

Body Mass Index, Health Related Behaviors and Obesity among Female Adolescent Students

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Abstract

Obesity is a worldwide public health problem affecting all levels and age groups within the society. Health-related behaviors can negatively affect adolescents' health which contributes to the main causes of morbidity and mortality in this age group. Early identification of health risk behaviors during adolescents are considered to be an important element in the prevention of obesity. **Aim:** to identify the relationship between body mass index (BMI), health related behaviors and obesity among female adolescent students. **Design:** a descriptive design was used . **Setting:** The study was conducted at Technical Institute of Nursing, Ain Shams University. **Sample:** Simple random sample of 100 female adolescent students from the previously mentioned setting **Tools of data collection:** included a structured interview questionnaire to assess student's body mass index and health behaviors related to obesity **Results:** The results showed that less than half of students were normal weight (47%) compared to 39% for overweight and obese and 14% for underweight. The most common health problems as reported by the students were snoring during sleep 14%, anemia 13%, back & knee pain 11%, headache and high blood pressure 10%, diabetes and bronchial asthma 6%. Adolescents had some unhealthy behaviors regarding eating pattern, technology usage, exercise programs. There is a significant correlation between students' body mass index and their eating pattern. As regards students' body mass index and their technology usage, television watching was significantly associated with overweight and obese students than normal weight and underweight students. It was clear that the majority of participants reporting that they use internet more than 3 hours per day and they eat while using the internet. Only 19% of overweight and 16.7% of obese students have exercise program in compared to 57.1% of underweight and 72.3% of normal weight students instead of the majority of the sample did not have any barriers to regular exercise. **Conclusion.** The study concluded that, there was a strong relationship between body mass index, health related behaviors and obesity among female adolescent students. A high prevalence of them had unhealthy behaviors related to dietary pattern, usage of technology, exercise programs. **Recommendations:** The study recommended that there is a need for application of educational programs regarding healthy behaviors to reduce the tendency of overweight and obesity among adolescent students.

Key words: Body mass index (BMI), health-related behaviors, obesity and adolescent students.

Introduction

Obesity is a major public health problem worldwide and considered as a

serious epidemic health issues affecting all age groups Obesity represents a rapidly growing threat to the health of adolescents in

an increasing number of countries. The prevalence of obesity is increasing worldwide at an alarming rate in both developing and developed countries (Hadhood, Ali, Montaser, and Mohammed, 2017). Overweight and obesity are the fifth leading risk for global deaths. At least 2.8 million adults die each year as a result of being overweight or obese. The prevalence of overweight and obese individuals in the World Health Organization (WHO) Region of the Americas was 62% overweight in both sexes and 26% of obese (WHO, 2013). Egypt is the 14th fattest country in the world, the prevalence of obesity has been escalating to levels that are threatening the public health of the entire Egyptian population, especially the female population (WHO, 2010). WHO, 2014 documented that the overall prevalence of obesity in Egypt ranged from 74% to 86% in female and 69% to 77% in males. It is predicted that by 2030, a majority of the adult population of the world would be either obese or overweight. Concern over adolescent obesity has mount due to its rapid increase in prevalence, its persistence into adulthood, and its associated morbidity and mortality (Jackson, Henderson and Frank, 2012).

Adolescence is a critical period of development during which a variety of health risk behaviors may commence that can negatively affect health status and both social and academic functioning. In many cases, these behaviors will persist into adulthood (Fox, McManus, and Arnold, 2010). Obesity is a worldwide health problem which places adolescents at increased risk of significant health problems. It is associated with coronary heart disease, hypertension and stroke, certain types of cancer, diabetes mellitus, gallbladder disease, dyslipidemia, osteoarthritis and gout, and pulmonary diseases, including sleep apnoea, are becoming increasingly significant causes of disability and premature death in both developing and newly developed countries (El-Gilany & El-Masry, 2011). It is well recognized that 70%–80% of obese

adolescents will remain obese adults that placing additional burdens on already overtaxed individuals and national health budgets (Garawi, Ploubidis, Devries, Al-Hamdan and Uauy, 2015).

Factors that contribute to the occurrence of obesity include genetic, metabolic, behavioral, cultural and environmental which are interrelated influences (Hokenberry & Wilson, 2013). Mahmood and Arulkumaran, 2013 show associations between environmental influences, genetics, age, sleep and medication, comorbidities and social relationships, as well as health behaviors such as eating pattern, physical activity levels and screen time. In addition to individual traits and behaviors, the recent rise in obesity on a national level can be attributed to the societal changes in eating behaviors, food and beverage availability, and less-active lifestyles, which has shifted the balance of energy intake and expenditure (Fitch A, Fox, Bauerly, Gross and Heim, 2013).

