

Health Related Quality of Life and Weight Self-Efficacy of Life Style among Normal-Weight, Overweight and Obese Iranian Adolescents: A Case Control Study

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Abstract

Background: Identifying and investigating the factors influencing self-efficacy and eventually health related quality of life (HRQoL) can be an important step toward the prevention and treatment of the obesity. The aim of the study was to compare weight self-efficacy and HRQoL among normal-weight, overweight and obese Iranian adolescents.

Materials and Methods

In this case-control study, 118 obese and overweight adolescents (case group) and 118 adolescents with normal weight (control group) were recruited. Adolescent's anthropometric characteristics were measured. The Weight Efficacy Lifestyle Questionnaire (WEL), pediatric quality of life inventory (PedsQL™ 4.0) and self-reported physical activity were completed by the adolescents.

Results: Multivariate logistic regression adjusting for various confounders indicated that overweight and obese adolescents were less likely to be physically active (adjusted odds ratio, AOR= 0.66; 95% confidence interval [CI], 0.48 to 0.911), had lower ability to cope with social pressure (AOR= 0.54; 95% CI, 0.32 to 0.93), involved in less positive activities (AOR= 0.53; 95% CI, 0.37 to 0.75), and felt more negative emotions (AOR= 0.23; 95% CI, 0.14 to 0.36) than their normal-weight counterparts. Moreover, obese and overweight adolescents were more likely to report deteriorated quality of life in all PedsQL subscales than those with normal weight ($P<0.05$). The results of the mediation analysis indicated that negative emotions mediated the relationship between adolescents' weight status and HRQoL ($Z = -5.79, P<0.001$).

Conclusion: Weight management programs should focus on increasing adolescent's control on situations related to negative emotions to improve their HRQoL.

Key Words: Adolescent, Emotions, Obesity, Quality of Life, Self-efficacy.

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1- INTRODUCTION

Childhood and adolescent obesity is one of the most important risk factors for chronic diseases in adulthood (1). The growing trend of obesity in childhood and adolescence is now viewed as a challenging and costly issue in the health area (2). The investigation of food consumption patterns in Iranian households during 2001-2003 has revealed that the prevalence rates of overweight are equal to 8.7% and 11.83% in 11-to-19-year-old female and male adolescents, respectively (3). A systematic review and meta-analysis found that the prevalence rates of obesity and overweight among 12-to-18-year-old adolescents have been 7% and 11.83%, respectively (4). In Caspian IV study in 2011 and 2012 (Iran), the prevalence rates of general obesity and abdominal obesity in 12-year-old adolescents were estimated about 11.89% and 19.12%, respectively, and the highest prevalence rate of obesity was observed in high school adolescents (5).

The findings of the national survey of Iranian students (6-18 years) showed that more than one fifth of students (22.2% females and 22.9% males) were obese or overweight (6). Some studies suggest that more than half of the overweight children will be overweight in adulthood; moreover, this risk will be intensified with an increase in age and weight. In comparison with children, about 80% of obese adolescents remain obese in adulthood, as well (7). Obesity in childhood and adolescence will result in the incidence of many chronic diseases in adulthood (8, 9).

It has been recognized that type 2 diabetes, asthma, hypertension, insulin resistance, high levels of blood fats, and a wide range of psychological disorders (i.e. low self-esteem, depression, anxiety, adjustment problems, social stigma, negative social relations, and deteriorated health related quality of life) are among the chronic

diseases associated with obesity in adolescence (10, 11). Studies have indicated that obese children in school show more behavioral problems (such as low self-esteem, conflict and contention, rebellion, sadness, disciplinary problems) than non-obese children and these problems are significantly heightened with the increase of weight (12-14). Increased weight in 10-to-17-year-old children and adolescents is associated with poor school functioning (including school absenteeism, poor school relations, repetition of learning lessons) (12). Self-efficacy is a key indicator and determinant of behavioral change because of the effect it may have on the onset of choosing to show a specific behavior in individuals (15). Self-efficacy refers to one's belief and confidence in his/her ability to demonstrate a particular behavior even in a tempting situation, which influences the conduct of an activity and persistence of its conduct (16).

