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Screening of Abdominal Obesity and its Risk Factors among Egyptian University Students

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Abstract

Background*: Obesity is a global and growing health problem. Few data were found to describe the Egyptian prevalence of obesity among adolescents and young adults. *Aim:* To estimate the prevalence of abdominal obesity and its related risk factors among university students in Egypt. *Subjects and Methods:* A cross-sectional descriptive study at Suez Canal University, including 1204 university students from all over Egypt. A self-administered questionnaire was distributed. Anthropometric measurements were taken, and Body Mass Index (BMI) was calculated to assess body status and detect abdominal obesity. *Results:* The surveyed participants included 607 males (50.4%) and 597 females (49.6%). The age in the entire sample ranged from 18–25 years. The overall obesity was 8.17% with a confidence interval (6.61% - 9.72%) while abdominal obesity was 6.11% with a confidence interval (4.75%-7.47%) which was higher in females than in males (6.6% and 5.63% respectively). Screen time mean was 4.3±3.7 hours per day among participants, whereas 96.6% use social media about 7.13±5.72 hours per day. 78.8% of the students reported at least once weekly fast-food consumption. Abdominal obesity was 31.5% among the over-weights and 68.5% among obese surveyed participants. Positive family history of obesity was the most significant risk factor associated with abdominal obesity (odds ratio 2.835 with CI (1.244-6.462) and *p*=0.013) among the studied group. *Conclusion*: Obesity and its related factors are highly prevalent among Egyptian university students. Parental obesity is the most significant risk factor for abdominal obesity.

***Keywords**: BMI; Youth; Abdominal Obesity; Risk Factors.*

Introduction

Since 1975, worldwide obesity rates have more than tripled. In 2016, more than 1.9 billion adults (≥ 18 years) were overweight, and over 600 million were obese. In other words, 39% aged more than 18 years were overweight while 13% were obese[(1)]. Neglecting obesity in a younger age will compromise the cardiovascular health of the affected population and result in a serious public health crisis in the future[(2)]. In adolescents, the accumulation of abdominal fat has been identified as a risk factor for the occurrence of cardiovascular and metabolic diseases[(3-5)]. Increased abdominal fat may be associated with elevated blood pressure[(6)], higher triglyceride concentration[(7)], and hyperinsulinemia[(8)]. Surprisingly, the term "young adults" refers to people who are 15 to 50 years old, making the definition of young adults ambiguous

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and intangible. Other definitions of young adults based on human development stages and sociological perspectives, as well as definitions based on occupational, sexual, and emotional indices, are also available[9-11]. However, in the context of obesity, a tighter age range was required, capturing the age of transition from adolescence to adulthood for most global social settings. The most suitable age is thought to be within 16–30 years[12]. Obesity causes or risk factors are highly complex. The imbalance between caloric intake and physical activity is obesogenic[13]. Wright and Aronne[14] mentioned more than ten contributors to the obesity epidemic. Environmental factors play a significant role earlier childhood and adolescence. The complexity of the risk factors makes managing this population challenging[13]. The study aimed to describe the prevalence of central obesity and its related lifestyle risk behaviors among universities' students.

Subjects and Methods

This cross-sectional study took place in Suez Canal University, Ismailia city, Egypt, during the national event "10th universities youth week" during September 2015; in which students from all over the Egyptian universities were recruited to participate in different activities. A convenient sample of 1204 students were included.

Administrative design
Official permission was obtained from the Suez Canal University authority before conducting this research. The study proposal was approved by Suez Canal University Research Ethical committee and included a free and informed written consent from each student with an explanation of the purpose of the study and ensuring privacy.

Data Collection
A pre-designed self-reported questionnaire was developed and completed by the students in 15 minutes. Questionnaires were distributed to the students inside the Suez Canal University campus with the help of the event organizers. We had a response rate of 89%. The following data were obtained:

1. Personal and socio-demographic characteristics of the students; age, sex and residence.
2. Paternal and maternal medical history included presence of chronic diseases as cardiac disorder, hypertension Diabetes Miletus and obesity.
3. Central/abdominal obesity-related lifestyle behavior among students during the month prior to the study. This included dietary risk behavior, physical activity, screen time, and sleep pattern[15].
4. Dietary risk behaviors: frequency of fast-food consumption per week.
5. Physical activity and sedentary lifestyle behaviors were assessed in terms of frequency of current physical activity per week and screen time. Average daily hours of watching television and time spent following social media watching of 2 or more hours/day were considered to be excessive[16].
6. Sleep behavior was assessed in terms of the total hours of sleep per night; 8 hours or more of sleep per night was considered sufficient[17].

