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Effect of Hemodialysis and Peritoneal Dialysis on FDP In Chronic Renal Failure "A Comparative Study"

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SUMMARY

In the body, fibrinogen is broken down by plasmin, to produce high molecular weight polypeptide fragments X and Y and low molecular weight fragment D and E. Concentration of serum fibrin degradation products (FDP) has been found to reflect the activity and severity of renal lesions. Sixty confirmed cases of chronic renal failure (CRF) were included in this study. Half of them were on peritoneal dialysis, while other half on regular hemodialysis. Pre-dialysis samples in 26 patients (43.3%) and post dialysis samples in 17 patients (28.3%) showed raised FDP. In peritoneal dialysis group the pre-dialysis samples of 15 patients (50%) and post-dialysis samples of 13 patients (43.3%) showed raised FDP. In hemodialysis group the pre-dialysis samples of 11 patients (36.6%) and post dialysis samples of 04 patients (13.3%) showed raised FDP.

In this study FDP were high in 43% of patients. Dialysis caused a significant reduction in their level. Hemodialysis seems to be more efficient then peritoneal dialysis in lowering the levels of FDP.

INTRODUCTION

Fibrinogen is broken down in the body, by plasmin to produce high molecular weight polypeptide fragments X and Y and low molecular weight fragments D and E. Much of the fibrin formed naturally in vivo is removed by fibrinolysis. In this process an insoluble gel is converted to soluble polypeptide fragments known as fibrin/fibrinogen degradation products (FDP). Excessive fibrinolysis may cause FDP to appear in high concentration in the plasma. They compete with fibrinogen for the GP 1b-11a binding sites on the platelets to which fibrinogen must bind for normal platelet adhesion. The resultant impaired formation of homeostatic plug contributes to fibrinolytic bleeding[1]. Action of plasmin degraded fibrinogen and fibrin on coagulation mechanism was first appreciated in 1958[2]. It was also noted that different degradation products had different anticoagulant potential.

Concentration of serum FDP has been found to reflect the activity and severity of renal lesions[3]. Other non-renal conditions such as deep venous thrombosis and disseminated intravascular coagulation are also associated with a rise in serum FDP[89]. This study reports the comparative effect of hemodialysis and peritoneal dialysis on FDP.

PATIENTS AND METHODS

Sixty cases of chronic renal failure irrespective of their age, sex ethnic group and previous dialysis schedule and technique were studied in the Hematology and Nephrology Departments of Shaikh Zayed Hospital Lahore. Half of the patients were on peritoneal dialysis and the other half were on hemodialysis. Detailed history of each patients was taken with emphasis on the history of bleeding diathesis. Patients who showed evidence of liver disease on biochemical estimation were excluded from the study.

Hematological tests were performed along with pre and post dialysis level of FDPs. Diagnostic stago kit Cat N. 0538 was used. In this preparation suspension of latex particles is coated with specific antibodies to purified FDPs (fragments D and E). Agglutination of these particles, when mixed with serum, indicates the presence of FDPs.

Reagents

1. Sample collection tube. It contains thrombin to ensure rapid clotting and a proteolytic inhibitor to prevent in vitro fibrinolysis.
2. Latex suspension; suspension of latex particles coated with rabbit anti-FDP antibodies.
3. Buffer solution containing 0.1 M glycine pH S.2
4. Test cards.
5. pipettes and mixing rods.
6. Negative and positive controls.

Test samples and negative, positive controls were run at the same time. Blood was collected in the sample collection tubes upto 3 ml mark and immediately mixed by inverting the tubes several times to ensure rapid coagulation. The tubes were incubated at 37°C for 30 minutes for clot retraction-to commence and then centrifuged for 30 minutes at 5000 r pm. Clear serum was removed from the FDP tubes and 1:5, 1:10, 1:20 dilutions were made in glycine buffer. One drop of serum dilution (1:5) was mixed with one drop of latex suspension on the slide and the slide rocked gently for 2 minutes and examined for agglutination in good light. If positive, the test was repeated with the next dilution

Observations

Physiological fibrinolytic activity produces only trace amounts of FDPs. Interpretation of agglutination reactions was as follows:

No agglutination in 1:5 dilution means FDP less than 10 μg/ml.
Agglutination in 1:5 dilution means FDP more than 10 μg/ml.
Agglutination in 1:10 dilution means FDP more than 20 μg/ml.
Agglutination in 1:20 dilution means FDP more than 40 μg/ml.

