EPIDEMIOLOGICAL STUDY OF CHRONIC KIDNEY DISEASE IN A TERTIARY CARE HOSPITAL

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Abstract

Background: Chronic Kidney Ddisease (CKD) diagnosed with objective measures of kidney damage and function has been recognised as a major public health burden worldwide. Independent of age, sex, ethnicity and comorbidity, strong associations exist between cardiovascular diseases, mortality morbidity with CKD. Detection of CKD within the population is therefore a priority for health systems. To evaluate etiology, common clinical presentations and laboratory findings of Chronic Kidney Disease (CKD) and to raise the index of clinical suspicion so to diagnose and treat CKD at the earliest.

Materials and methods : This is a retrospective observational study carried out at CMH Dhaka. We had collected documents of 100 hospital patients of CKD (Stage- 3,4,5) who were admitted at Nephrology Center, Combined Military Hospital (CMH) Dhaka from 1 July 2013 to 31 May 2014. Clinical and laboratory data were collected from case sheets and attached lab results.

Results: Out of 100 patients, 69.0% (n=69) were male and female were 31.0% (n=31). Male to female ratio was 2.2:1. Mean age was 45.64 years (±12.89 SD). Majority 37(37.0%) patients had diabetic nephropathy, 24(24.0%) had hypertensive nephropathy, 23(23.0%) had chronic glomerulonephritis. On the basis of creatinine clearance majority (50%) were CKD stage- 3. Mean urinary albumin-creatinine ratio were 634.4 mg/g (CKD stage- 3) 1965 mg/g (CKD stage- 4) and 2831.20 mg/g (CKD stage- 5). Eighty one percent (81%) of the patients had their hemoglobin level in the range of 8-9 gm/dl. Sixty five percent (65%) had the potassium within normal limits (3.5-5 meq/l) and 35% had hyperkalemia. We found anemia (86%), HTN (75%), oliguria (73%), pedal edema (70%), vomiting (44%), anorexia (30%), generalized weakness (28%), facial edema (24%), breathlessness (12%) were common clinical features.

Conclusion

Diabetes, hypertension and glomerulonephritis are the most common etiological conditions of CKD. Most patients are anemic and a significant number of them develop hyperkalemia. At the time of diagnosis most of the patients are in advanced state with CKD stage- 3 or more with shrunken kidneys.

Key words

Chronic Kidney Disease (CKD); KDIGO; GFR; CrCI (Creatinine clearance); Urine Albumin-Creatinine Ratio (UACR).

Introduction

Chronic Kidney Disease (CKD) is a public health problem worldwide, with adverse outcomes of Cardiovascular Disease (CVD) kidney failure and premature death. The KDIGO definition and classification were accepted, with clarifications. CKD is defined as kidney damage or Glomerular Filtration Rate (GFR) <60 mL/min/1.73 m^2 for 3 months or more, irrespective of causes. The incidence and prevalence of Chronic Kidney Disease (CKD) is increasing, high costs and poor outcomes worldwide[1]. Global efforts to improve outcomes will require a directed at the earlier stages of CKD. The global initiative to address this problem is simple and self-evident. It is important to increase the efficiency of utilizing available expertise and resources in improving the care and outcomes of CKD worldwide although risk factors and resources for care vary locally. Development, dissemination and implementation of clinical practice guidelines are important means to improve outcomes of CKD.

Rigorously developing evidence-based clinical practice guidelines and their implementation, can reduce variability of care, improve patient quality, and ameliorate paucity in health care delivery[2,3,4].

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All patients with ESRD need Renal Replacement Therapy (RRT) unless contraindications are present[5]. Chronic Kidney Disease affects every aspect of the lives of the patients who suffer from it. Treatment must be directed against the causes, the progression and the many consequences of the loss of renal excretory and endocrine function and should provided over a lifetime[6]. Diabetes and hypertension are the two most common causes of chronic kidney disease and are associated with a high risk of cardiovascular death[7].

