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Impact of weight reduction coaching program on control of weight and lifestyle behaviors of children with obesity

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ABSTRACT

Background: Obesity is one of the most serious problems in global public health. It is a chronic disease thatleads to medical and psychological complications. Lifestyle coaching provides a successful model for future treatment and prevention of pediatric obesity. **Aim of study** to evaluate the impact of a weight reduction coaching program on the control of weight and lifestyle behaviors of children with obesity**. Method:** The study was conducted at the National Nutrition Institute, Cairo, Egypt.A non-probability purposive sample of 30 school-age children who are overweight or obese.Three tools were used for data collection: A Structured Interview Questionnaire, The Food Frequency Questionnaire (FFQ), and The Lifestyle Behavior Checklist (LBC).**Results:** The mean age of studied children was 8.3±2.1 years, 53.3% of childrenwere females. There is a significant decrease in mean body mass index from 33.6 to 28.7 at post one month and 25.1 at three months post. A significant decrease in life style behavior after coaching program, eating too much decreased from 88.1% to 51.4% at post one month and 34.8% at three months post coaching program . **Conclusion:** Weight reduction coaching program improved lifestyle behaviors and decreased children's body weight. **Recommendations**: Future research recommendationsfor using coaching programs to support and promote positive healthy eating and lifestyle behavior.

Keywords: *Children, Coaching Program, FoodConsumption,LifestyleBehavior, Obesity*

Introduction:

Pediatric obesity is one of the most serious problems in the global public health domain. It has reached epidemic proportions according to the latest data by the Centers for Disease Control and Prevention (CDC, 2022). Obesity is defined as abnormal or excessive fat accumulation that presents a risk to health. A body mass index (BMI) over 25 is considered overweight, and over 30 is obese. Diagnosis of childhood obesity is based on weight to length ratio and BMI percentiles (World Health Organization[WHO], 2022).

Obesity impacts 14.7 million children and adolescents (CDC, 2022). The prevalence of overweight or obese children and adolescents aged 5–19 years increased more than four-fold from 4% to 18% globally. In low- and middle-income nations, the prevalence of overweight and obesity is sharply increasing, especially in urban areas. The majority of children who are overweight or obese reside in developing nations, where the rate of increase has surpassed that of developed nations by more than 30% (WHO, 2022).

Unhealthy eating habits and lack of physical activity are major contributors to overweight or obesity (Parkman, 2020; WHO, 2022). Factors responsible for obesity include societal and lifestyle factors like lack of parental control, spending more time on gadgets, use of technology, social media, lack of activities, stress, overeating, and lack of healthy eating, which also contribute to overweight (Dhiman & Kumari, 2022). Study showed a dose-response effect of screen time and childhood adiposity, with screen time greater than 2 hours per day being positively associated with higher risk of overweight or obesity. "Screen time" includes TV, computer, video or videogames, mobile phones, and other digital devices (Hampl et al., 2023).

Obesity in childhood is associated with a wide range of serious health complications and an increased risk of premature onset of related illnesses.Children and adolescents with obesity will likely continue to be obese into adulthood (WHO, 2022). Obesity is linked to a higher risk for diseases and conditions like high blood pressure, high cholesterol, diabetes, asthma, anxiety, and depression. In addition, children with obesity are more likely to be bullied and to have obesity as adults (Jebeile, Kelly, O'Malley,& Baur, 2022).

Management of pediatric obesity is complex and challenges pediatric providers to implement thorough individualized methods guided by the child's age, mental status, severity of obesity,

presence of risk factors and co-morbidities, genetic or congenital factors, lifestyle behaviors, family and community support, and the patient/family motivation for change (Chen et al., 2022). Research on programs improving dietary habits and increasing physical activity in children can assist with preventing and treating obesity in children (Mittal& Jain, 2021; Morsi, 2020)

The coaching program is a professional lifestyle coachthat counsels adults and children (and/or their parents) who are obese or at high risk of obesity to achieve a sustained healthier lifestyle. Lifestyle coaches are expected to promote lifestyle changes of participants regarding physical activity and diet (Van Rinsum et al.,2021;Tung, Poon, Du,& Wong, 2023). They study lifestyle and behavior modifications, with dietary changes, increased physical activity, and adequate sleep being integral parts of obesity management.

Nurses can collaborate closely with children and families to provide health education on healthy diet and physical exercise (Ibrahim, Mohsen, Hussein,& Shehata, 2022). Children are encouraged to live an active lifestyle with a daily balance of sleep, sedentary behaviors, and physical activities that support their healthy development. Children should practice healthy sleep hygiene (habits and practices that are conducive to sleeping well), limit sedentary behaviors (especially screen time), and participate in a range of physical activities in a variety of environments (e.g., home/ school/ community; indoors/outdoors; land/water; summer/winter) and contexts (e.g., play, recreation, sport, active transportation, hobbies, and chores) (WHO, 2022; Sampasa-Kanyinga, Lien, Hamilton,& Chaput, 2022).

