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CHRONIC KIDNEY DISEASE;

THE ASSOCIATION OF PLATELET COUNT WITH ESTIMATED GLOMERULAR FILTRATION RATE IN KNOWN CASES.

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ABSTRACT… Objectives: This study aimed to determine the platelet count in diagnosed chronic renal failure patients and to find out the association of platelet count with glomerular filtration rate. **Study Design:** Case control study. **Place of study:** Diagnostic and research laboratory Liaquat University Hospital Hyderabad and Nephrology Unit, Isra University Hospital Hyderabad. **Duration of study:** January 2015 to July 2015. **Materials and methods:** Total of one hundred and twenty subjects (n=120) were divided into two groups. The healthy controls (n=60) were included in group-I whereas patients with chronic renal failure (n=60) were kept in group-II. 5 ml of blood was drawn and sent to laboratory for estimation of serum platelet count, blood urea nitrogen and serum creatinine levels. **Results:** The present study showed highly significant difference with marked decrease in the platelet counts seen in the CRF patients with 223.9±89.1 million/μL in comparison to the 347.60±55.9 million/μl platelets in control individuals. Also the results of BUN in CRF patients showed highly significant differences with 27.67±7.68 mg/dl when compared to controls having BUN 8.95±1.02 mg/dl. The comparison between GFR with mean platelet count showed negative correlation (r = -0.27) in CRF patients. **Conclusion**: The present study shows weak negative correlation of platelet count with GFR.

Key words: platelet count, Glomerular filtration rate, chronic renal failure

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INTRODUCTION

Chronic renal failure (CRF) is the condition in which there is slow and progressive loss of renal function which takes weeks, months or years to lead to End stage renal disease (ESRD) which consequently requires renal replacement therapy (RRT). In CRF the problem lies in renal clearance or GFR leading to rise in urea and creatinine levels in blood.[1] The normal GFR is 125ml/min.[2,3] GFR is measured by renal clearance of certain filtration markers in the plasma but since these tests are costly so determination of serum creatinine and urinary creatinine clearance may be used for diagnosis of deteriorating renal function and thereby for monitoring the progression of disease.[4,5] There are multiple factors that affect serum creatinine concentration including production, extra renal elimination and tubular secretion. in that case serum creatinine or creatinine clearance alone may not always be an accurate measure for estimation of renal function.[6]

There are multiple hemostatic disorders that are related with chronic kidney disease (CKD). Bleeding diathesis is the major disorder that develops in CKD cases. The most common sites for bleeding are mucosal, serosal, cutaneous, and retroperitoneal and intracranial.[7] The major indication to start the dialysis in CKD patients is the hemostatic disorder, so for proper management of CKD patients, it is very much important to understand the functional status of platelets. The exact mechanism for the hemostatic abnormalities is still uncertain.[8,9] There are multiple reasons for excessive bleeding in patients with CKD. The most pronounced function that is disturbed in CKD is due to dysregulation of platelet interaction with vascular wall. There are numerous hormonal and biochemical factors due to progressive uremia that results in abnormal expression of glycoprotein adhesive receptor complex, which

is the main factor contributing to formation of platelet aggregates at vessel wall endothelium. In CKD, platelet volume and its circulating mass are reduced which may be because of reduced levels of thromboxane.[10]

The present study was carried out to facilitate the doctors practicing in remote areas to diagnose the CKD by a simple method (blood cp) so that they can immediate referral to tertiary care center where all facilities for diagnosis and management are available for CKD.

MATERIALS AND METHODS

The present case control study was conducted at Diagnostic and research laboratory Liaquat University Hospital Hyderabad and Nephrology Unit, Isra University Hospital Hyderabad from January 2015 to July 2015. One hundred and twenty subjects (n=120) were taken and were divided into two groups. The healthy controls (n=60) were included in group-I whereas patients with chronic renal failure (n=60) were kept in group-II as shown in Figure-1. Only diagnosed, both male and female cases of chronic renal failure between ages of 20-50 years were included in present study. The patients of age less than 20 and more than 50 years, patients taking medicine likes aspirin, heparin, warfarin or drugs causing platelet dysfunction and patients with UTI were excluded from the study. The BMI was calculated by taking the weight and height measurements. The blood samples for complete blood picture were collected in EDTA bottles for processing in automatic hematoanalyzer. For blood samples were also taken for biochemical analysis of serum creatinine and blood urea nitrogen. Urinary examination was done for albuminuria and urinary concentration of creatinine. The GFR was measured according to the formula

$$\text{Creatinine clearance (Ccr)} = \frac{\text{Urine concentration x Urine flow}}{\text{Plasma concentration}}$$

Statistical analysis of the data for continuous variables and categorical variables was done by using student`s t-test and Chi-square test respectively. The data was presented as Mean ± SD, frequency and percentages. The correlation between the variables was done by using Pearson`s correlation. Statistical significance of the data was given to p-value of ≤0.05.

