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Interference of different hemoglobin variants on the HbA1c results obtained from HPLC method, a major problem in proper assessment of glycemic status among the individuals with diabetes mellitus

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Statement of the Problem: Diabetes has become a modern epidemic. Worldwide increase in the prevalence of type-2 diabetes is posing a massive health problem in both developed and developing countries. Unfortunately, more than 50% of the diabetic subjects remain unaware of their diabetes status, which adds to the disease burden. Till now estimation of blood glucose is the highly effective method for diagnosing diabetes mellitus but it provides a short-term picture of control. That is why, to study the patterns of glycemic control in diabetic subjects, measurement of hemoglobin (Hb)A1c by high performance liquid chromatography (HPLC) has become a widely used tool to monitor long-term glycemic control in diabetic patients. But it has been found that hemoglobin variants strongly interferes and affect HbA1c measurements in this process. Hence, the objective of this study was to compare the HbA1c values measured on HPLC in patients who were detected to have hemoglobin variant after HbA1c analysis in order to avoid mismanagement of glycemic status in diabetic patients.

Methodology & Theoretical Orientation: In the present study, we have investigated glycosylated hemoglobin and hemoglobin variants by the HPLC method. The rest of hematological tests were done in the Beckman Coulter instrument. We have enrolled all over 1200 study subjects in the present study. Among them 456 people were enrolled as non-diabetic and rest of the study subjects have type 1 or type 2 diabetes mellitus. All of the study subjects enrolled in the present study was more than 19 years of age. The study was carried out in accordance with the code of ethics of the World Medical Association (Declaration of Helsinki).

Findings: Our findings revealed that 65% of diabetic population have normal hemoglobin pattern, 23% subjects were found with beta thalassaemia trait, 7% subjects with HbE trait, 1.5% subjects were found to have HbE homozygous and rest of the subjects were found to have other kinds of hemoglobin variants like HbD, HbD Punjab heterozygous among the diabetic individuals. Average results of HbA1c, HbF, HbA and HbA2 were calculated and the mean value of each variable were compared by unpaired student's two tailed t test to find out the significant difference between different variables.

Conclusion: So, we can conclude that HbA1c can be significantly altered by HbE trait and HbE homozygous variant. The more HbA2 or HbE concentration in blood, the more is the interference and lower is the HbA1c value. In case of beta thalassaemia trait, abnormal hemoglobin was found not so high, therefore, the interferences in HbA1c results is less than those with HbE trait and HbE homozygous variant.

Biography

Susruta Sen He has completed his Medical graduation from Calcutta Medical College; MD from University of Burdwan in 2005 and; PG Diploma in Diabetology from Annamalai University in 2007. At present, he is the sectional Head of Biochemistry at Calcutta Medical Research Institute and BM Birla Heart Research Center. He has validated biological reference intervals of different clinical biochemistry parameters among eastern Indian population. He investigated a comparative study of lipid profile between hypothyroid and euthyroid patients along with elucidation of the effect of alcohol on blood lipid profile. At present, he is investigating the exact relation involved in urinary micro albumin excretion and blood lipid profile changes in different stages of controlled type 2 diabetes mellitus. He is also investigating the relation between HbA1c% and blood glucose value, and the interferences of different hemoglobin variants in the estimation of glycosylated hemoglobin among the subjects with poor glycemia.

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