The important point in self-efficacy is that if the person believes that s/he can perform a behavior successfully, it will be likely that s/he can manage to do it (17). However, the perceived ability one has over the control of his/her weight is obtained through resistance against eating, social pressures by others, placement in a position of positive and negative emotions, food availability, and physical discomfort (18). Health-related quality of life (HRQoL) is a multidimensional construct that pertains to the effect of a health condition (e.g. overweight) on the individuals' internal, physical, emotional, occupational, and academic function and it has been shown to be significantly available among the obese children compared with the non-obese adolescents in all dimensions of disorders (19-21). Research has shown that obesity and overweight reduce HRQoL and also increase body mass index (BMI) (22, 23). Given that a limited number of studies have been carried out on the relationship

between self-efficacy and HRQoL in obese adolescents compared with adolescents with normal weight, the present study is an attempt to evaluate the self-efficacy and HRQoL in adolescents with normal weight and those with obesity and overweight in high school settings, in Qazvin, Iran.

2- MATERIALS AND METHODS

2-1. Participants and Setting

The present study case-control study was conducted on 16 secondary schools in the academic year 2016 in Qazvin, Qazvin province, Iran. The number of 118 obese or overweight students (above the 85th percentile for children and teens of the same age and sex; 56 girls and 62 boys; cases) and 118 students with normal weight (5th percentile to less than the 85th percentile; 56 girls and 62 boys; control group) in the age group (12-18 years) were selected through multistage cluster sampling method by considering the inclusion criteria. The inclusion criteria were: being overweight or obese as defined by the World Health Organization (WHO) (24), not suffering any specific underlying disease, non-use of the medical drugs that influence weight, lack of weight loss diets, willingness to participate in the study, and parental consent. Both case and control groups were similar by gender, age and school. This study was approved by the ethic committee of the Qazvin University of Medical Sciences (IR.QUMS.REC.1395.172). In addition, the researchers obtained informed consent from their parents.

2-2. Assessment

2-2-1. Weight status

The weight of each student was measured by an independent research associate using SECA scale (SECA, Hamburg, Germany) with having the minimum clothes on and without any shoes on (with the accuracy of 100 mg), and students' height was also measured by means of a non-elastic tape

with the accuracy of 0.5 cm while the heel had been attached to the wall and the eyes were straight on the opposite side. The Z scores of BMI were calculated using AnthroPlus software based on the adolescents' age and WHO's standard (25). According to this standard, if the Z score of BMI is smaller than -3 SD (standard deviation), the person is very thin; if this score is less than -2SD, the person is thin. On the other hand, if the BMI Z score is larger than + 1 SD, the person is overweight; and if the BMI Z score is larger than + 2 SD, the person is obese. The individuals with the inclusion criteria were invited for participation in the study (25).

2-2-2. Sociodemographic information

Sociodemographic information on age, gender, and educational level, was collected from records in the schools.

2-2-3. Weight self-efficacy

One of the main instruments for data collection in this study was the Weight Efficacy Lifestyle Questionnaire (WEL), which has been developed by Clark et al. (26). This questionnaire contained twenty items and five subscales (negative emotions, availability, social pressure, physical discomfort, and positive activities) as well as a global sum of the subscales. All items are rated on a 10-point Likert scale ranging from 0 (not confident) to 9 (very confident) (4). The reliability and validity of the Persian version of the WEL have been approved by Navidian et al. (27).

2-2-4 Health-related quality of life (HRQoL)

The Pediatric Quality of Life Inventory™ (PedsQL™) 4.0 Generic Core Scales Adolescent Version (i.e., 13–18 years old) was used to evaluate the HRQoL in the adolescents. This questionnaire included 23 items and four scales including physical functioning (8 items), emotional

functioning (5 items), social functioning (5 items), and school functioning (5 items). All items are rated on a five-point Likert scale, ranging from "never" (0) to "almost always" (4). The scores are linearly transformed on a scale from 0 (worst condition) to 100 (best condition). The PedsQL has two summary scores; Psychosocial Health Summary score and Physical Health Summary Score. To create Psychosocial Health Summary score, a mean score is computed from items pertaining to the emotional, social, and school functioning subscales. The Physical Health Summary Score is the same as the physical functioning scale score. Psychometric properties of the Persian version of the PedsQL have been evaluated in Iranian children and adolescents (28).

