Original Research Article

Study of clinicoetiologic and biochemical profile of incident end stage kidney disease patients

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Abstract

Introduction :Chronic kidney disease (CKD) is emerging to be an important chronic disease globally. One reason is the rapidly increasing worldwide incidence of diabetes and hypertension. Diabetic kidney disease is the commonest cause of end stage Kidney disease (ESKD) in the world.Symptoms and overt signs of kidney disease are often subtle or absent until renal failure supervenes.This study was conducted as there is scare data available in our country regarding demographic, etiological and clinical profile of CKD**Materials and Methods:**In this observational prospective study conducted over a period of 1 year, we included 180 consenting incident ESKD patients (age > 18 years). Clinocoetiologic profile including the search for risk factors was done. Both biochemical and radiologic profile was studied in the included patient population. Long-term therapy preference by patients was also studied. Results:Of the 180 newly diagnosed ESKD patients enrolled over 12 months, most were males (Sex ratio male: female was 2.3:1). Mean age was 43.66 +/-14 years. Although diabetes or hypertension was present in a substantial proportion of our patients,most had no identifiable risk factor for CKD. Anemia was universal as were clinical features like anorexia, nausea or vomiting. Most of our patients continued on haemodialysis as a form of RRT 10 out of the surviving 174 patients underwent Kidney transplant. **Discussion** :As against diabetes being the most common cause of ESKD world over, more than half of our study population had no identifiable risk factor. Similarly most had shrunken kidneys and hence the histopathologic diagnosis couldn't be done. CKD of unknown origin is being recognized as a significant health problem in many regions across India and kidney transplantation rates are low as seen in our study. Large scale studies are needed to identify risk factors for CKD and detection of CKD at the earliest to retard the progression of disease.

Keywords: Diabetes, hypertension, CKDu, RRT.

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Introduction

Chronic kidney disease (CKD) is emerging to be an important chronic disease globally. One reason is the rapidly increasing worldwide incidence of diabetes and hypertension.[1].Diabetic kidney disease is the commonest cause of end stage Kidney disease (ESKD) in the world[2].CKD encompasses a spectrum of different pathophysiologic processes associated with abnormal kidney function and a progressive decline in glomerular filtration rate (GFR)[3-5].Symptoms and overt signs of kidney disease are often subtle or absent until renal failure supervenes. Risk factors include hypertension, diabetes mellitus, autoimmune disease, glomerulo-nephritis, older age, family history of renal disease, a previous episode of acute kidney injury, and the presence of proteinuria, abnormal urinary sediment, or structural abnormalities of the urinary tract.(3) The prevalence of CKD is higher in developing countries than in the developed world. Diabetes mellitus is becoming increasingly prevalent in these countries. Therefore, it is expected that there will be a proportionate increase in vascular and renal disease. World health bodies, local governmental Healthcare agencies must plan forimproved screening for early detection, prevention, and treatment plans in these nations and must start considering options for improved availability of renal replacement therapies. The burden of CKD in India cannot be assessed accurately because of the absence of a renal registry in India. It has been recently estimated that the age-adjusted incidence rate of ESKD in India to be 229 per million population (pmp), and >100,000 new patients enter renal replacement programs annually in India.On the other hand, because of scarce resources, only 10% of the Indian ESKD patients receive any form of renal replacement therapy (RRT)[5-8]. The lack of community- based screening programs has led to patients being detected with CKD at an advanced stage. It is possible that early detection of kidney disease through community based screening programs might have an impact on this problem through earlier intervention. The outcome of ESKD is very poor and this is principally as a result of poor awareness of kidney disease, late presentation to the hospital, limited capacity of health workers in kidney disease prevention and limited accessibility as well as affordability of RRT.As a consequence of these, preventive strategies would be most beneficial in the sub-region considering the region specific risk factor profile and availability of resources. Participation in these endeavors by both governments and nongovernmental organizations cannot be overemphasized[9-12].However to be able to plan a useful CKD prevention program in any community, there would be a need for background statistics on possible magnitude of CKD, probable predisposing factors or causes and mode of presentation. This study was conducted as there is scare data available in our country regarding demographic, etiological and clinical profile of CKD

Material and methods

In this observational prospective study conducted over a period of 1 year, we included 180 consenting incident ESKD patients (age > 18 years). CKD patients on renal replacement therapy and those age <18

