

Effect of Educational Program on Mothers' Knowledge and their Nutritional Habits about Obesity among their Preschool Children

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Abstract: Background: Obesity in preschool period is a public health problem caused when the intake of calories and food exceeds the expenditures and lack of exercise. The most significant health consequences of obesity in preschool period are cardiovascular diseases, diabetes and musculoskeletal disorders that affect child quality of life. Pediatric nurses provide weight related health information to the mothers and school nurses using research evidence in designing health promotion program for families. Therefore, **the aim of** this study was to evaluate the effect of an educational program on mothers' knowledge and their nutritional habits about obesity among their preschool children. A quasi-experimental **design** was used in carrying out the study. The study was conducted at six nursery schools (3 private & 3 governmental) at Mansoura City. The study **subjects** included a convenience sample of 120 obese child and their mothers recruited over 6 month period. Data were collected by using three **tools**, child assessment sheet for the preschool child, interview questionnaire for mothers' knowledge and their nutritional habits about obesity and mothers' checklists for measuring preschool child's weight and height to calculate BMI. The study **results** revealed that there were statistically significant differences between the studied children anthropometric measurements before & post 3 months of the program implementation as well as there were statistically significant relations between the studied mothers' total knowledge and their total habits post 3 months of the program implementation. The study **concluded** that there was a positive effect of the educational program in improving mothers' knowledge & nutritional habits regarding their preschool children obesity. The study **recommended** regular and continuous health educational programs are essential for improving the mothers' knowledge and habits regarding preschool obesity.

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Key words: Obesity, Mothers, Preschool Children, Educational program

1. Introduction

Obesity is a growing global health problem; in which overweight children is an indicator to a threat to their health status. It results from overeating and lack of enough exercise. It's very difficult to treat obesity when it develops and endangers children to lifelong health problems which reduce the quality of life and social stigma in addition to exclusion. It is no wonder that obesity has rapidly increased in the last few decades around the world (**Anup, 2013**). One of the most dangerous challenges of public health of the 21st century is childhood obesity. It has a steady effect on a lot of low and middle income countries. There has been an alarming rate worldwide, in 2010, 43 million children were estimated to be obese and 92 million were at risk of obesity (**Singh, et al., 2014**).

The prevalence of childhood obesity across the world rose from 4.2% in 1990 to 6.7% in 2010. It's expected that this trend will reach 9.1% in 2020. The prevalence of childhood obesity in Africa in 2010 was 8.5% and is predicted to reach 12.7% in 2020. In

Egypt the obesity prevalence was 20.5% in 2008 in which more than 25 % of 4 year old children were obese (**Kim et al., 2015**). In Mansoura city the capital of Dakahlia governorate the prevalence of preschool obesity was estimated to be 21.5% in 2013 (**Abdelgawad, 2013**).

Higher socioeconomic status, urban residency, medical and genetic conditions can lead to childhood obesity, but there is a bigger role for too little exercise and too much of the wrong food in the epidemic of obesity. Obesity is caused by high calories foods and drinks, so it's necessary for children to burn off those calories. Preschoolers don't have much time for physical activity as they spend most of their time in school and daycare. When they feel stressed from problems in the home or at daycare, they may overeat unhealthy foods. (**Koirala et al., 2015**).

Childhood obesity is a serious health problem that has adverse and long lasting consequences for individuals, families, and communities. Obese children are probably suffering from the chronic

diseases a lot growth complication as advanced bone age, increased height, gallbladder disease, obstructive sleep apnea, hepatic steatosis, hypertension, hyperlipidemia, dyslipidemia, and musculoskeletal and psychosocial disorders that affect peer discrimination (Matthew & Wieland, 2015).

During the preschool period habits of eating should be built on a strong foundation. The most influential environment in developing eating habits is family (Dougherty et al., 2015). Mothers feeding and activity practices during infancy in particular could have an effect on their children's perceptions, receptivity and attitudes to the new activities and foods introduced via different phases of development. Physical activity and eating habits of the children established by themselves in early life and can affect their choices made throughout late childhood and adolescence. So, parents' influence over children's eating patterns at home, modeling of healthful eating practices and levels of physical activity can shape their children's lifelong habits that contribute to their weight status (Erica et al., 2015).

So, preventing obesity in preschool age children holds promise for enabling significant gains toward both reversing the epidemic of childhood obesity and reducing obesity in adolescence. The prevention of obesity needs efforts. Co-operation among programs, institutions, settings as well as families can have an effect on promoting and sustaining a healthy environment for young children. (Weight-control Information Network, 2015).

