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ORIGINAL ARTICLE

Epicardial adipose tissue thickness in children and adolescents with cardiometabolic risk factors☆

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KEYWORDS
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Abstract
Objective: To assess the relationship of epicardial adipose tissue (EAT) thickness with cardiometabolic risk factors (CRFs) in children and adolescents.
Methods: Seventy-seven subjects of both sexes aged 7–18 years were selected. Medical history, clinical parameters, and glucose, insulin, and lipid levels were collected. EAT thickness was measured using transthoracic echocardiography. Study subjects were divided into two groups based on whether they had less than two or two or more CRFs.
Results: The group with two or more CRFs had higher EAT thickness, insulin, and HOMA-IR values ($p < 0.05$). EAT thickness showed a statistically significant positive correlation with body mass index (BMI) ($r = 0.561$, $p = 0.0001$), waist circumference ($r = 0.549$, $p = 0.0001$), systolic blood pressure (SBP) ($r = 0.256$, $p = 0.028$), insulin ($r = 0.408$, $p = 0.0001$), and HOMA-IR ($r = 0.325$, $p = 0.005$). However, these correlations were not significant after adjustment for BMI. The cut-off point for EAT thickness as predictor of two or more CRFs was 3.17 mm. The risk (odds ratio) of having two or more CRFs if EAT thickness was >3.17 mm was 3.1 (95% CI: 1.174–8.022). BMI was the independent variable that most affected EAT thickness and the presence of two or more CRFs.
Conclusion: In this group of children and adolescents, the relationship of EAT thickness with CRFs was found to be dependent on BMI.

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PALABRAS CLAVE
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Espesor del tejido adiposo epicárdico en niños y adolescentes con factores de riesgo cardiometabólico

Resumen
Objetivo: Determinar la relación del espesor del tejido adiposo epicárdico (TAE) con factores de riesgo cardiometabólico (FRC) en niños y adolescentes.
Métodos: Se seleccionaron 77 sujetos de ambos sexos entre 7 y 18 años. Se realizó anamnesis y evaluación de parámetros clínicos, determinación de glucemia, insulina y lípidos y se calculó el HOMA-IR. Se determinó el espesor del TAE mediante ecocardiografía transtorácica. Se formaron 2 grupos, participantes con menos de 2 FRC (cero o un FRC) y participantes con 2 o más FRC.
Resultados: El grupo con 2 o más FRC presentó mayores valores de espesor del TAE, insulina y HOMA-IR ($p < 0,05$). El espesor del TAE mostró una correlación positiva estadísticamente muy significativa con el índice de masa corporal (IMC) ($r = 0,561$; $p = 0,0001$), la circunferencia abdominal ($r = 0,549$; $p = 0,0001$), la presión arterial sistólica (PAS) ($r = 0,256$; $p = 0,028$), la insulina ($r = 0,408$; $p = 0,0001$) y el HOMA-IR ($r = 0,325$; $p = 0,005$), sin embargo, estas correlaciones fueron no significativas al ajustar para el IMC. El punto de corte para el espesor del TAE como predictor de 2 o más FRC fue de 3,17 mm. El riesgo *(odds ratio)* de tener 2 o más FRC si presenta un espesor de TAE > 3,17 mm fue de 3,1 (IC: 1,174–8,022, $p = 0,02$). El IMC fue la variable independiente que más influyó sobre los valores del espesor del TAE y la presencia de 2 o más FRC.
Conclusión: En este grupo de niños y adolescentes se encontró que la relación del TAE con los FRC es dependiente del IMC.

Introduction

Different studies have shown that obesity, together with other cardiometabolic risk factors (CRFs), is associated with subclinical markers of atherosclerosis in children and adolescents,[1,2] and with early mortality in adulthood.[3,4]

Interest in organ-specific adiposity has increased rapidly in recent years. In this context, epicardial adipose tissue (EAT), the visceral fat of the heart, has emerged as a new cardiometabolic risk marker because of its close anatomical proximity to the myocardium and coronary artery, its endocrine and metabolic properties, and its diagnostic and therapeutic value.[5]

EAT thickness is consistently associated with metabolic syndrome (MS) and its components,[6,7] but changes markedly with age and between subjects from different ethnic groups, which has prevented agreement on a single general cut-off point for predicting the risk of MS.[8,9] In Venezuela EAT thickness greater than 5 mm was shown to have a good sensitivity and specificity for predicting MS[10]; that study, however, was conducted in an adult population, and its results are therefore not applicable to children and adolescents.

A significant correlation has been shown in obese children between EAT thickness and other anthropometric variables such as the body mass index (BMI) and abdominal circumference (AC).[11] Kim et al.[12] similarly showed that EAT thickness measured by echocardiography is a practical and accurate marker of visceral obesity in adolescents. In fact, sedentary adolescents have been shown to have greater EAT thickness as compared to non-sedentary ones, and each 1-mm increase in EAT thickness increases sevenfold the risk of visceral obesity.[13]

Recently, a 2.2% prevalence of MS has been reported in children and adolescents from Mérida, Venezuela; however, this population has a high frequency of abdominal obesity, hypertriglyceridemia, and high blood pressure.[14] No prior studies assessing EAT thickness in our children and adolescents are available. This study was therefore undertaken to assess EAT thickness in children and adolescents with CRFs, to ascertain to what extent our results were consistent with the few data available, and thus to make better use of the currently available diagnostic tools.

Materials and methods

Subjects

This was an observational, cross-sectional, analytical study. Participating subjects were selected from the outpatient clinics of endocrinology, nutrition, growth and pediatric development of the Instituto Autónomo Hospital Universitario de los Andes and the general population of Mérida, Venezuela. When sample size was considered, no studies were found comparing EAT thickness between children and adolescents, and estimation was therefore based on obese and non-obese data. Specifically, EAT thickness data from Mazur et al.[11] were used: 2.5 ± 0.81 mm for non-obese children and 5.5 ± 1.98 mm for obese children, with an α error of 0.05 and a β error of 0.20. The final sample size was 30 subjects per group. Overweight and obese subjects are known to have a greater frequency of CRFs than subjects with normal weight. Thus, overweight and obese individuals of both sexes aged 6–18 years of age were