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D-dimer Levels in Patients Presenting Chronic Kidney Disease in Sudan

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Abstract **Background:** Chronic kidney disease is a progressive loss in renal function over a period of months or years. This disease may also be identified when it leads to one of its recognized complications such as cardiovascular disease, anemia, or pericarditis [1]. Measurement of plasma D-dimer level has been shown as a useful diagnostic aid in suspected deep vein thrombosis (DVT) in medical patient. This study aimed to assess D-dimer level in chronic renal failure patients. **Materials & methods:** A total of forty nine patients had chronic renal failure were enrolled in this study; 29(59.2%) were males and 20(40.8%) were females; their age ranged (20-88) years. D-dimer level was performed by quantitative immunoassay using I-CHROMA^{TM} kit and reader. **Discussion and conclusions:** A higher level of D-dimer was observed among patient with chronic kidney disease. Both males and females patients were showed positive D-dimer levels above the normal range.

Keywords D-dimer, Chronic Kidney disease (CKD), DVT, FDP, VTE

1. Introduction

Chronic kidney disease (CKD) is a progressive loss in renal function over a period of months or years. The symptoms of worsening kidney function are non-specific, and might include feeling generally unwell and experiencing a reduced appetite [1]. Often, chronic kidney disease is diagnosed as a result of screening of people known to be at risk of kidney problems, such as those with high blood pressure or diabetes and those with a blood relative with chronic kidney disease. This disease may also be identified when it leads to one of its recognized complications such as cardiovascular disease, anemia, or pericarditis [1]. Moreover, it accepted also to be as the presence of kidney damage, manifested by abnormal albumin excretion or decreased kidney function, quantified by measured or estimated glomerular filtration rate (GFR), that persists for more than three months [2, 3]. The risk of VTE is increased across the spectrum of CKD, including mild and more advanced CKD, nephrotic syndrome, ESRD and after kidney transplant. This increased risk may be due to underlying hemostatic derangements, including activation of procoagulants, decreased endogenous anticoagulants, enhanced platelet activation and aggregation, and decreased fibrinolytic activity.

D-dime; is a fibrin degradation product (or FDP), a small protein fragment present in the blood after a blood clot is degraded by fibrinolysis. Measurement of plasma D-dimer level has been shown as a useful diagnostic aid in suspected deep vein thrombosis (DVT) in medical patient [4, 5]. Several factors, other than pulmonary embolism or deep vein thrombosis (DVT), are associated with positive D-dimer result. Determination of D-dimer will improve the understanding of mechanisms linking kidney disease with venous thromboembolism and will allow a prevention effort [6, 7].

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2. Materials and Methods

A cross-sectional study was conducted at Alneelain University, Faculty of medical laboratory Sciences and Omdurman Military Hospital, Renal disease unit, Khartoum, Sudan. Citrated venous blood samples were collected from 49 patients diagnosed by Chronic kidney disease prior dialysis. All patients were admitted erythropoietin, iron and folic acid. Twenty nine (59.2%) of them were males and 20 (40.8%) were females; their range between 20 to 88 years. The glomerular filtration rate (GFR) was estimated for each patient. Creatinine level, duration of the disease, dialysis duration and treatment were recorded also. Patients have malignancies; pregnancy and Known patient of thrombosis were exclude from the study.

D-dimer performance

The D-dimer level was measured by quantitative immunoassay using I-CHROMA^{TM} Kit and reader. A sandwich immune detection method, such that the detection

antibody in buffer (contains fluorescence-labeled anti D-dimer antibody, fluorescence-biotin labeled BSA, BSA as a stabilizer, and sodium azide as a preservative in PBS) was bound to D-dimer in plasma sample and antigen-antibody complexes were captured by anti bodies that \have been immobilized on the test strip as sample mixture migrates through nitro celluose matrix.

Reference value: ≤ 300 ng/ml

Statistical analysis

Data were analyzed by SPSS16. Comparisons between groups were calculated by Anova and liner relation. P.value of 0.01 or less was considered significant.

Results

Age and gender

Of 49 patients; 29(59.2%) were males and 20(40.8%) were females; their mean age was 45 years.

