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Research Article

Evaluation of Platelet Indices, PT and PTT in Sudanese Chronic Renal Failure Patients at Khartoum state, 2022

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Abstract

Background: Chronic renal failure is a global public health problem; Kidney transplantation and dialysis are possible solutions of kidney failure. The aim of our study was to assess the platelet count, platelet indices, prothrombin time (PT) and partial thromboplastin time (PTT) in Sudanese chronic renal failure patients at Khartoum sate, 2022.

Materials and Method: This was analytical case control study conducted at Khartoum state. A total of 200 blood samples were collected (100 samples from chronic renal failure patients and 100 healthy individuals from control group). A total of five ml of whole blood was collected from each participant and divided into EDTA anticoagulated tube for platelet count and platelet indices, and into sodium citrate anticoagulated tube. for PT and PTT measurement. Examination of platelet count and platelet indices was done by using Haematology analyser (Sysmex-XP-300), where PT and APTT measurement was done by using coagulation analyser (Coatron-M-1).

Results: The study revealed that in the case group; the mean age was (48.19± 15.53), 42.1% of them were female and 57.1% were male, where in the control group; the mean age was (45.54 ± 16.82), 57.9% were female and 42.9% were male. Regarding to the haematological results; the mean platelet count and PCT of the case group was significantly decreased when compared with the control group with P-value of 0.000. where the mean average of MPV, PDW and PLCR showed no statistically significant differences between cases and control with P-value of > 0.05. According to the PT and PTT; they were increased in the case group when compared with the control group with P-value of 0.000.

Conclusion: The study concluded that platelet count and plateletcrit was decreased, where mean platelet volume and platelet distribution width in addition to PLCR, showed no statstically significant difference. PT and PTT were increased in chronic renal failure patients.

Keywords: Platelet count, Platelet indices, PT, PTT, chronic renal failure, haemodialysis, bleeding

INTRODUCTION

Renal failure is a condition in which the kidneys fail to remove metabolic end-products from the blood and regulate the fluid, electrolyte, and pH balance of the extracellular fluids. Renal failure can occur as an acute or a chronic disorder. [16] Renal failure is a global public health problem; Kidney transplantation and dialysis are possible solutions of kidney failure. The proportion of kidney failure is increasing world widely.[1.]

The most common type of dialysis is haemodialysis which uses a machine filter called a dialyzer or artificial kidney to remove excess water and salt, to balance the other electrolytes in the body, and to remove waste products of metabolism. Blood is removed from the body and flows through tubing into the machine, where it passes next to a filter membrane. A specialized chemical solution (dialysate) flows on the other side of the membrane. The dialysate is formulated to draw impurities from the blood through the filter membrane. Blood and dialysate never touch in the artificial kidney machine. [2.]

The incidence of renal failure has been estimated to be 209 patients per million population per year, with 36% of patients requiring renal replacement therapy [3].

In Sudan, according to ministry of health records, the prevalence of renal failure is increasing through the few past years; approximately 70 to 140 new patients pmp undergo dialysis each year. This high frequency is thought to be due to epidemic malarial infection, which is well known to cause glomerulonephritis. [4]

There are many risk factors that can lead to renal failure, like poorly controlled diabetes, poorly controlled high blood pressure, chronic glomerulonephritis, polycystic kidney disease, reflux nephropathy (damage caused by urine backflow from the bladder into the ureters and kidney), Nephrotic syndrome, Alport's disease, Kidney stones, and Prostate diseas [5]

Many researchers have shown that the dialysis can impact the platelet count, platelet indices, PT and PTT which can lead to a bleeding to these patients.

Regarding to the less of data available in Sudanese chronic renal failure patients about the impact of chronic renal failure on haematological parameters, we aimed this study to evaluate the platelet count, platelet indices, PT and PTT in Sudanese chronic renal failure patients at Khartoum state.

MATERIALS AND METHODS

This study was analytical case control hospital-based study at Sudan Renal Transplantation Association Centre, Khartoum state, Sudan, during the period from May 2022 to August 2022. Patients attending at Sudan Renal Transplantation Association Centre and diagnosed with chronic renal failure during the aforementioned period were included. In addition to healthy participants were selected as control group. A total of five ml of whole blood was collected from each participant and divided into EDTA anticoagulated containers for platelet count and platelet indices, and into sodium citrate anticoagulated containers for PT and PTT measurement. Examination of platelet count and platelet indices was done by using Haematology analyser (Sysmex-XP-300), where PT and APTT measurement was done by using coagulation analyser (Semi-automated M1 coatron). The data was gathered using pre-designed structural questionnaire and the SPSS 23.0 statistical software (SPSS Inc., USA) was used for statistical analysis. Finally, the study was licensed by the ethical committee ethical committee of national university.

