Nutritional variables associated with anxiety and body image self-perception in mexican children according with the presence of overweight/obesity

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Original article

ABSTRACT

Introduction

Childhood obesity has been associated with the intake of energy-dense foods and sedentary lifestyle, and with mental health indicators such as anxiety and perception of body image. In Mexico the relationship between these variables in children has not been studied.

Objective

To assess the body self-perception and risk of anxiety according to the presence of children with normal weight for their stature and age (BMI) and children with overweight/obesity, controlling for dietary variables and health habits in children of school age.

Method

259 boys and girls with normal BMI *vs.* 326 with overweight/obesity from three public schools in the State of Mexico were evaluated. BMI was calculated from direct measures of weight and height. Diet and lifestyle were associated with the presence of anxiety and body-image dissatisfaction. For anxiety assessment, the CMAS-R questionnaire was used and test-SC for body image self-perception.

Results

43% of school children showed cardiovascular risk and 7.7% metabolic syndrome risk. Children with normal weight have greater satisfaction with their body image and weight, compared to children with overweight or obesity (68.3% *vs.* 49.1%).

Discussion and conclusion

There were no differences in anxiety according to BMI. The self-perception of body image is less favorable in specific areas of the body, in children with overweight or obesity.

Key words: Body image perception, anxiety, child overweight, obesity.

RESUMEN

Introducción

La obesidad infantil se ha asociado con la ingesta de alimentos densamente energéticos, con el sedentarismo y con indicadores de salud mental como la ansiedad manifiesta y la percepción de la imagen corporal. En México no se ha reportado la relación entre dichas variables en población infantil.

Objetivo

Evaluar la auto-percepción corporal y el riesgo de ansiedad, de acuerdo con la presencia de sobrepeso u obesidad, controlando las variables dietéticas y los hábitos de salud en niños en edad escolar.

Método

Clasificados por su Índice de Masa Corporal (IMC) se compararon 259 niños y niñas sin sobrepeso/obesidad *vs.* 326 quienes presentaron dicha condición, en tres escuelas públicas del Estado de México. El IMC se obtuvo por medición directa del peso y la estatura. Se exploró la relación del consumo de alimentos (dieta) y el estilo de vida con la presencia de ansiedad (cuestionario CMAS-R), auto-percepción y satisfacción corporal (test–SC).

Resultados

El 43% de los escolares presentan riesgo cardiovascular y 7.7% riesgo de síndrome metabólico. Los participantes sin sobrepeso/obesidad presentaron mayor satisfacción con su imagen corporal (68.3%). No se encontraron diferencias entre el IMC y la ansiedad total, ni con cada una de sus dimensiones.

Discusión y conclusión

No se reportaron diferencias en la ansiedad de acuerdo con el IMC. La auto-percepción de la imagen corporal fue menos favorable, en zonas específicas del cuerpo en niñas y niños con sobrepeso u obesidad.

Palabras clave: Autopercepción corporal, ansiedad, sobrepeso, obesidad infantil.

INTRODUCTION

Child obesity is an important public health problem worldwide. The World Health Organization (WHO) reports that by the year 2010, over 43 million pre-school children were affected by it, and it was estimated that by the year 2015, 2.3 billion people 15 years or older would suffer from overweight and 700 more million from obesity.[1] In Mexico, the National Survey for Health and Nutrition (ENSANUT) 2012 shows that 34.4% of the boys and girls between 5 and 11 years of age have overweight (19.8%) or obesity (14.6%).[2] The study of those factors associated with the presence of overweight in children population, which are those used for its treatment, have been mainly focused on the energy imbalance (greater intake of food *vs*. lesser physical activity), on genetic and perinatal factors, of sedentary life style, and on those factors associated with the environment, characterized by an accessible offer of energy-dense foods.[3] Also, the importance of sociocultural variables has been recorded, among which one can underscore parental raising styles, influence of mass media, family eating and physical activity habits.[4] The relation of childhood obesity with different dimensions of mental health has also been recorded, specially anxiety and dissatisfaction with the body image.[5-9]

