

Opinions of Mothers About the Weights of Their Preschool Children and Its Relationship with Their Own Body Perceptions

Annelerin Okul Öncesi Çocuklarının Ağırlığı ile İlgili Görüşleri ve Kendi Beden Algıları ile İlişkisi

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ABSTRACT

Objective: Misperception of children's weight status by their mothers, either lower or higher than it actually is, can lead to incorrect nutrition practices and health problems. This study aimed to evaluate mothers' perceptions about their children's weight and their own weight and determine the sociodemographic factors that may influence their perception.

Material and Methods: The research was a cross-sectional study involving 170 children aged 2-5 and their mothers. For the study, mothers' and children's heights and weights were measured; questionnaires containing verbal (5-point Likert type scale) and visual scales (Toddler Silhouette Scale for children, Contour Drawing Rating Scale for mothers) were administered to mothers to understand their perception of themselves and their children.

Results: As the children's weight-for-height percentile increased, the mothers' accuracy rate in verbal and visual assessment of their children's weight decreased, making them more prone to underestimate the child's weight. On verbal scale, mothers of underweight, normal weight, overweight, and obese children had an accuracy rate of 53.19%, 71.72%, 31.25%, and 0%, respectively, in defining the children's weight status. On visual scale, these rates were 72.34%, 54.55%, 12.50% and 0%, respectively. Overweight and obese mothers were less accurate than others at verbal and visual self-assessment of their own weight. Verbal and visual self-assessment accuracy rates were 100% and 75% in underweight mothers, 75.36% and 89.86% in mothers with normal weight, 47.46% and 32.20% in overweight mothers, and 34.21% and 23.68% in obese mothers. No significant relation was found between the mothers' perceptions of their own weight and their children's weights.

Conclusion: We observed problems related to their mothers' interpretation of children's weight status. We could not identify any sociodemographic risk factor that could explain the inaccurate perception of the mothers. Since mothers may not be able to perceive problems related to their child's weight and express them as problems, we recommend that paediatricians measure each child's height and weight and evaluate their percentiles.

Key Words: Child, Mothers, Preschool, Weight perception



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ÖZ

Amaç: Çocukların ağırlıklarının anneleri tarafından olduğundan düşük ya da yüksek olarak algılanması yanlış beslenme uygulamalarına ve sağlık sorunlarına yol açabilmektedir. Bu çalışmanın amacı, annelerin çocuklarının ve kendilerinin ağırlıkları ile ilgili algılarını değerlendirmek ve bu algıları etkileyebilecek sosyodemografik faktörleri belirlemektir.

Gereç ve Yöntemler: Çalışma 2-5 yaş arasındaki 170 çocuk ve annesinin dahil edildiği kesitsel tipte bir araştırmaydı. Çalışma için annelerin ve çocukların boy ve ağırlıkları ölçüldü; annelere kendine ve çocuğuna dair algısını anlayabilmek için sözel (5'li Likert tipi ölçek) ve görsel ölçekler (çocuklar için Toddler Silhouette Scale, anneler için Contour Drawing Rating Scale) içeren anketler uygulandı.

Bulgular: Çocukların boya göre ağırlık persentili arttıkça, annelerin çocuklarının ağırlığını sözlü ve görsel değerlendirmesindeki doğruluk oranı azaldı ve bu da onları çocuğun kilosunu hafife almaya daha yatkın hale getirdi. Sözel ölçekte zayıf, normal kilolu, fazla kilolu ve şişman çocukların annelerinin çocuklarını doğru şekilde tanımlama oranları sırasıyla %53.19, %71.72, %31.25 ve %0'dı. Görsel ölçekte ise bu değerler sırasıyla %72.34%, %54.55, %12.50 ve %0'dı. Fazla kilolu ve şişman annelerin sözel ve görsel öz değerlendirme doğruluğu diğerlerine göre daha düşük saptandı. Sözel ve görsel ölçekte öz değerlendirme doğruluk oranları sırayla zayıf annelerde %100 ve %75, normal kilolu annelerde %75.36 ve %89.86, fazla kilolu annelerde %47.46 ve %32.20 ve şişman annelerde %34.21 ve %23.68 olarak saptandı. Annelerin kendi ağırlıklarına ilişkin algıları ile çocuklarının ağırlıkları arasında anlamlı bir ilişki tespit edilmedi.

Sonuç: Çocukların ağırlık durumlarının anneleri tarafından yorumlanmasında sorunlar olduğu saptandı. Annelerin yanlış algısını açıklayabilecek herhangi bir sosyodemografik risk faktörü tespit edemedik. Annelerin çocuğun ağırlığı ile ilgili sorunları algılayabilmesi ve bir sorun olarak dile getirmesi eksik olabileceği için çocuk hekimlerinin her başvuran çocuğun boy ve ağırlık ölçümünü yapmasını ve persentillerini değerlendirmesini öneririz.

Anahtar Sözcükler: Çocuk, Anne, Okul öncesi, Ağırlık algısı

INTRODUCTION

Healthcare workers frequently see mothers dissatisfied with their children's weight gain or growth during paediatric visits at the outpatient department. Despite mothers' concerns, childhood obesity is an increasing public health problem in all age groups (1-3).

