

Parental Perception of the Children's Weight Status in Indonesia

Syahrul Syahrul,^{1,2,*} Rumiko Kimura,³ Akiko Tsuda,³ Tantut Susanto,^{1,4} Ruka Saito,¹ and Agrina Agrina^{1,5}

¹Division of Health Sciences, Graduate School of Kanazawa University, Kanazawa, Japan

²Department of Community and Family Health Nursing, Hasanuddin University, Makassar, Indonesia

³Faculty of Health Sciences, Institute of Medical, Pharmaceutical, and Health Sciences, Kanazawa University, Kanazawa, Japan

⁴Family and Community Health Nursing Department, Universitas Jember, Jember, Indonesia

⁵Community Health Nursing Department, University of Riau, Pekanbaru, Indonesia

*Corresponding author: Syahrul, Department of Community and Family Health Nursing, Hasanuddin University, Makassar, Indonesia. Tel: +62-81342954914, Fax: +62-411686297, E-mail: syahrulsaid@unhas.ac.id

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Abstract

Background: The frequency of overweight among children in developing countries is increasing. Parents play a significant role in the successful prevention and treatment of overweight in their children. However, parents will be unable to take effective action against overweight if they cannot correctly perceive their children's weight status.

Objectives: The aim of the study was to investigate parents' perceptions of their children's weight status and the factors associated with parental misperceptions about their children's weight status.

Methods: In this cross-sectional study, a sample of 886 children aged 6 - 13 years and their fathers or mothers were selected using convenience sampling. Data were collected using a questionnaire about the subjects' sociodemographic characteristics and the parents' perceptions of their children's weight status. The children's anthropometric parameters were measured using standardized equipments. The chi-square test and logistic regression were used to analyze the data.

Results: Approximately 50% of the parents misperceived their children's weight status, -4.29% overestimated, and 45.26% underestimated it. The frequency of weight status underestimation was high among the parents of overweight and normal weight children (47.65% and 55.08%, respectively). Logistic regression analysis revealed that the underestimation of weight status by parents was associated with the child's body mass index (BMI) (odds ratio [OR]: 0.93 and 95% confidence interval [CI]: 0.89 - 0.97), the younger children (OR: 1.5, 95% CI: 1.13 - 1.99), a higher parental educational level (OR: 1.54, 95%CI: 1.02 - 2.33), and irregular BMI screening (OR: 1.34, 95%CI: 1.01 - 1.77).

Conclusions: Parents often have misperceptions about their children's weight status. Nurses should help parents to correctly perceive their children's weight status. This study also emphasizes on the need for periodic follow-up of BMI among children.

Keywords: Body Mass Index, Parent, School Children, Weight Perception

1. Background

Overweight and obesity in school children have become problems in developing countries (1). Various studies have shown that excess weight in childhood is likely to continue into the adulthood, leading to a higher risk of hypertension, type 2 diabetes mellitus, metabolic and mental disorders (2). Poor eating habits, excessive food intake, lack of physical activity, and particular lifestyles which are considered as the causes of overweight, are predominantly shaped in the family environment by parental behavior (3, 4). Parents play a crucial role to provide support and treatment to overweight children and also to prevent children from overweight by initiating family-based changes to a healthier lifestyle (5). However, parents will not be able to implement appropriate changes in the dietary patterns and lifestyles of their children as long as they are unable to correctly perceive their children's weight status (6).

In numerous studies on the parents' perceptions of their children's weight status, a high rate of mispercep-

tion, particularly among parents of overweight children is reported (3, 6, 7). Some of these studies have focused on the factors associated with parental misperception. It has been reported that children's weight is more likely to be estimated incorrectly by their parents when the child is more overweight (8-10), male (9, 11, 12), or older (8, 13). Furthermore, mothers with low levels of education or low body mass index (BMI) were found to have a poor ability to classify their children's weight status, correctly (10, 14). On the contrary, other studies have reported that a child's gender, age, and parents' educational level and BMI status are not associated with the ability of parents to recognize their children's weight status (15-18). Accordingly, the obtained results are inconsistent.

