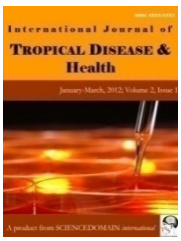

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The Study of Social Profile and Some Health Problems Associated With Body Weight Disorders in Upper Egypt Male Youth

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Authors' contributions

This work was carried out in collaboration between all authors. Author SSZ designed the study, set aim and objectives, wrote the protocol and the first draft of the manuscript, as well as the correspondences and approvals, and set the statistical analysis plan. Author RMA, selected and conducted the statistical analysis techniques, data handling, presentation of the study findings in tabulated forms, participated in the discussion plan, and the abstract drafting, and write-up editing. Author HA conducted literature searches, referencing and citation, supervised and conducted clinical evaluation, participated in the sampling process. Author MA, supervised data collection, questionnaire setting and piloting, and participated in the study design and results interpretation. Author HN set the laboratory work plan, supervised and conducted the lab techniques, and results interpretation. All authors read and approved the final manuscript.

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ABSTRACT

Background: Body weight disorder is a common health problem, unfortunately. The excess weight of the enlarged adipose tissue mass together with the metabolic changes of obesity can induce serious health problems and increase the risk for many diseases.

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Aim: To study social profile and some medical health problems associated with obesity among Upper Egypt male youth.
Methods: A cross-sectional study was carried out in Qena University Hospital with a total number of 500 male individuals 18-30 years old, attending medical examinations for different causes. Participants were submitted to: filling a predesigned questionnaire, clinical interview, body mass index (BMI) measurement, fasting blood glucose (FBG) level, and postprandial serum glucose (PPG) level, as required.
Results: The mean age was 25±4.55 years. Middle social class comprised most individuals with normal weight [$\chi 2(df=6)$ 35.01, $p<0.001$]. Among them, too, who were weight disordered, middle class subjects with overweight accounted up to 63.2%, those with obesity accounted up to 45.2%, and those with underweight accounted up to 42.1%. More than half (57.9%) of those with underweight, and 41.9% of the obese were of low social class; while most of high social class youth were either normal (14/30,46.7%)- or over-weight; none were underweight [$\chi^2(df=6)=35.01$, $p<0.001$]. Also, 6.1% participants were obese. Further, 3.2% and 6.5% of obese persons were diabetics and hypertensive, respectively [Fisher's exact, p=0.003, Fisher's exact, p=0.002, respectively]. Young adults with family history of obesity were more than five-folds prone to obesity compared to those counterparts without family history of obesity (OR=5.72, 95%CI:1.05-32.43).
Conclusion: Obesity is associated with comorbid medical problems among young adult males in the Upper Egypt district. Particularly low socioeconomic class individuals, as well as those with a positive family history of obesity disorder problem are at greater risk.

Keywords: Obesity; male youth; Upper Egypt.

1. INTRODUCTION

Obesity is a common problem among young adults, which threatens to become the foremost cause of chronic disease in the world and considered by WHO as a global epidemic and public health problem. Unfortunately, the prevalence of obesity is increasing in both developed and undeveloped countries, worldwide. Reasons for the rising prevalence include urbanization of the world's population, increased availability of food supplies, and reduction of physical activity [1]. Traditionally, obesity is defined as excessive accumulation of body fat, whereas overweight refers to increased body weight over the ideal weight in weight tables, so that all obese are overweight and not necessarily the vice is viscera [2]. There are no clear-cut markers separating lean, average, and overweight, as well as obese. However, many indices, tables, and graphs are designed for evaluation of weight disorders. The BMI is the commonest index used in assessment of weight disorders in young adults. Mathematically, BMI equals the weight in kilograms divided by height in meters, squared. A BMI between 18.5 and 24.9 is considered normal [3]. Several factors have been incriminated in the development of obesity, including: *a)* genetic factors, e.g. variants of leptin gene that causes a deficiency of the leptin hormone responsible for modulation of eating behavior and regulation of adipose proliferation, (the extent of genetic influences on human obesity has been assessed by twin, adoption, and family studies)[4], *b)* energy imbalance whereas caloric consumption exceeds the need, probably together with diminished physical activity and low energy expenditure [5], *c)* fat cell theory, such that an increased proliferation of fat cells and adipose tissues during infancy and childhood predisposes to adulthood obesity [6], *d)* behavioral and psychological factors, including irresistance to eating when food is available, eating associated with other activities, such as reading and TV watching, eating when depressed, and inability to differentiate between bodily sensations and emotional state, all have an apparent role in weight gain and obesity [3], the central regulation theory

that incorporates the affection of hypothalamus upon the development of improper appetite control, and hence caloric imbalance [7], *e)* secondary obesity, which constitutes about 5% of obesity, e.g., those secondary to hypothyroidism, Cushing's syndrome, and long-term steroids therapy [8].

