The Indian Journal of Pediatrics (October 2019) 86(10):881–882
https://doi.org/10.1007/s12098-019-03047-7

EDITORIAL COMMENTARY

Continuous Metabolic Syndrome Score in Children: How Useful is it?

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Received: 22 July 2019 / Accepted: 23 July 2019 / Published online: 3 August 2019

India is facing a widespread epidemic of lifestyle illnesses including type 2 diabetes mellitus (T2DM) and cardiovascular disease (CVD), many of which have their antecedents in childhood and adolescence [1, 2]. Reaven first described an association of T2DM and CVD morbidity and mortality in adults with a *cluster of metabolic abnormalities*, including central obesity, dyslipidemia, high fasting glucose and high blood pressure, which is now termed as 'Metabolic Syndrome' (MS) (formerly called syndrome 'X') [3]. The underlying mechanism of MS has been postulated to be insulin resistance and hyperinsulinemia secondary to obesity [3]. With the rising prevalence of childhood obesity worldwide, MS is increasingly encountered in children. In India, MS affects 11–18% and 36–50% overweight and obese children, respectively, with an overall prevalence of 4–4.5% amongst urban adolescents [4, 5]. In longitudinal studies, the adverse metabolic profile of childhood MS has been shown to persist into adulthood predisposing to adverse health outcomes [6].

Childhood MS is defined by the adult criteria of the National Education Program Adult Treatment Panel (ATP-III), modified for adolescents, which includes 3 out of 5 risk factors [waist circumference > 75th percentile, high density lipoprotein (HDL) Cholesterol <40 mg/dl, fasting triglycerides >/= 100 mg/dl, fasting blood sugar >/= 110 mg/dl and blood pressure > 90th percentile) [7]. However, there are inherent fallacies in this binary definition of MS [8]. Many children with central obesity and hyperinsulinemia do not fulfill the criteria for MS due to ethnic or gender differences, though they are at high risk for T2DM and CVD [9]. The component risk factors of MS are not 'all or none'dichotomous variables but rather represent a continuous risk for adverse metabolic effects. Additionally, the definition does not reflect the severity of the metabolic derangements and how they evolve over time. In fact, the traditional definition of MS leads to loss of data and affects the statistical power of research studies, which may fail to show association with adverse outcomes even if they exist [10]. Hence, researchers have advocated the use of a continuous metabolic syndrome (cMetS) risk score to improve recognition of associations between risk and outcome in epidemiological studies [8]. Longitudinal studies have shown that the childhood cMetS risk score had a high correlation with adult onset T2DM and CVD [11]. The cMetS score has been shown to predict CVD risk in young adulthood more reliably [12] or equally well [11] compared to the traditional MS definition.

In this issue of the journal, Sawant and Amin examine the usefulness of cMetS risk score in predicting MS in a cohort of obese and overweight Indian children [13]. The authors used the residual z-score method described by Eisenmann, by calculating the sum of the z-scores of each MS component of individual patients to yield the cMetS risk score [10]. The cMetS risk score correlated with the number of risk factors and predicted the presence of MS with great accuracy at the cut-offs suggested. However, the authors have derived cMetS score from the MS component z-score of their cohort of patients and hence, the risk score and cut-offs may not be applicable to other populations. One way to overcome this limitation would be to use ethnic nationally representative (rather than sample specific) data for z-scores of MS risk components [14]. Secondly, the cMetS risk score calculation is based on the assumption that all components of MS contribute equally to disease risk; however, it is known that MS components may influence risk differentially depending on gender and ethnicity [15]. Some authors have tried to account for this by using confirmatory 'factor analysis' in calculating the cMetS score [15].

Further research is required to determine the usefulness of the cMetS risk score in predicting adverse health outcomes in the Indian population. Also, the clinical utility of the score to identify at-risk individuals and guide targeted lifestyle and

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pharmacological interventions needs to be explored. The cMetS risk score can be used to monitor trends in metabolic and CVD risk in the population [16] and also guide policy-makers regarding efficacy of public health programmes. In conclusion, cMetS risk score is a valuable tool in the hands of researchers, clinicians and policy makers in addressing the childhood obesity and MS epidemic. Future research should identify Indian cut-off values and focus on monitoring trends and effectiveness of lifestyle interventions.

Compliance with Ethical Standards

Conflict of Interest None.

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