Higher weight can sometimes be considered an indicator of good health and successful parenting (4). Factors such as the parent's weight, the weight status of the child's peers, cultural beliefs, and patterns created in the media have all been shown to influence mothers' perceptions of their children's weight (5-11). For example, compared to other mothers, women who are overweight were found to be more likely to perceive their children's weight lower (6, 7, 12). Mothers of overweight children were also shown to be more likely to view their children's weight as lower than it is (7, 13-16). This appraisal may encourage the mother to overfeed the child to bring him/her to the weight that she perceives as healthy, which may lead the healthy child to become overweight (17,18). On the other hand, if a normal-weight child is regarded as overweight by the caregiver, the child may face food intake and essential nutrient restrictions, leading to malnutrition or eating behaviour disorders (5,17,19, 20).

In this study, we aimed to evaluate mothers' perceptions on (i) the weight status of their children by using different tools (verbal and visual child silhouette scale for children) (ii) how a healthy hypothetical child would look like, and (iii) their own weight status by using verbal and visual contour drawing rating scale for adults.

MATERIALS and METHODS

Ethical approval for the study was obtained from Akdeniz University Non-Interventional Research Ethics Committee (Date 12.02.2014, Number 111).

This study was conducted in a convenience sample between February 2014 and July 2014. The first 170 children between the ages of 2 to 5 years who applied to the outpatient clinics of Akdeniz University Department of Pediatrics and whose mothers consented to participate in the study were included as mother-child dyads. Children who were not with the mother on admission, children under two or older than five years, and children with chronic diseases were excluded from the study.

The mother's and child's height and weight were measured and recorded. For the weight measurements, a calibrated NAN brand scale, which can weigh a minimum of 1 kg and a maximum of 150 kg and has a sensitivity of 50 gr, was used. Children's weight measurements were carried out with underwear or diapers; three consecutive measurements were made, and their averages were recorded. Weight measurements of mothers were made by taking two consecutive measurements, and their averages were recorded. NAN brand height measuring device with 5 mm sensitivity was used for height measurements. All height measurements were made by taking three consecutive measurements, and their averages were recorded.

Children's weight status was determined by weight for height percentiles of the World Health Organization (WHO). A weight for height value less than the 15th percentile was accepted as wasting (underweight), between the 15th and 85th percentile as normal weight, between the 85th and 95th percentile as overweight and more than the 95th percentile as obese. Mothers with a body mass index (BMI) below 18.5 were considered

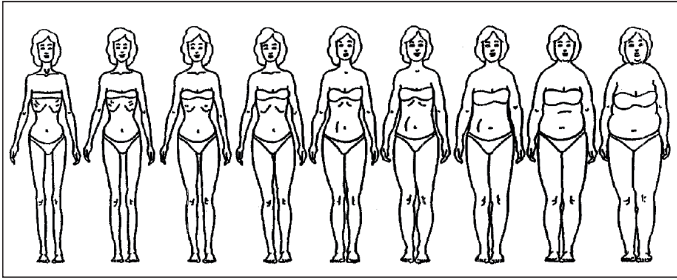


Figure 1: Contour Drawing Rating Scale

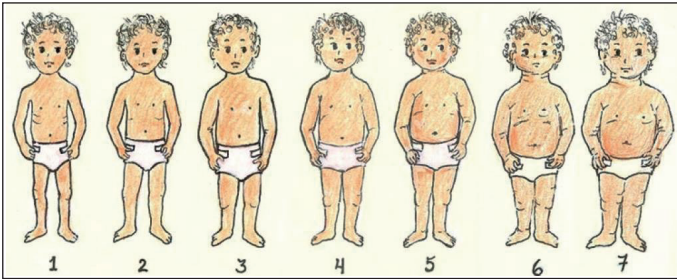


Figure 2: Toddler Silhouette Scale

underweight; those between 18.5 and 25 were normal; those between 25 and 30 were overweight; and those over 30 were considered obese.

The questionnaire applied to the mothers sought information about the demographic characteristics, the mother's opinion about the weight and nutrition of the child, assessments of the mother's self-perception of her weight status, and evaluation of the mother's perception of the child's weight status.

A verbal scale consisting of "very thin," "thin," "normal," "overweight," and "fat/obese" options were used to evaluate how the mother perceived her weight status verbally. Contour Drawing Rating Scale was used as a visual scale to evaluate how the mother felt about her weight status visually (Figure 1). Contour Drawing Rating Scale is a visual scale consisting of 9 pictures prepared for adult women based on BMI percentiles (21). Picture 1 in the visual scale represented underweight women (BMI <18.5). Pictures 2-3-4-5 and 6 represented normal-weight women ($18.5 < \text{BMI} < 25$), pictures 7 and 8 represented overweight women ($25 < \text{BMI} < 30$), and picture 9 represented obese women (BMI > 30). It was accepted as "correct" if the mother had chosen a picture suitable for her BMI.