The association between obesity and socioeconomic status has been a matter of interest in obesity epidemiology research. In one study [9], it was shown that low-socioeconomic-status and minority groups from all age categories were significantly more affected by increased BMI than subjects who were otherwise. Using an intersectional approach, studying the effect of inequality and social disparities upon BMI trajectory during a time of rapid weight gain in the USA, it was found that high-educated and high-income white subjects 25-54 years old experienced the least BMI growth compared to low-educated and low-income black counterparts [10]. There is a multitude of health problems associated with obesity. The excess weight of the enlarged adipose tissue mass together with the metabolic changes of the obesity can induce serious health problems, increasing the risk for many chronic ailments,[11] most commonly of which is hypertension; the greater the weight the greater the risk. Coronary heart disease and congestive heart failure are also associated with obesity [12]. Obese persons have more than double risk to have hypercholesterolemia than others [11,12]. Diabetes mellitus (DM), especially type 2, is known with its strong positive relationship with obesity. Moreover, obesity usually potentiates the state of insulin resistance [13]. Respiratory disturbances in form of sleep apnea and obesity hypoventilation syndrome with hypoxia that may end up with the development of corpulmonale [14]. The risk of orthopedic complications, e.g., osteoarthritis of both weight-bearing and non-weight-bearing joints increases by obesity [15]. Skin disorders are particularly common, including increased sweat and skin secretions, trapped in thick folds of skin, produce a culture medium conducive to fungal and bacterial growth and infections [16].

Overweight men are at greater risk for developing cancer of the colon, rectum, and prostate [17]. Although young adults with psychological disorders may not be affected or concerned by the hazards of obesity, they may be impacted more with the psychological problems such as poor body image, social isolation and depression [3,18] Despite many therapeutic approaches, obesity is one of the most difficult and discouraging problems to treat, and long-term success rates remain low. Specialized nutritional and exercise programs are the main measures for weight reduction. Anorectic drugs and surgical approaches to reduce stomach size are reserved for the severely obese [19]. Jeffery and French [20] reported that as a modest weight loss as 10% or perhaps even 5% of body weight is sufficient to control most complications of obesity. Therefore, there is no reason to pursue the traditional goal of attaining an ideal body weight, which is so seldom attained, and if attained, is so rarely maintained [21-24]. The current work was built on the hypothesis that social profile and some medical health problems may be important drivers for obesity among male youth in Upper Egypt district.

2. METHODOLOGY

A Cross-sectional design was selected to achieve goal of this research. Data had been collected between August 2011 and August 30, 2012 at Qena University Hospital (QUH), Qena governorate, southern Egypt. (The hospital is a secondary care health institution with modern technology that receives referrals from the surrounding districts, such as Luxor and Albahr Alahmar governorates). All the examinations and investigations were performed at the outpatient department (OPD) setting in QUH.

According to 2006 census, Qena governorate population accounted 3,001,681, with an estimated annual increase rate of 2.29 percent. In 2013, male subjects in Qena area18-30 years old were estimated at 286,094 residents [25], (54 percent of which are original Qena residents, 28 percent luxor immigrants, 9 percent Albahr Alahmar immigrants, and 9 percent other immigrants). Using EPI info [26], a sample of 500 men was selected from the Qena source population, using systematic random sampling technique.

As per the study design, participants were interviewed during working days until the study sample had been collected (average 4 subjects/d, 3d/wk, 4wk/m, for 12m; where those who gave invalid or uncompleted questionnaires, or those who refused to carry on with the study after preliminary consent were excluded from the study, meanwhile the desired sample size could be obtained). Participation was voluntary; a written consent was taken from all enrollees. Participants reserved the right to withdraw from the study at any time.