2-2-5. Physical Activity

The 7-day Physical Activity Recall Scale was originally developed by Salis et al. to measure the amount of physical activity over the past 7 days. For the completion of this questionnaire, each respondent is interviewed and asked to recall his/her physical activities in the last seven days (it is initiated from yesterday and gradually is turned to the past), and to determine the duration (in minutes), intensity (based on the changes in heart rate compared to walking and running), and type (daily activities, leisure activities) of each of the activities. The consumed energy during the past week is calculated by means of following the instructions available in the instrument. According to these guidelines, the duration of sleep, moderate activity, hard activity, and very hard activity that have been reported by the respondent for each day are added together. Then, the number 24 is subtracted from the obtained value in order to obtain the duration of mild activity. In the next stage, the durations of each of the daily activities are added together to obtain the duration of daily activities for a week. The time period spent asleep and each of the activities are

multiplied by a fixed number. This constant value is 1 for sleep, 1.5 for mild activities, 4 for moderate activities, 6 for hard activities, and 10 for very hard activities. All the obtained numbers are added together to determine the amount of energy expenditure. This value is divided by 7 in order to obtain the average consumed energy in one day of the previous week. The reliability of this scale has been assessed in several studies by means of intra-class coefficients (ICC) and it has been reported to be within the range of 0.34 to 0.99. This questionnaire has been recognized as a useful tool for the assessment of the amount of physical activity (29).

2-3. Data analyses

Data analysis was performed using IBM SPSS Statistics for Windows Version 23.0 (IBM Corp., Armonk, NY, USA). Independent t-tests were used to test for differences between groups in terms of sociodemographic characteristics. The Benjamini and Hochberg false discovery rate was used to control the multiple comparisons (30). A multivariate logistic regression was performed, adjusting for age and gender, to investigate which variables contributed to adolescents' weight status (normal weight vs. obese or overweight). The results were expressed as adjusted odds ratios (AOR) with 95% confidence intervals (95% CI). A p-value of < 0.05 was considered significant.

To find out the mechanism and pathway that could explain the association between the independent variable (i.e. zBMI) and the outcome (i.e. HRQoL), a mediation analysis was performed. This analysis examines the role of third variable (negative emotion in this study) as intermediate variable between the independent variable (i.e. zBMI) and the outcome (i.e. HRQoL) (31). Mediation was evaluated using the PROCESS macro of SPSS version 23.0, developed by Hayes (32). The analysis was followed by Sobel

test to test the significance of the mediation. Furthermore, a bootstrapping method (with 5000 bootstrap resamples) was also employed to calculate the bias-corrected 95% confidence intervals (95% CIs) (33).

3- RESULTS

In this study, 236 adolescents (118 adolescents in each of the case and control groups) participated. The descriptive characteristics of the adolescents are shown in **Table.1**. The mean age of the adolescents in both groups was slightly more than 15 years. There was no significant difference between the two groups in terms of demographic variables, with the exception of their weight status ($P<0.05$). However, in terms of energy expenditure, a significant difference was observed between the two groups in such a way that the consumed energy in adolescents with normal weight equaled 342.94 kcal and in obese and overweight adolescents equaled 286.61 kcal ($P<0.05$).

The comparison of the mean scores of WEL subscales across the study groups is shown in **Table.2**. Adolescents with normal weight reported significantly higher scores on all WEL subscale as well as total score (67.73 ± 20.36 in control group vs 32.42 ± 17.61 in case group, $P<0.05$), with the exception of psychical discomfort (8.22 ± 6 in control group vs 8.00 ± 5.34 in case group, $P>0.05$) (**Table.2**). As it has been displayed in **Table.3**, the mean scores of the PedsQL subscales as well as total score were significantly higher in adolescents with

normal weight those with overweight and obesity (85.37 ± 12.21 in control group vs 70.47 ± 10.91 in case group, $P<0.05$). Multivariate logistic regression results indicated that lower levels of physical activity were significantly associated with a higher chance of obesity/overweight (**Table.4**). The individuals with higher scores on negative emotions were about 77% less likely to get obese or overweight (AOR = 0.23, 95% CI = 0.14-0.36). As the adolescents' resistance to food availability becomes lower, obesity is expected to significantly increase (AOR = 0.55, 95% CI = 0.38-0.79). Physical discomfort was not associated with risk of obesity/overweight in adolescents (AOR = 0.94, 95% CI = 0.58-1.55).