Anxiety disorders are one of the most common psychiatric conditions, which is present in 9% during childhood and 32% during adolescence.[10] Generally anxiety appears together with depression and other behavioral disorders[11] and is characterized by excessive worrying which lasts over six consecutive months.[12] Somatic symptoms which usually appear are headaches, abdominal pain, nausea, vomiting or diarrhea, choking sensation, dyspnea, tachycardia, thoracic oppression, palpitations, paleness or flushing, dry mouth, sweating, restlessness or impatience, fatigability, difficulty concentrating, irritability, muscle tension, and sleep disturbances.[13] It has been recorded that anxiety in childhood and adolescence is characterized by increase in appetite and in food intake,[14] which can increase the incidence of overweight or obesity and, along with it, of metabolic consequences such as high blood pressure and an increase in the levels of peripheral cortisol, among others.[15,16]

On the other hand, a relationship has been identified between dissatisfaction with their own body image and increase in BMI in female childhood population, whereas such dissatisfaction is reported in males whose BMI is located at the minimum and maximum extremes.[17] This has been underscored at project "ETA", a relevant study which shows an inverse linear relation between continuous BMI values and the body image satisfaction in North American children.[18]

Relationship between the presence of anxiety, dissatisfaction with the body image, and overweight or obesity may then be associated with the intake of foods which provide more energy. This may be due to high sensitivity to be re-warded in the short term and the presence of dysfunctional self-regulation.[15] It has also been recorded that functional diminution of dopamine may lead to compensation by immediate gratification, by means of the consumption of energy-dense foods, rich in carbohydrates.[19]

Considering the alarming prevalence of childhood obesity in Mexico, it is important to analyze the relation between overweight/obesity with manifest anxiety, dissatisfaction with the body image, and food intake, with the goal to make specific suggestions for their care. Our hypothesis is focused on the assumption that boys and girls with BMI classified as overweight/obesity shall show greater risk to develop anxiety and less body image satisfaction.

The objective of this study is to assess the body self-perception and risk of anxiety according to the presence of overweight/obesity, controlling for dietary variables and health habits at school age.

METHOD

Design

Comparative cross-sectional study. The Health Department of Ibero-American University developed, implemented and assessed, in 2013, an intervention designed for the rehabilitation of eating, physical activity and rest habits for boys and girls at school age.[20] This work is part of the base assessment of the aforementioned study.

Sample

We worked with 585 students from three elementary urban public schools in Toluca, State of Mexico. The age of the participating school children was 8 to 12 years, taking into account that, according to nationwide data, the increase in prevalence for overweight/obesity takes place during the last years of primary school.[2]

Schools were selected considering the 5th Weight and height Census at the State of Mexico, which was held during the school cycle 2009-2010.[21] Out of 10 Elementary Schools selected with greater prevalence of obesity, three accepted taking part in the study; their base assessment data is reported in this study.

Procedure

Only third to sixth grade students were included, those who wanted to participate in the study and who had their parents' authorization, by means of a signed letter of informed consent, ethics and confidentiality.

Expert nutritionists who had been previously standardized and trained were in charge of taking the anthropometric weight, height, and waist circumference measurements,

as well as of administering the self-report questionnaires within the school context and hours, in an individual manner, in some section authorized by the principal and under the supervision of one of the school teachers.

For administering the questionnaires, groups of 10 students were formed and one facilitator read each item aloud, allotting enough time to answer individually.

Instruments

From the data, BMI was calculated taking into consideration, the weight, height, and age, using as a reference the tables from the WHO[22] The waist/height ratio (WHtR)[23] and the waist perimeter as indicators of cardiovascular and metabolic syndrome risk during childhood, according to the criteria of the International Diabetes Federation (IDF).[24] For the diet and health habits, a self-administered questionnaire which posed questions about the frequency and habits for the consumption of foods as well as other habits related to health, such as period of time doing a physical activity, hours in front of screens (tv. and videogames), and hours sleeping.

The questionnaire, made up of 37 items, reported each item under four answer options: *Never*, *once a week*, *two to four days a week*, and *five to seven days a week*. The first section recorded the consumption of sodas, fruit juices, fruit drink with sugar, beverages made with sugary powders and flavorings, cookies, cupcakes, sweet rolls, snacks (potato chips, corn chips), sweets (candy and lollipops), chocolate, sweet powdered flavoring for the milk (chocolate, strawberry, or vanilla), vegetables, fruit, fried food, plain water, whole milk, sweetened and flavored whole milk (chocolate, strawberry or vanilla).

The second part of the questionnaire included items which explored eating and health behavior. The questions were about how frequently the child feels to have eaten in excess, about the size of the portions (big, small, or sufficient), taking part in active games with friends or family, practicing some sport, time watching TV during mealtimes, hours of sleep, having breakfast before going to school and buying food inside or near the school.