A verbal scale consisting of "very thin," "thin," "normal," "overweight," and "fat/obese" options were used to evaluate how the mother perceived the child's weight status verbally. In order to evaluate the mother's opinion about the quantity that the child eats, the options of "my child eats too little," "my child eats little," "my child eats normal," "my child sometimes eats too much," and "my child eats too much" were offered. Toddler Silhouette Scale was used as a visual scale to evaluate the mothers' visual perceptions, satisfaction, and expectations about their children (Figure 2). Toddler Silhouette Scale is a validated visual scale comprising seven pictures representing

gender, race, and ethnically neutral children. The scale is prepared for children 2-5 years old and is based on weight for height percentiles (22). Pictures 1 and 2 in the visual scale represented underweight children (weight for height percentile <15), pictures 3-4 and 5 represented normal weight (weight for height percentile between 15-85), picture 6 overweight (weight for height percentile between 85-95) and picture 7 obese children (weight for height percentile > 95).

Statistical analysis

Support was received from the Akdeniz University Department of Biostatistics and Medical Informatics in determining the required number of patients, evaluating the validity of the questionnaire, and statistically evaluating the results.

Data were analysed using PASW 18 (SPSS / IBM, Chicago, IL, USA). Descriptive statistics such as frequency, percentage, median, mean, and standard deviation were used to define the sample. The Chi-square test or Fisher's exact test, where appropriate, was used to compare the proportions in different groups. Since parametric test assumptions were not provided, non-parametric tests (Spearman correlation) were used in comparisons. A p-value less than 0.050 was considered statistically significant.

RESULTS

A total of 170 mother-child dyads were included in the study. The average age of the children was 40.55 ± 10.73 months, and of the mothers was 30.52 ± 5.26 years. Of the children, 88 (51.76%) were female, and 82 (48.24%) were male (Table I).

When children's weight for height percentiles were evaluated, 4.70% of the children were obese, 9.41% were overweight, 58.24% were normal weight, and 27.65% were underweight. The average height of mothers was 160.00 ± 5.56 cm, the average weight was 68.32 ± 14.56 kg, and the mean BMI was 26.60 ± 5.15 (Table I).

The person with whom the child nutrition was most frequently consulted was the family physician (44.71%), then the paediatrician (23.53%), and then others (14.71%). When asked verbally about the mothers who chose the other option, they stated that most of them benefited from the internet. Those consulted less frequently were 5.29% maternal grandmother, 5.29% paternal grandmother, 3.53% spouse, and 2.94% friends (Table I).

When asked who makes the final decision about the child's nutrition, the most common choice was the mother (72.94%), followed by the child (15.88%), spouse (8.82%) and grandmothers (2.35%).

Mother's perception about the child's food intake

In the section where mothers were asked about their assessment of their children's food intake, 37.06% of mothers

Table I: Socio-demographic characteristics of children and parents

Demographic Characteristics	
Children's gender*	
Female	88 (51.76)
Male	82 (48.24)
Age of children (months) [†]	40.55 ± 10.73
Female	41.13 ± 10.87
Male	39.94 ± 10.59
Height of children (cm) [†]	97.89 ± 8.56
Female	97.77 ± 8.66
Male	98.01 ± 8.49
Weight of children (kg) [†]	14.71 ± 2.91
Female	14.68 ± 3.20
Male	14.75 ± 2.58
Weight for height percentile of children*	
< 15	47 (27.65)
15 - 85	99 (58.24)
85 - 95	16 (9.41)
> 95	8 (4.70)
Age of mother (year) [†]	30.52 ± 5.26
Mother's BMI (mean) [†]	26.60 ± 5.15
Mother's BMI*	
< 18.5	4 (2.35)
18.5 - 25	69 (40.59)
25 - 30	59 (34.71)
> 30	38 (22.35)
Mother's education*	
≤ 8 years	116 (68.24)
High School	29 (17.06)
College and more	25 (14.70)
Father's education*	
≤ 8 years	107 (62.94)
High School	36 (21.18)
College and more	27 (15.88)
Family income*	
Expenses are more than income	30 (17.65)
Expenses are equal to income	119 (70.00)
Expense are less than income	21 (12.35)
With whom the mother consults about the child's nutrition*	
Family physician	76 (44.71)
Paediatrician	40 (23.53)
Internet	25 (14.71)
Own mother	9 (5.29)
Mother-in-law	9 (5.29)
Spouse	6 (3.53)
Friends	5 (2.94)
Final decision-maker of the child's nutrition*	
Mother	124 (72.94)
Child	27 (15.88)
Father	15 (8.82)
Paternal / Maternal grandmother	4 (2.35)
Number of people in the household ^{††}	4.20 ± 1.70 / 4

*: n(%), †: mean±SD, ††: median

said “eats little / too little,” 48.8% “eats normally,” and 14.2% “eats too much.” Being overweight was more common among the children whose mothers stated “eats too much” ($p<0.001$)

(Table II). As the mother's comments about how much her child eats progressed from “eats little” to “eats too much,” the child's weight for height percentile increased. A statistically weak correlation was found between the mother's perception of the amount the child eats and the child's weight for height percentile ($p=0.003$ $r=0.223$) (Table III).

Mother's perception about the child's weight status determined by verbal scale

On a verbal scale, 59.41% of the mothers could correctly identify their children's weight status. Mothers of normal-weight children were more prone to correctly identify the weight status of their children (71.72%) compared to the mothers of underweight (53.19%), overweight (31.25%) or obese (0%) children (Figure 3). None of the mothers described her child as “fat”. As the child's weight for height percentile increased, the rate of correct assessment of the child's weight by the mother decreased ($p<0.001$) (Figure 4). On the verbal scale, of all mothers, 10.59% overestimated their children's weight, and 27.06% underestimated it. Almost half of the mothers of underweight children overestimated their child's weight. Underestimation of the child's weight status conversely increased as the weight for height percentile of the child increased and reached 100% in the mothers of obese children (Figure 4). A moderate correlation was found between the verbal scale and the child's weight for height percentile ($p<0.001$ $r=0.428$) (Table III).