Pediatric nurse has an important role in obesity prevention during childhood through educating parents about healthy weight categories (BMI) and the numerous health risks of pediatric obesity. Also, it is critical for nurses to find ways to reduce access to dense of energy for even children. Vegetables, fruits and whole grains are wonderful sources of complex carbohydrates, fiber and minerals as they have more fiber content and water. Also the consumption of vegetables and fruits increases the intake of necessary nutrients at the time of consumption and may reduce intake of calorie, which reducing the obesity risk and chronic disease in the future (Colleen et al., 2015).

Aim of the study:

The aim of this study was to evaluate the effect of an educational program on mothers' knowledge and their nutritional habits about obesity among their preschool children.

Research hypothesis:

- Mothers' will have better knowledge about reducing obesity in preschool children after implementation of educational program.

- Mothers' nutritional habits regarding reducing of obesity in preschool children will be improved after implementation of educational program.

2. Materials and Methods:

Research Design:

A quasi-experimental design was utilized in carrying out the study.

Setting of the study:

The study was conducted at six nursery schools at Mansoura City; three private (Mogma El Eman, El Mansoura College & El Zahraa Islamic) and three governmental (El Horia, El Mansoura El Tagrebia & Fakhr El Dakahlia). These were randomly selected from Mansoura City nursery schools.

Research Subjects:

A convenient sample of 120 obese children and their accompanying mothers from the previously mentioned settings who are available over a six month period and fulfill the following criteria:

1. Age: ranged from 3 to less than 6 years.
2. Weight: BMI equal or more than 95th.
3. Sex: males and females.
4. Free from any chronic diseases.

Tools of Data Collection:

Data were collected through the following tools:

Tool (I): Assessment Sheet for the Child, it consisted of two parts:

- a. Characteristics of child such as; age, sex, ranking and residence (pre formate).
- b. Anthropometric measurements (weight & height) for using body mass index (weight kg / height ^{m2}) (pre & post formate).

Tool (II): Interview Questionnaire for Mothers: was used to assess the following:

- a- Socioeconomic status using a scale for measuring family socioeconomic status (SES) for health research in Egypt: Adopted from (El-Gilany et al., 2012), it included 7 domains (education and culture, occupation, family, family possessions, economic, home sanitation and health care) with a total score of 84 (pre formate).
- b- Sociodemographic characteristics such as age, residence, number of family members, family history of obesity.
- c- Medical history regarding mothers' pregnancy period, such as weight, any health problems, any medications, and healthy diet during this period (pre formate).
- d- Mother's knowledge regarding the child's obesity, such as meaning of obesity, risk factors of obesity, identifying the normal body weight of her

child, health problems that result from this disorder, etc. (pre& post formate).

e- Mother's nutritional habits, which include type of feeding to her child during infancy period, type of milk, use of additional fluids in bottle feeding, additional types of food, time of additional foods, number of meals per day, eating between meals, daily intake of children's breakfast before going to nursery, frequency of consumption of special preferred types of foods, sleeping habits, the most preferred activities for the child, eating while watching television, etc (pre & post formate).

Operational design.

Preparatory phase:

Review of related literature covering various aspects of preschool children having obesity and their mothers. This was done using available books, articles, journals and internet search to be acquainted with previous and current relevant literature and to develop relevant tools for data collection.

Pilot study:

A pilot study was carried out to test the study tools: it was conducted on 10% of the total sample size of the studied mothers and their children in order to evaluate the research plan, clarity and applicability of the study tools. Minor modifications were done consequently in form of omission of certain questions. Mothers in the pilot study were included in the study.

Field work:

- The actual fieldwork started after an approval that was obtained to conduct the study from the directors of nursery schools in each zone of Mansoura City to facilitate data collection. Once the permission was granted to proceed in the study, the researcher met each child and his / her caregiver individually, the researcher was available two days weekly between private and governmental were mentioned before morning till afternoon. At the beginning, the purpose and nature of the study were explained. Each child with his/her mother was interviewed individually to assess the actual mothers' knowledge and habits. Anthropometric assessment of the child was taken as measuring height and weight. Data collection was completed at 6 month period, from the beginning of October 2014 to end of March 2015.

- Based on the finding of the assessment and review of literature, the educational program developed and implemented for mothers to assess the effect of the educational program for mothers care for

their preschool children having obesity. The program consisted of the following:

1st part was concerned with the knowledge regarding:

- Definition of obesity.
- Types of obesity.
- Predisposing factors for obesity in preschool children.
- Complications of obesity.
- Prevention of obesity.
- Prepare healthy meals and snacks.

2nd part was concerned with the practical skills regarding:

- Measurement of weight, height and calculate BMI.

