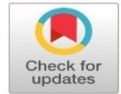


*Research Article***Obesity/Overweight among University students. Minia, Egypt****Shaimaa Moustafa Hafez¹, Eman Ramadan Ghazawy¹, Eman Mohamed Mahfouz¹, Tarek Ahmed Abd-Elrahman¹, Shima Anwer Emam¹**¹Department of Public Health and Preventive Medicine, Minia University

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Abstract

Background: University student populations are widely reported to engage in high rates of physical inactivity, sedentary behaviours, and unhealthy dietary habits. There is rising prevalence of overweight and obesity among university students. Aims of study: Assessment of body mass index among university students, detection of obesity and underweight prevalence among students and determining risk factors of obesity among university students. **Methods:** This study is a cross sectional study conducted for assessment of body mass index and obesity prevalence among university students among 714 students; (426 from Faculty of Medicine and 288 from faculty of Arts and social sciences) were included in the study, using a self-administered questionnaire which include demographic characteristic sand measuring weight and height. BMI was calculated as weight (kg) divided by the square of height (m²). A digital scale was used for the measurements. **Results:** weight index of studied students was within the range of normal (24.12 ± 4.76). (59.5%) of students were normal weight, (27.6%) were overweight, (8.3%) were obese and only (4.6%) were underweight. Body mass index was significantly higher in urban and fourth grade students. University resident students were 1.58 times significantly more likely to have a higher BMI ≥ 25 than non-residents. **Conclusions:** as there are more than 35% of students have body mass index ≥ 35 , so that, universities should consider the establishment of on-campus exercise facilities in attainable prices to encourage students to exercise especially because they spent a substantial part of their time in the university

Keywords: Obesity; overweight; university students.**Introduction**

Body mass index (BMI) is an indirect measure of nutritional status in a particular population, and BMI is calculated from person's weight and height. This indicator provides a method that can assist in planning interventions to help eliminate many preventable diseases. An obese (BMI ≥ 30 kg/m²) individual is more likely to get hypertension, heart disease, diabetes mellitus, cardiovascular disease, gall bladder disease and various types of cancer. Overweight and obesity are the fifth leading risk of global deaths, in worldwide⁽¹⁾.

University student populations are widely reported to engage in high rates of physical

inactivity, sedentary behaviours, and unhealthy dietary habits including skipping meals, inadequate snacking, high consumption of fast foods, and insufficient consumption of fruits and vegetables⁽²⁾.

Overweight and obesity is a major public health problem currently, and globally, there is rising prevalence of overweight and obesity among university students, special attention should be paid to university students considering their potential influence on the family and their

contribution to the nation's workforce in near future⁽³⁾.

Obesity consequences among university students may include different chronic diseases such as type 2 diabetes mellitus, cardiovascular diseases, hypertension, dyslipidaemia, metabolic syndrome, osteoarthritis, insulin resistance, skin problems such as poor wound healing, psychosocial problems (stress, depression, anxiety, and low self-esteem), decreased academic and professional performance and low overall quality of life⁽⁴⁾.

Accordingly, A focus on strengthening protective factors and earlier investment in prevention of NCDs among young people and particularly university students is therefore essential. In this respect, it was stated that, in the age range of 18 to 24 years of many university students, the establishment of healthy life behaviours, including eating behaviour, may have a lasting impact on the health of these individuals and consequently on the health of their future families⁽⁵⁾.

Since university students are overlooked as a nutritionally at-risk population. Lifestyle development during the typical undergraduate student ages (18 to 25 years) is crucial for establishing healthful, lifelong dietary habits, because college typically is the first time that young adults live on their own. Within this age range, chronic disease factors begin to manifest themselves as a consequence of poor dietary habits⁽⁶⁾. Thus, this study conducted to assess body mass index and obesity among this population.

Aim of the study:

- 1- Assessment of body mass index among university students.
- 2- Detection of obesity and underweight prevalence among students
- 3- Determining risk factors of obesity among university students

Patients and methods

This cross-sectional study was conducted among undergraduate students in Minia University, Minia, Egypt, during the period from March to May, 2020. Minia University is composed of 20 Faculties, and the sample was chosen randomly from students studying inside the main campus,

which harbours 16 Faculties (faculties of Science, Pharmacy, Medicine, Nursing, Education, Physical Education, Art Education, Specific Education, Kindergarten Education, Fine Arts, Tourism and Hotels, Alsun, Dar Al-Uloom, Computer and ITCs Science and Law).

