members delaying the start of renal replacement therapy to the point when a life threatening complication brings the patient to the hospital^{3,8,14}.

The follow up of our patients revealed that a large no of patients discontinued haemodialysis after the initial few weeks. In absence of state support for dialysis in our country, the cost of therapy has to be borne by the patient's family. The economic status of majority of patients precludes the possibility of any form of long term therapy

widespread perception that PD is more expensive than haemodialysis in India. PD is often advised as a last option of RRT in patients who are very elderly with multiple co-morbidities, those who are unsuitable for transplantation or who are unable to tolerate HD or develop problems on HD with lack of vascular access. Many of the patients receive inadequate exchanges and infection and dropout rates are very high.

Conclusions:

There is increasing incidence of chronic

kidney disease because of rapidly increasing incidence of diabetes and hypertension. Thus, diabetes is a major contributor towards CKD and ESRD, reflecting changing disease demographics throughout the world. The findings of our study regarding the aetiology of CKD are consistent with the results obtained in studies done in other parts of the India. After the extensive review of literature, we could not find any such study carried out previously in our state. However, in view of WHO reports which warn of India emerging as diabetic capital of the world; the attention paid by the primary health care systems to combat the rising epidemic of chronic diseases has been inadequate. The data regarding the epidemiology of ESRD and dialysis treatment in this part of the country are scarce and knowledge about the spectrum of renal diseases is very limited. The purpose of this study was to get some insight into the epidemiology of dialysis treated end stage renal disease in a tertiary care centre. Keeping in mind ,the constraints imposed by the developing economy ;the emergence of the discipline of preventive nephrology that emphasizes early detection of kidney disease(as there is low awareness of CKD; only 7.9% of subjects knew that they had CKD in SEEK-India cohort) and institution of measures to slow down its progression, is promising. Thus planning for the preventive health policies and allocation of more resources for the treatment of CKD/ESRD patients are imperative in our state as is true for the rest of the country.

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