Mother's perception about the child's weight status determined by visual scale (Toddler Silhouette Scale)

On the visual scale, 52.94% of the mothers made the correct assessment by choosing the picture corresponding to their child's percentile range. Correct identification of the silhouette that corresponds to the actual weight was highest among the mothers of underweight children (72.34%) compared to the mothers of normal weight (54.55%), overweight (12.50%), or obese children (0%). No mother described her child with the silhouette corresponding to an obese child. As the child's weight for height percentile increased, the rate of correct assessment of the child's weight on the visual scale by the mother decreased ($p<0.001$) (Figure 5). While 38.82% of the mothers found their children compatible with a picture in the lower weight group than their current status (visual underestimation), 8.24% chose a picture compatible with a weight higher than their actual status (visual overestimation). Underestimation of the child's weight status on visual scale increased as the weight for height percentile of the child increased and reached 100% in the mothers of obese children. While the rate of overestimating their child's weight was 72.34% in underweight children's mothers, it decreased as the weight for height percentile increased (Figure 5). There was a weak correlation between children's weight for height percentile and the picture chosen by the mothers to characterise their child's body structure in the Toddler Silhouette Scale ($p<0.001$ $r=0.369$) (Table III).

As the child's weight for height percentile increased, the mother's accuracy rate in verbal and visual assessment of her

Table II: Mother's view about the amount the child eats compared to the actual weight for height percentile of the child

Mother's view about the amount the child eats	Actual weight for height percentile of the child			
	Underweight*	Normal*	Overweight*	Total*
Eats too little / Eats little	20 (31.75)	40 (63.49)	3 (4.76)	63
Eats normal	22 (26.51)	52 (62.65)	9 (10.84)	83
Sometimes eats too much / Eats too much	5 (20.83)	7 (29.17)	12 (50.00) [†]	24

*: n(%), †: The rate of overweight children was significantly higher compared to the other groups (p < 0.001) (Pearson Chi-Square)

Table III: Correlation results

	r *	p
Mother's perception of the amount the child eats and the child's weight for height percentile	0.223	0.003
Mother's verbal assessment of the child and the child's weight for height percentile	0.428	<0.001
Mother's visual assessment of the child and the child's weight for height percentile	0.369	<0.001
The pictures the mothers wanted their children to look like and those they chose for healthy children	0.826	<0.001
Mothers' BMI values and the pictures they chose from the visual scale for herself	0.690	<0.001

*Spearman's rho

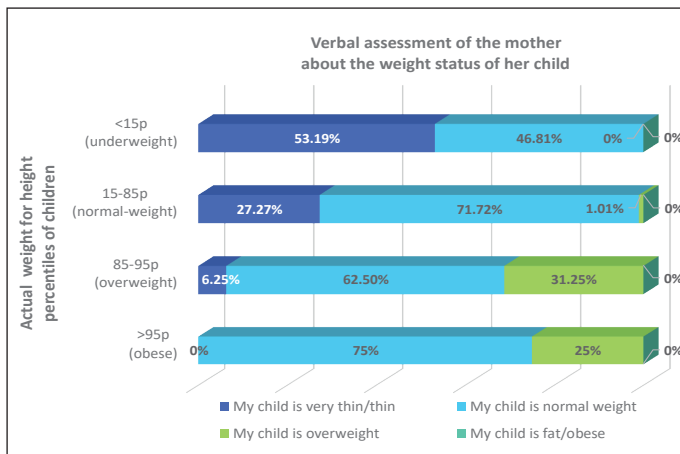


Figure 3: Mothers verbal assessment compared to the actual weights of the children

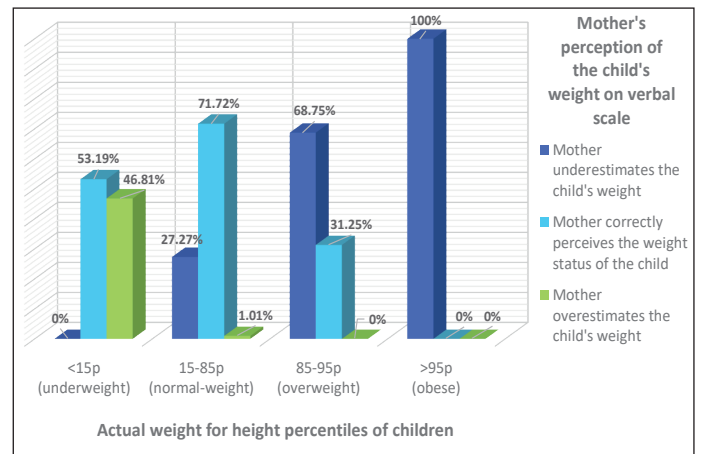


Figure 4: Mothers' perceptions of the children's weight on verbal scale compared to the actual weight for height percentiles of children