Body mass index (BMI) is considered as an essential indicator in clarifying the association between overweight/obesity and health-risk behaviors among youth (Melton, Bigham, Bland, Bird, and Fairman, 2014). BMI is measured by dividing the body weight in kilograms to height in meters squared (kg/m^2). BMI is a heuristic measure of body weight based on person's weight and height. It is used to estimate a healthy body weight based a person's height, assuming an average body compositions due to its ease of measurement and calculation, it is the most widely used diagnostic tool to identify weight problems within population, usually whether individuals are underweight, overweight, normal or obese (International council of Nurses, 2009).

Adolescence a time of opportunity that many physical, cognitive, emotional, and social developmental changes occur during this period and experimentation with health compromising behaviors is common, as youth's independence from parents, peer modeling and access to potentially risky behaviors increase. (Farhat, Iannotti, and Morton, 2010). A health-related behavior is defined as any behavior that may affect an individual's physical health (Sutton, Baum, and Johnston, 2004). Health-related behaviors include alcohol use, drug use, smoking, physical exercise, nutrition, sexual behavior, screen time (watching television, online gaming and internet use) and peer bullying. Many of such behaviors originate during adolescence and frequently lead to impaired adult health. These behaviors are modifiable causes of morbidity and mortality in this age group. Therefore, the need for increased focus on healthy behaviors become more important (Hassen & Kibret, 2016).

Nurses play a crucial role in the application of effective strategies for prevention of adolescents' obesity to improve the health of population. Prevention is the key to success for obesity control through early identification of health risk behaviors, weight maintenance, measuring body mass index, more rewarding and providing better chances for reducing long-term complications (Pelletier, 2015). They have an ideal opportunity to work collaboratory with staff primary health care provider, family, universities, communities and government to reduce the tendency of overweight, obesity among adolescents and to promote healthy eating behaviors in our youth (Larson, Davey, Caitlin, Kubik, and Nanney, 2017). Pediatric nurses have the unique position in healthcare promotion which is an important component of population-based strategies to prevent obesity through educating adolescents on ways enhancing fitness, improving nutrition and managing stress; moreover, providing a trusting relationship, reinforcing good health behaviors and acting

as an advocate for community changes that promote a healthier environment (Hadhood, Ali, Montaser, and Mohammed, 2017).

Significance of the study:

The alarming rise in overweight and obesity among adolescents due to a significant health problem. Overweight and obesity continue to be health concerns facing today's adolescent population. There are many risk factors associated with obesity, that threaten the public's health. In Egypt few studies investigated the relationship between BMI, health related behaviors and obesity. Therefore, in the present study, the researchers tried to explore the relationship between BMI, health related behaviors and obesity and to promote nursing care toward students. It will also contribute to the better understanding of the relationship between BMI, health related behaviors and obesity.

Aim of the study:

This study aimed to identify the relationship between body mass index (BMI), health related behaviors and obesity among female adolescent students.

Subjects and Methods

Research Question:

What is the relationship between body mass index (BMI), health related behaviors and obesity?

Type of the study: It is a cross sectional study.

Design: A descriptive design was used in the conduction of this study.

Setting: The study was conducted at Technical Institute of Nursing at Ain Shams University.

Sampling:

100 female students from the previously mentioned setting were chosen by simple random sample. All students aged between 18 to 20 years old were included. The students who refused to participate in the study and were excluded.

Tools for Data Collection

It Included Two Tools

Tool I: A Structured Arabic Questionnaire Sheet: This was constructed by the researchers after reviewing the related literature. It assessed the necessary data which covered the aim of the study. The questionnaire was divided into 2 parts to identify the health related behaviors and body mass index (BMI) among students related to obesity and consisted of open & closed ended questions.

Part I:

Socio –demographic characteristics of the students such as: age, marital status, education and family history of obesity.

Part II:

Student's health behaviors related to obesity, which covers the following areas: Obesity related complaints, eating pattern, technology usage and exercise programs.

Tool II: Anthropometric measurements

Height was measured to the nearest 0.1 cm using portable height scales with shoes removed. Weight was measured to the nearest 0.1 Kg using portable bathroom scales with student shoes and heavy clothing removed. Body Mass Index (BMI) was calculated by using the weight in kilograms divided by the square of the height in meters (kg/m^2). A value of $\text{BMI} < 18.5 \text{ kg}/\text{m}^2$ was considered as underweight, $18.5\text{--}24.9 \text{ kg}/\text{m}^2$

was considered as normal weight, $25.0\text{--}29.9 \text{ kg}/\text{m}^2$ was considered as pre-obese (overweight), and $\text{BMI} \geq 30$ was considered as obese. (World Health Organization, 1995.

Ethical Considerations:

The research approval was obtained from Scientific Research Ethical committee in Faculty of Nursing, Ain Shams University before starting the study. Informed consent was obtained from the students after explanation of the objective and aim of the study. The researchers assured maintaining anonymity and confidentiality of the subject's data. The students were informed that they were allowed to choose to participate or not in the study and they have the right to withdraw from the study at any time.

