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Original/*Pediatría*

Body image and weight status of children from rural areas of Valparaíso, Chile

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Abstract

Objective: **To determine the relation between the perceived and the real nutritional status in children from rural areas.**

Participants: **The study comprehends 206 students from first to eighth year of primary school from rural institutions of the Valparaiso region, Chile (43% females).**

Methods: **The real nutritional status was measured using the Body Mass Index (BMI), and the perceived status by means of corporeal figures. The Socioeconomic Status (SES) was determined using the modified Graffar scale. The analysis was carried out using the concordance correlation coefficient kappa, and the chi-square test was used for the association of variables.**

Results: **The subjects are concentrated in the low SES (82% male; 72% female). 49.5% of the students present overweight and obesity. Boys show higher prevalence of obesity (29%) than girls (20%). 62.5% of the females underestimate their weight, which surpasses the percentage of males (52.5%). 98.10% of the obese individuals underestimate their weight, as well as the 100% of the evaluated children with an overweight condition.**

Conclusions: **Boys and girls from rural areas in conditions of overweight and obesity present a higher prevalence rate of an inappropriate perception of body image (underestimation), which has an important impact when recognizing their own condition of over nutrition. This status can have significant repercussions in public health, since it can be maintained to adult life and develop non-transmissible chronic diseases.**

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Key words: *Body mass index. Obesity. Weight perception. School children. Socioeconomic status.*

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AUTOPERCEPCIÓN DEL ESTADO NUTRICIONAL EN ESCOLARES DE CONTEXTOS RURALES DE VALPARAÍSO, CHILE

Resumen

Introducción: **La obesidad en niños es un problema multifactorial, entre ellos se encuentra la percepción que tienen de su propio peso.**

Objetivo: **Determinar la concordancia entre el estado nutricional percibido y el real en escolares de áreas rurales.**

Métodos: **Comprenden 206 estudiantes de primer a octavo año de enseñanza primaria de establecimientos rurales de la región de Valparaíso, Chile (43% mujeres). El estado nutricional real se evaluó a través del índice de masa corporal (IMC) y la percibida mediante figuras corporales. El nivel socioeconómico (NSE) se determinó mediante la escala de Graffar modificada. Los análisis se realizaron utilizando el coeficiente de concordancia kappa y para la asociación de variables se utilizó la prueba X^2.**

Resultados: **Los sujetos se concentran en el NSE bajo (82% hombres; 72% mujeres). 49.5% de los escolares presenta sobrepeso y obesidad. Los hombres presentan una mayor prevalencia de obesidad (29%) que las mujeres (20%). El 62,5% de las mujeres subestiman su peso, cifra mayor que en el caso de los hombres (52,5%). El 98,10% de los individuos obesos subestiman su peso y el 100% de los niños estudiados en condición de sobrepeso también lo subestiman.**

Conclusiones: **Los niños y niñas de contextos rurales en condición de sobrepeso y obesidad son los que presentan la mayor prevalencia de una inadecuada percepción de la imagen corporal (subestimación) lo cual tiene un importante impacto al no reconocer su condición de malnutrición por exceso. Esta condición puede tener importantes repercusiones en salud pública, puesto que esta condición se puede mantener hasta la vida adulta, desarrollando enfermedades crónicas no transmisibles.**

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Palabras clave: *Índice de masa corporal. Obesidad. Percepción del peso corporal. Escolares. Nivel socioeconómico.*

Introduction

In Chile, according to the figures given by the National Health Survey in 2010, 39.3% of the adult Chilean population is overweight, 1.5% above the result in 2003. 25.1% of Chileans are obese, of which 35% belong to a low educational level, compared to the 18.5% who have a high educational level[1]. According to data of the National Board of School Assistance and Scholarships (JUNAEB), between 1987 and 1997 the obesity figure duplicated (7% to 14.4%). Since 1997, the obesity prevalence rate in first year students has continued to grow gradually, reaching 20.8% in 2008. The study of the evolution of the prevalence of over-nutrition in first year students from 1000 schools committed to the Global Strategy against Obesity (EGO-Chile), between the years 2005 and 2008, carried out with data from JUNAEB, revealed an increment of obesity from 19.2% to 21.62% in 2005 and 2007 respectively, with a minor decrease in 2008. The evolution of the obesity prevalence rate in the region of Valparaiso increased 4.9% between 2006 and 2008[2].