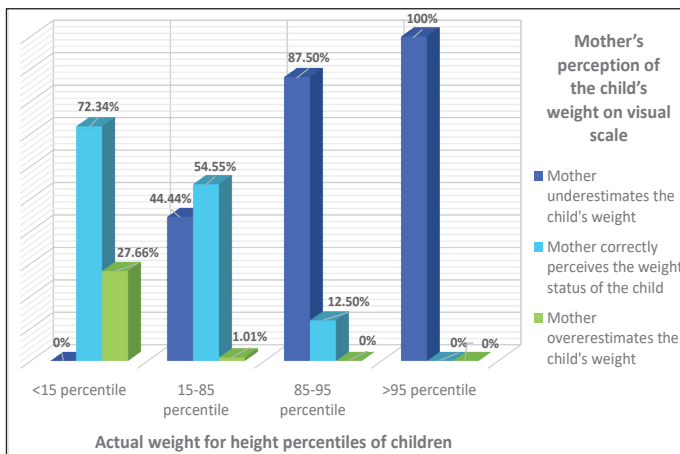


Figure 5: Mothers' perceptions of the children's weight on visual scale compared to the actual weight for height percentiles of children

child decreased (p < 0.001) (Figure 4 and Figure 5). No relation was found between the mother's accuracy in the visual or verbal assessment of her child with the mother's BMI, education level or working status, or the number of people in the household.

Mother's preference for the ideal appearance that her child may have on the visual scale (Toddler Silhouette Scale)

When the mothers were asked about the appearance they wanted their child to have, 15.88% preferred an underweight picture, 82.94% a normal-weight picture, and 1.18% an overweight picture. No mother preferred an obese picture. In addition, 78.72% of underweight children's mothers, 83.84% of normal-weight children's mothers, 93.75% of overweight children's mothers, and 87.50% of obese children's mothers chose normal-weight images as the desired appearance for their child to have (Figure 6).

Mother's perception of a healthy child's appearance on the visual scale (Toddler Silhouette Scale)

When the mothers were asked "to which picture a healthy child should look like," of all mothers, 12.94% chose an underweight picture, 85.88% chose a normal-weight picture, 0.59% chose an overweight picture, and 0.59% chose an obese picture.

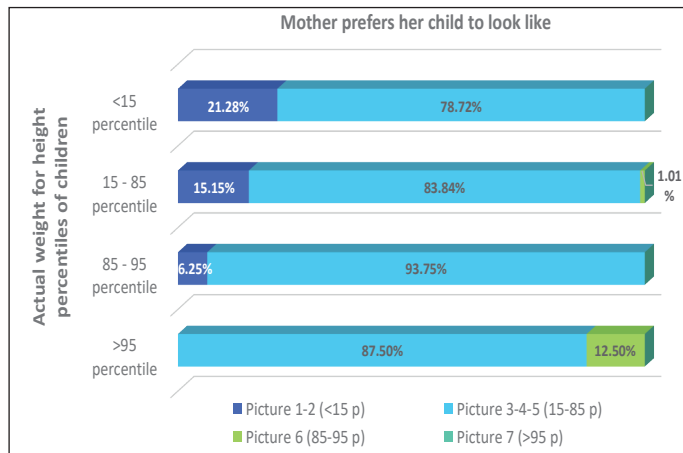


Figure 6: Distribution of mothers' preferences for the appearance of their own children compared to the weight status of the child

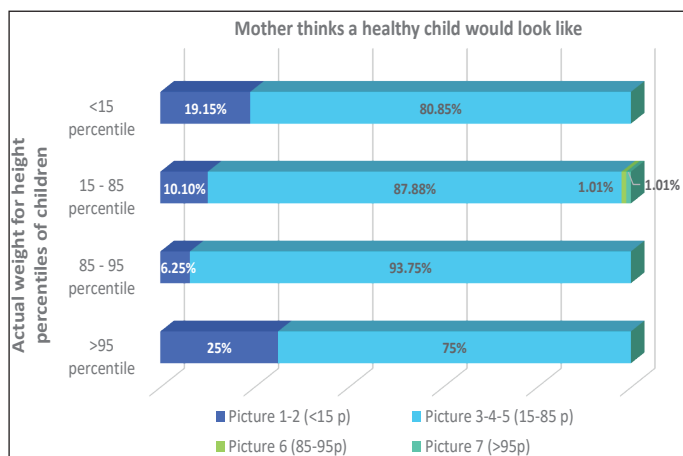


Figure 7: Mothers' preferences on the appearance of healthy children compared to the actual weight for height percentiles of their own children

For the appearance of a hypothetical healthy child, 80.85% of underweight children's mothers, 87.88% of normal-weight children's mothers, 93.75% of overweight children's mothers, and 75% of obese children's mothers chose normal-weight images (Figure 7). There was a strong correlation between the pictures the mothers wanted their children to be and those they chose for healthy children ($p < 0.001$ $r = 0.826$) (Table III).

Mother's perception about her appearance on the verbal scale

On the verbal scale, 57.06% of the mothers correctly described their own weight status, while 35.88% underestimated and 7.06% overestimated it. Underestimation of weight was highest in obese mothers (65.79%) (Figure 8). On the verbal scale, the rate of an accurate description of own weight was 100% in underweight, 75.36% in normal-weight, 47.46% in overweight, and 34.21% in obese mothers (Figure 8). The rate of overweight and obese mothers correctly defining their weight status on the verbal scale was significantly lower than in other groups ($p < 0.001$).

