



The Relationship between Obesity and Quality Of Life in School Children

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Abstract

Background: To determine relationships between healths related quality of life and body mass index in children aged 9-11 years old.

Methods: This cross sectional study was conducted on 240 children 9-11 year olds who were selected via multi stage cluster sampling design from primary schools in the Shahre Qods of the Tehran, Iran in 2007. Pediatric Quality of Life inventory was completed by child self report with measured height and weight used to determine body mass index percentile/weight classification. Obesity was defined as body mass index (BMI) $\geq 95^{\text{th}}$ percentile for age and gender and one way analyses of variance (ANOVA) was used for data analyses.

Results: Physical, social and school functioning was significantly lowered for obese when compared to normal weight children ($P < .05$). The impairment in QOL in the community-based sample of elementary school children was less marked than clinical sample of obese. Obese children maintain emotional health.

Conclusion: These results highlight the importance in considering dimensions of quality of life at further understanding obesity in children.

Keywords: *Body mass index, Children obesity, Quality of Life, Iran*

Introduction

Childhood obesity is a worldwide epidemic, with prevalence rates doubling or tripling over the past 15 yr (1). Iran has followed this trend with about 13.3%-24.8% overweight and 7.7% - 8% obese children and adolescents (2, 3). Overweight children are more likely to become overweight adults (4, 5). The negative consequences of obesity as a chronic disease in adults have repeatedly been confirmed (6, 7), but even among children, there is an increase in postural weakness and joint complaints as well as an increased prevalence of hypertension and type 2 diabetes (8). In addition to increased co-morbidity, psychosocial limitations play an important

role in the lives of these children (9). Also they display significantly lower Quality of Life (QOL) than normal weight children of similar ages (10-13). Quality of life (QOL) can be defined as a multidimensional construct that reflects one's self-perceptions of enjoyment and satisfaction with life (14). Assessing childhood QOL can provide insights into a child's self-rating of physical, social, emotional, and school functioning (10, 16), but most QOL researches with children have been conducted with individuals experiencing weight related distress significant enough to seek treatment (15). Community samples are generally not heavy nor do they demonstrate the degree of impairment seen in treatment samples

(16, 17). To our knowledge, three prior studies (16-18) have been performed in community samples of elementary school children, on how weight affects the quality of life.

The primary purpose of the present study was to evaluate the relationship between QOL and obesity in schoolchildren, aged 9 to 11 yr. We hypothesized that with an increasing body mass index (BMI) the children would be reported as having decreasing levels of QOL.

Materials and Methods

Participants

This cross sectional study was conducted on 240 children 9-11 yr olds who were selected via multi stage cluster sampling design from primary schools in the Shahre Qods of the Tehran, Iran in 2007, based on school, grade (3 through 5) and student (ages ranged between 9-11 yr). Accordingly, ten schools, eight students from each grade and 24 students from each school were randomly selected.

Questionnaire

The Pediatric Quality of Life Inventory (Peds QL) is a modular instrument for measuring health-related QOL in children and adolescents aged 2-18 yr (19, 20). In repeated reliability and validity tests, the Peds QL has consistently had high reliability scores ($\alpha = 0.71-0.89$) and has also been able to distinguish between healthy children and those with chronic diseases (14). The Peds QL is consisting of 23 items in four domains: physical, emotional, social and school. The instructions ask how much of a problem each item has been during the last month. A five-point response scale is used (0=never, 1=almost never, 2=some times, 3=often, 4=always). Items are reverse-scored and linearly transformed to a 0-100 scale (0=100, 1=75, 2=50, 3=25, 4=0), so that higher scores indicate better QOL. A total scale score, derived by the mean of all 23 items, was calculated to provide an overall measure of the QOL (19). The Peds QL English version was forward translated into Per-

sian by two independent translators and then discussed by a translation committee, which combined the translations into one version. The forward translated version was then back-translated into English, independently, by two other translators, and the Persian version with acceptable reliability score ($\alpha = 0.88$) subsequently was approved for use.

Anthropometry

Height was measured to the nearest 0.5 cm using a portable stadiometer. Weight was measured to the nearest 0.1 kg using scales. BMI was calculated as weight (kg)/ height (m²). BMI percentiles for age and sex were categorized in to the following 4 group: (1) obese (BMI \geq 95th percentile), (2) over weight (BMI \geq 85th <95th percentile), (3) Normal weight BMI \geq 5th <85th percentile), and (4) underweight (BMI<5thPercentile) (21).