Nutritional status in rural contexts

The nutritional status of students experiments significant variations in relation to the geographic area where they develop[3]. These variations are more evident in rural populations, where cases with high rates of overweight and obesity are found[4], compared to urban areas and complemented even with the percentage of body fat[5]. In other world populations, over-nutrition prevalence rates in rural contexts are lower than in urban areas[6,7]. In relation to this point, there are few researches on the nutritional status of students from rural zones in Chile. One of these few exploratory studies was carried out by Ivanovic and collaborators in the 1990s. The results of the research disclosed that the students of urban areas present better nutritional statuses than those of rural zones, and that the undernutrition had notably decreased in Chile. Contrarily, a significant increase of obesity and overweight in rural areas had also been registered, as well as in rural areas. The obesity rate in the urban area is practically double than the rate in rural areas (12.0% and 5.6%, respectively). An opposite situation was registered regarding the undernutrition (26,2% and 47,4%)[3]. However, in recent year there is evidence of a major shift toward overweight and obesity in rural context (26.1% obesity; JUNAEB data)[16].

Self-perception of body image

The etiology of overweight and obesity during child development, as well as the adult, is mostly caused by a number of factors. Among the several factors originating obesity is the own weight perception of the subject. Hence, in recent years several studies on the variables that explain the discrepancy between weight perception and nutritional status in various populations in Chile, mainly adults, have been carried out, where the chief underestimation of the body weight occurs in overweight and obese people[8,9].

Therefore, changes in their lifestyles are fundamental, which cannot be achieved if there is no self-awareness of the disease.

Subjects and methods

A transversal sample was taken from both genders from March to December in 2013. The population comprehends students from first to eighth year of rural primary school, from 6 to 13 years of age. Complete data were obtained from 206 people, of which 43% were females. The participants belonged to the province of Quillota, Region of Valparaiso, Chile, and were enrolled in the rural educational system. A parent and school consent had to be signed, according to the norms of the Declaration of Helsinki[10].

Anthropometric measurements

Weight and height measurements were carried out in the educational institutions during the morning. All evaluations were done by the author of this research (PLA). Weight was measured with a digital flat scale (SECA 813™) with 100g sensitivity. Height was evaluated through a stable stadiometer of 0.1 cm (SECA 217™). Body-mass index (BMI) was calculated as weight (kg) divided by squared height (m^2) and the nutritional status the Center of Disease of Control (CDC) source was used, adapted for Chile[11]. Weight and height were evaluated in bipedestation, barefooted and minimum clothes.

Body image

In order to evaluate body image Body Silhouette Charts were used[12]. The boys and girls were shown a series of seven pictures that went from extreme thinness to obesity. Along with the pictures, the children were asked which picture corresponded to their appearance. The pictures were divided into four categories: Pictures 1 and 2 represented low weight; pictures 3, 4 and 5 normal weights; picture 6 represented overweight, and figure 7, obesity. To establish the correlation between the perceived weight in the body images and the real nutritional status, the fact considered was that the subjects underestimated their weight when classifying themselves into an inferior category of nutritional status compared to their real BMI. However, an overestimation of their own BMI was established when they classified themselves into a superior category to

Table I
Demographic and nutritional status of children in the sample

Characteristics		Male	Female
		n (%)	n (%)
SES	Low	98 (83.05)	64 (72.73)
	Medium	17 (14.41)	22 (25)
	High	3 (2.54)	2 (2.27)
Nutritional Status	Normal	60 (50.85)	44 (50)
	Overweight	23 (19.49)	26 (29.55)
	Obese	35 (29.66)	18 (20.45)
Age	6 - 7	16 (13.56)	13 (14.77)
	8 - 9	32 (27.12)	23 (26.14)
	10 - 11	40 (33.90)	35 (39.77)
	12 - 13	22 (18.64)	15 (17.05)
	14 - 15	8 (6.78)	2 (2.27)

SES: Socioeconomic Status.

the corresponding, and a concordance when they classified their images in the same nutritional status category.

For the data analysis, the average and standard deviation in the continuous variables with normal distribution (age, weight, height, BMI) and frequency distribution were used, and chi-square test in the categorical variables. The concordance between both diagnostic criteria was analyzed with the Kappa coefficient, considering ≤0.20 as low value, between 0.21-0.40 as regular, between 0.41-0.60 as good and ≥0.61 as very good. The information was processed with the software SPSS version 15.00 for Windows. A $p < 0.05$ was considered significant.