In addition, most previous studies about this topic have focused on mothers' perceptions and mainly examined the perceptions of parents with overweight children, rarely including the parents of normal weight children. Moreover, there have not been any previous stud-

ies about parents' perceptions of their children's weight status among the Indonesian population, even though the rates of overweight and obesity in Indonesia have been increasing over the last decade (19, 20).

2. Objectives

The aim of this study was to investigate the frequency of parental misperceptions about their children's weight status and the factors associated with such parental misperceptions (particularly underestimation).

3. Methods

3.1. Study Design and Participants

This observational cross-sectional study was done on 886 elementary school students who belonged to the grades 1 to 6 (aged 6 to 13 years) and their parents (one parent was enrolled for each child) in 2014. The sample size was estimated based on the following Formula 1:

$$n = \frac{\left(Z_{1-\frac{\alpha}{2}}\right)^2 p(1-p)}{d^2} \quad (1)$$

Where n is the minimum sample size, and $Z_{1-\alpha/2}$ is the value of the standard normal distribution at the desired confidence interval (95%). The relative precision (d) required in this study was 30%, and the estimated prevalence (p) of parental misperception about their children's weight status was 69% (based on the findings of Yao and Hillemeier (10)). Using the above formula a minimum sample size of 514 subjects was selected. However, we distributed the questionnaire to a greater number of subjects. The inclusion criteria were the children aged between 6 and 13 years, attending school on the day that the measurements were taken, having literate parents and the children with no serious or acute illnesses that could have affected their weight (e.g., diarrhea, fever, etc.). Participants who received the questionnaires but did not complete it were excluded.

After calculating the sample size, convenience sampling was conducted at 7 elementary schools distributed across the Makassar city. There are 365 schools in Makassar which are scattered across 14 districts. We chose 7 convenient schools that were representative of two close districts. All of the eligible subjects in these schools were recruited and participated in the study. A total of 1140 questionnaires were distributed to the parents, and 886 parents completed and returned the questionnaires (participation rate: 77.7%).

3.2. Questionnaire

A questionnaire containing 10 items was developed. The first 6 items concerned the subjects' sociodemographic characteristics, such as the child's date of birth and gender, the parent's educational level, and the relationship between the child and the person who completed the questionnaire. The remaining 4 items were related to the parent's body weight (kg) and height (cm), the parent's perception of their child's weight, the parent's views about their child's weight status (whether they thought that their child should be thinner, unchanged, or fatter), and whether their child's weight was monitored regularly. The available responses for the question about the parents' perceptions of their children's weight included thin, normal weight, and overweight. Children whose body weight and height were measured at least every three months were categorized as undergoing regular weight monitoring.

The questionnaire was first tested on 15 parents with elementary schoolchildren to ensure that it was readable and understandable. Some revisions were made based on the feedback from the parents; the changes mostly dealt with the words selection. Then, it was further reviewed by the researcher's colleagues at the Department of Community and Family Health Nursing, School of Nursing, Hasanuddin University.

The children's body weight was measured with an Omron digital weighing scale (HBF-251), which had a precision of 0.1 kg. A microtoise (SECA) was used to measure their height with a precision of 0.1 cm. BMI-for-age z-scores (BAZ) were calculated using the World Health Organization (WHO) AnthroPlus software version 1.0.3 (21, 22). BMI (kg/m^2) was defined as body weight (kg) divided by the square of the height (m): $\text{BMI} = \text{body weight (kg)}/\text{body height (m)}^2$. The children's nutritional statuses were classified based on the WHO growth standards for children aged 5 - 19 years old, which was used in the Indonesia Basic Health Research program (19). BAZ of < -2.00 SD and > 1 SD were used as cut-off values for defining underweight and overweight children, respectively (21). The parents' BMI values were calculated based on their self-reported body weight and height data. Children's body weight and height were measured by the principle investigator along with the well-trained nutritionists and nurses.

3.3. Data Collection

After obtaining approval from the Makassar City government and the relevant elementary school administrators, we visited the schools and met the teachers and students to explain the study aims and schedule. Furthermore, with assistance from the teachers, each student was

given a questionnaire to take home to be answered by one of their parents (either their father or mother). A letter explaining the aims of the study and a written informed consent form for parents were enclosed with the questionnaire. When the students submitted the completed questionnaire to the teachers on the next day, a small reward was given.