RESULTS

The present study included 60 patients with CRF and 60 healthy controls. The results showed mean ± S.D age of 40.4±7.9 years of controls and 44.3±8.6 years of CRF patients (p-value=0.47). Male dominance was seen in both the controls group and CRF group with 39(65%) and 32(53%) male respectively (p-value=0.19). Regarding the BMI, CRF patients have slightly raised BMI i.e. 27.2±2.18 in comparison to the 26.2±3.76 BMI in control group individuals (p-value=0.07) as shown in table-I.

Regarding the GFR in patients with CRF the results showed Mean GFR 38.85±19.13 ml/min where as it was 120.80±7.21 ml/min in control group. Marked reduction was noted in GFR in patients with CRF. In majority 33% of the CRF patients GFR was less than 15ml/min followed by 25% patients showed GFR of 15-29ml/min as shown in Figure-1.

Groups	Mean age (Years)	SD	t	df	p-value
Control (n=60)	40.40	7.9			
CRF (n=60)	44.30	8.6	0.720	118	0.47
Groups	**Male**	**Female**	**X^2**	**df**	**p-value**
Control (n=60)	39	21			
CRF (n=60)	32	28	1.69	1	0.19
Groups	**Mean BMI**	**SD**	**t**	**df**	**p-value**
Control (n=60)	26.20	3.76			
CRF(n=60)	27.24	2.18	1.70	118	0.078

Table-I. Age, gender and BMI of CRF patients and control (n=120)

Groups	Mean	SD	t	df	p-value
Control (n=60)	347.60	55.94	50.2	118	0.003
CRF(n=60)	223.95	89.15			

Table-II. Platelet count (x10³/μL) in CRF patients and control (n=120)

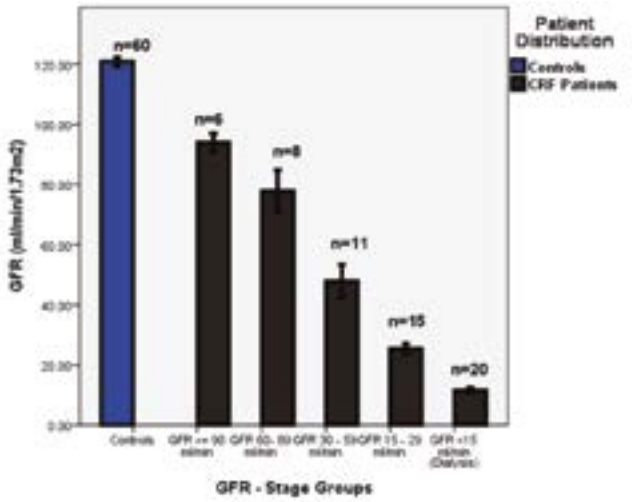

Figure-1. Bar graph representing GFR in CRF patients and control individuals

The present study showed highly significant difference (p-value=0.003) with marked decrease in the platelet counts seen in the CRF patients with 223.9±89.1 million/μL in comparison to the 347.60±55.9 million/μl platelets in control individuals as shown in table-II and Figure-2.

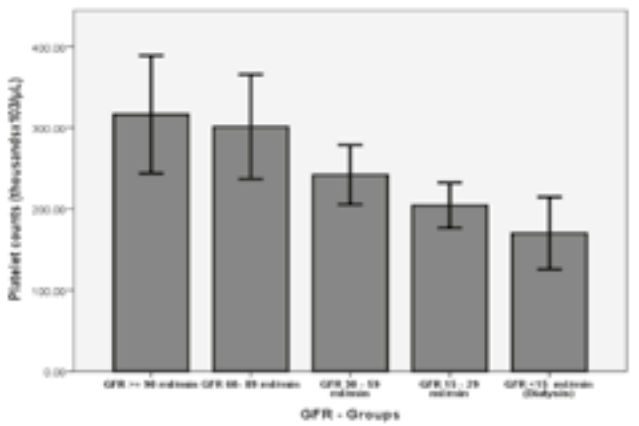

Figure-2. Bar graphs showing platelet count in CRF patients and control

The results of BUN in CRF patients showed highly significant differences with 27.67±7.68 mg/dl when compared to controls having BUN 8.95±1.02 mg/dl (p-value=0.0001) as shown in Figure-3. The comparison between GFR with mean platelet count showed negative correlation (r = -0.27) in CRF patients (p-value =0.0001) as shown in table-III and Figure-4.

