Platelet-Lymphocyte Ratio (PLR) in Post Renal Transplant Patients, Khartoum State, 2021

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Abstract

Background: Inflammation is important components of renal transplantation that responsible to cardiovascular mortality and morbidity. Platelet to lymphocyte ratio (PLR) was reported as inflammatory markers in various cardiac and non-cardiac diseases. We aimed to evaluate the value of PLR as inflammatory markers among renal transplant patients and.

Methods: A comparative case-control study enrolled 100 subjects (50 renal transplant subjects and 50 normal individuals). Data on patient demographics and laboratory findings (lymphocyte, platelet, creatinine and eGFR) were recorded.

Results: The mean ± SD of platelet-to-lymphocyte ratio (PLR) was higher in case group more than control group (128.4±66.5 vs 63.6±16.4; P. value= 0.000). Moreover, among renal transplant patients group, PLR showed significant positive correlation with creatinine levels (r= 0.370; P. value= 0.008) and negative correlation with GFR levels (r= - 0.678; P. value= 0.000).

Conclusion: Kidney transplant patients had a higher PLR than healthy subjects, and PLR values and the development of graft function loss.

Keywords: Platelet to lymphocyte ratio (PLR), renal transplantation.

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1. Introduction

Renal transplant or kidney transplant is surgical procedure to place a functioning kidney from a donor into a patient with kidney failure. A renal transplant is often the best treatment option for patients with end stage kidney failure. The successful renal transplant could offer enhanced quality and duration of life, which make the recipients return to a more normal lifestyle and have more control over their daily living (1)

Increased inflamed endothelium has been reported in transplant patients, and this has been associated with an increased risk of inflammation. Inflammation has been reported to play an important role in the development of arterial stiffness in addition to the well-known risk factors including calcium/phosphate imbalance, secondary hyperparathyroidism, homocysteine, fluid overload, malnutrition, uremic toxins, oxidative stress, and insulin resistance. Furthermore, chronic inflammation in patients with end-stage renal disease (ESRD) has been reported to be a component of malnutrition-inflammation-atherosclerosis syndrome (2).

Platelets are fundamental for hemostasis and also have a role on inflammation and immunity since they interact with the endothelium and cells of innate and acquired immunity (3). The presence of inflammation inhibits the antiadhesion properties of platelets, which tends to increase the interaction of platelets with the endothelium. This circumstance sets off a series of inflammatory effects in cascade, analogous to the phenomena that occur in thrombosis and haemostasis. Greater platelet activation triggers the secretion of cytokines and, in turn, creates a "chemotasis" effect that some authors have termed "inflamed endothelium" (4).

Transplant patients demonstrated a significant reduction in lymphocyte proliferation, and thus lymphcytopenia (4).

In renal transplant patients, increased rates of malnutrition, inflammation, and atherosclerosis have been demonstrated which are consequently altered circulating platelets and lymphocytes as well leading to graft rejection of reduced graft function (5).

Platelet-to-lymphocyte ratio (PLR) is ratio of platelets to lymphocyte count, is a simple and inexpensive biomarker of systemic inflammation. Platelet-to-lymphocyte ratio (PLR) has been shown to be strong predictors of inflammation and of worse prognosis (6).

2. Materials and Methods

A comparative study conducted that was conducted during the period from February 2021 to May 2021. A total 50 renal transplant subjects (case group) and 50 normal individuals (control group) were enrolled in this study. Exclusion criteria were the following: any condition that platelets and lymphocyte counts and hereditary hematological disorders.

Three ml of venous blood was draw from renal transplant and control subjects by sterile syringe and added to EDTA container for complete blood count (CBC) examination that performed by using Sysmex Hematology Analyzer KX-21N

Data analysis

Statistical Package for Social Science program (SPSS) version 21 was used for data analysis. The independent *t*-test and one-way analysis of variance (ANOVA) test was used for continuous variables as well as Chi-Square ($\chi 2$) test was used for categorical variables in order to compare variables between the groups. Two-tailed *P* value less than 0.05 was defined to be statistically significant

3. Results

This study enrolled 50 renal transplant subjects (case group) and 50 normal individuals (control group). The demographic characteristics detailed in table (1)

Table (1): The distribution of the gender and age among the study group

	Case (N=50)	Control (N=50)	P. value
Age (Yrs.)	59.7±8.4	53±9.4	
• <40	2(4%)	5(10%)	0.297
• 40-60	34(68%)	36(72%)	
• >60	14(28%)	9(18%)	
Gender			
• Male	31(62%)	38(76%)	0.097
• Female	19(38%)	12(24%)	

Chi-Square test was used

Comparing to control group, patients in case group showed greater levels of creatinine (2.4±0.9 mg/dl vs 0.9±0.5 mg/dl; P. value= 0.000) and platelets counts (257.8±100 x103 cell/Cumm vs 225.9±51.7 x103 cell/Cumm; P. value= 0.000), as well lower levels of GFR (72.8±16.2 ml/min vs 100.9±43.3 ml/min; P. value= 0.000) and lymphocyte counts (2.2±0.9 cell/Cumm vs 3.7±0.7 cell/Cumm; P. value= 0.041) (table 2).

