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**Validation of Beale's modified method using a commercially available enzymatic assay kit for serum uric acid estimation**

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Serum uric acid (SUA) is a biochemical risk marker of cardiometabolic disorders. Accurate low cost assays for the estimation of SUA are necessary for research studies. This study validated a low cost chemical (Beale's modified) method with a standard enzymatic assay kit method (Human Diagnostic Pvt. Ltd., Germany).

Beale's modified method was performed on serum samples stored at -20 °C, for 14 (n = 9), 21 (n = 15), 42 (n = 14) and 62 (n = 13) days. The estimates were compared with values obtained by a commercial kit. Correlation analysis, Bland Altman analysis and cross classification methods were performed to validate the chemical method. All samples were assayed in duplicates and a pooled serum was used as the internal quality control.

There was no significant difference in mean difference of estimates of SUA from the two methods for samples stored for 21 ( $0.2 \pm 0.2$  mg/dl), 42 ( $0.3 \pm 0.4$  mg/dl) and 62 ( $0.4 \pm 0.4$  mg/dl) days. However, the mean difference of SUA estimates obtained from samples stored for 14 days ( $1.1 \pm 0.2$  mg/ dl) were significantly higher ( $P < 0.001$ ) when compared with samples stored for longer. This indicates that the 14 days storage is not sufficient to eliminate the non-urate chromogens in the samples. Estimates done on samples stored for 21 days had the highest precision. Estimates of samples stored for 21, 42, 62 days were pooled for further analysis. A significant correlation was obtained between SUA estimates from the two methods (Pearson's  $r = 0.891$ ,  $P < 0.001$ ). The Bland- Altman plot was obtained by plotting the difference between the estimates of two methods against their mean. The bias (mean difference = - 0.273 mg/dl) and the standard deviations obtained were small ( $+1.96$  SD = 0.48 mg/dl and  $- 1.96$  SD = - 1.03 mg/dl) and 94.6% of estimates were within the 95% limits of agreement. This confirms the ability of the chemical method to estimate group mean as well as individual values within acceptable limits. The chemical method correctly classified 75% and 88% of subjects in correct and extreme tertiles respectively. The inter and intra-assay CV were 2.36% and 3.1% for the chemical method and 1.21% and 3.56% for the kit method respectively.

In conclusion, estimation of SUA using the Beale's modified method is accurate and precise and can be used in research to assess individual as well as mean group concentrations of SUA.

Keywords: Beale's modified method, serum uric acid