CLINICO-HAEMATOLOGICAL STUDY OF CHRONIC KIDNEY DISEASE IN A TERTIARY CARE CENTRE

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ABSTRACT

BACKGROUND

Chronic kidney disease (CKD) is a major public health problem causing significant morbidity and mortality worldwide. Diabetes mellitus (DM) and hypertension are common causes and anaemia is a common complication. It is important to identify the cause and complication, to treat it and prevent its progression to end-stage renal disease (ESRD).

AIM

To identify the haematological pattern in chronic kidney disease patients and to study the clinical presentation.

MATERIALS AND METHODS

72 cases of CKD were studied for a period of 6 months and thorough assessment of clinical features and haematological examinations were done.

RESULTS

CKD is observed in all age groups and predominantly in older age group greater than 50 yrs., with male preponderance. DM and hypertension are common causes. 89% of the patients presented with anaemia and 4 cases of sickle cell anaemia were observed. Neutrophilic leucocytosis was seen in 29.2% and thrombocytopenia in 8.3% of cases.

CONCLUSION

CKD is seen in all age groups with a male predominance, common in older age group, anaemia being the most common and important haematological complication. Few cases of sickle cell anaemia (SCA) were seen presenting with CKD. Knowledge and treatment of these conditions has proved to improve the quality of life.

KEYWORDS

Chronic Kidney Disease, Anaemia, Leucocytosis.

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INTRODUCTION: CKD embraces a wide range of patho-physiological processes associated with abnormal kidney function and a progressive decline in glomerular filtration rate.[1] It is a progressive condition and finally ends in irreversible renal failure, a condition known as end-stage renal disease (ESRD).

CKD is a major public health problem world-wide which tends to increase with the increasing number of patients with DM and hypertension which are the leading cause of CKD in India followed by glomerulonephritis and chronic interstitial nephritis.[2][3] Others are hereditary conditions and malignancies.

Anaemia is a complication of CKD. Due to its insidious onset, it is often asymptomatic and is usually diagnosed on blood examination. There are three factors involved in the anaemia pathogenesis in CKD. They are erythropoietin deficiency, suppression of marrow erythropoiesis and shortened red cell survival.[4] There is a background prevalence of iron deficiency in India, which alters the type of anaemia, hence awareness of this condition is important.

Leukopenia and thrombocytopenia are comparatively rare. This is probably because inhibition of erythropoiesis by uremic inhibitors is much more than inhibition of granulopoiesis and megakaryopoiesis. Disorders of leukocytes and thrombocytes have been described in renal failure. Renal disease is seen in 15-18% of all sickle cell disease patients and it involves damage to multiple structures within kidney.[5]

The present study is an attempt to review RBC, leukocyte and platelet profile in CKD patients and to study the clinical presentation. It is necessary to study the haematological abnormalities and their clinical presentation for proper patient care.

MATERIALS AND METHODS: It is a prospective study of haematological profile in CKD patients, conducted in the Department of Pathology, Andhra Medical College for a

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period of 6 months from July 2015 to December 2015. The study includes 72 cases of CKD patients who were admitted in the nephrology ward of King George Hospital for evaluation. A thorough clinical history was taken and blood samples were collected under aseptic conditions. The blood counts were done using Sysmex XN-1000 haematology analyser and peripheral smear was stained with Leishman's stain.

Inclusion Criteria:

- Patients with chronic kidney disease.
- Patients on dialysis.

Exclusion Criteria:

- Pregnancy.
- Patients with known haematological malignancy.
- Renal transplant patients.
- Aplastic anaemia.
- History of recent blood transfusions.

RESULTS AND OBSERVATIONS: A total of 72 cases of CKD were studied over a period of six months in the Department of Pathology, Andhra Medical College, Visakhapatnam. In the present study out of 72 cases, 1 case was in 1-10 yrs. age group (1.4%), 3 cases in 11-20 yrs. (4.2%), 10 cases in 21-30 yrs. (13.9%), 12 cases in 31-40 yrs. (16.7%), 14 cases in 41-50 yrs. (19.4%), 18 cases in 51-60 yrs. (25%), 12 cases in 61-70 yrs. (16.7%) & 2 cases greater than 70 yrs. (2.8%) (Table 1). The youngest was 9 yrs. old and oldest was 74 yrs. Majority of cases occurred above 50 yrs. age group.

Out of 72 cases 45 were male (62.5%) and 27 were female (37.5%) (Table 2). The male to female ratio is 1.7:1. There were 21 cases of diabetic nephropathy, 17 cases of hypertensive nephropathy, 14 cases of chronic glomerulonephritis, 4 cases of obstructive uropathy, 2 cases of polycystic kidney disease, 5 cases of chronic pyelonephritis, 5 cases of nephrotic syndrome (Table 3) and 4 cases of sickle cell anaemia [Fig 1]. The commonest aetiological association was with diabetes followed by hypertension.

