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Effect of Comprehensive Health Promotion Program on Quality of Life, Weight, and Physical Activity among Iranian Overweight School-age Girls

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Abstract

Background

Prevalence of overweight and obesity in children and its trend in recent years has taken a worrying figure. Overweight in childhood is the most important cause of adulthood obesity. Therefore, the present study aimed to investigate the effect of comprehensive health program on quality of life, weight and physical activity in Iranian overweight school-age girls.

Materials and Methods

In this quasi-experimental study, 80 overweight girls participated in a comprehensive health program for 12 weeks in 2014. The participants were randomly selected and were assigned to intervention (n=40), and control (n=40) groups. Quality of life, weight, and physical activity scores were measured in both groups before and after the program. The data were collected by using the general quality of life questionnaire Pediatric Health-Related Quality of Life (Ped- sQL4.0) in two forms (child and parent self-report), physical activity checklist, and a Digital Stadiometer. Then in the intervention group, comprehensive health program including three stages assessment, supportive planning and evaluation was administered for three months. Data were analyzed by the SPSS version 22.0 software.

Results

The results showed no significant differences between the two groups in terms of demographic characteristics, weight, physical activity, and quality of life, before intervention ($P>0.05$). However, statistically significant difference was found between the two groups regarding changes in body weight, body mass index (BMI), physical activity scores, and quality of life, before and after intervention ($P<0.05$).

Conclusion

Implementation of a comprehensive health program by school nurses can decrease the growing trend of overweight and increase the quality of life and physical activity among children.

Key Words: Body weight, Iran, Obesity, School age, Physical activity, Quality of life.

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1- INTRODUCTION

Childhood obesity and overweight are a worldwide epidemic with prevalence rates doubled in children and quadrupled in adolescents over the past 30 years (1). It has been estimated that at least 155 million children are overweight or obese throughout the world (2). Almost a third of children in the U.S.A, and a fifth in the Europe, are overweight or obese (3). In the past three decades, the rates of overweight and obesity have increased dramatically in most of the industrialized the countries and in several low-income contexts (3). In the U.S.A alone, the annual direct medical costs associated with obesity (diagnosis and treatment), were $147 billion for adults and $14.3 billion for children. Additionally, the indirect costs related to lost productivity might be as high as $66 billion annually (4).

The percentage of obese children aged 6–11 years in the U.S.A increased from 7% in 1980 to nearly 18% in 2012. Similarly, the percentage of adolescents aged 12–19 years, who were obese increased from 5% to nearly 21% over the same period (2, 5). Iran has followed this trend with about 13.3-24.8% overweight and 7.7-8% obese children and adolescents (2). Children and adolescents are likely to be obese as adults, and are more at risk for adults' problems (6). Childhood obesity is associated with a higher chance of premature death and disability in adulthood. Studies on the psycho-social development and adjustment of children suffering from obesity and overweight, have shown that obesity has negative consequences such as stigmatization, restriction of access to social contacts, and decreased self-esteem.

Its physical consequences are associated with an increased risk of future cardiovascular diseases (CVDs), hypertension, dyslipidemia, hyperinsulinemia, diabetes, respiratory insufficiency (such as sleep apnea or asthma), orthopedic complications, and sharp increase in the number of fat cells (7). Therefore, childhood obesity strongly tracks into adulthood with implications for morbidity and premature mortality (3). These comorbidities are associated with a severe dysfunction in Quality of Life (QOL), because lower QOL associated with obesity is comparable to the burden of chronic diseases such as diabetes, gastrointestinal disorders, or cancer (5, 8, 9). Overweight children display significantly lower QOL compared to normal weight children of similar ages (2).

QOL can be defined as a multidimensional construct that reflects one's self-perception of enjoyment and satisfaction with life. Assessing childhood QOL can provide insights into a child's self-rating of physical, social, emotional, and school functioning (2). Overweight adults and children have reported more limitations in the physical dimension of health-related QOL compared to those with normal weight (9). In fact, QOL of severely obese children and adolescents has been reported to be as low as that of cancer patients during chemotherapy treatment (10, 11).

