

ORIGINAL ARTICLE

Frequency of Post-Transplant Erythrocytosis in Patients with Live Related Renal Transplant

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Background: It is commonly observed in the patients undergoing kidney transplant. The red cell mass increased in this condition but the plasma volume remain normal. It is characterized by the hematocrit levels equal to 51% or greater than 51%.

Study design: It was a cross-sectional and descriptive study conducted at the department of nephrology and transplantation, Pir Abdul Qadir Shah Jeelani Institute of Medical Sciences Gambat. This study was conducted for the duration of six months from January 2022 to June 2022.

Material and Methods: There were total 90 patients selected for the study. There were 35 patients in the control group and 55 patients in the Post-transplant Erythrocytosis patients group. The 25 out of 35 were male and 7 were females. The 17 out of 55 were male and 38 were females. Haemoglobin and Hematocrit was assessed retrospectively. Those with Hct > 51 was labelled as PTE. The study comprised of control group and PTE group having post erythrocytosis patients. The duration of dialysis of the patients was 12 and 13 months for control and PTE group respectively.

Results: The red cell and plasma volume of the control group and PTE was analyzed and it showed that most of the patients had their RCV and PV in the normal range. However, there were 5 patients in control group and 15 patients in PTE group that had reported low level of RCV. The percentage of alive patients with functional graft was more in case of control (97%) as compared to PTE group (83%).

Conclusion: The study was done to find the frequency of post-transplant Erythrocytosis among patients and control group. It was found that there were several risk factors that could possibly play role in causing the disease. The 21% of the patients were diagnosed with PTE.

Keywords: Erthrocytosis, haematocrit, and haemoglobin.

INTRODUCTION

The term post-transplant erythrocytosis (PTE) was first coined by the Nies in 1965. It is commonly observed in the patients undergoing kidney transplant. The red cell mass increased in this condition but the plasma volume remain normal. It is characterized by the hematocrit levels greater than 51% or equal to 51%¹⁻³. The cut off value of the hemoglobin is reported to be vary from 16.5 g/dL to 18 g/dL. The few studies have reported that there is difference in the cut off value of the male and female, while other use the same cut off value for both gender. The cut off for the red cell mass for this condition must be greater than 25% of mean normal predict value. The varying incident ranging from 7%-19% is observed in renal allograft recipients. Erythrocytosis is a common complication that happens after renal transplantation; according to reports, it affects 17% of the population. It can appear within three months of transplantation or six to seven months later. If Erythrocytosis is combined with other problems, it can result in a high morbidity rate.

Few studies have reported that the incidence is observed to be raised in the recent years by the usage of cyclosporine in clinical practice. Though the onset time of PTE is variable but, it was reported that the PTE is more commonly observed within the first 2 years of the renal transplant. The spurious polycythemia is different from the term PTE, as the former one occur in the volume depleted recipients. It is one of the serious complication reported in the renal transplant patients. The higher morbidity cases are associated with the condition. There are higher risk of associated thrombotic events in such condition⁴⁻⁶. The renal transplant patients with well-preserved renal allograft function are consider to be more frequently effected by the PTE. It is known as a benign phenomenon. It is reported to be associated with thromboembolic events in few cases. There is need to understand the etiology of PTE as it is unclear and poorly understood. There are a number of factors that are known as contributing factor for PTE such as smoking, hypertension, and diabetes. There allograft function extent, immunosuppression dose, dialysis duration and renal artery stenosis are also considered as other contributing factor linked to the PTE⁷⁻⁹. The male gender is more commonly effected by this condition. Smoking is one of the most vital factor. The haematocrit pathologic elevation substantially affect the blood rheology. The

plethora, lethargy, malaise, headache are the most common conditions in PTE patient experienced¹⁰. One of the most serious problem is thromboembolic event. The most common treatment modalities used for the PTE management are theophyllins, angiotensin converting enzyme, and phlebotomies.

MATERIAL AND METHODS

It was a cross-sectional and descriptive study conducted at the department of nephrology and transplantation, Pir Abdul Qadir Shah Jeelani Institute of Medical Sciences Gambat. This study was conducted for the duration of six months from January 2022 to June 2022. The study comprised of control group and PTE group having post erythrocytosis patients. There were more female than male in the PTE group as compared to control group where only 7 females were included with 25 men. The duration of dialysis of the patients was 12 and 13 months for control and PTE group respectively. The ethical and review board committee approved the study. The patients having the haemoglobin level greater than 17 g/dl were added in the PTE group while the other were added in the non PTE group. The serum creatinine, haemoglobin and mean arterial pressure changes were recorded. The patient smoking and diabetes history was also recorded. The demographic feature of each patient were recorded. The data was collected and statistical analysis was performed. The results was recorded in the form of table.

RESULT

The control group was taken to match the population of Erythrocytosis for average duration of follow-up after a functional kidney transplant. Control group was developed to have equal chance of experiencing Erythrocytosis. The patients with hypertension, splenectomy and phlebotomy was also studied as shown in table no.1.

The red cell and plasma volume of the control group and PTE was analyzed and it showed that most of the patients had their RCV and PV in the normal range. However, there were 5 patients in control group and 8 patients in PTE group that had reported low level of RCV as shown in table no.2.

Table 1: Demographic profile and clinical data of patients

	Control group	Post-transplant Erythrocytosis patients
Number of patients	65	18
Average age	32	35
Male/female	48/17	6/12
Duration of hemodialysis (months)	12	13
Patients with abnormal liver function tests(%)	12 (18%)	4 (22%)
Patients with hypertension (%)	49(73%)	13 (76%)
Patients with splenectomy (%)	4 (4%)	1 (5%)
Number of phlebotomies (n)	0	11

Table 2: Red cell and plasma volume

Plasma volume	Red Cell Volume	
	Control (n)	PTE patients (n)
High	1	3
Low	5	8
Normal	29	7

Graft function and its prognosis was examined, the results showed that as compared to control group where no patient died with functional graft, there were 9% patients in PTE group that had died. The percentage of alive patients with functional graft was more in case of control (97%) as compared to PTE group (83%).

