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Original article

Association of the Relationship Between Eating Behavior, Parental feeding Style and Body weight in Children

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Abstract. *Objectives:* The aim of this study was to investigate the effects of parental feeding styles and children's eating behavior patterns on both low body weight and obesity. *Methods:* This study was a descriptive and cross-sectional. The cohort consisted of the preschool and elementary school parents (350 children) of a school in Istanbul/Turkey, 244 parents were participated between 15 April-15 June 2018. Children's Eating Behavior Questionnaire and Parental Feeding Style Questionnaire were applied. Descriptive statistical methods were used to explain children's characteristics. Parametric methods were used for variables with normal distribution and non-parametric statistical methods were used for data with abnormal distribution. Spearman's rho was used to determine the relationship between scores obtained from both questionnaires and BMI. Mann-Whitney U test was used for non-normally distributed variables and t-test or independent variables was used to determine the difference between the mean scores according to gender. *Results:* The median age of the children was 7.3 (5-10) years. Mean BMI Z-score value was 0.4 ± 1.4. According to BMI Z- score; 4.9% (n: 12) were underweight, 56.6% (n: 138) were normal weight, 26.6% (n: 65) were overweight and 11.9% (n:29) were obese. Underweight children were picky about food consumption. Overweight/obese children were prone to both emotional overeating and under eating and enjoyed eating more. Parental emotional feeding style was associated with emotional overeating, under eating and food selectivity scores and they enjoyed eating more. *Conclusion:* Applying practical and reliable methods to assess nutritional habits may help to diagnose and prevent malnutrition problems early in childhood. Healthy nutrition behavior could be improved with proper parental feeding styles.

Key words: Children eating behavior, parental feeding style, body weight

Introduction

Recently, one in nine people in the world is reported to be hungry, and one in three people is overweight or obese. More and more countries experience the double burden of malnutrition, where undernutrition coexists with overweight, obesity and other diet-related non-communicable diseases (1).

The number of systematic national studies that show the frequency of malnutrition in Turkish children is limited (2-4). Also, most studies were conducted only in certain age groups (5, 6).

Parental feeding styles, concerns and beliefs play an important role in creating their children's nutritional behaviors and affects children's body weight (7). Family feeding patterns, parents' attitudes and behaviors are associated with the development of obesity in children. It may also affect the child's ability to self-regulate food intake (8, 9-11). Increased mother insistence during feeding has been associated with lower

body weight, slower eating and greater saturation in children (12, 13). Children are especially affected by their mother's eating behavior model (14). Parental feeding styles, which follow children's hunger and satiety tips, provide less adiposity, a healthier diet and body weight (15, 16).

Exploring and understanding the relationship between parental feeding styles and children's eating behavior will help to identify families and children with eating behavior problems (13, 16). The effects of parental feeding styles and eating behavior models on obesity in children were investigated in recent studies (3, 17, 18). It is necessary to have more information about children's eating behaviors and parental feeding styles in order to reduce the risk of non- communicable and preventable diseases in children. Determining the effects of parental feeding style and eating behavior patterns on children's body weight may contribute to reducing pediatric morbidity and mortality rates.

METHODS

Hypotheses in this study were; to estimate the tendency to malnutrition by using the children's eating behavior questionnaire in Turkish children, to examine whether the Turkish parental feeding style contributes to malnutrition in children and to assess the relationship between these two scales. For this reason, Children's Eating Behavior Questionnaire and Parental Feeding Style Questionnaire were applied to parents who were participated in this study to investigate the effects of parental feeding styles and children's eating behavior patterns on both low and over body weight.

Methods

Subject Population and Recruitment

This study was a descriptive and cross-sectional study and the cohort consisted of the preschool and elementary school parents (of 350 children) of a school in Istanbul/Turkey. Children's Eating Behavior Questionnaire (CEBQ) and Parental Feeding Style Questionnaire (PFSQ) were delivered to parents by their teachers. The questionnaires were answered by parents who agreed to contribute their child's in the study and a total of 244 parents were participated in the study. Data were collected between 15 April and 15 June 2018.

