

COAGULATION PROFILE IN PRE AND POST HEMODIALYSIS PATIENTS OF END STAGE RENAL DISEASES

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ABSTRACT

Background: Renal failure is a situation in which kidney fails to function adequately. The two forms of renal failure are acute and chronic. End stage renal disease is the final stage of chronic renal failure where there is a progressive irreversible deterioration in renal function which can be substituted by renal replacement therapy, hemodialysis (HD), peritoneal dialysis or transplantation.

Aims & objective: This study was carried out in order to evaluate the changes in coagulation profile and platelets count that may occur in renal failure patients undergoing hemodialysis.

Study Design: Cross-Section descriptive Study

Subjects and Methods: This study was carried out at Hematology section, Department of Pathology, Institute of Kidney Diseases, Hayatabad Peshawar. A total of 100 chronic renal failure patient's blood samples were evaluated for Coagulation profile by coagulation analyzer Model Sysmex CA500, along with 100 subjects taken as control. The coagulation profile i.e. Prothrombin time, Activated Partial Thromboplastin time and INR were compared in pre and post hemodialysis patients. The platelet counts of the CRF patients were performed by Sysmex KX-21 Haematology Analyzer.

Results: The mean pre hemodialysis PT was 16.219 sec \pm std 3.257sec with PT control of 11.2 sec, APTT was 33.845 \pm std 0.937 sec with control APTT of 26.2 sec. Similarly, post hemodialysis mean PT was 16.696 sec \pm std 1.082 sec with control of 11.2 sec. APTT was 40.612 sec \pm std 1.595 sec with control APTT of 26.2 sec. Post hemodialysis INR was 4.548 \pm std 3.010 while pre hemodialysis INR was 3.776 \pm 1.635. These results clearly indicate that both PT and APTT are prolonged post hemodialysis and the platelet counts are decreased.

Conclusion: The result showed that in coagulation profile, Prothrombin time, Activated partial Thromboplastin time measured before and after hemodialysis (HD) in renal failure patients were increased as compared to control groups. While the platelets count showed on decline side in post hemodialysis patients due to heparin used.

The present investigations may help clinicians to initiate precautions before and after dialysis procedures. Therefore it is recommended that all patients are screened for coagulation profile and platelet count appropriately before and after dialysis to avoid complications.

Key Words: Hemodialysis, renal failure, coagulation profile,

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INTRODUCTION

Kidneys are those vital organs of the body responsible for diverse body functions. Among them are excretion of nitrogenous waste products i.e. urea and uric acid; protein and vitamin D metabolism; hormone production i.e. erythropoietin, rennin and prostaglandin and maintaining homeostasis. Failure of renal excretory function results in renal failure ¹. Over 1.1 million patients are estimated to have renal failure world wide with an annual increase at a rate of 70%. In the USA, the incidence and prevalence counts expected to increase by 44 and 85% respectively from 2000 to 2015 the incidence and prevalence rates per million population by 32 and 70%. Awareness of the cause of chronic renal failure (CRF) helps the nephrologists to anticipate problems during renal replacement therapy and plan preventive measures for the community ³. The average incidence of end-stage renal disease (ESRD) in Middle-East countries with similar renal care systems is more than 93 per million population ⁴. Hemodialysis

increases longevity of patients with ESRD by removing the metabolic end products and excess of water ⁵. In 2002 the national kidney foundation developed kidney disease outcome quality initiative (K/DOQI) guidelines ⁶. In Pakistan chronic kidney disease is managed mainly by the internists or primary care physicians until the patients reach advance renal failure when they are referred to a nephrologist. It has been shown that patients referred late to a nephrologist have adverse outcome. Timely referrals can only be made if physicians have better understanding of eGFR including the level of eGFR when referral is recommended ⁷. Renal replacement therapy for end stage renal disease patients includes, hemodialysis (HD) peritoneal dialysis (PD) and renal transplantation. The aim of renal replacement therapy is to prolong life without diminishing the quality of remaining years. Hemodialysis is the most used modality of renal replacement therapy with a utilization rate that ranges from 40% of prevalent patients in Australia to 95% in Japan. In India and Pakistan treatment of end stage renal disease is a low priority for cash-strapped public hospitals and in the absence of Health Insurance plans, or private insurance less than 10% of all patients receives any kind of renal replacement therapy ⁸. Although renal transplantation is the best option and about 5% of all patients end up having a transplant. The goals of hemodialysis to treat uremic symptoms (through removal of toxic metabolites) correct acid base and electrolyte disturbances, maintain volume status and over the long term improve quality of life, lower morbidity and mortality rates and maintain nutritional stability ⁹.

This study is aimed at investigating the coagulation changes and platelets count before and after hemodialysis in renal failure patients compared to normal controls.

SUBJECTS AND METHODS

In this cross sectional descriptive study, a total of 100 patients having 10-70 years of age with ESRD admitted in dialysis unit were selected. Prothrombin Time, Activated Partial Thromboplastin Time was performed by coagulation analyzer pre and post dialysis on venous blood samples of these patients taken in tri-sodium citrate Vacutainers. While platelet count was done on venous blood samples of patients taken

in EDTA Vacutainers by Sysmex KX-21 Haematology Analyzer and visually checked on light microscopy

Inclusion criteria

All renal failure patients having history of:

Hemorrhagic disorders

Coagulation disorders

Exclusion criteria

Patients having known history of bleeding diathesis.

