Usefulness of Bedside Ketone Testing in the Evaluation of Children with Hypoglycaemia

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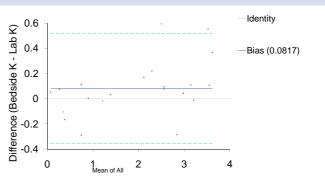
Introduction

Bedside blood ketone measurement has often been used in the management of diabetic ketoacidosis. However there is no available data on its reliability in the evaluation of hypoglycaemia in children. We aimed to assess the reliability of bedside ketones (β-hydroxybutyrate, BHB) in the evaluation of hypoglycaemia in children.
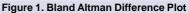
Methods

- 21 children, who underwent controlled fast over a period of 1 year were included. Paired measurements of bedside and laboratory blood ß-OHB were undertaken during hypoglycaemia or at the end of the fast.
- Bedside measurement was done using Precision Xceed Pro (Abbot diagnostics care Inc. US), based on biosensor technology and laboratory assay was based on enzymatic method (Randox laboratories, Crumlin, UK).
- Data was analysed with help of Bland-altmann's analysis and Passing Bablock regression analysis using appropriate statistical tools (SPSS 16.0, Chicago, IL and Analyse it 2.0, Leeds, UK).

Results

- Patient cohort included 14 boys and 7 girls. The median age was 4.03 years (range: 1.97-16.36 years)
- 14 patients were known to have congenital hyperinsulinism and 7 patients were investigated for hypoglycemia
- ß-OHB measurements were overestimated by sensor in 71.4% (n=15, mean difference 0.17nmol/L) and underestimated in 28.5% (n=6, mean difference -0.15nmol/L)
- The Bland Altman Plot, a difference plot between Bedside and laboratory ß-OHB against average of the readings was used. The bedside sensor had a statistically insignificant tendency to overestimate as compared to laboratory method (bias= 0.08),
- Passing Bablock regression analysis was suggestive of a linear relationship between the two, y = -0.05 + 1.06x. The intercept (constant difference) was 0.05 (95%CI -0.18-0.07), while the slope(proportional difference) was 1.06 (95% CI 1.00-1.15) which was suggestive that the two methods could be used interchangeably.

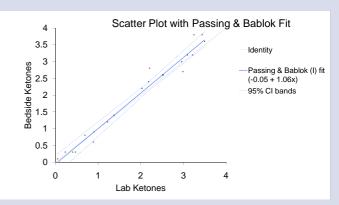Figure 1. Bland Altman Difference Plot

Figure 2 Passing Bablok regression analysis

Conclusion

In this study, we have demonstrated that assessment of bedside ketones using Precision Xceed Pro system is a reliable way of evaluating the ketotic response during hypoglycaemia in children. Bedside ketone measurement is a simple tool that would provide valuable insight into the aetiology of hypoglycaemia..