After collecting the completed questionnaires, the body weight and height of the children were measured. Both the weight and height scales were calibrated to zero before each measurement. The children's anthropometric parameters were measured without shoes, socks, caps, watches, or any other accessories that might influence their body weight or height. To increase the accuracy of the body weight data, a sample of the school uniform worn by the children was weighed to obtain a correction factor for each sex group. The correction factor for the school uniform was 250 and 200 grams for girls and boys, respectively. The height was measured by standing the child against the wall, with their heels, hips, and head touching the wall.

3.4. Ethical Considerations

This study was approved by the regional board of research and development of South Sulawesi (Approval Number: 07047). The investigators gave a brief description of the study to the teachers and students. The same explanation was given to the parents through the letter sent via their children. A written consent to participate and to permit the children to participate in the study was obtained from the parents. The subjects were informed that the study is voluntary and they can withdraw at any time with no consequences. To maintain the subjects' confidentiality, the questionnaires were anonymous.

3.5. Data Analysis

The obtained data were entered into the Statistical Package for Social Science (SPSS) version 22.0. Descriptive statistics regarding the parents' perceptions of their children's weight status were examined in relation to the children's actual body weight status, sociodemographic characteristics, and anthropometric data. The parents' BMI values were classified into the underweight, normal and overweight when their BMI were $< 18.5 \text{ kg/m}^2$, 18.5 to $\leq 24.9 \text{ kg/m}^2$, and $\geq 25 \text{ kg/m}^2$, respectively (19). This definition was based on the BMI status criteria for adults established by the Indonesia Basic Health Research program (19).

To identify the number of parents who correctly estimated their children's weight status, the parents' perceptions and the children's actual weight status were cross-tabulated. Cohen's Kappa test was used to analyze the

agreement between the parents' perceptions about their children's weight status and their children's actual weight status. Overestimation was defined as when a parent perceived an underweight child as normal weight or overweight, or when a normal weight child was perceived as overweight. Underestimation was defined as when a parent perceived a normal weight child as thin or an overweight child as normal weight or thin. A correct estimation was defined as when a parent perceived their child's weight status correctly. Since the frequency of parental overestimation was very low, it was excluded from the subsequent analysis.

The Chi-square test and Pearson's correlation coefficient were used to identify independent variables that were related to the parental underestimation of children's weight status. Logistic regression analysis was performed to identify predictors of parental underestimation of children's weight status. A $P < 0.05$ was considered statistically significant.

4. Results

4.1. Subjects' Characteristics

The demographic characteristics and anthropometric parameters of the studied children are presented in Table 1. In total, 15.24% and 19.19% of the school children were underweight and overweight, respectively. Of the 6 to 13 years old children (9.87 ± 1.78), 417 were boys, and 469 were girls. The parents included 254 fathers and 632 mothers. A number of anthropometric parameters, such as height, body weight, BMI, the height-for-age z-score (HAZ), and the BAZ, differed significantly between the groups. The mean BMI of the underweight and overweight children were $13.12 \pm 0.95 \text{ kg/m}^2$ and $22.13 \pm 3.59 \text{ kg/m}^2$, respectively. The mean BAZ of the underweight and overweight children were -2.63 ± 0.68 and 1.94 ± 0.76 , respectively.

4.2. Parents' Perceptions

Table 2 shows how the parents perceived their children's weight status according to their children's actual weight status. The agreement between the children's actual weight status and the parents' perceptions of their children's weight status was low (Cohen's Kappa coefficient: 0.249). In total, 50.45% of the parents perceived their children's weight status correctly, and 49.55% of the parents misperceived their children's weight status. More specifically, 45.26% of the parents underestimated and 4.29% overestimated their children's weight status. Since the percentage of patients who overestimated their children's weight status was very low, we excluded these children from the subsequent analyses. The parents underes-