Table 1. Correlations

		Dia/Dur/year	Dis/Dur/year
D#dimer	Pearson Correlation	-.118-	.380
	Sig. (2-tailed)	.419	.007
	N	49	49
GFR	Pearson Correlation	-.011-	.004
	Sig. (2-tailed)	.941	.977
	N	49	49
Cr/mmol	Pearson Correlation	.034	.131
	Sig. (2-tailed)	.815	.369
	N	49	49
Cr/L	Pearson Correlation	-.029-	-.144-**
	Sig. (2-tailed)	.845	.324
	N	49	49
Age	Pearson Correlation	.011	.094
	Sig. (2-tailed)	.938	.522
	N	49	49
Dia/Dur/year	Pearson Correlation	1	.670
	Sig. (2-tailed)		.000
	N	49	49
Dis/Dur/year	Pearson Correlation	.670**	1
	Sig. (2-tailed)	.000	
	N	49	49

Table 2. Correlations

		D#dimer	GFR	Cr/mmol	Cr/L	Age
D#dimer	Pearson Correlation	1	.175	.008	-.193-	-.151-
	Sig. (2-tailed)		.229	.956	.183	.301
	N	49	49	49	49	49
GFR	Pearson Correlation	.175	1	-.106-	-.741-**	.047
	Sig. (2-tailed)	.229		.467	.000	.748
	N	49	49	49	49	49
Cr/mmol	Pearson Correlation	.008	-.106-	1	.091	.148
	Sig. (2-tailed)	.956	.467		.532	.310
	N	49	49	49	49	49
Cr/L	Pearson Correlation	-.193-	-.741-**	.091	1	-.192-
	Sig. (2-tailed)	.183	.000	.532		.187
	N	49	49	49	49	49
Age	Pearson Correlation	-.151-	.047	.148	-.192-	1
	Sig. (2-tailed)	.301	.748	.310	.187	
	N	49	49	49	49	49
Dia/Dur/year	Pearson Correlation	-.118-	-.011-	.034	-.029-	.011
	Sig. (2-tailed)	.419	.941	.815	.845	.938
	N	49	49	49	49	49
Dis/Dur/year	Pearson Correlation	.380**	.004	.131	-.144-	.094
	Sig. (2-tailed)	.007	.977	.369	.324	.522
	N	49	49	49	49	49

Renal parameters

The means of disease duration, dialysis duration, creatinine level and GFR were 6 years, 3 years, 11.3 g/l and 6.5 respectively. A significant correlation was between creatinine level and GFR (P.value = 0.001) (Table 1).

D-dimer level

The mean of D-dimer level among all patients was 2037 ng/ml. According to gender the males and females were showed 1859 ng/ml and 2295 ng/ml respectively. No significant correlations were found between D-dimer level, creatinine level and GFR. On the other hand, a significant correlation was found between D-dimer level and disease duration (P.value=0.007) (Table 2).

3. Discussion and Conclusions

The risk of VTE is increased across the spectrum of CKD, including mild and more advanced CKD, nephrotic syndrome, ESRD and after kidney transplant. This increased risk may be due to underlying hemostatic derangements, including activation of procoagulants, decreased endogenous anticoagulants, enhanced platelet activation and aggregation, and decreased fibrinolytic activity [13]. It is reasonable to assume that the higher levels of D.dimer are primarily as a result of increased fibrin clot formation and breakdown. The increased thrombogenic state may be related to increased susceptibility to vascular disease in these patients [12].

The current study aimed to assess the D-dimer level among Sudanese patients with chronic renal failure. All patients were showed significant elevation of D-dimer, and the females showed the higher level. These findings were supported by study had been performed in 18 diabetic nephropathy patients and 16 hypertensive patients with nephrosclerosis and their D.dimer were significantly elevated [11]. We also aimed to evaluate the association between D-dimer level and glomerular filtration rate (eGFR), but there was no correlation. We also observed that D-dimer was significant associated with the duration of the disease, the highest levels were found in patients who had the disease for more than 3 years. On the other hand we did not found an association between the duration of dialysis and the elevation of D-dimer. We concluded that patients with Chronic kidney disease were at serious risk for VTE and D-dimer beside the other coagulation parameters should be considered for patients fellow up and management.

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