3-1 Mediation analysis

The mediational analysis evaluated whether negative emotions mediated the association of high BMI and worse psychosocial health. The zBMI (independent variable) were significantly associated with both negative emotions (the mediator) and psychosocial health (dependent variable). When negative emotion was included in the model, the association of negative emotions with psychosocial health remained significant, whereas the association of zBMI with psychosocial health did not. The bias-corrected bootstrap 95% CI indicated that the indirect effect through negative emotions was significant [$B = -0.06$ (SE = 0.02), 95% CI = 0.03, 0.01], thus indicating that in negative emotions acts as mediator between zBMI and psychosocial health (**Figure.1**).

Table-1: Sample characteristics across normal weight adolescents sample and obese and overweight adolescents sample

Variables	Groups	
	Control (n=118)	Case (n=118)
Gender (girl)	56 (%47.5)	56 (%47.5)
Age, year	15.12 \pm 1.3	15.01 \pm 1.60
Weight, *kg	64.72 \pm 12.31	81.05 \pm 19.43

Height, cm	167.34±17.65	166.70 ±11.45
BMI: *(kg/m ²)	23.02 ±15.13	30.01±17.30
zBMI*	0.99±0.24	2.16 ±0.63
Physical activity (Kcal/day)*	342.94 ±99.70	286.61±83.93

*Statistically significant according to Benjamini–Hochberg procedure; BMI: Body Mass Index; ZBMI: Body Mass Index -for-age z-score.

Table-2: The comparison of WEL scores of normal weight adolescents sample and obese and overweight adolescent samples

Variables	Groups	
	Control (n=118)	Case (n=118)
Negative emotions*	14.67±8.81	9.32 ±9.03
Availability*	12.20 ±9.34	7.22 ±5.65
Social pressure*	12.39 ±8.71	8.39±6.42
Physical discomfort	8.22 ±6.39	8.00 ±5.03
Positive activities*	15.62±7.49	8.89 ±5.34
Total*	64.73±20.36	32.42 ±17.61

*Statistically significant according to Benjamini–Hochberg procedure; WEL: Weight Efficacy Lifestyle.

Table-3: The comparison of HRQoL of normal weight adolescents sample and obese and overweight adolescent samples

Variables	Groups	
	Control (n=118)	Case (n=118)
Physical functioning*	83.10 ±12.52	71.09 ±12.05
Emotional functioning*	76.39 ±16.62	60.12 ± 16.92
Social functioning*	85.27 ±15.95	67.11 ±14.17
School functioning*	80.14 ±16.97	73.56±15.47
Psychosocial Health Summary Score*	14.93±81.22	16.11±66.81
HRQoL total score*	85.37 ±12.21	70.47 ± 10.91

*Statistically significant according to Benjamini–Hochberg procedure; HRQoL: Health-related quality of life.

Table-4: Results of multiple regression predicting weight status

Variables	OR	CI 95%	P- value
Physical activity	0.66	0.48-0.911	0.011
Negative emotions	0.23	0.14-0.36	0.001
Availability	0.55	0.38-0.79	0.001
Social pressure	0.54	0.32-0.93	0.027
Physical discomfort	0.94	0.58-1.55	0.83
Positive activities	0.53	0.37-0.75	0.001
Physical functioning	0.50	0.33-0.71	0.001
Emotional functioning	0.21	0.11-0.32	0.001
Social functioning	0.16	0.10-0.25	0.001
School functioning	0.49	0.38-0.62	0.001

OR: odds ratio; CI: confidence interval.

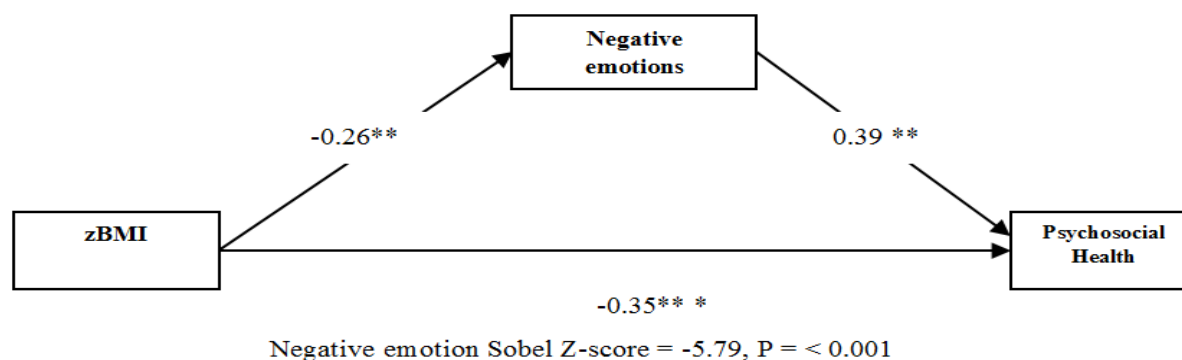


Fig.1: Mediation Model. Standard regression coefficients for the relationship between zBMI and HRQoL (** P<0.01, *** P<0.001).

