

[Clin Chim Acta](#). 1987 Jun 30;166(1):9-16.

## Application of transformation algorithm and nonparametric calculation in determining the reference intervals of some urine constituents and characteristics.

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### **Abstract**

We have applied a multi-stage computer algorithm for normalization of distributions and calculation of reference intervals of some urine characteristics and constituents. The study analyzed 24-h urines, collected from adult male Saudis from different socioeconomic classes, for volume, pH, osmolality, specific gravity, creatine, creatinine, urea and uric acid. Frequency distributions, for each analyte, were found to be nongaussian as judged by the coefficients of skewness and kurtosis, chi 2 and Kolmogorov-Smirnov tests, and from probability plots. Data were transformed to gaussian distributions by multistage log-power transformation. Stepwise, this procedure removed skewness and residual kurtosis. Using the gaussian transformed data the reference intervals were estimated parametrically as the mean  $\pm$  2 SD. In addition, the non-parametric percentile technique was applied to estimate these values. The former intervals were found to have narrower 0.90 confidence limits than the latter. When established limits were compared with those reported for Western subjects urine volume and uric acid showed the most marked variation