Significance of the study

Pediatric obesity prevalence has significantly increased globally over the past three decades. Obesity is a chronic disease, when originating in childhood, can lead to medical and psychological complications and premature comorbidity and mortality (Salama, 2023).

Last survey of the Egyptian society in the framework of the "100 million Health" initiative revealed that about 25% of the children exhibited normal weight while the rest suffer from obesity and overweight (Puri-Mirza, 2019)(WHO)ranks Egypt as the 18th most obese country in the world (Mehrzad, 2020).

Nurse interventions can deliver care to prevent or treat overweight and obesity in infants, children and adolescents (Cheng, George, Dunham, Whitehead& Denney-Wilson, 2021). Lifestyle coaching provides a successful model for future treatment and prevention of pediatric obesity. Educating parents along with children and adolescents about lifestyle, nutrition and physical activity will improve body compositions that have potential to be sustainable (Van Rinsum et al., 2021).

Nurses in pediatric settings have a critical role to play in assessing and managing childhood obesity. Thewell-being of children and the provision of high-quality, evidence-based care are core responsibilities for nurses. This even becomes more critical while taking care of children and adolescents who are overweight or obese (Okoye, 2023). There are scarcestudies specifically addressing weight reduction coaching program onlifestyle behavior among children with obesity, the aim of the current study was to investigate impact of weight reduction coaching program on lifestyle behavior of children with obesity.

Research Hypotheses

The current study hypothesized the following:

1. Children who would receive weight reduction coaching program would have decreased body weight than before.
2. Children who would receive weight reduction coaching program wouldhave better lifestyle behaviors than before.

Operational definition

Weight reduction coaching program: It is a professional lifestyle coaches counseling through nurse for children with obesity including dietary, sedentary, and physicalactivities behaviors modification to reduce weight and to achieve better lifestyle behaviors.

Aim of the Study

The study aim was to evaluate the impact of weight reduction coaching program on control of weight and lifestyle behaviors of children with obesity.

Subject and Method

Research Design

A quasi-experimental pretest- posttest design was used in this study. Pretest- posttest design, the dependent variable is measured once before the treatment is implemented and once after it is implemented (Grove & Gray, 2019).

Setting

The study wasconducted at the National Nutrition Institute, Cairo, Egypt.

Sample

A non-probability purposive sample of children in the study setting were included in the study sample per 6 months. According to the inclusion criteria of being a child (6-18 years old) with a body mass index (BMI) of ≥85th percentile, with obesity have exogenous obesity. The exclusion criteria were having a medical condition known to promote obesity e.g.(Prader-Willi syndrome, Cushing's syndrome),with any pre-existing chronic disease (e.g., diabetes or kidney disease),prescribed a weight-affecting medication (e.g., Ritalin, steroids, and/or psychotropic medications),a diagnosis of a behavioral or psychiatric disorder that could preclude full participation in the program (e.g., mental retarded, autism),physical difficulty that limits his/her ability to exercise and having attended a previous similar training.

Data Collection Tools

Three tools were used for data collection:

Tool I.A Structured Interview Questionnaire. It was constructed by the researchers after reviewing recent literature (WHO, 2022; Ibrahim et al., 2022; Mahmood, Shaker &Ismail, 2022) It included four parts: PartI: Child characteristics:age, gender, educational level, residence. Part II: History about child obesity in the family, previous use of medications by the child related to weight gainandproblems from obesity. Part III: Childanthropometric measurements. It includes measuring Height /m, Weight/ kg, and Body Mass Index (weight in kilograms/height in metres2). Part IV: Child diet, sedentary, and physical activities behaviors contain 11 questions related to child diet; 6 questions related to sedentary; 8 questions related to physical activities behaviors. All questions are closed-end questions.

Tool II.The Food FrequencyQuestionnaire (FFQ). It contains 15 items adopted from Thompson (1944) and used to assess how often the children consumed different categories of foods: “fresh fruits”, “vegetables”, “hamburgers/ sausage”, “pizza/pasta/rice”, “fish”, “ice-cream”, “cookies /biscuits/cake”, “sugar/sweetened drinks”, “fruit juices”, “sweets/chocolate”, “potatoes chips/ popcorn ”“peanuts”, “snacks”, “dark bread”, “white bread”.The FFQ had 5 possible responses:0 = “Less than one time a week”, 1= “One time per week”, 2=”2–3 times a week”, 3 =”4–6 times a week”, 4= “Every day”. Total score was60.