The Manifest Anxiety Scale (CMAS-R) by Reynolds and Richmond[25] which had been previously tested in Mexican population.[26] The instrument includes 37 dichotomous answer (yes/no) items, and was designed to assess the level and nature of anxiety in children and teenagers. The sum of positive answers determines the total score of anxiety, which is then translated to a percentile scale according to the gender and age of the participants. It then provides four scores in additional dimensions: physiological anxiety, restlessness or hyper-sensitivity, social worrying or concentration, and lie.

The instrument to measure the degree of perception/body satisfaction was SC-test by García-Tornel and Gaspar,

adapted by Raich, Torras and Sánchez in the year 2001.[27] The test consists of the drawing of a person with 18 body parts, where the child self-evaluates their liking of their own bodies (total self-approval). It uses a 0 to 10 scale; where 0 means being completely uncomfortable with that specific part of the body and 10 means being completely comfortable about it. The 18 items are then averaged to obtain a general body satisfaction index.[27]

Statistical analysis

The demographic variables (measurements of central trend, frequencies, and proportions) were described and later bivariate comparisons between BMI with the proposed independent variables (anxiety and dissatisfaction with the body image), apart from assessing it with its corresponding co-variables (food intake and health habits) since both had been widely recorded in the area of nutrition as risk factors for overweight or obesity.[4,7,28] Several epidemiological studies make use of the childhood overweight/obesity classification in only one category in order to make the comparison between groups easier, considering that the metabolic risk due to excess adiposity begins with the overweight classification.[4]

Anthropometric comparisons which are comorbidity references associated to overweight/obesity, such as cardiovascular risk and metabolic risk in childhood (waist circumference) were also taken into account. Comparison of continuous variables was made by means of Student t for independent samples and for proportions comparison, χ^2 was used.

To complement the analysis, logistic regression models were proposed to explain the presence of alteration in each anxiety dimension (as dependent variables), taking into consideration diet, life style, gender, and age co-variables. As can be seen in the results section, BMI was not considered in its dichotomous classification (with or without overweight/obesity) as part of such models, since no statistically significant differences were found between groups in bivariate analysis.

RESULTS

585 primary school boys and girls were assessed; no losses were reported at this first stage of the data collection. 50.8% of the participants were male and the average age was 9 ± 1.32 years. A little over half of them (57.7%) showed overweight or obesity. General characteristics of the anthropometric and psychological variables assessed are shown in table 1.

7.7% of the participants, all of them with overweight/obesity, were identified as having risk for metabolic syndrome, since they had a very prominent waist. Some authors have proposed that WHtR is a good indicator of car-

Table 1. Descriptive characteristics of the sample

Variable	% (n)
Gender	
Male	50.8 (297)
Female	49.2 (288)
Nutrition state diagnosis by BMI	
Underweight	2.2 (13)
Normal weight	42.1 (246)
Overweight	29.7 (174)
Obesidad	26.0 (152)
Presence of central adiposity (WC)*	7.7 (45)
Presence of cardiovascular risk (WHtR)**	25.0 (146)
Presence of manifest anxiety	20.9 (122)
Presence of physiological anxiety	34.7 (203)
Presence of restlessness	24.6 (144)
Presence of worrying	32.6 (191)
Presence of lie	42.4 (248)

* Waist Circumference.
** Waist Height Ratio.

diovascular risk in children when its value is above 0.5.[22] Taking such criterion into account, 43% of the participants were classified as in risk; only one child with normal weight was included in this group.

About satisfaction with the body image, differences were identified in the average scores about how much the participants reported to have liked different parts of their bodies. As it can be appreciated in table 2, the group no Overweight/Obesity reports liking certain parts of their body, in a significantly greater way than the group with Overweight/Obesity, such as their abdomen (9.0 *vs.* 8.42), their arms (9.24 *vs.* 8.92), their waist (9.12 *vs.* 8.6), their thighs (9.20 *vs.* 8.86). Likewise, significant differences were identified regarding the frequency in which the normal weight group (68.3%) *vs.* the overweight/obesity group (49.1%) reports being content with their weight.

Anxiety data reported a 20.9% prevalence. Physiological anxiety was present in 34.7%; restlessness in 24.6%; worrying in 32.6%, and lie in 42.4%. Prevalence was no different at segmenting it on account of the presence of overweight/obesity for any of the traits assessed (table 3), which is why no predictive analysis was proposed considering the aforementioned variables.

