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Association of eating behaviors and BMI among elementary school students from Mexico

Samuel Munguía-Lizárraga, Montserrat Bacardí-Gascón, Ana Armendáriz-Anguiano and Arturo Jiménez-Cruz

Autonomous University of Baja California. Medical and Psychology School, México.

Abstract

The aim of this study was to analyze the association of cognitive restraint (CR), uncontrolled eating (UE), and emotional eating (EE) with body max index (BMI) among elementary schools children in Mexico. 5th and 6th grade students were recruited from two schools. Weight, height, and waist circumference were measured and BMI was calculated. Overweight and obese children were classified according to the World Health Organization's (WHO) BMI z-score. The TFEQ -R18 questionnaire was applied to assess behavioral patterns. Gender differences of UE and EE were observed. Private school children had higher scores of CR and UE. Children with CR were three times more likely to have abdominal obesity (AO) and children with OW or O were more likely to have UE. Children attending the private school and those with AO had higher CR scores; private school children, those with overweight or obesity and with AO had higher UE scores.

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Key words: *Eating behavior. Children. Obesity. Overweight. Abdominal obesity. Mexicans.*

ASOCIACIÓN DE LAS CONDUCTAS ALIMENTARIAS CON EL IMC EN ESTUDIANTES DE PRIMARIA DE MÉXICO

Resumen

El objetivo de este estudio fue analizar la asociación de la restricción cognitiva (CR), el consumo incontrolado (UE) y el consumo emocional (EE) con el índice de masa corporal (IMC) entre alumnos de primaria en México. Se reclutaron estudiantes de quinto y sexto grado de dos escuelas. Se midieron el peso, la estatura y la circunferencia de cintura y se calculó el IMC. El sobrepeso (SP) y la Obesidad (OB) se clasificó de acuerdo al puntaje Z de IMC de la OMS. Se aplicó el cuestionario TFEQ -R18 para valorar los patrones de conducta. Se observaron diferencias de UE y de EE. Los niños de las escuelas privadas presentaron mayores puntajes de CR y UE. Los niños con CR presentaron tres veces más probabilidades de tener obesidad abdominal (OA) y los niños con SP u OB tenían más posibilidades de tener UE. Los niños que atendían escuelas privadas y los que tenían OB tenían mayores puntajes de CR; los niños de escuelas privadas, los que tenían OW u OB y OA tenían más puntaje en UE.

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Palabras clave: *Conductas alimentarias. Niños. Obesidad. Sobrepeso. Obesidad abdominal. Mexicanos.*

Dear Dr. Culebras (Perspective)

During 2012, from a representative sample of 6 – 12yo children in Tijuana, a 46% prevalence of overweight (OW) and Obesity (O) was observed in the same age group[1], and during 2013, among 18 to 30 yo college students was observed a prevalence of O and abdominal obesity (AO) of 12 and 33% among men and 14 and 17% among women, respectively[2].

OW and O have multifactorial origins, including the environmental factors associated such as decreased physical activity (PA), high caloric intake, increased availability of energy dense foods, and changes in dietary behavior have also been included[3,4]. Some authors have suggested that there are three patterns of eating beha-

viors that may explain the mechanism of self-regulation of food intake in children[5]. These patterns are: cognitive restriction (CR), uncontrolled eating (UE), and emotional eating (EE)[5]. CR is defined as, "the tendency of some people to restrict their food intake to control their weight", and UE is defined as a behavior or trend where quantities of food are over ingested due to different stimuli and situations[5] EE refers to food intake as a response to various negative emotions, such as anxiety, depression, anger, or loneliness[5]. The aim of the study was to assess whether eating behaviors such as CR, UE, and EE were associated with BMI and socioeconomic status (SES) among 5th and 6th grade (9 to 12yo) elementary schools students in a Mexico-California border city.

This study was conducted in the morning and evening shifts from a public school (73%) and in the morning shift at a private school (27 %) in the city of Tijuana, Mexico. Nighty three percent (535) of the 5th and 6th graders participated in the study. The children's weight, height, and waist circumference (WC) were measured and recorded during the months of September through November 2013. Height, weight and WC were measured with standards techniques. WC values were compared with the 90th percentile of NHANES III for age and sex for Mexican-Americans. BMI was calculated using the following formula: $BMI = weight/height^2$ (kg/m^2). BMI values were compared with WHO cutoff points (2006)[6] according to age and sex. BMI z scores for age/gender were calculated using the ANTHRO plus software (v 1.0.4, WHO, 2007) .