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years were not included. Patients were diagnosed to have CKD 5D if they had an irreversible decline in renal function i.e. estimated glomerular filtration rate of less than 15 ml/min/1.73m2 by using the Modification of Diet in Renal Disease (MDRD) formula with presence of signs and symptoms of kidney failure necessitating initiation of treatment by RRT.The clinical diagnosis was based on history, clinical examination (including fundus examination), and previous medical records, supported by relevant investigations including complete blood count, electrocardiogram, random blood glucose, glycosylated haemoglobin (HbA1C), blood urea, serum creatinine, calcium, phosphorous estimation, urine analysis, and abdominal ultrasonography. For socioeconomic assessment Kuppuswamy's socioeconomic status scale was used. All patients were given hemodialysis initially. Counseling regarding other RRT options including Peritoneal dialysis and kidney transplantation was done. All the responses were tabulated and graphically represented as and wherever necessary. All data were entered into SPSS version 1.6 and statistical tools like mean, Chi square test were applied as and when required

Observation and results

This study included 180 newly diagnosed ESKD patients enrolled over 12 months. Mean age was 43.66 +/-14 years. Males were 125(69.4%) and females 55(30.6%). Sex ratio male: female was 2.3:1.(Table 1) Considering the socioeconomic status most (64.4%) were in lower middle class.Most patients 72.2%(142/180) had prehypertension, while 12.2%(22/180)had stage 2 hypertension and 8.3% (15/180) patients had normal blood pressure. It was observed that most patients i.e. 94/180 (52.2%) patients had no risk factors. In other patients diabetes 25% (45/180) was the most common risk factor followed by hypertension10% (18/180) (Figure 1)

Table 1: Age distribution of ESKD patients (n=180)

Age(years)	18-30	31-40	41-50	51-60	61-70	71-80
Number	39	54	22	37	27	1
Percentage	21.7	30	12.2	20.6	15	0.6
Mean age	43.66 years					
Standard deviation	14					

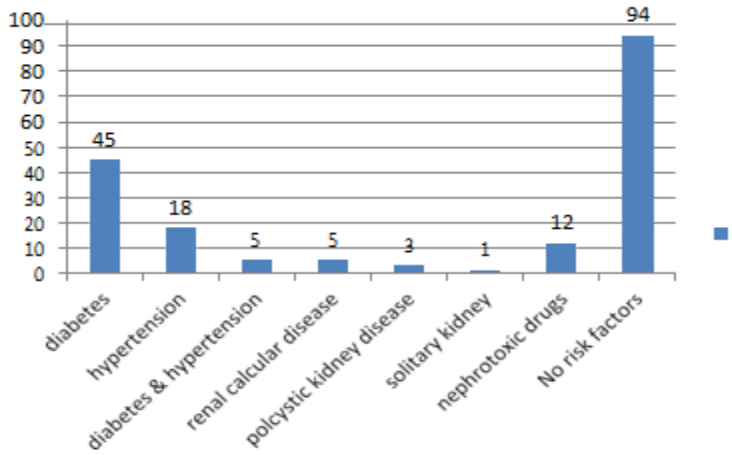

Fig 1: Risk factors in ESKD

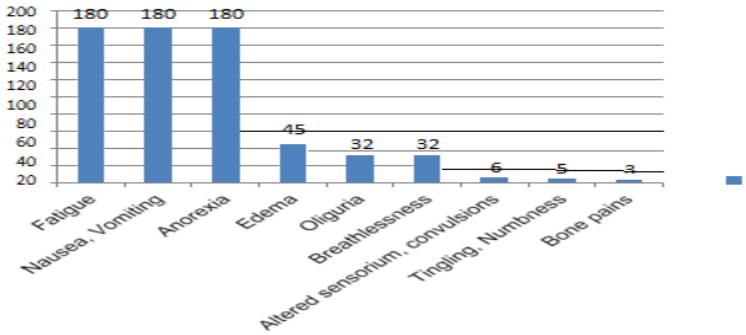

Fig 2: Symptoms in ESKD patients at presentation (n=180)

