

Parents perception of weight status of Mexican preschool children using different tools

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SUMMARY. The aim of this study was to evaluate the ability of parents to estimate the weight status of preschool children attending the Instituto Mexicano del Seguro Social (IMSS) day-care centers using three different tools. A total of 100 parent-child pairs attending to all the existing IMSS day-care centers in Ensenada (n=9) completed a questionnaire on the perception of children's weight status using verbal description, sketches, and pictures. Chi squared test and univariate logistic regression was applied to assess the difference in perception between the tools used, the factors associated with the weight status perception and to identify predictors of parental underestimation of their child's weight. The sample size was estimated for a significance level of 0.05 with statistical power of 80%. No significant differences were found in the perception of weight status using different tools. The parents' underestimation of the child's weight status ranged from 51 to 59%, this percentage jumps to 79 to 84% in overweight children and 82 to 91% in obese children. Being a young mother and having a daughter increased the risk of underestimation. Higher odds of underestimation were found in > 2 BMI z-score. The high underestimation found in this study shows that the ability of parents in signaling an alert to prevent childhood obesity might be highly reduced and preventive health programs should include increasing the weight status perception.

Key words: Weight perception, weight status, overweight, childhood obesity, preschool children, Mexican children

RESUMEN. Percepción de los padres del peso corporal de niños preescolares mexicanos utilizando diferentes herramientas. El objetivo de este estudio es evaluar la habilidad de los padres para estimar el peso corporal de niños preescolares que acuden a guarderías del Instituto Mexicano del Seguro Social utilizando tres instrumentos diferentes. Un total de 100 parejas padre-hijo que acudían a todas las guarderías del IMSS en Ensenada (n=9) completó un cuestionario acerca de la percepción del peso corporal utilizando descripción verbal, pictogramas y fotografías. Se usó la prueba de Ji cuadrada y regresión logística univariada para valorar la diferencia en la percepción entre los instrumentos utilizados, los factores asociados con la percepción del peso corporal y para identificar los predictores de la subestimación por parte de los padres del peso corporal de sus hijos. El tamaño de la muestra se estimó para un nivel de significancia de 0.05 con un poder estadístico del 80%. No se encontraron diferencias significativas en la percepción del peso con el uso de las diferentes herramientas. La subestimación de los padres del peso de los niños con las diferentes herramientas osciló entre 51 y 59%, y este porcentaje se incrementó a 79 al 84% en niños con sobrepeso y a 82 al 91% en niños con obesidad. El riesgo a subestimar se incrementa en las niñas, cuando las madres son más jóvenes, y cuando los niños tienen un puntaje z de IMC > 2 . El alto grado de subestimación encontrado en este estudio indica que la habilidad de los padres para detectar la obesidad en los niños es muy baja, por lo que los programas de prevención a la salud deben incluir mejorar la percepción del peso.

Palabras clave: Percepción del peso, peso corporal, obesidad infantil, preescolares, niños mexicanos

INTRODUCTION

In the last decades, overweight (OW) and obesity (OB) in children have become a public health problem (1). The prevalence of OW and OB in Tijuana and Ensenada, Mexico in children 6 to 12 years old was 48-50%, with 5-6% with extreme OB (2). More than one

percentage point increase of OW and OB in children has also been reported from 2002 to 2006 (3). Childhood OB has been associated with OB in adulthood and short and long term consequences in overall health (4-6). Therefore, it is important to identify environmental factors that can be influenced for prevention or treatment purposes.

Parents have an important role in the attitudes and lifestyle of children (4,7). Understanding how the community perceives OB during childhood is important to identify children with high risk of OW or OB, as well as for engaging families in prevention programs (8-10).

Parent's underestimation of their children's body size has ranged from 14-100% and higher underestimation has been found when children were OW or obese (11-13). Underestimation for boys is greater than for girls, while overestimation of girls is more frequent (10,14). Misperception has also been associated with low education levels (13,15). Weight perception of children has been evaluated with different tools. Questionnaires with verbal descriptions, sketches, and pictures of children specific to age and gender have been used (15-18). Eckstein et al. (19) reported that the sensitivity of parents to identify their children's OW or at risk of overweight (AROW) using sketches was 70% compared to 36% using verbal descriptions; nevertheless, specificity was lower using sketches (79% compared to 84%) for identification of OW and AROW ($p>0.05$). Killion et al. (16) developed sketches specific for gender and ethnicity in African-American and Hispanic children between 4 and 5 years of age. They reported that on average, mothers underestimated their children's weight status. Huang et al. (20) concluded that parents' perception of the weight status of their children depends on the characteristics of their own children and not on the perception of the weight status of unrelated children.

In addition, the results of assessing the weight status might depend on the parents' level of education or their cultural background (13,15,16). Also, literature suggests that the assessment of parents' perception of children's weight status requires instruments validated for the population studied.

