HYPERTRIGLYCERIDEMIC WAIST PHENOTYPE IN OBESE INDIAN CHILDREN

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BACKGROUND

Cardiovascular diseases are the leading cause of death in developed and developing countries. Body Mass Index (BMI), most commonly used to screen children for cardiometabolic risk (CMR) has numerous drawbacks. Hypertriglyceridemic waist (HW) phenotype is well accepted to screen adults for CMR and recently being studied for use in children to detect cardiometabolic risks.

OBJECTIVE

To evaluate HW phenotype as an alternative for BMI to detect children at risk for metabolic risk factors.

METHODS

Retrospective review of case records of children evaluated for metabolic risk factors in the paediatric endocrine clinic of a tertiary care referral unit of a multi-speciality children's hospital of a developing country. All children referred to obesity clinic had their waist measured and those who had abnormal waist circumference under went blood investigations.

TABLE 1: STUDY CRITERIA[4,5,6,7,8]

Parameter	Cut off value for obesity (mg/dL)	Mmol/L
Clinical Criteria		
Waist circumference	≥ 90th percentile as per ethnic data	
Blood pressure	> 90th percentile for age, sex and height	
Body Mass Index	> +2SD for age	
Biochemical Criteria		
Triglycerides	> 100	5.55
HDL-c	< 45	2.49
LDL-c	> 130	7.21
Total cholesterol	> 200	11.09
Fasting blood sugar	> 110	6.10
Fasting Insulin	≥ 15 mU/L	90 pmol / Lt
HOMA-IR	≥ 2.5	

HDL –High density lipoprotein cholesterol, LDL – Low density lipoprotein cholesterol, HOMA-IR – homeostatic model for assessment of insulin resistance

Children with abnormal waist circumference and serum triglyceride levels were considered to have HW phenotype.

STATISTICAL ANALYSIS

All data was tabulated on Microsoft Excel. Chi Square test and student t test were used as appropriate and $p<0.05$ was considered as significant. Statistical test was performed with SPSS 9.0 statistical package(SPSS,Inc.,Chicago,IL)

RESULTS

Records of 40 children (mean age 10.0 ± 3.3years; 27 males) reviewed. Mean BMI-SD score was 2.8±0.6. Out of 40 children, 34(85%) had abnormal BMI and 35(87.5%) had abnormal waist circumference. Abnormal HW phenotype was seen in 40% of children.

Children with abnormal HW phenotype had higher total cholesterol (9.21 ± 2.11 vs 8.94 ± 1.85mmol/L; $p>0.05$), higher LDL levels (5.86 ± 2.11 vs 5.71 ± 1.68mmol/L, $p>0.05$) and lower HDL levels (2.29 ± 0.94 vs 2.49 ± 0.78; $p<0.05$) with elevated serum insulin (1.77 ± 0.649 vs 0.96 ± 0.73; $p>0.05$). Fasting blood sugar (92.67 ± 10.6 vs 94.3 ± 13.5) systolic and diastolic blood pressure (SBP - 108.0 ± 113. vs 110.8 ± 17.8 and DBP – 74.0 ± 8.4 vs 73.3 ± 10.7) remained same in both groups.

Elevated blood pressure was seen in 7 children (17.5%) of which 57.14% had elevated triglycerides. Polycystic ovarian disease and fatty liver was present in 2(5%) children of which 1 each had abnormal HW phenotype.

