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Interventional Program for Teenagers' Obesity

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Background: The increasing rates of overweight and obesity in children and adolescents have been accompanied by an increase in cardiovascular disease and diabetes. There is a need for evidence-based interventions that could be used by primary care providers to address this issue. Teen obesity increases the risk for adult obesity and is associated with negative health consequences.

Objective: To evaluate obesity management through interventional multidisciplinary program for teenagers.

Design: An Interventional Multidisciplinary Program.

Setting: A'Ali Health Center, Kingdom of Bahrain.

Method: An interventional multidisciplinary program for six months from October 2012 to March 2013 was designed for thirteen teenagers. The mean age was 16.2 years. The height, weight and Body Mass Index (BMI) were measured before and after enrollment in the program. Behavioral parameters were also assessed before and after enrollment in the program. Data entry was analyzed with SPSS version 19.

Result: The mean BMI during the initial visit was 44.5 (SD±4.42) and at the end of the interventional program, the mean BMI decreased to 42.9 (SD±4.87). The teen participants showed 77% decrease in screen time to 2 hours/day, 12 (92.3%) had no sugar sweetened beverages, 11 (84.6%) consumed 5 serving of fruits and vegetables daily and 13 (100%) ate breakfast daily.

Conclusion: A group of teenagers enrolled in interventional program showed small but noticeable declines in obesity. Continued prevention efforts are needed to sustain and expand the implementation and evaluation of population-level interventions to prevent teenagers' obesity.

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Obesity has become a major health problem and is reaching epidemic proportions in both developed and developing countries. It has affected not only adults but also children and adolescents. However, the condition is worsening and WHO describes the situation as an "Epidemic of Obesity"[1]. Recently, the prevalence of overweight and obesity among children has increased[2]. In the United States, the prevalence of overweight and obesity among adolescents increased from 5% in 1980 to 21% in 2012[1]. In UK, one-fifth of children aged 11-15 were classified as obese[3]. In the Mediterranean region, the prevalence of overweight and obesity among school-aged children ranged from 7% to 45%[4]. In the Arabian Gulf states, overweight and obesity is increasing among children. The highest prevalence of obesity is among Kuwaiti adolescents (40%-60%)[5].

The prevalence of overweight and obesity in Bahrain has increased recently among children. According to 2005 Health Survey on 2,594 students, 25% Bahraini children and adolescents aged 6-18 years were overweight[6]. The percentage of obesity increases with age; 25% of those aged 10-13 years were found to be obese while 38.5% in the age group of 14-18[5]. In another study of 396 adolescents, 27% were overweight or obese, more females than males[7].

The cause of obesity is complex and multi-factorial including environmental, social and genetic factors[8]. As the prevalence of obesity increases, sedentary lifestyle and increased caloric intake have an increasing impact[2]. During adolescence, the dietary habits usually start to be established and is usually low in fruit portions, 2.8 in teen females compared to 4 in adults, low iron and other minerals, irregular meals and over reliance on fast foods[3]. In Bahrain, studies showed that 69.9% of adolescents have sedentary lifestyle, 31% are eating fast food almost daily and only 13.6% are consuming fruits[5].

In a recent survey about adolescent's knowledge, beliefs and self-perceptions, 54% believed that their diet is healthy and they relate it to high consumption of fruits and vegetables. Only 16% say that their diet is healthy as they eat a balanced diet, 13% selected eating low-fat food, low salt[9]. In the same survey, authors found that only 32% of adolescents believed that they should do exercise every day[9].

The high proportion of obesity among children is a cause for concern because there is a tendency for obese children to remain obese as adults. In addition, obesity-related health problems are now occurring at a much earlier age and continue to progress into adulthood.

Obese adolescents are more likely to have pre-diabetes. Seventy percent have at least one risk factor for cardiovascular disease and have a greater risk for joint problems, and sleep apnea[10]. Obesity is the leading cause of chronic diseases in adulthood, which are the leading cause of morbidity and mortality, not only type 2 diabetes, hypertension and ischemic heart disease, but also osteoporosis, osteoarthritis and cancer[1,11].

Prevention is viewed as the best approach to reduce obesity incidence; however, no agreement on a single effective way and most programs show mixed results[2,12,13].