Hence obesity is a complex condition requiring equally complex solutions. According to the World Health Organization (WHO), this requires action in multiple settings, using a variety of approaches, and involving diverse stakeholders (3). Generally, it is difficult to reduce excessive weight once it becomes established. Since nutritional deficiencies, poor eating and physical activity habits are established during childhood; they may have long-term health and developmental consequences, so prevention and treatment of obesity is essential in this age group (12). Therefore, comprehensive health promotion program as "the process of enabling people to increase control over their health", may be achieved through a variety of interventions. Some of these potential strategies for intervention in children, can be implemented by targeting

preschool institutions, schools, or after-school care services as natural settings for influencing nutrition and physical activity (12, 13). Comprehensive health promotion program has proved popular in tackling obesity and other important public health issues such as cardiovascular diseases (CVDs), and Type II diabetes (3).

Thus it comprises: health education promoted through the formal school curriculum; changes to the school's physical and/or social environment; and engagement with families and the wider community in recognition of their influence on children's health (3).

Also, focus on family therapy has received less attention. In fact, parents and school members must be encouraged to participate in children's treatment and education (14,15). Most successful programs involving obese and overweight children utilize a multidisciplinary team approach comprising behavior modification, nutritional, and physical activity therapies (3). Accordingly, the present study aimed to investigate the impact of comprehensive health promotion program on QOL, weight, and physical activity in Iranian overweight school-age girls.

2- MATERIALS AND METHODS

2-1. Study design and procedure

The present quasi-experimental study was conducted in overweight school age girls in Firozabad city, Iran, over a period of three months in the academic year 2013-2014. According to education status, the city was divided into two regions, then, one school was selected randomly from each region.

Next, the participants were randomly selected from two public schools using the attendance lists and each was given a code. The sample size was calculated by a related study (16) and the Pukak formula (17):

$$n = \frac{s1^2+s2^2}{(\mu 2-\mu 1)^2} f(\alpha,\beta)$$

S_1=5.07 (standard deviation of control group), S_2= 4.54 (standard deviation of intervention group), $\mu 1$=18 (mean score of control group), μ_2=14 (mean score of the intervention group), (α, β)= type I and II errors, α= 0.05, β= 0.95, f (α, β)=10.

2-2. Methods

The Quality of Life Questionnaire (QOL), weight and physical activity scores were measured for all children in the intervention and control groups before and after intervention. The QOL was completed by the children with help of nurse and their parents. It is noteworthy that the parents in both groups were invited by "Association of Teachers and Parents", for participating in our research.

2-3. Measuring tools; validity and reliability

The nurse measured the height and the weight of children. Height was measured in centimeters using a digital stadiometer (SECA Model 207 Germany), with the subject barefoot, standing upright with the heels and back against a vertical scale. Weight was measured on a balanced scale (SECA Model 710 Germany), without shoes and heavy outer clothing. Body mass index (BMI), was calculated as weight (kg)/height (m^2). BMI percentiles for age and gender were categorized into the following 4 groups:

1. Obese (BMI $\geq 95^{th}$ percentile),

2. Overweight (BMI $\geq 85^{th}$ <95^{th} percentile),

3. Normal weight (BMI $\geq 5^{th} < 85^{th}$ percentile), and

4. Underweight (BMI < 5^{th} percentile) (18, 19).

QOL was assessed using Pediatric Quality of Life InventoryTM (PedsQL), developed by Gheissari (19). In repeated reliability and validity tests, the PedsQL has consistently had high reliability scores (α= 0.71 to 0.89). It was also able to differentiate between healthy children and those with chronic diseases (20).

The PedsQL consists of 23 items in four domains: physical, emotional, social, and school performance. The instructions ask how much of a problem each item has been during the last month. A five-point response scale was used (0=never, 1= almost never, 2= some times, 3= often, and 4= always). Items are reverse-scored (2).

Amiri (2012), demonstrated the initial reliability and validity of the Iranian version of the PedsQL™ 4.0 Generic Cores Scales as an outcome measure of generic QOL in Iranian children aged 8-12 years (α=0.88) (21). In the present study, Cranach's alpha in the quality of life Questionnaire was 0.96 (child- report), and 0.94 (parent- report). Physical activity score was also measured with physical activity checklist.

2-4. Intervention

In the intervention group, comprehensive health promotion program (with 3 stages: assessment, supportive planning and evaluation), was held for 12 weeks for school staff (teachers, shopkeeper), students and their parents by pediatric nurse. In the assessment stage, educational needs were detected based on completing the 24-hour dietary recall form for 3 days and recording the physical activity (in min) for one week (**Table.1**).