Pitting oedema of lower limbs was the commonest complaint seen in 80.5%, followed by weakness and easy fatigability in 79.2%. Puffiness of face was seen in 46.7%, oliguria in 34.7%, breathlessness in 29.2%, haematuria in 25% and fever in 13.9%. (Table 4).

54.2% of cases had Hb between 6-9 gm %; 40.3% had 9-11 gm % and only 5.6% had Hb below 6 gm % (Table 5). Normocytic hypochromic anaemia was seen in 34 cases (47.2%) [Fig. 2], followed by microcytic hypochromic anaemia [Fig. 3] in 19 cases (26.4%), normocytic normochromic anaemia was seen in 10 cases (9.7%), dimorphic in 7 cases (9.7%) and macrocytic in 2 cases (2.8%). 6 out of 72 cases showed thrombocytopenia. 21 cases showed neutrophilic leucocytosis.

Age in Yrs.	No. of cases	%
1-10	1	1.4
11-20	3	4.2
21-30	10	13.9
31-40	12	16.7
41-50	14	19.4
51-60	18	25
61-70	12	16.7
>70	2	2.8

Table 1: Age Distribution Chart of Patients with CKD

Sex	No. of cases	%
Male	45	62.5
Female	27	37.5

Table 2: Sex Distribution Chart of CKD Cases

Aetiology	No. of cases	%
Diabetic nephropathy	21	29.2
Hypertensive nephropathy	17	23.6
Chronic glomerulonephritis	14	19.4
Chronic pyelonephritis	5	6.9
Nephrotic syndrome	5	6.9
Obstructive uropathy	4	5.6
Sickle cell anaemia	4	5.6
Polycystic kidney disease	2	2.8

Table 3: Aetiology of Patients with CKD

Clinical Presentation	No. of cases	%
Pitting oedema of lower limbs	58	80.5
Weakness and easy fatigability	52	79.2
Puffiness of face	35	46.7
Oliguria	25	34.7
Breathlessness	21	29.2
Haematuria	18	25
Fever	10	13.9

Table 4: Clinical Presentation of CKD Cases

Hb gm %	No. of cases	%
Below 6	4	5.6
6-9	39	54.2
9-11	29	40.3

Table 5: Hemoglobin (Hb) Evaluation in CKD Cases

Distribution of Type of ANAEMIA	No. of Cases	%
Normocytic hypochromic anaemia	34	47.2%
Microcytic hypochromic anaemia	19	26.4%
Normocytic normochromic anaemia	10	9.7%
Macrocytic anaemia	2	2.8%