Anthropometric measurements
Unification of the methods among contributors was done through one day workshop prior to the event by two of the authors. The weight, height, and waist circumference (WC) of each student were taken under the supervision of two of the authors to assess body weight and WC. Students were weighed to the nearest one kg, lightly dressed and barefooted. The scale used is Soehnle, Qualitskontrolle 406, Ger

many. Standing height was measured to the nearest one cm, with shoes off, feet together and head in the Frankfort horizontal plane[18]. The body mass index (BMI) was calculated from a person's weight in kilograms and height in meters (kg/m2). Then BMI of each student was calculated and applied to WHO reference standards. BMI cut-off points that were used to define overweight and obesity were as follow[1]:

1. BMI < 25.0 kg/m^2 equals normal weight and underweight.
2. BMI 25.0–29.9 kg/m^2 equals overweight.
3. BMI > 30.0 Kg/m^2 equals obesity.

Waist circumference: everyone was asked to stand erect with abdomen relaxed, arms at the sides, feet together, and was asked to breathe normally. The measuring tape was applied horizontally midway between the lowest rib margin and the iliac crest (natural waist-line or narrowest part of the torso as seen from the anterior view). The tape was tied firmly at the level of the umbilicus. The individual must be wearing light clothes. The reading is recorded to the nearest millimeter[19]. The cut-off points used to establish abdominal obesity (AO) were 97.5 cm for male and 92.3 cm for female based upon data from the Egyptian National Hypertension Project[20]. Blood pressure was measured for each student. For systolic blood pressure (SBP) measurements, the first Korotkoff phase (K1) was used, for diastolic blood pressure (DBP), the fifth Korotkoff phase (K5) was used. Students were seated for at least 5 minutes and the appropriate cuff size was used. Two blood pressure measurements were taken with a minimum of 30 seconds rest between each, and the values were used for calculating the mean blood pressure[7]. The blood pressure of each student was classified as follows[9]: Normal (SBP < 130 and DBP < 85 mmHg), High normal (SBP 130–139 and DBP 85–89 mmHg), Mild hypertension (SBP 140–159 and DBP 90–99 mmHg), Moderate hypertension (SBP 160–179 and DBP 100–109 mmHg), Severe hypertension (SBP180–209 and DBP 110–119 mmHg), Very severe hypertension (SBP 210 mmHg and DBP 120 mmHg). The higher category was selected when SBP and DBP fell into different categories to classify an individual's blood pressure.

Statistical analysis

Statistical analysis of the data including data coding, entry, and sorting statistics were performed. The collected data were tabulated and analyzed statistically using SPSS program version 16. Bivariate analysis was used for risk factors and abdominal obesity. The Chi-square test was used for categorical variables. Independent samples *t*-test was used to establish the relationship between abdominal obesity and age. Mann-Whitney test was used with data that were not normally distributed as mean time spent following social media. To estimate the independent association of each lifestyle risk behavior with central obesity, logistic regression was applied. Confounding factors included: sleep hours per night, screen time parental history of diabetes mellitus, and obesity. $P<0.05$ was considered statistically significant.

Results

A total of 1204 participants were surveyed: 607 males (50.4%) and 597 females (49.6%). The mean age in the entire sample was 21.7 ± 1.8 years (ranged from 18 – 25 years); 21.9 ± 2.1 for males and 21.4 ± 1.3 for females. The overall obesity and overweight were 8.2% and 26.9 respectively. The abdominal obesity was 6.11% with confidence interval (4.75% - 7.47%) which was higher in females than males (6.6% and 5.63% respectively) (Table 1).

