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DETERMINATION OF PROTEIN C LEVEL IN PATIENTS WITH NEPHROTIC SYNDROME AT KHARTOUM STATE

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ABSTRACT

Background: Nephrotic syndrome has many clinical manifestations including thrombosis and thromboembolic events. The hypercoagulability state in nephrotic syndrome could be related to deficiency of naturally occurring anticoagulant like Antithrombin III (ATIII) protein C and S. **Aim:** The aim of this study was to determine protein C level among Sudanese patients with nephrotic syndrome. **Material and metho**d: A total of 90 samples were included (45) samples as case and (45) samples as control. Protein C level was measured using Sandwich-ELISA. **Results:** The present study showed that the mean of Protein C level among case group (49.6±15.5), was significantly lower than control group (81.27±15.8), (P-value 0.000), there was no correlation between age and protein C level.

KEYWORDS: Nephrotic Syndrome, Protein C, Sudan.

INTRODUCTION

Nephritic syndrome (NS) is a clinical entity characterized by massive loss of urinary protein (albuminuria > 1 g/m2/24 hrs) leading to hypoproteinemia (serum albumin < 2.5 g/dl). hyperlipidemia, hypercholesterolemia and increased lipiduria are usually associated.[1]

The etiology of NS is divided into primary NS and secondary NS. Furthermore, secondary causes of NS can be subdivided into NS-related systemic diseases and NS related to medication use. common primary causes of NS are focal segmental glomerulosclerosis (FSGS), membranous nephropathy (MN), and minimal change disease (MCD) (after excluding identifiable causes such as cancer, systemic diseases, and medications).[2]

The hypercoagulability state in NS has been attributed to low serum concentrations of plasminogen, antithrombin III, protein C and protein S due to urinary loss and elevated serum levels of some coagulative factors such as macroglobulin, fibrinogen, thromboplastin, factors II, V, VII, VIII and X.[3]

Protein C (PC) is a vitamin K–dependent serine protease that is synthesized as a single polypeptide chain of 461 amino acids and is a natural anticoagulant protein.[4] Whereas synthesis predominantly occurs in the liver, PC has also been identified in the epididymis, kidney, lung, brain, and male reproductive tissue.[5] Cotranslational and posttranslational modifications of PC include β-hydroxylation, γ-carboxylation, and glycosylation; the γ-carboxylation is required for efficient secretion and for the anticoagulant activity of PC. PC is multimodular and contains structural elements similar to other vitamin K–dependent coagulation proteins.[6]

functions of PC in hemostasis are in keeping with its role of maintaining a fluid state of blood. By virtue of the ability of PC to down-regulate thrombin, the activation of thrombin activatable fibrinolytic inhibitor (TAFI) is also suppressed, thus indirectly promoting fibrinolysis. Fibrinolysis is also stimulated by another activity of PC, its ability to inhibit plasminogen activator inhibitor-1 (PAI-1).[7]

Coagulation and inflammation also play a major role in glomerulonephritis. For this reason, the PC system has been investigated in several forms of glomerular injury, including diabetic nephropathy. In the kidneys of patients with persistent hyperglycemia, reduced levels of thrombomodulin (TM) were detected accompanied by impaired formation of PC.[8] Consistent with these findings, low levels of PC in the glomeruli of animals with diabetes increased the activation of blood coagulation and renal fibrin deposition. In patients with nephrotic syndrome (NS), there is an increased incidence of renal vein thrombosis as well as other venous and

arterial thrombosis.[9]

The aim of this study was to determine protein C level among Sudanese patients with nephrotic syndrome.

MATERIALS AND METHODS

This was a case-control study, conducted in Khartoum, Sudan during the period from October 2019 to March 2020, A total of 90 samples were included (45) samples as case and (45) samples as control. Protein C was measured using Sandwich-ELISA.

This ELISA kit uses the Sandwich-ELISA principle. The micro ELISA plate provided in this kit has been pre-coated with an antibody specific to Mouse APC. Standards or samples are added to the micro ELISA plate wells and combined with the specific antibody. Then a biotinylated detection antibody specific for Mouse APC and Avidin-Horseradish Peroxidase (HRP) conjugate are added successively to each micro plate well and incubated. Free components are washed away.