Tool III.The Lifestyle Behavior Checklists (LBC). It was adopted from Westand Sanders (2015). The LBC is a 25-item. The LBC was developed by generating a list of childproblem behaviors related to eating (e.g. eating too quickly, eating unhealthy snacks), activity (e.g. playing too many computer games, complaining about doing physical activity) andoverweight (e.g. complaining about being overweight, complaining about not having enough friends).

Pilot study

A pilot study was carried out on 3childrento test thestudytools in terms of their clarity, applicability, time required to fill in them, and accordingly, no modifications were made. Subjects who were shared in the pilot study were included in the sample.

Tools Validity and Reliability

The tool (I) was thoroughly reviewed by three experts (pediatric nursing, pediatric medicine, and nutritionists) to test the content validity. The Experts examined the relevancy, clarity, fluency, and simplicity of each component in the questionnaire and concluded that it is useful and helpful.Tool (II) the Pearson’s correlation coefficients were 81.1–94.6% (Syauqy et al., 2021). Tool (III). Construct validity was measured by using Spearman correlation coefficients and it had the Problem scale (r = 0.74) and the Confidence scale (r = 0.70) (Omidvar et al., 2022).

The reliability of the tool I tested by Cronbach's alpha test, and the result was highly reliable and equaled 0.74. Additionally, reliability of Tool II by Cronbach’s alpha value was 0.708, Tool III had high internal consistency ($\alpha = 0.97$) for the Problem scale and ($\alpha = 0.92$) for the Confidence scale) .

Ethical considerations

Primary approval obtained from the research ethical committee at the Faculty of Nursing, Cairo University. All children who participated in the study were informed about the aim, procedure, benefits, and nature of the study and formal written consent was obtained by the researchers from mothers and assent from children. The researchers emphasized that participation in the study was voluntary, and participantscould refuse to participate in the study without any reason, and obtained data was only used for the research purpose. The anonymity and confidentiality issues of information assured, and the parents had the right to withdraw from the study at any time during the study without any effect on the care provided to their children.

Data CollectionProcedure

The study started from January 2022 until May 2022

Weight reduction coaching program would beimplemented through the following four phases:

1. Assessment Phase

After official permission fromNational Nutrition Institute. The researchers interviewed each child and his/her mother individually in theNational Nutrition Institute clinic to fulfill the structured interview questionnairesusing tool I (Part I and II) once. Assessment using toolI (Part III and IV), tool II, and tool IIIwere taken as baseline (pre-coaching program intervention). The assessment phase was done through one session (around 30-40 minutes).

2. Planning Phase

The proposed weight reduction coaching program covered knowledge related to dietary, sedentary, physical activities behaviors modification to reduce weight and to achieve a sustained healthier lifestyle. Weight reduction coaching program was prepared through using audiovisual aids (power point and video for topics) and booklets to children and their mothers with the program content for guidance**.**

3. Implementation Phase

The researchers provided a weight reduction coaching program for a group of children (3-5) and their mothers. It was done in the National Nutrition Institute clinic through two theoretical sessions (around 20-30 minutes for each session) per day. The first session was knowledge about the definition of obesity, causes, and complications. The second session utilized three themes: knowledgeabout diet, sedentary and physical activities behavior modifications for managing obesity.

Weight reduction coaching program was presented to children and their mothers through using audiovisual aids (PowerPoint and video for topics), and booklets were given to children and their mothers with the program content for guidance**.**

Phone follow up for each child and his/her mother was done by researchers every week to follow up (keep track of implementing weight reduction coaching program, discussing the current situation, answering any question).

4. Evaluation Phase

The researchers interviewed each child and his/her mother individually to make post-coaching program evaluation after 1 month (as a routine in the National Nutrition Institute clinic), and then after 3 months (follow-up) by tool I (Part III and IV), tool II, and tool III. The evaluation phase was done through one session (around 30- 40 minutes).

Statistical Analysis

Data was computerized and analyzed using appropriate descriptive and inferential statistical tests to test the study hypotheses. Data was statistically described in terms of percentages, frequencies, mean, and standard deviation when appropriate. Comparing nominal data between the two groups was done by Chi-square test, and the numerical data were compared by paired t-test and ANOVA. Correlations between various variables were done using Pearson correlation. By level of significance at $p<0.05$. All statistical calculations were done using IBM SPSS (Statistical Package for the Social Science; IBM Corp, Armonk, NY, USA) release 22 for Microsoft Windows.

Results

Table1 shows that the mean age of studied children was 8.3±2.1 years. More than half (53.3%) of studied children were females and the majority (90%) of them had a primary school education level while 83.3% lived in urban areas.