Data collection and measures

***Children's Eating Behavior Questionnaire*:** It was developed by Wardle et al. (19) and adapted in Turkish by Resul Yılmaz et al. (20). The scale consists of 35 questions and 8 subscales that determine the appetite of the child by evaluating it over five-point scale (1-never, 5-always). These subscales were food responsiveness (FR), emotional overeating (EOE), enjoyment of food (EOF), desire to drink (DD), satiety responsiveness (SR), slowness in eating (SE), emotional under eating (EUE), and food fussiness (FF).

FR defines children's appetite for food or desire to eat (21). EOE refers in the absence of hunger clues that appear in response to emotions such as worry, stress and anxiety (22). EOF defines general interest and appetite in eating. SR is usually measured behaviourally by seeing whether food intake is reduced to compensate for a prior snack. SE generally defines speed of eating. EUE refers to a change in eating behavior in response to distress and results in food avoidance. FF was a common observation, eating too little at meals, and being easily put off eating all of these being aspects of undereating (19). FF also include the frequent rejection of both familiar and unfamiliar foods (21). The subscales of FD, EOF and EOE indicate a tendency towards increased food intake while the subscales of SE, SR, EUE and FF indicate a tendency towards reduced food intake, and DD indicates a tendency for increased intake of sweetened beverages (20).

The Cronbach's alpha coefficient of the validated scale was 0.69, showing good reliability. The subscale reliability coefficients were: FR 0.69, EOE 0.61, EOF 0.84, DD 0.79, SR 0.76, SE 0.75, EUE 0.67, and FF 0.74 (20). In our study, we calculated the Cronbach alpha coefficient of the scale was 0.71 by using statistical program. The reliability coefficients of the subscales were: FF 0.75, EOE 0.73, EOF 0.88, DD 0.88, SR 0.79, SE 0.83, EUE 0.85, and FF 0.84.

Parental Feeding Style Questionnaire: This scale was developed by Wardle et al. (23) and adapted in Turkish by Mustafa Özçetin et al. (24). The scale consists of 27 questions and 5 five-point subscales (1 never, 5 always). The subscales of Parental Feeding Style Questionnaire in the original scale were emotional feeding (EF), instrumental feeding (IF), prompting and encouragement to eat (PTE), and control over eating (COE). Feeding in response to emotional distress (emotional feeding) and using food as a reward (instrumental feeding) are both assumed to encourage the child to associate eating with cues other than hunger and thereby increase the risk of eating in excess of physiological need. Excessive prompting or encouragement to eat is deriving either from the parents' enthusiasm to see the child eating food that has been carefully prepared or the belief that a heavier child is a healthier one (16). COE describes how parents control a child what, when, how much eats (25).

Cronbach's alpha coefficients of the subscales were EF 0.65, IF 0.85, PTE 0.69, and COE 0.77 in the original scale (23). The original questionnaire of four subscales was divided into five subscales in the Turkish version—emotional feeding (EF), instrumental feeding (IF), prompting and encouragement to eat (PTE), strictly controlled (SC), and tolerantly controlled (TC) (24). SC refers parent decides when/what/how much child should eat and TC defines allowing child to make these decisions (25). In terms of structure validity and internal consistency, the Turkish version is divided into five sub-scales in order to obtain very close results with the original questionnaire in terms of subgroup relationships. As a result, the whole correlation of the question was found to be between 0.248 and 0.667 and it was evaluated as "good" (24). In our study, the Cronbach's alpha coefficient of the scale was 0.75 and the subscale coefficients were EF 0.92, IF 0.78, PTE 0.79, SC 0.63, and TC 0.59.