Platelet counts (thousand sx 103/ μL)	GFR >= 90 ml/min	344.75	57.36	< 0.0001
	GFR 60- 89 ml/min	301.12	77.10	
	GFR 30 - 59 ml/min	242.09	54.40	
	GFR 15 - 29 ml/min	204.46	50.27	
	GFR <15 ml/min (Dialysis)	170.00	95.15	

Table-III. Correlation between GFR and platelet count according to GFR groups

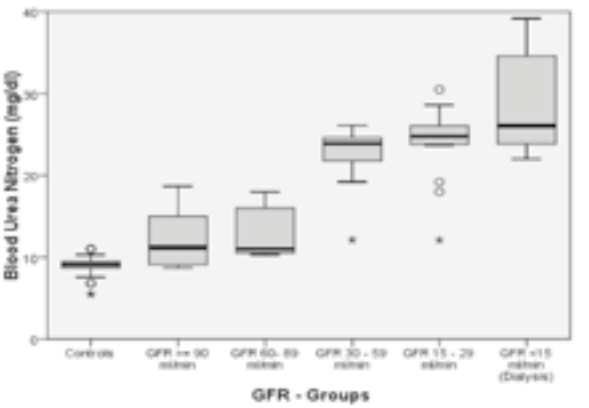

Figure-3. Box plot representing blood urea nitrogen in CRF patients and controls

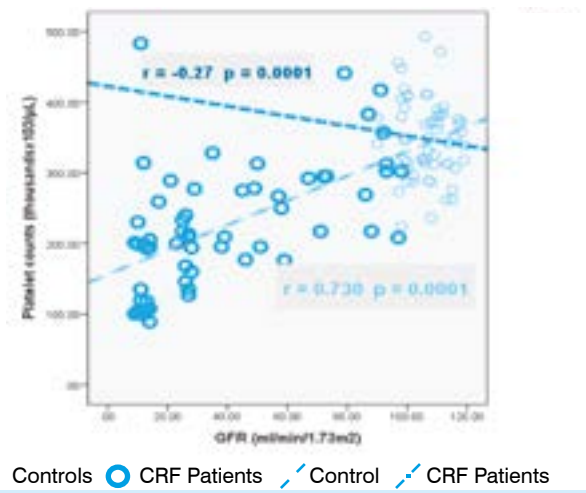

Figure-4. Scatter plot showing correlation between GFR and platelet count

DISCUSSION

The present study was carried out to see the correlation of platelet count and estimated GFR in CKD patients**.** This study observed the decreased platelet count which is not in agreement with a previous study reported by zuberi et al[11] who reported no any decrease in the platelet count. In the present study the patients with CRF revealed tendency of decline in platelet count. The platelet count seen in the CRF patients was 223.9±89.1 million/μL in comparison to the 347.60±55.9 million/μl platelets in control individuals.

There is great variation in platelet count in patients with chronic kidney disease, which is mainly because of etiology as well as pathogenesis of the disease. The previous study conducted by Islam et al[10] found thrombocytopenia in 38 % cases (<150x109/L), in a study conducted on 50 patients with chronic kidney disease before dialysis, whereas in present study we found progressive decrease in platelet count from stage 1(344.75 thousands x103/μL) to stage 5(170.00 thousands x103/μL).

Mean platelet volume assessment is now being utilized as an important risk factor of atherosclerosis. Increased risk of various morbid diseases including myocardial infarction, stroke and diabetic microvascular complications like diabetic albuminuria[12,13] and coronary artery ectasia[14] have been linked with increase in the mean platelet volume. Role of platelet function in the pathogenesis of diabetes mellitus is also being discussed as focal area of research.[15-18]

As the present study is the case control study so we found statistically significant result in comparison to the controls. Some of the other studies also reported decreased platelet count in 52%, 29% and 8% cases respectively. This difference may be due to variation in techniques for measurement of platelet count and also different sample size. The other study done by Hughes et al[19] present the CKD as dilemma that can show either bleeding tendencies or the prothrombotic but the present study is in the agreement that bleeding tendencies are more dominant because we have found the progressive decrease in platelet count along with increasing severity the chronic kidney disease.

CONCLUSION

The present study concluded that marked decrease in the platelet counts was seen in the CRF patients with 223.9±89.1 million/μL in comparison to the 347.60±55.9 million/μl platelets in control individuals. Also the results of BUN in CRF patients showed highly significant differences with 27.67±7.68 mg/dl when compared to controls having BUN 8.95±1.02 mg/dl. The comparison between GFR with mean platelet count showed negative correlation (r = -0.27) in CRF patients.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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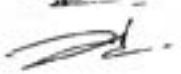
1	Dr. Shagufta Memon	Study conception and design acquisition of data	
2	Dr. Navaid kazi	Drafting of manuscript, Acquisition of data, Final approval	
3	Dr. Amin Fahim	Drafting of manuscript, Critical revision, data analysis	
4	Dr. Ghulam Shah Nizamani	Analysis and intrepation of data	
5	Prof. Dr. Anila Qureshi	Drafting of manuscript, Plagiarism check Analysis and interpretation of data