



The Relationship of Perceived Body Image, Body Mass Index and Physical Activity with Weight Status among Students at King Abdulaziz University Hospital

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aim: Identify the relation between poor esteem for body image and weight-related behaviors. The results will help increase awareness and improve students' lifestyles to have a better body image and achieve ideal body weight.

Methods: A cross-sectional study was conducted among King Abdulaziz University medical students (n= 460) between July to the end of August 2019. Data was collected using the International physical activity questionnaire (IPAQ), figure rating scale (FRS) and analyzed using SPSS software.

Result: The results showed that the average Body Mass Index (BMI) was 24.80 ± 11.89 .

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Participant sex was an important factor influencing the prevalence of obesity; male students were more obese than female students with a significant difference ($p < 0.001$). The level of body satisfaction was also affected by gender. Students in preclinical years were more likely to gain weight more than clinical years students.

Conclusion: The results show a significant relationship between body satisfaction and gender ($P < 0.0001$) despite having diverse BMIs. Overweight and obese males and females' participants had the lowest body satisfaction. Females who were too thin and had low BMIs described themselves as normal, while males describe themselves as too thin. Conversely, females with high BMIs described themselves as too fat, while males described themselves as normal. This could be due to different factors. Also, underweight females and males have high body satisfaction, which can lead to dangerous behaviors to maintain low body weight which cause negative health consequences.

Keywords: Students; public health; weight; physical activity; body image; body mass index.

1. INTRODUCTION

Obesity is a major global health problem; its propagation has risen dramatically over the last years. Depending on World Health Organization (WHO), the prevalence of obesity worldwide has increased three more times from (1975 to 2016). Around 1.9 billion adults were reported overweight; of these, 650 million were obese [1]. Also, there has been an increase in the attention given to the relationship between body image (BI) and obesity. At the same time, many people do not sufficiently understand the meaning of overweight and obesity. Several studies have shown misperceptions of weight status by adults [2]. The body mass index (BMI) is a metric measurement used to assess body weight status. It can be calculated by dividing the weight over height. The BMI is beneficial in detecting individuals with abnormal weight in proportion to their height [3,4]. We can define the "body image" as one's perceptions, thoughts, and emotions towards their body [5]. Different factors play important roles in influencing this image, such as psychological components, socio-cultural effect, and the media, which leads a person to search for the ideal body. This creates real pressure and body dissatisfaction which is a risk factor for serious problems such as eating disorders [6]. Studies showed that awareness of being overweight or obese is a crucial factor to start following weight-related behaviors. Therefore, a key to improving health and weight control is proper self-weight [7]. Incorrect weight perception among overweight and obese people was associated with less interest in weight loss attempts and lower physical activity levels [8]. When obese Females perceive themselves as being obese, they gain less weight over time and attempt to lose weight, while those who perceive themselves as being overweight or normal gain more weight. This indicates that people with real

body size perceptions are associated with less weight gain [9]. Normal or under-weight teenagers, who perceive themselves as being overweight, are at risk for malnutrition [10]. So, it is important to identify those in need of intervention, early diagnosis, and, therefore, treatment. Awareness of being overweight or obese is an essential factor for successful weight loss in both males and females [7]. Body mass index is related to different levels of body satisfaction in teenagers according to gender. It has been reported that females with low BMIs demonstrate greater body satisfaction than females with normal or high BMIs. Conversely, satisfaction with body image was higher in males with normal and low BMIs in comparison with males with high BMIs [11]. A cross-sectional study carried out in 2019 on university students in Sharjah, UAE, found that families are a strong influence on eating disorders among young adults [12]. Another cross-sectional study among King Faisal University students from March to May 2012 revealed that people with high BMIs are more susceptible to having body-shape dissatisfaction [13]. There are not enough studies exploring body-image satisfaction, weight change patterns, and body-image perception among undergraduate medical students in Saudi Arabia, especially in Jeddah, who are more susceptible to obesity because of their stressful environment [14,15]. We hypothesize that body satisfaction will be higher in normal-weight males and underweight girls in comparison with other BMI statuses. This cross-sectional study aims to identify the relation between poor esteem for body image and weight-related behaviors. The results will help increase awareness and improve students' lifestyles to have a better body image and achieve ideal body weight.

2. METHODS

This cross-sectional study was performed at King Abdulaziz University Hospital (KAUH). It was carried out from the first of July to the end of August 2019. Respondents were drawn from the KAUH undergraduate medical student resulting in a sample size of 460 volunteer medical students. Data were collected using a self-administered electronic questionnaire that combined the International Physical Activity Questionnaire (IPAQ) and the Figure Rating Scale (FRS). The questionnaire that we used in our study was taken from the “Body Mass Index Perception, Body Image Dissatisfaction and Their Relation with Weight-Related Behaviors among University students” article [2]. The questionnaire included 33 items divided into six sections. The participant who was non-medical students, students who were graduates, or did not give full anthropometric measures were excluded from the study. The sample contained equal proportions from the five educational levels to make it as representative of the student population as possible.