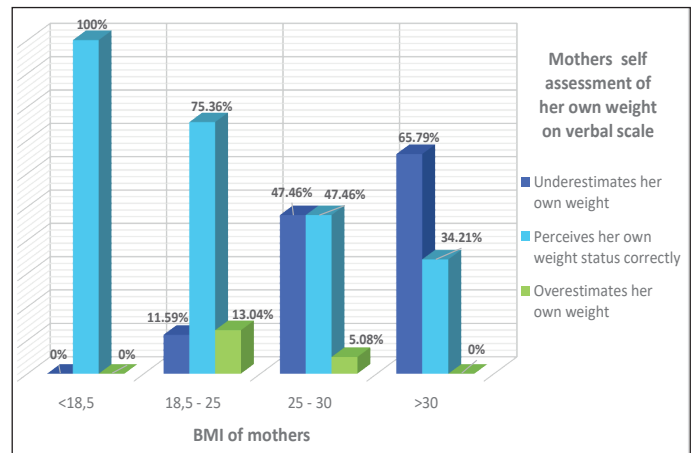


Figure 8: Mothers' perceptions of their own weight on verbal scale compared to their actual BMI

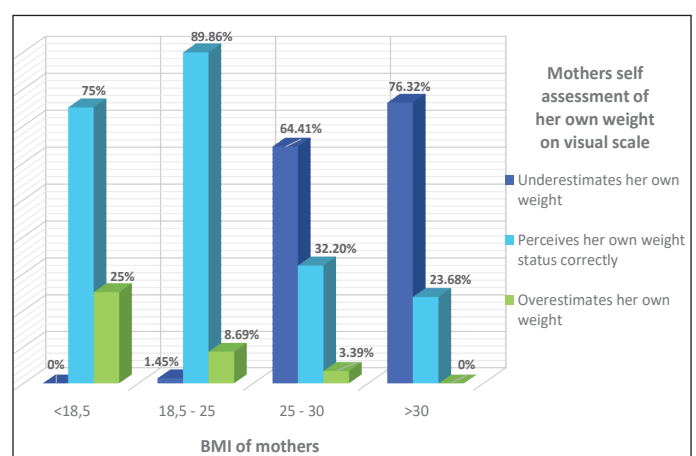


Figure 9: Mothers' self assesment of their own weight on visual scale according to their actual BMI

Mother's perception of her weight status on the visual scale (contour drawing scale)

When the mother's visual perception of her weight was evaluated, the rate of choosing the correct picture reflecting the actual weight status was 54.71%. Of the mothers, 40% chose the slimmer picture, and 5.29% chose the picture with a higher weight than their actual state. While the rate of visual evaluation success was 75% in underweight mothers and 89.86% in normal-weight mothers, this rate decreased to 32.20% in overweight and 23.68% in obese mothers (Figure 9). Visual evaluation success was lower in overweight and obese mothers than in the normal-weight or underweight groups ($p < 0.001$). Mothers' actual BMI values correlated well with the pictures they chose from the visual scale ($p < 0.001$ $r = 0.690$) (Table III). There was no relation between the mothers' self-perception accuracy and their assessment accuracy of the children's weight status on the verbal or visual scale.

Mother's preference for the ideal appearance of herself

The mothers were asked about the weight they wanted to have, and their hypothetical BMI corresponding to their desired weight

was calculated. While the actual BMI mean of the mothers was 26.60 ± 5.14 , the mean BMI they wanted to be was 23.10 ± 2.20 . The weight they determined as ideal for themselves was an average of 9 ± 10.90 kg less than their current weight.

In a question, the mothers were asked which of the visual scale's pictures they wanted to look like. The BMI corresponding to the chosen images was compared with the BMI calculated from the weight they wanted to be. When the BMI of the weight that the mothers wanted to be and the BMI of the picture they chose from the visual scale for desired appearance were compared, it was found that 52 (30.59%) mothers could not achieve the desired appearance even if they reached their ideal weight. Their desired weight condition did not meet their visual expectations.

DISCUSSION

This study showed that the mother often makes the final decision regarding the child's nutrition (72.94%). Determining the content and amount of nutrition by only the mother may cause the child to remain passive about eating and cause problems in the development of eating behaviour. Problems in the mother's perception of child's weight can affect the child's weight and health status (19).

While 4.71% of the children in the study group were obese, 27.65% were underweight. The high rate of underweight children in the study group may be due to the selection of the convenience sample from outpatient departments of the hospital instead of the community. Although the presence of chronic disease was excluded, we did not evaluate prospectively the health status of children who were found to be "underweight" because it was not within the main target of this study. Another reason for the high rate of underweight children may be the use of WHO percentiles. In this study, we used the weight for height percentiles of the WHO since the pictures on the Toddler Silhouette Scale were based on WHO percentiles. The study results may need to be reinterpreted with Turkish reference values for weight percentiles instead of WHO standards. However, we did not choose this option to maintain harmony with the visual scale.