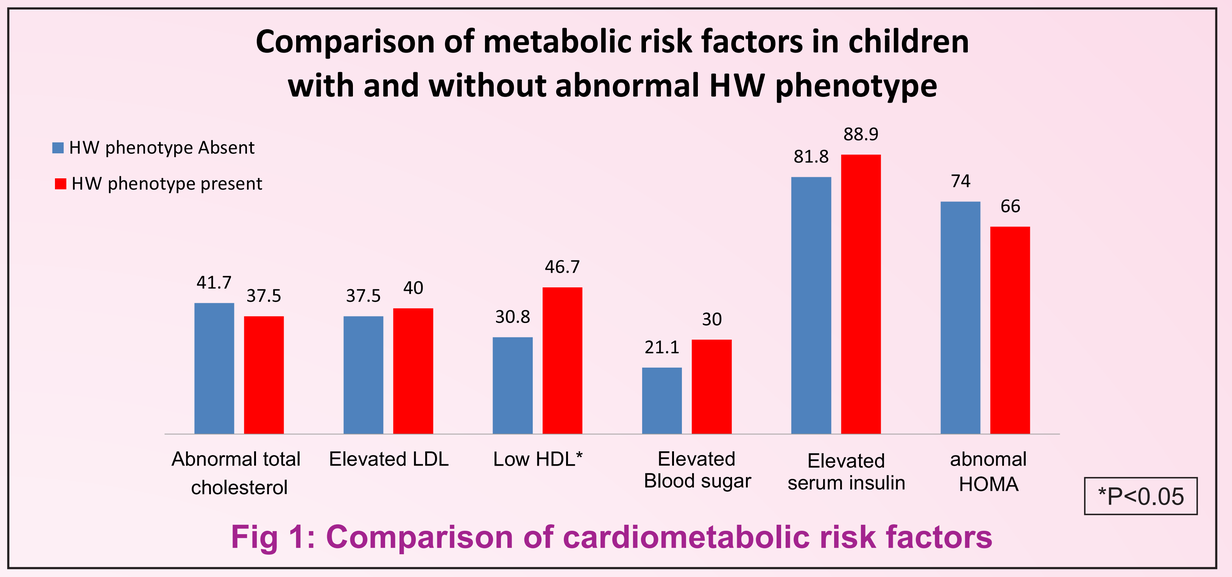

Fig 1: Comparison of cardiometabolic risk factors

Table 2: Comparison of factors predicting cardiometabolic risk in children

Parameter	HW phenotype		BMI	
	Sensitivity	Specificity	Sensitivity	Specificity
TC	37.5	58.3	92.3	13.4
LDL	40	62.5	91.6	13.0
HDL	58.3	70.3	80	8
Insulin	50	64	100	5
Blood Sugar	42.8	68.1	83.3	9.5

TC – total cholesterol, HDL –High density lipoprotein cholesterol, LDL – Low density lipoprotein cholesterol

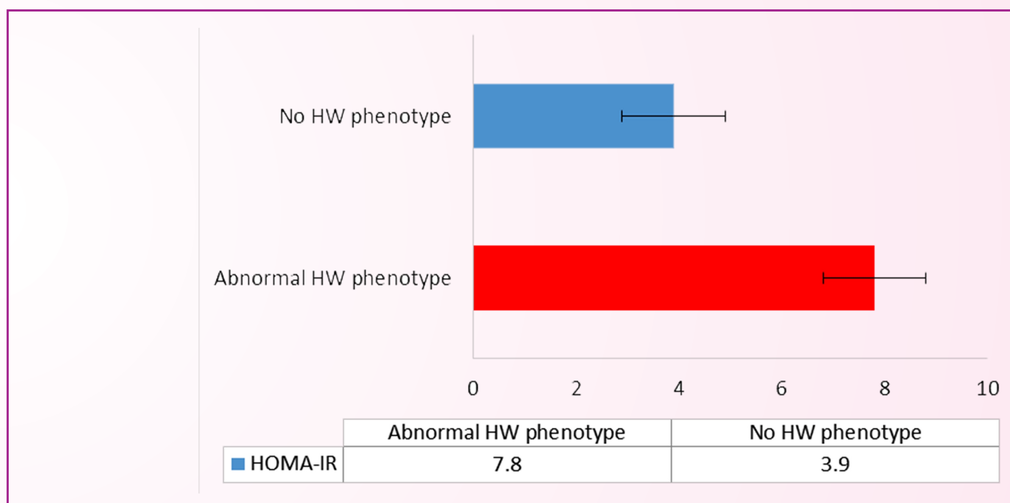

Fig 2: HOMA-IR distribution

DISCUSSION

Study done by Esmaillzadeh A et al in Iran comparing HW phenotype with BMI showed higher sensitivity for HW phenotype patients in recognising patients with abnormal LDL and HDL cholesterol. There was equal specificity for both HW phenotype and BMI in all the metabolic parameters in the same study.

Authors	References	Sample size	Place of study	Finding
Conceição-Machado ME et al [1]	2013	80	[3] Brazil	Total cholesterol, LDL cholesterol, TG were higher in HW phenotype HDL-c – lower, No difference in blood sugar levels
Bailey DP et al [9]	2013	234	United Kingdom	HDL-c and impaired fasting glucose was seen in HW phenotype
OUR STUDY (unpublished data)	2014	40	India	Total cholesterol, LDL cholesterol, TG were higher and HDL-c lower in HW phenotype. No difference in blood sugar and serum insulin levels

CONCLUSION

HW phenotype is associated with an atherogenic lipid profile.
It is a useful specific tool to recognize children at risk for cardiometabolic complications; however BMI remains a better screening tool.

References

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