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Caregiver perceptions of child nutritional status in Magallanes, Chile

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Abstract

Background—We aimed to identify risk factors for childhood overweight and obesity and the accuracy of caregivers' perceptions of their child's nutritional status in the Magallanes region, Patagonia, Chile.

Methods—Heights and weights of children attending day care centers and elementary schools were collected and caregivers completed questionnaires regarding their child's health and behavior. The child's nutritional status was diagnosed using the 2006 WHO Child Growth Standards (for children under age 6) and the CDC 2000 Growth Charts (for children age 6 and older). Logistic regression was used to evaluate factors related to childhood overweight/obesity and weight underestimation by caregivers of overweight or obese children.

Results—Of the 795 children included in the study, 247 (31.1%) were overweight and 223 (28.1%) were obese. Risk factors for overweight/obesity included younger age and being perceived to eat more than normal by the caregiver. Caregivers were less likely to underestimate their child's weight if the child was older or if the caregiver believed the child ate more than a normal amount.

Conclusions—There is a high prevalence of overweight and obesity among children in Magallanes and the majority of caregivers underestimate the extent of the problem in their children.

Keywords

Nutrition; Overweight; Children; Chile

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Background

In Latin America, an epidemiologic transition is currently underway, with the prevalence of overweight and obesity increasing to become a serious public health issue (1–3). Chile has one of the highest rates of childhood overweight in Latin America (1, 4) and the prevalence of childhood overweight and obesity is generally greater in the southern part of the country (5). In the southernmost Chilean region of Magallanes, 37.5% of children under age 6 are estimated to be overweight or obese, but research to investigate the risk factors and parental awareness of childhood excess weight in Magallanes is extremely limited (6). We therefore aimed to investigate the factors associated with excess weight among children attending day cares and elementary schools in Magallanes. We also sought to assess caregiver perceptions of their child's nutritional status and factors associated with caregiver underestimation of their child's weight.

Methods

Setting and Study Population

Between November 2009 and July 2010, data were collected from 795 children (aged 2 months to 14 years) and their caregivers in Punta Arenas, Puerto Natales and Porvenir, Chile. Caregivers and children were recruited at 12 day care centers belonging to the Integra Foundation and 2 public elementary schools. All of the day cares and schools serve children from low-middle income families except one of the elementary schools, which serves children from middle-high income families. School administrators were provided with informed consent forms and questionnaires, which they distributed to their students to take home and ask their caregivers to complete. Children were weighed and their height was measured by a clinician at a separate visit to the school. Caregiver consent was obtained prior to the start of all study procedures. This research was reviewed and approved by the Institutional Review Boards of the Corporación de Rehabilitación Club de Leones Cruz del Sur and of the University of Washington..

Procedures and Measures

Caregivers completed a questionnaire regarding their relationship to the child, their level of education, and their perception of their child's weight, daily media (television, computer, and/or videogame) use, food intake, and level of physical activity. All children were weighed and measured without shoes, wearing only one layer of clothing. Infants less than 12 kilograms were weighed using an electronic Seca® baby scale and all other children were weighed using an electronic Tanita® scale. Infant heights were measured using a Seca baby measuring rod; older children were measured using a roll-up Seca measuring band with wall attachment.

For the purpose of analysis, the nutritional status of each child was determined as recommended by the Chilean Ministry of Health (7). For children under age 6, the child's nutritional status was determined by comparing the weight(kg)/height(cm) of each child to the 2006 WHO Child Growth Standard for children up to 120 cm (8). For children under age 6 and between 120 and 130 cm, the 1977 CDC/NCHS child growth standard was used. For children age 6 and older, the Centers for Disease Control and Prevention 2000 Growth Charts (9) was used to determine nutritional status on the basis of BMI-for-age.

Statistical Analyses

Descriptive statistics were generated using cross-tabulations and Chi-square tests were used to determine significant differences between groups. Logistic regression was used to determine whether child and caregiver characteristics were associated with the odds of a

child having any excess weight (overweight/obesity). For overweight/obese children, logistic regression was used to identify whether child and caregiver characteristics were associated with the odds of a caregiver underestimating his or her child's weight. The child's sex and age were identified as a priori confounders; unadjusted models and models adjusted for these two variables were therefore fit to estimate odds ratios (ORs) and 95% confidence intervals (95% CIs). Spearman's rank correlations were calculated to investigate associations between selected variables. The level of agreement (Kappa) between the caregiver perceived and actual nutritional status of the child was calculated for gender groups. A significance level of 0.05 was used for all hypothesis tests. All analyses were performed using Stata Version 11.1 (Stata Corp, College Station, Texas, USA).