Necessary approval from the institutional review board (IRB) of Qena Faculty of Medicine, as well as other formal approvals, all have been obtained. Participants were oriented on the study aim, assuring them of the confidentiality of their personal and medical information, and that only grouped data results may be disseminated for research purpose.

The study subjects were then submitted to the following procedures: *A)* filling a predesigned validated questionnaire. The questionnaire consists of five scales: demographic and social characteristics, risk factors, lifestyle, health status, and screening attitude. The modified questionnaire's items relevant to economic and educational state variables (total family monthly income from all sources and highest educational degree) were used to determine each subject's social class [27]. Each variable was given a maximum score (50 each, and 100 total); and the social class could then be determined based on the total scores obtained (0-33.33=low social class, 33.34-66.66=moderate social class, and 66.67-100=high social class).

The presence of family history of obesity was defined as positive when a subject recollected having a first-degree relative (a parent, grandparent, sibling or child) who had ever been diagnosed with obesity by a health worker. (The family history was defined as "missing" if she/he reported not knowing whether any relatives had ever been told that they were affected). *B)* Clinical check-up, including general and systemic examination (vital signs, body measurements, including weight, which was measured to the nearest of 0.1kg on physician balance beam scales, placed on a firm surface with the subject wearing light clothes and with no shoes; all scales were identical and calibrated with a standard Inter ASIA protocol, and height, measured without shoes to the nearest of 0.1cm using a stadiometer,[28] and then the BMI (in kilograms per square meter of body surface area) (kg/m²) could be calculated as the weight divided by height squared, where BMI<18.5kg/m^2=underweight, 18.6-24.9kg/m^2=normal weight, 25-29.9kg/m^2=overweight, >30kg/m^2=obese. Blood pressure measurement, chest, heart, abdomen examination have been done, too. *C)* Laboratory investigations: 5ml of blood was aspirated from each individual under aseptic conditions using disposable syringes fitted with 20-gauge needle. All subjects were fasting (over-night) 8-12hours. The blood sample was evacuated slowly on the inner wall of a coded tube and allowed to clot at room temperature. After complete clotting, each tube was centrifuged at 4,000rpm for 20 minutes to get a clear yellow serum for estimation of FBG level; (this was achieved by Roche/Hitachi 911 analyzer with Roch-Glu Kits-enzymatic colorimetric assay method based on the work of Trinder) [29]. The intensity is directly proportional to glucose concentration measured photometrically. Those with history of DM or had a risk factor for

DM were prone to PPG level assay. They drank 75gm glucose in 300ml water within 5 minutes then another blood sample was taken after 2hours and measured as mentioned above. Considering DM means FBG level above 120mg/dl and PPG level above180mg/dl [30].

Collected data were verified, variables coded and then entered to a Microsoft program with adequate backup. Both categorical variables (closed-ended questions with fixed responses offering), and continuous variables (open ended questions the answers to which require quantities) were handled. Descriptive statistics, e.g., numbers, proportions, were displayed, as appropriate. Analytically, statistical techniques were used, as appropriate. For the association between categorical variables, e.g., the influence of family history of obesity upon the presence of obesity among participants could be measured using the Chi square (χ^2) test of independence or Fisher's exact test, as appropriate. The "Statistical Package for Social Sciences" (SPSS) software for Microsoft- version-16 was used for the analysis. All tests were conducted at level of significance α=0.05; results with *p*-values<0.05 were considered statistically significant.

3. RESULT

Among the 500 males attending to medical examination at QUH for different causes, 250 were from Qena (50%), 200 were from Luxor (40%) and 50 were from Albahr Alahmar (10%) Governorates Table 1. The mean age of the study population was 25±4.55 years. Studying the overall prevalence of increased weight (overweight and obesity) among the study population, it was found that 19(3.8%) had underweight, 49(9.8%) had overweight, and 31(6.2%) had obesity Table 2. Particularly, comparing the prevalence of obesity across the three studied governorates, no significant difference was found [Qena: 30/500=6.0%, Luxor: 30/500=6.0%, Albahr Alahmar: 20/500=4.0%; [χ^2(df=2) = 2.49, *p*=0.288] Table1.

