

Original/Síndrome metabólico

Diagnosis of metabolic syndrome in children as a potential indicator of technical ability in medical and nutritional care

Isabel Medina Vera¹, Aurora E. Serralde Zúñiga², Laura Islas Ortega³, Edith Jiménez Rolland¹, Karla Daniela Jiménez Chanes⁴ and Martha Guevara Cruz¹

¹Department of Nutrition Physiology, Instituto Nacional de Ciencias Médicas y Nutrición, Salvador Zubirán. ²Department of Clinical Nutrition, Instituto Nacional de Ciencias Médicas y Nutrición, Salvador Zubirán. ³Department of Endocrinology, Children's Hospital DIF, Hidalgo. ⁴Medicine School, Universidad Veracruzana, campus Xalapa, México.

Abstract

Background: currently, there is an increase in the incidence of obesity in the pediatric population, which is associated with an increase in metabolic syndrome (MetS). Thus, an early diagnosis of MetS is needed in this population to improve the prevention of cardiovascular disease and type 2 diabetes in adulthood.

Objective: the aim of this study was to explore the ability of health professionals to identify the main criteria for MetS in children, which is required for establishing the conditions for early diagnosis and timely treatment.

Methods: a cross-sectional study was conducted using a survey and conducted in two states of the republic (Aguascalientes and Hidalgo) and in the Federal District from January to December 2014.

Results: the questionnaire was applied to 274 health professionals. Most of these professionals (61.7%) reported knowledge of the criteria for MetS diagnosis in children and adolescents. Additionally, it was observed that 63.1% of professionals did not perform the needed measurements the waist of circumference in preschool children and that 46.4% did not measure them in school children. However, 64.6% of professionals performed the measurements in adolescents.

Conclusions: this study found that health professionals providing care to pediatric patients do not know the parameters and cutoff points for MetS diagnosis. They do not conduct a deliberate search for MetS risk factors, which is a major limitation for diagnosis and early treatment. Therefore, we suggest a systematic approach for

DIAGNÓSTICO DE SÍNDROME METABÓLICO EN NIÑOS COMO INDICADOR POTENCIAL DE LA CAPACIDAD TÉCNICA EN LA ATENCIÓN MÉDICA Y NUTRICIONAL

Resumen

Introducción: actualmente se ha producido un aumento en la incidencia de obesidad en la población pediátrica, y con ello un incremento del Síndrome Metabólico (SM) por lo que es necesario realizar un diagnóstico oportuno del SM en esta población, así se propiciará la prevención de la enfermedad cardiovascular y la diabetes tipo 2 en la edad adulta.

Objetivo: explorar la capacidad de los profesionales de la salud para identificar los principales criterios de SM en niños, requisito para poder establecer las condiciones para el diagnóstico temprano y su tratamiento oportuno.

Material y métodos: se realizó un estudio transversal de investigación a través de una encuesta para identificar el conocimiento y la capacidad técnica de los profesionales de la salud en la atención y detección de niños y adolescentes con SM. Se llevó a cabo en dos Estados de la República (Aguascalientes e Hidalgo) y en el Distrito Federal en los meses de enero a diciembre de 2014.

Resultados: el cuestionario se aplicó a 274 profesionales de la salud dentro de los cuales se encontraban licenciados en nutrición, médicos generalistas, médicos pediatras, licenciados en enfermería y licenciados en enfermería con especialidad pediátrica. El 61,7% de los encuestados refirieron conocer los criterios de diagnóstico de SM en esta población, sin embargo solo el 32,8% contestó de manera correcta a estos. Por otro lado se observó que el 63,1% del total de los profesionales no miden la circunferencia de cintura en preescolares y el 46,4% en escolares; no obstante, el 64,6% sí realiza esta medición en adolescentes. Por otro lado, el 72,6% de los encuestados no mide la presión arterial en edad preescolar y el 64,6% en edad escolar; sin embargo, el 52,2% sí la mide en adolescentes.

