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A study on effect of lipemia on electrolyte measurement by direct ion-selective electrode method

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Introduction: Lipemia is known to interfere in the measurement of electrolytes using indirect potentiometry, whereas effect of lipemia using direct potentiometry is yet to be fully understood. The objective of this experiment is to observe whether lipemia affects the measurement of electrolytes using direct potentiometry by increasing concentration of triglyceride on the serum samples in vitro and if it does so, then at what specific concentration the effect occurs.

Methods: Two instruments, VITROS250 and HDC LYTE were used for a comparative study to measure electrolytes by direct potentiometric method (where direct serum sample is used for the measurement of electrolytes). For the characterization of this experiment, we collected one hundred & five serum samples and divided each of them into five aliquots, of which no intra-lipid was added to the first aliquot and to the rest four, 0.83%, 1.96%, 5% and 15% concentration of intravenous fat emulsion was added respectively to induce lipemia. This is followed by measurement of the electrolyte concentration of these prepared serum samples, resulting in five data set for each serum sample. In the VITROS250 machine, three parameters are measured, i.e., sodium, potassium and triglyceride content of the samples. In the HDC LYTE machine two parameters are measured, i.e., sodium and potassium concentration of the samples. The results are thus recorded and the results as measured in the two separate machines i.e. VITROS 250 and HDC LYTE are used to compare accordingly to ascertain the influence of increasing lipid concentration on the electrolytes are significant or not by statistical analysis.

Result: It was revealed that the electrolytic measurement of both sodium and potassium were significantly affected when the triglyceride concentration was gradually increased in serum samples. A considerable change in sodium concentration has been observed. Sample with 167 mmol/L in normal condition underwent an abrupt change to 145mmol/L, when the triglyceride concentration was 1550mg/dl or beyond. Beyond 650 mg/ml triglyceride concentration, the electrolyte values were significantly lower than the baseline values in both the analyzers. So it is evident that, lipemia even if it is about 650 mg/ml may bias the electrolyte concentration measured by ISE methods.

Conclusion: A correction method is required for the amendment of this interference property of lipemic serum samples for the major electrolyte (i.e. sodium and potassium) measurements to deliver quality and safe patient care.

Biography

Susruta Sen is currently working as Consultant at Department of Lab Medicine in The Calcutta Medical Research Institute (CMRI) and B M Birla Heart Research Center since June, 2005. He received MD (Biochemistry) in June, 2005 from Burdwan Medical College, University of Burdwan, India. He completed DNB (Biochemistry) in November, 2005 from National Board of Examination, Department of Health & Family Welfare, Govt. of India and PG Dip. in Diabetology in September, 2007 from Annamalai University, Tamil Nadu. He is the President for Association of Clinical Chemistry & Lab Medicine Practitioners. He is Assessor for NABL (National Accreditation Board for Testing & Calibration of Laboratories) since 2010 and International inspector for CAP (College of American Pathologist) since 2011.

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