Table (2): The mean and standard deviations of creatinine, GFR, platelets and lymphocyte counts of the study group

	Case (N=50)	Control (N=50)	P. value
Creatinine (mg/dl)	2.4±0.9	0.9±0.5	0.000
GFR (ml/min)	72.8±16.2	100.9±43.3	0.000
Platelets (x10^3 cell/Cumm)	257.8±100	225.9±51.7	0.000
Lymphocytes (cell/Cumm)	2.2±0.9	3.7±0.7	0.041

Independent t-Test was used

Figure (1) illustrated that, the mean of platelet-to-lymphocyte ratio (PLR) was higher in case group more than control group (128.4±66.5 vs 63.6±16.4; P. value= 0.000).

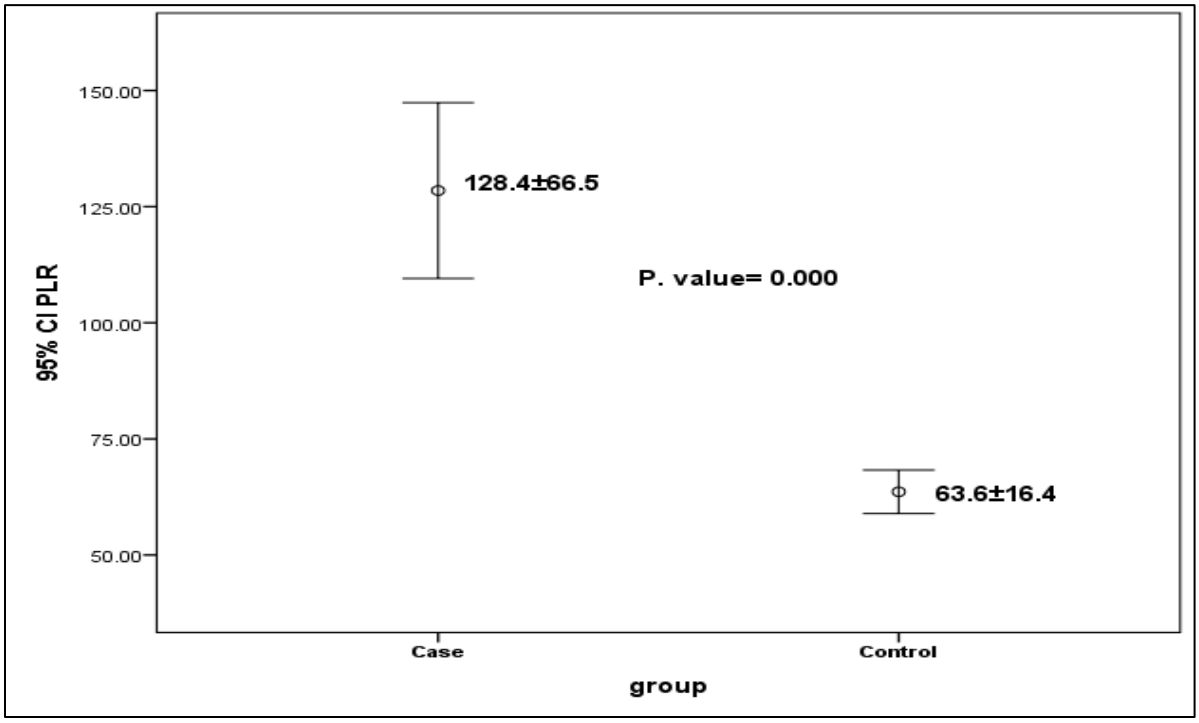

Figure (1): The Comparison of platelet-to-lymphocyte ratio (PLR) between case and control groups.