SES

The SES was evaluated with the modified Graffar scale, which was validated in the Chilean urban and rural population[13], The scale considers school level and occupation of the head of household, and their housing (quality, possession, water supply, sewerage, and home goods). This scale categorizes the sample into six SES: 1, high; 2, middle-high; 3, middle; 4, middle-low; 5, low; 6, extreme poverty[13]. For this research Project the six levels of the SES were grouped into three levels: high (1+2), middle (3), and low (4+5+6).

Results

Table I shows the demographic characteristics of the evaluated school sample. The subjects are concentrated on the low SES level (82% male; 72% female). 49.5% of the students suffer from overweight and obesity. However, males show a higher obesity prevalence rate (29%) than females (20%).

Table II presents important differences in the nutritional status and age group. 62.5% of the females underestimate their weight, which represents a higher figure than in the case of males (52.5%). 98.10% of

Table II
Concordance of self-reported weight according to the variables analyzed

Variable		underestimating		Correct		overestimating		p-value
		n	%	n	%	n	%	
Gender	Male	62	52.50	54	45.80	2	1.70	0.203
	Female	55	62.50	33	37.50	0	0.00	
Nutritional status	Normal	16	15.4	86	82.7	2	19.6	0.000
	Overweight	49	100	0	0.00	0	0.00	
	Obese	52	98.10	1	1.90	0	0.00	
SES	Low	94	58.0	66	40.7	2	1.2	0.467
	Medium	22	56.40	17	43.60	0	0.00	
	High	1	20.00	4	80.00	0	0.00	
Age	6 - 7	21	72.40	8	27.6	0	0.00	0.03
	8 - 9	36	65.50	19	34.5	0	0.00	
	10 - 11	38	50.7	36	48.0	1	1.3	
	12 - 13	17	45.9	20	54.1	0	0.00	
	14 - 15	5	50.0	4	40.0	1	10.00	

SES: Socioeconomic Status.

the obese individuals underestimate their weight, and 100% of the children at risk of obesity also underestimate it.

As can be seen in table III, 100% females and males at risk of obesity self-consider as normal status. In the case of obese males, 97.14% underestimate their weight, as well as 100% of females under the same circumstances. As regards the Kappa coefficient, males and females consider it mild, which shows low concordance. In high and middle SES, 100% of obese underestimate their weight, whereas in the low SES only one of the forty-four obese children coincided with his real nutritional status.

Table IV shows concordance with the perception when the nutritional status is normal in all age groups. On the other hand, 100% of children classified as overweight perceive themselves as normal. As the Kappa coefficient, concordance for all age groups is mild, except for the group of children aged 14 and 15 in which it is considered as acceptable. Nevertheless, the coefficient calculation might have been influenced by the size of the sample (7 children)[14].

Discussion

The students' data present significant prevalence rates of overweight and obesity, similar to the results obtained by Davy et al., where 54% of the tested population showed both conditions[4]. Other rural populations have also registered high obesity prevalence rates in children from first grade (6 years old), where results show 16.8% of obesity using the CDC criterion, such as the North-central rural zone of Texas, in the United States, where 19.8% of children of 6-11 years of age are overweight and 16% are obese[15].

The overweight and obesity present in students from the rural educational institutions tested for this research showed a nutritional status that is similar to urban sectors (21.3% in Valparaiso; 21.9% in Viña del Mar, according to 2011 JUNAEB data)[16]. Different reality to that described 20 years ago, where a predominant 47.4% with an undernutrition status existed, above the 40.3% showing normal weight[3]. The under-nutrition rate dropped, compared to the study realized 26 years ago[3]. The results match with the nutritional transition in Chile, where undernutrition became overnutrition, aspect which has been observed in school populations where the BMI has been incremented in time, especially in children[17].

The same sexual dimorphism was found in urban communities: higher percentage of obesity in males than in females. JUNAEB data (2011) describe that boys present 23.5% and girls 18.8%[16]. In rural contexts worldwide similar results have been described, e.g. in Italy where boys from 8.0 to 9.5 years old presented

Table III
Concordance between self-perception of nutritional status and classification according to Body mass index for gender and socioeconomic status