Mothers were divided into small groups; (6-8 in each group). The program was given in three sessions (around 30-45 minutes for each). Various teaching methods were used in the form of lectures, group discussion, demonstration and re-demonstrations. Various teaching media were used, such as colored posters, power point, video and booklet. The program was carried out in nursery schools (private & governmental) at Mansoura City. Mothers' knowledge and reported practices was reassessed immediately after application of the guidance program (post-test) and after three months later was used the previously mentioned study tools.

Administrative design:

1- Permission to conduct the study was obtained from the administrators of Mansoura educational administrations and permission was obtained from the administrator of the nursery school before the beginning of the study after explanation of the purpose of the study.

2- Ethical consideration:

Ethical approval was obtained from the Research Ethics Committee of the Faculty of Nursing – Mansoura University and informed consent was obtained from the mothers before the beginning of the study after explanation of the purpose of the study. Privacy and confidentiality of the collected data were assured and participants were allowed to withdraw from the study at any stage.

IV- Statistical design:

1- Scoring system

The total score for mothers' knowledge regarding their children obesity (Tool II, d) were 32 grades, which divided as the following (Appendix I):

Appendix I. The total score for mothers' knowledge regarding their children obesity (Tool II, d)

• Mothers' knowledge about definition of the healthy food	2
• Mothers' knowledge about essential food items	2
• Mothers' knowledge about groups of the food pyramids	2
• Mothers' knowledge about definition of obesity	2
• Mothers' knowledge about causes of obesity	2
• Mothers' knowledge about identifying of the normal weight	2
• Mothers' knowledge about problems of obesity	2
• Mothers' knowledge about family history of obesity	2
• Mothers' knowledge about development of obesity as a healthy sign	2
• Mothers' knowledge about the role of television advertisement on spread of preschool obesity	2
• Mothers' knowledge about the prevalence of obesity regarding the gender	2
• Mothers' knowledge about methods of reducing the weight	4
• Mothers' knowledge about definition of body mass index	2
• Mothers' knowledge about methods of obesity prevention	2
• Mothers' knowledge about methods of obesity treatment	2

Scoring System of Mothers' Knowledge regarding preschooler obesity:

The scoring system was graded according to the items of interviewing questionnaire; the answers of the mothers were evaluated by using model key answer prepared by the researcher. Each correct answer was given (2) score, incomplete answer was given (1)

score and (0) score for incorrect answers. The scores were considered good if the percent scored (60%) or more, average if the percent score (50% - less than 60%) and poor if less than (50%)(**Abdelgawad, 2013**). The total score for mothers' nutritional habits regarding their children obesity (Tool II, e) were 38 grades, which divided as the following(Appendix II):

Appendix II. The total score for mothers' nutritional habits regarding their children obesity (Tool II, e)

• Mothers' habits about dealing methods with the child during eating	2
• Mothers' habits about using the food as a reward	2
• Mothers' habits about numbers of meals per day	2
• Mothers' habits about types of snakes	4
• Mothers' habits in producing different types of foods for their children per day	20
• Mothers' habits about producing a breakfast meal	2
• Mothers' habits about giving her child sandwich in nursery school	2
• Mothers' habits about producing children foods in front of television	4

Scoring System of Mother's habits regarding preschooler obesity:

The scoring system was graded according to the items of interviewing questionnaire; the answers of the mothers were evaluated by using model key answer prepared by the researcher. Each correct answer was given (2) score, incomplete answer was given (1) score and (0) score for incorrect answers. The scores were considered acceptable if the percent scored (60%) or more, partial acceptable if the percent score (50% - less than 60%) and unacceptable if less than (50%)(**Abdelgawad, 2013**).

2- Statistical analysis:

The collected data were organized and categorized, tabulated and analyzed by using SPSS and software version 15.

1. Descriptive measures include: frequencies, percentage, arithmetic mean and standard deviation.

2. Data entry and analyses were performed using SPSS statistical package version 15. The quantitative data were presented as a mean and standard deviation. T test, the most commonly used Statistical Data Analysis procedure for hypothesis testing since it is straightforward and easy to use. Additionally, it is flexible and adaptable to a broad range of circumstances was used to find the association between variables of qualitative data. The P value of <0.05 indicates a significant result, while the P value of < 0.001 indicates a high significant result at confidence interval 95%.

3-Data Analysis

The collected data were coded and entered in a data based file using the excel program for windows. Frequency analysis and manual revision were used to detect any error. After complete entry, data were transformed to the statistical package of social sciences (SPSS) version 15.0 by which the analysis

was conducted applying frequency tables with percentages.