Table 2 shows that 73.3% of studied children had history of obesity in their family, and 36.7% of them were the mother/father history. Also 70% of children had a previous history of using medications related to weight gain and they had problems with overweight which was insulin resistance for 46.7% and difficulty breathing during sleep for 23.3 %.

Table 3 shows that there is no steady schedule time for snack for 83.3% of studied children while for 63.3% snacking pattern was between meals. The location of meals was bedroom for 80% of them while for 73.3% eating occurs in front of television or computer or mobile. Also 83.3% of children don't use lot of salt in food and 53.3% had more eating at screen time. For 53.3% of them child does not participate in buying and in preparation meals and 73.3% of children drink water during eating where 63.3% drink 4 to 6 cups daily. The mean numbers of meals /day were 4.6±3.2, while the mean numbers of snacks were 4.1±1.8.

Table 4 shows that 60% of children sleep at night while 70% had regular sleep, 73.3% go to school by walking and 93.3% has no organized exercise inside school while 86.7% has no organized exercise outside school and all of them have no parents or siblings engage in any physical activity. The mean hours of watching TV /day for

children was 3.10±2.95, the mean hours of playingon the computer was 2.53±2.29, and the mean hours of using mobile was 4.37±2.82

Table 5 revealed that a significant increase in mean height of children after the program (mean increased from 135.8 cm to 140.3 at post one month and 143.7 at post three months and a significant decrease in BMI of children (mean decreased from 33.6 to 28.7 at post one month and 25.1 at post three months).

Table 6 highlights a significant decrease in percent of food consumption of studied children after the program for all items except fresh fruits and vegetable increased. The consumption of pizza/pasta/rice decreased from 90.8% to 43.3% at post 1, then 23.3% at post 3, while consumption of white bread decreased from 73.3% to 34.2% then 15%. Also, consumption of potato chips/ popcorn decreased from 87.5% to 43.3%, then 20%, while consumption of cookies /biscuits/ cake decreased from 76.7% to 41.7%, then 19.2%. Consumption of sugar/ sweetened drinks decreased from 73.3% to 39.2% then 15.8%. Snacks from 85.8 to 45% then 21.7%

Table 7 shows a significant decrease in the percentage of lifestyle behavior of studied children after the program for all items. Eating too much decreased from 88.1% to 51.4% then 34.8% while requests for food continuously between meals decreased 86.2% to 50.5% then 30.5%. Also demand for food when shopping or on outings decreased from 85.7% to 48.1% then 28.6 %. In addition, children complaints about demanding extra helpings at meals decreased from 90% to 52.2% then 31.4%.

Table 8 shows a significant decrease in the percentage of lifestyle complaints of children after the program for all items. The number of complaints about not fitting into clothes decreased from 91.9% to 53.3% then 34.8% while complaints about being teased and not having enough friends decreased from 90% to 53.3% then 34.3%. Also, children complaints about doing physical activity decreased from 90.5% to 52.9% then 34.8% while complaints about being overweight decreased from 92.4% to 53.8% then 34.8%.

Table 9 shows that there was a significant direct correlation between weight and lifestyle behavior among studied children at post one month and post three months (follow up). Also, there was direct correlation between BMI and lifestyle behavior at post one month and post three months. There was a significant direct positive correlation between food consumption and weight and BMI at post three months (follow up).

Table1. ChildrenCharacteristics in Percentage Distribution (n=30)

Children Characteristics	n	%
Age /years		
6-8	16	53.3
9-12	14	46.7
Mean±SD	8.3±2.1	
Gender		
Male	14	46.7
Female	16	53.3
Education level		
Cannot read and write	1	3.3
Primary school	27	90.0
Secondary school	2	6.7
Residence		
Urban	25	83.3
Rural	5	16.7

Table 2. Distribution of Medical History of Studied Children (n=30)

Child Medical History	n	%
History of obesity in family		
Yes	22	73.3
No	8	26.7
Family history		
Father or mother	11	36.7
Sibling	4	13.3
Grandfather/mother	4	13.3
Uncle /aunt	5	16.7
Previous use of medications by the child related to weight gain.		
Yes	21	70.0
No	9	30.0
Child problemsrelated to overweight		
Yes	21	70.0
No	9	30.0
Child problems		
Insulin resistance	14	46.7
Hypertension	1	3.3
Spine and joint pain	2	6.7
Difficulty breathing during sleep	7	23.3
Depression and lack of self confidence	1	3.3

Table 3. Percentage Distribution of Eating Habits of Children (n=30)