Nutricional Status, real			*Nutritional Status Perceived*				
			Normal (%)	*Overweight (%)*	*Obese (%)*	*Total*	*Kappa*
Gender	Male	Normal	60 (100)	0 (0)	0 (0)	60	0.12
		Overweight	23 (100)	0 (0)	0 (0)	23	
		Obese	21 (60)	13 (37.14)	1 (2.86)	35	
	Female	Normal	44 (100)	0 (0)	0 (0)	44	0.064
		Overweight	26 (100)	0 (0)	0 (0)	26	
		Obese	12 (66.67)	6 (33.33)	0 (0)	18	
SES	High	Normal	4 (100)	0 (0)	0 (0)	4	0.00
		Overweight	0 (0)	0 (0)	0 (0)	0	
		Obese	1 (100)	0 (0)	0 (0)	1	
	Medium	Normal	18 (100)	0 (0)	0 (0)	18	0.061
		Overweight	13 (100)	0 ()	0 (0)	13	
		Obese	5 (62.50)	3 (37.50)	0 (0)	8	
	Low	Normal	82 (100)	0 (0)	0 (0)	82	0.105
		Overweight	36 (100)	0 (0)	0 (0)	36	
		Obese	27 (61.36)	16 (36.36)	1 (2.27)	44	

SES: Socioeconomic Status.

Table IV
Concordance between self-perception of nutritional status and classified according to body mass index for age

Nutritional Status, Real			Nutritional Status Perceived				Kappa
			Normal (%)	Overweight (%)	Obese (%)	Total (%)	
Age	6 - 7	Normal	14 (100)	0 (0)	0 (0)	14	0.031
		Overweight	9 (100)	0 (0)	0 (0)	9	
		Obese	5 (83.33)	1 (16.67)	0 (0)	6	
	8 - 9	Normal	25 (100)	0 (0)	0 (0)	25	0.057
		Overweight	15 (100)	0 (0)	0 (0)	15	
		Obese	11 (73.33)	4 (26.67)	0 (0)	15	
	10 - 11	Normal	41 (100)	0 (0)	0 (0)	41	0.101
		Overweight	16 (100)	0 (0)	0 (0)	16	
		Obese	11 (61.11)	7 (38.89)	0 (0)	18	
	12 - 13	Normal	20 (100)	0 (0)	0 (0)	20	0.137
		Overweight	6 (100)	0 (0)	0 (0)	6	
		Obese	6(54.5)	5 (45.5)	0 (0)	11	
	14 - 15	Normal	4 (100)	0 (0)	0 (0)	4	0.275
		Overweight	3 (100)	0 (0)	0 (0)	3	
		Obese	0 (0)	2 (66.7)	1 (33.3)	3	

SES: Socioeconomic Status.

higher overweight percentages than girls[18]. Researches carried out in rural localities in the United States confirm the situation[17,19].

Over 77% of subjects tested belong to a low SES. In 1986 and 1987, Ivanovic and collaborators[4] found out that 90.5% of students from the tested rural population belonged to a low SES. From this idea, it is inferred that the SES in rural contexts has not changed substantially in the last three decades, and that the majority of the rural population remains in a low SES, which can be attributed to the insufficient rural development that entails lack of improvement in the production, nutrition, preventive health care, water supply, sewerage, and education, which have not changed significantly in the last 20 years[20].

As regards the body image perception, the overweight and obese subjects underestimated their weight more, compared to the subjects in normal nutritional status. This situation has also been described in children and teenagers between 9 and 16 years old in the province of Quebec, Canada. The study was carried out with the Stunkard Body Rating Scale, finding higher error prevalence in the perception of the nutritional status in obese and overweight boys and teenagers, who were prone to underestimate considerably their real weight compared to those who were not overweight[21].

The male and female children underestimate their weight more than the teenagers, who overestimate their weight more than boys and girls, with important differences between the male boys and male teenagers. These differences may occur because of the susceptibility to cultural and social pressure to which teenagers are exposed, imitating models from the television, movie celebrities, which could lead to dissatisfaction of their own bodies; adolescents (male and female) would tend to consider themselves heavier than how they really are[21,22]. In the case of girls and teenagers, there would not be significant differences, since social pressure to be thin affects girls from very early ages, finding cases of body dissatisfaction from 5 years of age[23]. Higher rates of weight misperception in overweight boys were also found, compared to overweight girls. Possible explanations for this gender differences are related to the influences linked to weight, e.g. the parents' opinion about the weight in children, which affects girls more than boys, and the comparison of their own bodies with images from media. These factors are mediators of the corporal dissatisfaction among teenagers, except for males[24].

In Chile, the adult population also shows important underestimations of body weight. In Santiago de Chile 63% of the population underestimate their weight[8] and in the city of Talca, Chile, 76.5% of the analyzed adult obese population has a misperception of their nutritional status[9], which can have significant consequences in public health care. Based on the data, it can be observed that there is an inappropriate body image perception that would maintain during adulthood.

