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Coagulation Profile in End-Stage Kidney Disease Patients before and after Hemodialysis

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I. Introduction:

Chronic kidney disease (CKD) is a major global health issue that places a heavy financial burden on poor nations like India. The Kidney Disease Outcomes Quality Initiative lists five phases of CKD, with End Stage Renal Disease (ESRD) as the final stage. ESRD is defined by a progressive, irreversible decline in renal function and a failure of the body to maintain fluid and electrolyte balance, leading to uremia. The main cause of bleeding and thrombotic problems in CKD is an unbalanced ratio of pro- and anti-hemostatic factors, which results in significant morbidity and death. Dialysis continues to be one of the most popular forms of RRT in the globe because of the high expense and difficulty in locating an organ donor who is a good match associated with transplantation. Platelet function is altered by hemodialysis (HD), which also affects the coagulation and fibrinolytic systems[1,2]. Since the 1970s, it has been known that platelets and dialysis membranes interact; it has been demonstrated that these interactions lead to platelet adhesion, aggregation, and activation. Variations in the vascular wall's integrity, platelet activity, and decreased blood flow into the fistula used to access the vessel all contribute to thrombotic events. Heart disease, pulmonary embolism, and cerebral spill are all linked to hypercoagulability situations. Following dialysis, PT (prothrombin time) and aPTT (activated partial thromboplastin time) both frequently rise. When polytetrafluorethylene (PTFE) fistulas are employed, there is a danger of thrombus formation in the vascular access for dialysis due to enhanced coagulation. The study's objective is to ascertain the differences between the platelet count, PT, INR, and aPTT before and after HD[3].

II. Aims and Objectives:

To compare the coagulation profile values in patients with ESRD, before and after hemodialysis.

Materials and Methods:

In this cross-sectional descriptive study, 100 ESRD patients between the ages of 20 and 70 who were being treated in a dialysis unit were chosen. On venous blood samples of these patients obtained in tri-sodium citrate Vacutainers, the coagulation analyzer performed prothrombin time and activated partial thromboplastin time pre and post-dialysis. Patients' venous blood samples collected in EDTA Vacutainers were used to count the platelets, which were then visually inspected under a light microscope.

Inclusion criteria:

All renal failure patients having a history of:

1. Hemorrhagic disorders
2. Coagulation disorders

Exclusion criteria:

Patients having a known history of bleeding diathesis.

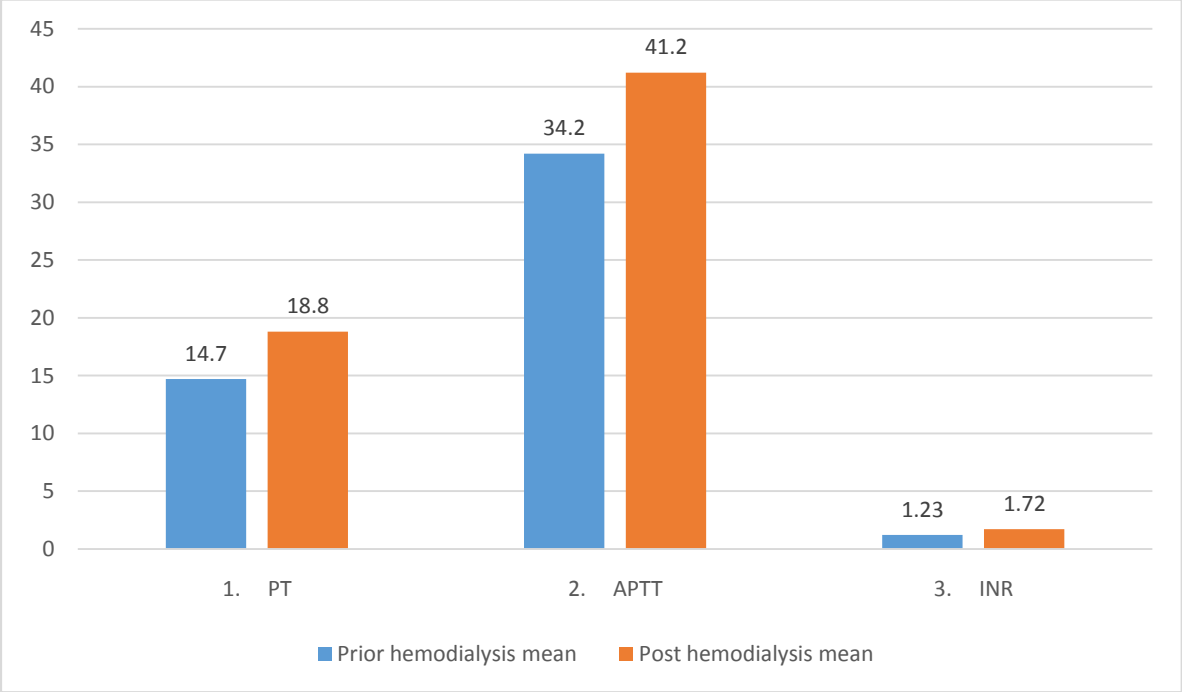
Statistical analysis was done using Microsoft excel. 95% confidence interval was taken as a standard. Informed and written consent was taken from all the participants included in the study. Ethical committee clearance was taken from the institutional review board. This study abides by the guidelines laid by the declaration of Helsinki.