Materials and methods

This is a retrospective observational study was carried out at Combined Military Hospital (CMH) Dhaka. We had collected documents of 100 hospital patients of diagnosed CKD (Stage 3,4,5) who were admitted at Nephrology Center, Combined Military Hospital (CMH) Dhaka from 1 July 2013 to 31 May 2014. Clinical and laboratory data were collected from case sheets and attached lab results respectively. Data were placed in a preformed data sheet which were evaluated subsequently by the research team. A total number of 100 patients were selected randomly. A details history, general examination, respiratory, cardiovascular, gastrointestinal, neurological, musculoskeletal, endocrine & skin manifestations were recorded from case sheets. History, physical and lab findings were endorsed in a structured preformed data sheet. Drug history including use of NSAID's, diuretics, also enquired in details. Past history of previous hospital admissions also taken. Age and sex incidence, etiology of Chronic Kidney Disease were noted. Complete blood picture, blood urea, serum creatinine, serum electrolytes, creatinine clearance, serum calcium, phosphates, serum albumin, urinary albumin-to- creatinine ratio, kidney Size (By USG) were recorded. Systemic complications were also recorded. All collected data were checked for omissions, inconsistencies and improbabilities. Data analysis was performed by Statistical Package for Social Science (SPSS), version-21. All data were edited, coded and entered in to the computer. Statistical analyses were performed and level of significance was checked by using appropriate procedures like chi-square test (χ^2), Relative Risk (RR) measurement, t-test and proportion (d) test. Level of significance (p value) was set at <0.05 and confidence interval at 95%. Results were presented as text and tables.

Results

Out of 100 patients the mean age was 45.64 years (±12.89 SD) (Table I). Male was found 69(69.0%) and female was 31(31.0%). Male-female ratio was 2.2:1. Majority 37(37.0%) patients had diabetic nephropathy, 24(24.0%) had hypertensive nephropathy, 23(23.0%) had chronic glomerulonephritis, 7(7.0%) had obstructive uropathy, 2(2.0%) had polycystic disease of kidney, 2(2.0%) had chronic pyelonephritis and 5(5.0%) were unknown etiology (Fig I). On the basis of Creatinine clearance majority (50%) were CKD stage- 3 (Table II). Mean urinary albumin-creatinine ratio were 634.4 mg/g (CKD stage- 3) 1965 mg/g (CKD stage- 4) and 2831.20 mg/g (CKD stage- 5) here p value was significant (p <0.05) (Table II). Eighty one percent (81%) of the patients had their hemoglobin level in the range of 8-9 gm/dl. Only 5% of the patients had its value below 8 gm/dl, but 14% of the patients exhibited that their hemoglobin level more than 9 gm/dl (Table IIIa). Thirty five percent (35%) patients had hyperkalemia and 65% had the value within normal limits (3.5-5 meq/l) (Table IIIb). Hypocalcemia (<8 mg/dl) had 55% of cases, 42% of cases had this value within normal limits (8-10 mg/dl) (Table IV). Hypoalbuminemia (Serum Albumin < 3.5 g/dl) were 43% of cases and 57% of cases had this value within normal limits (3.5 - 5 g/dl) (Table IV). The clinical examination reflects that almost 86 % of the patients had pallor, 75% reflected the presence of hypertension and 70% had pedal edema. Nail changes were 20%. Only 12 of them had ascites and all the other signs were found to be below 6%. The presences of various symptoms observed in 100 patients are presented in the table below. We found that 70% of the cases had pedal edema followed by the most common urinary symptom oliguria that was 73%. The Gastrointestinal symptom mainly anorexia is found in 30% cases, 44% were having vomiting as symptom and 28% had generalized weakness. There were facial edema 24%, flank pain 21%, hematuria 16%, polyuria 8% and 12% of the cases exhibited breathlessness as a symptom (Table V).

In the CKD stage- 3,4,5 group of patients (Table VI) average hemoglobin level was found 9.96 gm/dl, 8.72 gm/dl and 7.95 gm/dl respectively. The standard deviation value had gone up (2.06) in stage 5, which indicates more variations in the level of hemoglobin among the patients belonging

to stage 5. The average level of potassium was found to be more in stage 5. Further the average level of calcium were also different with stage, however the standard deviation of stage 5 group is more than those of CKD- 3 and 4 stage. The average level of albumin varied according to stage.

Table I : Distribution of the study patients by age and sex (n=100).

Age	Percentage	Sex	Percentage
20-40 Yrs.	19.0	Male	69.0
40-72 Yrs.	81.0	Female	31.0
Mean Age (Yrs.)	45.64±12.89		

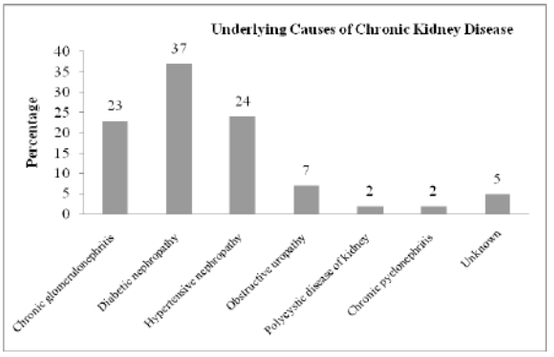

Fig 1 : Shows Underlying Causes of Chronic Kidney Disease (n=100).