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References

1. Ministerio de Salud de Chile. II Encuesta Nacional de Salud 2010. Departamento de Salud Pública de la Pontificia Universidad Católica de Chile. Informe Técnico, 2010.
2. Andrade A, Cerda R, Gálvez P, Maghalaez V, Morales G, Orellana Y, et al. Tercer informe: Evaluación externa de las acciones realizadas en las EGO-ESCUELAS para el Ministerio de salud. Santiago, Chile, 2010.
3. Ivanovic R, Olivares S, Ivanovic D. Estado nutricional en escolares chilenos urbanos y rurales de la Región Metropolitana, 1986-1987. *Rev Chil Pediatr* 1990; 61: 210-7.
4. Davy B, Harrell K, Stewart J, King D. Body weight status, dietary habits, and physical activity levels of middle school-aged children in rural Mississipi. *Southern Medical Journal* 2004; 97: 571-7.
5. Ghosh A. Rural-urban comparison in prevalence of overweight and obesity among children and adolescents of Asian Indian origin. *Asia Pac J Public Health* 2011; 23: 928-35.
6. Luo J, Hu FB. Time trends of obesity in pre-school children in China from 1989 to 1997. *Int J Obes Relat Metab Disord* 2002; 26: 553-8.
7. Hodgkin E, Hamlin MJ, Ross JJ, Peters F. Obesity, energy intake and physical activity in rural and urban New Zealand children. *Rural Remote Health* 2010; 10: 1336.
8. Atalah S E, Urteaga R C, Rebolledo A A. Autopercepción del estado nutricional en adultos de Santiago. *Rev Med Chil* 2004;132: 1383-8.
9. Mujica V, Leiva E, Rojas E, Díaz N, Icaza G, Palomo I. Discordancia en autopercepción de peso en población adulta de Talca. *Rev Med Chil* 2009; 137: 76-82.
10. The World Medical Association. Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects (Declaration of Helsinki). 59th WMA General Assembly, Seoul, Korea, October, 2008. 2008.
11. Ministerio de Salud, Unidad de Nutrición, Consejo Asesor de Nutrición. Norma técnica de evaluación nutricional del niño de 6 a 18 años. *Rev Chil Nutr* 2004; 31: 128-37.
12. Collins M. Body figure perceptions and preferences among preadolescent children. *Int J Eat Disord* 1991; 10: 199-208.
13. Alvarez M, Muzzo S, Ivanovic D. Escala para medición del nivel socioeconómico, en el área de la salud. *Rev Med Chil* 1985; 113: 243-9.
14. Landis J, Koch G. The measurement of observer agreement for categorical data. *Biometrics* 1977; 33: 159-74.
15. Duran M, Duran M, Gillespie J, Malina RM, Little BB. Growth and weight status of rural Texas school youth. *Am J Hum Biol* 2012; 25: 71-7.
16. Junta Nacional de Auxilio Escolar y Becas (JUNAEB). Mapa Nutricional de Chile. 2011. Available from: http://www.junaeb.cl/mapa-nutricional.
17. Smith DT, Vendela MJ, Bartee RT, Carr LJ. Body mass index in rural first grade schoolchildren: progressive increase in boys. *J Rural Health* 2008; 24: 40-8.
18. Toselli S, Brasili P, Spiga F. Body image, body dissatisfaction and weight status in children from Emilia-Romagna (Italy): comparison between immigrant and native-born. *Ann Hum Biol* 2013; 41: 23-8.
19. Joens-Matre RR, Welk GJ, Calabro MA, Russell DW, Nicklay E, Hensley LD. Rural-urban differences in physical activity, physical fitness, and overweight prevalence of children. *J Rural Health* 2008; 24: 49-54.
20. Atchoarena D, Gasperini L. Educación para el desarrollo rural. Hacia nuevas respuestas de política. FAO-UNESCO. 2004.
21. Maximova K, McGrath JJ, Barnett T, O'Loughlin J, Paradis G, Lambert M. Do you see what I see? Weight status misperception and exposure to obesity among children and adolescents. *Int J Obes (Lond)* 2008; 32: 1008-15.
22. Vaquero-Cristóbal R, Alacid F, Muyor JM, López-Miñarro PÁ. Imagen corporal; revisión bibliográfica. *Nutr Hosp* 2013; 28(1): 27-35.
23. Grogan S. Body image: understanding body dissatisfaction in men, women, and children. Routledge. New York; 2008.
24. Edwards NM, Pettingell S, Borowsky IW. Where perception meets reality: self-perception of weight in overweight adolescents. *Pediatrics* 2010; 125: e452-8.