Insulin Resistance and Cardio Metabolic Abnormalities among Overweight South Indian Children: Chennai Slim and Fit Programme

Sir,

Overweight and obesity during childhood/adolescence is associated with insulin resistance (IR), dyslipidemia, and elevated blood pressure in young adulthood.[1] IR, which is strongly associated with central obesity, appears early in children in the recent years.[1] The aim of this study was to assess IR and cardiometabolic abnormalities among south Indian children with BMI ≥ 85th percentile.

A total of 2376 school children in the age group of 8-13 years were randomly selected from four schools representing east, west, north, and south zones of Chennai, Tamil Nadu. They were screened for overweight, of which 500 children satisfied the WHO criteria of BMI ≥ 85th percentile and obesity as ≥ 97th percentile.[2] A total of 261 children (M:F, 171:90) willing to participate were instructed to stay minimum 8 h fasting and venous blood samples were collected. Plasma glucose and lipid profile were estimated using standard enzymatic procedures. Fasting insulin was estimated by chemiluminescence method, and IR was calculated using Homeostasis Model Assessment method. Lipid abnormalities constitute cholesterol ≥ 169 mg/dl in boys and ≥ 181 mg/dl in girls, triglycerides ≥ 118 mg/dl, high density lipoprotein cholesterol (HDL-C) ≤ 38 mg/dl, low density lipoprotein cholesterol (LDL-C) ≥ 108 mg/dl in boys and ≥ 114 mg/dl in girls.[3] Normal cut-off values for fasting insulin and IR as ≤ 15 μU/ml and ≤ 3.2, respectively, were derived from normoglycemic, normal weight children (n = 28) by taking mean + 1SD. Blood pressure was recorded and subjects were categorized as normal, pre-hypertensive and hypertensive as per 4th report of National High Blood Pressure Education Program.[4] Institutional ethical committee approved the study. Written consent was obtained from the parents of the children.

According to WHO criteria, 322 children (13.5%) were found to be overweight and 178 children (7.5%) obese. Out of 500 children, 261 children with a mean age of 10.5 ± 1.3 years and mean BMI of 22.1 ± 3.2 kg/m^2 showed willingness to participate in the study. 43.7% of the children had at least one lipid abnormality.

High total cholesterol was significantly higher among boys than girls (33.9 vs. 14.3%; P < 0.001). A higher proportion of girls had fasting hyperinsulinemia than boys (45.6 vs. 26.3%; P = 0.001). IR (>3.2) was higher among girls, but was not statistically significant compared with boys (33.3 vs. 24.6%) (P = 0.087). Abnormal triglycerides, HDL-C, LDL-C, elevated glucose levels, and blood pressure were observed among the children, with no significant difference in gender. This study highlighted a high prevalence of cardiometabolic abnormalities among overweight children, and gender differences were seen in fasting insulin levels with predominance in girls. Similarly, Misra *et al*., reported high prevalence of IR correlating with overweight and obesity in postpubertal children.[3] A study in North India reported 13.6% of hypertriglyceridemia, 10.6% of hypercholesterolemia, and 18.2% of low HDL-C levels among normoglycemic children aged 14-18 years,[5] whereas the present study on overweight children without diabetes reported higher prevalence of hypertriglyceridemia and hypercholesterolemia and lower prevalence of low HDL-C levels.

In conclusion, there is a generalized dyslipidemia and IR among overweight children, suggestive of probable rise in future cardiovascular-related events. The findings may help to plan primary prevention programs towards weight reduction and optimum maintenance of lipid levels among children.

Acknowledgments

We are indebted to the children who were very cooperative during the study and the principals, parents and teachers for their cooperation. We thank our epidemiology team members–Mr. Irudaya Raj for blood collection, Mr. Mirza Rafiullah Baig for blood collection and analysis of all biochemical parameters, and Ms. Gayathri, Mrs. Shanthakumari, Ms. Ramya, Mrs. Indumathy, Mrs. Hajira Parveen, Mrs. Ruth Annapurni, Ms. Manjula, Mr. Elayaraja and Mr. Pintochan Abraham for their support in field work.

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DOI: 10.4103/0970-0218.112452