RESULTS

Total number of patients in this study was sixty. Half of them were on peritoneal dialysis while the other half were on regular hemodialysis.

Pre-dialysis samples were taken just before dialysis while post dialysis samples were drawn six hours after dialysis. Pre-dialysis samples in 26 patients (43.3%) and post dialysis samples in 17 patients (28.3%) showed raised FDP. Their titre and the effect of dialysis on them are show in Tables 1 and 2.

In peritoneal dialysis group the pre-dialysis samples of 15 patients (50%) and post-dialysis samples of 13 patients (43.3%) showed raised FDP. The range of pre and post-dialysis FDP was $<10>20<40$.

In hemodialysis group the pre-dialysis samples of 11 patients (36.6%) and post-dialysis samples of 04 patients (13.3%) showed raised FDP. The range of Pre-dialysis FDP was $<10>20<40$, whereas the range of post-dialysis FDP was $<10>10<20$ (Table 1 and 2).

Table 1: comparison of frequency of increased FDP before and after dialysis (n=30).

Methods	*Pre-dialysis*		*Post-dialysis*	
	No.	*%*	*No.*	*%*
Peritoneal dialysis	15	50.00	13	43.3
Hemodialysis	11	36.06	04	13.0

Table 2: Effect of dialysis on FDP titre and comparison of the two dialysis methods (n=30).

Methods	*FDP*	*Pre-dialysis*		*Post dialysis*	
		No.	*%*	*No.*	*%*
Peritoneal	<10 (Normal)	15	50.0	17	56.67
(n = 30)	>10<20	10	33.33	11	36.67
	>20<40	5	16.67	2	6.67
Hemodialysis	<10 (Normal)	19	63.33	26	86.67
(n = 30)	>10<20	8	26.67	4	13.33
	>20<40	3	30.0	0	0.00
Combined	<10 (Normal)	34	56.67	43	71.67
(n = 60)	>10<20	18	30.0	15	25.0
	>20<40	8	13.33	2	3.33

DISCUSSION

The frequency of raised FDP levels was higher in patients in the peritoneal dialysis group. Raised FDP levels were found with and without hemorrhagic complications. In most of the patients, raised FDP either returned to normal or its concentration decreased after dialysis.

Hemodialysis was more effective in reducing the FDP level. Of 15 patients in the peritoneal dialysis group, who showed raised FDP before dialysis, the titer of FDP returned to normal in 04 patients and was partially reduced in 02 patients. Two patients with normal FDP levels before dialysis showed raised levels after dialysis. In hemodialysis group, 11 patients showed raised FDP before dialysis, which returned to normal in 07 patients and decreased in 01 patient.

FDP are known to have a potent anticoagulant effect[4] FDP may affect platelet function but it is uncertain if they play any important part in the pathogenesis of platelet function defect in CRF[5] Results of this study are similar to those of Briggs [6] who showed significantly higher frequency of raised serum FDP level in uremic patients. Elevated levels of FDP occur in uremia and are thought to be in part related to intravascular coagulation in the kidneys. Recent data indicates that delayed catabolism of fibrinogen fragment D occurs in a nephric animals. Decreased catabolism of Fg-D and Fg-E in renal disease is neither due to decreased excretion nor is it due to an indirect effect of retained waste products (uremia); it is the end result of loss of functional mass of the kidneys.

In this study FDP level were high in 43% of patients. Dialysis caused a significant reduction in their level. Hemodialysis seems to be more efficient than peritoneal dialysis in lowering the level of FDP.

The abnormal haemostasis in these patients is multifactorial. The raised FDP is one of them and can be corrected by dialysis. The haemodialysis should be preferred if raised FDP is thought to be responsible for abnormal haemostasis.

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