Table II: Creatinine Clearance (CrCl) and Urine Albumin-to-creatinine (UACR) ratio (n=100).

Stage	CrCl (ml/min)	*Mean UACR(mg/g)	Percentage	p value
3	>30 to <59	634.4	50	*0.0001
4	>15 to <30	1965	25	
5	<15	2831.20	25	

*p value is significant (< 0.05) Crcl done by MDRD equation.

Table III A : Hemoglobin levels in chronic Kidney Disease (n=100).

Hemoglobin (gm/dl)	Frequency	Percentage
<8	5	5.0
8-9	81	81.0
>9	14	14.0

Table III B : Serum Potassium levels in Chronic Kidney Disease (n=100).

Serum potassium (meq/l)	Frequency	Percentage
3.5-5	65	65.0
>5	35	35.0

Table IV : Adjusted Serum calcium and Serum Albumin levels in Chronic Kidney Disease (n=100).

Serum calcium (mg/dl)	Percentage	Serum albumin (g/dl)	Percentage
<8	55.0	<3.5	43.0
8-10	42.0		
>10	3.0	3.5-5	57.0

Table V : Signs/symptoms of chronic kidney disease (n=100).

Signs	Frequency	Percentage
Anemia	86	86.0
Hypertension	75	75.0
Oliguria	73	73.0
Pedal edema	70	70.0
Vomiting	44	44.0
Anorexia	30	30.0
G. weakness	28	28.0
Facial edema	24	24.0
Flank pain	21	21.0
Hematuria	16	16.0
Breathlessness	12	12.0
Ascites	12	12.0
Pulmonary edema	6	6.0
Palpable kidney	5	5.0
Nail changes	20	20.0
Polyuria	8	8.0
Pleural effusion	5	5.0
Skin changes	3	3.0
Dysuria	3	3.0
Peripheral neuropathy	2	2.0
Pericardial effusion	1	1.0

Table VI: The Comparison between groups based on CKD stage in terms of Hemoglobin, Potassium, Calcium and Albumin Levels.

KDIGO Stage (CrCl)	Percentage of patients	Hb (g/dl) Avg± SD	S.Pottasium (meq/l) Avg±SD	S. Calcium (mg/dl) Avg± SD	S.Albumin (g/dl) Avg±SD
3 (30-59 ml/min)	50	9.96 ± 1.87	4.46 ± 0.91	8.90 ± 0.98	3.65 ± 0.54
4 (15-29 ml/min)	25	8.72 ± 1.72	4.84 ± 0.90	8.76 ± 0.97	3.36 ± 0.55
5 (<15 ml/min)	25	7.95 ± 2.06	5.56 ± 0.89	7.89 ± 1.08	3.21 ± 0.51

Discussion

In our study the mean age was 45.64 years (±12.89 SD). Similar observation was found at Sing et al reported in a recently published Screening and Early Evaluation of Kidney Disease study, mean age of the population was 45.22 ± 15.2 years[8]. Aslam et al

they showed the age range of patients was 20-70 years with mean age of 46.22(±12.89) years[9]. In contrast, the prevalence of congenital tubular disorders, urinary tract abnormalities and chronic glomerulonephritis is far more common in the younger age groups (< 30 yrs.). Our findings are similar to those reported by subgroup on children and adolescents study conducted by Col M Kanitkar et al[10].

In this study, we observed that male was found 69(69.0%) and female was 31(31.0%). Male to female ratio was 2.2:1. Aslam et al also reported the study group included thirty one (62%) males and nineteen (38%) females with male to female ratio of 1.6:1[9].

In this study, we found majority i.e 37(37.0%) patients had diabetic nephropathy, 24(24.0%) had hypertensive nephropathy, 23(23.0%) had chronic glomerulonephritis, 7(7.0%) had obstructive uropathy, 2(2.0%) had polycystic disease of kidney, 2(2.0%) had chronic pyelonephritis and 5(5.0%) were unknown. Aslam et al reported similar observation[9]. They showed, glomerulonephritis was the most common cause (n=15, 30%) followed by hypertension (n =12, 24%) and diabetic nephropathy (n=10, 20%) regarding etiology of CKD. Other etiologies were renal stone disease (n=4, 8%) and polycystic kidney disease (n=1, 2%). The unknown etiology of CKD remains in 16% (n= 8) cases. Lysaght et al have also demonstrated similar trends in American populations[11]. In the study conducted by Xue et al patients with diabetic nephropathy was almost 50% of the study group[12]. The etiological data also showed the prevalence of chronic glomerulonephritis was 23% which is similar with the study from other developing countries like Egypt and Bolivia[13,14]. The albumin to creatinine ratio was significantly associated with anemia, hyperkalemia, acidosis, hyperphosphatemia, hypoalbuminemia and hypercholesterolemia.