For the evaluation of behavioral patterns, a validated, adapted version of the questionnaire, "The Three-Factor Eating Questionnaire-R18" (TFEQ-R18)[7,8], was applied. The questionnaire measures three behavioral patterns: CR, UE, and EE. The TFEQ-R18 has 18 items with four possible answers: always, sometimes, rarely, and false. The answers to the 18 items have a value ranging from one to four. Each item point was added to evaluate each behavior.

Means and frequencies were calculated and BMI and SES were categorized. Quartiles of eating behavior variables were calculated. To observe ranks differences between sex, SES, and eating behaviors, the Mann-Whitney test was used. Binomial logistic regression was conducted to know whether the probability of having a specific eating behavior depend on sex, BMI categories, SES, and type of school. A level of significance was considered from an alpha level equal to or less than 0.05.

A total of 535 students (93% of the sample) participated in the study 9 to 12yo. Mean age was 10.4, mean WC 68.7, mean BMI z-score was 0.7 ± 1.3. The prevalence of AO was 10.2% in boys and 12.7% in girls; prevalence of OW was 27.9% in boys and 21.3% in girls; prevalence of O was 24.2% in boys and 24.1% in girls. Table I shows the differences of obesity, and AO prevalence, behavioral patterns according to SES.

Boys had higher UE (p=0.005) and EE (p=0.005) than girls. The children with higher SES (p=0.033) and children from private schools (p=0.0001) had higher CR. Private school children also had higher scores in UE (p=0.013) than children from public schools. Children with AO had higher CR (p=0.0001) than those with a normal WC. Children with CR were three times more likely to have AO (OR=3.03, 95% CI 1.71-5.36) than children with normal WC, and children with OW and or O had higher UE (p=0.047) than those with normal weight.

The study shows that high SES, private school children, and children with AO, had higher scores in CR. Private school children, children with AO, and children with O had higher UE. Children with CR were three times more likely to have AO and children with OW or O had higher UE. Boys had higher UE and greater EE than girls.

Our results on UE are consistent with those reported by Braet et al., (2008), among 13 to 17yo teenagers[9].

Although findings of this study warrant further studies, this behavior might be a high risk factor for O among boys, which is health priority problem in México[2]. This study also found that children with CR were higher than those found in the meta-analysis conducted by Lowe[10]. However, that meta-analysis only included normal-weight populations and Mexican children were not included in that study. Mexican children living in the Mexico-US border city might behave different due to social, economic and cultural environment.

We also found a high prevalence of O in high SES, and positive associations between CR and high SES, as well as higher scores of CR and UE in private schools. These results might suggest that a specific violent environment is not similar to those living in developed or developing countries with different levels of exposed to a safety/violent environment.

Table I
Differences of SES, Obesity Prevalence and Eating Behavior according to SES at schools

SES	N	AO (%)	O (%)	OW (%)	CR score Mean	UE score Mean	EE score Mean
Middle	367	11.4	25.9	22.1	2.24	2.02	1.51
High	168	11.9	20.2	29.2	2.33	2.05	1.48
P < 0.005		0.878	0.586	0.362	0.036	0.471	0.603

SES: Socioeconomic Status; AO: Abdominal Obesity; O: Obesity; OW: Overweight; CR: Cognitive Restriction; UE: Uncontrolled eating; EE: Emotional eating.

Among the strengths of this study is the large size of the sample population participating in this type of study; to our knowledge, this is the first time a study like this is conducted in this age group in Latin América. The questionnaire used had high levels of reproducibility and internal consistency. And the results of this study suggest that eating behavior disorders are more likely to occur among children with O at earlier stages of life or during adolescence among Mexican children.

The limitations of the study include that this is a cross-sectional study that cannot analyze cause-effect relationships; it is limited to two large schools; thus, its generalization is limited. Further prospective studies are warranted to confirm the associations found here.

In conclusion, children of high SES and in private schools, as well as children with AO, had higher scores of CR; private school children, children with AO, and OW/O children had greater UE. Our results indicate the need of programs address to elementary school children and their parents encouraging better food attitudes by parents and relatives, as well as the need to reduce an obesity toxic environment. It is also warranted validated questionnaires for Mexican living in cities with different environments.

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