

Association of body image with physical activity, sleep, meal and smoking in obese male

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Abstract

Background and Study Aim Body image is a multidimensional construct that involves mental representations of the body, feelings, cognitions, and behaviors. The objective was to compare body image among different categories of obesity, investigate the relationship between obesity and body image, and examine the association of physical activity, meal habits, sleep, and smoking with body image.

Material and Methods Fifty-five undergraduate students Mean age 19.7 ± 0.90 were divide into three obese categories: Obese Class I ($30 < 35 \text{ kg/m}^2$), Obese Class II ($35 < 40 \text{ kg/m}^2$) and Obese Class III ($\geq 40.00 \text{ kg/m}^2$). Body Image measured through (MBSRQ-AS).

Results ANOVA revealed no significant difference among BMI categories on body image global score $F(2,52) = 0.074, p = 0.928$. Pearson product-moment correlation could not establish significant relationship between body image and BMI ($r = -0.00, n = 55, p = 0.998$). We found a strong association of smoking with body image $X(1) = 6.909, p = 0.009$. However, the statistical analysis of data could not establish any significant association of PA $X(1) = 0.044, p = 0.978$; sleep $X(1) = 2.403, p = 0.121$; and number of meals $X(1) = 0.654, p = 0.721$; with body image among obese individuals.

Conclusions The university students exhibited low body image. Higher scores on Self-Classified Weight describe how individuals perceive their weight and how they believe others perceive it. The low scores on Appearance Evaluation determine unhappiness with their physical appearance. Interestingly, most students are getting sufficient sleep, and a high percentage of the students' population is not smoking. The university needs to encourage physical activity and healthy eating behavior.

Keywords: obesity, university students, body mass index, morbid obese, severely obese

Introduction

Body image is a multidimensional construct that involves mental representations of the body, including the size and shape of body structures and feelings, cognition, and behaviors related to them [1]. In general, body image is one's attitude towards body size, shape, beauty, and assessments of emotional experiences concerning physical traits [2]. Body image is defined as the internal representation of own outer appearance [3]. This internal view of the physical self has perceptual, affective, cognitive, and behavioral components [4, 5]. The feelings and thoughts associated with the self-perception of appearance may lead to changes in behavior and ultimately affect overall functioning [5]. It is evident that body image is strongly influenced by many different factors and can be altered in certain situations [6]. It was observed that severe and morbid obesity is a stigmatized condition, where people face social exclusion, community judgment, and discrimination in many areas of their lives [7], so they experience social isolation, lack of confidence, life dissatisfaction, and negative excitements [8].

Researchers have shown body image to be an essential part of a person's self-concept and have linked it with body dissatisfaction concern that affects psychological wellbeing and traits, primarily associated with eating disorders and obesity [9-11]. Studies have indicated that body image is highly correlated with men's and women's

overall self-concept [12, 13]. A negative body image has been associated with low self-esteem [14, 15]. Negative body image and body dissatisfaction have been implicated as risk factors for various forms of psychopathology, including depression, anxiety, and disordered eating [16-19]. Consequently, persons who are dissatisfied with their bodies are likely to be at significant risk for psychological dysfunction.

Obesity is a global epidemic that affects over 650 million adults [20]. People are commonly aware that the difficulty in maintaining weight within the "normal" range of body mass index (between 18.5 and 24.9) stems from widespread environmental factors that promote overeating, physical inactivity, and passive leisure activities [21]. Physical activity was associated with overweight/obesity. Physically inactive people are more likely to gain weight and have a higher risk of obesity than those who are physically active [22, 23]. Recent studies show that university students are not sufficiently physically active as per the recommendations of the World Health Organization [24-26].

Obesity is a leading risk factor for premature mortality and numerous chronic health conditions that reduce the overall quality of life. The prevalence of obesity has increased to epidemic proportions in developed and developing countries during the past two decades. Adolescence and young adulthood may be critical periods for the development of obesity as elevated body mass

index (BMI) during this time is associated with chronic obesity, higher morbidity, and premature mortality [27,28]. There are many physical, economic, social, familial, emotional, and behavioral consequences of obesity. One of the most common psychological problems is the defect in body image [29]. In the university student population, overweight and obesity affect 23% and 14% of American undergraduate students, respectively [30].