2-4-1. Nutritional intervention

The intervention group took part in 3-hour structured sessions weekly for 12 weeks. Each session led by the nurse involved half an hour of individual nutritional consultation followed by two hours of practical education about cooking, tasting, and smelling of food for students, parents, and school staff.

During the intervention, the parents were also given practical and theoretical counseling related to healthy eating, preparation of healthy foods, and appropriate shopping practices by a registered pediatric nurse. The nurse measured and recorded the weight of overweight students for 3 months every week.

2-4-2. Physical activity program

Increased physical activity was encouraged in group meetings once a week in order to educate the participants about the benefits of physical activity. The children received an individually adapted physical activity program for supporting weight reduction, motivating them to include physical activity as a part of their daily routine, and encouraging them to maintain an active lifestyle on a long-term basis. The daily exercise program included 30 minutes physical activity during the day and walking the distance between school and house.

In order for the maximum participation of students, parents, and school staff, healthy food and physical activity festival was held at the school. An encouragement gift was also given in each session to bolster positive behavior changes. All the group members were advised to share their weekly success and challenge others in order to facilitate group reinforcement and motivation.

Tabale-1: The Comprehensive Health Promotion Program

Participant	Sessions	Intervention 12-week (3 months)
Students	First session	The nurse measured height and weight and selected overweight children. After that, QOL, weight, physical activity scores were measured for the children in both groups before the intervention. Then 40 overweight students were randomly selected in the intervention group.
	Second session	Children in the intervention group were invited and explained about overweight and obesity and the risk factors, symptoms, complications, prevention and diagnosis. The nurse explained to intervention group about overweight and obesity and the risk factors, symptoms, complications, prevention and prognosis
	Third, fourth and fifth sessions	The nurse explained about the role of nutrition in preventing overweight and obesity, benefits and barriers of diet, following dietary recommendations. During 3- month every week, the nurse measured and recorded students' weight.
	Sixth, seventh and eight sessions	The previous sessions were reviewed, and the subjects were provided with educational pamphlets. Then role of exercise, appropriate exercises, importance of physical activity, benefits, and barrier type were explained. After that during 3- month every week children had to complete physical activity checklist.
	Tenth session	After 3-month, QOL, weight, physical activity scores, were measured for the students in both groups.
Parent and school staff	First session	The goal of research was explained to parent and school staff. Then the student QOL was examined in both groups before intervention.
	Second session	The nurse explained to school staff in intervention group about overweight and obesity and the risk factors, symptoms, complications, prevention and prognosis.
	Third, fourth and fifth sessions	The nurse explained the role of nutrition in preventing overweight and obesity, benefits and barriers of diet, following dietary recommendations. During the entire period, parents were also given practical and theoretical counseling about healthy eating, preparation of healthy foods, appropriate shopping practices.
	Sixth , seventh and eight sessions	The previous sessions were reviewed, and the subjects were provided with educational pamphlets. Then role of exercise, appropriate exercises, importance of exercise, benefits and barrier type were explained.
	Tenth session	QOL was examined for the students in both groups before and after intervention.
Students Parents and school staff	In order the maximum participation students, parents, and school staff a healthy food and physical activity festival was held at the school. Then an encouragement gift was given to student in each session to bolster positive behavior changes.	

2-5. Inclusion criteria

The inclusion criteria of the study were:

- Willingness to participate in the study,
- BMI between the 85th and 95th percentile,
- Primary school girls aged 12-10 years, and
- Living with one of the parents.

2-6. Exclusion criteria

The exclusion criteria were:

- Suffering from pre-existing diseases or an organic cause for obesity,
- Receiving any medication that might interfere with the study,
- Having secondary obesity, and
- Suffering from underlying endocrine diseases.

All the participants were examined by a registered pediatric nurse to exclude these factors.

2-7. Ethical consideration

Approval to conduct the study was obtained from the Research Ethics Committee of Tarbiat Modares University (ID number: 2124526). Written informed consent was obtained from the parents of the participating children, and oral consent was obtained from the children. Furthermore, the children and their parents were informed that they had the right to withdraw from the study at any time, and were assured of the confidentiality of the study.

2-8. Statistical analysis

SPSS version 22.0 software was used for data analysis. For the primary analysis, Chi-square and t- tests were used to explore the association between the demographic variables in the intervention and control groups. Also, we used independent sample t-test in order to compare the scores of QOL, weight and physical activity between the intervention and control groups. Paired sample t-test to compare the scores of QOL before and after the program in the intervention group. P-values <0.05 were considered as statistically significant.

