

Association Between Protein C, Protein S and Cerebral Blood Flow Velocity in Sickle Cell Disease Patients with High Risk of Cerebrovascular Accident

Uche EI, Olowoselu FO, Ogunmola A, Olowoselu O, Oyedeji O, Osunkalu V, Akinbami A, Ajie O, Oyedemi I

The main trigger of thrombosis in sickle cell patients is hyper-coagulable state; which may be due to deficiency of natural anticoagulant such as protein C and protein S among other abnormalities of the coagulation factors. This study aimed to determine association between protein C and S vis-a-vis cerebral blood flow velocity in sickle cell anaemia patients with high risk of cerebrovascular accident (CVA).

This was a case-control study involving HbSS patients who have been categorized based on risk of cerebrovascular accidents using transcranial doppler (TCD), and HbAA age-matched controls. All participants' samples were assayed for protein C, S, full blood count, prothrombin time (PT) and activated partial prothrombin time (APTT). The association between the assayed parameters and TCD values were established.

150 participants with Hb SS phenotype and 80 HbAA controls were recruited. There was a statistically significant increase ($p < 0.05$) in the time average mean velocity (TAMV) of the participants with sickle cell anaemia (184.29 ± 4.39 secs) in comparison to the control group (119.00 ± 1.42 secs). Similarly, decreased levels of proteins C and S observed in the participants with sickle cell anaemia ($46.21 \pm 5.56\%$, $128.90 \pm 3.86\%$) respectively in comparison with the control group (65.76 ± 3.87 , $155.13 \pm 3.50\%$), were also statistically significant ($p < 0.05$). As the risk of CVA increased from standard/normal risk, conditional risk to high risk, the levels of protein C significantly ($p < 0.05$) decreased. However, the observed decrease in the levels of Protein S was not statistically significant.

The results showed significant difference ($p < 0.05$) in the plasma levels of protein C and S in the HbSS group compared with the HbAA controls. The TAMV was also significantly increased in the HbSS group. There was also a significant negative regression coefficient between high TAMV and protein C levels ($r^2 = 0.073$, $p = 0.03$) but not with protein S ($r^2 = 0.019$, $p = 0.028$).