Table 1. Demographic and Anthropometric Parameters of the Children^a

Variables	N	Children's Actual Weight Status ^a			P Value
		Under Weight (n = 135, 15.24%)	Normal Weight (n = 581, 65.58%)	Over Weight (n = 170, 19.19%)	
Children's age, y	886	10.13 ± 1.89	9.81 ± 1.76	9.98 ± 1.76	0.125 ^b
6 - 9	442	68 (15.38)	295 (66.74)	79 (17.87)	0.610 ^c
10 - 13	444	67 (15.09)	286 (64.41)	91 (20.50)	
Children's gender					
Male	417	75 (17.99)	267 (64.03)	75 (17.99)	0.091 ^c
Female	469	60 (12.79)	314 (66.95)	95 (20.26)	
Children's anthropometric parameters					
Height, cm	886	126.07 ± 9.91	127.81 ± 10.99	135.11 ± 10.65	< 0.001 ^b
Weight, kg	886	21.11 ± 4.28	26.04 ± 6.68	41.08 ± 11.07	< 0.001 ^b
BMI, kg/m ²	886	13.12 ± 0.95	15.66 ± 1.64	22.13 ± 3.59	< 0.001 ^b
HAZ	886	-2.02 ± 1.06	-1.50 ± 1.00	-0.49 ± 1.10	< 0.001 ^b
BAZ	886	-2.63 ± 0.68	-0.62 ± 0.80	1.94 ± 0.76	< 0.001 ^b

Abbreviations: SD, standard deviation; BMI, body mass index; HAZ, height for age z-score; BAZ, BMI-for-age z-score.

^aData are presented as No. (%) or mean ± SD.

^bProbability according to ANOVA.

^cProbability according to the Chi-square test.

timated the weight status of 55.08% of the normal weight children and 47.65% of the overweight children.

Table 2 also shows the parents' hopes regarding their children's weight status. Most of the parents who underestimated the weight status of normal weight children wanted their children to get fatter (90.63%). Meanwhile, 82.72% of the parents who underestimated the weight status of overweight children did not want their children's body weight to change. Almost half of the parents (48.31%) who correctly perceived that their children were overweight did not want their children's weight status to change, and 40.93% of the parents who correctly perceived that their children were normal weight wanted their children to get fatter.

4.3. Factors Influencing the Underestimation of Body Weight Status

Table 3 shows that the accuracy of the parents' perceptions of their children's weight status was significantly related to the children's BMI and age, the educational level of the parents, and the frequency of weight monitoring. The weight status of the younger children was more likely to be underestimated by their parents (53.54%) than the older children (41.04%). Parents with higher levels of education were significantly more likely to underestimate their children's weight status (53.41%) than parents with a senior high school level of education (43.75%). Children

whose weight was monitored irregularly were more likely to have their weight status underestimated by their parents (51.18%) than the children whose weight was monitored regularly (44.11%).

As shown in Table 3, logistic regression analysis demonstrated that the children with lower BMI values were at a greater risk of underestimated weight status (OR: 0.93, 95% CI: 0.89 - 0.97). Compared with the children aged 10 to 13 years old, those who were 6 to 9 years old were 1.5 times (95% CI: 1.13 - 1.99) more likely to have their weight status underestimated by their parents. In addition, it was shown that more highly educated parents were more likely to underestimate their children's weight status (OR: 1.54, 95% CI: 1.02 - 2.33). Compared with the children whose weight was monitored regularly, those whose weight was monitored irregularly were more likely to have their weight status underestimated (OR: 1.34, 95% CI: 1.01 - 1.77).

5. Discussion

In the present study, the prevalence rates of underweight and overweight children were closely correlated with the national data for Indonesia collected in 2013 (19). The high rate of obesity observed in this study is consistent with the results of studies conducted in other developing countries (1). In addition, the rate of undernutrition was similar to that which was seen about a decade earlier (23).

Table 2. Parents' Perceptions and Wishes About Their Children's Weight and the Accuracy of These Perceptions^a