3- RESULTS

Finally, 80 students participated in this study (n=40 in the control group and n=40 in the intervention group). The mean of age of the subjects was 11.5±0.73 years. **Table.1** presents the mean and standard deviation (SD) of age, BMI, weight, height and physical activity scores for each group. There was no significant difference between the two groups before the intervention (P>0.05). QOL scores for child and parent self-report showed the limits and complications of children in all QOL dimensions; therefore, lower score means increased QOL.

QOL scores for child and parent self-report by using independent sample t-test, showed no significant difference between the two groups before the intervention (P>0.05). However, the mean QOL scores (child and parent self- report), showed a significant difference in all aspects after the intervention (P=0.001) (**Tables 2 and 3**). Therefore, the effect of intervention on the children's QOL was statistically significant. The paired t-test showed that QOL scores for the child self-reported in the intervention group decreased after the intervention compared to before the intervention, but QOL scores for the child self-reported in the control group increased after intervention compared to before the intervention (**Table.2**).

The paired t-test showed that QOL scores for the parent-reported in the intervention group decreased after the intervention compared to before the intervention, but QOL scores for the parent-reported in the control group increased after intervention compared to before the intervention (**Table.3**). The results indicated that there

was significant changes in QOL scores between two groups before and after intervention (P<0.05). **Table.4**, indicated that there were no significant changes in weight and physical activity scores between the intervention and control groups before the intervention (P>0.05).

There was significant changes in weight and physical activity scores between the intervention and control groups after the intervention (P<0.05); that means comprehensive health promotion program had positive effect on weight and physical activity scores.

Table 1: Comparison of age, height, weight, BMI, physical activity in the intervention and control groups (Mean ± SD)

Groups	Intervention group	Control group	P-value
Age, (years)	11.5± 0.736	11.28± 0.751	0.454
Height, (cm)	1.46± 6.44	1.48± 5.57	0.302
Weight, (kg)	48.95± 5.67	50.08± 4.53	0.327
BMI	22.52± 1.1	22.72± 0.854	.375 0
Physical activity,(minute)	13.02 ± 4.5	12.76 ± 4.37	0.467

Table-2: Comparison of the scores of children's quality of life (child-report), before and after the intervention in the intervention and control groups

Variables	Time of intervention	Intervention group	Control group	P-value
Physical (Mean ± SD)	Before	21.85± 3.471	22.58±2.925	0.167
	After	6.68±2.526	22.62±3.271	0.000
	P-value	0.000	0.931	
Emotional (Mean ± SD)	Before	15.12±2.729	15.82±2.308	0.219
	After	4.80±2.103	16.30±2.053	.000 0
	P-value	0.000	0.194	
Social (Mean ± SD)	Before	13.20±2.919	13.52±2.746	0.609
	After	2.92±1.403	14.58±2.659	.000 0
	P-value	0.000	0.088	
School (Mean ± SD)	Before	9.85±2.107	9.50±1.987	0.447
	After	4.30±1.667	11.32±1.927	.000 0
	P-value	.000 0	.0000	
Total (Mean ± SD)	Before	59.75±7.530	61.42±5.935	0.273
	After	18.70±6.346	64.82±5.913	.000 0
	P-value	0.000	0.002	

Table 3: Comparison of the scores of children's quality of life (parent-report) before and after the intervention in the intervention and control groups

Variable	Time of intervention	Intervention group	Control group	P-value
Physical (Mean ± SD)	Before	21.78±2.703	21.50±3.916	0.716
	After	9.30±2.289	23.12±2.691	.000 0
	P-value	0.000	0.007	
Emotional (Mean ± SD)	Before	14.25±2.706	14.42±3.088	0.788
	After	6.85±1.777	14.98±2.423	.000 0
	P-value	.000 0	0.283	
Social (Mean ± SD)	Before	13.22±2.665	12.85±2.413	0.511
	After	4.05±1.339	13.90±2.753	.000 0
	P-value	.000 0	0.010	
School performance (Mean ± SD)	Before	10.02±1.493	9.68±2.005	0.379
	After	4.65±1.847	10.45±2.160	.000 0
	P-value	.0000	0.082	
Total (Mean ± SD)	Before	59.28±5.870	58.45±7.331	0 .580
	After	24.85±4.796	62.45±6.559	.000 0
	P-value	.000 0	0.000	