Results

Descriptive Analyses

Characteristics of the children and caregivers stratified by the child's WHO/CDC weight diagnosis are shown in Table 1. Overall, 11 (1.4%) of the children included in this study were diagnosed as at risk for undernutrition, 314 (39.5%) were normal weight, 247 (31.1%) were overweight, and 223 (28.1%) were obese.

Factors associated with child overweight/obesity

Results of logistic regression models of the associations of child and caregiver characteristics with the odds of a child being overweight/obese as compared to normal weight are presented in Table 2. In adjusted models, the likelihood of overweight/obesity decreased with increasing age of the child (OR: 0.96, 95% CI: 0.92, 1.00). Stratifying by the age groups in which different child growth standards were used (ages 0–5 and 6–14), there was a decreasing trend in the odds of overweight/obesity with increasing child's age in children ages 6 and older (OR: 0.88, 95% CI: 0.78, 0.99). There were no other significant trends in child excess weight with age in adjusted models.

Children who were perceived as overweight or underweight by their caregivers were more or less likely, respectively, to be overweight/obese relative to children whose caregivers perceived them as having a normal weight. Caregiver perception of the child's food intake was also a significant predictor of the child's weight diagnosis, with caregivers who perceived their children to consume more or less food than normal being more or less likely, respectively, to classify their child as overweight/obese. More daily television/video game/computer use by the child was associated with an increased odds of overweight/obesity (OR: 1.14, 95% CI: 1.00, 1.30) in adjusted models, although this trend was marginally significant. Media use was positively correlated with food consumption ($r=0.09$, $p=0.01$) and negatively correlated with the child's level of physical activity ($r=-0.19$, $p<0.01$).

Factors associated with misperception of child nutritional status

Of the 795 caregivers who completed the study survey, 37 (4.7%) overestimated their child's weight, 426 (53.6%) underestimated their child's weight, and 332 (41.8%) assessed their child's weight accurately. There was a poor level of agreement between the caregiver's perception of the child's nutritional status and the child's actual diagnosis, although the agreement between the child's perceived and actual nutritional status was still better than that which would be expected due to chance (Kappa=0.104, $p<0.001$). The level of agreement was similar for male and female children (Kappa=0.111 for males, 0.098 for females).

The factors associated with caregiver misclassification of an overweight or obese child as being underweight or normal weight were analyzed and these results are presented in Table

3. Among caregivers of overweight or obese children, the odds of underestimating their child's weight decreased with the increasing age of the child after adjustment (OR: 0.80, 95% CI: 0.75, 0.85). This odds of underestimation also decreased with increasing caregiver education in adjusted models (OR: 0.72, 95% CI: 0.57, 0.91). The odds of caregiver underestimation of her overweight or obese child's weight decreased with increasing television/video game/computer use, however, this trend did not quite reach significance (OR: 0.86, 95% CI: 0.72, 1.01; $p=0.07$). Among caregivers of overweight or obese children, caregivers who believed that their child ate more than a normal amount were significantly less likely to underestimate their child's weight.

Discussion

In this population of Chilean children, 30.8% were overweight and 28.1% were obese. Additionally, 60.9% of children under 6 years old and 67.5% of 6–7 year olds were either overweight or obese; these estimates are approximately 1.5 times those reported for Magallanes by the Chilean Ministry of Health in 2007 and by a 2002 study conducted in Punta Arenas in comparable populations (6, 10). Our results may therefore suggest that the rate of childhood excess weight in Magallanes is growing, as is indicated by the most recent governmental surveillance data (6, 11, 12). These high rates may also be partially explained by the low or middle socioeconomic level of the participating children, as obesity has generally (though not always) been found to be more prevalent among children from lower income Chilean families (13–16).

In this population, we found the likelihood of any excess weight was inversely related to the child's age. Similarly, a cross-sectional analysis of a cohort of Chilean children found a greater prevalence of excess weight upon entering first grade than at entry into high school for both sexes (17). The overall trend in our sample may be partially due to the use of the WHO standard for children under 6 and the CDC standard for older children, as the WHO standard results in higher rates of overweight and obesity (18). However, this difference cannot account for our finding of a trend in the risk of any excess weight was present in the children 6 and older. Due to the cross-sectional design of our study, we cannot determine whether or to what extent this finding is due to a secular trend in the prevalence of excess weight in children or to a longitudinal trend toward normal weight, and future longitudinal studies are needed to investigate the causes of this cross-sectional age-related trend in childhood excess weight.