Level of significance:

For all above mentioned statistical tests done, the threshold of significance is fixed at 5% level (p-value). The results were considered:

- Non-significant when the probability of error is more than 5% ($p > 0.05$).
- Significant when the probability of error is less than 5% ($p < 0.05$).
- Highly significant when the probability of error is less than 0.1% ($p < 0.001$).

- The smaller the p-value obtained, the more significant are the results.

3. Results:

Sociodemographic characteristics of the studied children are illustrated in **table (1)**. It was found that, more than one third of the studied children (39.2%) were in the age group from 4 to less than 5 years of age. In relation to sex, more than half of the studied children (55%) were girls. As regards to birth order, approximately half of the studied children were ranked as the first child (46.7%). Regarding the child living; it was found that the majority of the studied children (85%) live with their fathers & mothers.

Table (1): Distribution of the studied children according to their characteristics

Child Characteristics	Total children number=120 (100%)	
	N	%
Child age in years:		
- 3 – < 4	32	26.7
- 4 – < 5	47	39.2
- 5 – < 6	41	34.1
Sex:		
- Boy	54	45
- Girl	66	55
Birth order:		
- 1 st	56	46.7
- 2 nd	35	29.2
- 3 rd	22	18.3
- 4 th	7	5.8
Living with:		
- Father & mother	102	85
- Mother only	15	12.5
- Grandmother	3	2.5

Table (2): Distribution of the studied children according to their anthropometric measurements.

Children's characteristics	Before the program		Post 3 months of the program		Wilcoxon signed rank test <i>Z</i>
	N	%	N	%	
Weight in kg					
15 - <20	32	26.7	47	39.1	
20 - <25	63	52.5	56	46.7	<i>Z</i> =4. 271
25 - < 30	22	18.3	14	11.7	<i>P</i> <0.001*
> 30	3	2.5	3	2.5	
Mean ± SD	22.13 ± 3.50		21.55 ± 3.52		
Height in cm					
95 – <100	59	49.2	42	35	<i>Z</i> =3. 441
100 – 110	53	44.2	72	60	<i>P</i> =0. 001*
> 110	8	6.6	6	5	
Mean ± SD	100.63 ± 5.29		101.76 ± 4.78		
BMI					
85– < 95	4	3.3	18	15	<i>Z</i> =5. 399
95– < 97	2	1.7	23	19.2	<i>P</i> <0.001*
> 97	114	95	79	65.8	
Mean ± SD	21.88 ± 2.78		21.06 ± 2.89		

(*). Statistically significant at $P > 0.05$; *Z*=differences between before & post 3 months of the program implementation.

Table (2): Represent distribution of the studied children according to their anthropometric

measurements. It revealed from the table that more than half of the studied children (52.5%) weighted

from 20 - < 25 before the implementation of the educational program and this percent decrease to 46.7% post 3 months of the program implementation.

As regards the child's height, it was found that nearly half of them (49.2%) measured from 95 – <100 before the program implementation while this percent decrease to 35% post 3 months. On the other hand, regarding to the studied children weight, height & BMI it was found that there was a statistically significant difference between before & post 3 months of the program implementation.

Table (3): revealed that 50%, 76.7%, 41.7%, 61.7% and 55.9% of the studied mothers aged between 30- < 40 years, from urban areas, had bachelor degree, employed, and in middle socioeconomic level respectively.

Figure (1): clarified distribution of the studied mothers regarding to their total knowledge. It was observed from the figure that more than half of the studied mothers (55%) had "poor" knowledge before the program and this percent decreased to 3.3% and 2.5% immediately after the program and 3 months later respectively. On the other hand, only 3.2% of them had "good" knowledge before the program compared to 79.2% immediately after the program implementation and 80% post 3 months of the program implementation.

The distribution of the studied mothers regarding to their total habits before & post 3 months of program implementation is illustrated in **figure (2)**. It is revealed from the figure that only 7.5% of the studied mothers had "acceptable" habits before the program

implementation, compared to the majority of them 80% post 3 months of the program implementation. It is clear from this figure that, there were statistically significant differences between before and post 3 months of the program implementation regarding the studied mother's total habits.

Table (4): clarified that, there were no statistically significant relations between the sociodemographic characteristics of the studied mothers and their children, BMI with their total knowledge post 3 months of the program implementation except related to mothers' age.

Table (5): cleared that, there were no statistically significant relations between the sociodemographic characteristics of the studied mothers and their children, BMI with mothers' total habits post 3 months of the program implementation.