Conclusión: en el estudio observamos que los profesionales de la salud que dan atención a los pacientes pediátricos no conocen los parámetros y puntos de corte para diagnosticar el SM; no realizan una búsqueda intencionada de esos factores de riesgo y, por lo tanto, esto se considera una gran limitación para realizar el diagnóstico y tratamiento temprano. Por lo que sugerimos un acercamiento sistemático para mantener los estándares de los

Correspondence: Martha Guevara Cruz.
Departamento de Fisiología de la Nutrición.
Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán.
Vasco de Quiroga N.º 15 CP.14000 México, D.F.
E-mail: marthaguevara8@yahoo.com.mx

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maintaining the standards of health professionals and to make determining the criteria for proper diagnosis of MetS a target of clinical practice.

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Key words: *Metabolic syndrome. Children. Pediatrics. Diagnosis. Health professionals.*

Introduction

Most complications of childhood obesity are caused by metabolic disorders induced by excessive accumulation of fat tissue that increases the risk of type 2 diabetes mellitus and cardiovascular disease. The increase in the incidence and prevalence of obesity in childhood can lead to a significant increase correlated with metabolic syndrome (MetS)¹ because obesity is the main factor involved in both MetS physiopathology² and cardiovascular diseases. Finding more effective ways to identify pediatric patients at higher risk of developing cardiovascular and metabolic complications is a promising strategy for improving the prevention of complications of early obesity³. However, several definitions of MetS in children and adolescents have been formulated⁴, all of which share the following criteria: elevated waist circumference (abdominal obesity), high triglycerides, low HDL (high density lipoprotein-cholesterol), high blood pressure (BP), and high fasting glucose^{4,5}.

Techniques used to determine MetS in the pediatric population are different from those used in adults. There are cutoff points for each parameter based on percentiles of the pediatric population^{4,6}. This diversity may lead to inconsistent results for prevalence estimation and diagnosis of MetS, including when the same population is being assessed⁷⁻⁹. This inconsistency is increased due to different academic training standards and geographical locations of healthcare professionals. Friend *et al.* performed a systematic review of 63 studies in which Adult Treatment Panel III, International Diabetes Foundation, and World Health Organization (ATP III, IDF and WHO) criteria were applied. A MetS prevalence of 3.3% (range 0–19.2%) was found in children, of which 11.9% (range 2.8–29.3%) were overweight and 29.2% (range 10–66%) were obese¹⁰.

In clinical practice, metabolic variables included in the definition of MetS should be evaluated to improve the opportunity to identify those subjects with high metabolic risk at an early age. Unfortunately, it has been found that the different components of MetS are not being evaluated in everyday clinical practice, despite the international recognition of MetS association with cardiovascular risk and other complications¹¹⁻¹³. Therefore, this study aims to explore the ability of healthcare professionals to identify the main criteria for MetS in children, which is required for establishing the conditions for early diagnosis and timely treatment.

profesionales de la salud y establecer como objetivo de la práctica el determinar los criterios de SM para realizar el diagnóstico adecuadamente.

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Palabras clave: *Síndrome metabólico. Niños. Pediatría. Diagnóstico. Profesionales de la salud.*

Materials and methods

A cross-sectional study was conducted through a survey to identify the technical knowledge and ability of health professionals in the diagnosis of children and adolescents with MetS. A random sample of healthcare professionals was selected, and they were invited to participate in the survey anonymously. The study was conducted in two states of Mexico (Aguascalientes, Hidalgo) and the Federal District from January to December 2014.

A multiple choice questionnaire was used. It consisted of nine questions to assess the ability to diagnose MetS in the pediatric population. The first question sought to identify the profession of the interviewees, and the following questions focused on their knowledge of the MetS criteria: 6 questions were related to the methodology of measuring the components of MetS, such as waist circumference and BP in preschool, school and adolescent ages, which is the typical method for conducting these measurements in clinical practice and the reasons for using such methods.