Our overall finding that 53.6% of caregivers underestimated the weight of their child and that 75.3% and 30.5% of caregivers of overweight and obese children, respectively, classified their child's weight as normal or underweight, is similar to the high prevalence of weight underestimation found among caregivers of overweight and obese children in other studies. The frequency of misclassifications of child nutritional status by caregivers in this study was similar to or greater than that generally found in previous studies in Latin America (19–24). We also found that caregivers were less likely to underestimate the weight of older overweight/obese children. This pattern that has been observed in other populations and has been attributed to a general misperception of what constitutes a healthy weight in young children and to evidence that caregivers of young children believe that the child will lose the weight as he grows older and more active (25–29). It has been posited that caregivers of older children are less confident that the child will lose weight and therefore more accurately assess the child's nutritional status (26), but qualitative research has not been conducted to confirm this possibility. Caregivers in our study were less likely to underestimate their child's weight if they perceived their child to eat more than a normal amount, suggesting that food intake is a behavior that caregivers associate with their child's body size. This finding is contrary to the results of a recent review that found no relationship

between the accuracy of parental perceptions of their child's weight and the caregiver's perception of the child's eating habits, however, very few studies have investigated this association and not all that have published their findings (30). More research is needed to confirm the relationship between caregivers' perception of their child's weight and food intake found in the present study.

This study had a number of strengths including its large sample size and the wide age range of child participants which allowed us to investigate trends in excess weight among children beyond the first grade level, which had not been previously done in the Magallanes region. This study also is the first to estimate the prevalence of child weight underestimation among caregivers of overweight elementary school-age children in Chile. The limitations of this study included its cross-sectional design, which prevented any ascertainment of causal relationships, the convenience sampling scheme of our study, which may limit the generalizability of our findings, and our lack of data regarding the caregiver's BMI, household income, family composition, or caregiver age, which may have confounded our risk estimates. An additional limitation of this study is that caregivers may become less accurate sources of information on their child's behavior as the child ages, introducing error in the behavioral measures of the older children in this study. Despite these limitations, these results suggest alarmingly high rates of childhood overweight and obesity in Magallanes, particularly among younger children. Moreover, caregivers of overweight or obese children were frequently unaware of their child's weight problem, and education of caregivers regarding their child's nutritional status should therefore be emphasized in pediatric clinical care and relevant public health programs in the region. Given that the caregiver-reported level of the child's food consumption and media use have been related to risk of overweight and obesity, a discussion of these behaviors may serve as a starting point for caregiver education regarding healthy child body size. Future studies should investigate causal relationships related to the risk of childhood excess weight and caregiver misperceptions of child nutritional status to identify opportunities for intervention to reduce and prevent child overweight.

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Table 1
 Characteristics of 795 children and their caregivers by nutritional status of the child in Magallanes, Chile, 2009–2010

Characteristic (N)	Nutritional Status				p
	At risk for undernutrition 11	Normal weight 314	Overweight 247	Obese 223	Total 795
Sex					.70
Male	4(36.4)	155(49.4)	128(51.8)	116(52.0)	403(50.7)
Female	7(63.6)	159(50.6)	119(48.2)	107(48.0)	392(49.3)
Caregiver relationship to child					.65
Mother	10(90.9)	265(84.4)	201(81.4)	192(86.1)	668(84.0)
(Step)father/ both parents	1(9.1)	39(12.4)	35(14.2)	22(9.9)	97(12.2)
Grandparent(s)	0(0.0)	6(1.9)	8(3.2)	3(1.4)	17(2.1)
Other	0(0.0)	4(1.3)	3(1.2)	6(2.7)	13(1.6)
Caregiver level of education					.47
Elementary School	0(0.0)	39(12.4)	38(15.4)	39(17.5)	116(14.6)
High School	7(63.6)	154(49.0)	131(53.0)	97(43.5)	389(48.9)
Technical School	3(27.3)	86(27.4)	55(22.3)	63(28.3)	207(26.0)
University	1(9.1)	34(10.8)	21(8.5)	24(10.8)	80(10.1)
Missing	0(0.0)	1(0.3)	2(0.8)	0(0.0)	3(0.4)
Perception of child's weight					<.001
Underweight	3 (27.3)	32 (10.2)	4 (1.6)	1 (0.5)	40 (5.0)
Normal	8 (72.7)	255 (81.2)	186 (75.3)	68 (30.5)	517 (65.0)
Somewhat overweight	0 (0.0)	26 (8.3)	55 (22.3)	135 (60.5)	216 (27.2)
Extremely overweight	0 (0.0)	1 (0.3)	2 (0.8)	19 (8.5)	22 (2.8)
Perception of child's daily TV/ videogame/ computer use					.12
<1 hour	3 (27.3)	70 (22.3)	62 (25.1)	42 (18.8)	177 (22.3)
1 hour	3 (27.3)	78 (24.8)	63 (25.5)	50 (22.4)	194 (24.4)
2 hours	3 (27.3)	93 (29.6)	72 (29.2)	60 (26.9)	228 (28.7)
3 hours	1 (9.1)	48 (15.3)	34 (13.8)	39 (17.5)	122 (15.4)
4 hours	0 (0.0)	13 (4.1)	7 (2.8)	23 (10.3)	43 (5.4)