Table (6): presented the relationship between the total habits of the studied mothers and their total knowledge before, immediately after & post 3 months of program implementation. It was observed from the table that none of the studied mother had "Good" knowledge scores or "Acceptable" habits before the program implementation (0% for each). While the majority of the studied mothers (88.9%) who had "Good" knowledge scores had "Acceptable" scores immediately after the program implementation and 68.8% of them who had "Good" knowledge scores had "Acceptable" scores post 3 months. There were statistically significant relations between total mothers' knowledge and total habits post 3 months of the program implementation.

Table (3): Distribution of the studied mothers, according to their sociodemographic characteristics

Mothers' Characteristics	Total mothers number=120 (100%)	
	N	%
Mother's age in years:		
- 20- <30	59	49.2
- 30- < 40	60	50
- > 40 y	1	0.8
Residence:		
- Rural	28	23.3
- Urban	92	76.7
Mothers' Education:		
- Secondary school	39	32.5
- Technical Institute	9	7.5
- Bachelor degree	50	41.7
- Postgraduate studies	22	18.3
Mothers' occupation:		
- Employee	74	61.7
- Housewife	46	38.3
Socioeconomic level:		
- Low	13	10.8
- Middle	67	55.9
- High	40	33.3

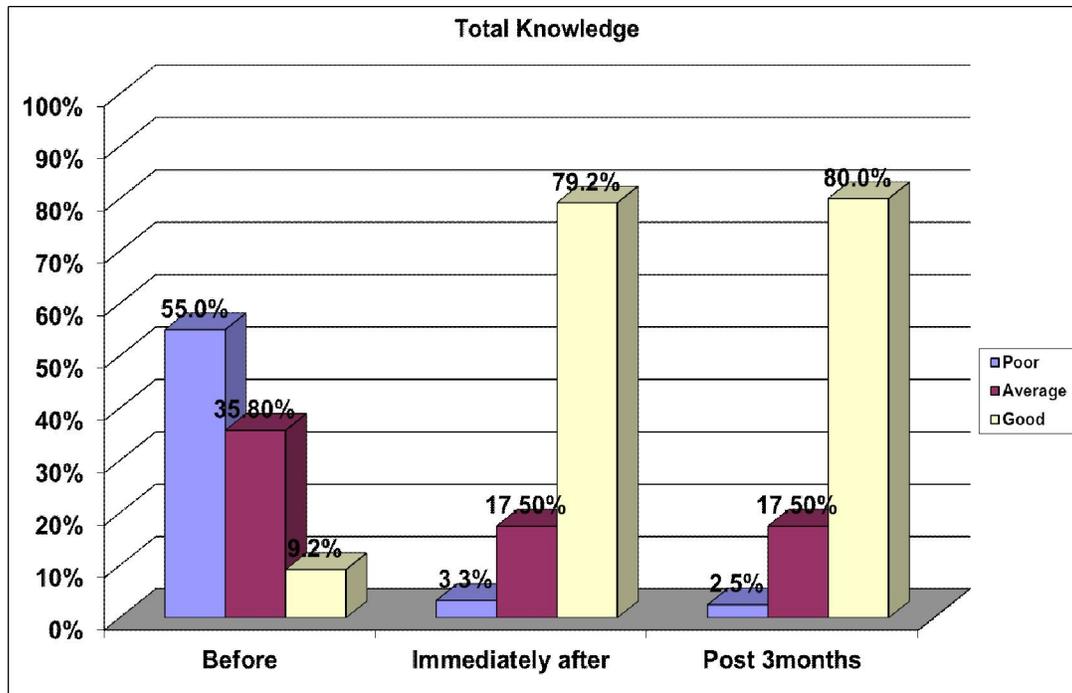


Figure (1): Distribution of the studied mothers regarding to their total knowledge about their children's obesity before, immediately after & post 3 months of program implementation

