Eating Behaviors vs. BMI: which is more related with Health-Related Quality of Life? A Cross-Sectional Study on Iranian Female Adolescents

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Abstract

Background: With the increasing prevalence of obesity among adolescents, many studies have been conducted on the impact of body mass index (BMI) on adolescents' health-related quality of life. The objective of this research was to study the association among eating behavior constructs, anthropometric parameters of BMI, and health-related quality of life (HRQOL).
Methods: Random cluster sampling was employed to select 250 female high school students and their mothers in six schools located in District 3 of Tehran, Iran, in October 2017. The research tools were: Child Eating Behavior Questionnaire (CEBQ), Short Form of Health-Related Quality of Life Questionnaire for Children and Adolescents (Kidscreen-10), and BMI measurements. Data were analyzed by Pearson correlation coefficient and analysis of variance.
Results: The findings of the research showed a significant indirect correlation between certain practices of eating behavior with HRQOL variables such as emotional over-eating (r="0.13", P=0.038) and emotional under-eating (r="0.14", P=0.022); a weak significant indirect correlation was further observed between slowness in eating (r="0.11", P="0.078") and variables of HRQOL. The results showed no association between BMI and HRQOL.
Conclusion: The present study showed that controlling behaviors such as slowness in eating, emotional over-eating, and emotional under-eating are able to significantly improve the quality of life regardless of anthropometric indices. Eating behaviors ultimately make up a major component of adolescents' lifestyle; therefore, they play a key role in improving their quality of life.

Keywords: Health-related quality of life; Eating behaviors; Anthropometric indices; Adolescent

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1. Introduction

For a complete review of the quality of life (QOL) in the health system, the concept of health is described in relation to the quality of life and it is defined as the concept of health-related quality of life (HRQOL) (1).

Until recently, the concept of HRQL only concerned adults, in recent years; however, this concept has been increasingly utilized in childhood and adolescence research (2). Because personal experiences, beliefs, expectations, and feelings have a significant impact on HRQOL, myriad studies have examined the role of diseases, personality, and psychosocial characteristics in HRQOL (3).

Previous research has suggested that feelings, moods, psychological advancements, and skills associated with childhood and adolescence are potential areas of research (4). Accordingly, investigating particular aspects of adolescent life such as the type of dietary habit, seems to be of great importance in examining the different dimensions of QOL associated with adolescent health.

It is widely accepted that malnutrition and uncontrolled calorie intake can adversely affect longevity. However, recent studies have shown that mortality risk, reproduction, growth, and health (body condition) are mostly dependent on macronutrient intake rather than calorie intake (5). Lower HRQOL was reported more frequent among overweight/obese adolescents compared with those with a normal weight. Particularly, overweight/obese girls experienced HRQOL similar to those suffering from chronic diseases such as cancer (6). Moreover, eating behaviors might be able to predict HRQOL beyond the concept of BMI and even in the absence of obesity or overweightness in an individual. Therefore, the present research sought to determine whether eating behaviors are associated with HRQOL and if BMI is solely able to predict HRQOL in adolescents and adults.

2. Methods

The present cross-sectional study was approved by the Council of Postgraduate studies in Allameh Tabatabai University. This article was approved by the

Research Council of the Faculty of Psychology and Education of Allameh Tabatabai University. Sample size was calculated by Cochran formula. A total of 250 female students aged 13-15 years were selected through the use of cluster sampling method in October 2017, Tehran, Iran. The participants were chosen from six randomly selected schools in District 3 of Tehran. Two classes were randomly selected from each school. Overall, 250 students were selected via random cluster sampling method without any specific exclusion criteria. Body mass index (BMI) of the participating students was calculated by their mothers who also completed the study questionnaires (7).

The Child Eating Behavior Questionnaire (CEBQ) comprises 35 items and eight sub-scales, namely Food Responsiveness (FR), Enjoyment of Food (EF), Satiety Responsiveness (SR), Slowness in Eating (SE), Food Fussiness (FF), Emotional Over-eating (EOE), Emotional Under-eating (EUE), and Drink Desire (DD). In a study (8), the Persian translation of the questionnaire was developed and standardized (validity: 86% and reliability: 62.8%).

The short form of the HRQOL for Children and Adolescents (Kidscreen-10) (4) is designed specifically for children and adolescents aged 8-18 years. This questionnaire consists of nine items rated on a five-point Likert scale. The questionnaire was translated and standardized (9) for the first time in Iran. In this version of the questionnaire, Cronbach's alpha coefficient was higher than 70%, and the retest coefficient was assessed to be significant (P<0.05) in every dimension. In the present study, Cronbach's alpha coefficient was employed to assess the reliability of the questionnaire, which was 0.74

Informed consent was obtained from the students willing to participate in the study. Noteworthy, personal information irrelevant to the purpose of study was not collected, and data confidentiality was assured. Eventually, 249 valid completed questionnaires were collected, and data was analyzed by SPSS version 23. Pearson correlation and analysis of variance (ANOVA) were employed for data analysis.

3. Results

The mean age, height, and weight of the students were 12 years, 161.65 cm (SD=8.09) and 55.99 kg (SD=25.11), respectively. Our findings showed that 1.2% of the students were underweight, 55.5% had normal weight, 26.1% were overweight, and 26.9% were obese.

Initially, the normal distribution hypothesis of the variables was examined for the Pearson correlation test using the Kolmogorov-Smirnov (K-S) test; the results showed that the distribution of all variables was normal (P>0.05). The Pearson correlation results are reported in Table 1.

