Obesity, overweight, elevated waist circumference and Insulin differ in their associations with insulin resistance markers- the ERICA study

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ERICA
ESTUDO DE RISCOS CARDIOVASCULARES EM ADOLESCENTES

BACKGROUND

- Increasing interest in early identification of insulin resistance in adolescents in routine clinical practice [1,2];
- Insulin resistance markers: related to glucose homeostasis[3];
- Aim: Estimation of the level of fasting insulin (fasting insulin equivalent, FIeq) that would replicate the strength of the associations of adiposity variables with each insulin resistant marker (Sharret AR, et al)[4,5].

METHODS

- 2013-2014 population-wide school-based survey of 37,815 Brazilian adolescents aged 12 to 17 years from whom blood samples were collected[6,7];
- Outcome: insulin resistance markers: see Table 2
- We calculated linear regression coefficients of each independent variable stratified by age and sex.

RESULTS

- Characteristics of the study sample are shown in Table 1. Median age, 15 years; obesity, 9%.
- The insulin markers QUICKI and TyG showed the least variability (Table 2)
- The highest FIeq values were related to obesity, TyG-BMI and METS-IR, whereas the lowest FIeq values were related to TyG and TG/HDL, mainly in adolescents aged 15 to 17 years old (Figures 1 and 2)
- FIeqs for elevated WC were higher than those for obesity and overweight in late adolescence (15-17 years old);
- FIeqs for obesity, overweight and elevated WC were ≤ 4 mU/L, for HOMA-IR, QUICKI, FIRI, FGIR and InsuTAG.

CONCLUSIONS

- Importance of adding WC measurements to routine clinical practice for identifying insulin resistance individuals, particularly in late adolescence;
- Future studies: prospective approaches and inclusion of insulin resistance markers combined with anthropometric parameters.

RESULTS

Table 1. Characteristics of 37,815 adolescents enrolled in the ERICA, 2013-2014.

Variables	n	Median	Interquartile range	
			1ºQ	3ºQ
Age (years)	37,815	15	13	16
Female (%)	37,815	50.2		
Nutritional status				
Normal[a] (%)	27,073	71.0	69.4	72.5
Overweight[b] (%)	6,635	17.5	44.0	49.2
Obesity[c] (%)	3,097	9.2	8.5	10.0
Waist circumference (cm)				
Normal (%)	33,373	87.4	86.3	88.4
Elevated[d] (%)	4,386	12.6	11.6	13.7
Insulin (mU/L)	37,760	8	5.5	11.3

Table 2: Median values and interquartile range of insulin resistance markers in the ERICA, 2013-2014.

Variables	n	Median	Interquartile range	
			1ºQ	3ºQ
HOMA-IR*	37,526	1.69	1.15	2.42
QUICKI**	37,526	0.15	0.15	0.16
FIRI[α]	37,526	1.52	1.03	2.18
FGIR[β]	37,526	10.7	7.6	15.3
TG/HDL[δ]	37,706	0.66	0.48	0.93
TyG[ϕ]	37,559	8.0	7.7	8.3
TyG-BMI[γ]	37,559	164.1	146.6	188.3
InsuTAG[λ]	37,667	6.2	3.8	10.3
METS-IR[π]	37,559	29.6	26.2	34.1
HOMA-IR*	37,526	1.69	1.15	2.42
QUICKI**	37,526	0.15	0.15	0.16

[a]Z-score ≥ -2 & Z-score ≤+1
[b]Z-score > +1 & Z-score ≤+2
[c]Z-score> +2
[d]≥ 90th percentile for those aged 10 to <16 years old; and ≥ 90cm for males and ≥ 80 cm for females for those aged 18 years or older
*Homeostasis Model Assessment Insulin Resistance
** Quantitative Insulin Sensitivity Check index
[α]Fasting insulin resistance index
[β]fasting glucose to insulin ratio
[δ]Triglyceride/high-density lipoprotein
[ϕ]Triglyceride/glucose index
[γ]Triglyceride/glucose-Body Mass Index
[λ]fasting insulin x fasting triglycerides
[π]Metabolic Score of Insulin Resistance

Figure 1. FIeq for overweight, obesity and elevated WC for insulin resistance markers in girls according to age ERICA (2013-2014)

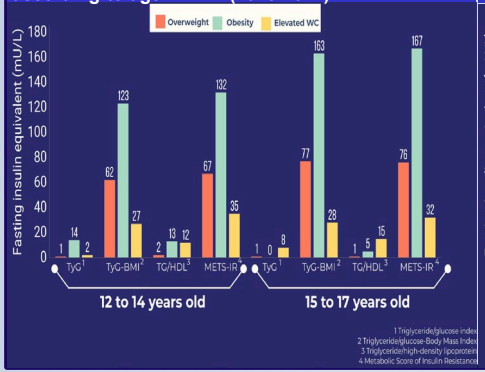
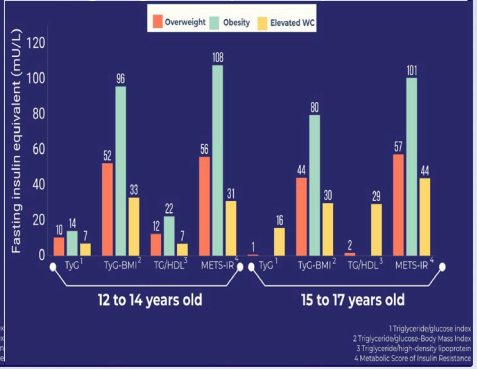


Figure 2. FIeq for overweight, obesity and elevated WC for insulin resistance markers in boys according to age ERICA (2013-2014)



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