III. Results:

The mean age of the study population was 45.25 ∓ 5.2 years. Males were 62 and females were 38. The most common age group was 41-50.

Parameter	Prior hemodialysis mean	Post hemodialysis mean	*p*-value
1. PT	14.7	18.8	0.04
2. aPTT	34.2	41.2	0.03

3.	INR	1.23	1.72	0.10
4.	Platelet count	185462	148658	0.02



The pre and post-hemodialysis values in patients in terms of PT, aPTT, INR, and Platelet count were given in the above table. The difference is statistically significant in PT, APTT and Platelet count.

IV. Discussion:

Glomerular Filtration Rate (GFR) of 60 ml/min per 1.73 m^2 for 3 months with or without kidney impairment is regarded as a marker for chronic kidney disease (CKD). Based on the estimated glomerular filtration rate, chronic kidney disease (CKD) was divided into five stages (eGFR). These recommendations and stages were developed to facilitate early CKD detection by general physicians, promote prompt referral to nephrologists, manage CKD complications, and assist nephrologists in making planned decisions for renal replacement treatment. Depending on the underlying cause, chronic kidney disease is characterized by the gradual loss of nephrons and destruction of the renal mass over months to years. Without rigorous screening, identification may not happen until just before clinical renal failure manifests since chronic kidney disease is typically quiet until its advanced stages. Heparin is used during hemodialysis, which causes thrombocytopenia in patients. When a citrate lock is used in place of heparin, the risk of thrombocytopenia can be significantly reduced. In addition, a number of hydroxyl phenolacetic acids, including guanidine-succinic acid, phenol, and others, are dialyzable substances that have been linked to a variety of hematological abnormalities in renal failure. In our study, PT, APTT was elevated and platelet counts decreased after hemodialysis[4–7].

In a study published by Veena Raja et al, 150 CKD patients were included in this prospective observational study of the platelet count and coagulation profile in pre and post hemodialysis patients with chronic renal failure at the Department of Pathology, SRM Medical College Hospital & Research Centre. A p value of 0.05 or lower was regarded as statistically significant. In this study, the mean platelet count decreased significantly from 2.29 cells/cu.mm before dialysis to 2.03 cells/cu.mm after dialysis. Both the PT and aPTT levels significantly increased after dialysis. According to these data, bleeding disorders are more common in CKD patients, which may contribute to an increase in patient mortality and morbidity. In light of this study, nephrologists must monitor the platelet count and coagulation profile of CKD patients on dialysis and correct any abnormalities to enhance patient outcomes[8].

V. Conclusion:

PT and aPTT increase after hemodialysis and platelet counts decrease in patients with end-stage kidney disease after hemodialysis.

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