In our study the mean Urinary Albumin to Creatinine Ratio (UACR) were 634.4 mg/g (CKD stage- 3) 1965 mg/g (CKD stage- 4) and 2831.20 mg/g (CKD stage-5) here p value was significant ($p < 0.05$). Similar observation were found at Lu Huan, I et al[15].

In this study revealed that 81% of the patients had their hemoglobin level in the range of 8-9 gm/dl. Only 5% of the patients had its value below 8 gm/dl, but 14% of the patients exhibited that their hemoglobin level more than 9 gm/dl. Numerous articles describe the association of anemia with Chronic Kidney Disease . Anemia was present in 15.4% of people with any stage of CKD. The prevalence of anemia increased with stage of CKD, from 8.4% at stage 1 to 53.4% at stage 5[16]. Study consistent with McGonigle, Wallin et al they studied 863 patients of CKD for anemia and observed up to 90% of patients to have hemoglobin less than 10 gm/dl[17].

The serum Albumin levels were decreased in 43% of the patients and this is consistent with known studies like Kopple et al. in their Modification of diet in renal disease (MDRD study group)[18].

In present study, we observed that the clinical examination reflected that almost 86 % of the patients had pallor, 75% reflected the presence of hypertension and 70% had pedal edema. Nail changes were 20%. Only 12% of them had ascites and all the other signs were found to be below 6%. Aslam et al reported anemia came out to be the universal sign at presentation (n = 47, 94%)[9]. Hypertension (BP >140/90 mmHg) was present in 12 (24%) patients. Majority of hypertensive patients (n = 10) had their blood pressure in stage II according to JNC VII. Ascites 4 (8.0%), pulmonary edema 4 (8.0%), pleural effusion 5 (10.0%), dry skin 4 (8.0%) and Pericardial Effusion 1 (2.0%)[9].

In this study showed that the presences of various symptoms observed in 100 patients are presented in the above table. We saw that the most common urinary symptom oliguria that was 73%, followed by 70% of the cases had pedal edema. The Gastrointestinal symptom mainly anorexia was found in 30% cases, 44% were having vomiting as symptom and 28% had generalized weakness. The numbers of facial edema were 24% and 12% of the cases exhibited breathlessness as a symptom. Aslam et al reported the most common gastrointestinal symptoms like anorexia (76%) nausea (60%) and vomiting (40%)[9]. This is also similar with the studies done at Mayo hospital Lahore and kidney center Karachi which showed that nausea and vomiting were the predominant clinical features[19,20]. Similarly cardiovascular symptoms e.g dyspnea, edema and hypertension were also predominant in current study. Our outcome matched with the studies performed in Nigeria and China, which revealed that hypertension, was the main cardiovascular finding[21,22].

Limitations

This is a retrospective observational study, only 100 cases were observed. If the study could be done in a large number of cases then the results would be better.

Conclusion

From this study, we aim to highlight the growing incidence of CKD among the population. The growing incidence of CKD is a major health hazard in our country which we can ill afford.

In our study, out of 100 patients, the majority (61%) was having CKD as a result of Diabetes and Hypertension, which noticed/detected and managed at early stages can halt the progress to chronic kidney disease and renal replacement therapy. Obstructive uropathy and other manageable conditions should also be detected and managed at an early stage to prevent irreversible kidney damage. The complications like anemia, hyperkalemia hypocalcaemia and hyponatremia were also present in significant number of patients of CKD and should emphasize the need for the detection and correction of these complications.

Recommendation

A large scale, multicenter study should be carried out for detection of CKD within the population. It should be stressed to all primary care physicians taking care of hypertensive and diabetic patients to screen for early kidney damage.

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Contribution of authors

MAIM - Conception, design, acquisition of data, drafting & final approval.

AKMMR - Data analysis, critical revision & final approval.

TH - Acquisition of data, data analysis, interpritation of data & final approval.

Disclosure

All the authors declared no competing interest.

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