Table 1. Distribution of participants by BMI, by governorate

BMI category	Qena		Luxor		Al Bahr Alahmar		Total	
	n	%	n	%	n	%	n	%
Overweight-obese	30	6.0	30	6.0	20	4.0	80	16.0
Other BMI categories	220	44.0	170	34.0	30	6.0	420	84.0
Total	250	50.0	200	40.0	50	10.0	500	100.0
Test statistic, p-value				χ^2(df=2)=2.49, *p*=0.288				

As in Table -2, the participants' BMI profile was tested in associations both with DM and with hypertension, as well as with social class. It is noted that 3.2%(1/32) and 6.5%(2/31) of obese persons were significantly diabetics and hypertensive, respectively, as compared to lesser percentages of normal weight individuals [Fisher's exact, *p*<0.003, Fisher's exact, *p*<0.002, respectively]. Interestingly, too, 10.5% (2/19) in the underweight group had DM.

Studying the impact of social class upon the participants' BMI, it was found that moderate social class characterizes most individuals with normal weight [279/401(69.6%)], compared to those who have body-weight disorders [overweight: 31/49(63.2%), obese: 14/31(45.2%), underweight: 8/19(42.1%), Table 2]. On the other hand, more than half [11/19(57.9%)] of the underweight group, and also 13/31(41.9%) of the obese group belonged to the low social class category.

Table 2. Distribution of the study BMI groups by DM, hyopertension, and social class

BMI	DM No. (%)	Hypertension No. (%)	Social Class			
			Low No. (%)	Middle No. (%)	High No. (%)	Total
Normal weight (BMI: 18.6-24.9) n=401(80.2%)	1/401(0.2)	1/401(0.2)	108 /401(26.9)	279/401(69.6)	14/401(3.5)	401(100.0)
Overweight (BMI: 25-29.9) n=49(9.8%)	0/49(0.0)	0/49(0.0)	6/49(12.2)	31/49(63.2)	12/49(24.6)	49(100.0)
Obese (BMI>30) n=31(6.1%)	1/31(3.2)	2/31(6.5)	13/31(41.9)	14/31(45.2)	4/31(12.9)	31(100.0)
Underweight (BMI<18.5) n=19(3.8%)	2/19(10.5)	0/19(0.0)	11/19(57.9)	8/19(42.1)	0/19 (0.0)	19(100.0)
Test statistic	Fisher's exact	Fisher's exact	χ^2(df=6) 35.01			
Significance	p=0.003	p=0.002	p<0.001			

Looking to the high social class group alone (column 6, Table 2, n=30), the majority of youth were of normal BMI (14/30=46.7%). Further, 40% (12/30=40%) of this group who were left with BMI problems were overweight, while only 4/30(13.3) had worse BMI. Notably, none of them were underweight. The variability above in the frequencies of BMI categories among different social class were statistically significant [χ^2(df=6)=35.01, p<001], Table 2.

As in Table 3, there is a significant association between the frequency of obesity and family history of obesity [χ^2(df=1)=6.35, p=0.012]. Young adults with family history of obesity were at more than five times increased risk of being obese than those without family history of obesity [OR=5.72, 95% confidence interval (CI) 1.05-32.43).

Table 3. Obesity and family history

Family history	Non-obese No.(%)	Obese No. (%)	OR	95%CI
-ve (n=402)	389/402(96.8)	13/402(3.2)		
+ve(n=98)	80/98(81.6)	18/98(18.4)	5.72	1.05 - 32.43
Total (n=500)	469(93.8)	31(6.2)		

χ^2(df=1)=6.35, p=0.012

4. DISCUSSION

In 1998, the world health organization (WHO) [31], announced that obesity has ranked as one of the important risk factors for occurrence of many health problems, and its prevalence significantly varied by sex, age, socioeconomic status and race. As regards age and sex, Ajlouni and collaborates[32] on their study on 2836 adults of both sexes and age of 20-55 years highlighted that obesity was more prevalent in older age groups, as well as in females. Likewise, in their study on 1081 subjects 18 and older, Ismail and colleagues [33] added that obesity in females was three folds than in males. The present work revealed that 6.2% of the studied male youth had obesity (BMI≥30). Bakr, 2000 [34], states that 12.5% of 317 university students of both sexes and age of 20-24 years were obese. Farahat and Abou-El Fath (2001) [35], recorded that 13.4% of 500 students from Menoufia university were also obese. Likewise, Al Isa [36], found that the prevalence of obesity was 13.7% among 842 Kuwait university students who aged 18-25. In the USA, Mokdad et al. [37] through a national survey in 2000, report that the prevalence of obesity was growing; reaching 19.8% among 20-74 years old population. With subtraction of both age and sex factors, the prevalence of obesity in the present study more or less coincided with these national and international results. Higher estimates of the rates of obesity are encountered by Egyptian populations. The overall prevalence of obesity among adult Egyptians ranges between 30 percent [38] and 35 percent [39]. The data from the national survey for "Assessment of Obesity among Egyptian Populations" included all adult ages up to 80 years. Moreover, the survey did not include Luxor or Albahr Elahmar governorates. Notably, the frequency of female obesity was more than double that of male's (48.1% vs. 18.7%).