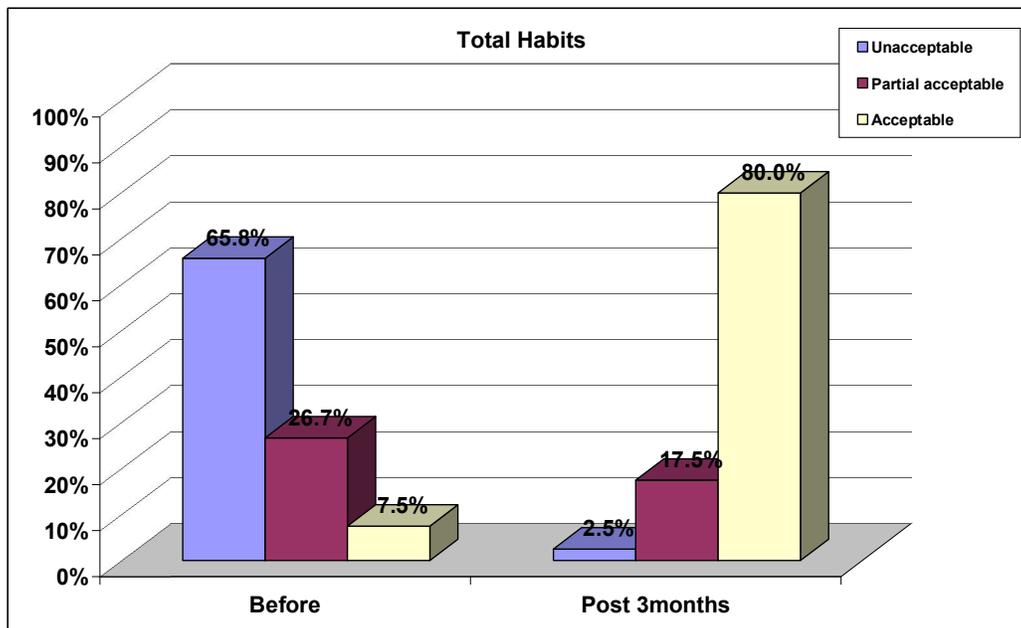


Figure (2): Distribution of the studied mothers regarding to their total nutritional habits about their obese children before & post 3 months of program implementation

Table (4): Relationship between the sociodemographic characteristics of the studied mothers and their children, BMI with mothers' total knowledge before, immediately after & post 3months of the program implementation

Variables	Total Knowledge									Test of significance		
	Before			Immediately after			Post 3 months			χ^2_1 & P	χ^2_2 & P	χ^2_3 & P
	Poor %	Average %	Good %	Poor %	Average %	Good %	Poor %	Average %	Good %			
Residence:												
- Rural	25.8	23.3	9.1	25	19	24.2	28.6	21.9	23.5	1.464	0.263	0.146
- Urban	74.2	76.7	90.9	75	81	75.8	71.4	78.1	76.5	0.481	0.877	0.930
Mothers' Education:												
- Secondary school	10.6	0	0	0	23.8	2.1	14.3	12.5	2.5	18.555 0.017*	20.880 0.007*	15.091 0.057
- Technical Institute	42.5	25.6	18.2	25	47.6	31.6	28.6	43.8	30.9			
- Bachelor degree	34.8	51.2	45.5	50	23.8	45.2	42.8	34.4	44.4			
- Postgraduate studies	12.1	23.2	36.3	25	4.8	21.1	14.3	9.3	22.2			
Mother's age in years:												
- 20-30	57.6	39.5	36.4	50	52.4	48.4	71.4	56.2	44.4	5.387 0.250	29.627 <0.001*	20.078 <0.001*
- 30-40	40.9	60.5	63.6	25	47.6	51.6	14.3	43.8	55.6			
- >40	1.5	0	0	25	0	0	14.3	0	0			
Socioeconomic:												
- Low	10.6	14	0	0	23.8	8.4	28.6	9.4	9.9	17.098 0.002*	6.029 0.197	3.120 0.538
- Middle	69.7	32.5	63.6	50	57.2	55.8	42.8	62.5	54.3			
- High	19.7	53.5	36.4	50	19	35.8	28.6	28.1	35.8			
BMI												
- 85- <95	4.5	2.3	0	0	0	4.2	0	3.1	3.7	2.532 0.639	10.543 0.032*	5.868 0.209
- 95- <	3	0	0	0	9.5	0	0	6.3	0			
- >97	92.5	97.7	100	100	90.5	95.8	100	90.6	96.3			

(*) Statistically significant at $P > 0.05$ χ^2_1 = relations between variables & total knowledge before the program χ^2_2 = relations between variables & total knowledge immediately after χ^2_3 = relations between variables & total knowledge post 3 months**Table (5): Relationship between the sociodemographic characteristics of the studied mothers and their children, BMI associated with total mothers' habits before & post 3 months of the program implementation**