Pilot Study:

Tools were reviewed for appropriateness of items through an expert panel to assure content validity and then a pilot study was conducted for 10 participants (10 % of the total sample) to evaluate the applicability and reliability of the constructed tools and the obtained results of the pilot study were used as a guide for the necessary modifications needed in the study title, setting, subjects, resources or data collecting tools. No modification was done to the tools.

Procedure:

The process of data collection was carried out from April to June 2016. The researchers visited data collection site (Technical Institute of Nursing at Ain Shams University) from 9.00 am to 1.00 pm for three days per week. The researchers invited students to participate in the study and informed consent was obtained from the students prior to data collection. The data were collected by filling questionnaire to identify health behaviors related to obesity and socio demographic characteristics of the

students, the questionnaire forms were filled by students, time allowed for filling this questionnaire was an 50 minutes, and additional information obtained with interview. Height and weight were measured and body mass index was calculated.

Statistical analysis:

The collected data were organized, tabulated and statistically analyzed using SPSS version 19 (Statistical Package for Social Studies) created by IBM, Illinois, Chicago, USA. For categorical variables, the number and percentage were calculated and differences between subcategories were tested by Monte Carlo exact test. The level of significance was adopted at $p < 0.05$.

Table (1): Characteristic of Study Participants

Variables	Number (n=100)	%
Age in years:		
19	25	25.0
20	75	75.0
Body mass index(BMI):		
Underweight	14	14.0
Normal	47	47.0
Overweight	21	21.0
Obese	18	18.0
Marital status:		
Single	76	76.0
Married	24	24.0
Having children		
None	87	87.0
Yes	13	13.0
Family history of obesity		
None	38	38.0
Yes	62	62.0

Table (1) illustrates that 75% of studied subjects aged were 20 years and less than half of them were normal weight (47%) compared to 39% of overweight and obese and 14% for underweight. In addition, the majority of them were single (76%), haven't children (87%) and have a family history of obesity (62%).

Table (2): Distribution of the Studied Subjects' Complaints

Complaints	Number (n=100)	%
Anemia	13	13.0
Diabetes mellitus	6	6.0
High blood pressure	10	10.0
Bronchial asthma	6	6.0
Snoring during sleep	14	14.0
High cholesterol	4	4.0
Back & Knee pain	11	11.0
Headache	10	10.0

Table (2) reveals the distribution of the studied subjects' complaints. This table shows that less than one quarter of them complains from snoring during sleep (14%), anemia (13%), back & knee pain (11%), headache and high blood pressure (10%), diabetes and bronchial asthma (6%).

Table (3): Distribution of the Studied Subjects' Health Behaviors

Health Variables	Number (n=100)	%
Eating behaviors		
Eating during stress:		
Increased eating	41	41.0
Decreased eating	59	59.0
Eating snacks before bed time	41	41.0
Frequency of eating fast foods:		
>once daily	17	17.0
Once daily	5	5.0
3-4 times per week	33	33.0
Once per week	19	19.0
<once per week	26	26.0
Number of meals per day:		
3 meals + 2 snacks	47	47.0
Less than two meals	17	17.0
More than 5 meals	36	36.0
Eating Pattern		
Meat:		
>once daily	6	6.0
Once daily	45	45.0
3-4 times per week	13	13.0
Once per week	17	17.0
< once per week	19	19.0
Fresh fruits:		
Once daily	20	20.0
3-4 times per week	24	24.0
Once per week	16	16.0
< once per week	40	40.0
Fresh vegetables:		
Once daily	3	3.0
3-4 times per week	13	13.0
Once per week	45	45.0
< once per week	39	39.0

Cont. Table (3): Distribution of the Studied Subjects' Health Behaviors

Health Variables	Number (n=100)	%
Intake of fluids		
Frequency of juices and drinks:		
>once daily	28	28.0
Once daily	26	26.0
3-4 times per week	10	10.0
Once per week	22	22.0
<once per week	14	14.0
Juices are mostly fresh	2	2.0
Fizzy drinks	77	77.0
Frequency of intake of milk products		
>once daily	36	36.0
Once daily	3	3.0
3-4 times per week	18	18.0
Once per week	13	13.0
< once per week	30	30.0
Technology Usage		
Hours watching TV/day:		
<1	30	30.0
1	9	9.0
2	4	4.0
3	24	24.0
>3	33	33.0
Hours using internet/day:		
None	2	2.0
<1	3	3.0
1-3	12	12.0
>3	83	83.0
Eating while using the internet	91	91.0
Exercise programs	49	49.0
Have any exercise program		
Barriers to regular exercise:		
None	62	62.0
Physical	3	3.0
Others	35	35.0