As detailed in table (3), platelet-to-lymphocyte ratio (PLR) was not significantly affected by the age (P. value= 0.694) and gender of patients in case group

Table (3): The correlation of platelet-to-lymphocyte ratio (PLR) with age and gender of case group

	Mean	SD	P. value
Age (Yrs.)			
• <40	130.0	42.4	0.694
• 40-60	126.7	74.6	
• >60	132.5	48.9	
Gender			
• Male	125.2	47.1	0.725
• Female	132.1	84.6	

ANOVA Test was used

By using Pearson's correlation, PLR exhibited significant positive correlation with creatinine levels (r= 0.370; P. value= 0.008) and negative correlation with GFR levels (r= - 0.678; P. value= 0.000) (figure 2 & 3)

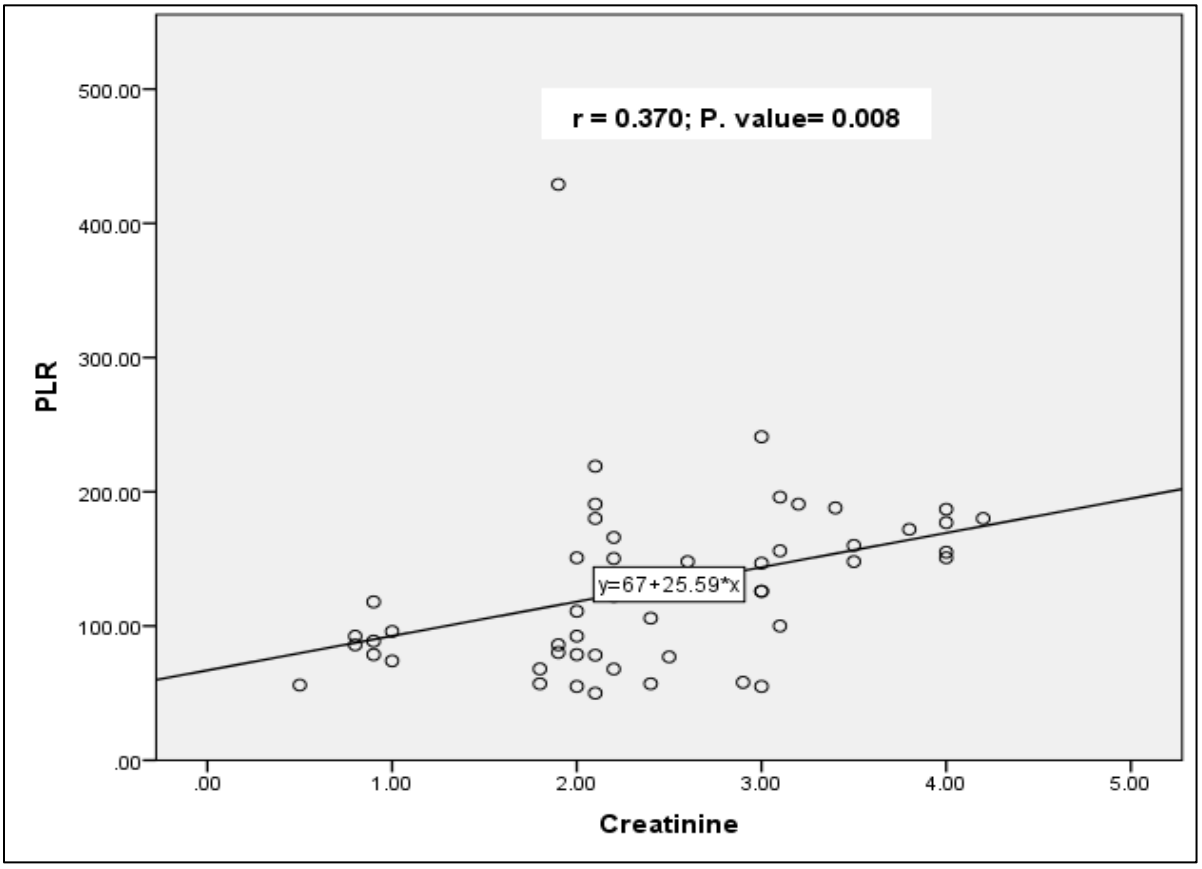

Figure (2): Scattered plot showed the correlation between platelet-to-lymphocyte ratio (PLR) and creatinine levels of case group.