Ethical Issues

Approval to conduct the study was obtained from the research Ethics Committee of the Tarbiat Modares University. Written informed consent was obtained from the parents of the participating children and oral consent from children. Furthermore, the children and their parents also were informed that they had the right to withdraw from the study at any time and were assured of the confidentiality of the study.

Statistical analyses

For the primary analyses, weight status was used as the independent variables while physical, emotional, social, school and total QOL scores were used as the dependent variables. SPSS version 13.0 was used for data analyses. One way analyses of variance (ANOVA) was used to test for significant overall mean differences among the weight category groups. Univariate generalized linear models were used to determine the estimated marginal means of the Peds QL scales adjusted for the children's age and sex as covariates. Differences among the groups were adjusted for multiple comparisons using the Bonferroni method. Finally, Pearson's correla-

tion coefficient tests were used to test the correlation between QOL scores and BMI. *P*-values <0.05 were considered as statistically significant.

Results

QOL was measured in 240 children (120 boys) with mean (SD) age 10(0.82) yr (rang 9-11 yr), mean (SD) BMI 18.14 (4.10). The general characteristics of the study population are given in Table 1 based on the BMI categories 7.1% of the children were under weight, 64.6% were of normal weight, 13.8% were over weight, and 14.6% were obese. QOL scores for the child self-reported are shown in Table 2. Results showed obese children significantly lower physical, social, school functioning and total score Peds QL than normal weight children. (*P*< 0.05). Table 3, shows estimated marginal mean (SD) Peds QL scores after adjustment for age and sex. Among the weight categories there were no significant differences in QOL scores by sex (*P*= 0.13). As in the univariate analyses, the decreases in total, physical, social, and school Peds QL scores in obese children remained significant even after adjustment.

However, only physical Peds QL scores was lower for overweight compared to normal weight children, while social, school, emotional and total Peds QL scores did not differ between them. Correlation analyses between BMI and Peds QL scores showed that physical functioning had the strongest negative correlation(*r*= -0.178; *P*< 0.01), followed by social functioning (*r*= -0.163; *P*< 0.05).

Table 1: General characteristics of the 240 children in the community-based sample

Variable	Value
Female	120(50)
Age, mean(SD),yr	10.0(.82)
Height ,mean(SD),cm	136.37(8.63)
Weight ,mean(SD).kg	34.25(10.62)
BMI ,mean(SD)	18.14(4.11)
BMI groups	
Under weight	13.10(.94)
Normal weight	16.33(1.55)
Overweight	21.24(1.19)
Obese	25.68(3.25)

Abbreviation: BMI, body mass index

Table 2: The mean (SD) scores for each of the Peds QL scales by weight category

	Obese Mean (SD)	Over weight mean(SD)	Normal weight mean(SD)	Under weight mean(SD)	<i>P</i> value
Physical	74.91(12.39)	76.33(15.06)	83.37(12.4)	74.27 (16.37)	.000
Emotional	71.14(21.79)	77.88(20.69)	78.97(19.5)	71.76(26.68)	.105
Social	79.42(16.83)	82.12(21.97)	88.03(14.6)	80.29(20.65)	.003
School	84.71(15.47)	90.90(14.16)	91.00(11.3)	86.47(14.65)	.014
Total	79.30(12.74)	81.80(15.31)	85.34(11.7)	78.19(17.48)	.005

Table 3: Estimated marginal mean Peds QL by weight category, adjusted for age

	Obese mean(SE)	Over weight mean(SE)	Normal weight mean(SE)	Under weight mean(SE)	<i>P</i> value
Physical	74.65 (2.19)	76.27(2.27)	83.45(1.05) †‡§	74.19 (3.162)	.000
Emotional	70.86 (3.45)	77.47 (3.58)	79.17 (1.64)	71.26(4.98)	.105
Social	70.86 (3.45)	77.47 (3.58)	79.17 (1.64) ‡	71.26(4.98)	.003
School	84.47 (2.07)	90.28 (2.15)	91.27 (.99) ‡	85.69 (2.99)	.014
Total	79.05(2.11)	81.34 (2.20)	85.56 (1.01) ‡	77.62 (3.05)	.005