A descriptive analysis was performed. The nominal variables were expressed as frequencies and proportions. The software used for statistical analysis was SPSS for Windows (version 19.00; SPSS Inc, Chicago, Ill).

Results

The survey was conducted among a total of 274 healthcare professionals. The majority of professionals involved were nutritionists (n=123 professionals, 44.8%), followed by 84 general practitioners (30.7%), 34 (12.4%) reporting another medical subspecialty, 21 (7.7%) pediatricians, 9 (3.2%) nursing graduates and only 3 (1.1%) pediatric nurses. Healthcare professionals were evaluated regarding their knowledge of the MetS criteria in children (without specifically mentioning the criteria). One hundred sixty-nine (61.7%) healthcare professionals stated knowing the criteria. When categorized by profession, 100% (n=3) of pediatric nurses stated that they were aware of MetS criteria, followed by 85.7% of pediatricians (n=18) (Figure 1).

Ninety (32.8%) healthcare professionals were able to correctly specify the MetS criteria in children (Ta-

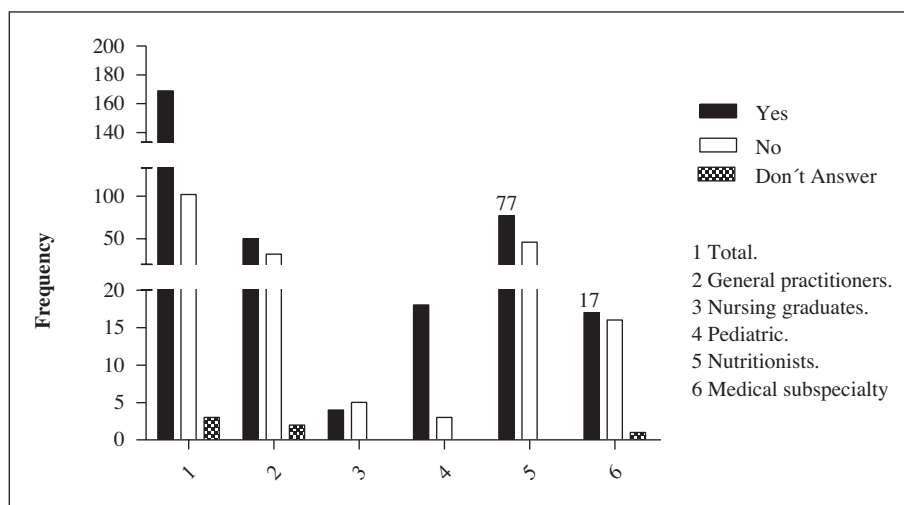


Fig. 1.—Number of health professionals who reported knowing and ignoring the criteria for diagnosing metabolic syndrome in children and adolescents.

ble I). Eighty-two professionals out of 169 (48%) stated that they knew the MetS criteria in children and at the same time answered the survey correctly; the general practitioners provided the highest percentage of correct responses (58%), with 29 general practitioners out of 50. Among the other professionals, 44-58% replied correctly.

With regard to questions focused on frequency, cause, and method for measuring waist circumference in children, 63.1% of professionals did not measure waist circumference in preschool children, 46.4% did not measure it in school children, and 64.6% performed this measurement in adolescents. Data expressing the percentages categorized by professions are shown in table II.

When asked about the reasons for not measuring waist circumference, 37.6% did not reply, 14.6% replied that they did not measure it because no specific cutoff point has been approved by any organization, and 14.2% did not think it was useful to measure this parameter. Professionals who measure waist circumference were as follows: 40.9% performed the measurement at the midpoint between the iliac crest and

the lower rib, 17.2% measured it at the level of the navel, and 15.3% measured at the narrowest point of the waist.