Items	n	%
The steady schedule time for snack		
Yes	5	16.7
No	25	83.3
Time of snacking		
Between meal	19	63.3
Evening	3	10.0
Night	8	26.7
Places of meals		
Dining room	1	3.3
Living room	3	10.0
Bed room	24	80.0
Eating occurs in front of television or computer or mobile		
Yes	22	73.3
No	8	26.7
The use of a lot of salt in the food		
Yes	5	16.7
No	25	83.3
More eating occurs for child in which condition		
Stress	3	10.0
Boredom	3	10.0
Screen time	16	53.3
All of them	8	26.7
Children participate in buying and in preparation meals.		
Yes	14	46.7
No	16	53.3
Drinking water occurs		
Between meals	8	26.7
During eating	22	73.3
Frequency of water		
4 to 6 cups	19	63.3
6 to 8 cups	7	23.3
8 to 10 cups	4	13.3
Number of meals/days	4.6±3.2	
Number of snacks/days	4.1±1.8	

Table (4). Sleeping Habits, Activities, and Physical Exercise of Children with Obesity (n=30)

Items	No	%
Sleeping habits		
Day	12	40.0
Night	18	60.0
Sleeping pattern		
Regular	21	70.0
Interrupted	9	30.0
Mean ±SD	7.80±1.9	
Going to school		
Walking	22	73.3
cycling (biking)	4	13.3
Transport	4	13.3
Organized exercise inside school		
Yes(football)	2	6.7
No	28	93.3
Organized exercise outside school		
Yes(football 30-60 minutes 1-3 times/week)	4	13.3
No	26	86.7
Parents or siblings engage in any physical activity		
No	30	100.0
Mean hours spent in front of : - T.V	3.10±2.95	
- Computer	2.53±2.29	
- Mobile	4.37±2.82	

Table 5.The Mean Scores of Anthropometric Measures of Children with Obesity Pre and Post Intervention.

Time	Height/m	Weight/Kg	Body Mass Index
	Mean ±SD	Mean ±SD	Mean ±SD
Pre intervention	135.82± 11.45	62.85±22.23	33.6 ±39.23
Post intervention (one month)	140.37±12.04	59.58±22.81	28.76 ±10.52
Post intervention (three months)(Follow up)	143.73±11.56	53.63± 23.34	25.19±9.71
ANOVA	3.38	0.2	5.4
P	0.03	0.81	0.006

Significant at p-value<0.05

Table 6. Percentage of Food Consumption among Children with Obesity Pre and Post Intervention

Items	Pre	Post one month	Post three months	ANOVA	*P*
	%	%	%		
Fresh fruits	52.5	50.0	39.2	1.565	0.215
Vegetables	48.3	44.2	35.8	1.203	0.305
Hamburgers/ Sausage	45.8	23.3	10.8	22.116	0.000*
Pizza/Pasta/Rice	90.8	43.3	23.3	91.771	0.000*
Fish	32.5	30.8	20.8	3.208	0.045*
Ice-cream	48.3	28.3	15.0	18.797	0.000*
Cookies /Biscuits/Cake	76.7	41.7	19.2	39.887	0.000*
Sugar/Sweetened drinks	73.3	39.2	15.8	47.070	0.000*
Fruit juices	60.8	48.3	33.3	6.951	0.002*
Sweets/Chocolate	72.5	37.5	16.7	46.910	0.000*
Potatoes chips/ popcorn	87.5	43.3	20.0	66.172	0.000*
Peanuts	74.2	35.0	15.8	44.407	0.000*
Snacks	85.8	45.0	21.7	63.261	0.000*
Dark bread	96.7	51.7	30.8	73.075	0.000*
White bread	73.3	34.2	15.0	40.113	0.000*

*Significant at p-value<0.05

Table 7. Total Percent Score of Lifestyle Behavior among Children with Obesity Pre and Post Intervention

Items	Pre	Post one month	Post three months	ANOVA	*p*
	%	%	%		
Eats too quickly	81.0	49.5	32.4	42.640	.000*
Eats too much	88.1	51.4	34.8	66.703	.000*
Eats unhealthy snacks	86.7	51.0	31.0	93.123	.000*
Whines about food	83.3	48.1	30.0	56.729	.000*
Yells about food	81.9	44.8	28.6	57.145	.000*
Throws a tantrum about food	82.9	46.7	29.0	60.295	.000*
Refuses to eat certain foods (i.e. fussy eating)	81.4	47.6	30.5	60.355	.000*
Argues about food (e.g. when you say No more)	83.8	48.6	30.5	71.198	.000*
Demands extra helpings at meals	90.0	52.9	31.4	110.766	.000*
Requests food continuously between meals	86.2	50.5	30.5	77.238	.000*
Demands food when shopping or on outings	85.7	48.1	28.6	87.739	.000*
Sneaks' food when they know they are not supposed to	78.1	44.3	28.1	45.955	.000*
Hides food	76.2	42.4	27.1	43.720	.000*
Steals food (e.g. from other children's lunchboxes)	69.5	38.1	23.8	37.445	.000*
Eats food to comfort themselves when feeling let down or depressed	75.2	43.3	28.6	42.099	.000*

*Significant at p-value<0.05

Table 8.Total Percent Score of Lifestyle Behavior among Children with Obesity Pre and Post Intervention (cont.)