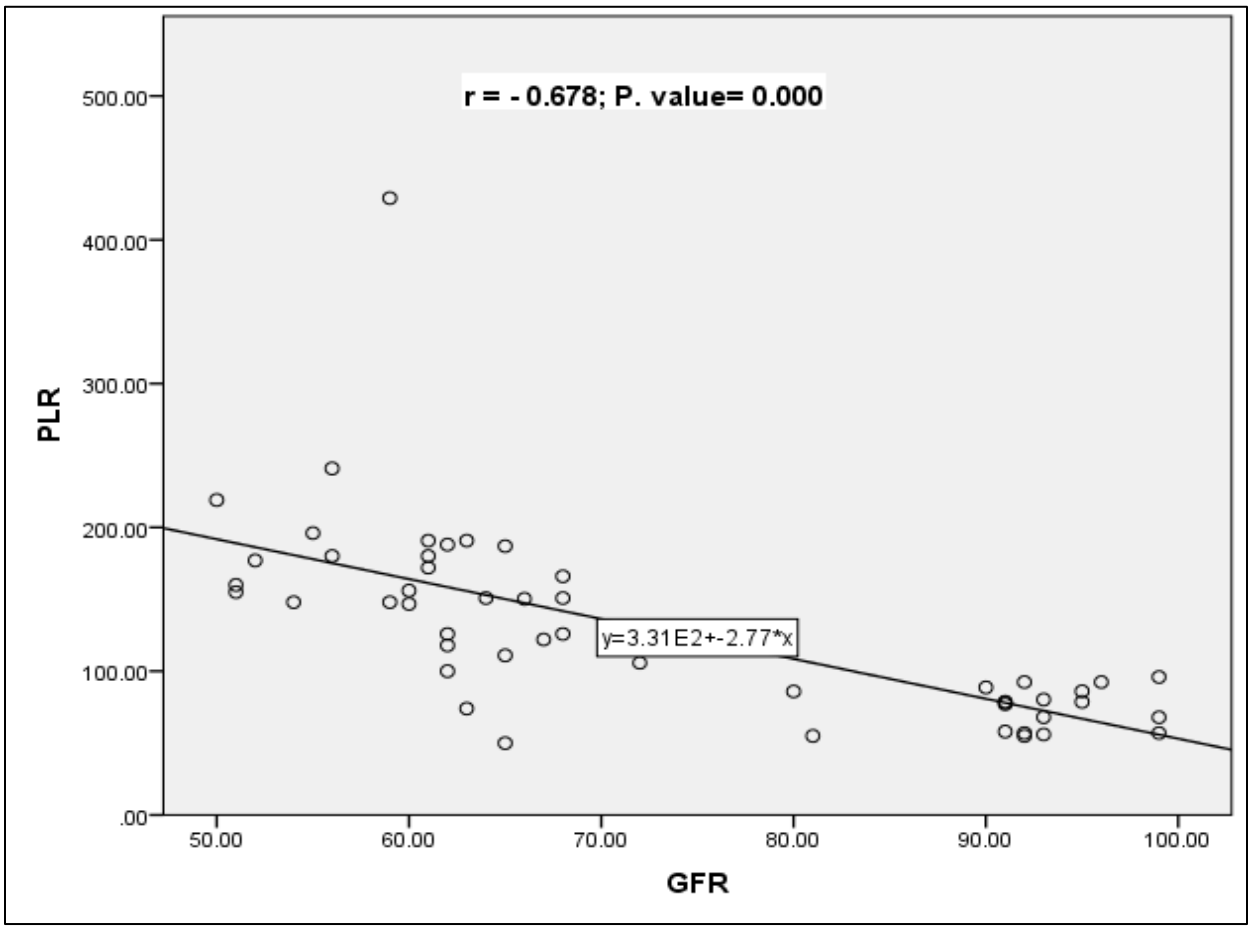

Figure (3): Scattered plot showed the correlation between platelet-to-lymphocyte ratio (PLR) and GFR levels of case group.

4. Discussion

Our findings revealed significantly higher PLR values in the renal transplant group when compared to control group (128.4±66.5 vs 63.6±16.4; P. value= 0.000). Kidney transplant patients had a higher PLR than healthy subjects due to the ongoing inflammation in these patients. Greater platelet activation triggers and thus thrombocytosis caused by the secretion of cytokines, also transplant patients demonstrated a significant reduction in lymphocyte proliferation, and thus lymphcytopenia (4). Our results were in agreement with Emel I et al who reported kidney transplant patients had a higher PLR than healthy subjects (125 vs 83; P. value= 0.008) (7). In contrast, Maha B et al in Egypt found the mean ± SD of PLR in patients was

144.6±63.17 higher than the mean of PLR 130.2 ± 49.11 in control group but with no statistically significant difference (P>0.05) (8).

Interestingly, our results showed PLR exhibited significant positive correlation with creatinine levels (r= 0.370; P. value= 0.008) and negative correlation with GFR levels (r= - 0.678; P. value= 0.000). These findings indicating graft function loss in renal transplant patients that consequently cause cute rejection among them. Our observations were goes in same line with studies of Emel I et al (7) and Mario N et al (9) those reported in kidney transplant patients, there is a strong relationship between high PLR values and the development of graft function loss (P. value< 0.001).

In conclusion, this study showed that Kidney transplant patients had a higher PLR than healthy subjects, and PLR values and the development of graft function loss. Moreover, PLR is inflammatory markers that are inexpensive and readily available in routine clinical practice, therefore our recommendation is to PLR routinely for monitoring Kidney transplant patients.

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