With regard to BP measurement, 72% of interviewees did not measure BP in preschool children, and 64.6% did not measure BP in school-age children; however, 52.2% of interviewees measured BP in adolescents (table III). The following reasons were given for not performing this measurement during clinical practice: 25.5% did not reply to the question, 34.7% replied that it was due to lack of suitable supplies for taking the measurement, 5.5% replied that it was due to lack of knowledge of the procedure to perform the measurement, 7.3% replied that it was because they did not find it useful to measure BP, and 17.5% replied that it was due to lack of information for interpreting BP. The healthcare professionals who stated that they measured BP were asked about how they interpreted the results: 24.5% did not respond, 5.8% were based on cutoff points used for adults, 30.7% used percentile tables for the pediatric population, 3.6% used a BP of <130/85 mmHg as a reference point, and 35.4% did not measure BP in pediatric patients.

Table I
MetS criteria and responses stratified by profession

	Total	General practitioner	Nurse	Pediatric nurse	Pediatrician	Nutritionist	Other
Waist circumference, triglycerides, HDL-c, BP and glucose.	90 (32.8)	34 (40.5)	2 (22.2)	1 (33.3)	8 (38.1)	37 (30.1)	9 (26.5)
BMI, triglycerides, total cholesterol, BP and glucose.	65 (23.7)	19 (22.6)	2 (22.2)	2 (66.7)	9 (42.9)	26 (21.1)	8 (23.5)
Waist circumference, LDL-c, BP and glucose.	29 (10.6)	5 (6)	0 (0)	0 (0)	1 (4.8)	18 (14.6)	3 (8.8)
Non-respondent	90 (32.8)	26 (31)	5 (55.6)	0 (0)	3 (14.3)	42 (34.1)	14 (41.2)

*Data are expressed as total numbers (%).

Table II
Percentages of professionals who do or do not measure waist circumference

		<i>Total</i>	<i>General practitioner</i>	<i>Nurse</i>	<i>Pediatric nurse</i>	<i>Pediatrician</i>	<i>Nutritionist</i>	<i>Other</i>
Preschool children	Non-respondent	28 (10.2)	8 (9.5)	0 (0)	1 (33.3)	0 (0)	16 (13)	3 (8.8)
	Yes	73 (26.6)	13 (15.5)	2 (22.2)	0 (0)	8 (38.1)	46 (37.4)	4 (11.8)
	No	173 (63.1)	63 (75)	7 (77.8)	2 (66.7)	13 (61.9)	61 (49.6)	27 (79.4)
School children	Non-respondent	37 (13.5)	12 (14.3)	1 (11.1)	1 (33.3)	4 (19)	14 (11.4)	5 (14.7)
	Yes	110 (40.1)	23 (27.4)	5 (55.6)	1 (33.3)	6 (28.6)	70 (56.9)	5 (14.7)
	No	127 (46.4)	49 (58.3)	3 (33.3)	1 (33.3)	11 (52.4)	39 (31.7)	24 (70.6)
Adolescents	Non-respondent	29 (10.6)	8 (9.5)	1 (11.1)	0 (0)	4 (19)	13 (10.6)	3 (8.8)
	Yes	177 (64.6)	46 (54.8)	5 (55.6)	2 (66.7)	12 (57.1)	101 (82.1)	11 (32.4)
	No	68 (24.8)	30 (35.7)	3 (33.3)	1 (33.3)	5 (23.8)	9 (7.3)	20 (58.8)

*Data are expressed as total numbers (%).