Anthropometric measurements: Body weight was measured to the nearest 0.1 kg without any clothes using an electronic scale. Height was measured without shoes and in minimal clothing using a stadiometer to the nearest 1 mm. Anthropometric measurements were measured by the school nurse. Parents were also requested to report birth date. This information was entered into WHO Anthroplus program (26) and children's Body Mass Index (BMI) score and percentile values were calculated according to age.

Statistical Analysis

SPSS 17 statistical package program was used for descriptive data analysis, cronbach alpha coefficients of the sub-scales of the questionnaires. The hypothesis were stated before data collection. Descriptive statistical methods were used to explain children's characteristics. Parametric methods were used for variables with normal distribution, and non-parametric statistical methods were used for data with abnormal distribution. Pearson correlation was used to determine the relationship between subscale scores obtained from both questionnaires and BMI zscores. In addition, Mann-Whitney U and Post Hoc tests were used to determine the significance between the body weight categories. P values below 0.05 were considered statistically significant. The analytic plan was pre-specified and all data-driven analyses were clearly identified and appropriately discussed.

Ethical Considerations

This study was found appropriate by the Ethics Committee of Istanbul Arel University (Date: 07/05/2018, Number: 2018/05) and investigated under the guidance of the Declaration of Helsinki.

Results

Children's anthropomorphic data (body weight, height, BMI z-score) and frequency of body weight categories are presented in Table 1. The percentages of girls and boys were similar. The median age of the children was 7.3 (5-10) years. Their mean BMI Z-score value was 0.4 ± 1.4. In this study, 4.9% (n: 12) of the participants were underweight, 56.6% (n: 138) were of normal weight, 26.6% (n: 65) were overweight and 11.9% (n:29) were obese.

There was a significant relationship between BMI Z-score categories and food responsiveness, emotional over eating, enjoyment of food, satiety responsiveness and food fussiness scores ($p<0.05$) (Table 2).

Table 1. Children's characteristics and body weight categories.

	n (%)	Mean±Sd	Median (min-max)
Age (year)			7.3 (5-10)
Gender			
Girl	131 (53.7)		
Boy	113 (46.3)		
Body weight (kg)			27.8 (15-72)
Height (cm)		129.7±9.9	
BMI z-score for age		0.4±1.4	
Body weight categories			
underweight (<-2 Sd)	12 (4.9)		
Normal (≥-2 Sd- ≤+1 Sd)	138 (56.6)		
Overweight (> +1 Sd- ≤ +2 Sd) *Obese (>+2 Sd)*	65 (26.6) 29 (11.9)		

BMI: Body mass indeks, Sd:standart deviation, n:number.

Table 2. CEBQ and PFSQ total scores and subscale scores by BMI zscore categories

Subscales		underweight (n:12) (<-2 Sd) Mean Rank	Normal weight (n:138) (≥-2 Sd - ≤+1 Sd) Mean Rank	Overweight (n:65) (>+1 Sd - ≤+2 Sd) Mean Rank	Obese (n:29) (>+2 Sd) Mean Rank	p
CEBQ	Total scores	107.3	114.4	130.9	148.9	0.063
	food responsiveness	180.3	121.7	115.2	119.0	0.029*
	emotional over eating	118.1	106.6	133.8	174.5	0.000*
	enjoyment of food	84.4	103.8	146.6	173.4	0.000*
	desire to drink	113.5	115.3	138.3	125.2	0.173
	satiety responsiveness	138.5	133.3	108.4	96.2	0.014*
	slowness in eating	96.8	121.0	124.4	136.1	0.412
	emotional under eating	91.9	117.4	127.8	147.7	0.066
	food fusiness	93.6	111.4	140.8	146.5	0.004*
PFSQ	Total scores	132.9	124.3	118.2	119.4	0.884
	emotioanl feeding	97.4	120.9	127.4	129.6	0.514
	instrumental feding	110.8	122.8	126.2	117.7	0.880
	prompting and couragement to eat	140.0	126.9	110.7	120.8	0.371
	strict controlled	126.5	125.9	106.9	139.6	0.150
	tolerant controlled	130.8	123.9	130.3	95.3	0.147