4- DISCUSSION

This study aimed to investigate the psychosocial and well-being differences between the obese and overweight adolescents and normal-weight adolescents in the city of Qazvin. The results of this study indicated that WSE and HRQoL in obese and overweight adolescents were much lower than those in normal-weight adolescents. Obese and overweight adolescents had a lower sense of control over their eating behavior and this problem appears in their HRQoL. In addition, the results of the study indicated that negative emotions mediated in the relation between the zBMI and psychosocial health. In other words, adolescents with higher zBMI level had lower resistance to eating when they are angry, anxious, and depressed which these contribute to worsening their HRQoL. Adolescents' motivation to modify his or her lifestyle is considered as important factor for successful treatment of obesity (34). Obese adolescents are often expected not to be able to resist against the temptations and eating conditions; therefore, they may surrender during the dietary plans and withdraw from the diet earlier. Peter M. Miller et al. found that there is a lower level of self-efficacy in obese patients with an eating disorder than that in the obese people

without an eating disorder and, thereby, self-efficacy is associated with the eating severity and disorder. In addition, there is a significant negative correlation between eating disorders and self-efficacy score as well as its subscales, including negative emotions, social pressures, physical discomfort, and positive activities. The researchers found that self-efficacy is an important factor in the prognosis of treatment in the overweight people with eating disorders. Indeed, this may explain the fact that these patients are more likely to leave the treatment (35). The consequences of obesity and overweight are not just limited to physical health. Childhood obesity will be associated with a large number of problems such as dissatisfaction with body shape, negative body image, depression, and low self-esteem. Moreover, there are some pieces of evidence that obese children and adolescents have lower HRQoL. In the current study, the PedsQL subscales on physical, emotional, social, and school functioning among obese and overweight adolescents were found to be significantly lower than those with normal weight. In addition, the total score of PedsQL in obese and overweight adolescents was lower than adolescents with normal weight. Obese and overweight adolescents

are often dissatisfied with their weight and usually seek non-standard methods for weight loss; hence, this causes physical harm to them (36). Increased awareness and motivation in adolescents as well as parental involvement can be an important and effective strategy to increase efficacy and improve the style and HRQoL in obese and overweight adolescents (37).

4-1. Limitations of the study

The researchers acknowledge limitations of this study. One limitation of this study is that we used a cross sectional design. Therefore, it is not possible to assess causal relationship between the study variables across the two groups. Furthermore, a parallel parent-proxy for the PedsQL is available. We did not assess parental perceptions of children weight and HRQoL. Nevertheless, studies demonstrated that parent-child agreement on children' HRQoL is low to moderate (38, 39). Child's health condition plays an important role for the perception of parents or caregivers on the HRQoL of children/adolescents. However, parents of healthy children would report higher HRQoL than their children but parents of ill children including obesity report lower HRQoL than their children (40, 41). On the other hand, a weak agreement was found for parent-child agreement in body weight status in US population (42). Therefore, parents of obese schoolchildren were no aware of deteriorated HRQoL in their obese children and tented to overestimate HRQoL for their obese children (43). Therefore, using parent proxy measure alone for assessing QOL among obese children is not still recommended.

5- CONCLUSION

The present study revealed that lifestyle self-efficacy and HRQoL in obese and overweight adolescents are far lower than that in their peers with normal weight. Uncontrolled negative emotions could be a

significant variable to reduce adolescents' HRQoL. Therefore, weight management programs should focus on increasing adolescent's control on situations related to negative emotions to improve their HRQoL.

6-AUTHORS CONTRIBUTIONS

- Study design: FM, MJ, AHP.
- Data Collection and Analysis: FM, KI, AR.
- Manuscript Writing: FM, AHP, MJ.
- Critical Revision: KI, AR, C-YL.

7- CONFLICT OF INTEREST

The authors had not any financial or personal relationships with other people or organizations during the study. Therefore, there was no conflict of interests in this article.

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