Table III
Percentages of professionals who do or do not measure blood pressure

		<i>Total</i>	<i>General practitioner</i>	<i>Nurse</i>	<i>Pediatric nurse</i>	<i>Pediatrician</i>	<i>Nutritionist</i>	<i>Other</i>
Preschool children	Non-respondent	33 (12)	13 (15.5)	3 (33.3)	1 (33.3)	0 (0)	11 (8.9)	5 (14.7)
	Yes	42 (15.3)	13 (15.5)	0 (0)	0 (0)	14 (66.7)	12 (9.8)	3 (8.8)
	No	199 (72.6)	58 (69)	6 (66.7)	2 (66.7)	7 (33.3)	100 (81.3)	26 (76.5)
School children	Non-respondent	37 (13.5)	12 (14.3)	3 (33.3)	0 (0)	2 (9.5)	13 (10.6)	7 (20.6)
	Yes	60 (21.9)	21 (25)	1 (11.1)	1 (33.3)	14 (66.7)	20 (16.3)	3 (8.8)
	No	177 (64.6)	51 (60.7)	5 (55.6)	2 (66.7)	5 (23.8)	90 (73.2)	24 (70.6)
Adolescents	Non-respondent	20 (7.3)	5 (6)	1 (11.1)	0 (0)	2 (9.5)	9 (7.3)	3 (8.8)
	Yes	143 (52.2)	57 (67.9)	6 (66.7)	2 (66.7)	19 (90.5)	47 (38.2)	12 (35.3)
	No	111 (40.5)	22 (26.2)	2 (22.2)	1 (33.3)	0 (0)	67 (54.5)	19 (55.9)

*Data are expressed as total numbers (%).

Discussion

Screening performed by health care professionals to detect medical problems in the pediatric population re-

lies especially on primary care-givers, who are the first to be in contact with this age group and who cover a range of disciplines, including Nursing, Nutrition, and Medicine. Healthcare staff is responsible for finding

and identifying the risks of future conditions associated with obesity and MetS and for following up with the proper treatment.¹⁴

Recent evidence has shown the strong correlation between intra-abdominal fat, BMI (body mass index) and waist circumference¹⁵⁻¹⁷. A pilot study showed that anthropometric evaluation (BMI, waist circumference, waist circumference/height ratio), which is an easy method to perform and does not imply a great economic cost, was associated with MetS risk markers in 188 school children in Mexico City (9-12 years old). Measuring waist circumference proved to be a better indicator of the risk of hypertension and hypertriglyceridemia than BMI; the waist circumference/height ratio was the best predictor of hypertriglyceridemia. In school children with obesity, waist circumference explains half of the variability in blood pressure.

The American Academy of Pediatrics recommends a metabolic evaluation, including fasting levels of glucose and lipid and blood pressure measurements, for obese children and adolescents, regardless of other conditions¹⁴. MetS has become an internationally recognized diagnosable entity by various organizations (the National Cholesterol Education Program, ATP III, the WHO, and the IDF). However, MetS diagnostics face considerable controversy, especially when applied to the pediatric population. Due to changes in growth and development, adult criteria cannot be applied to children or adolescents.

There is evidence of the presence of early functional and morphological changes in the heart and blood vessels in obese children with MetS. The plasticity of the cardiovascular system during childhood and adolescence allows the reversal of cardiovascular damage, but only if risks are identified early and treated aggressively^{18,19}. However, the results of this study show that during the care given to the patients, the interviewees do not know the parameters and cutoff points for MetS diagnosis and do not undertake a deliberate search of these risk factors. This lack of knowledge is a major limitation for early diagnosis and treatment. With the present study, we have an idea of what happens in the daily care of the population and may be underestimated at different care levels, despite MetS being one of the major public health problems because of the high cost associated with MetS complications. Therefore, it is ineffectual that different health units have not updated their health staff and do not have information and material resources for determining the criteria for MetS in the pediatric population.

All of these findings lead us to ask some questions to explain this situation: Are the care conditions so adverse in general that they do not allow for timely diagnosis? Does staff knowledge exist about the relevance of MetS? Is the lack of continuing education courses the main reason for the lack of updated knowledge? Is there a lack of commitment on the part of healthcare professionals? Is the budget too limited for the resources assigned to preventive medicine to buy a tape mea-

sure and the appropriate tool to measure BP in children and adolescents? Until we have the answers to these questions, we suggest a systematic approach to maintain standards of healthcare professionals and to establish the determination of MetS criteria as a practical objective for performing the proper diagnosis.

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Author disclosure statement

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