A simple random sample technique was used to select students. The sample size was calculated according to this formula: $n = [z^2 - p(1 - p)]/e^2$, where n = sample size, z = is the 95% confidence level (CI), p = expected prevalence of obesity among students (44%) and e = the 5% margin of error. Accordingly, the minimum sample size needed was 379 students; however, to increase the validity and the power of the study, we invited randomly double the minimum sample size, 758 students, to participate in the study. Of whom 44 students refused to participate. Thus, a total 714 students; (426 from Faculty of Medicine and 288 from faculty of Arts and social sciences) were included in the study, with a response rate of 94.2%.

Data collection

Participants were asked to complete a self-administered questionnaire which include demographic characteristics including age, gender, type of college, study grade, nationality, family structure, socio-economic status and residence status. The height in stocking feet and weight in light clothing were measured in the faculty staff room after obtaining the required permissions from the authorities in each faculty. BMI was calculated as weight (kg) divided by the square of height (m²). A digital scale was used for the measurements

Statistical analysis

The SPSS for Windows version 22 was used for statistical analysis. Quantitative data expressed as mean±SD, qualitative data expressed as number and percent. Student t test and binary logistic regression were used. A value of $p < 0.05^*$ was accepted as statistically significant.

Results:

As shown in table (1), the age of study participants ranges from (17-28) years with a mean of (19.89 ± 1.47). Female students

(66.7%) are more than males (33.3%), and more than half of participants (55.3%) reside in rural areas. The majority of students are Egyptian, only 10 students are international. From all the studied students, 426 (55.7%) Studying at practical faculty (Faculty of Medicine) and 288 (40.3%) studying at theoretical faculty (Faculty of Arts and social sciences). About (56%) at first grade and (44%) at fourth grade. (58.8%) of students are non-resident living with their family, (17.1%) of students live at university residence and (24.1%) of them live in private off campus residence.

Table (2) shows that body mass index of studied students is within the range of normal (24.12 ± 4.76). (59.5%) of students are normal weight, (27.6%) are overweight, (8.3%) are obese and only (4.6%) are underweight. Table (3) shows that body mass index is significantly higher in urban

(24.56 ± 4.82) and fourth grade students (24.59 ± 4.57) than rural and first grade students. Practical male international students and those reside in private residence have higher insignificant body mass index (24.16 ± 4.83), (24.33 ± 4.62), (24.60 ± 5.16) and (24.68 ± 0.946) than theoretical female, Egyptian and those non-resident students.

Table (4) illustrates the associations between various factors and body mass index. Urban students are 1.57 times more prone to have body mass index ≥ 25 with adjusted OR (95%CI) is 1.57 (1.12 – 2.18). Resident students also have higher odds to have body mass index ≥ 25 with adjusted OR (95%CI), 1.58 (1.01 – 2.48) university resident and 1.14 (0.77 – 1.69) for private resident students.

Table (1): Socio-demographic characteristics of the studied college students, Minia University, 2020

Socio-demographic characteristics	Mean \pm SD or N (%)
Age (years)	19.89 ± 1.47 (17-28)
Sex	
Male	238 (33.3%)
Female	476 (66.7%)
Residence	
Urban	313 (44.7%)
Rural	395 (55.3%)
Nationality	
Egyptian	704 (98.6%)
International	10 (1.4%)
Faculty	
Practical	426 (59.7%)
Theoretical	288 (40.3%)
Grades	
First grade	399 (55.9%)
Fourth grade	315 (44.1%)
Housing type	
with family	420 (58.8%)
university residence	122 (17.1%)
Private residence	172 (24.1%)

Table (2): Body mass index of the studied college students, Minia University, 2020

Physical measurement	N (%)
	Mean \pm SD
Body mass index	24.12 \pm 4.76
Underweight	33 (4.6%)
Normal weight	425 (59.5%)
Overweight	197 (27.6%)
Obesity	59 (8.3%)

Table (3): Body mass index in relation to personal characteristics of the studied college students, Minia University, 2020

Body mass index	Mean \pm SD	p-value
Sex		
Male	24.33 \pm 4.62	0.4
Female	24.02 \pm 4.73	
Residence		
Urban	24.56 \pm 4.82	0.02*
Rural	23.78 \pm 4.57	
Nationality		
Egyptian	24.12 \pm 4.69	0.4
International	24.60 \pm 5.16	
Faculty		
Practical	24.16 \pm 4.83	0.8
Theoretical	24.07 \pm 4.49	
Grades		
First grade	23.76 \pm 4.77	0.02*
Fourth grade	24.59 \pm 4.57	
Housing type		
with family	24.05 \pm 4.77	0.8
university residence	24.28 \pm 4.76	
Private residence	24.68 \pm 0.946	

* p value was calculated by using independent sample t- test

Table (4): Multiple logistic regression analysis for factors affecting body mass index among college students, Minia University, 2021

Independent variables	Adjusted odds (95% CI)	P-value
Age	1.03 (0.85 – 1.24)	0.7
Sex		
Male	1.08 (0.76 – 1.55)	0.6
Female	Ref	