†Significant difference between participants who were normal weight and those who were overweight: *P*<.05 ‡Significant difference between participants who were normal weight and those who were obese: *P*<.05

§Significant difference between participants who were normal weight and those who were under weight: *P*<.05

Discussion

This study describes variation of generic measurements of QOL in a sample of school-aged children across various BMIs. The decrease in QOL was no significant for over weight children but more marked for those who were obese. These finding are less dramatic than the much lower scores reported for children attending clinics. Because QOL is multidimensional, it is feasible that some dimensions may be more affected by over weight or obesity. Obese children differed from who was normal weight, most strongly on physical, social, and school functioning scores, while emotional functioning seemed unaffected. Williams et al. (16) used the Peds QL 4.0 to assess QOL in a community-based sample of obese children and reported that total score, physical health, and social functioning decreased significantly as weight increased in a community sample of children. Using a similar sample of school-aged children, Friedlander et al. (17), found that overweight children had significantly lower scores on psychosocial, physical functioning and global QOL when compared to healthy-weight children. In another school aged children, Fiveash (18) assessed physical and psychosocial consequences of obesity on self-perceived quality of life and observed significantly lower scores for social functioning in obese children than their under weight, normal weight and over weight peers. Study of clinical sample of severely obese children and adolescents concluded that obese children were over five times more likely to report poor quality of life scores when compared to healthy-weight children (10).

The consequences of Pinhas-Hamiel et al. (12) demonstrated significantly lower quality of life related to physical functioning and social domains. Finally, in recent study of clinical sample of obese children, physical health was significantly impaired in the obese clinical sample relative to control children (11).

However, the impairment in QOL in the community-based sample of obese children by pre-

vious studies (16-18), and the present study, was less marked than clinical sample of obese (10-13). Obese and overweight children in our study had impaired physical functioning. We observed that the BMI was inversely correlated with physical functioning. This supports the idea that the diminished ability to move with increasing weight leads to a decrease in caloric expenditure with the potential consequence of a further mismatch in energy balance leading to additional weight (10).

This finding elucidates the limitations associated with excess weight (e.g., difficulty running, doing chores) for obese and overweight children, even they are not as heavy as treatment seeking populations. Although Fiveash(18) didn't show different in physical functioning Peds QL among weight groups. This may be owing to his sample including African American children. Studies of African Americans indicate that they tend to be more satisfied with their physical appearance compared to white girls even if they are larger than their white counterparts (22, 23). Obesity is one of the most stigmatizing and least socially acceptable conditions in childhood (10). Indeed, obese school aged children are more likely to be the victims of bullying behavior (24). Obese children commonly suffer discrimination and teasing from their peers (9, 25, 26). In keeping previous studies, the obese children in our study demonstrate impairment in social domain when compared Social functioning QOL, however, remained consistent across weight categories, except for the obese children, suggesting the modest decrease in weight (i.e., shifting from obese to over weight) may improve social well being. The differences in emotional QOL scores across weight category were not significant; obese children who maintain their emotional health are of specific interest. These resilient children who 'do well 'despite being different and experiencing some degree of physical and social difficulties may hold the key to efforts aimed at understanding the nature and determinants of invulnerability and to develop preventive interventions

to promote well-being in obese children(27). Further more, obese children were more likely to report impaired school functioning. It is consistent with a study in Thailand, which reported that overweight children and adolescents in grades seven through nine were twice as likely to have low grads in math and language as healthy children and adolescents (28).

Although the reasons for absenteeism were not investigated, increased school absenteeism has been documented in children and adolescents with other chronic diseases including diabetes and asthma (29, 30). Missed school days may subsequently lead to decreased school performance. The main strength of this study was the use of a valid and reliable instrument for assessment of QOL. There are several limitations of the present study including the inability to evaluate causality, the narrow age range of the sample and small sample size of schoolchildren who were selected on the Shahre Qods (a small part of Tehran-Iran). Therefore, the result of the present study should only be extrapolated to the wider community of schoolchildren with caution. Further studies in other samples and setting are necessary to confirm generalizability of our finding. In conclusion obese children have decreased in scores of several QOL domains, suggesting the importance in considering such domains in programs aimed at further understanding obesity in children. Further more, the understanding of resilience of obese children in emotional domain may assist in defining approaches to the management of childhood obesity.

Ethical Considerations

Ethical issues including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been completely observed by the authors.

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