In a study conducted in Mexico, 43% of low-income mothers underestimated their 6 to 24 month old child's weight status. This percentage jumped to 83% among mothers with obese children (18). The perception of weight status in this study was assessed by verbal description. Likewise, Mexican physicians' underestimation of children 6 to 12 years old was 47% among boys and 43% among girls (21), and Mexican parents and teachers, using the Stunkard pictogram, underestimated the figure corresponding to OW and obese children 68% for boys and 56% for girls (22).

However, assessment of the differences in the perception of childhood obesity in Mexico using different tools is lacking and the perception of the weight status of pre-school children has not been reported.

The aim of this study was to evaluate the ability of parents to estimate the weight status of children 2 to 4 years old and to assess whether there are differences in the perception of obesity using different verbal descriptions, sketches, and pictures of Mexican children. Also, the association of this perception with socio-demographic variables was assessed.

MATERIALS AND METHODS:

Subjects and Recruitment Procedures

All parents of children between 2 and 4 years old attending to all (9) day-care centers of the Instituto Mexicano del Seguro Social (IMSS) in Ensenada, Baja California were invited to participate by announcements on day-care centers. Assuming a 65% participation rate, a sample size of approximately 99 individuals was required to detect a size effect of 0.25 ($\delta = 0.85 - 0.60$) using photographs vs other instruments for adequate perception of body weight; a significance level of 0.05 with statistical power of 80% was detected. From the 525 possible respondents only 119 (23%) accepted to participate in the study. Nineteen subjects were excluded from the analysis because questionnaires were incomplete; therefore, a total of 100 parent-child pairs were analyzed. Direct interviews were conducted from May to June of 2009. Parents of children with any disease and those photographed for the picture chart were excluded. Only one adult-child pair per family was used to evaluate perception of weight status. Assessments were conducted for their own children (related children) and for unknown children (unrelated children). The Human Subjects Committee of the Nutrition Academic Group of the University Autonomous of Baja California approved the study. Written informed consent was obtained from all parents before the study began.

Socio-demographic information

A questionnaire was applied to parents to obtain information about their age, education status, and number of children in the family, time living in Baja California, and average income per month.

Tools used to assess weight status perception were:

1) Verbal descriptions

Parents were questioned as to how they perceived their own weight and their children's weight offering the following categories: underweight, normal weight, OW, or very OW. To assess the weight status perception, parents' responses were compared to their child's z-score.

2) Pictogram Sketches

Pictogram sketches for boys and girls between 2 and 5 years old were obtained from the Eckstein et al. study (19). The pictogram sketches were presented to parents and they were questioned as to which sketch resembled their children the most. Responses were compared to their child's z-score

3) Picture Charts

Boys and girls with different weights that measured 95 ± 2 cm (median height of three year old children) were photographed in antero-posterior position wearing a white t-shirt and shorts. Anonymity of the picture was preserved by superimposing a black bar over identifiable facial features. BMI was calculated for each child and seven pictures of boys and girls representing different categories of weight status were chosen (two for OB, one for OW, two for normal weight, and two for underweight children). Pictures were arranged from the highest to lowest weight status using WHO criteria to construct a chart that mirrored the pictogram sketches. One chart was built for boys and one for girls. A test retest was conducted among 20 adults to assess the reliability of the picture chart. The questionnaire was repeated 10 to 15 days later. Reliability for all questions was between 0.6 and 1.0 ($p < 0.01$).

The picture charts were presented to parents and they were questioned which picture resembled their children the most. Responses were compared to their child's z-score.

Anthropometrical Measurements

Height and weight measurements of adults and children were obtained by a trained medical doctor (MSG) in the day-care centers. Subjects were dressed in light clothing and were measured without shoes. Length and height were measured in triplicate to the nearest 0.1 cm with a stadiometer (SECA model 214, Germany). Weight was measured in triplicate to the nearest 0.1 kg with an electronic scale (TANITA Scale Plus Body Fat Monitor UM-0.28, Japan). Body Mass Index (BMI) was calculated (Weight/Height²). Adult

and children weight categories were established according to the WHO criteria. Adult categories were: underweight ($x < 18.5$ kg/m²); normal weight ($18.5 \leq x < 25$ kg/m²); OW ($25 \leq x < 30$ kg/m²); and OB ($x \geq 30$ kg/m²). Children weight categories were: severe undernutrition ($x \leq -3$ SD); undernutrition ($-3 \text{ SD} < x \leq -2 \text{ SD}$); normal weight ($-2 \text{ SD} < x \leq 1 \text{ SD}$); at risk for overweight (AROW) ($1 \text{ SD} < x \leq 2 \text{ SD}$); OW ($2 \text{ SD} < x \leq 3 \text{ SD}$); and OB ($x > 3 \text{ SD}$).