Variables	No. (%)	Children Nutritional Status ^b		
		Under Weight	Normal Weight	Over Weight
Parents' gender				
Male	254 (28.67)	41 (30.37)	161 (27.71)	52 (30.59)
Female	632 (71.33)	94 (69.63)	420 (72.29)	118 (69.41)
Parents' perceptions^c				
Thin	447 (50.45)	121 (89.63)	320 (55.08)	6 (3.53)
Normal weight	322 (36.34)	10 (7.41)	237 (40.79)	75 (44.12)
Overweight	117 (13.21)	4 (2.96)	24 (4.13)	89 (52.35)
Accuracy of the parents' perceptions^d				
Overestimated	38 (4.29)	14 (10.37)	24 (4.13)	0
Accurately estimated	447 (50.45)	121 (89.63)	237 (40.79)	89 (52.35)
Underestimated	401 (45.26)	0	320 (55.08)	81 (47.65)
Parents' wishes about their children's weight (among the underestimating parents) (n = 401)				
Thinner	6 (1.50)	0	0	6 (7.41)
No change	97 (24.19)	0	30 (9.37)	67 (82.72)
Fatter	298 (74.31)	0	290 (90.63)	8 (9.88)
Parents' wishes about their children's weight (among the accurately estimating parents) (n = 447)				
Thinner	49 (10.96)	2 (1.65)	1 (0.42)	46 (51.69)
No change	188 (42.06)	6 (4.96)	139 (58.65)	43 (48.31)
Fatter	210 (47.98)	113 (93.39)	97 (40.93)	0

^aAll data are presented as No. (%).

^bColumn percentage values are shown.

^cCohen's Kappa coefficient: 0.249 (P < 0.001), 95% CI: 0.204 - 0.294.

^dThe overestimating parents perceived underweight children as normal weight or overweight or normal weight children as overweight. The accurately estimating parents perceived their children's actual weight status correctly (underweight children as thin, normal weight children as normal, and overweight children as overweight). The underestimating parents perceived normal weight children as thin or overweight children as normal weight or thin.

In general, half of the parents in this study were not able to recognize whether their children were of normal weight or overweight. These findings are in agreement with the percentages reported in previous studies (13, 18, 19). However, there were differences in the criteria used to determine children's nutritional status, the age range of the study population, and parental participation (whether the father, mother, or both were involved in the study) among the previous studies and the present study. In addition, compared with previous studies, which rarely assessed the perceptions of fathers and found the low rates of weight misperception among the parents of normal weight children, this study found that half of the normal weight children were perceived as thin by their parents (by either their fathers or mothers).

In this study, the higher a child's BMI was, the more accurately their weight category was identified by their par-

ent. This implies that the parents of normal weight children who underestimated their children's weight status had difficulty classifying their children's weight status in borderline cases. However, the promotion to use growth charts for children (24, 25), which could be included in comprehensive routine school-based weight and height monitoring programs run by nurses or well-trained teachers, could assist parents to perceive their children's weight status, correctly (26). This study also found that children whose weight was monitored at least every three months were more likely to have their weight status correctly estimated by their parents. However, in Indonesia a regular monitoring of schoolchildren is not common, and a healthy weight status has been unclearly defined and poorly promoted. Continuous anthropometric monitoring of BMI status based on clear categories/cut-off points is necessary among school children.

Table 3. Factors Associated With Parents' Underestimation of Their Children's Weight Status (n = 848)^a

Variables	N	Correct Estimation (n = 447)	Underestimation (n = 401)	P Value ^b	Predictors of Underestimation ^d	
					OR	95% CI
Children's BMI	848	16.98 ± 4.19	16.04 ± 2.66	< 0.001 ^c	0.93 ^e	0.89,0.97
Children's gender						
Boys	401 (47.29)	200 (49.88)	201 (50.12)	0.117		
Girls	447 (52.71)	247 (55.26)	200 (44.74)			
Children's age groups						
6 - 9 years old	424 (50.00)	197 (46.46)	227 (53.54)	< 0.001	1.50 ^e	1.13, 1.99
10 - 13 years old	424 (50.00)	250 (58.96)	174 (41.04)		Ref	
Parents' gender						
Male	247 (29.13)	141 (57.09)	106 (42.91)	0.119		
Female	601 (70.87)	306 (50.92)	295 (49.08)			
Parents' educational level						
Basic education	153 (18.04)	83 (54.25)	70 (45.75)	0.040	Ref	
Senior high school	416 (49.06)	234 (56.25)	182 (43.75)		0.98	0.67, 1.44
Higher educational level ^f	279 (32.90)	130 (46.59)	149 (53.41)		1.54 ^e	1.02, 2.33
Parents' BMI status (n=752)						
Thin	64 (8.51)	36 (56.25)	28 (43.75)	0.714		
Normal	503 (66.89)	269 (53.48)	234 (46.52)			
Overweight	185 (24.60)	94 (50.81)	91 (49.19)			
Weight monitoring						
Regular	467 (55.07)	261 (55.89)	206 (44.11)	0.047	Ref	
Irregular	381 (44.93)	186 (48.82)	195 (51.18)		1.34 ^e	1.01, 1.77

Abbreviations: OR, odds ratio; CI, confidence interval; Ref, reference category.