Treating obesity is complicated because of the adolescent rapid growth and development which require a multidisciplinary, multi-phase approach including dietary management, physical activity enhancement, and elimination of sedentary behavior[9,11]. "California nutrition and physical guidelines for adolescents" is a comprehensive document for healthier choices[9,12-14]. The expert committee recommendation on the assessment, prevention and treatment of child and

adolescent obesity is an important milestone in the management[12,13,15]. Only few prevention programs are available in schools such as healthy friendly schools[16].

The aim of this study is to evaluate obesity management through interventional multidisciplinary program for teenagers.

METHOD

The interventional program started from October 2012 to March 2013. Sixteen teenagers were enrolled in the program. Informed consent was taken from both the parents and the candidates.

Inclusion criteria comprised of A'Ali residents, obese with BMI 30 and above, aged 5-19 years[17-19]. Exclusion criteria were adolescents with chronic medical conditions such as DM or hypothyroidism. Participants who attend the program less than four times were excluded from the study.

Full assessment was performed by a family physician and nutritionist. The assessment included history, physical examination and laboratory investigations if required[20]. Risk factors, physical activity, nutritional intake, endocrine disorders or the use of medication, hypertension lipid disorders, glucose, abnormalities, polycystic ovarian syndrome and depression were documented[20,21].

The weight loss program was well-structured, comprehensive, multidisciplinary, individually focused, and included dietary, behavioral and physical activity; it was adopted from a number of international guidelines in the management of obesity in children[9,15,20,22].

The prescribed meal plan was a nutritionally balanced diet aimed at a body weight loss of 0.5-0.9 kg per week and tailored to personal food preferences.

A physical activity program was introduced to all the participants with personal trainers. The sessions usually last for 60 minutes three times a week but the candidates were instructed to do further exercise at home. The sessions concentrated mainly on weight loss cardio exercises.

Behavioral modifications included: decrease screen time to 2 hours/day or fewer; no sugar-sweetened beverages; consume at least 5 servings of fruits and vegetables daily; be physically active 1 hour or more daily; prepare more meals at home.

During each clinic visit, body weight and BMI were measured. Blood pressure, total cholesterol, high density cholesterol (HDL), low density cholesterol (LDL), triglycerides, glucose and HBA1C were measured according to the conditions of each participant.

The most important changes in weight and BMI were recorded. The following were also assessed: dietary changes, behavioral modifications and change in physical activity pattern. Participation was evaluated by calculating the attendance rate. To ensure that the weight loss program was safe, candidates were asked during each visit for expected undesirable side effects such as headache, constipation, dizziness and hair loss.

Data was analyzed using SPSS version 19. Results are presented as means, standard deviation (SD), frequencies and percentages.

RESULT

Sixteen obese teenagers were enrolled in the program. Thirteen participants fulfilled the inclusion and exclusion criteria. The mean age was 16.2 years and standard deviation of 1.96. Eight (61.5%) were males.

Eight (61.5%) teenagers had no medical history of comorbidities. Two (15.4) teenagers had history of joint pain and the same percentage reported having bronchial asthma. One (7.7%) had anemia and one had psoriasis, see table 1.

Table 1: Medical History among Participants

Comorbidities	
No	8 (61.5%)
Bronchial Asthma	2 (15.4%)
Anemia	1 (7.7%)
Joint Problem	2 (15.4%)
Psoriasis	1 (7.6%)
Risk Factors for obesity	
Formula fed	1 (7.7%)
Mixed bottle & Formula fed	1 (7.7%)
Birth weight >3.5kg	1 (7.7%)
Maternal Diabetes mellitus	1 (7.7%)
≥ two risk factors	2 (15.4%)
None	10 (76.9%)
Family History	
Obesity	3 (23.0%)
Diabetes mellitus	1 (7.6%)
Two Chronic Diseases	5 (38.4%)
>2 Chronic Diseases	6 (46.1%)
None	1 (7.6, 7.7%)

Ten (76.9%) teenagers had no risk factors. Most adolescents had history of 2 or more chronic diseases in the family, see table 1.

The depression scale questionnaire was filled by 10 (76.9%) teenagers only, 2 (15.4%) teenagers were found to have borderline depression and one (7.7%) had a high score for the possibility of major problem, see table 2. All teenagers with abnormal scale were referred to the concerned discipline.