As seen in Figure 2, all ESKD patients had uremic symptoms like fatigue, nausea or vomiting, anorexia at presentation. At presentation moderate anaemia (Hb 8-10.9 g/dl) was seen in 46.7% and 53.3% had severe anemia (Hb< 8g/dl). Most (70.6%)patients had eGFR(ml/min/1.73m2) between 5-9.9 while 28.9% patients had eGFR<5 at presentation. It was seen that 28.3% (51/180) patients had hypoalbuminemia (<3.5g/dl) and rest had normal serum albumin level. It was observed that 19.4% patients had mild hyperkalemia,

7.8% had moderate hyperkalemia, 0.6% had severe hyperkalemia.In the study population it was observed that 90% (162/180) of patients had hypocalcemia and 55% (99/180) patients had hyperphosphatemia at presentation. serum uric acid levels was elevated in 35% (64/180) and 45.65% patients had metabolic acidosis of which 10% (18/180) had severe metabolic acidosis at presentation. On Ultrasonography ESKD patients at presentation,66.7% (127/180) had shrunken kidneys. (Table 2) At presentation maximum number of patients 112/180 had normal fundus, 45/180 had diabetic retinopathy, 18/180 had hypertensive retinopathy, 5/180 had both diabetic plus hypertensive retinopathy.

Table 2:**USG KUB findings in ESRD patients at presentation (n=180)(USG- ultrasound, KUB- kidney urinary bladder)**

USG KUB	Number	Percentage
Shrunken kidneys	127	66.7
Normal size kidneys with poor CMD	44	24.4
Renal calculus disease	5	2.8
Polycystic kidney disease	3	1.7
Solitary kidney	1	0.6

Table 3: Etiology of ESRD in study patients (n=180)

Etiology	Number	Percentage
Unknown	104	57.8
Diabetes	45	25
Hypertension	18	10
Diabetes & hypertension	5	2.8
Renal calculus disease	5	2.8
Polycystic kidney disease	3	1.7

In the current study, most of the patients 58.7% (104/180) had ESKD of unknown etiology, followed by diabetes 25% (45/180), hypertension 10% (18/180), 2.8%(5/180)patients had diabetes plus hypertension.(Table 3) Majority of our patients 88.5% (154/174) chose to continue hemodialysis after discharge, only 10 of surviving 174 patients opted for kidney transplant. While some patients (10/174), after initial hemodialysis and their renal function was stable enough to continue conservative management for the time being.(Table 4) It was observed that kidney transplant was opted only by younger age group patient (18-30 years) and among the patients who opted for kidney transplant most (9/10) were males. It was observed that conservative treatment was opted by patients in upper lower & lower socioeconomic classes, while kidney transplant was opted by upper middle class patients(P value< 0.05) it indicates there is significant correlation between socioeconomic status and treatment options at discharge

Table 4: Correlation of gender and treatment opted at discharge (n=174)

Gender	Total number	hemodialysis	conservative	Renal Transplant
Male	121	107	5	9
Female	53	47	5	1
Chi square statistics is 3.7791 P value is 0.1514				

Discussion

The wide age range (19 to 71 years) with mean age 46.23 +/- 14 years as seen in our study reflects the fact that ESKD is a major health problem in all age groups. Table 5 shows comparison of demographic profile of patients with other studies.Mean age was higher in Pradeep et al and lesser in Madhumathi et al study as compated to our study[13,14]. In the Indian CKD registry report the mean age was 50.1 years[15]. Majority of patients presenting as ESKD in our study were young 51.7% between 18-40 years (Table1). All studies had male predominance except Pradeep et al study which had almost equal number of male & female patients. [13]In our study ESKD was more common in males 69.4% (125/180),The male:female ratio being 2.3:1 which is similar to Indian CKD registry report. National Kidney Foundations analysed 18 studies and in 17 reported that the male gender was more at risk for CKD and most studies revealed that the male gender was associated with a faster progression of CKD[16].