Table (3) shows the distribution of studies subjects' health behaviors; it was clear from this table that there is a particularly high prevalence of certain health related behaviors among participants; however, more than one third of participants eat snacks before the bedtime (41%), eating fast food 3 to 4 times per week (33%). As regarding eating pattern, more than one third of participants eat fresh fruits and vegetables (40%, 39% respectively) less than once per week. Also, regarding intake of fluids, this table shows that only 2% of studied subjects drink juices that are mostly fresh and 77% of them consume fizzy drinks. Concerning technology usage, it was found that the majority of participants use the internet more than 3 hours per day (83%) and eat while using the internet (91%). It was observed that 49% of participants have an exercise program; instead of 62% of them have no barriers to regular exercise.

Table (4): Distribution of Studied Participants by Body Mass Index and their Complaints

Complaints	Underweight (n=14)		Normal (n=47)		Overweight (n=21)		Obese (n=18)		p
	N	%	N	%	n	%	n	%	
Anemia	2	14.3	2	4.3	2	9.5	7	38.9	0.020*
Diabetes mellitus	0	0.0	0	0.0	1	4.8	5	27.8	0.001*
High blood pressure	1	7.1	2	4.3	3	14.3	4	22.2	153.0
Bronchial asthma	0	0.0	1	5.6	3	14.3	2	11.1	137.0
Snoring during sleep	2	14.3	2	4.3	2	9.5	8	44.4	0.001*
High cholesterol	0	0.0	1	5.6	1	4.8	2	11.1	332.0
Back & Knee pain	1	7.1	1	5.6	4	19.0	5	27.8	014*0
Headache	1	7.1	2	4.3	3	14.3	4	22.2	153.0

*Significant

Table (4) reveals the distribution of studied participants by body mass index and their complaints, these results show that more than one third of obese participants complaining from snoring during sleep (44.4%) and anemia (38.9%) compared to 4.3% of normal weight and 14.3% for under weight. The results also reveal that 27.8% of obese participants complain from diabetes mellitus compared to 0.0% of both normal weight and underweight. There was a statistically significant difference.

Table (5): Distribution of Studied Participants by body Mass Index and their Eating Behaviors

Behaviors	Underweight (n=14)		Normal (n=47)		Overweight (n=21)		Obese (n=18)		p
	n	%	n	%	n	%	n	%	
Eating during stress:									0.001*
Increased eating	4	28.6	6	12.8	16	76.0	15	83.3	
Decreased eating	10	71.4	41	87.3	5	23.8	3	16.7	
Eating snacks before bed time	2	14.3	5	10.6	6	28.6	5	27.8	0.160
Frequency of eating fast foods:									0.050
>once daily	3	21.4	8	17.0	5	23.8	1	5.6	
Once daily	0	0.0	1	2.1	0	0.0	4	22.2	
3-4 times per week	4	28.6	13	27.7	10	47.6	6	33.3	
Once per week	3	21.4	11	23.4	1	4.8	4	22.2	
< once per week	4	28.6	14	29.8	5	23.8	3	16.7	
Number of meals per day:									0.450
3 meals + 2 snacks	9	64.3	33	70.2	1	4.8	4	22.2	
Less than two meals	4	28.6	6	12.8	5	23.8	2	11.1	
More than 5 meals	1	7.1	8	17.0	15	71.4	12	66.7	

*Significant

Table (5) shows the distribution of studied participants by body mass index and their eating behaviors, this table reveals that the majority of obese (83.3%), and overweight (76%) participants increase eating during stress time. The results show that there was a statistically significant difference among the groups p-value=0.001. Regarding the frequency of eating fast foods more than

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one third of obese (33.3%) and overweight (47.6%) participants eating fast foods 3 to 4 times per week. On the other hand 66.7% of obese and 71.4% of overweight eat more than 5 meals per day and significant differences were not found

Table (6): Distribution of Studied Participants by Body Mass Index and their Eating Pattern

Variables	Underweigh t(n=14)		Normal (n=47)		Overweig ht (n=21)		Obese (n=18)		p
	n	%	N	%	n	%	n	%	
Meat and alternatives (animal protein):									0.001*
>once daily	0	0.0	5	10.6	0	0.0	1	5.6	
Once daily	5	35.7	17	36.2	11	52.4	12	66.7	
3-4 times per week	2	14.3	10	21.3	1	4.8	0	0.0	
Once per week	4	28.6	5	10.6	6	28.6	2	11.1	
< once per week	3	21.4	10	21.3	3	14.3	3	16.7	
Fresh fruits:									0.001*
Once daily	2	14.3	11	23.4	0	0.0	7	38.9	
3-4 times per week	5	35.7	17	36.2	2	9.5	0	0.0	
Once per week	2	14.3	4	8.5	8	38.1	2	11.1	
<once per week	5	35.7	15	31.9	11	52.4	9	50.0	
Fresh vegetables:									0.001*
Once daily	0	0.0	1	2.1	0	0.0	2	11.1	
3-4 times per week	3	21.4	4	8.5	2	9.5	4	22.2	
Once per week	7	50.0	26	55.3	9	42.9	3	16.7	
<once per week	4	28.6	16	34.0	10	47.6	9	50.0	