The substrate solution is added to each well. Only those wells that contain Mouse APC, biotinylated detection antibody and Avidin-HRP conjugate will appear blue in color. The enzyme- substrate reaction is terminated by the addition of stop solution and the color turns yellow. The optical density (OD) is measured spectrophotometrically at a wavelength of 450 nm ± 2 nm. The OD value is proportional to the concentration of Mouse APC. You can calculate the concentration of Mouse APC in the samples by comparing the OD of the samples to the standard curve.

Data were analyzed by using statistical package for the social science (SPSS) Version **23.**

Ethical clearance

Ethical approval was obtained from Alneelain University review Board.

RESULTS

This study was conducted in Khartoum Sudan among 90 individuals. There were divided into two groups, patients with nephrotic syndrome who considered as cases and apparently healthy individuals, who considered as control. Our study revealed that there was no correlation between age and protein C level. The mean of protein C level among case group (49.6±15.5), was significantly lower than control group (81.27±15.8), (P-value 0.000).

Table (1) Frequency of age group in case and control.

Gender	Study population	
	Case	Control
Male	28	30
Female	17	15
Total	45	45

Most of them were male in case and control group with frequency 28 and 30 respectively.

Table (2): mean and STD of Protein C among study populations.

Protein C	N	Mean	P-value
Study groups			
Case	45	49.6±15.5	0.000
Control	45	81.27±15.8	
Gender			
Male	58	66.29±22.7	0.62
Female	32	63.8±21.7	

The Table shows the mean ± SD (mini - max) and probability (P). Independent T-test was used for comparison.

P value ≤ 0.05 was considered significant.

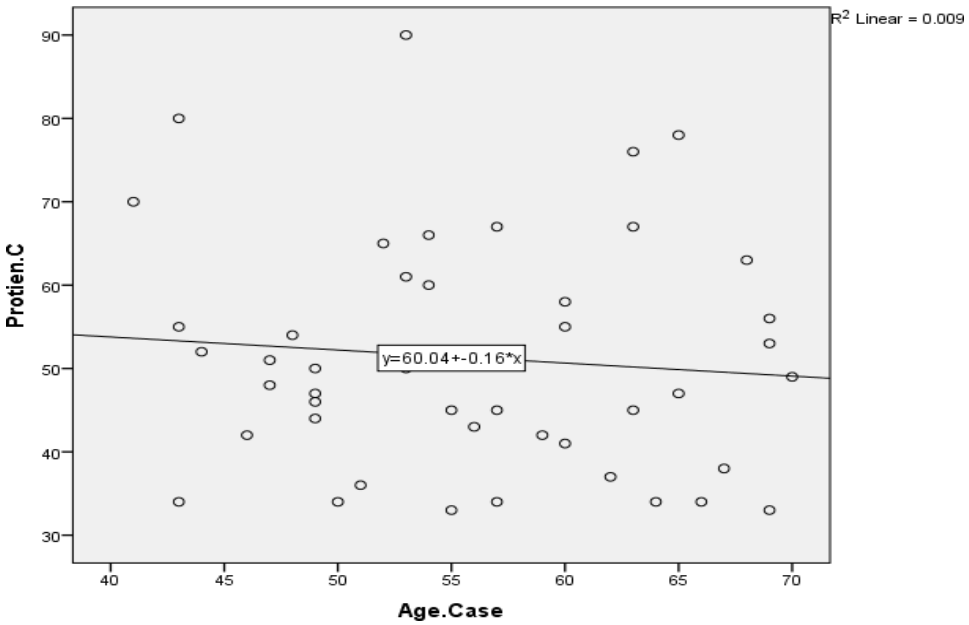

Figure (1): correlation between age and protein C level (R= -0.104, P. =0.49).

DISCUSSION

The nephrotic syndrome is one of the best-known presentations of adult or pediatric kidney disease. The term describes the association of (heavy) proteinuria with peripheral edema, hypoalbuminemia, and hypercholesterolemia.

In the present study we had evaluated 45 patients with nephrotic syndrome, 28 were males and 17 were females. The mean of protein C level among case group was significantly lower than control group (P-value 0.000).

Our finding of protein C was in concordance with study done by Soff et al., they reported significant low protein C value in case group when compared with control group.[10]

CONCLUSION

Our study concluded that protein C level was significantly lower among patients with nephrotic syndrome than control.

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