Coalescence of Insulin and Triglyceride/High Density Lipoprotein Cholesterol Ratio for the Derivation of a Laboratory Index to Predict Metabolic Syndrome in Morbid Obese Children

Authors : Orkide Donma, Mustafa M. Donma

Abstract : Morbid obesity is a health threatening condition particularly in children. Generally, it leads to the development of metabolic syndrome (MetS) characterized by central obesity, elevated fasting blood glucose (FBG), triglyceride (TRG), blood pressure values and suppressed high density lipoprotein cholesterol (HDL-C) levels. However, some ambiguities exist during the diagnosis of MetS in children below 10 years of age. Therefore, clinicians are in the need of some surrogate markers for the laboratory assessment of pediatric MetS. In this study, the aim is to develop an index, which will be more helpful during the evaluation of further risks detected in morbid obese (MO) children. A total of 235 children with normal body mass index (N-BMI), with varying degrees of obesity; overweight (OW), obese (OB), MO as well as MetS participated in this study. The study was approved by the Institutional Ethical Committee. Informed consent forms were obtained from the parents of the children. Obesity states of the children were classified using BMI percentiles adjusted for age and sex. For the purpose, tabulated data prepared by WHO were used. MetS criteria were defined. Systolic and diastolic blood pressure values were measured. Parameters related to glucose and lipid metabolisms were determined. FBG, insulin (INS), HDL-C, TRG concentrations were determined. Diagnostic Obesity Notation Model Assessment Laboratory (DONMA$_{LAB}$) Index [ln TRG/HDL-C*INS] was introduced. Commonly used insulin resistance (IR) indices such as Homeostatic Model Assessment for IR (HOMA-IR) as well as ratios such as TRG/HDL-C, TRG/HDL-C*INS, HDL-C/TRG*INS, TRG/HDL-C*INS/FBG, log, and ln versions of these ratios were calculated. Results were interpreted using statistical package program (SPSS Version 16.0) for Windows. The data were evaluated using appropriate statistical tests. The degree for statistical significance was defined as 0.05. 35 N, 20 OW, 47 OB, 97 MO children and 36 with MetS were investigated. Mean ± SD values of TRG/HDL-C were 1.27 ± 0.69, 1.86 ± 1.08, 2.15 ± 1.22, 2.48 ± 2.35 and 4.61 ± 3.92 for N, OW, OB, MO and MetS children, respectively. Corresponding values for the DONMA$_{LAB}$ index were 2.17 ± 1.07, 3.01 ± 0.94, 3.41 ± 0.93, 3.43 ± 1.08 and 4.32 ± 1.00. TRG/HDL-C ratio significantly differed between N and MetS groups. On the other hand, DONMA$_{LAB}$ index exhibited statistically significant differences between N and all the other groups except the OW group. This index was capable of discriminating MO children from those with MetS. Statistically significant elevations were detected in MO children with MetS ($p < 0.05$). Multiple parameters are commonly used during the assessment of MetS. Upon evaluation of the values obtained for N, OW, OB, MO groups and for MO children with MetS, the [ln TRG/HDL-C*INS] value was unique in discriminating children with MetS.

Keywords : children, index, laboratory, metabolic syndrome, obesity

Conference Title : ICO 2019 : International Conference on Obesity

Conference Location : London, United Kingdom

Conference Dates : May 23-24, 2019