Table 1: Prevalence of overall obesity, overweight and abdominal obesity among surveyed population						
Obesity	**Male** (n=604)		**Female** (n=596)		**Total** (n =1200)	
	Freq	**% (95% C.I)**	**Freq**	**% (95% C.I)**	**Freq**	**% (95% C.I)**
Overweight	177	29.3% (25.7 – 32.9)	146	24.5% (21.0 – 28.0)	323	26.9% (24.4 – 29.4)
Obese	48	7.9% (5.8 – 10.1)	50	8.4% (6.2 – 10.6)	98	8.2% (6.6 – 9.7)
Abdominal Obesity	**Male** *(n=604)*		**Female** *(n=591)*		**Total** *Total (N =1195)*	
	34	**5.63%** (3.8 - 7.5)	**39**	**6.6%** (4.6 - 8.6)	**73**	**6.1%** (4.8- 7.8)

Abdominal obesity was 31.5 % among the over-weights that increased to 68.5% among obese surveyed participants (Table 2). Screening the possible risk factors of obesity in general and abdominal obesity specifically was included among all students, through inquiring about the hours of physical activity, TV screen time, frequency of social media use as well as sleep hours per day. In addition, 2 main questions were asked about frequency of fast food eating as well as meals while watching TV. Screen time mean was 4.3±3.7 hours per day among participants, whereas 96.6% use the social media about 7.13±5.72 hours per day. 78.8% of the students reported at least once weekly fast-food consumption (Table 3).

Table 2. Distribution of abdominal obesity according to overall obesity					
		Abdominal Obesity			
		No		Yes	
		Freq.	%	Freq.	%
BMI	**Underweight**	48	4.3%	0	0%
	Normal	728	64.9%	0	0%
	Overweight	298	26.6%	23	31.5%
	Obese	47	4.2%	50	68.5%

Family history scoped on maternal and paternal obesity, diabetes, and cardiac diseases were also enrolled through the questionnaire. The study revealed that positive family history of obesity was the most significant risk factor associating abdominal obesity through multiple logistic regression (odds ratio 2.835 with CI (1.244 -6.462) and *p*= 0.013%) among the studied group (Table 4).

Discussion

Our survey was carried out during a national event "*10th universities youth week*", in which students from all over the Egyptian universities were recruited to participate in different activities.

Table 3: Bivariate analysis of the risk factors for abdominal obesity						
Risk Factors		**Abdominal Obesity**				***p* value**[a]
		No		**Yes**		
Age (yrs); *Mean±SD*		21.5±1.2		21.5±1.3		0.927 [b]
Sex	*Male*	570	50.8%	34	46.6%	0.484 [a]
	Female	552	49.2%	39	53.4%	
Hours of physical activity per week		10.0±9.83		11.74±11.73		0.172 [a]
Fast food intake	No	206	18.5%	9	12.5%	0.200 [a]
	Yes	907	81.5%	63	87.5%	
TV screen time (hrs/day); Mean±SD		4.3±3.7		4.2±3.4		0.907 [c]
Meals while watching TV	No	241	21.5%	12	16.4%	0.478 [a]
	Always	353	31.5%	27	37.0%	
	Sometimes	525	46.9%	34	46.6%	
Snacking while watching TV	No	483	43.6%	33	45.8%	0.715 [a]
	Yes	624	56.4%	39	54.2%	
Freq. of social media use (hrs/day); *Mean±SD*		7.06±5.70		8.15±5.76		0.067 [c]
Night sleep (hrs/day)	< 6 hrs	241	21.5%	24	32.9%	**0.036*** [a]
	6 - 8 hrs	682	60.9%	34	46.6%	
	> 8 hrs	197	17.6%	15	20.5%	
DM among fathers	No	965	86.0%	57	78.1%	0.062 [a]
	Yes	157	14.0%	16	21.9%	
DM among mothers	No	1018	90.7%	66	90.4%	0.927 [a]
	Yes	104	9.3%	7	9.6%	
Cardiac diseases among fathers	No	998	89.0%	65	89.0%	0.997 [a]
	Yes	123	11.0%	8	11.0%	
Cardiac diseases among mothers	No	1014	90.4%	66	90.4%	0.992 [a]
	Yes	108	9.6%	7	9.6%	
obesity among fathers	No	1075	95.8%	65	89.0%	**0.007*** [a]
	Yes	47	4.2%	8	11.0%	
obesity among mothers	No	994	88.6%	61	83.6%	0.195 [a]
	Yes	128	11.4%	12	16.4%	