Variables	Total habits						Test of significance	
	Before			Post 3 months			χ^2_1 & P	χ^2_2 & P
	Unacceptable %	Partial acceptable %	Acceptable %	Unacceptable %	Partial acceptable %	Acceptable %		
Residence:								
- Rural	17.7	37.5	22.2	33.3	33.3	20.7	4.987	2.089
- Urban	82.3	62.5	77.8	66.7	66.7	79.3	0.083	0.352
Mother's Education:								
- Secondary school	8.9	0	0	0	19	3.1	17.522 0.025*	12.604 0.126
- Technical Institute	36.6	37.6	0	0	28.6	36.5		
- Bachelor degree	34.2	43.7	100	66.7	42.9	40.6		
- Postgraduate studies	20.3	18.7	0	33.3	9.5	19.8		
Mother's age in years:								
- 20-30	46.8	50	66.7	33.3	33.3	53.1	4.123 0.390	7.193 0.126
- 30-40	53.2	46.9	33.3	66.7	61.9	46.9		
- >40	0	3.1	0	0	4.8	0		
Socioeconomic:								
- Low	11.4	12.5	0	0	19	9.4	2.541 0.637	3.706 0.447
- Middle	53.2	62.5	55.6	33.3	57.2	56.3		
- High	35.4	25	44.4	66.7	23.8	34.3		
BMI								
- 85- <95	1.3	9.4	0	0	4.8	3.1	5.955 0.203	0.750 0.945
- 95- <	2.5	0	0	0	0	2.1		
- >97	96.2	90.6	100	100	95.2	94.8		

(*) Statistically significant at $P > 0.05$ χ^2_1 = relations between variables & total habits before the program χ^2_2 = relations between variables & total habits post 3 months

Table (6): Relationship between the total habits of the studied mothers and their total knowledge before, immediately after& post 3months of program implementation

Knowledge	Habits						χ^2	P
	Unacceptable		Partial acceptable		Acceptable			
	N	%	N	%	N	%		
Before:								
- Poor	43	54.4	20	62.5	3	33.3	6.845	0.144
- Average	26	32.9	11	34.4	6	66.7		
- Good	10	12.7	1	3.1	0	0		
Immediately after:								
- Poor	3	3.8	1	3.1	0	0	1.145	.887
- Average	13	16.5	7	21.9	1	11.1		
- Good	63	79.7	24	75	8	88.9		
Post 3 months:								
- Poor	2	66.7	2	9.6	3	3.1	23.409	<0.001*
- Average	1	33.3	4	19	27	28.1		
- Good	0	0	15	71.4	66	68.8		

(*) Statistically significant at $P>0.05$

4. Discussion

The finding of the present study showed that more than half of the studied children were girls (**table 1**). This finding might be due to those girls spend more time at home compared to boys who are more active, where they had many activities to do outside home. This finding was in agreement with **Koirala et al., (2015)** who conducted the study about the prevalence and factors associated with childhood overweight/obesity of private school children in Nepal and reported that, girls represented a higher proportion of obesity than boys. However, the present study disagrees with **Bouhlal et al., (2015)** who conducted a study about drivers of overweight mothers' food choice behaviors depend on child gender and found that the obesity prevalence among boys is significantly higher than girls.

As regards the birth order, the current study showed that approximately half of the studied children were ranked as the first child (**table, 1**), it might be attributed to lack of mothers' knowledge and their nutritional habits in preparing the food for the first child in addition to the mothers give the optimum level of attention and care including nutrition for the first born child. On the same line, **Abdelgawad, (2013)** finding agreed with the current result and found that, the highest percentages of obesity were found in the first child.

As regards the distribution of the studied children according to their anthropometric measurements, the current study found that there was statistically significant difference between before & post 3 months of the program implementation (**table, 2**). This finding supported by **Ajie & Chapman, (2014)** who found

that, health education programs that directed to parents only were more successful for the child weight loss than programs that directed to children only and these programs that directed to parents only produce significant decreases in child BMI.

Concerning the residence, the result of the current study findings revealed that more than three quarters of the studied mothers were from urban areas (**table, 3**); this might be due to lack of areas for physical activity, different modes of transports and availability of restaurants for fast foods. This finding was similar to the view of **Wijnhoven et al., (2015)** who found that, the prevalence of obesity was increased in urban versus rural areas. On the contrary, **Bridevaux et al., (2007)** found no differences in the prevalence of obesity between urban and rural areas.

As regards the studied mothers' educational level, the finding of the present study, showed that more than two fifths of them had university certificates (**table, 3**); this might be due to the children of those mothers spend more time in non parental child care setting and the highly educated mothers are more likely to have higher income that make the children easily to buy fast and junk foods. Similarly, **Magnusson et al., (2014)** confirmed the result of the current study and found that a higher prevalence of obesity in children is associated with higher educational level of the mothers. On the contrary, **Zafar et al., (2014)** found that higher education levels of mothers may imply greater knowledge of healthier nutritional and physical activity that lower risk of child obesity.

Regarding the studied mothers' occupation, the present study result revealed that, more than two thirds

of them were employed (**table, 3**); it might be attributed to that employed mothers spend less time at home and thus maybe also less time for preparing meals and taking care of their children, which could cause an increase in unhealthy eating behaviors. Furthermore, employed mothers spend more time outside their home, that cause their children may spend more time in the day care centers with other persons. Additionally, without supervision of parents, children may be more likely to stay in their home (watching TV, playing video games) and spend less time on more active activities. This finding was in accordance with **Gwozdz et al., (2013)** who mentioned that increasing in childhood obesity is often associated with mothers' employment. On the contrary, **Mohsen, (2010)** found that housewife mothers recorded the highest percentages of having obese children.