Table-4: Comparison of the weight and physical activity before and after the intervention in the intervention and control groups

Variables	Before intervention			After intervention		
	Intervention group	Control group	P-value	Intervention group	Control group	P-value
Physical activity (Mean ± SD)	13.02±4.5	12.76±4.37	0.467	37.38±14.89	13.71±5.14	.001 0
Weight (Mean ± SD)	48.95±5.67	50.08±4.53	0.327	47.39±5.56	52.76±4.44	.000 0

4- DISCUSSION

The objective of this research was to compare the effectiveness of comprehensive health promotion interventions on the QOL of overweight children. Based on the obtained results, participants in the intervention group showed marked improvement on Pediatric Quality of Life Inventory. This research adds to the small body literature examining the effects of comprehensive health promotion program by parents-nurse school staff on QOL changes. Our results are consistent with the results of other studies conducted on the efficacy of interventions in increasing the QOL (22). The impacts of interventions not only influence the Pediatric Quality of Life Inventory (child report), but also the Pediatric Quality of Life Inventory (parent report). This finding could be due to the fact that comprehensive interventions have parallel effect on the QOL of children. Our research is one of the few studies with

comprehensive pattern that involved overweight students, parents and school staff in health promotion program in order to improving QOL and physical activity scores along with decreasing weight among Iranian overweight school-age girls. In the present study, there was a statistically significant difference in the QOL score in overweight school- age girls of the intervention group in all dimensions before and after intervention that showed marked improvement on the Pediatric Quality of Life Inventory. This finding is consistent with Ravens-Sieberer et al. (2006) and Hoffmeister et al. (2011), that found that in-patient rehabilitation treatment for obesity in children is associated with increase in QOL (23, 24).

In this study, a significant difference was found in all dimensions of QOL between the intervention and control groups after intervention. However, there was no significant difference in any of the dimensions of QOL in the control group, before and after intervention. This finding is consistent with Williams et al. (2005), and Chan et al. (2013), that used the PedsQL 4.0 to assess QOL in a community- based sample of obese children, and reported that total score, physical health, school performance and social functioning decreased significantly as weight increased in a community sample of children (25, 26).

Our results further showed a statistically significant decrease in body weight and BMI. The results of this study are consistent with those of Yackobovitch et al. (2009), and Knöpfli et al. (2008), who declared that weight-management programs with healthy eating environment and physical activity could improve physical activity and QOL, and reduce weight in overweight and obese children (27,28). Schwimmer et al. (2008), also found that interventions with an emphasis on improving the quality of nutrition, weight control and increased physical activity could improve QOL, nutrition and physical activity in children (29). Thus it is important to note that most successful programs involving obese and overweight children utilize a multidisciplinary team approach comprising behavior modification, nutritional, and physical activity therapies (29).

Therefore, children should be considered as a priority for interventional strategies to initiate prevention and treatment of obesity (7, 9). Hence, the findings of the present study have several important implications of short-term treatment programs for overweight and obese children, parent-child interactions and the school environment can affect behaviors related to the risk of obesity, because family life has changed a lot over the past two decades, with trends towards eating out and greater access to TV programs than previously (30). Accordingly, family and school interventions should be implemented based on the principles of parental support, family functioning, and school environment as important determinants in treatment of overweight children. However, in the present study, weight reduction and increased physical activity and QOL after intervention suggest that it is important to understand the role of family and social environment for the children's well-being and changes in their lifestyle.

4-1. Limitations of the study

The main limitation of the present study was that we were not able to assess the long-term effects of the program. Our sample is consisted of girls. Future studies may be profitably conducted with samples of both sexes.

5- CONCLUSION

This study showed that the comprehensive health promotion program improved QOL and physical activity of overweight school-age girls, and decreased

their weight. Consequently, it can be concluded that comprehensive health promotion program as an effective intervention in schools with collaboration of child, parent, school staff and nurses, can prevent consequences of overweight and obesity in children. It is to be mentioned that nurses more than other health professionals could play an active role in helping students for maintaining a healthy lifestyle. Therefore, it is proposed that with the implementation of comprehensive health promotion program by nurses in schools, we can prevent the growing trend of overweight, obesity, as well as low quality of life and poor physical activity in children and adolescents.

6- CONFLICT OF INTEREST: None.

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