^aAll data are presented as No. (%) or mean ± SD.

^bProbability according to the Chi-square test.

^cProbability according to Pearson's correlation test.

^dLogistic regression analysis; Hosmer-Lemeshow test: 0.283; Cox & Snell R²: 0.292; Nagelkerke R²: 0.391.

^eP < 0.05.

^fDiploma/bachelor's degree and higher educational level.

However, half of the parents who correctly perceived their children as overweight wanted their children's weight status to remain the same, and almost half of the parents who correctly recognized that their children were normal weight wanted them to be fatter. This implies that parents have no negative image about overweight children or lack of knowledge and awareness about the adverse effects of being overweight on children. Cultural or belief differences might also affect parents' perceptions of the weight status of children. For instance, a study in Turkey revealed that parents believe that an overweight child is healthy and that children will get thinner as they grow (16).

Older people in China viewed being overweight as a sign of good health in children rather than as a negative condition (11). In Indonesia, it is not entirely understood why parents tend to have overweight children. Further studies with a qualitative approach are needed to explain this phenomenon. The appropriate prevention and treatment of overweight should be addressed after regular anthropometric monitoring to improve parents' knowledge and awareness of the balanced nutrition and to correct parents' understanding of a healthy body weight for children (27).

Although other studies did not detect any relationship

between parents' perceptions of their children's weight status and parents' educational levels (16, 28) or a higher level of misperceptions among parents with less education (14), the present study found a higher rate of weight underestimation among highly educated parents. This might have been due to the lack of knowledge of the parents to identify their children's weight status and they are less concerned about their children's excessive body weight. It can also reflect low health literacy among parents (29).

In accordance with the findings of Regber et al. (28) and Hudson et al. (8), the current study showed that the parents of younger children are more likely to underestimate their children's weight status. This might be because parents believe that overweight younger children will become slimmer as they grow older or as they grow tall or big boned (16).

This study had some limitations. First, the parents' weight and height data were self-reported, so it might be less accurate. Second, the sample of children was limited to the school children and only targeted one urban area; hence, it might not represent the children from the study area and their parents in general. Therefore, a larger sample size including a wide range of children of various ages and measurement of parent's weight and height by the health professionals are recommended for further research.

However, as only a very limited number of studies have examined parents' perceptions of their children's weight status among Asian populations, this study can provide initial descriptive information and act as a baseline for further studies, particularly in Asian populations. Another strength of the present study was that the subjects included fathers and normal weight children, which were rarely included in previous studies.

In conclusion, the present study found that half of the parents with normal weight or overweight children underestimated their children's weight status, especially parents with higher educational levels. Parents were also more likely to underestimate their children's weight status when their children were not routinely weighed or were younger (6 to 9 years old). Even among the parents of overweight children who correctly perceived their children's weight status; most parents wanted their children to remain overweight, while most parents of normal weight children who accurately perceived their children's weight status wanted their children to be fatter. Therefore, nurses should help parents to correctly perceive their children's weight status, which could increase parents' awareness of the problems associated with excessive body weight and involve them in the prevention and treatment of overweight in children. This study also emphasizes on the need for periodic follow-up of BMI among children.

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Footnotes

Authors' Contribution: All authors contributed extensively to the work presented in this paper. Syahrul, Rumiko Kimura, and Akiko Tsuda designed the study, constructed the questionnaire, interpreted the data, and made critical revisions to the paper. Syahrul was responsible in data collection and writing the original draft. Tantut Susanto and Agrina performed the analysis and interpretation of data. Ruka Saito participated in the questionnaire construction and helped to draft the manuscript. All authors read and approved the final manuscript.

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