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HAEMATOLOGICAL AND BIOCHEMICAL MANIFESTATIONS OF CHRONIC KIDNEY DISEASES IN TERTIARY CARE HOSPITAL OF TELANGANA.

Pathology

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ABSTRACT

Objectives: Aim of the study was to study the hematological and biochemical manifestations of chronic kidney disease (CKD) and to correlate the hematological abnormality with the clinical stage.

Methods: A total of 112 hospitalized patients of CKD who were not on dialysis, hematinics or erythropoietin therapy were selected, irrespective of age, sex, clinical profile and etiology. The stage of kidney disease was evaluated by estimating GFR. Complete hematological and biochemical investigation was performed.

Results: CKD was seen in all age groups with a mean age of 46 and predominantly in males (62%). Majority of patients were in stage V CKD (66.7%). The commonest cause of CKD was diabetes mellitus (46.2%). The mean hemoglobin was 7.8g/dl and mean RBC count was 3.12 millions Blood group 'O' was the most frequent blood group seen in CKD (44.08%).

Conclusion: Chronic kidney disease is seen across all age groups with a male preponderance. Diabetes is the most common cause of CKD

KEYWORDS

Chronic kidney disease; anemia.

INTRODUCTION

Chronic kidney disease (CKD) is a major public health problem throughout the world[1].Number of prevalent CKD patients will continue to rise, reflecting the growing elderly population and increasing numbers of patients with diabetes and hypertension[2]. Symptoms and overt signs of kidney disease are often absent until renal failure supervenes[3]. The major outcomes of chronic kidney disease, regardless of the specific diagnosis (i.e., type of kidney disease), include progression to kidney failure, complications from decreased kidney function, and development of cardiovascular disease. Increasing evidence shows that early detection and therapeutic interventions in the earlier stages may prevent or ameliorate some of these complications, as well as slow progression to kidney failure[1].

Chronic kidney disease (CKD) is becoming a major global health problem. It increases patient mortality and morbidity and puts a major economic strain on the health care system[4] .

Most epidemiological information on chronic kidney disease (CKD) originates from data available on end-stage renal disease (ESRD). Little information is available on the prevalence of earlier stages of CKD, as patients are often asymptomatic. The epidemiological studies that have been performed provide evidence that ESRD represents the "tip of the iceberg" of CKD and suggest that patients with earlier stages of disease are likely to exceed those reaching ESRD by as much as 50 times[5].

Diabetic nephropathy is the leading cause of end-stage renal disease (ESRD) worldwide, and its prevalence is strikingly raising mainly due to a significant increase in the number of type 2 diabetic patients[6].

Chronic kidney disease reportedly ranges from approximately 1 to 30 percent[7]. Chronic kidney disease (CKD) encompasses a spectrum of different pathophysiologic processes associated with abnormal kidney function, and a progressive decline in glomerular filtration rate (GFR) [3].

In India, there is a rising burden of chronic diseases like hypertension and diabetes. The increase in number of CKD patients can be partially attributed to the epidemic of chronic diseases and the aging population. It is estimated that 25-40% of these patients are likely to develop CKD[4].

METHODOLOGY

Source of data:

Patients with chronic kidney disease referred to government medical college and general hospital ,suryapet,Telangana state were included in the study.

sMethod of collection of data:

The clinical diagnosis of CKD was done based on elevation of Serum Creatinine for more than 3 months. Estimated Glomerular Filtration Rate (eGFR) was calculated by the Cockcroft-Gault equation **i.e.,** 140 – age x body wt(kg)

72 x S.Creatinine(mg/dl)

Based on eGFR, patients are categorized in various clinical stages of CKD as follows;

STAGE	eGFR, ml/min per 1.73m^2
0	>90
1	≥90
2	60-89
3	30-59
4	15-29
5	<15.

Patients in various stages of the disease were studied for changes in clinical manifestations and hematological parameters.

Detailed clinical history was collected from the patient. Details were collected from hospital records also.

After obtaining the informed written consent, blood was collected (before the start of dialysis procedure in case of stage V CKD) under aseptic precautions for,

Investigations for assessment of renal failure: Serum Creatinine Investigations for assessment of hematological changes: Complete hemogram, blood grouping, Rh typing,

Complete hemogram was done using SYSMEX AUTOMATED HEMATOLOGY ANALYZER. 21 hematological parameters obtained were HB, RBC, HCT, MCV, MCH, MCHC, RDW-SD, RDW-CV, WBC, NEUT%, LYMPH%, MONO%, EOSINO%, BASO%, NEUT#, LYMPH#, MONO#, EOSINO#, BASO#,

PLT and MPV. Also RBC & PLT histograms with scatter plot for WBC differential and WBC BASO were obtained. Biochemical investigations done by Biochemical auto analyzer.

STATISTICAL TEST

Results are expressed as mean SD, range values, number and percentage. One way ANOVA was used for multiple group comparisions.

Unpaired T-test was used for comparing between two groups. Categorical data was analysed by chi-square test.

INCLUSION CRITERIA:
Patients of chronic kidney disease with stage I –V disease.