Table 2: Depression Scale

Depression Scale	
Normal (1-8)	6 (46.2%)
Borderline (9-13)	2 (15.4%)
Significant Score (14-19)	0
Major problems (20+)	1 (7.7%)
Missing data	3 (23.1%)

The mean systolic blood pressure was 132 (SD±16.4), and diastolic blood pressure was 76 (SD± 13.7).

The maximum BMI recorded during the initial visit was 53.3 and the lowest was 38.6. The mean was 44.3 (SD±4.42). The mean weight was 123.4 kg (SD±21.66) and the mean height was 1.7 meters (SD±0.1). Physical examination was normal in most of the teenagers except for one with heart murmur and two with skin changes, one consistent with psoriasis and the other with acanthosis nigricans.

The lipid profile showed normal HDL, LDL and triglyceride level; however, 1 (7.7%) teenager had total cholesterol above the recommended level and subclinical hypothyroidism with TSH level of 5.7. None of the teenagers had diabetes, 3 (23.1%) teenagers had impaired fasting sugar. HbA1c was normal in all cases, see table 3.

Table 3: Biochemical Data

Laboratory results		
Total Cholesterol mmol/L	Normal	12 (92.3%)
	High ≥5.2	1 (7.7%)
FBS mmol/L	Normal	10 (76.9%)
	Impaired (≥5.6-<7)	3 (23.1%)
	High ≥7	0
Hemoglobin (Hb) g/dL	Normal	12 (92.3%)
	Low <11	1 (7.7%)
TSH µIU/ml	Normal	12 (92.4, 92.3%)
	Subclinical(>5-<10)	1 (7.6)
	Hypothyroidism ≥ 10	0
Vitamin D nmol/L	Normal	4 (31.0)
	Low<50	9 (69.2%)

Anemia was detected in 2 (15.4%) teenagers (HB<11); 1 (7.7%) had medical history of the anemia, see table 3. Nine (69.2%) teenagers had vitamin D deficiency. Teenagers with an abnormal result were referred to an endocrinologist, see table 3.

Seven (53.8%) teenagers ate breakfast daily, 5 (38.5%) ate in restaurants several times a week and 6 (46.2%) ate in restaurants once a week. Eleven (84.6%) teenagers ate with the family, while 2 (15.4%) never met to eat a meal. Ten (76.9%) teenagers reported eating fruits and vegetables daily. Nine (69.2%) drank dairy products and 11 (84.6%) had soft drinks. Nine (69.2%) were taking mixed healthy and unhealthy snacks; 3 (23.1%) of them were taking unhealthy snacks only, see figure 1.