Findings were different at correlating the location by percentile of the anxiety, restlessness, worrying, and lie scores with the measurement of the waist perimeter, identifying some significant correlations, though very weak ones, for some of the variables. The greater the waist measurement, the greater the scores for the following dimensions:[25] physiological anxiety ($r = 0.111$; $p = 0.008$), restlessness ($r = 0.110$; $p = 0.015$), worrying ($r = 0.100$; $p = 0.015$), and lie ($r = 0.144$; $p = 0.000$).

Using BMI as a continuous variable, it was also significantly and positively associated only with the "lie" dimension ($r = 112$; $p = 0.007$).

Table 2. Body satisfaction variables according to the presence of overweight/obesity classified by BMI

	Overweight/Obesity		
	Without $\overline{x}$, SD	With $\overline{x}$, SD	Sig.*
I like my hair	9.58 (1.25)	9.52 (1.49)	0.63
I like my eyes	9.18 (1.86)	9.17 (1.93)	0.95
I like my cutis	8.33 (2.53)	8.52 (2.45)	0.34
I like my nose	8.94 (4.83)	8.81 (2.24)	0.70
I like my mouth	9.22 (1.65)	9.13 (1.89)	0.54
I like my lips	9.04 (2.01)	8.98 (2.11)	0.72
I like my neck	9.09 (1.73)	9.00 (2.09)	0.55
I like my breast	9.03 (2.00)	8.89 (2.24)	0.41
I like my arms	9.24 (1.76)	8.92 (2.16)	0.05
I like my hands	9.13 (1.88)	9.03 (2.08)	0.52
I like my abdomen	9.00 (2.09)	8.42 (2.81)	0.04
I like my waist	9.12 (1.98)	8.60 (2.48)	0.00
I like my genitals	8.93 (3.06)	8.60 (2.75)	0.16
I like my buttocks	8.45 (2.64)	8.29 (3.00)	0.50
I like my hips	9.03 (2.05)	8.86 (2.37)	0.35
I like my thighs	9.20 (1.90)	8.86 (2.27)	0.05
I like my legs	9.01 (2.00)	9.40 (5.45)	0.23
I like my skin	9.21 (1.92)	9.08 (2.13)	0.45

* Student T independent samples.

Some diet and life style variables were explored in a predictive model for the presence of anxiety and its dimensions. Table 4 shows those predictive factors that were found to be statistically significant, for each of the anxiety dimensions.[25] For total anxiety, the following were identified as risk factors: age (OR = 1.30); frequency of sweet rolls consumption (OR = 1.29); and frequency for the child to feel to have eaten in excess (OR = 1.46). Frequency of sweet powder for milk consumption was identified as a protective behavior (OR = 0.08).

In the remaining dimensions, risk factors are coincidentally: feeling of having eaten in excess, feeling of having eaten small portions, buying food at school, and consumption of sweet powders for milk (table 4).

Table 3. Anxiety, restlessness, worrying, and lie variables comparing population with or without overweight/obesity

	Overweight/Obesity			
	Without (n = 259) %	With (n = 326) %	T GL	Sig.*
Total anxiety	23.2	19.0	1.5043	0.220
Physiological anxiety	37.8	32.2	2.0184	0.155
Restlessness	25.2	24.2	0.0580	0.810
Worrying	32.0	33.1	0.0769	0.782
Lies	40.9	43.6	0.4093	0.522

* Test: χ^2

Table 4. Predictor variables for anxiety and their dimensions

Dimension	Risk factor*	OR**	CI 95%
Total anxiety			
	Sweet rolls consumption	1.29	1.01 – 1.65
	I felt I ate too much	1.46	1.14 – 1.86
	Sweet powder consumption	0.08	0.64 – 0.99
Physiological anxiety			
	I felt I ate too much	1.54	1.22 - 1.94
	I felt I ate small portions	1.33	1.10 – 1.61
	Buying food at school	1.32	1.07 – 1.61
	Sweet powder consumption	0.72	0.54 – 0.88
Restlessness			
	I felt I ate too much	1.55	1.21 – 1.98
	I felt I ate small portions	1.46	1.18 – 1.81
Worrying			
	I felt I ate too much	1.44	1.15 – 1.81
	I felt I ate small portions	1.36	1.12 – 1.64
	Sweet powder consumption	0.78	0.64 – 0.95
	Playing during recess	0.76	0.62 – 0.92
	Sleeping 8 to 10 hours	0.81	0.68 – 0.96
Lies			
	Fruit juice consumption	1.57	1.25 – 1.97
	Buying food at school	1.30	1.05 – 1.61
	Waist/height ratio	2.75	1.28 – 5.92

* Controlled by gender, age, and BMI.
** Logistic regression models.