In the Kingdom of Saudi Arabia (KSA), recent studies revealed increasing consumption of animal products and refined foods in the diet at the expense of vegetables and fruits [31]. These dietary changes were accused of increasing the prevalence of overweight and obesity observed among Saudi children, adolescents, and adults in the last few decades [32, 33]. One out of four adult males and three adult females had obesity [34]. The two most contributing factors leading to the obesity epidemic in Saudi Arabia are an imbalanced diet and lack of regular physical activities [35-38]. Studies revealed the prevalence of overweight 21.8% and obesity 15.7% among male college students in Saudi Arabia [39]; another study documented that 49.8% of male undergraduate students were overweight or obese [40].

College students are highly exposed to unhealthy eating habits, leading to body weight gain [41]. A high risk of body image and eating disorders within the college population has been found and is on the rise. The dramatic lifestyle change going from high school to college is a stressor that has been shown to influence the risk of weight gain and disrupt eating patterns in college students [42, 43]. The prevalence of obesity, body dissatisfaction, and body image appears to be increasing among the Saudi population. While looking at the reviews, we learned that there was a big gap in the literature on body image research, especially on the male population. The present study objective was to compare the body image among different categories of obesity. Other objectives were to investigate the relationship between obesity and body image; and examine the association of physical activity, meal habits, sleep, and smoking with body image.

Material and Methods

Participants

Participants were male undergraduate students from King Fahd University of Petroleum & Minerals, Saudi Arabia. We randomly selected 60 participants with BMI ≥ 30 kg/m². Online questionnaires (MBSRQ-AS and IPAQ-S) were sent to all 60 participants. Fifty-five students returned both questionnaires completed in all aspects and therefore removed five students with incomplete responses. The age of the students ranged from 18 - 25 years. Based on self-reported BMI, and according to the Center for Disease Control and Prevention, three obese categories were formed: Obese Class I ($30 < 35$ kg/m², Obese), Obese Class II ($35 < 40$ kg/m², Severely Obese) and Obese Class III (≥ 40.00 kg/m², Morbidly Obese) [44-46].

Study Design

The participants were asked to provide demographic

details (name, age, height, weight, time spent on physical activity, smoking habits, hours of sleep, and meal habits). All participants were informed regarding the aims and procedures, written informed consent was obtained prior to the enrolment, and confidentiality was ensured. Research Committee of King Fahd University of Petroleum and Minerals has approved this study through project IN191040, 29 March 2020. Exclusion criteria included anyone who did not complete a minimum of one semester in any undergraduate program; participants undergoing body image or obesity-related therapies were excluded from the study. The questionnaires body image (MBSRQ-AS) and physical activity (IPAQ-S) were prepared in google forms and sent to participants through their emails with a link. The authors sent a reminder email after seven days to ensure the highest response rate possible.

Measuring Tools

Body Image

The Multidimensional Body Self Relations Questionnaire Appearance Scale (MBSRQ-AS) is considered the most comprehensive measure for assessing body image. The 34-item version of the scale, which evaluates only appearance-related body image constructs. Precisely, the 7-item Appearance Evaluation measures feelings of physical attractiveness and satisfaction/dissatisfaction with one's looks. The 12-item Appearance Orientation subscale assesses the extent of investment in one's appearance, and the 4-item Overweight Preoccupation subscale evaluates fat anxiety, weight vigilance, dieting, and eating restraint. All items were rated on a five-point Likert-type satisfaction/dissatisfaction scale. The subscales of the current measure demonstrated excellent psychometric properties among both genders and different cultural groups. It is reliable based on internal consistency (Cronbach's alpha = .73 to .89 on the subscale level) and test-retest reliability ($r = .74$ to .91) according to the published manual [47].

Physical Activity

International Physical Activity Questionnaire (IPAQ-S) is a seven items self-reported questionnaire that measures the intensity, frequency, and duration of physical activity of respondents in the last seven days. It estimates total physical activity in MET-min/week and time spent sitting [48].

Statistical Analysis

The demographic characteristics of the data were summarized using numbers and percentages. The descriptive statistics were computed to assess the status of participants' body image. Analysis of Variance (ANOVA) was employed to compare the significant mean difference among obese groups and body image factors. The correlation coefficient was used to measure the relationship between obesity and body image. To determine the association between qualitative demographic variables and body image, Chi-square was analyzed. All statistical analyses were performed using IBM SPSS version 24.0. The level of significance for acceptance was $P < 0.05$.