Nutritional Status						
Characteristic (N)	At risk for undernutrition 11	Normal weight 314	Overweight 247	Obese 223	Total 795	p
5+ hours	1 (9.1)	9 (2.9)	9 (3.6)	9 (4.0)	28 (3.5)	
Missing	0 (0.0)	3 (1.0)	0 (0.0)	0 (0.0)	3 (0.4)	
Perception of child's eating						
Less than normal	3 (27.3)	46 (14.7)	20 (8.1)	8 (3.6)	77 (9.7)	<.001
Normal	8 (72.7)	252 (80.3)	199 (80.6)	134 (60.1)	593 (74.6)	
More than normal	0 (0.0)	16 (5.1)	28 (11.3)	81 (36.3)	125 (15.7)	
Perception of child's level of physical activity						
Less than normal	1 (9.1)	61 (19.4)	33 (13.4)	65 (29.2)	160 (20.1)	.01
Normal	8 (72.7)	206 (65.6)	170 (68.8)	123 (55.2)	507 (63.8)	
More than normal	2 (18.2)	46 (14.7)	42 (17.0)	35 (15.7)	125 (15.7)	
Missing	0 (0.0)	1 (0.3)	2 (0.8)	0 (0.0)	3 (0.4)	

Table 2

Risk of childhood overweight/obesity by child and caregiver characteristics in Magallanes, Chile, 2009–2010.

Risk Factor	Unadjusted OR (95% CI)	P	Adjusted OR* (95% CI)	P
Sex of child				
Female	1.00 (Ref)		1.00 (Ref)	
Male	1.11 (0.83, 1.47)	.48	1.09 (0.82, 1.46)	.61
Age (years)				
0–2	0.87 (0.58, 1.30)	.49	0.86 (0.57, 1.29)	.46
3–5	1.00 (Ref)		1.00 (Ref)	
6–8	0.98 (0.65, 1.49)	.94	0.98 (0.64, 1.48)	.92
9+	0.64 (0.45, 0.93)	.02	0.65 (0.45, 0.93)	.02
Caregiver relationship to child				
Mother	1.00 (Ref)		1.00 (Ref)	
(Step)father/both parents	0.99 (0.64, 1.52)	.95	1.04 (0.67, 1.61)	.87
Grandparent(s)	1.24 (0.45, 3.38)	.68	1.24 (0.45, 3.42)	.67
Other	1.52 (0.46, 4.98)	.49	1.48 (0.45, 4.86)	.52
Caregiver level of education				
Elementary School	1.00 (Ref)		1.00 (Ref)	
High School	0.75 (0.48, 1.16)	.20	0.77 (0.49, 1.19)	.23
Technical School	0.69 (0.43, 1.12)	.13	0.74 (0.46, 1.19)	.21
University	0.67 (0.37, 1.21)	.18	0.72 (0.40, 1.31)	.28
Perception of child's weight				
Underweight	0.16 (0.06, 0.41)	<.001	0.15 (0.06, 0.40)	<.001
Normal	1.00 (Ref)		1.00 (Ref)	
Somewhat/ extremely Overweight	7.85 (5.07, 12.14)	<.001	9.81 (6.20, 15.53)	<.001
Child's daily TV/ videogame/computer use				
<1 hour	1.00 (Ref)		1.00 (Ref)	
1 hour	0.98 (0.64, 1.48)	.91	1.08 (0.70, 1.66)	.72
2 hours	0.96 (0.64, 1.43)	.82	1.15 (0.75, 1.75)	.53
3 hours	1.02 (0.64, 1.64)	.92	1.25 (0.76, 2.06)	.38
4 hours	1.55 (0.76, 3.18)	.23	2.04 (0.96, 4.33)	.06
5+ hours	1.35 (0.57, 3.17)	.50	1.70 (0.71, 4.09)	.24
Perception of child's eating				
Less than normal	0.46 (0.28, 0.76)	.002	0.44 (0.27, 0.73)	.001
Normal	1.00 (Ref)		1.00 (Ref)	
More than normal	5.16 (2.98, 8.93)	<.001	5.51 (3.16, 9.59)	<.001
Child's level of physical activity				
Less than normal	1.13 (0.78, 1.63)	.51	1.34 (0.91, 1.99)	.14
Normal	1.00 (Ref)		1.00 (Ref)	