Statistical analysis

The results obtained in pre and post dialysis patients were subjected to statistical analysis by using SPSS software (version 14).

To test the significance of the difference between pre and post hemodialysis student "t" test was applied.

The level of significance was used as 0.05 and the p-value was calculated. The p-value ≤ 0.05 was taken as significant difference and p-value ≥ 0.05 was taken as non significant. The mean and standard deviation and other descriptive statistics were also calculated.

RESULTS

Data were analyzed statistically by paired sample test.

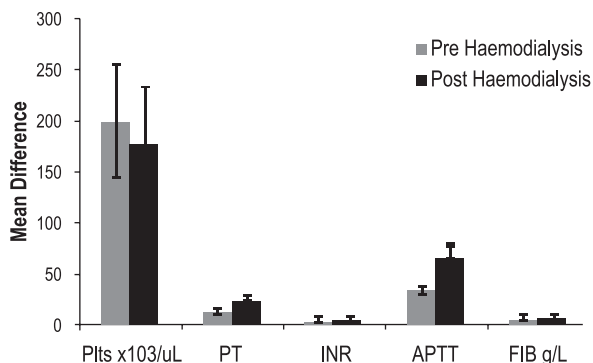
The difference between mean of coagulation profile that occurred in renal failure patients before, after Hemodialysis procedures and control group is shown in table 1. The PT levels showed significant increase in post Hemodialysis patients compared to the control group. Significant increase was also seen in the APTT level of post Hemodialysis patients when compared to the control group.

The difference between the mean of coagulation profile that occurred in renal failure patients before and after Hemodialysis session, were calculated (Figure 1).

The PT levels showed statistical significant increase post HD when compared to the pre-HD levels. Likewise the APTT levels increased significantly post HD when compared to those of the pre HD level.

Table1: Coagulation profile and platelet count from pre and post HD patients and healthy controls.

S.NO	PARAMETERS	PRIOR HEMODIALYSIS MEAN			POST HEMODIALYSIS MEAN		
		Patients	Controls	T-Tests (p-value)	Patients	Controls	T-Tests (p-value)
1	PT Sec	14.7	11.2	0.84	18.7	11.2	0.84
2.	APTT Sec	34.4	26.2	0.00	40.7	26.2	0.00
3.	INR	1.211	1.0	0.822	1.693	1.0	0.822
4.	Platelet count	177,381	250,000	0.010	156,326	250,000	0.010



DISCUSSION

Chronic kidney disease (CKD) is defined as kidney damage for 3 months and/or Glomerular Filtration Rate (GFR) 60 ml/min per 1.73 m² for 3 months with or without kidney damage. Chronic kidney disease (CKD) was classified into five stages on the basis of estimated glomerular filtration rate (eGFR). These guidelines and staging were devised to facilitate early detection of CKD by general physicians, promote timely referral to nephrologists, manage complications of CKD and help nephrologists decide renal replacement therapy in a planned fashion.

Chronic kidney disease is characterized by progressive destruction of renal mass with irreversible sclerosis and loss of nephrons over a period of months to years depending on the underlying etiology. Chronic kidney disease is usually silent until its late stages, and without aggressive screening, detection may not occur until immediately before symptomatic kidney failure develops¹⁰. We found in our study that the difference between mean of coagulation profile that occurred in renal failure patients before and after Hemodialysis procedures when compared with control group is shown in table 1, in which the PT levels showed significant increase in post Hemodialysis patients. Similarly Significant increase was also seen in the APTT level of post Hemodialysis patients when compared to the control group¹¹.

Thrombocytopenia induced by hemodialysis is due to the heparin used during the procedure¹². This risk of thrombocytopenia can be considerably reduced when a citrate lock is used instead of heparin¹³. Moreover, some dialyzable compounds like guanidine-succinic acid, phenol and several other hydroxyl phenolacetic acids have been implicated in various hematological abnormalities in renal failure¹⁴.

We in our findings found that platelets were on lower side in post hemodialysis patients, which is consistent with earlier studies.

Prolonged thrombin times similar to those in the present report have been seen in patients with heart disease and other chronic illnesses. The moderate reduction in prothrombin complex (factors, II, V, VII, X)

reported in the present study is probably due at least in part to the liver disease which often accompanies uremia¹⁵. In patients with ESRD deficiencies of the anticoagulant proteins C and S have been observed¹⁶.

At the end it is concluded that haemostatic parameters i.e. Prothrombin time and activated partial thromboplastin time are prolonged while the platelet count is reduced after hemodialysis session in patients with end stage renal disease.

CONCLUSION

The present investigations may help clinicians to initiate precautions before and after dialysis procedures. Therefore it is recommended that all patients are screened for coagulation profile and platelet count appropriately before and after dialysis to avoid complications.

ACKNOWLEDGMENT

I pay my special acknowledgement to Mr Qaisar Noor, Laboratory technician IKD & Ms Yasmeen Bashir Dialysis technician IKD for their assistance in sample collection and processing. Mr Iqbal Hussain statistical officer PMRC KMC also contributed his expertise in data analysis.

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