Of the mothers, 10.59% on verbal and 8.24% on the visual scale overestimated their children's weight. This means that one in ten children may be at risk of unrecognised nutritional needs or unnecessary food restrictions. Mothers' overestimation of their children's weight might have contributed to the high rate of underweight children in the study group. Previous research has revealed that mothers who are prejudiced against their weight and nutritional behaviour may negatively affect their children's eating behaviour (20). If the mother overestimates her child's weight when the child is at an average weight, she may make excessive restrictions for her child to lose weight (17,19).

When the mothers' perceptions about their children's weight are incorrect, they cannot recognise necessary cues on nutrition, so children are at risk for nutrition-related diseases (e.g., obesity, diabetes) (4, 5,19, 23, 24). In our study, 27.05% of the mothers verbally and 38.82% visually perceive their children at a lower weight than their actual state. Studies show that mothers - especially mothers of overweight children - underestimate their child's weight (7,11,13,15,16, 25). In accordance with the literature, we found that overweight and obese children were more commonly underestimated by their mothers than others ($p < 0.001$).

In a systematic review of the difference between parental perception and actual weight status of children, 32.90% of 35103 children who were evaluated were found to be overweight, and 62.40% of those children's weight was underestimated by their families (10). In our study, the weight status of all the obese children and most of the overweight children (87.50%) were underestimated by their mothers. This high underestimation rate poses a significant obstacle to the recognition of overweight and obesity disorders and the appropriate management of risks. Considering only obese children, nearly three-quarters of the mothers rated their child at an average weight, and a quarter rated their child overweight. No mother chose the "obese" option for her child in the verbal scale or picture 7, which figured an obese child on the visual scale. This may be related to mothers' underestimation of children's weight or may also be due to the mother's hesitation to label her child as "obese."

There are studies supporting that mothers' perceptions of their children's weight are affected by many factors, such as their own weight status, their children's weight status, cultural beliefs, and stereotypes created in the media (6, 8, 24). In the study conducted by Yalçın et al., parental perception of the child's weight was not found to be related to factors such as the gender of the child or the education of the parents (25). Our study found no relation between the mother's perception of the child's weight and the mother's BMI, the parents' educational or working status, and the family's income.

We found that the verbal and visual self-perception accuracy of overweight or obese mothers was lower than others ($p < 0.001$). However, there was no significant difference in the accuracy of perception of their child's weight between overweight or obese mothers and others. Gregori et al. (23) evaluated mothers' perceptions of their children's weight in a study and found that overweight/obese mothers were more prone to perceive their children's weight as lower. Thus, contrary to Gregori et al. (23), we found that mothers' weight status does not determine their perception of their children's weight. Gregori et al.(23) included 2720 mother-child pairs from 10 countries in their study and found that the mother's being overweight increased the risk of misperception by 1.19 times. This difference may not have been able to be detected due to the smaller number of participants in

our study. Since more than 60% of the participants in Gregori et al.'s (23) study were from one country (India) and the rest were from 9 countries, their results may have been heavily influenced by Indian culture. In this case, cultural differences may be effective in finding different results in our study.

In our study, mothers' perception of healthy children was highly (85.88%) compatible with normal-weight images. We found a strong correlation between the pictures mothers chose for the appearance they wanted their children to have and those they chose for healthy children ($p < 0.001$ $r = 0.826$). Although mothers experienced difficulties in evaluating their children's actual weight for height, they were able to choose more accurate options when hypothetical situations were mentioned (which picture they want their children to look like and which picture a healthy child should look like). This suggests that they are able to make an accurate assessment at the cognitive level, but their perceptions change when it comes to their children.

In conclusion, we observed problems related to the interpretation of children's weight status by their mothers. Since mothers may not be able to perceive problems related to their child's weight and express them as problems, we recommend that paediatricians measure each child's height and weight and evaluate their percentiles. We could not identify any socio-demographic risk factor (such as maternal age, education, income, and mother's weight status) that could explain the inaccurate perception of the mothers. In order to improve child health, we believe that qualitative studies are needed to understand the basis of the subjective perceptions of the mothers about the weight status of their children.

Strengths and limitations of the study

Evaluating mothers' perceptions of weight both towards themselves and their children is one of the strengths of the study. Using verbal and visual evaluations together also adds strength to the study.

One of the limitations of the study is that it is a hospital-based study. This may have worsened the high rates of underweight children. Since the study was hospital-based and the number of participants was limited, the results may not be generalisable to society. Another limitation is that WHO percentages were used when evaluating children's weight for height in order to be compatible with the Toddler Silhouette Scale. The use of WHO percentiles may have worsened the high rate of underweight children and may have contributed to mothers of underweight children overestimating their children.