The Pearson test results showed a significant direct association between HRQOL and certain components of eating behavior such as slowness in eating (r=0.11, P=0.078), a weak significant direct relationship with emotional over-eating (r=0.13, P=0.038), and an indirect correlation with emotional under-eating (r=0.14, P=0.022). However, no significant relationship was observed between HRQOL and eating behavior. There was no correlation between BMI and eating behavior either. However, BMI was found to be poorly associated with some components of eating behavior such as Food Responsiveness (r=0.17, P<0.05) and Enjoyment of Food (r=0.16, P<0.05), and negatively associated with Emotional Over-eating (r=0.16, P=0.01) and Emotional Under-eating (r=0.13, P<0.05). Finally, there was no significant relationship between HRQOL and BMI.

Table 1: The Pearson correlations between health-related quality of life, eating behavior, and body mass index among the study population

Correlation		Mean	SD	HRQL	Significance level	Body mass index (BMI)	Significance level
BMI		21.87	4.75	-0.034	0.596	-	-
Sub-scales of eating behaviors	Food Responsiveness	18.07	4.85	0.073	0.255	0.177	0.006
	Enjoyment of Food	9.07	3.1	0.097	0.128	-0.166	0.009
	Emotional Over-eating	15.08	2.49	0.133	0.038	0.165	0.010
	Drink Desire	9.38	3.34	-0.062	0.333	0.031	0.631
	Satiety Responsiveness	15.08	2.49	0.074	0.253	0.019	0.769
	Slowness in Eating	13.27	2.52	0.113	0.078	0.056	0.387
	Emotional Under-eating	11.73	3.49	0.145	0.022	0.137	0.031
	Food Fussiness	18.14	2.67	0.021	0.741	0.009	0.883
Total Eating Behavior		110.53	15.97	0.093	0.146	0.099	0.124

Furthermore, ANOVA was conducted to investigate the differences among the different levels of BMI (underweight, normal, overweight, and obese), HRQOL, and eating behaviors. However, findings showed no significant association between BMI and HRQOL.

4. Discussion

Several studies have been conducted to investigate the relationship between the three concepts of eating habits, anthropometric indices, and quality of life, particularly among adults; however, in the present research, we aimed at exploring the association between the three variables simultaneously among a group of adolescents. According to the results, BMI did not correlate with HRQOL and could not be used as a predictor of HRQOL in adolescents. However, some components of eating behavior such as food responsiveness, enjoyment of food, emotional over-eating and emotional under-eating were shown to be significantly correlated with HRQOL. This corroborates the study hypothesis that regardless of BMI, life style-related eating behaviors are significantly associated with HRQOL. However, the total score of eating behavior did not have a significant correlation with HRQOL.

The concept of external stimuli refers to eating as a response to stimulants associated with food, irrespective of hunger state, a concept similar to that of food responsiveness in the present study. It seems that higher response to external eating stimuli, including the image or smell of food, regardless of whether hunger is felt, is directly and positively correlated with increased body mass. This indicates the inability to recognize hunger, an issue mostly observed in overweight and obese individuals.

Another eating behavior characteristic is slowness in eating, which positively and indirectly influences the HRQOL and can be highly related to mindful eating. Identification of emotional or external eating stimuli can help control over-eating through mindful eating, which is shown to be effective in weight management (10). However, in phenomena such as hedonic eating, factors like overeating sugar-laden food could sometimes adversely impact satiety signal system, disrupting the homeostatic psychological mechanism and resulting in over-eating (11).

Consequently, it seems that in mindful eating, which emphasizes full attention to the current experience of eating, the focus is on the pleasure of eating, which restrains overeating and leads to lower

BMI. This type of eating is further considered to be slow in pace and have a positive influence on HRQOL. In a study (12), fast eating pace had a direct correlation with high BMI. Mindful eating is among cognitive factors that can affect health along with behavioral factors such as eating behavior (13). This confirms the results of the present study and suggests that mindful self-care is negatively associated with perceived stress, mediating the relationship between perceived stress and psychological well-being, which is consistent with the results of previous research (14-17).

On the other hand, in 2016, the association among emotional over-eating and under-eating and BMI was confirmed in a study (18). This study showed the mediating role of emotional eating between BMI and depression, which is in line with the previous findings (19, 20).

The present study showed that eating behavior factors, especially controlling behaviors such as slowness in eating, emotional over-eating, and emotional under-eating, can significantly enhance QOL, irrespective of anthropometric indices such as BMI. This finding can be very important for health policymakers as it influences key health strategies to improving the QOL of adolescents. Therefore, the focus of interventions for improving QOL will be focused on ameliorating behaviors rather than modifying anthropometric indices. In this regard, emphasis on home food rules (21), awareness raising, modifying nutritional behaviors during adolescence, and taking note of healthy lifestyle habits can greatly enhance HRQOL. On the other hand, teaching teenagers how to regulate their emotions and impulsive behaviors can be further effective in preventing emotional over-eating and under-eating.

5. Conclusion

In addition, the promotion of these behaviors in adulthood can also reduce the incidence of obesity and overweight; accordingly, behavioral interventions and nutritional behavior modifications should be implemented with the objective of modifying the quality of life in adolescents rather than improving anthropometric indicators.

The present study encountered certain limitations. Firstly, considering the characteristics of the study population, caution should be exercised in generalizing the results to other groups. Secondly, we faced some time restraints while interviewing the mothers. Thirdly, this study did not assess the food intake of adolescents

and only evaluated eating behaviors via a self-report subjective questionnaire. Finally, the cross-sectional design of the study showed the correlation between variables, not causality.

Ethical Considerations

This article was approved by the Research Council of Faculty of Psychology and Education of Allameh Tabatabai University.

Conflict of Interest

The authors declared no conflict of interest.

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