* Kruskal-Wallis p<0.05
CEBQ: Children's Eating Behavior Questionnaire, PFSQ: Parental Feeding Style Questionnaire, n:number, Sd:standart deviation

There were a negatively significant weak correlation between food responsiveness (r = -0.139, p <0.05), satiety responsiveness (r = -0.193, p <0.01) and positive weak correlation between emotional under eating (r=0.194, p<0.05) and emotional over eating (r=0.274, p<0.01) with BMI z-score for age. Also the

significant correlations were between eating behavior questionnaire and parental feeding style questionnaire subscales (Table 3).

Discussion

In this study, we investigated the effects of eating behavior and parental feeding styles on body weight. In recent studies, the relationship between eating behavior and parental feeding style has been examined in children and their effects have been investigated only on obesity (3, 18, 27). We endeavored to answer the question of whether these questionnaires could help identify trends in the food habits of Turkish children and their effects on body weight. The results of this study showed that some eating behavior patterns in children could change according to body weight. We did not establish significant relationship between parental feeding style and body weight. There was not a significant relationship between parental feeding style and BMI z-scores, however, children eating behavior was associated with BMI z-scores. In addition, a significant correlation was found between the CEBQ and PFSQ subscales.

According to 2016 Turkish data, 1.5% of children between aged 6-9 years were underweight, 14.6 % were overweight and 9.9 % obese (5). According to 2013 Turkish data of the same study, the ratio of children who were underweight decreased by 0.6 % and those who were overweight increased by 0.4 % and obese children increased by 1.6 % (6). The subjects of this study were preschool-age and school-age children between 5 and 10 years age. Five-point three percent of the children were underweight and 38.4 % were overweight and obese. According to the results of the study, we observed that the ratio of underweight and overweight-obese children have increased in the same age group in 3 years. Being either obese or underweight, influences negatively academic success in both school-age children and preschool-age children, by adversely affecting growth and development. Early detection of these problems by applying questionnaires which show eating behavior in children and parental feeding styles, may be effective in determining obese and underweight children. Using these methods in clinics does not require special knowledge, skills and costs.

Individual differences in eating behavior may cause both obesity and low body weight (19). Picky eating is considered part of normal development in early childhood (28, 29). It has been shown that food selectivity and picky eating are associated with less food consumption and nutrient intake. Selective and fussy food consumers get nutrients insufficient with diet (29). An inadequate diet provides less energy, there may be insufficient intake of certain macronutrients, minerals and vitamins, and children's body weights are lower. (30). The children eating behavior questionnaire helps identify some basic features of picky and selective eating behavior such as: consumption of limited variety and amount of food, reluctance to try new foods, and rejection of foods based on certain sensory characteristics or tissues (19, 20). In this study, we observed that children with low z-scores were selective for food experience, less pleasure from eating, and underweight children had lower food fussiness scores (reverse coded) compered to normal, overweight and obese individuals. Similarly, satiety responsiveness scores of the underweight and normal weight children were significantly higher than the overweight and obese groups. However, as the BMI z-scores increased, the food responsiveness subscale scores decreased significantly. Although the food fussiness was higher in the underweight children, the food responsiveness scores (indicating the tendency of food consumption) in the underweight children, were found significantly higher than the normal weight, overweight and obese groups. Qualitative studies are needed to determine the reasons why they are more eager to eat. Because of the low number of underweight children may have prevented us from finding the expected significance.