*Significant

As clear from table 6; thatmore than half of obese (66.7%) and overweight (52.4%) participants eat meat and alternatives (animal protein) once daily. The results also reveal that 50% of obese participants eat fresh fruits and vegetables less than once per week. The results show that there was statistically significant difference among the groups p-value=0.001.

Table (7): Distribution of Studied Participants by Body Mass Index and their Intake of Fluids

Variables	Underweight(n=14)		Normal (n=47)		Overweight (n=21)		Obese (n=18)		p
	N	%	N	%	n	%	n	%	
Frequency of juices and drinks:									0.030*
>once daily	4	28.6	19	40.4	3	14.3	2	11.1	
Once daily	2	14.3	6	12.8	11	52.4	7	38.9	
3-4 times per week	2	14.3	3	6.4	2	9.5	3	16.7	
Once per week	4	28.6	12	25.5	2	9.5	4	22.2	
< once per week	2	14.3	7	14.9	3	14.3	2	11.1	
Juices are mostly fresh	0	0.0	1	2.1	1	4.8	0	0.0	0.688
Fizzy drinks	11	78.6	33	70.2	17	81.0	16	88.9	0.440
Frequency of intake of milk products									0.100
>once daily	6	42.9	19	40.4	8	38.1	3	16.7	
Once daily	1	7.1	1	2.1	1	4.8	0	0.0	
3-4 times per week	2	14.3	10	21.3	1	4.8	5	27.8	
Once per week	3	21.4	5	10.6	5	23.8	0	0.0	
< once per week	2	14.3	12	25.5	6	28.6	10	55.6	

*Significant

Table (7) shows the distribution of studied participants by body mass index and their intake of fluids, this table illustrates that, more than one third of obese participants(38.9%) significantly drink juices once daily, but none of them drink fresh juices (0.0%), while the majority of them (88.9%) of them consumed fizzy drinks. More than half of obese participants consumed milk products less than once per week (55.6%) compared to 40.4% for normal weight and 42.9% for underweight participants who consumed milk products more than once per week and significant differences were not found.

Table (8):Distribution of Studied Participants by Body Mass Index and their Technology Usage

Variables	Underweight(n =14)		Normal (n=47)		Overweight (n=21)		Obese (n=18)		p
	n	%	n	%	n	%	n	%	
Hours watching TV/day:									0.001*
<1	3	21.4	17	36.2	4	19	6	33.3	
1	2	14.3	6	12.8	1	4.8	0	0.0	
2	0	0.0	0	0.0	0	0.0	4	22.2	
3	4	28.6	17	36.2	2	9.5	1	5.6	
>3	5	35.7	7	14.9	14	66.7	7	38.9	
Hours using internet/day:									0.260
None	0	0.0	1	2.1	1	4.8	0	0.0	
<1	1	7.1	0	0.0	2	9.5	0	0.0	
1-3	0	0.0	8	17.0	1	4.8	3	16.7	
>3	13	92.9	38	80.9	17	81.0	15	83.3	
Eating while using the internet	11	78.6	45	95.7	20	95.2	15	83.3	0.110

*Significant

Table (8) indicates the distribution of studied participants by body mass index and their technology usage, this table illustrates that (38.9%) of obese, (66.7%) of overweight, they are watching TV more than 3hours /day, whereas 36.2% of normal weight and 21.4% of underweight participants respectively reported that they watching TV less than 1 hour per day. The results show that there was significant different among the groups p-value=0.001. While the majority of participants (83.3%) of obese, (81 %) of overweight and (92.9%) of underweight reported that they using the internet more than 3 hours /day. The results show that there was no significant differences among them.

Table (9): Distribution of Studied Participants by Body Mass Index and their Exercise Programs

Variables	Underweight(n =14)		Normal (n=47)		Overweight (n=21)		Obese (n=18)		p
	n	%	n	%	N	%	n	%	
Have any exercise program	8	57.1	34	72.3	4	19.0	3	16.7	0.001*
Barriers to regular exercise:									0.150
None	8	57.1	34	72.3	11	52.4	9	50.0	
Physical	0	0.0	1	2.1	0	0.0	2	11.1	
Others	6	42.9	12	25.5	10	47.6	7	38.9	

*Significant

Table (9) reveals that less than one quarter of obese (16.7%) and overweight (19%) participants have significantly reported that they have an exercise program instead of there is no barriers to practice regular exercise for about half of obese and overweight (50.0% and 52.4%) participants respectively compared to (72.3%) of normal weight, (57.1%) of underweight who reported that they have an exercise programs.