RESULTS

Socio- demographic data

A total of 200 samples were collected from the study population, 100 blood samples were chronic renal failure patients and selected as case group, where 100 of them were healthy participants and selected as control group. In the case group; the mean age was (48.19 ± 15.53), 42.1%were female and 57.1% of them were male, where in the control group; the mean age was (45.54 ± 16.82), 57.9% of them were female and 42.9% were male. In the distribution of the family history of chronic renal failure in the case group; 22.0% had family history of chronic renal failure, where 78.0% of them had no family history of chronic renal failure. The mean duration of dialysis in the case group was 32.61 ± 24.54. Regarding to the distribution of chronic diseases in the case group; 42% of patients had hypertension, 5% of them had diabetes, 12% of them had both hypertension and diabetes, and 42% of them had other chronic diseases (Tables 1, 2,3,4,5).

Table 1: Comparison of study population according to the age

	Chronic renal failure	N	Mean	Std. Deviation	Std. Error Mean	P-value
Age	yes	100	48.19	15.53	1.55	0.249
	No	100	45.54	16.82	1.68	

Table 2: Distribution of gender in the study population

			Renal failure on dialysis	
			Yes	No
Gender	Male	Count	60	45
		% Within Gender	57.1%	42.9%
	female	Count	40	55
		% Within Gender	42.1%	57.9%
Total		Count	100	100
		% Within Gender	50.0%	50.0%

Table 3: Distribution of family history of chronic renal failure

Family history	Frequency	Percent
Yes	22	22.0
No	78	68.0
Total	100	100

Table 4: Age and duration of dialysis descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	200	15.00	85.00	46.8650	16.20462
Duration of dialysis	100	6.00	144.00	32.6100	24.54635
Valid N (listwise)	100				

Table 5: Distribution of chronic diseases in the cases

	Other disease	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	hypertension	42	21.0	42.0	42.0
	Diabetes	5	2.5	5.0	47.0
	hypertension + diabetes	12	6.0	12.0	59.0
	other chronic diseases	41	20.5	41.0	100.0
	Total	100	50.0	100.0	
Missing	System	100	50.0		
Total		200	100.0		

Haematological data finding

When compared some haematological parameters between cases and control group, the results revealed: the mean platelet count of the case group where decreased when compared with the control group (0.000). In platelet indices; mean platelet volume (MPV) and platelet distribution width (PDW) in addition to PLCR, showed no statistically significant differences between cases and control with P-value of > 0.05, where plateletcrit (PCT) was decreased in case group when compared with control group (P-value=0.000). regarding to the PT and PTT; they were increased in the case group when compared with the control group with P-value of 0.000. (Table 6).

Table 6: Comparison of study population according to the haematological parameters.

	Renal failure on dialysis	N	Mean	Std. Deviation	Std. Error Mean	P-value
platelet count	Yes	100	228.17	70.47946	7.04795	0.000
	No	100	281.05	53.71462	5.37146	
PDW	Yes	100	12.0060	2.04301	.20430	0.324
	No	100	12.2640	1.62633	.16263	
MPV	Yes	100	9.7720	1.02839	.10284	0.490
	No	100	9.8640	.84238	.08424	
P-LCR	Yes	100	23.4640	7.60351	.76035	0.480
	No	100	24.1887	6.89909	.68991	
PCT	Yes	100	0.2354	0.08894	0.00889	0.003
	No	100	0.2666	0.05465	0.00546	
PT	Yes	100	16.8570	2.00601	0.20060	0.000
	No	100	15.0720	1.48902	0.14890	
PTT	Yes	100	36.2950	5.23538	0.52354	0.000
	No	100	33.0560	3.38602	0.33860	

DISCUSSION

Renal failure is a condition in which the kidneys fail to remove metabolic end-products from the blood and regulate the fluid, electrolyte, and pH balance of the extracellular fluids. Chronic renal failure is a global public health problem; Kidney transplantation and dialysis are possible solutions of kidney failure. The present study was analytical case control hospital-based study conducted at Sudan Renal Transplantation Association Centre, for the evaluation of platelet count, platelet indices, prothrombin time (PT) and partial thromboplastin time (PTT) in Sudanese chronic renal failure patients, at Khartoum state, Sudan, 2022.