Items	Pre	Post one month	Post three months	ANOVA	*p*
	%	%	%		
Watches too much television	81.9	48.6	31.0	63.325	.000*
Spends too much time playing video or computer games	81.0	47.6	31.0	51.970	.000*
Complains about doing physical activity (e.g. This is boring, I'm too tired, My leg hurts)	90.5	52.9	34.8	87.302	.000*
Refuses to do physical activity	85.7	50.5	33.3	67.004	.000*
Complains about being unfit or feeling low in energy	89.5	52.9	33.8	79.417	.000*
Complains about being overweight	92.4	53.8	34.8	90.188	.000*
Complains about being teased	90.0	53.3	34.3	80.518	.000*
Complains about not having enough friends	90.0	53.3	34.3	80.518	.000*
Complains about being unattractive	91.0	52.4	33.8	87.209	.000*
Complains about not fitting into clothes	91.9	53.3	34.8	78.400	.000*

Table 9. Correlation Between Children Characteristics, Weight, BMI, and Food Consumption, Lifestyle Behavior Pre and Post Intervention

Characteristics	Food consumption		Lifestyle behavior	
	R	*p*	r	*p*
Age	0.02	0.84	-0.05	0.63
Education	-0.12	0.23	-0.08	0.41
Weight				
Pre intervention	0.3	0.09	-0.04	0.82
Post intervention (one month)	0.32	0.07	0.49	0.005*
Post intervention (three months) (Follow up)	0.52	0.003*	0.6	0.0001*
BMI				
Pre intervention	0.29	0.11	-.02	0.89
Post intervention (one month)	0.3	0.09	0.52	0.003*
Post intervention (three months) (Follow up)	0.64	0.0001*	0.61	0.0001*

*Significant at *p*-value<0.05

Discussion

The current study's findings showed that the mean age of studied children was 8.3 years. This result is in the same line with Ahmed, Melika, and Ismail (2022) about "Childhood Obesity and Healthy Weight Program among Primary School Children, who discovered that the mean age of the studied primary school children was 8.67. Furthermore, a study by Mahmood et al.(2022)with the title "Prevalence of overweight, obesity and sedentary behavior among primary school children in Rania City",they found that the youngest age group (6–9 years) had a higher distribution of overweight and obesity. Based on the current study's findings, more than half of children were females and the majority had primary school education. The result was consistent with Mahmood, Shaker, and Ismail (2022). They reported that half of children were equal first to third primary and fourth to sixth primary school. Regarding gender findings, their findings were contradicted; they found that over half of children were male and that male sex was more likely than female sex to be overweight.

Regarding residence, the current result showed that the highest percentage of children lived in urban areas. This resulted in conflicts with Ahmed et al. (2022), they found that less than half of thechildren were from urban areas. While the finding agree with Mahmood, Shaker, and Ismail (2022). Who stated that the prevalence of overweight and obesity among primary school children in the city was at a high level. A study conducted by Hampl et al. (2023) entitled was "Clinical practice guideline for the evaluation and treatment of children and adolescents with obesity" reported that a child's surrounding environment may influence the amount of physical activity they get. For instance, living in an urban environment that lacks safe walkable and/or green spaces for kids to play may result in decreased physical activity levels, greater exposure to green space is associated with higher levels of physical activity and lower risk of obesity.

Concerning the family history of obesity, the study's findings showed that the highest percentage of the children under investigation had a family history of obesity, with over one-third of those cases in the mother or father. This result is supported the finding of the study by Silverio-Murillo and Rodriguez-Tirado (2022) about Family factors affecting the transition of children weight, they discovered that the presence of other family members with obesity increases the likelihood of a normal-weight child developing overweight or obesity; having an obese mother or father also increases the risk that a child will become overweight or obese.

The results of the current study illustrated that less than three quarters of children had previously used drugs related to weight gain. This result was in line with the findings of Cuda et al. (2022) study entitled" Medication-induced weight gain and advanced therapies for the child with overweight and obesity"; they demonstrated how numerous kinds of drugs have been linked to weight increase. Glucocorticoids, sulfonylureas, insulin, thiazolidinediones, antipsychotics, tricyclic antidepressants, and antiepileptic medications are among the medications linked to this issue. Risperidone, clozapine, quetiapine, and aripiprazole are examples of second-generation antipsychotics that are particularly known to cause fast weight gain and comorbidities such dyslipidemia, diabetes, and prediabetes.