Patients with End stage renal failure on renal replacement therapy in the form of hemodialysis and peritoneal dialysis

EXCLUSION CRITERIA:
Patients with other systemic illness without renal failure
Pregnancy
Aplastic anemia
Known hematological malignancy causing secondary renal failure
Patients with end stage renal disease treated with renal replacement therapy in the form of renal transplantation

History of blood transfusion during last three months.

Period of study: 2 years i.e. from July 2017 to June 2019.

RESULTS

Sex distribution:
One hundred and twelve patients with chronic kidney disease were included in this study.There were 69 males (62%) and 43 females (37%).

Age distribution: The age of the study population ranged from 6 months to 80 years, with the mean age being 48 years. Majority of the patients (31.7%) belonged to the age group of 51-60 years.

Stage distribution
Majority of the patients (69.7%) in the study were in stage V CKD, followed by stage IV (21.1%), stage III (8.5%) and stage II (0.7%). No cases of stage I were seen.

Correlation of Hemoglobin with the stage of CKD:
There is fall in hemoglobin level as there is progression of CKD. One patient in stage V CKD with hemoglobin of 15.4g/dl had Autosomal dominant polycystic kidney disease.

Biochemistry: Majority of patients of CKD had proteinuria (85.9%) with microalbuminuria seen in 13.4% patients. Hyperkalemia was seen in 43.2% of patients.

Blood Group:
Blood group 'O' (45.08%) was the predominant blood group seen in CKD followed by group 'B' (27.46%) and group 'A' (22.54%). Blood group 'AB' was the least frequently seen group (4.92%).

RBC Count:
The RBC count ranged from 1.74 – 6.35 x10^{12}/l with a mean of 3.32 0.91 x10^{12}/l. Table 2 depicts the distribution of RBC count in various stages of CKD. There is fall in the RBC count as the stage progresses.

DISCUSSION

Chronic kidney disease is progressive renal disease characterised by various biochemical manifestations and haematological abnormalities.

The prospective clinico-hematological study of chronic kidney disease involving 112 patients was undertaken during period of July 2017 to June 2019 and diagnosis was made with available clinical and laboratory data. The observations were compiled, results analysed and discussed with previous similar studies.

112 patients who were admitted in the hospital were the study population. The incidence was high in males (62%) than that in females (37%)

Table 1 : Comparison of mean age and sex ratio in CKD

	Talwar et al 2002[9]	Sardenberg et al 2006[8]	Anees et al 2009[10]	Morranne et al 2009[11]	Agarwal et al 2011[12]	Present study
Mean age	44.6 yrs	66 y rs	51 yrs	59 yrs	67 yrs	48 yrs
Male: Female ratio	1.17:1	4.6:1	1.15:1	2.22:1	28.6:1	1.73:1

The present study shows mean age falling in the 5th decade which is similar to the study by Talwar et al done in India. Studies by Anees et al, Sardenberg et al and Moranne et al report higher mean age. This can be due to geographical differences in the studies as a result of higher life expectancy in the western world.

The present study agrees with all the other studies in terms of increased male preponderance, which is attributed to the high prevalence of risk factors for CKD in males.

Male dominance in children with CKD is due to the increased occurrence of congenital renal anomalies in males.

The present study showed that CKD affects all age groups (with increasing prevalence in the elderly population. This high prevalence of CKD in the elderly reflects the presence of a variety of different risk factors for CKD such as diabetes and hypertension in older individuals. However, high rates of CKD in the elderly may occur because of an age-associated decline in kidney function that is not explained by other known risk factors.

Table 2: Comparison of stage prevalence in CKD

	Morranne et al 2009[11]	Agarwal et al 2011[12]	Present study
Stage I	0%	1%	0%
Stage II	12%	3%	0.7%
Stage III	48%	51%	8.5%
Stage IV	31%	38%	21.1%
Stage V	9%	6%	69.7%

Majority of the cases belonged to stage V CKD with 99 cases, followed by stage IV with 33 cases. 12 cases were in stage III, 1 case belonged to stage II, while none of the cases were in stage 1.

The present study shows an increased prevalence of CKD patients in stage V. Moranne et al and Agarwal et al observed an increased prevalence in stage III and IV.

This is because of the fact that the present study is a hospital based study and hospitalisation occurs more in stage V as a result of complications and co- morbidities.

Table 3: Comparison of hemoglobin in CKD

	Singh et al 1999[13]	Talwar et al 2002[9]	Agarwal et al 2011[12]	Present study
Mean Hemoglobin g/dl	6.93	7.1	13.1	8.8

CKD is associated with anemia in a majority of patients. The mean hemoglobin in the present study in 8.8g/dl/. Talwar et al and Singh et al observed lower hemoglobin. Study done by Agarwal et al observed a higher hemoglobin value in the CKD population in the US. Study done by Agarwal et al observed a higher hemoglobin value in the CKD population in the US.

CONCLUSION

CKD is seen across all age groups with increased prevalence in the age group 51- 60 years.CKD is predominantly seen in males.Anemia is a common complication of CKD, seen with increasing prevalence as the stage progresses.The fall in haemoglobin is due to the low RBC count as a result of decreased erythropoiesis.

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