DISCUSSION AND CONCLUSION

Considering the results of the present study, it is possible to come to the conclusion that overweight/obesity classification by means of child BMI does not allow for reporting differences in anxiety indicators. With regards to the body image self-perception there were differences recorded between groups, for those body zones which usually have greater adipose reserves in case of overweight/obesity, On the other hand, there was a positive correlation between the waist perimeter with the physiological anxiety, worrying, and lie scores, which can be translated as a better anthropometric indicator at making comparisons with childhood anxiety dimensions. Vámosi[28] corroborates these results in an extensive revision of scientific literature, mentioning that childhood obesity is related to different psychosocial factors among which anxiety can be underscored and suggesting that it be dealt with in comprehensive treatments.

In the group of normal weight boys and girls we identified greater acceptance and liking of their body when compared to the overweight/obesity group. This has also been reported by other studies which associate childhood obesity with body dissatisfaction, mainly in dislike towards their own shape, which can unchain depression.[17,29] This may be partially explained by beliefs and negative value judgments which are conveyed to the obesity child under a western model for the representation of the body.[30] Thence, the overweight child can be the target of criticism and mockery provoked by their body composition and this may, medium term, lead them into rejecting their own image, presenting risk eating behavior with the possibility of developing eating disorders.[31]

Social pressure and bullying towards obesity children may provoke anxiety or, the other way around, anxiety may push them to excessive food intake, which then has an effect on weight gain, related to dissatisfaction of the body image,[32] and as a consequence such process becomes a recurring vicious circle.

As part of the results, some protective factors for the presence of anxiety were identified, such as consumption of sweet powders and artificial flavorings for milk, playing during recess, and sleeping for 10 hours ("worrying" dimension). A study by Pervanidou[16] recorded the close negative relation between hours of sleep and cortisol concentrations as an indicator of anxiety in obesity school children. This may account for the fact that children with correct sleep habits report lower scores in the "worrying" dimension.[25] This confirms that correct life style and health habits in children and not only eating habits may have a positive impact in their nutrition and mental health states. Similarly, the "lie"[25] dimension increases along with the frequency of specific consumptions (such as fruit juice, sweet rolls), eating behaviors (consuming food within the school which tend to have a high-energy value), the feeling of eating small portions and the feeling of the child eating in excess. Treviño[33] also found a positive relation, in the Mexican children population, be-

tween the consumption of monosaccharides and disaccharides with serum cortisol as an indicator of anxiety. This may offer some hints of the need to study the association of the consumption of foods rich in carbohydrates with the presence of overweight/obesity and, at the same time, show the presence of anxiety in Mexican children population.

As can be seen in the results, specific anxiety dimensions increased with the consumption of sweet foods. Several studies by Schulte and Avena,[34] suggest that consumption of highly processed foods share the properties of some pharmaceutic cytokines, comparing drug abuse with the fast absorption of refined carbohydrates as reported by the glycemic index of foods rich in fats and carbohydrates. This contributes preliminary results that suggest addictive properties in sugar-rich foods.[34] With such antecedents, and considering our results about the consumption of sweet powders and juices, one could assume that anxiety alterations may be associated to the search of immediate gratification by means of the consumption of fast absorbing carbohydrates, which may at the same time be accepted and allowed by the family and social reference group.

Such mechanisms may also regulate the preference for sweet foods under highly stressful circumstance. This bay be related with the concept of emotional eating, analyzed by Goossens L,[14] who reported a close relation between the presence of anxiety, obesity and loss of control while eating in adolescents; such relation is mediated by the styles for coping with stress and is especially present in the female population. In the case of our results, perception of eating small portions may show loss of control over the amounts of food that one wants to eat.

Finally, some methodological limitations were identified regarding the sample size as well as the administration in groups of mental health instruments. Also, final results may not be extrapolated to contexts different from the central region of Mexico, where specific tastes and eating habits are shared.

For future research, it is recommended to complement the data reported by school children with the anxiety manifested by their parents. Both habits and some mental health characteristics have been associated with the childhood reply characterized by imitation processes, typical of their development stage. Also, it is recommended to assess coping styles in childhood as one control variable of the anxiety response. It is also recommended to use WHtR and measurement of the waist circumference as anthropometric outcome parameters.

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Conflict of interest

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