Discussion

Obesity is a global epidemic health problem which increases worldwide, reaching epidemic proportions, which considered as a leading preventable cause of death worldwide. Adolescence is a critical period of development during which a range of health risk behaviors may begin that can negatively affect health status and both social and academic functioning. (Pandita, Sharma, Pandita, Pawar, and Tariq, 2016). In many cases these behaviors will continue into adulthood. The adverse health consequences of these behaviors have been recognized as most serious public health issues. Obesity is increasing in Egypt at an alarming rate due to that most eating habits are less healthful and the level of physical activity is very low. (Talat, & El Shaha, 2016). Therefore, this study aimed to identify the relationship between body mass index (BMI), health related behaviors and obesity among female adolescent students at Technical Institute of Nursing, Ain Shams University.

Our study showed that the adolescents in this study, irrespective of body mass index category, they had some unhealthy behaviors, including drink packed juice, high consumers of fizzy drinks, low daily milk consumption, watching television (TV) and using the internet more than 3 hours per day, eating while using the internet and have not any exercise program. This finding is supported by Eaton, Kann, Kinchen, Shanklin, and Flint, 2012 who reported that an unhealthy diet is one of the major risk factors for a range of chronic diseases, including cardiovascular diseases, cancer, diabetes and other conditions linked to obesity. Tork & Al-Jalout, 2016 stated that risk behavior categories among youth and young adults

include; drugs and alcohol abuse, unhealthy dietary behaviors, risky sexual behaviors, unhealthy weight control, inadequate physical activity and suicidal attempt, such behaviors which contribute to the leading causes of morbidity and mortality among youth and adults are often established during childhood, adolescence, and extend into adulthood.

The present study revealed that more than one third of studied students were overweight and obese. This finding is in agreement with Peltzer, Pengpid, Samuels, Özcan, and Mantilla, 2014 who found in their study about prevalence of overweight/obesity and its associated factors among university students from 22 Countries that overweight and obesity among female Egyptian students were 25.3% and 8.5% respectively and the study subjects had a family history of maternal obesity. From the researchers' point of view, lack of physical activity and rapidly increasing tendency of consuming fast food are responsible for high incidence of overweight and obesity among young generation.

As regards students' body mass index and their complains, findings of this study revealed that, more than one third of the students who are overweight and obese are complaining from anemia and high blood pressure, diabetes mellitus, snoring during sleep, back and knee pain. This finding is consistent with the result of the study conducted by Nazif, El Shaheed, Karima, El-Shamy, and Mohsen, 2015 who found in their study about iron status among obese Egyptian adolescents that obese adolescents had a higher frequency of iron-deficiency anemia and hypertension compared with nonobese adolescents. WHO, 2013 reported that 44% of the diabetes burden and 23% of the ischaemic heart disease burden are

attributable to overweight and obesity. Deere, Clinch, Holliday, McBeth, and Crawley, 2012 found that obesity is associated with reporting of musculoskeletal pain, about 16.3% who reported lower back pain were obese.

Concerning the students' body mass index and their eating behaviors, the present study showed a significant relationship between increased eating during stress and obesity. This result is in congruence with Mcparitland, 2013 who found in his study about stress, lifestyle, and diet in college students: analysis of the yeath study that, increased levels of perceived stress were associated with greater BMI, waist circumference, dietary fat intake and weight-related eating behaviors. Students' eating snacks before bedtime, eating fast foods 3-4 times per week and eating more than 5 meals per day were associated with overweight and obesity. This could be due to the fact that students eating away from home depend mainly on fast food high in calories and fats and low in vegetables and fruits which leads to the risk of dietary behaviors. This finding is in agreement with Neumark-Sztainer, Story, Hannan, and Croll, 2002 who reported that food choices made by adolescents while snacking tend to be high in sugar, sodium, and fat, while relatively low in vitamins and minerals, which increase the risk of developing obesity, heart disease, osteoporosis, dental cavities and various types of cancer.

According to the present study findings, there is a significant correlation between students' body mass index and their eating pattern. While this finding reflects that the overweight and obese students consume significantly more serving of meat than that in non-obese students, however, both groups are consumed less fruits and vegetables. This is in agreement with Peltzer, Pengpid, Samuels, Özcan, and Mantilla, 2014 who found in their study that obese and overweight students more frequently

consumed meat and alternatives with low consumption of fruits and vegetables which was considerably less among students in the obese group. Also, this finding is similar to Teshome, Singh, and Mogesin, 2013 who found in their study about prevalence and associated factors of overweight and obesity among high school adolescents in urban communities of Hawassa, Southern Ethiopia that, the predominance of students had unhealthy behaviors related to dietary habits.