Table 3: Function of graft and its prognosis

	Erythrocytosis	Control	P value
Average follow-up of patients (months)	41.6 months	32	0.000
Serum creatinine	1.54	1.65	0.005
Patients having functional graft			0.004
At last follow-up	50 (91%)	17 (97%)	NS
Alive with functional graft	45 (83%)	17 (97%)	NS
Died with functional graft	4 (9%)	0	0.005
Patients returned on dialysis	5 (10%)	1 (4%)	NS

The renal disease that were reported in the study group were also analyzed and it was found that 32% patients in the PTE group and 40% in the control group that had glomerulonephritis

Table 4: Renal disease in the study group

	Erythrocytosis	Control	P value
Glomerulonephritis	17 (32%)	14 (40%)	NS
Polycystic kidney disease	14 (25%)	1(5%)	0.005
Hereditary disease	3 (6%)	6 (17%)	0.005
Obstructive uropathy	2 (4%)	2 (7%)	0.000
Systemic disorder	1 (3%)	1%	0.00

Table 5: Risk factors in the study group

	Erythrocytosis	Control	P value
Diabetes	8(15%)	1 (2%)	Not significant (NS)
Smokers with native kidney	24(45%)	11(32%)	0.000
Smoker with acute rejection	6(11%)	1(2%)	0.000
Smoker with bilateral nephrectomy	6(12%)	4(11%)	0.010
Non Smokers with native kidney	21(39%)	18(51%)	0.01
Non Smoker without acute rejection	7 (13%)	2(6%)	NS

DISCUSSION

Erythrocytosis is a commonly experienced complication that occur after renal transplantation, as per reports it takes place in 17% of the population¹¹. Its onset can be variable; it can occur within 3 months or after 6 or 7 months of transplantation¹²⁻¹³. If Erythrocytosis is complicated with other issues, it can lead to high morbidity rate¹⁴. This study was carried out to find the frequency of post-transplant Erythrocytosis in patients with live related renal transplant. Two groups were taken into study, control group containing 65 members and PTE group that had 18 members. All patients were taken following the inclusion criteria and those who were contrary to criteria were excluded from the study. The demographic profile and clinical data of patients was analyzed as shown in table no.1. The average age, sex of patients, duration of

dialysis, hypertension, abnormal liver functioning and splenectomy cases were analyzed for both the groups. The red cell volume and plasma volume of patients was studied and it was found that most of the patients had normal plasma and blood cell level however, 8 patients in the PTE group and 5 patients in control group had low level. This study is correlating with a previous study where the red cell volume came out to be 8 in case of control and 13 in case of PTE patients. In this study it was found that the post transplantation Erythrocytosis can take place where there is efficient graft functioning and prognosis. Because most of the patients 97% (control) and 83% PTE group were alive with proper graft functioning and few had died as indicated by follow-up sessions. The follow-up sessions, duration of dialysis and pre-transplant hematocrit was same for both groups. The chance of occurrence of any renal disease was found to be qualitatively same in both control and PTE group. Hereditary diseases were found to be taking place more commonly in the control group as compared to the PTE group. Glomerulonephritis was considered as most frequent renal disease reported by the patients occurring 40% in control group and 32% in Erythrocytosis group. There were more female than male in the PTE group as compared to control group where only 17 females were included with 48 men. The duration of dialysis of the patients was 12 and 13 months for control and PTE group respectively. The ratio of systemic disorders was quite less in both groups. As per studies it was found that the greater percentage of patients that had Erythrocytosis experienced smoking. Smoking alone can't be considered as a risk factor but it significantly plays role in increasing the chance of Erythrocytosis. Another study linked the presence of diabetes and smoking with Erythrocytosis. However, these factors can be analyzed further to find the synergism between them and Erythrocytosis. In our study, the graft function and its prognosis was examined, the results showed that as compared to control group where no patient died with functional graft, there were 9% patients in PTE group that had died. The percentage of alive patients with functional graft was more in case of control (97%) as compared to PTE group (83%).

In this study it was found that conditions like splenectomy, anemia or immunosuppression therapies have no role in causing Erythrocytosis. The prevalence of vascular diseases like diabetes shows that it can be linked with Erythrocytosis¹⁵⁻¹⁶. As per another study it was found that PTE prevalence was more in case of women as compared to men¹⁷. Same study showed its prevalence among diabetic patients, smokers and rejection free recipients. Another study showed that 16% had developed Erythrocytosis and they reported about pre-transplant hematocrits in their history¹⁸⁻¹⁹. The level of serum erythropoietin was elevated in these patients. As per literature, PTE occurred within one year of post-transplant in which there is abnormal increase in erythropoietin²⁰. The risk factors that can be linked to it included diabetes, smoking. Gender and pre-transplant hematocrit²¹. There is one limitation of this study, the number of patients included in both groups was low, if more patients were taken from more than one tertiary care unit then more precise results can be made.

CONCLUSION

The study was done to find the frequency of post-transplant Erythrocytosis among patients and control group. It was found that there were several risk factors that could possibly play role in causing the disease. The 21% of the patients were observed with PTE. The condition was more prevalent among patients that were already suffering from diabetes, smoking was also found to be a risk factor for Erythrocytosis. If allograft procedures are improved and associated thromboembolic events could be managed, then it will encourage the application of therapeutic guidelines.

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