The results of our study were revealed that; In the case group; the mean age was (48.19 ± 15.53), 42.1% of them were female and 57.1% were male, where in the control group; the mean age was (45.54 ± 16.82), 57.9% of them were female and 42.9% were male, which shows that male patients were predominant in our study. These findings agree with a study done by Dr. Maria Aashitha, which stated that male patients were predominant and age group between 41 to 60 were commonly affected.[7]

In the distribution of the family history of chronic renal failure in the case group; 22.0% had family history of chronic renal failure, where 78.0% of them had no family history of chronic renal failure. The mean duration of dialysis in the case group was 32.61 ± 24.54. Regarding to the distribution of chronic diseases in the case group; 42% of patients had hypertension, 5% of them had diabetes, 12% of them had both hypertension and diabetes, and 42% of them had other chronic diseases. These findings agree with a study done by Magid M. Yassin, et al which stated that hypertension and diabetes were the most

common self-reported disorders among the haemodialysis patients and also stated that haemodialysis duration was 3.2±2.9 year at frequency of 2.6±0.6/week. [8]

In platelet count, our results revealed that; the mean platelet count of the case group where decreased when compared with the control group (0.000). which was similar with a study done by Gafter U., et al which stated that platelet count in chronic renal failure were reduced. [9] also our results agree with a study done by Anwar Habib, et al which found that platelets counts are significantly reduced in the patients of chronic renal failure and the process of haemodialysis further decreases the level of platelet count. [10]

Regarding to the findings of platelet indices in our study revealed that; mean platelet volume (MPV) and platelet distribution width (PDW) in addition to PLCR, showed no statistically significant differences between cases and control with P-value of > 0.05, where plateletcrit (PCT) was decreased in case group when compared with control group (P-value=0.000). which agree with a study done by Dr. Maria Aashitha, et al which found that, there were no statistically significant differences in PLT indices (mean platelet volume, platelet distribution width), in contrast with platelet count and plateletcrit which they found also that there were no statistically significant differences. [7]

The PT and PTT findings of our study revealed that; they were increased in case group when compared with the control group (P-value=0.000). Similar results have been found by John, et al, which reported that PT and PTT were prolonged among case group when compared with the control group [11]

CONCLUSION

The study concluded that platelet count and plateletcrit was decreased, where mean platelet volume and platelet distribution width in addition to PLCR, showed no statistically significant difference. PT and PTT were increased in chronic renal failure patients.

REFERENCES

1. Melinda Ratini, Kidney Dialysis, Medical journal, 2014; 4:22-45.

2. Levey AS and Coresh, Chronic kidney disease; 2012; 379(9811):165- 80. https://doi.org/10.1016/S0140-6736(11)60178-5

3. Bagshaw SM, George C, Bellomo R, A comparison of the RIFLE and AKIN criteria for acute kidney injury in critically ill patients, Nephrol Dial Transplant, 2008; 23(5):1569-74. https://doi.org/10.1093/ndt/gfn009

4.Correa A, Patel A, Chauhan K, Shah H, Saha A, Dave M, Poojary P, Mishra A, Annapureddy N, Dalal S, Konstantinidis I, Nimma R, Agarwal SK, Chan L, Nadkarni G, Pinney S, National Trends and Outcomes in Dialysis-Requiring Acute Kidney Injury in Heart Failure: 2002-2013, J Card Fail, 2018; 24(7):442-450. https://doi.org/10.1016/j.cardfail.2018.05.001

5. Ahmad R, Kidney Dialysis, Medical journal 2012; (3):12-16.

6. Benjamin Werdo, longo DL, Harries principles of internal medicine, liver disease and kidney failure, 18th edn, McGraw Hill, 2011; 279-305.

7-Dr. Maria Aashitha, Dr. Sunderesh Kamal Chander*, Dr. Muthuvel, A Correlative Study of Platelet Indices in Different Stages of Chronic Kidney Disease Patients in A Tertiary Care Centre, Saudi Journal of Pathology and Microbiology, 2021; 6(10):375-380.

8-Maged M. Yassin1 , Abdel Monem H. Lubbad 2, Ahmed J. Abu Taha3 , and Nabil M. Saadallah4, Homocysteine and Hematological Indices in Hemodialysis Patients, Ibnosina Journal of Medicine and Biomedical Sciences 2014; 06(04): 173-179. https://doi.org/10.4103/1947-489X.210380

9-Gafter U. Bessler H. Malachi T. Zevin D. Djaldetti M. Levi J, Platelet Count and Thrombopoietic Activity in Patients with Chronic Renal Failure, Nephron, 1987; 45(3):207-210. https://doi.org/10.1159/000184118

10-Anwar Habib, Razi Ahmad, Sana Rehman, Haematological changes in patients of chronic renal failure and the effect of haemodialysis on these parameters. int j Res Med Sci, 2017; 5(11):4998-5003. https://doi.org/10.18203/2320-6012.ijrms20174959

11-John T. Daugirdas, Angelito A. Bernardo, Haemodialysis effect on pt and aptt-associated thrombocytopenia, International Society of Nephrology, 2012; 82:147-157. https://doi.org/10.1038/ki.2012.130