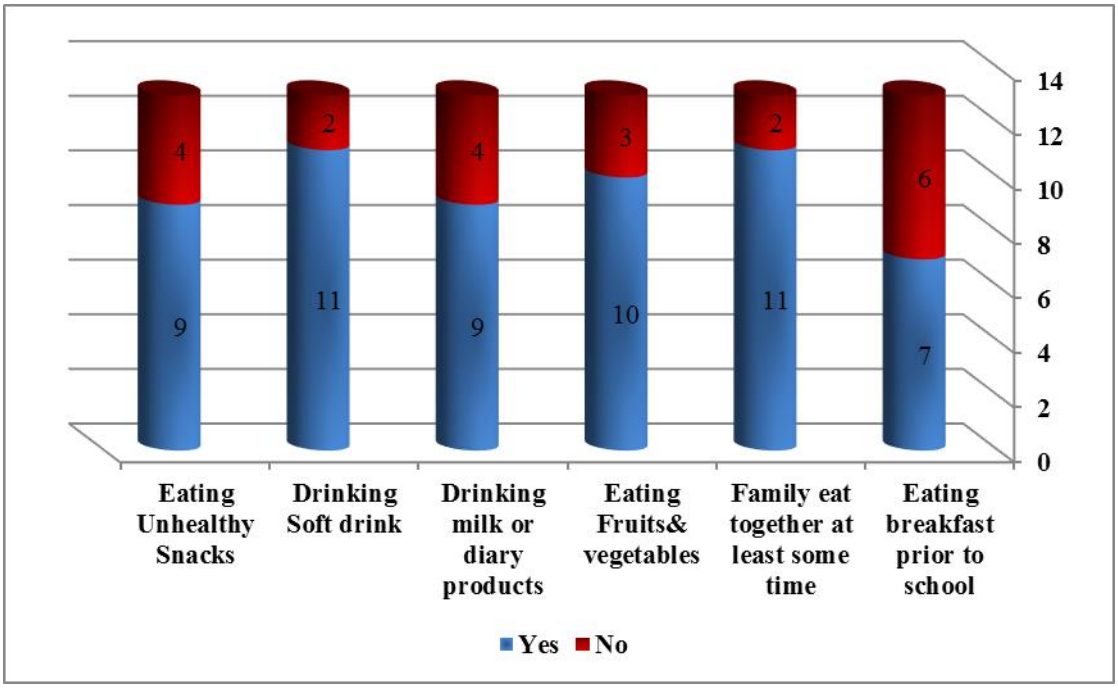

Figure 1: Eating and Drinking Habits

Nine (69.2%) have no chores at home. Twelve (92.3%) were using a bus or a car for the school. Two (15.4%) use transport. Thirteen (100%) participated in after-school physical activities such as walking, running and football, missing information from two, see figure 2.

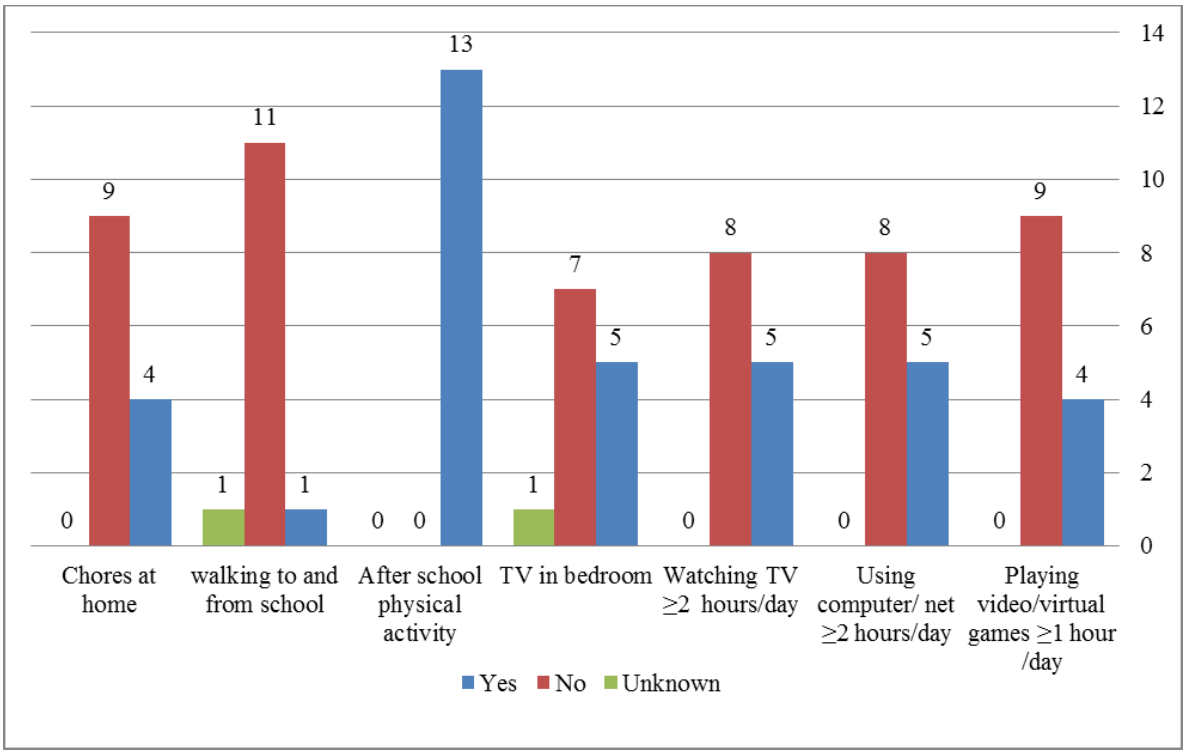

Figure 2: Daily Activities

Five (38.5%) have TV in the bedroom. Five (38.5%) were watching TV for more than 2 hours per day. In addition, 9 (69.2%) teenagers spent more than 1 hour per day playing video games.