In relation to children's problems related to overweight, the current study revealed that nearly half of the children had insulin resistance, and less than one quarter had trouble breathing when they slept. This result is supported by Marcus, Danielsson,&Hagman (2022) who study pediatric obesity—Long-term consequences; they stated that two important characteristics of obesity are dysregulated glucose homeostasis and hyperinsulinemia. Childhood obesity is the primary cause of insulin resistance, which is characterized by higher levels of circulating insulin, glucose, and free fatty acids. Furthermore, the study finding of Larizza et al. (2023) about an application to support lifestyle improvement in children with obesity, they stated that pediatric obesity is a multisystem condition that has potentially harmful consequences, including hyperinsulinemia and insulin resistance, type 2 diabetes mellitus, hypertension, dyslipidemia, hyperandrogenism and polycystic ovarian syndrome, chronic inflammation, endothelial dysfunction, asthma and obstructive sleep apnea syndrome, gastrointestinal and neurological disorders, and psychosocial complications.

The results showed that the highest percentage of children did not have a regular snack time, and less than two thirds of them only snacked in between meals. The mean daily meal count was 4.6±3.2, while the mean daily snack count was 4.1±1.8. This finding was concurrent with Biadgilign et al. (2023) regard association between dietary Intake, eating behavior, and childhood

obesity, they found a significant amount of overweight and obesity (89.0%) in children and adolescents was caused by snacking within the previous 24 hours. The researchers view what consuming more meals and snacks daily, as well as the kinds of foods that children typically bring to school from stores located near schools, can significantly contribute to childhood obesity. Fast food, beverages with added sugar, and foods embedded in entertainment media are also major contributors for children obesity.

The current study's findings demonstrated that the highest percentage of children ate in their bedrooms, in front of televisions, computers, or mobile devices. The findings are consistent with the study carried out by Kansra, Lakkunarajah, andJay (2021) with title "Childhood and Adolescent Obesity: A Review; according to their findings, children who watch television for extended periods of time each day play computer games or use smartphones or other devices are more likely to be overweight. This could be due to two factors: first, screen time takes up time that could be spent exercising; and second, spending more time in front of the TV increases the likelihood of snacking and exposure to advertisements for high-sugar, high-fat foods, which make up most of the food marketing.

The findings revealed that less than three quarters of children drank water during eating mealtimes, whereas over half drank 4–6 cups daily. This finding was agreed with Khil, Chen, Lee, Hong, and Keum (2024) concerning water intake and obesity, they found that drinking water may influence adiposity risk in different ways depending on a person's genetic predisposition to obesity. It is generally recommended to drink plenty of water (e.g., "drink at least eight glasses of water a day") to prevent weight gain or to lose weight. However, drinking water during or after a meal has been shown to interfere with digestion by diluting stomach acid and digestive enzymes.

The results of this study showed that the mean number of hours spent watching TV per day was 3.10±2.95, the mean number of hours spent using a computer was 2.53±2.29, and the mean time spent on a mobile device was 4.37±2.82. This result is supported by DhimanandKumari (2022) with title "Mobile based application on weight control among overweight children"; they said that that most children spend most of their time sitting at home, eating, playing, and watching TV. In addition, the results agree with Hampl et al. (2023). They stated that certain research has demonstrated relationship between screen time and childhood obesity, with more than two hours of screen time daily being positively linked to an increased risk of being overweight or obese, "screen time" refers to the use of digital devices such as smart phones, computers, video games, and TV. While the result disagrees with Sampasa-Kanyinga, Lien, Hamilton,and Chaput (2022) recommendation regarding sedentary behaviors that no more than 2 hours per day of recreational screen time and limiting sitting for extended periods.

As regard to children's sleeping patterns, the study results revealed that over half of them slept regularly and at night. This outcome is consistent with the research findings of Skjakodegard et al. (2021) with title "Beyond sleep duration: sleep timing as a risk factor for childhood obesity" and Kanellopoulou et al. (2021) about sleeping patterns and childhood obesity; their investigation revealed a wealth of data supporting the link between pediatric obesity, sleep disorders, and sleep deprivation. Not only is the quantity and quality of sleeping important, but later sleep times have also been linked to childhood obesity-causing behaviors and obesity itself.