Risk Factor	Unadjusted OR (95% CI)	P	Adjusted OR* (95% CI)	P
More than normal	1.18 (0.78,1.77)	.43	1.15 (0.77,1.73)	.50

* Adjusted for sex and age of the child.

Table 3

Risk of weight misclassification as normal/underweight among caregivers of overweight/obese children by child and caregiver characteristics in Magallanes, Chile, 2009–2010.

Risk Factor	Unadjusted OR (95% CI)	p	Adjusted OR* (95% CI)	p
Sex of child				
Female	1.00 (Ref)		1.00 (Ref)	
Male	1.21 (0.84, 1.74)	0.30	1.16 (0.79, 1.71)	0.45
Age (years)				
0–2	1.14 (0.66, 1.98)	0.63	1.13 (0.65, 1.97)	0.65
3–5	1.00 (Ref)		1.00 (Ref)	
6–8	0.38 (0.23, 0.64)	<0.001	0.38 (0.22, 0.63)	<0.001
9+	0.19 (0.11, 0.33)	<0.001	0.19 (0.11, 0.33)	<0.001
Caregiver relationship to child				
Mother	1.00 (Ref)		1.00 (Ref)	
(Step)father/both parents	0.92 (0.53, 1.60)	0.77	1.07 (0.59, 1.94)	0.83
Grandparent(s)	3.73 (0.79, 17.47)	0.10	4.33 (0.88, 21.26)	0.07
Other	1.03 (0.27, 3.91)	0.96	0.86 (0.21, 3.50)	0.84
Caregiver level of education				
Elementary School	1.00 (Ref)		1.00 (Ref)	
High School	0.98 (0.57, 1.67)	0.94	1.00 (0.57, 1.75)	>0.99
Technical School	0.49 (0.27, 0.89)	0.02	0.59 (0.32, 1.10)	0.10
University	0.33 (0.16, 0.72)	.01	0.42 (0.19, 0.94)	0.03
Child's daily TV/ videogame/ computer use				
< 1 hour	1.00 (Ref)		1.00 (Ref)	
1 hour	0.73 (0.42, 1.28)	0.27	0.99 (0.55, 1.79)	0.98
2 hours	0.48 (0.28, 0.82)	0.01	0.79 (0.44, 1.40)	0.41
3 hours	0.41 (0.22, 0.75)	0.004	0.68 (0.35, 1.31)	0.25
4 hours	0.20 (0.08, 0.48)	<0.001	0.37 (0.14, 0.95)	0.04
5+ hours	0.46 (0.17, 1.28)	0.14	0.91 (0.31, 2.69)	0.87
Perception of child's eating				
Less than normal	2.30 (0.85, 6.21)	0.10	1.80 (0.65, 5.03)	0.26
Normal	1.00 (Ref)		1.00 (Ref)	
More than normal	0.07 (0.04, 0.14)	<0.001	0.08 (0.04, 0.14)	<0.001
Child's level of physical activity				
Less than normal	0.29 (0.18, 0.47)	<0.001	0.46 (0.27, 0.78)	0.004
Normal	1.00 (Ref)		1.00 (Ref)	
More than normal	0.87 (0.52, 1.45)	0.59	0.78 (0.46, 1.32)	0.35

* Adjusted for sex and age of the child