*[a]. Chi-square test; [b]. independent samples t-test; [c]. Mann-Whitney test. * Statistically significant at p<0.05*

A total of 1204 students from different faculties and universities were enrolled to describe the prevalence of overall obesity and central obesity as well as its related lifestyle risk behaviors. The prevalence of obesity among the surveyed students was far less than the WHO[1] estimated prevalence among adults as well as that among Egyptian medical students done by Mahmoud[21] and Abou-Elfotouh et al.[22] This could be due to the inclusion of all adults above 18 till 60 in the WHO and Aboul-Elfotouh surveillances, while a small sample from one faculty (180 medical students) in Mahmoud's study. However, the obesity, as well as overweight prevalence results, fall within the range declared by a systematic review[12] done on the obesity/overweight within developing countries' young adults (2.3-1% and ≤28.8%).

Table 4: Multiple Logistic Regression for the risk factors of abdominal obesity						
	B	S.E.	Sig.	Odds Ratio	95% CI for OR	
					Lower	Upper
Constant	-3.111	0.230	0.000	0.045		
Night Sleep hours *(> 8 hrs./day)*	0.165	0.325	0.611	1.180	0.624	2.231
Social media *(hrs./day)*	0.032	0.021	0.119	1.032	0.992	1.075
Family history of obesity among participants' fathers	1.042	0.420	**0.013***	2.835	1.244	6.462
Family history of DM among participants' fathers	0.387	0.325	0.234	1.473	0.779	2.785

** Statistically significant at p<0.05; Overall classification 93.6%; Model fit: Chi-square 10.08 (p=0.039).*

Abdominal obesity showed lower prevalence in comparison to the stated prevalence in the different studies from Egypt, Mediterranean and African countries. Rather than Abo-Elfotouh's[22], the other studies used the International Diabetes Federation (IDF) cut off points. However, in comparison with the Brazilian[23] results, they were nearly the same despite using another WC references rather than IDF and the Egyptian ones. Every country has its own population characteristics, and it is worthy to make its own norms to measure the population upon. In our study group, 66.5% of the students were participating in sports activities during the event, but 76.8% were adherent to physical activities in their daily practice, and that may influence the total results. It was found that one third of the abdominal obesity was among the overweight student and that should highlight the importance of measuring the WC, that correlates with abdominal adiposity rather than BMI. Accordingly, WC is considered to be of great value in prediction mortality causes among young and middle-aged adults with low BMI[24]. It is important to rely upon both BMI as well as WC so as not to miss those at high risk to develop the complications.

Family history of obesity among participants' fathers was the only risk factor of abdominal obesity revealed by the multiple logistic regressions. However, the other studies showed that physical inactivity was the most influencing factor[15]. Surprisingly, about three quarters of the students used to have fast food at least once weekly, which is in line with the studies from Saudi Arabia despite the different economic levels between the two countries[25,26]. This could be due to the university lifestyle, for being outdoor for longer time as well as the peer-to-peer influence, moreover the psychological aspect of the young youth who rush to try everything as well as the nutrition transition particularly in developing countries[27]. However, we did not go through the detailed content of the fast food nor the factors attracting them to fast food. More than 90% of the students use social media. Social media and screen time in general may be a double-edged weapon. The dangers of these media include deteriorating sleep, attention, and learning skills which affect development of obesity. Moreover, exposure to unreliable, inappropriate, or dangerous content and contacts; and jeopardized privacy and confidentiality are frequent hazards[28]. However, it may be a great opportunity to reach them and deliver healthy messages related to lifestyle, food, etc.

Conclusion

Overall obesity and overweight are highly prevalent among Egyptian universities students. Moreover, AO was present in obese as well as in over-weight participants but to a lesser extent, which means that the risk of cardio-metabolic events may extends into both groups. The most significant risk factor was the positive family history of paternal obesity reflecting the important role of the genetic factors in the AO, rather than fast-food intake and physical activity. Almost all the students use the social media. However, not being a significant risk factor; it seems like a proper method to reach them for the implementation of health-programs.

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