In a study conducted by Gregory et al. restrictive parental feeding behavior contributed to obesity and parental pressure to eat was associated with lower body weight in preschool children (31). In another study, higher adiposity was associated with lower parental pressure to eat and higher restrictive parental feeding style (32). In a twin's study, parents of children with selective eating behavior were found to be more predominant to food suppression and instrumental feeding. However, no significant relationship was found between restrictive parental feeding style and selective eating behavior (33). In this study, no significant

Table 3. The relationship between CEBQ subscales and PFSQ subscales with BMI z-score for age (Pearson Correlation)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
BMI zscore for age	1,000													
food responsiveness	-,139*	1,000												
emotional over eating	,274**	,318**	1,000											
enjoyment of food	,379**	,153*	,443**	1,000										
desire to drink	,101	,293**	,335**	,299**	1,000									
satiety responsiveness	-,193**	,466**	,269**	-,051	,479**	1,000								
slowness in eating	,059	,125	,269**	,159*	,131*	,151*	1,000							
emotional under eating	,194**	,218**	,302**	,360**	,354**	,263**	,097	1,000						
food fusiness	,258**	,298**	,584**	,349**	,647**	,321**	,155*	,284**	1,000					
emotioanl feeding	,073	,200**	,213**	,258**	,283**	,228**	,101	,171**	,228**	1,000				
instrumental feeding	,044	,113	,103	,149*	,273**	,214**	-,024	,124	,160*	,433**	1,000			
prompting and couragement to eat	-,065	,125	,147*	,062	,239**	,206**	,159*	,055	,153*	,169**	,176**	1,000		
strict controlled	-,001	,009	,031	,104	-0,14	-,039	,045	,013	,052	,025**	,062	,202**	1,000	
tolerant controlled	-,075	,036	-,063	-,100	0,74	,235**	,078	,024	-,021	,049**	,060	,026	-,326**	1,000

BMI:body mass index, CEBQ: Children's Eating Behavior Questionnaire, PFSQ: Parental Feeding Style Questionnaire *p<0,05
**p<0,001

relationship was found between the effect of parental feeding style on children's body weight. However, there was a negative correlation between prompting and encouragement to eat and BMI z-score; however, it was not statistically significant.

Child-parent interaction in nutrition is important in shaping children's food preferences and consumption. Especially in the long term, parental controlled food preferences adversely affect the dietary quality of children. Parents think that their children will make healthier choices when they try to control their children's food intake. However, studies have shown that feeding strategies by interfering with children's food preferences are not successful in maintaining healthy eating behavior, but on the contrary, children make unhealtier choices when parental control is eliminated (34-36). The results of our study showed that increased emotional feeding and encouraging eating behavior in the parents increased the tendency of food intake. If the parents try to feed their child's emotional hunger with food or encourage food intake, children's desire to reach food increases.

The study by Haycraft et al. (37) showed that overweight/obese mothers' children were more eager to drink, were sensitive to saturation, and ate meals slowly.

In our study, anthropometric measurements of the parents were not requested. This was considered to be a limitation of our study. Our study was conducted in a single center. In the study, we did not ask which parent answered the questionnaire questions, parent's anthropometric characteristics and socioeconomic status of individuals. Data were collected from children that attended a private school. Thus, it was assumed that the socioeconomic status of the participants was moderate to high. There is a need for qualitative and quantitative studies involving children.

In Turkey, while malnutrition is a problem of the population with lower socio-economic status, overweight /obesity is a problem of the population with higher socio-economic level (38). Developing practical and reliable methods, showing the trend of nutrition in children and their clinical application, could contribute to early diagnosis and prevention of malnutrition problems in children. In addition, it is considered that healthy nutrition behavior will improve in children with proper parental feeding styles.

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Authors Contribution: Dilek Ozcelik-Ersu: Constructing an idea or hypothesis for research and/or manuscript, Providing personnel, tools and place that are vital for the project, Taking responsibility in the construction of the whole or body of the manuscript, Taking responsibility in logical interpretation and presentation of the results, Making statistical analyze.

Ozlem Persil-Ozkan: Taking responsibility in logical interpretation and presentation of the results, Constructing an idea or hypothesis for research and/or manuscript, Organising and supervising the course of the project or the article and taking the responsibility. Planning methodology to reach the conclusion, Taking responsibility in this necessary function, Organising and supervising the course of the project or the article and taking the responsibility.

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