The present work provides that obesity uniformly affects young males representing the examined governorates Table1, unstratified by social class. In contrast, Table 1. Obviously, the residence of origin in the Upper Egypt district has no impact on the youth's weight profile. Being part of such a uniform community; and regardless of the variability in social class, residents of the three adjacent governorates share the same cultural, nutritional, and health behavior. In contrast, Shaheen et al. [40], in their survey on 36,000 individuals of both sexes and different age groups (2-70 years) from eight selected Egyptian governorates found that

20.6% of the total population sample were obese and the highest prevalence was in Cairo (27.2%) and the lowest in El-Wady El-Gadid (11.1%). Such difference was explained on the basis of the varied level of urbanization between the governorates. Similar results were obtained from the work of Al-Nuaim et al. [41], who concluded that obesity was lower in those living in desert and rural areas with traditional lifestyle than those living in more urbanized environment, which offered foods with lack of physical activity.

The present work throws light on the relationship between obesity and social class; where obesity was more prevalent in low class (41.9%) than in high class (12.9%) Table 2. In parallel, Lissner et al. [42], studying 208 obese individuals found that 37% of them were of low class, while 14.6% were of high class. A similar difference in prevalence of obesity between classes was also reported by Tawfik et al.[43] who concluded that socioeconomic factors have a major influence on both energy intake and energy expenditure, in a sense that unhealthy diet and insufficient physical activity could be principal factors contributing to obesity among low-social class communities. In this study, too, a significant association between obesity and comorbidities, such as DM and hypertension was revealed (3.2% and 6.5% of obese persons were diabetics and hypertensive, respectively, compared to lesser percentages of individuals with less BMI levels). Such relationship was well documented in literature. In 2012 in Japan, Sanada et al.[13] reported that high BMI is a risk factor for type 2 diabetes. Ogden and collaborate [44], found that the risk of developing hypertension was three folds greater among the obese. Another community-based study by Herman et al.[45] provided that obese subjects are at double the risk for DM than the non-obese. The influence of family history in the development of obesity was also addressed in this work. Such association was pretty much reflected by the fact that youth who has a family history of obesity are at greater risk of being obese Table 2. The current work provides that obesity in Upper Egypt is prevalent among low social class stratum of the community. It also provides that obesity is more prevalent among those coming from families suffering the same weight increase disorder. Similar result was supported by other works [46-47], either due to hereditary or environmental factors. In turn, obesity may well be risk for serious health problems, e.g., DM and hypertension. Having low prevalence rates of DM and hypertension (3.2% and 6.5%, respectively) in the high BMI group in this study may well be explain by the fact that the study population is already young (18-30y old), where time may still be needed for them to advance to diabetes or hypertension. In order to verify this probability, a futuristic prospective study to follow up this study cohort over the next 5-8 years is suggested. As such, a preventive approach to minimize the prevalence of those risks and subsequent health hazards is a priority. The modification of the eating habits, adopting strategies encouraging a reduction in sedentary behaviors, and an increase in physical activity may well be most effective in alleviating the burden of obesity upon the community.

5. CONCLUSION

The majority (31/49=69.6%) of overweight youth, as well as 14/31(45.2%) of the obese were middle class. Also a positive family history of obesity directly influenced the BMI. Despite their occurrence in low rates among the obese (3.2% and 6.5%), DM and hypertension pose threat upon such BMI population's health, perhaps when convenient circumstances for worsening comorbidities, e.g., advancing age, have taken place.

CONSENT

Not applicable.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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