Increased Homocysteine Level in Indian Sick Cell Anemia Patients

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To the Editor,

It is known that patients with sickle cell disease present activation of the blood coagulation and fibrinolytic systems, especially during vaso-occlusive crises, but also during the steady state of the disease [1]. Due to decreased erythrocyte half-life, individuals with homozygous sickle cell disease have increased erythropoietic demands for folate. Subjects with inadequate folate status might be expected to manifest higher blood levels of homocysteine. The observation of elevated blood homocysteine levels in sickle cell disease patients with stroke raised the possibility that this may contribute to stroke in SS disease [2]. Homocysteine may inhibit thrombomodulin [3] and protein C, S may be reduced in SS disease [4]. It is possible therefore that raised homocysteine levels in SS disease predispose to the development of thrombosis through inhibition of the protein C anticoagulant pathway [5]. The significance, interactions, and sources of coagulation abnormalities and their relationship to clinical severity and painful episodes in sickle cell disease are not clear. To find out the relationship to clinical severity of protein C, S and Homocysteine in sickle cell anemia; we had evaluate 40 sickle cell anemia patients who were recruited from hematology outpatient department All India Institute of

Medical Science, New Delhi. Diagnosis of patients done by high performance liquid chromatography (Bio-Rad-Variant™ Bio Rad, CA, USA). About 3 ml blood sample collected from patients and controls after taking signed consent. Protein C, S and homocystein measured from blood plasma. Protein C and S evaluation had done by ELISA kit (Corginex Inc, Colorado, USA) while Homocystein level checked using Axis-Shield UK, ELISA diagnostic kit. *t*-test used to compares the means of two groups on Graph Pad software. *P*-value < 0.05 was considered statistically significant. Forty sickle cell anemia patients had 24 male and 16 female with mean age 11.2 ± 5.3 . Age–sex matched 60 controls (37 male and 23 female with mean age 11.7 ± 8.2) sample collected to compare the level of protein C, S and homocysteine blood plasma level. Mean value of protein C and S within normal range and statistically not significant. Level of plasma homocysteine in sickle cell anemia patients surprisingly elevated (Details given in Table 1). Ischemic complications are a major cause of morbidity and mortality in patients with sickle cell disease [6]. There is evidence of activation of both blood coagulation and platelets in sickle cell disease. Hypercoagulability effects on the cleavage of fibrinogen and its ability to activate platelets, the increase in circulating thrombin levels, with its wide-ranging effects on endothelial cells and blood vessels, may be important in the pathophysiology of sickle cell disease [7]. Marked reductions in free protein S and normal protein C activity seen in sickle cell patients [8]. Reduced activity of naturally occurring anticoagulants protein C and protein S may contribute to vaso-occlusion in sickle cell disease (SCD) [9]. In our cases out of 40 sickle patient only one patient was reported SS with stroke. All the sickle cell anemia patients' protein C and S level within normal range. Observations of our study conclude the elevated level of

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Table 1 Protein C, S and homocysteine level in sickle cell anaemia patients

Parameters	HbSS Patients <i>N</i> = 40	Control <i>N</i> = 60	<i>P</i> -value
Protein C (%)	88.6 ± 6.75	90.6 ± 8.6	0.2188
Protein S (%)	82.3 ± 8.47	85.6 ± 12.58	0.1495
Homocysteine (μmol/l)	25.7 ± 8.24	8.7 ± 4.25	0.0001

homocysteine increased the risk of *Hypercoagulability* in sickle cell anemia patients.

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