Table 5: Comparison of demographic profile of ESRD patients

Study	Madhumathi Rao et al[14]	Sunil Dattu et al[17]	Santosh Varughese et al[18]	Pradeep Arora et al[13]		Our study
				Early referral	Late Referral	
N	463 (mixed)	160(rural)	561(mixed)	30	105	180(mixed)
Age range	-	21to 87	5 to 79	-	-	19 to 71
Mean age	38.6+/-13.9	49.9	41.1+/-14.5	55+/-17	61+/-15	46.3+/-14
Males	362 (78%)	107	429	16	49	125
Females	101	53	132	14	56	55

Anemia and hypocalcemia was higher in our study while hypoalbuminemia & hyperkalemia were higher in the study by Sunil Dattu et al however the incidence of hyperphosphatemia was similar in both the studies (55% in our study and 56%in their study[17] Cause was undetermined in most of our patients i.e. severe renal failure at presentation with sonologically contracted kidneys, therefore precluding the possibility of histological diagnosis. Similar predominance of ESKD with unknown etiology was found in Madhumathi et al & Sreejith Parmeswaran et al studies[14,19]. In the known causes percentage of diabetes was higher in Sunil et al, equal in Sreejith Parmeswaran et al, and lower in Madhumathi et al study as compared to our study[14,17,19]. Incidence of obstructive uropathy and cystic disease were uniformly low in all studies. Data from southern India also raises a possibility of an entity like CKD of unknown etiology (CKDu) like has been seen in Sri Lanka and South American countries.(20) One is not sure of the underlying cause for CKDu, though suspected agents are cadmium, fluoride, arsenic, pesticides, etc. Renal histology in these cases shows chronic tubule-interstitial nephritis.(Table 5)

Table 6: Etiological comparison of ESRD patients (data are shown as percentage)

Study	Madhumathi et al[14]	Sreejith Parmeswaran et al [19]	Sunil et al[12]		Our study
Number of patients	463	2490	160		180
			<60 years (119)	>60 years (41)	
Diabetes	13.8	24.9	56.5	58.5	25
Hypertension	-	2	12.5	16	10
Diabetes&Hypertension	-	-	-	-	2.8
Unknown etiology	66.3	38.5	10.5	25.3	57.8
Glomerulonephritis	11	12.6	20.5	Nil	Nil
Obstructive uropathy	2	3.3	Nil	Nil	2.8
Cystic disease	2	4.3	Nil	Nil	1.7
Others	5	14.3	Nil	Nil	Nil

A high proportion of our study population (85%) opted for hemodialysis, which is reasonably higher than other studies from India probably due to the in house availability of Maintenance Haemodialysis programme.(Table 6) Mortality rate was similar to that observed in Sreejith Parmeswaran et al study and lower than seen in Madhumathi et al study.[14-19]

Table 6 : Comparison of renal replacement therapy in different studies

Study	Madhumathi et al[14]	Varughese et al[18]	Sreejith Parmeswaran et al[19]	Our study
Number of patients	496	561	2490	180
HD	3.6	32.3	14.2	85.5
Tx	22.8	23.5	11.4	5.6
PD	4.5	2.3	2.3	Nil
Left programme/ Conservative	59.7	41.5	68.4	5.6
Died	9.5	Nil	3.7	3.3
Data is shown as percentage.N- number of patients, HD- hemodialysis, Tx- transplant, PD- peritoneal dialysis				

An effort to study the CKD in India has been made by some studies but most have been limited to single centeror limited regions [21,22]. Given the large population base in this country and limited resources to cater the health needs and and also the not so encouraging outcome in patients undergoing RRT, it is reasonable to detect the disease in the early stages so as to devise strategies and employ appropriate measures to retard the progression of CKD. Such measures include promoting healthy life style, avoiding smoking, avoiding nephrotoxic and herbal medications , blood pressure control and glycemic control. As diabetes is a significant contributor to CKD,employing the recently proven kidney protective antidiabetic medications like Sodium-glucose co-transporter 2 inhibitors [SGLT2i] and Glucagon-like peptide 1[GLP 1] analogs in diabetic patients.[23-25]. Moreover those patients who reach ESKD should be diagnosed timely and should receive comprehensive care including RRT taking into consideration patient and caregivers perspective.

Conclusions

In this observational study on incident ESKD patients, we found that most of patients were males with sex ratio male: female being2.3:1. Most patients belong to lower socioeconomic statusgroup. Amongst the risk factors found, diabetes was most common followed by hypertension, however majority of patients had no riskfactors. Anemia was observed in all patients andmost patients chose to undergo haemodialysis. Majority of patients had shrunken kidneys at presentation, so renal biopsy to determine the histopathologic diagnosis could not be done.

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