Results

Demographic and other characteristics

The mean age and BMI of participants were 19.67 ± 0.90 and 34.98 ± 4.47, respectively. Based on BMI, participants were categorized into Obese Class I (30 < 35 kg/m²), Obese Class II (35 < 40 kg/m²) and Obese Class III (≥ 40 kg/m²). Out of the total 55 participants, 26 (47.3%) participants were in Obese Class I, 18 (32.7%) in Obese Class II, and 11 (20%) in Obese Class III.

Descriptive statistics based on different obese categories were presented in Table 1. The majority of participants (89.1%) in the present study were not smoking. Half of the participants (50.9) took three meals daily, while 34.5% reported taking more than three meals every day. Concerning sleep, most participants (70.9%) reported having sufficient sleep (≥ 7 hours). Participants were not active enough in the current study. More than half of the participants (56.4%) were low active, and only 7.3% were highly active. The mean body image score in this study was 2.91 ± 0.34.

Comparison of Body Image among three classes of obesity

Table 2 shows the comparison of Body Image among different categories of obesity. Participants in three obese groups were demographically similar with no significant difference age, F (2,52) = 0.436, p = 0.649. ANOVA revealed no significant difference for body image global score between categories of obesity, F (2,52) = 0.074, p = 0.928. Further, no significant difference was found for scores of body image sub scales between obese categories. Appearance Evaluation, F (2,52) = 0.078, p = 0.925, Appearance Orientation, F (2,52) = 1.162, p = 0.321, Body Areas Satisfaction, F (2,52) = 0.737, p = 0.484, Overweight Preoccupation F (2,52) = 0.668, p = 0.517 and Self Classified Weight, F (2,52) = 1.103, p = 0.340.

Relationship of Obesity Categories and Body Image

To examine relationship between body image and obesity, Pearson product moment correlation was employed. After analyzing data, we could not find

Table 1. General and Demographic Characteristics of Participants

| Participants Characteristics | Obese Class I | Obese Class II | Obese Class III | Total |
|--------------------------------|---------------------------------------|---------------------------------------|------------------------------------|-----------------|
| | BMI (kg/m ²) (30 < 35) | BMI (kg/m ²) (35 < 40) | BMI (kg/m ²) (≥ 40) | |
| Participants n (%) | 26 (47.3) | 18 (32.7) | 11 (20) | 55 |
| Mean BMI | 31.02 ± 0.96 | 38.74 ± 1.37 | 41.93 ± 2.17 | 34.98 ± 4.47 |
| Age (Mean ± SD) | 19.61 ± 0.63 | 19.83 ± 1.24 | 19.54 ± 0.82 | 19.67 ± 0.90 |
| Smoking Status n (%) | | | | |
| <i>No Smoking</i> | 21(80.8) | 17(94.4) | 11(110) | 49 (89.1) |
| <i>Smoking</i> | 5(19.2) | 1(5.6) | 0(0) | 6 (10.9) |
| Meal Status n (%) | | | | |
| > 3 Meals | 11(42.3) | 5(27.8) | 3(27.3) | 19 (34.5) |
| 3 Meals | 12(11.5) | 11(61.1) | 5(45.5) | 28 (50.9) |
| <3 Meas | 3(46.2) | 2(11.1) | 3(27.3) | 8 (14.5) |
| Sleep Status n (%) | | | | |
| >7 hrs Insufficient Sleep | 7(26.9) | 3(16.7) | 6(54.5) | 16 (29.1) |
| ≥7 hrs Sufficient Sleep | 19(73.1) | 15(83.3) | 5(45.5) | 39 (70.9) |
| Physical Activity n (%) | | | | |
| <i>Low Active</i> | 11(42.3) | 12(66.7) | 8(72.7) | 31 (56.4) |
| <i>Moderate Active</i> | 13(50) | 4(22.2) | 3(27.3) | 20 (36.4) |
| <i>Highly Active</i> | 2(7.7) | 2(11.1) | 0(0) | 4 (7.3) |
| MET Minutes Per Week | 674.03 ± 1006.54 | 601.55 ± 939.00 | 439.63 ± 459.58 | 603.43 ± 890.97 |
| Body Image (BI) | | | | |
| BI Global Score | 2.92 ± 0.39 | 2.89 ± 0.30 | 2.93 ± 0.27 | 2.91 ± 0.34 |
| Appearance Evaluation | 2.45 ± 0.70 | 2.38 ± 0.72 | 2.35 ± 0.91 | 2.41 ± 0.74 |
| Appearance Orientation | 3.06 ± 0.61 | 3.32 ± 0.73 | 3.32 ± 0.56 | 3.20 ± 0.64 |
| Body Areas Satisfaction | 2.75 ± 0.54 | 2.54 ± 0.57 | 2.69 ± 0.58 | 2.67 ± 0.56 |
| Overweight Preoccupation | 2.66 ± 0.68 | 2.84 ± 0.65 | 2.93 ± 0.88 | 2.77 ± 0.71 |
| Self-Classified Weight | 4.34 ± 0.48 | 4.52 ± 0.49 | 4.27 ± 0.51 | 4.39 ± 0.49 |