The mean final BMI was 42.9 (SD±4.87), see table 4. The mean weight loss was 4.1 kg (SD±6.6). Eleven (84.6%) teenagers were able to lose weight change. The maximum weight reduction was 24.7 kg over the study period. The weight loss ranged between 0.1 to 24.7, see figure 3. Two (15.4%) teenagers gained weight.

Table 4: Mean Anthropometric Changes

	Mean		
	Initial Visit	**Final Visit**	**Change**
Weight	123.4 kg	119.3 kg	-4.1
BMI	44.3	42.9	-1.4

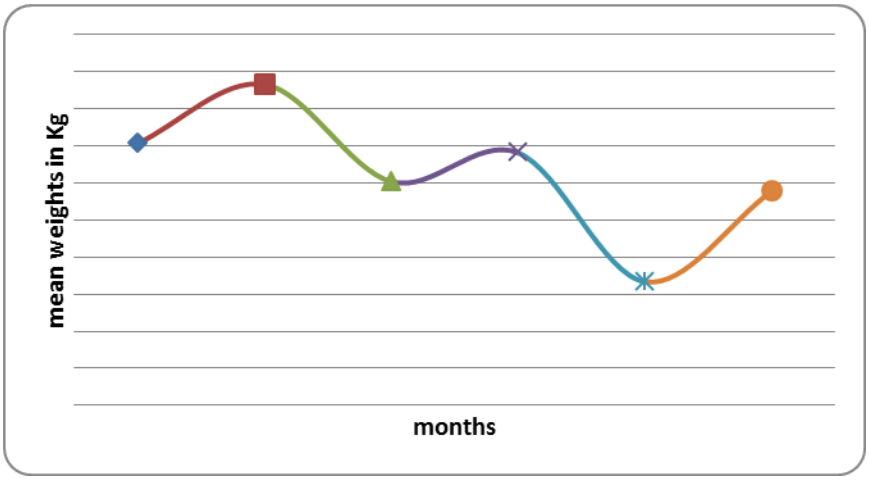

Figure 3: Mean Weight Loss over 6 months

The majority of the participants achieved considerable behavioral changes. Three participants did not have a perfect attendance. 10 (76.9%) decrease screen time to 2 hours/day or fewer; 12 (92.3%) had no sugar-sweetened beverages; 11 (84.6%) consume at least 5 servings of fruits and vegetables daily; 9 (69.2%) became physically active 1 hour or more daily; 10 (76.9%) prepare more meals at home as a family (the goal is 5-6 times a week); 10 (76.9%) limit meals outside the home; and 13 (100%) eat breakfast daily.

None of the participants reported any side effects during the program period including headaches, fatigue, hair loss and palpitation. The participants maintained a normal hemoglobin level during the follow-up period.

DISCUSSION

The weight and BMI changes demonstrated in this program are comparative to other studies[23]. Improvement in health behaviors including increased physical activity and type of healthy diet consumed is similar to another study[23].

Factors enhancing the success of this program were the young age of the participants, the duration of the program, the reward tips, the rigorous selection, close monitoring and the narrow goal of the program[23].

Sixteen teenagers were included in the study, but 3 (18.8%) were excluded because of irregular follow-up. The small dropouts were attributed to school work, transportation difficulties by the parents and involvement of the participants in other sport-related activities. The average dropout rate noted in obesity teen programs was 26%[22,23].

The study had few limitations; no control group to validate the results of the intervention, the sample was small, self-reported data, and increasing the intervention duration may have generated more realistic results. The investigators' skills in measuring the anthropometric changes may impose a small albeit mentionable limitation to the program.

This study has inherent strength that it was conducted by a multidisciplinary team including a family physician, a licensed nutritionist, a social worker and a health educator. The program is well-designed, and community-based. The involvement of the parents constitutes a positive strength in this program. In addition, the program utilized resources in the community which makes it more realistic and achievable.

CONCLUSION

This study illustrates that a 24-week teen-obesity intervention program based in the community and designed for obese teenagers is effective. It suggests that this experience could be translatable to the real world. Several factors have contributed to such success including parental involvement, careful selection of the participants, the community participation and the multidisciplinary collaboration.

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Competing Interest: None. **Sponsorship:** None.

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