Table 6: Distribution of type of Anaemia in CKD Cases

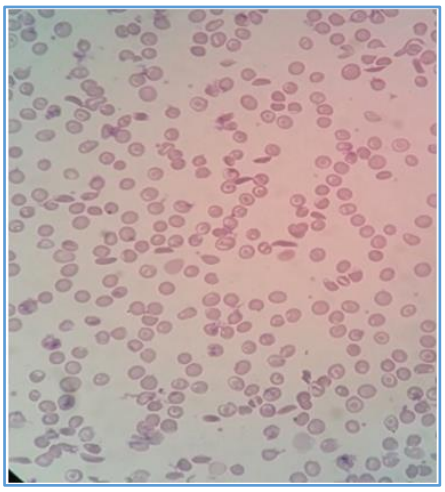

Fig. 1: Peripheral Smear showing Sickle cells 1000X

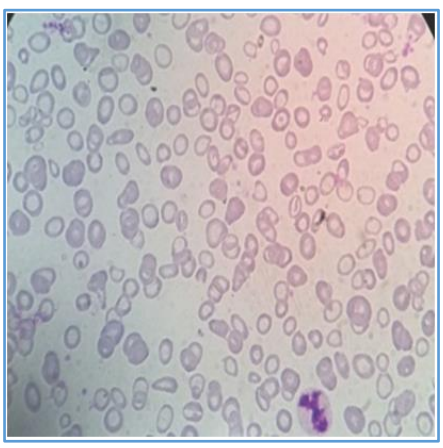

Fig. 2: Peripheral Smear showing Normocytic Hypochromic Anaemia 1000X

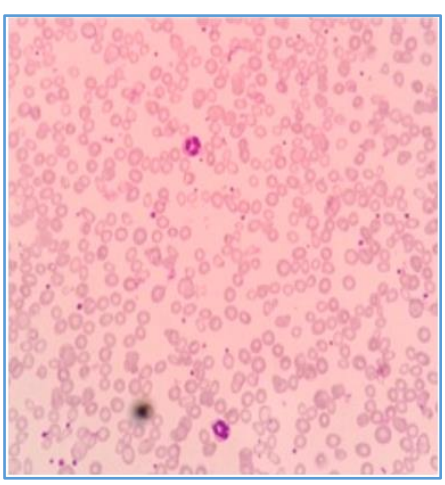

Fig. 3: Peripheral Smear showing Microcytic Hypochromic Anaemia 1000X

DISCUSSION: Chronic Kidney disease leads to functional disorders involving various organ systems. It is a progressive disease characterised by various clinical and haematological manifestations finally leading to ESRD if untreated. Anaemia is a common complication and if not treated increases the risk of cardiovascular complications, cognitive impairment, impaired immune response and impaired quality life which increases the importance of identifying and treating it.

The present study consisted of 72 cases of CKD who were admitted in the nephrology ward in KGH. The clinical features and haematological changes were analysed. The youngest patient was 9 yrs. old and oldest was 74 yrs. This shows the wide age range in which CKD can occur. Majority of cases occurred after 50 yrs. of age, this is similar to the study of Anees et al[6] and Moranne et al.[7]

There is a male preponderance with 62.5% occurring in males and 35.7% in females. The male to female ratio is 1.7:1. The older age group and male preponderance may be due to underlying risk factors like DM and hypertension. The commonest underlying systemic disorder is Diabetes mellitus 29.2%, followed by hypertension in 23.6%, which are comparable to Xue et al study.[8] Chronic glomerulonephritis, nephrotic syndrome and sickle cell anaemia were common in younger age group. The most common clinical features observed were pitting oedema of lower limbs (80.5%), weakness and easy fatigability (70.2%). The others are breathlessness (29.2%), puffiness of face (46.7%), oliguria (34.7%), haematuria (25%) and fever (13.9%).

Anaemia was present in majority of patients accounting for (89%). This was comparable to Talwar et al study,[9] which was (94%) and McGonigle, Wallin et al[10] study where 90% of patients had less than 10 g% Hb. Anaemia developing in the course of CKD is a known entity. This may be due to loss of erythropoietin synthesis and/or presence of inhibitors of erythropoietin synthesis.[4]

Moderate anaemia was observed in the majority 54.2%, followed by mild anaemia 40.3%, comparable to Talwar et al study 46% and 42% respectively. Normocytic hypochromic anaemia was most common in our study 47.2%, followed by microcytic hypochromic anaemia which correlated with study by Talwar et al and Callen IR et al.[11] Microcytic hypochromic anaemia was seen in 26.4% of cases. With the high prevalence of iron deficiency in India, this shows relevance of conducting serum iron studies and giving iron supplementation. However, in spite of adequate iron stores, some show microcytic hypochromic anaemia, this might be due to decreased iron utilisation due to inflammatory block caused by circulating inflammatory mediator in CKD. Macrocytic anaemia is seen in only two cases due to low frequency of occurrence of B12 deficiency in CKD which increases in renal failure, due to decreased clearance.

In our study, there were 4 cases of sickle cell anaemia in 20-40 years age group in which 3 cases were males and 1 was female. The renal manifestations of SCA range from various functional abnormalities to gross anatomic alterations of kidney. Young people with SCA usually have normal renal function and as they grow older the kidney progresses to ESRD. Several factors are responsible for such progression like worsening anaemia, hypertension, degree of proteinuria and microscopic haematuria.[12] 5-18% of patients with SCA, progress to ESRD.[13] There is an increased risk of infection secondary to encapsulated organisms such as Streptococcus pneumonia in those who undergo splenectomy as part of SCA treatment.[14]

Neutrophilic leucocytosis was observed in 29.2% of cases in our study. There was no definitive evidence of infection observed. Progressive alteration of both humoral and cell mediated immune response are one of the hallmarks of chronic uraemia and presence of leucocytosis, does not hint a search for cause of infection always and exclusive evaluation is not required in most of the cases. 6 cases showed thrombocytopenia constituting 8.3%, which was comparable to study by Gafter et al in 1987,[15] who studied platelet count in 55 patients with end-stage renal failure and in 19 pre-dialysis patients with CRF before haemodialysis. This study also showed mild thrombocytopenia.

CONCLUSION: Chronic Kidney disease in seen in all age groups, with increasing prevalence in above 50 years of age and male preponderance. Anaemia is a common complication of CKD which is normocytic hypochromic but microcytic hypochromic anaemia is also common in Indian setup due to associated iron deficiency which can be treated. So, evaluation of cause is important. Sickle cell disease can also present with CKD. Neutrophilic leucocytosis is seen in some cases and may not necessarily be due to infection and needs no further evaluation. It is imperative to evaluate the haematological parameters in CKD cases and identify the complications for proper management.

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