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EVALUATION AND CORRELATION OF HAEMATOLOGICAL PARAMETERS AND BIOCHEMICAL INDICES (UREA, CREATININE)IN PATIENTS WITH CHRONIC KIDNEY DISEASE UNDERGOING HAEMODIALYSIS IN A TERTIARY CARE HOSPITAL IN MID-WESTERN INDIA-A TWO YEAR PROSPECTIVE STUDY

Pathology

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ABSTRACT

Background: Chronic kidney disease is a worldwide public health problem besides being one of the emerging life-threatening diseases in India as well. It is invariably associated with various biochemical and hematological abnormalities leading to morbidity and mortality.The aim of this study is to evaluate and correlate the haematological and biochemical parameters(urea,creatinine) in CKD patients undergoing haemodialysis. **Methods:** This study is hospital based analytical observational cross sectional study conducted over a period of two years on whole blood samples of 236 CKD patients undergoing haemodialysis at dialysis centre of SRG Hospital and Medical College,Jhalawar. Samples were analyzed using a Sysmex XN-1000 automated hematology analyzer and Beckman Coulter DxC 700 AU automated biochemical analyzer. Data were analyzed using IBM SPSS v22 software for Windows. **Results:** In this study, the maximum number of patients are in the age group 66-80 years 129 (54.7%). Most of the participants are male 178 (75.4%) while the rest are female 58 (24.6%). A total of 159(67.37%) participants had history of both diabetes and hypertension. It is found out that Fatigue is the most common((85.6%) complaint of the patients . A total number of 232[98.3%] patients are suffering from Stage 5 CKD. We see that most of the patients are suffering from Normocytic Normochromic Anaemia-180(76.3%). It is found out that total WBC count shows a statistically significant(p value=0.023 i.e.<0.05) negative correlation with serum urea. It is found out that with respect to serum creatinine levels RBC count has a statistically significant(p value=0.030 i.e.<0.05) negative correlation, MCHC also has a statistically significant(p value=0.017 i.e.<0.05)negative correlation and so does MCH(p value=0.034 i.e.<0.05).

KEYWORDS

Haematological, Parameters, Biochemical, Chronic kidney disease, Haemodialysis.

INTRODUCTION

Chronic kidney disease is a worldwide public health problem besides being one of the emerging life-threatening diseases in India as well. It is invariably associated with various biochemical and hematological abnormalities leading to morbidity and mortality.

It is also called as chronic kidney failure, it being a process of irreversible loss of nephrons, which leads to kidney failure at the end stage. A large number of the Indian population live below or around poverty line and lack of proper medication make CKD highly prevalent in India because more than half of the patients with advanced CKD are diagnosed first time with GFR <15 mL/min/1.73 m^2 which is the last stage of CKD[1] . Therefore, CKD patients are at the high risk of end stage renal disease (ESRD) that requires costly treatment such as dialysis and renal replacement therapy (RRT), because they are quite limited and expensive for most of the patients, therefore aid in high morbidity and mortality rate.[2]

Anemia is common among patients with CKD. While the primary cause of anemia in patients with CKD who are not treated with dialysis is a relative deficiency of erythropoietin, in more advanced uremia and in patients treated with dialysis reduced RBC survival, intravascular hemolysis, blood loss, chronic inflammation and perhaps the presence of circulating inhibitors of erythropoiesis may also play a role in some patients[3,4].

The aim of this study is to evaluate and correlate the haematological and biochemical parameters(urea,creatinine) in CKD patients undergoing haemodialysis.

MATERIALS AND METHODS

Type Of Study-It was a hospital based observational analytical cross sectional prospective study for a period of two years.

Study Population- All CKD patients undergoing dialysis at dialysis unit of S.R.G. Hospital & Jhalawar Medical college, Jhalawar.

Inclusion Criteria-

Patients of all ages, both sexes with Chronic Kidney Disease who required haemodialysis at SRG Hospital and gave consent for being enrolled were included in this study.

Exclusion Criteria-

- All those patients who were not ready to give consent or complete history.
- Patients who are undergoing haemodialysis for conditions other than CKD.
- Samples rejected at pre analytical phase (Inadequate sample, Clotted sample,improper vacutainers,etc)

Methodology-

The sample was first run into automated 5 part haematology analyzer (Sysmex XN1000) which analyses the sample and provides a print out with complete blood count, RBC indices, RDW, platelet count, Platelet Distribution Width, scattergram and distribution curves.

The principal biochemical analyzer used is the Beckman Coulter DxC 700 AU.It offers a fully automated, random-access system with STAT capability.

Data were analyzed using IBM SPSS v22 software for Windows

RESULTS & DISCUSSION

In this study, the maximum number patients are in the age group 66-80 years 129 (54.7%) followed by the age group 51-65 years 74 (31.3%).17 (7.2 %) of the patients belonged to the age group 81-100 years and 16(9.8%) patients are in the age group of 35-50 years. The mean age of the study is 64.84+/- 11.713 years. The most common(54.7%) age group affected was 66-80 years old which is different from few other studies[5,6] where the most affected patients were younger.

Most of the participants were male 178 (75.4%) while the rest were female 58 (24.6%). This was similar to other studies[5,6,7,8,9,10] which also showed a male preponderance. This apparent predilection for CKD towards males is partly due to the action of testosterones which in high levels hamper kidney function and also women have higher estrogen which may be protective of kidney function. In this Study we can see 208 out of 236 participants(88.1%) are hypertensive and 182 (77.1%) of the participants are diabetic and only 16(6.8%) participants had chronic glomerulonephritis.A total of 159(67.37%)participants had history of both diabetes and hypertension.So it is found out that Combined Diabetes and Hypertension is the most common etiological risk factor for CKD. This is in line with other studies[5,6].