Procedure

Parents were interviewed directly in day-care installations by one of the authors (MSG), a Medical Doctor who was trained to make the interview, and data was coded using the criteria described further in the article.

Weight status perception

Parents' responses obtained with the three tools were coded as: adequate perception, underestimation (one or more categories below the real one), and overestimation (one or more categories over the real one).

To assess the perception of unrelated children, individual pictures of children with different weight status were randomly presented. Parents were asked to identify the weight category that corresponded to each picture. Responses were coded as: adequate perception, underestimation (one or more categories below the real one), and overestimation (one or more categories over the real one).

Statistical Analyses

Demographic data were summarized using descriptive statistics. The difference between percentages of incorrect responses of weight perception using different tools was assessed using X² test. The associations between the weight status perception using verbal descriptions, sketches, and pictures and adult BMI and socio-demographic data were assessed using X² test. Univariate logistic regression was applied to identify predictors of parental ability for underestimation versus adequately assessing the weight status of their children. All data was analyzed with SPSS v 17.0 statistical software. Significance for all the analyses was set at $p < 0.05$.

RESULTS

A total of 100 child-adult pairs were analyzed. De-

mographic data is presented in Table 1. The mean percentiles for weight were 75 ± 23 for girls and 71 ± 23 for boys. There were no significant differences in the perception of weight status of related children using pictures, sketches or verbal description, even after adjusting for children's gender (Table 2). The parents' underestimation of their child's weight status ranged from 51 to 59%, this percentage jumps to 79 to 84% in overweight children and 82 to 91% in obese children. The percentage of misperception of unrelated

children decreases to 32%. Underestimation of the weight status of their children, using pictures and sketches was observed more frequently when parents were younger than 30 years ($p < 0.05$), they assessed girls ($p < 0.05$), or when the children had a > 2 BMI z-score ($p < 0.001$). Using the three tools, underestimation was higher when children with a > 2 BMI z-score were assessed ($p < 0.05$; Table 3).

DISCUSSION

Misperception of weight status is found frequently between Mexican parents of pre-school children, primary because of underestimation of their children's weight status. The parents' underestimation ranged from 51 to 59%, and this percentage jumps to 79 to 84% in OW children and 82 to 91% in obese children. No difference was observed in the parents' perception of their children's weight status using verbal, sketches or pictures of Mexican children. Contrary to our results, Eckstein et al. (19) found a higher underestimation using verbal description (64%) than using sketches (30%). Reifsnider et al. (23) found no consistency between the perception of mothers about children's weight status using a picture chart and the perception of the weight status of their own children; however, pictures were not homogeneous. Our results are consistent with those found by Huang et al. (20), comparing the parent's perception of the weight status of their own children with photographs. The lack of difference found in the degree of perception of weight status of the preschool children using different tools might be the results of the high degree of underestimation.

These results highlight the importance of culturally appropriate tools to assess perceptions, beliefs, and attitudes toward health. It has been reported that there is a preference for heavier children in some cultures, including African-American and Mexican-American children (16, 24-27). Killion et al. (16) found that among African-American and Mexican-American mothers of OW and OB children, 58% and 48% respectively, were satisfied with their children's weight; additionally, they underestimated their normal weight children (48%), the overweight (26%) and the obese (2%). In our study, it was found that the higher the BMI, the higher the underestimation of the children's weight status, suggesting that the Mexican population might be less informed on the criteria to identify obe-

TABLE 1
Demographic Data

Children sex, male (%)	50
Children age, mean $\pm$ SD (months)	36.8 ± 7.6
Children weight status (%)	
Undernutrition	0
Normal weight	59
High Risk of Overweight	27
Overweight	7
Obese	7
Adult sex, male (%)	15
Relationship with the children (%)	
Mother	63
Father	15
Teacher	17
Nurse	5
Adult age, mean $\pm$ SD (years)	31.8 ± 7.2
Adult BMI, mean $\pm$ SD (kg/m ²)	26.5 ± 4.7
Adult weight status (%)	
Underweight	0
Normal weight	49
Overweight	27
Obese	24
Adult education status, mean $\pm$ SD (years)	13.2 ± 3.4
No. of children in family (%)	
1	35
2	36
3	23
≥ 4	3
Time living in Baja California	
< 20 years	34
20 or more years	66
Income per month (%)	
≤ 600 dlls/month	30
> 600 dlls/month	70

TABLE 2
Percentage of weight status perception of related children using picture pictograms, sketches,
and verbal questionnaire

Answers	Pictures			Sketches			Verbal description		
	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls
Adequate	39	64	36	44	61	39	40	50	50
Underestimation (All children)	57	37	63	51	37	63	59	49	51
Normal weight	41	33	67	29	29	71	39	52	48
OW	79	53	47	79	53	47	84	62	38
OB	82	28	72	86	32	68	91	35	65
Overestimation (All Children)	4	100	0	5	80	20	1	100	0

No significant differences were found between tools using X2 test, even after adjusting by children gender.