Data is shown as mean ± standard deviation; categorical variables were shown as frequency (percent) and N number of participants

significant relationship between body image Global score and BMI ($r = -0.00$, $n = 55$, $p = 0.998$).

Association of Physical Activity, Sleep, Smoking and Meal Status with Body Image

Chi-square was used to find the association between physical activity, sleep, smoking, meal status, and body image. We found a strong association of smoking with body image $X(1) = 6.909$, $p = 0.009$. The statistical analysis of data could not establish any significant association of PA $X(1) = 0.044$, $p = 0.978$; sleep $X(1) = 2.403$, $p = 0.121$; and number of meals $X(1) = 0.654$, $p = 0.721$; with body image among obese individuals. Chi-Square data was presented in Table 3. The majority of participants (76.4%) had low body image. Data in Table 3 shows that the highest number of participants (43.5%) with low body image was in the moderately active group.

With regard to smoking majority of non-smokers (72.7%) had low body image in this study. Interestingly only (12.7%) participants who had high body image are consuming three meals a day. The majority of participants

(58.2%) who were getting more than 7 hours of sleep had reported signs of low body image.

Discussion

Body image is an essential component of self-image. Obesity is a leading risk factor for premature mortality and numerous chronic health conditions that reduce the overall quality of life. The objective was to assess and compare the body image of young male students among different obese categories, investigate the relationship between body image and obesity, and examine the association of physical activity, meal habits, sleep, and smoking with body image.

Overall, the sample had a low body image when the overall means of each of the five body image subscales were examined. The mean for four of the five subscales was slightly above three; therefore, the participants were trending towards a more negative overall body image. The highest body image subscale mean was in the Self-Classified Weight Subscale, with a mean of 4.39, and the lowest mean, 2.41, was found in the

Table 2. ANOVA, Comparison of Body Image among different obese category

| Variable | Obese Class I | Obese Class II | Obese Class III | P Value |
|--------------------------|---------------|----------------|-----------------|---------|
| BI Global Score | 2.92±0.39 | 2.89±0.30 | 2.93±0.27 | 0.928 |
| Appearance Evaluation | 2.45±0.70 | 2.38±0.72 | 2.35±0.91 | 0.925 |
| Appearance Orientation | 3.06±0.61 | 3.32±0.73 | 3.32±0.56 | 0.321 |
| Body Areas Satisfaction | 2.75±0.54 | 2.54±0.57 | 2.69±0.58 | 0.484 |
| Overweight Preoccupation | 2.66±0.68 | 2.84±0.65 | 2.93±0.88 | 0.517 |
| Self-Classified Weight | 4.34±0.48 | 4.52±0.49 | 4.27±0.51 | 0.340 |

Data is shown as mean ± standard deviation

Table 3. Association of Physical Activity, Sleep, Meal Status and Smoking with Body Image (Chi Square)

| Variables | High Body Image, n (%) | Low Body Image, n (%) | P Value |
|-------------------------------|------------------------|-----------------------|---------|
| Overall | 13(23.6) | 42(76.4) | |
| Physical Activity (PA) | | | |
| Highly Active | 1(1.8) | 3(5.5) | |
| Moderate Active | 7(12.7) | 24(43.6) | 0.978 |
| Low Active | 5(9.1) | 15(27.13) | |
| Smoking | | | |
| Non-Smoking | 9(16.4) | 40(72.7) | 0.009* |
| Smoking | 4(7.3) | 2(3.6) | |
| Meal Status | | | |
| <3 Meals | 5(9.1) | 14(25.5) | |
| > 3 Meals | 1(1.8) | 7(12.7) | 0.721 |
| 3 Meals | 7(12.7) | 21(38.2) | |
| Sleep Status | | | |
| >7 hours Insufficient Sleep | 6(10.9) | 10(18.2) | 0.121 |
| ≥7 hours Sufficient Sleep | 7(12.7) | 32(58.2) | |

Data is shown numbers (n) and percentages (%)

Appearance Evaluation Subscale. These values indicate that participants believed their current weight status was similar to how others perceive them as obese. Lower scores on Appearance Evaluation means unhappiness with physical appearance or dissatisfaction individuals are with their looks.