Concerning physical activity of children, the results illustrated that the majority of children didn't participate in organized sports within schools, and the highest percentage didn't participate in organized sports outside. This aligned with the findings of Tung, Poon, Du,and Wong (2023) with title "Obesity in children and adolescents: overview of the diagnosis and management",they stated that one of the main contributing factors to obesity is insufficient physical activity. In real life, it is typically not feasible or achievable to engage in the recommended "physical activity of at least 60 minutes of daily moderate to vigorous physical activity." This finding was contradicted with WHO (2022) recommendation, which calls for limiting screen time and participating in regular, moderate-intensity physical exercise for at least 30 minutes.

The current study's results showed a considerable decrease in BMI and a significant gain in the mean height of children after three months of the program. This finding was concurrent with Park,and Kim (2022). They found that the child obesity management program improved BMI, height, and the degree of obesity. Additionally, the result agrees with Ibrahim, Mohsen, Hussein,and Shehata (2022) and Ahmed, Melika, and Ismail (2022). The study showed that there was a statistically significant reduction in BMI and body fat percentage in the study group compared to the control group after coaching program. However,

this result disagreed with Ghofranipour et al. (2022).They mentioned that the mean BMI z-score stayed steady between baseline, immediately after the intervention and after three months.The researchers' point of view, these results were attributed to children following the coaching program through eating low caloric diet, practicing regular exercise, and adopting healthy lifestyle behaviors.

Regarding children's food consumption, the current findings demonstrated that, after three months (follow-up) of the program, there was a substantial decrease in the percentage of food consumption for all products except fresh fruits and vegetables, which increased. This finding was in consistencywith Ibrahim, Mohsen, Hussein,andShehata (2022) regard effect of telephonic weight loss coaching program; they showed that there had been improvements in eating patterns, with people adopting healthier eating habits after the intervention. Also, the results agree with Ahmed, Melika, andIsmail (2022). They concluded that implementation of program for primary school children was efficient in improving their knowledge; there was a statistically significant difference between the pre- and post-program eating habits of the students that were associated to childhood obesity. According to the researchers, his was caused by a coaching program that changed children's eating pattern, physical activity, and encouraged them to consume more fruits, dark green vegetables, and water.

Concerning children's lifestyle behavior, the current findings demonstrated a significant decrease in the total percent score lifestyle behavior after three months of the program for all items such as eating too much, quickly, and unhealthy snacks. In agreement with this study done by Demir & Bektas (2021) about the effect of an obesity prevention program on children; they disclosed that the obesity intervention program was successful in lowering body mass index values and food addiction rates while also raising children's mean physical activity score and good eating behaviors. Additionally, the outcomes agree with Sandvik et al. (2022) regard associations of preschoolers' dietary patterns with eating behaviors; they found that children's eating behaviors have a larger impact on children's dietary patterns and that following the program, children consumed fewer less healthful foods.

The current study's findings had shown a noteworthy decrease in the proportion of lifestyle complaints following a three-month program (follow up) for all items such as watching too much T.V, playing games. This result is supported by Marcus et al. (2022); Moradi, Mozaffari, Askari, and Azadbakht (2022). They discovered a link between childhood obesity and mental health issues like anxiety and depression; a child's quality of life is correlated with obesity; reduced risk of anxiety and depression has been linked to effective obesity therapy.

The results showed that there was a significant direct correlation between weight, BMI, and lifestyle behavior at post one month and post three months (follow up) of intervention. This finding was concurrent with Li, Gao, Bao,and Li (2022) concern effectiveness of lifestyle interventions for treatment of overweight/obesity among children; they discovered through a systematic review and meta-analyses that lifestyle interventions can effectively lower BMI in Chinese children who are overweight or obese. Furthermore, the effectiveness of these interventions is enhanced when they involve multiple components, last longer than a year, and/or involve teenagers.

The results of the current study showed a substantial direct correlation between the number of meals consumed and the post-three-month weight and BMI. This outcome goes in line with the findings of Rabbani, Chiti, Sharifi, andMazloomzadeh (2022) about effect of lifestyle modification on obesity; they claimed that training-based food habit modification can considerably reduce obesity by raising children's and parents' awareness and helping them make behavioral changes. The researchers attributed that there are better weight loss results when dietary frequency habits and lifestyle behaviors are modified over longer periods of time.

Conclusion

Weight reduction coaching program improved lifestyle behaviors and decreased body weight. After the coaching program, the body mass index showed a substantial reduction. The program resulted in a significant decrease in the consumption of all food categories, except there was an increase in the consumption of fresh fruits and vegetables.

Recommendation

The present study recommended that

- Replication of the study with a large sample size and with a longer duration for follow up, as it could associate with better compliance and weight loss outcomes.

- Future research recommendations for using coaching programs to support and promote positive healthy eating and lifestyle behavior for weight loss in children.
- Developing an innovative intervention is crucial in the pediatric age to control the body weight.

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Conflict of Interest Statement

The authors declare that there is no conflict of interest

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