The results of this study indicated that obese and overweight students had more frequently drink of juices that were mostly canned and fizzy drinks were the preferred beverage and less frequently consumed milk and dairy product among the students in the obese group. This finding is in congruence with the results of the study conducted by Hadhood, Ali, Montaser, and Mohammed, 2017 who found in their study about prevalence and correlates of overweight and obesity among school children in Sohag, Egypt that obese and overweight students more frequently consumed soft drinks with less consumed milk and dairy products than those in the lean group. Christakis, Ebel, Rivara, and Zimmerman, 2004 reported that excessive drinking of sweetened beverages leads to excessive intake of simple carbohydrates and thus also of calories and supports the accumulation of adipose tissue. Spence, Cifelli, and Miller, 2011 indicate a beneficial relationship between the consumption of milk and/or calcium and body weight and body composition in children and adolescents.

As regards students' body mass index and their technology usage, the findings of this study revealed that, TV watching was significantly associated with overweight and obese students than normal weight and underweight students. This finding is consistent with Melton, Bigham, Bland, Bird, and Fairman, 2014 who found in their study about Health-Related Behaviors and

Technology Usage among College students that greater TV exposure time was found to be significantly associated with the obese participants. Regarding students' using internet and eating while using the internet, it was clear that the majority of participant reported that they use the internet more than 3 hours per day and they eat while using the internet. This is supported by Bélanger, Akre, Berchtold, and Michaud, 2011 who found in their study about a U-shaped association between intensity of internet use and adolescent health that, adolescents, who were classified as heavy internet users (>2 hours a day), were also at a higher risk for becoming overweight and obese. They also recommended that it is important for health professionals to understand its implications with continuous advance of technology usage on health behaviors.

The present study revealed that only 19% of overweight and 16.7% of obese students have exercise program compared to 57.1% underweight and 72.3% of normal weight and students instead of the majority of the sample did not have any barriers to regular exercise. This is congruent with Aboul Ella, Shehab, and Ismail, 2011 who found in their study about prevalence of overweight and obesity, and status of chronic non-communicable diseases and some related risk factors among Egyptian adolescents that the prevalence of physical inactivity in the Egyptian adolescents has been escalating to levels that are threatening the public health of the entire Egyptian population, especially the female population. The same authors reported that about half of our sample did not participate in physical activity on any day and they engaged in sedentary behaviors. Also, they recommended that the health professionals have a major role to promote participation in physical activity among adolescents through innovative activity programs.

Conclusion

Based on the results of the present study, it can be concluded that, there was a strong relationship between BMI category and health related behaviors among adolescent female students. While a high prevalence of them had less healthy behaviors related to dietary pattern, usage of technology, exercise programs.

Recommendations

From the current study results it is recommended that:

1. Providing early identification and appropriate referral for the students who have complained from the consequence health risk behaviors in the in high schools and universities.
2. Developing educational programs regarding healthy behaviors related to dietary pattern, usage of technology, exercise and daily activities to reduce the tendency of overweight and obesity among adolescent students.
3. Providing a behavior modification program to modify health behaviors students that will be effective in the treatment of obesity in Egypt.

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References

- AboulElla NA , Shehab DI, and Ismail MA. (2011): Prevalence of overweight and obesity, and status of chronic non-communicable diseases and some related risk factors among Egyptian adolescents