It is found out that Fatigue is the most common((85.6%) complaint of the patients followed by loss of appetite(69.5%),respiratory

distress(66.5%) and pedal edema experienced by 64.4% of patients.

We can see that most(232)[98.3%] of the patients are suffering from Stage 5 CKD also known as end-stage renal disease.All the patients within the sample size had anaemia.We see that most of the patients are suffering from Normocytic Normochromic Anaemia-180(76.3%) as seen with other studies[7,11]While 26(11%)patients are suffering from microcytic hypochromic anaemia,13 (5.5%) of patients showed features of hemolysis,2 patients(0.8%) had burr cells i.e. echinocytes>5% and 2 patients had Dimorphic anaemia.RBC counts, HCT, Hb are almost always decreased in CKD stage 5 patients whereas serum urea and creatinine are almost always increased as has been observed in other studies[5,6,7]

Some patients with increased leukocyte count were always polymorphonuclear leukocytotic which in turn has been linked to diminished cardiovascular outcome in such patients.

Table 1: Correlation Of Hematological Parameters With Urea

	Mean	Std. Deviation	N	r value	P value
Urea(mg/dl)	157.36	24.733	236		
RBC Count(*10^{12}/L)	3.3675	.65348	236	-0.007	0.918
Urea(mg/dl)	157.36	24.733	236		
HB(gm/dl)	8.672	.9990	236	0.032	0.623
Urea(mg/dl)	157.36	24.733	236		
MCV(fl)	87.423	7.7169	236	-0.003	0.961
Urea(mg/dl)	157.36	24.733	236		
MCHC(gm/dl)	32.336	2.5990	236	0.070	0.285
Urea(mg/dl)	157.36	24.733	236		
MCH(pg)	28.427	4.3827	236	0.044	0.499
Urea(mg/dl)	157.36	24.733	236		
RDW-cv(in%)	14.949	2.5064	236	-0.038	0.558
Urea(mg/dl)	157.36	24.733	236		
HCT	26.7072%	3.01315%	236	0.043	0.508
Urea(mg/dl)	157.36	24.733	236		
Platelet Count(/microL)	210317.80	64187.530	236	0.024	0.709
Urea(mg/dl)	157.36	24.733	236		
Total WBC Count(/µL)	6808.90	2239.464	236	-0.148	0.023*
Urea(mg/dl)	157.36	24.733	236		
ESR(mm/hr)	32.97	9.211	236	0.007	0.909

It is found out that total WBC count shows a statistically significant(p value=0.023 i.e.<0.05) negative correlation with serum urea.

Table 2: Correlation Of Hematological Parameters With Creatinine

	Mean	Std. Deviation	N	r Value	P value
Creatinine(mg/dl)	6.286	1.2791	236		
RBC Count(*10^{12}/L)	3.3675	.65348	236	-0.141	0.030*
Creatinine(mg/dl)	6.286	1.2791	236		
HB(gm/dl)	8.672	.9990	236	-0.017	0.791
Creatinine(mg/dl)	6.286	1.2791	236		
MCV(fl)	87.423	7.7169	236	-0.126	0.053
Creatinine(mg/dl)	6.286	1.2791	236		
MCHC(gm/dl)	32.336	2.5990	236	-0.156	0.017*
Creatinine(mg/dl)	6.286	1.2791	236		
MCH(pg)	28.427	4.3827	236	-0.138	0.034*
Creatinine(mg/dl)	6.286	1.2791	236		
RDW-cv(in%)	14.949	2.5064	236	0.086	0.188
Creatinine(mg/dl)	6.286	1.2791	236		
HCT	26.7072%	3.01315%	236	-0.051	0.432
Creatinine(mg/dl)	6.286	1.2791	236		
Platelet Count(/µL)	210317.80	64187.530	236	-0.061	0.352
Creatinine(mg/dl)	6.286	1.2791	236		
Total WBC Count(/µL)	6808.90	2239.464	236	-0.045	0.496
Creatinine(mg/dl)	6.286	1.2791	236		
ESR(mm/hr)	32.97	9.211	236	0.015	0.817

It is found out that with respect to serum creatinine levels RBC count has a statistically significant (p value=0.030 i.e.<0.05) negative correlation, MCHC also has a statistically significant(p value=0.017 i.e.<0.05)negative correlation and so does MCH(p value=0.034 i.e.<0.05).

CONCLUSION:

On enumerating the various haematological and Biochemical parameters, we find various abnormalities consisting of decrease in Hb, HCT, RBC count as well as increase in serum Urea, Creatinine compared to reference values. Males are mostly affected with the predominant age group being 66-80 years of age. Normocytic normochromic anaemia is the predominant form of anaemia found in patients. Hypertension combined with diabetes is the main cause leading to chronic kidney disease in patients requiring Haemodialysis as a form of Renal Replacement Therapy. WBC count has a statistically significant negative correlation with serum urea levels and RBC count,MCHC and MCH also has a statistically significant negative correlation with serum creatinine levels. The enumeration of all these parameters and their continuous monitoring are of utmost importance in the management of advanced CKD patients requiring haemodialysis and also help in predicting treatment outcomes as well. With continuous monitoring and evaluation of these parameters it is quite possible to save the patient from or retard and delay the progression of complications of CKD.

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