THE UNIVERSITY OF ARIZONA College of Medicine

Department of Family and Community Medicine
Healthy Families in Healthy Communities

Comparison of Methods Used to Detect Insulin Resistance in Overweight and Obese Children

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Introduction

Rates of childhood obesity and subsequent metabolic complications have increased throughout the United States. It is important that parameters for identifying metabolic complications used once only in adult populations now be standardized for children as well. Insulin resistance (IR) is an important risk factor for type 2 diabetes mellitus (T2D) and cardiovascular disease. By identifying IR before evidence of abnormal glucose levels, we may be able to intervene earlier and prevent beta-cell dysfunction and type 2 diabetes. The objective of this study is to compare surrogate methods of IR assessment by comparing the sensitivity and specificity of fasting insulin, fasting glucose, and triglyceride/HDL ratio in identifying IR in the pediatric population.

Methods

Children, aged 9-12 years-old, were recruited to participate in a family-based community diabetes prevention trial. Inclusion criteria were body mass index (BMI) ≥85th percentile for age and sex, and ≥ 1 T2D risk factor (e.g., family history of T2D, ethnic minority, etc.). Baseline fasting blood glucose, insulin, triglycerides, and HDL-c were collected from 28 participants and used for the analysis. Using a calculated Homeostasis Model Assessment (HOMA)-IR with a cut off value ≥ 2.5 to define presence or absence of insulin resistance, receiver operating characteristic (ROC) curves were generated and compared for fasting insulin, glucose, and triglyceride/HDL.

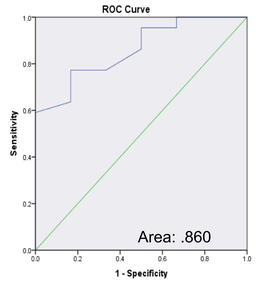
Results

28 children were included in the study. The average age (mean ±standard deviation) was 10.8 ± 1.2 years. Twenty (71%) were Hispanic. Twenty-four (85.7%) had weight ≥ 95th percentile BMI for age. Twenty-two (78.6%) were found to have a HOMA-IR value ≥ 2.5. ROC curves analysis showed the greatest sensitivity and specificity for fasting insulin with area under the curve of 0.989 (95 % Confidence Interval 0.956, 1.000.)

Correlations

		HOMAIR	Glucose
HOMAIR	Pearson Correlation	1	.391*
	Sig. (2-tailed)		.040
	N	28	28
Glucose	Pearson Correlation	.391*	1
	Sig. (2-tailed)	.040	
	N	28	28

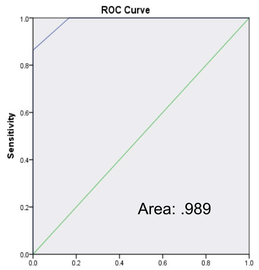
*. Correlation is significant at the 0.05 level (2-tailed).



Correlations

		HOMAIR	Insulin
HOMAIR	Pearson Correlation	1	.993**
	Sig. (2-tailed)		.000
	N	28	28
Insulin	Pearson Correlation	.993**	1
	Sig. (2-tailed)	.000	
	N	28	28

**. Correlation is significant at the 0.01 level (2-tailed).

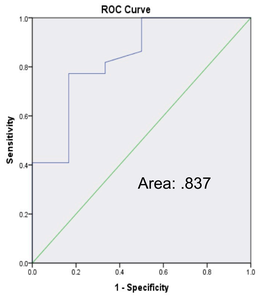


Correlations

		HOMAIR	TRIHDL
HOMAIR	Pearson Correlation	1	.487**
	Sig. (2-tailed)		.009
	N	28	28
TRIHDL	Pearson Correlation	.487**	1
	Sig. (2-tailed)	.009	
	N	28	28

**. Correlation is significant at the 0.01 level (2-tailed).

Figures and data analysis prepared by Randa Kutob



Conclusions

Multiple studies in adults and children have identified HOMA-IR as the best non-invasive method of identifying IR. The downfall in using HOMA-IR in the clinical setting is the additional time in calculating the value plus the additional glucose testing. Fasting insulin with cut off point of 12 µIU/ml maybe a good alternative option to identify IR and is superior to fasting glucose and Triglyceride/HDL ratio. Further, the traditional fasting glucose value of ≥ 100 mg/dl misses many children with IR. The limitations of the study are that it is small and targeting Hispanic overweight youth 9-12 which limits the generalizability of our results.

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