World Academy of Science, Engineering and Technology
International Journal of Medical and Health Sciences
Vol:14, No:02, 2020

Associations between Surrogate Insulin Resistance Indices and the Risk of Metabolic Syndrome in Children

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Abstract : A well-defined insulin resistance (IR) is one of the requirements for the good understanding and evaluation of metabolic syndrome (MetS). However, underlying causes for the development of IR are not clear. Endothelial dysfunction also participates in the pathogenesis of this disease. IR indices are being determined in various obesity groups and also in diagnosing MetS. Components of MetS have been well established and used in adult studies. However, there are some ambiguities particularly in the field of pediatrics. The aims of this study were to compare the performance of fasting blood glucose (FBG), one of MetS components, with some other IR indices and check whether FBG may be replaced by some other parameter or ratio for a better evaluation of pediatric MetS. Five-hundred and forty-nine children were involved in the study. Five groups were constituted. Groups 109, 40, 100, 166, 110, 24 children were included in normal-body mass index (N-BMI), overweight (OW), obese (OB), morbid obese (MO), MetS with two components (MetS2) and MetS with three components (MetS3) groups, respectively. Age and sex-adjusted BMI percentiles tabulated by World Health Organization were used for the classification of obesity groups. MetS components were determined. Aside from one of the MetS components-FBG, eight measures of IR [homeostatic model assessment of IR (HOMA-IR), homeostatic model assessment of beta cell function (HOMA-%β), alanine transaminase-to-aspartate transaminase ratio (ALT/AST), alanine transaminase (ALT), insulin (INS), insulin-to-FBG ratio (INS/FBG), the product of fasting triglyceride and glucose (TyG) index, McAuley index] were evaluated. Statistical analyses were performed. A p value less than 0.05 was accepted as the statistically significance degree. Mean values for BMI of the groups were 15.7 kg/m², 21.0 kg/m², 24.7 kg/m², 27.1 kg/m², 28.7 kg/m², 30.4 kg/m² for N-BMI, OW, OB, MO, MetS2, MetS3, respectively. Differences between the groups were significant (p < 0.001). The only exception was MetS2-MetS3 couple, in spite of an increase detected in MetS3 group. Waist-to-hip circumference ratios significantly differed only for N-BMI vs, OB, MO, MetS2; OW vs MO; OB vs MO, MetS2 couples. ALT and ALT/AST did not differ significantly among MO-MetS2-MetS3. HOMA-%β differed only between MO and MetS2. INS/FBG, McAuley index and TyG were not significant between MetS2 and MetS3. HOMA-IR and FBG were not significant between MO and MetS2. INS was the only parameter, which showed statistically significant differences between MO-MetS2, MO-MetS3, and MetS2-MetS3. In conclusion, these findings have suggested that FBG presently considered as one of the five MetS components, may be replaced by INS during the evaluation of pediatric morbid obesity and MetS.

Keywords : children, insulin resistance indices, metabolic syndrome, obesity
Conference Title : ICOM 2020 : International Conference on Obesity and Metabolism
Conference Location : Dublin, Ireland
Conference Dates : February 13-14, 2020