In our study, most university obese male youth are less physically active 56.4%, and only 7.3% were highly active as per the MET minutes per week. Results reported that 85.4% of participants were taking three or more meals per day. Regarding sleeping time, 70.9% of participants have a sufficient sleep that is ≥ 7 hours sufficient sleep. Interesting to note that the majority of the obese students, 89.1% were non-smokers.

The results of the study revealed that participants had high scores on appearance orientation and body area satisfaction. However, no significant difference was observed that reflects how they pay attention to their appearance and engage in extensive grooming behaviors. They contented with most areas of their body. In the current study, most of the students were enrolled in freshman courses, and Blair and colleagues reported that freshman courses were at higher risk for eating disorders and body shape dissatisfaction [49]. The study results revealed no significant differences in body image global score and its subscales among different categories of obesity.

Scores in all three categories were quite similar to each other. This homogeneity may have affected the body image. Further, no significant relationship between body image and obesity was observed. In this study, participants were all obese, so they had no considerable variability in body mass index. Body image is the subjective component of one's body image and the degree of satisfaction with one's body size or specific body parts [50]. Another reason may be shortcomings in self-reporting by the participants, while self-reporting participants may overestimate and underestimate psychopathology [51].

The study did not find any significant relationship between the level of physical activity and body image. Based on the results from the number of days engaged in physical activity and the number of minutes per day, many of the students in this study were not meeting the American College of Sports Medicine recommendations on physical activity. Studies have also found that physical activity behaviors decrease during the transition from high school to college [52, 53], partly explaining why the college population sampled was not meeting physical activity requirements.

Previous research has found that students engage in intense study periods, often working long hours and neglecting diet and appearance [54]. A recent study on the male population revealed no relationship between physical activity and body image satisfaction [55]. Findings of previous studies on athletes noted that although athletes engage in high levels of physical activity, they can also report body image dissatisfaction depending on the type of sport [56-59]. The relationship between physical activity and body image satisfaction is neither simple nor direct.

The majority of participants getting sufficient sleep seven hours or more, but it was observed that no significant association with body image. The result was not in line with our findings; previous studies found that bodyweight dissatisfaction has been associated with sleep impairment [60].

In the present study, 65.4% of participants take three or more meals per day. However, no significant association of meals with body image recognized. Our finding did not support previous study that suggested meal patterns and food consumption were associated with body dissatisfaction and overfat status among adolescents [60]. Some previous studies reflect that the number of meals taken a day was inversely related to obesity [61-63]. Body image (dis)satisfaction and perception were associated with food consumption (processed foods and ultra-processed food) [64].

It is fascinating those participants in this study, 89.1% student population, were not smoking. The percentage of non-smokers was similar to an earlier study conducted on university males in Saudi Arabia [65]. The results of the study revealed that a strong association between smoking and body image.

Limitations and Implications

One limitation of the study was that a convenience sample was utilized. The sample of this study is undergraduate students from just one university in the eastern province of Saudi Arabia; thus, generalization of results was not recommended. As in any study that relies on self-report, there are questions of possible bias, including the possibility of the students' overestimating or underestimating specific behaviors associated with participation in physical activities and body weight. We recommend conducting studies with a more heterogeneous sample. More awareness of university support services needs to be present across the campus. The university need to encourage physical activity healthy and eating behaviors. More awareness of healthy food items throughout campus dining centers would encourage on-campus students to make healthier choices. We also recommend special programs on body image, weight management, and nutrition management for obese students to improve their quality of life.

Conclusions

The university students exhibited low body image. Higher mean scores on Self-Classified Weight describe how individuals perceive their weight and how they believe others perceive it. The low scores on Appearance Evaluation determine unhappiness with their physical appearance. The results indicated no significant difference between obese categories and body image. No correlation was established between obesity and body image. A high percentage of the students' population is not smoking. The university needs to encourage physical activity and healthy eating behavior. Body image is viewed as a multi-dimensional concept, and to understand better needs more interventional studies.

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Conflict of interests

The authors have no conflict of interests to declare.

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