- Journal of Diabetes and Endocrinology. 2(4): 41-52.
- Bélangier RE, Akre C, Berchtold A, and Michaud PA. (2011): A U-Shaped Association Between Intensity of Internet Use and Adolescent Health. *Pediatrics*.127(2):e330-e335.
- Christakis DA, Ebel BE, Rivara FP, and Zimmerman FJ. (2004): Television, video, and computer game usage in children under 11 years of age. *J Pediatr*.145(5):652-6.
- Deere KC, Clinch J, Holliday K, McBeth J, Crawley EM, and Sayers A. (2012): Obesity is a risk factor for musculoskeletal pain in adolescents: findings from a population-based cohort. *Pain*,153(9):1932-8.
- Eaton DK, Kann L, Kinchen S, Shanklin S, and Flint K H.(2012): Youth risk behavior surveillance-United States 2011.61(SS04);1-162.
- El-Gilany AH, & El-Masry R. (2011): Overweight and Obesity among Adolescent School Students in Mansoura, Egypt childhood Obesity.7(3):215-222.
- Farhat T, Iannotti RJ, and Morton BS.(2010): Overweight, Obesity, Youth, and Health-Risk Behaviors. *Am J Prev Med*. 38(3): 258–267.
- Fitch A, Fox C, Bauerly K, Gross A, and Heim C. (2013): Institute for Clinical Systems Improvement. Prevention and Management of Obesity for Children and Adolescents.
- Fox HB, McManus MA, and Arnold KN. (2010): Significant Multiple Risk Behaviors among U.S. High School Students. *The National Alliance to Advance Adolescent Health*.8:1-9.
- Garawi F, Ploubidis GB, Devries K, Al-Hamdan N, and Uauy R.(2015): Do routinely measured risk factors for obesity explain the sex gap in its prevalence ? Observation from Saudi Arabia. 15:(254) 1-10 .
- Hadhood SE, Ali RA, Montaser MM, and Mohammed ES. (2017): Prevalence and Correlates of Overweight and Obesity among School Children in Sohag, Egypt. *Journal of Gastroenterology*. 7: 75-88.
- Hassen A, and Kibret BT.(2016): Health-Related Behaviors, Health Consciousness and Psychological Wellbeing among Teaching Faculty in Jimma University, Ethiopia *ClinExp Psychol*. 2(1):1-8.
- Hokenberry M & Wilson D.(2013): Wong's Essential of pediatric nursing. Ninth ed., Elsevier Mosby Co., USA.517-520.
- International council of Nurses. (2009): ICN on obesity creating public awareness of social-environmental disease ICN Fact sheet. http://www.inch.ch/image/stories/documents/publications/fact_sheets/13d_FS-obesity.pdf.
- Jackson CA, Henderson M, and Frank JW.(2012): An overview of prevention of multiple risk behaviour in adolescence and young adulthood. *J Public Health*.34(Suppl 1):i31–40.
- Larson N, Davey CS, Caitlin EC, Kubik MY, and Nanney MS. (2017): School-Based Obesity-Prevention Policies and Practices and Weight-Control Behaviors among Adolescents. *Journal of the Academy of Nutrition and Dietetics*.117(2):204-213
- Mahmood TA, and Arulkumaran S. (2013): Obesity: A ticking time bomb for reproductive health .Elsevier. London. 658.
-

- McPartland S. (2013): Stress, Lifestyle, and Diet in College Students: Analysis of the YEAH Study. University of Rhode Island. Master's thesis.
- Melton BF, Bigham LE, Bland HW, Bird M, and Fairman C.(2014): Health-related behaviors and technology usage among college students. *Am J Health Behav.*38(4):510-518.
- Nazif HK, El Shaheed AA, Karima AI, El-Shamy KA, and Mohsen (2015):Iron status among obese Egyptian adolescents, *Journal of the Arab Society for Medical Research.*3:76-81.
- Neumark-Sztainer D, Story M, Hannan PJ, and CrollJ. (2002): Overweight status and eating patterns among adolescents: where do youths stand in comparison with the healthy people 2010 objectives? *Am J Public Health.* 92(5):844-51.
- Pandita A, Sharma D, Pandita D, Pawar S, and Tariq M.(2016):Childhood obesity: prevention is better than cure. *Diabetes MetabSyndr Obes.* 9:83-89.
- Pelletier M. (2015): "The School Nurse Teacher's Role in Preventing Childhood Obesity at School" Honors Projects Overview.http://digitalcommons.ric.edu/honors_projects/109.
- Peltzer K, Pengpid S, Samuels TA, Özcan NK, and Mantilla C. (2014): Prevalence of Overweight/Obesity and Its Associated Factors among University Students from 22 Countries *Int. J. Environ. Res. Public Health.*11:7425-7441.
- Spence LA, Cifelli CJ, and Miller GD. (2011): The Role of Dairy Products in Healthy Weight and Body Composition in Children and Adolescents. *Curr Nutr Food Sci.*7(1):40-49.
- Sutton S, Baum A, and Johnston M.(2004): *The SAGE Handbook of Health Psychology* London SAGE Publications 1st edition. 94-126.
- TalatMA,& El Shahat E. (2016): Prevalence of overweight and obesity among preparatory school adolescents in Urban Sharkia Governorate, Egypt. *Egyptian Pediatric Association Gazette.* 64: 20–25.
- Teshome T, Singh P, and Moges D.(2013):Obesity Among High School Adolescents in Urban Communities of Hawassa, Southern Ethiopia. *Curr Res Nutr Food Sci. Jour.*1(1): 23-36.
- Tork, HM & Al-Jalout TR (2016): Health risk behaviors among university students in Qassim, KSA. *International Journal of Applied Research.* 2(1): 759-765.
- World Health Organization. (2014): Health topics: Obesity. Available at <http://www.who.int/topics/obesity/en/>.
- World Health Organization. (2013): Health topics: Obesity. Available at <http://www.who.int/topics/diet/en/>.
- World Health Organization.(1995):Growth Standards: anthropometric assessment of growth. Available at http://www.who.int/childgrowth/standards/Technical_report.pdf.
- World Health Organization statistics issued for the year 2010
-