REFERENCES

- Boutari C, Mantzoros CS. A 2022 update on the epidemiology of obesity and a call to action: as its twin COVID-19 pandemic appears to be receding, the obesity and dysmetabolism pandemic continues to rage on. *Metabolism* 2022;133:155-217.
- Hales CM, Carroll MD, Fryar CD, Ogden CL. Prevalence of Obesity and Severe Obesity Among Adults: United States, 2017-2018. *NCHS Data Brief* 2020;360:1-8.
- Jebeile H, Kelly AS, O'Malley G, Baur LA. Obesity in children and adolescents: epidemiology, causes, assessment, and management. *Lancet Diabetes Endocrinol* 2022;10:351-65.
- Zewude B, Siraw G, Melese B, Habtegiorgis T, Hizkeal A, Tadele M. Beliefs About Body Weight and Practices of Regulating Food and Physical Exercise Patterns of Children Among Parents in Southern Ethiopia. *Psychol Res Behav Manag* 2022;15:1871-83.
- Mazurkiewicz A, Raczowska E. The Connection between Knowledge and the Nutritional Behaviour of Parents and the Occurrence of Overweight and Obesity among Preschool Children-A Pilot Study. *Nutrients* 2024;16:174.
- Alshahrani A, Shuweihdi F, Swift J, Avery A. Underestimation of overweight weight status in children and adolescents aged 0-19 years: A systematic review and meta-analysis. *Obes Sci Pract* 2021;7:760-96.
- Christofaro D, Andrade S, Fernandes R, Cabrera M, Rodríguez-Artalejo F, Mesas A. Overweight parents are twice as likely to underestimate the weight of their teenage children, regardless of their socio-demographic characteristics. *Acta Paediatr* 2016;105:474-9.
- Garcia ML, Crespo NC, Behar AI, Talavera GA, Campbell N, Shadron LM, et al. Examining Mexican-Heritage Mothers' Perceptions of Their Children's Weight: Comparison of Silhouette and Categorical Survey Methods. *Child Obes* 2020;16:44-52.
- García-Blanco L, Berasaluce A, Romanos-Nanclares A, Martínez-González MÁ, Moreno-Galarraga L, Martín-Calvo N. Parental perception of child's weight, their attitudes towards child's dietary habits and the risk of obesity. *World J Pediatr* 2022;18:482-9.
- Rietmeijer-Mentink M, Paulis WD, van Middelkoop M, Bindels PJ, van der Wouden JC. Difference between parental perception and actual weight status of children: a systematic review. *Matern Child Nutr* 2013;9:3-22.
- Ruiter ELM, Saat JJEH, Molleman GRM, Fransen GAJ, van der Velden K, van Jaarsveld CHM et al. Parents' underestimation of their child's weight status. Moderating factors and change over time: A cross-sectional study. *PLoS One* 2020;15:e0227761.
- Tabak RG, Schwarz CD, Haire-Joshu DL. Associations between feeding practices and maternal and child weight among mothers who do and do not correctly identify their child's weight status. *Obes Sci Pract* 2017;3:51-8.
- Al-Mohaimed AA. Parents' perception of children's obesity, in Al-Qassim, Saudi Arabia. *J Family Community Med* 2016;23:179-83.
- Abbas N, Rouaiheb H, Saliba J, El-Bikai R. Childhood obesity: Facts and parental perceptions. *World Acad Sci J* 2023;5:38.
- Ramos Salas X, Buoncristiano M, Williams J, Kebbe M, Spinelli A, Nardone P, et al. Parental Perceptions of Children's Weight Status in 22 Countries: The WHO European Childhood Obesity Surveillance Initiative: COSI 2015/2017. *Obes Facts* 2021;14:658-74.
- Rodrigues D, Machado-Rodrigues AM, Padez C. Parental misperception of their child's weight status and how weight underestimation is associated with childhood obesity. *Am J Hum Biol* 2020;32:e23393.
- Gketsios I, Foscolou A, Vassilakou T, Panagiotakos DB, Kosti RI. Parental Misperceptions of Their Offspring's Weight and Their Strategies for Child's Eating Behavior: A Narrative Review of the Recent Evidence. *Children (Basel)* 2022;9:1565.

18. Regber S, Novak M, Eiben G, Bammann K, De Henauw S, Fernández-Alvira JM et al. Parental perceptions of and concerns about child's body weight in eight European countries - the IDEFICS study. *Pediatr Obes* 2013;8:118-29.
19. Costa A, Hetherington MM, Oliveira A. Maternal perception, concern and dissatisfaction with child weight and their association with feeding practices in the Generation XXI birth cohort. *Br J Nutr* 2022;127:1106-16.
20. Perez M, Kroon Van Diest AM, Smith H, Sladek MR. Body Dissatisfaction and Its Correlates in 5- to 7-Year-Old Girls: A Social Learning Experiment. *J Clin Child Adolesc Psychol* 2018;47:757-69.
21. Thompson MA, Gray JJ. Development and validation of a new body-image assessment scale. *J Pers Assess*. 1995;64:258-69.
22. Hager ER, McGill AE, Black MM. Development and validation of a toddler silhouette scale. *Obesity (Silver Spring)* 2010;18:397-401.
23. Gregori D, Hochdorn A, Azzolina D, Berchiolla P, Lorenzoni G. Does Love Really Make Mothers Blind? A Large Transcontinental Study on Mothers' Awareness About Their Children's Weight. *Obesity* 2018;26:1211-24.
24. Xiang C, Zhang Y, Yong C, Xi Y, Huo J, Zou H et al. Association between Parents' Perceptions of Preschool Children's Weight, Feeding Practices and Children's Dietary Patterns: A Cross-Sectional Study in China. *Nutrients* 2021;13:3767.
25. Yalçın SS, Serdaroğlu E, İnce OT. Parental perception and child's nutritional status. *Türk J Pediatr* 2016;58:63-8.