In relation to the studied mothers' socioeconomic level, this study showed that, more than one third of them in high socioeconomic level (**table, 3**). This finding might be attributed to higher income that leads to increase intake of fast and junk foods in addition to different types of inactive activities as video and computer games. This result goes on the same line with **Koirala et al., (2015)** who mentioned that family with a high socioeconomic level were 3.5 times more likely to be obese compared to those from lower socioeconomic level. However, the present study result disagrees with **Walsh&Cullinan, (2012)** who conducted a study about decomposing socioeconomic inequalities in childhood obesity and reported that the incidence of obesity increases as socioeconomic status falls.

In relation to the studied mothers' total knowledge about their children's obesity; it was observed from this study result that more than half of the studied mothers had poor knowledge before program while the majority of them had good knowledge immediately after and post 3 months of the program implementation (**figure, 1**). This result was emphasized by **Wen & Hui, (2011)** who reported that increased concern toward the child's weight was highly related with the parental knowledge. However, it is very important to provide parental education that focused on the restriction of the meal and its outcomes.

Moreover, **Jang et al., (2015)** mentioned that knowledge of the parents about nutrition are strongly associated with weight status and health behaviors of children and program for obesity intervention that targeting parents was more effective than the program that targeting children in managing obesity in childhood.

Additionally, **Jang et al., (2015)** proven that the nutritional knowledge of the mothers was associated

with intake of food and drink items by the child that increase risk of obesity and this relation was mediated by food availability at home. Nutritional knowledge of the mothers was significantly and directly associated with consumption of fruits, vegetables, and cake by the child, and inversely associated with salty snacks and soft drink consumption. On the contrary, **Vereecken& Maes, (2010)** reported a null association between mothers' nutrition knowledge and child diet.

Regarding to the studied mothers' total habits, the finding of this study showed that the percentages of the studied mothers that had acceptable habits, increased for the majority of them post 3 months of the program implementation (**figure, 2**). **Davison et al., (2013)** agreement with the result of the current study and reported that child feeding habits' of mothers required to understand how to promote responsive feeding habits that encourage their children to consume balanced diets and promote self regulation of their children about eating behavior and help to prevent obesity.

In addition **Kaar et al., (2016)** confirmed these results and found that, there was an association between maternal feeding beliefs and their children feeding habits as modeling of healthy parents of eating has been shown to correlate with lower rates of heavy eating of the children. Furthermore, the influence of parents on a child's diet via the foods they make accessible in the environment and the practices they use to offer foods to their children may also lead to their children obesity.

Regarding the relationship between the studied children, BMI with mothers' total knowledge before, immediately after& post 3 months of the program implementation, the result of the current study showed that, there was statistically significant relation between the studied mothers' total knowledge and their children, BMI immediately after the implementation of the program. This might be due to the fact that implementation of educational programs can build up and raise the studied sample level of knowledge (**table, 4**).

The current study also revealed that, there was no statistically significant relation between the studied mothers' total habits and their children, BMI before & post 3 months of the program implementation. This might be due to the unhealthy nutritional habits of mothers need a long period to change to healthy habits (**table, 5**). On the contrary, **Chaput et al., (2014)** found relations between child feeding practices' of mothers, the food intake of children and weight status.

On the same way, the study result found that, there were statistically significant relations between mothers' total knowledge and their total habits post 3 months of the program implementation (**table, 6**). **Karen et al., (2013)** supported the result of the current

study and reported that, maternal nutritional knowledge was significantly and directly associated with availability of fruit, vegetables, cakes, salty snacks, soft drink juice at home, where mothers habitually introduced to their children.

Conclusion

The results of the present study it can be concluded that:

There was a positive effect of the educational program in improving mothers' Knowledge as well as their nutritional habits & performance regarding their children obesity.

Recommendations:

In the light of the findings of the current study, the following recommendations are suggested:

- Regular and continuous health educational programs are essential for improving the mothers' knowledge and habits regarding preschool obesity.
- Surveys on a wide scale are needed to be conducted to assess the dietary habits of families from different cultures.
- Health promoting behaviors should be directed to children, such as physical activity for obesity prevention.
- Health education programs should be directed to mothers to encourage breastfeeding.
- It is necessary to adopt a multilevel approach in treating this problem starting with prevention and presenting the important role of behavioral therapy which is neglected in our country.

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