OW= overweight, OB= Obese

TABLE 3
Parents' Odds Ratios for underestimating (vs adequate) their children's weight status

Category	Pictures OR (95% IC)	Sketches OR (95% IC)	Verbal OR (95% IC)
Adults surveyed (parents)	0.97 (0.4-2.6)	0.55 (0.2-1.5)	1.46 (0.6-3.8)
Relationship (mother)	1.30 (0.4-4.3)	3.15 (0.9-11.2)	1.52 (0.5-4.7)
Adult age (< 30 years)	2.84 (1.2-6.6)*	2.68 (1.2-6.1)*	1.55 (0.7-3.5)
Adult weight status (< 25kg/m ²)	1.71 (0.8-3.9)	1.35 (0.6-3.0)	0.62 (0.3-1.4)
Child sex (girl)	3.06 (1.3-7.1)*	2.68 (1.2-6.1)*	1.03 (0.5-2.3)
Child weight status (> 2 BMI z score)	7.56 (2.7-20.9)‡	15.60 (5.2-46.8)‡	14.09 (4.4-44.8)‡
No. of children (2 or more)	0.41 (0.2-1.0)	0.82 (0.4-1.9)	1.34 (0.6-3.1)
Adult education status (≥ high school)	1.26 (0.6-2.8)	1.32 (0.6-3.0)	2.35 (1.0-5.3)
Time of residence in Baja California (> 20 years)	1.00 (0.4-2.4)	1.27 (0.5-3.0)	2.36 (1.0-5.8)
Income (≥ 4 minimum wages)	2.12 (0.9-5.2)	2.05 (0.8-5.0)	1.58 (0.7-3.8)

*p<0.05 ‡p<0.001

sity among children and the implications of childhood obesity over their health. In the Killion study it was found that many parents wished their children were heavier (21). Crawford et al. (27) also found that Mexican-American mothers that underestimated their children's OW, believed that an OW child means a healthy and happy child, while a thin child was considered to be in poor health. These results are consistent with the high underestimation of infants 6 to 24 months of age from low-income mothers from different regions of Mexico (18).

The high percentage of underestimation of weight status in pre-school children observed in this study is consistent with those observed in several countries.

Lampard et al. (24) found that underestimation is reduced when parents are more concerned about the weight status of their children, suggesting that higher information and concern about OW and OB might enhance the accuracy to identify high risk children, as well as the willingness to change their children's food consumption, physical activity, and overall lifestyle.

The underestimation observed in this study, using the three tools, fall within the range observed in different countries (11-13). Underestimation of all children was more frequently in girls and OW and obese girls (Table 2, Table 3). These results are not consistent with those reported elsewhere (10-13), which might indicate that pressure of society towards girls' body shape

is not as strong at this age group (25,26). Baughcum et al. (13) and Genovesi et al. (15) reported an association between weight status misperception and parents' low education status. We did not find an association with education status in this population group, which might be due to the homogeneous sample of mothers. Although we did not assess the parent's wishes about their children's weight status, the high underestimation of normal weight and obese children might indicate that the desire of parents for having heavier children observed among Mexican-Americans (27) might also apply to parents living in Mexico. Mexico is a country which is emerging from high rates of under nutrition; thus, mothers and grandmothers learn that underweight children have a higher incidence of mortality. Therefore, history might be influencing the way that mothers currently feed their children and prefer heavier than lighter children.

When the perception of unrelated children was evaluated, we found that the percentage of misperception decreases to 32%. These results are consistent with those reported by Doolens (10), and might indicate a higher tolerance for the weight status of their own children.

The results observed in our study might indicate less adequate information about childhood obesity, and is consistent with the reported high underestimation of the weight status of children from physicians and teachers in Mexico (21, 22). Those results suggest the need for professional advice and preventive measures focusing on the criteria to identify high-risk children.

Limitations to our study are that we only included children between 2 and 4 years of age whose parents agreed to participate, that socio-demographic data was not evaluated on parents who did not participate, and is also limited to parents having children in public day-care facilities and who are from the northwestern part of Mexico. Therefore, the results cannot be generalized to all pre-school children. The strength of this study was that it developed a pictogram with real photographs of Mexican children, and that three different tools currently used to evaluate perception of body shape were assessed and compared.

In conclusion, we found no difference in misperception using pictures, sketches, and verbal descriptions. Therefore, any tool could be adequately used to identify the misperception of the children's weight status. We also found a high degree of underestimation of overweight and obese children, which might pre-

vent early diagnoses and professional intervention. Thus, prevention programs should include training of health care professionals, day-care personnel, teachers, and parents to adequately identify a weight problem in their children.

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