Residence		
Urban	1.57 (1.12 – 2.18)	0.008*
Rural	Ref	
Nationality		
Egyptian	1.28 (0.32 – 5.18)	0.7
International	Ref	
Faculty		
Theoretical	1.16 (0.82 – 1.65)	0.4
Practical	Ref	
Grade		
Fourth	1.25 (0.71 – 2.17)	0.4
First	Ref	
Housing status		
University	1.58 (1.01 – 2.48)	0.1
Private	1.14 (0.77 – 1.69)	0.04*
Non-resident	Ref	0.4

Odds ratios with its 95% confidence intervals are calculated by using the logistic regression models.

Discussion

Regarding physical measurements in the current study, body mass index of studied students was within the range of normal (24.12 ± 4.76). (59.5%) of students were normal weight, (27.6%) were overweight, (8.3%) were obese and only (4.6%) were underweight (**Table 2**), in the Iranian study conducted among medical Sciences students, it was found that (81%) of students were normal weight, (10.8%) were overweight, (7%) were underweight and only (1.2%) were obese⁽⁷⁾.

Also, in the study conducted among university students in Bangladesh, the undernourished, healthy, overweight and obesity level among university students was (14.10%), (78.43%), (7.20%) and (0.27%) respectively⁽³⁾.

In studying the effect of various sociodemographic factors affecting body mass index in the present study, Male students had higher insignificant body mass index (24.33 ± 4.62) than female students (**table 3**), this was in agreement to the study conducted by Sadekur Rahman et al.,⁽³⁾, where body mass index was higher in male (21.56 ± 2.61) than female students (19.89 ± 2.58).

Body mass index was significantly higher in urban (24.56 ± 4.82) than rural students in the current study (**Table 3**) and in

studying the associations between various factors and body mass index. Urban residence was significantly associated with body mass index ≥ 25 , with the multivariable-adjusted OR (95%CI) is 1.57 (1.12 – 2.18) (**Table 4**), as urban environment favour un healthy lifestyles (junk foods, physical inactivity, delayed sleeping time and fatty meals and soft drinks) that significantly affect body mass index specially among university students.

This was in accordance to a comparative study conducted among urban and rural boys indicated that a higher percentage of urban boys was significantly obese, whereas urban girls were significantly overweight compared to rural girls⁽⁸⁾.

However, in the study of body mass index of freshman university students, mean BMI for students who came from rural hometowns was (25.6), compared with a mean BMI of (23.8) of the students who came from urban hometowns⁽⁹⁾, also a higher body mass index detected among rural adults in in United states⁽¹⁰⁾.

Regarding study grade in the present study, body mass index was significantly higher in fourth grade students (24.59 ± 4.57) than first grade students (**table 3**), and in multivariate analysis, it was found that fourth grade students were 1.25 times more

likely to have BMI ≥ 25 with an adjusted odds ratio 1.25 (0.71 – 2.17) (Table 4).

This was nearly similar to the study of impact of demographics, education, and stress on body mass index among Jordanian university students, that detected a higher percentage of overweight and obesity among fourth year students than first year⁽¹¹⁾.

On the other hand, A significant percentage of university freshmen students in USA were overweight or obese⁽⁹⁾.

University resident students were 1.58 times more likely to have a higher BMI ≥ 25 than non-residents with an adjusted odds ratio 1.58 (1.01 – 2.48) (Table 4).

University students who are living at homes, their parents look after them well but resident students especially university resident students, are totally dependent on themselves, sedentary lifestyle, irregular meal consumption, and physical inactivity are directly related to the risk of overweight and obesity.

Accordingly, in the study conducted among female students reside in university residence, (22.2%) of female students were overweight and (6.5%) were obese compared to (9.9%) for underweight subjects⁽¹²⁾.

Conclusion:

Nearly 36% of participants were overweight, or obese using Body mass index which was significantly higher in urban dwellers than rural ones. Males and international students had higher BMI

Recommendation:

1. Universities are hubs of student life and they need to expand their corporate responsibilities to include the protection and promotion of health in their core values. There is questionable value in awarding academic degrees if the health of students is part of the university.
2. Integration of physical activity and healthy lifestyle courses in the curriculum of all faculties of the universities is needed
3. It would be effective to develop internet programs that can induce health concern and provide strategies for improving body mass index. This may help the students to understand the

importance of practicing healthy lifestyle behaviors and eventually improve their health practices.

4. Universities should consider the establishment of on-campus exercise facilities in attainable prices to encourage students to exercise especially because they spent a substantial part of their time in the university.
5. Future studies are needed in this aspect and to evaluate the effect of interventions on students' body mass index.

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