2.1 The Figure Rating Scale (FRS)

Body image perception was assessed by the FRS. Participants were asked “Which figure best represent your current body size” and to choose the score that corresponded to their figure from a

scale ranging from 1 to 9. The participants were also required to state the “ideal” figure they desired (Fig. 1).

2.2 Body Image Satisfaction (BID)

Respondents were asked, “How do you feel about your body size right now?” and instructed to choose from three mutually exclusive categories: very satisfied, somewhat satisfied, not satisfied.

2.3 Weight Perception

Participants were asked to describe their body weight, “How would you describe your body?” using the following responses: Too thin, Thin, Normal, Fat, or Too fat.

2.4 Diet-Related Practices

Participants were asked if they were dieting at the time of the survey (replies were yes/no), if they followed a diet to either lose or gain weight and about the type of diet they followed.

2.5 Physical Activity Questionnaire

Physical activity was assessed using the short form (7 questions) of the IPAQ [16].

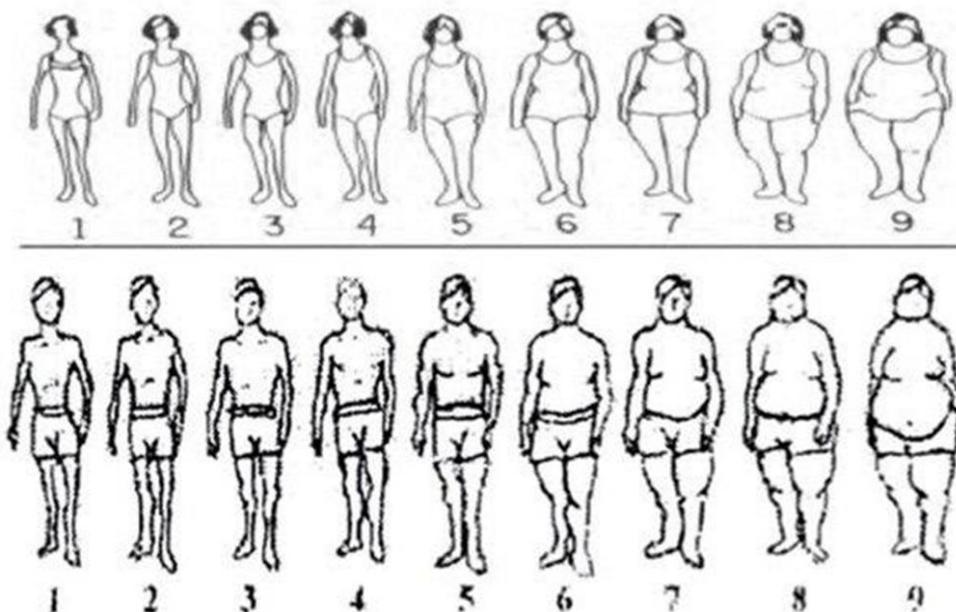


Fig. 1. The Figure Rating Scale (FRS)

2.6 Demographic and Anthropometric Measurements

Sociodemographic data were gathered using a questionnaire including information about age, sex, nationality, smoking status, educational level, and marital status. The students were also asked about self-reported measures of height in meters and weight in kilograms, from which BMI was calculated as weight in kilograms(kg) divided by height in meters squared. The participants' BMIs were divided into four classes based on the World Health Organization (WHO) classifications (underweight, BMI <18.5; normal, BMI 18.5–24.9; overweight, BMI 25.0–29.9; obese, BMI ≥30.0).

2.7 Data Entry and Statistical Analysis

The data from the questionnaires were entered into a Microsoft Excel 2010 worksheet. Data were coded and analyzed using IBM SPSS Statistics (Version 22.0). The Chi-square test was used to study the relationships between the categorical variables. P values less than 0.05 were considered significant.

3. RESULTS

In our cross-sectional study, a total of 460 students participated: 253 females (55%); and 207 males (45%). Other student characteristics are shown in Tables 1 and 2.

The mean BMI was 24.80 ± 11.89 . Regarding participant sex, there was a statically significant difference ($P < 0.001$), which means the prevalence of obesity was higher in the male students, 54 (26.1%), than the females, 25 (9.9%). The majority of the female students, 140 (55.3%), weighed within the normal range, and 64 (25.3%) were overweight or obese. On the other hand, the majority of male students, 81 (39.1%), weighed within the normal range. Regarding the relationship between sex and dieting, the proportions of women and men who were following a diet (27.7% and 24.6%, respectively) were not significantly different ($P = 0.530$). The majority of women who were following a diet (85.7%) wanted to lose weight. Also, 76.47% of the men were dieting to lose weight, and 17.6% were on a diet to gain weight. Half of those who followed a diet were overweight or obese, 67 (55.3%). Despite this, 110 (32.5%) of those who were overweight or obese did not follow any diet. Our research shows that there is a difference in the level of body satisfaction between both genders

($P < 0.001$). Underweight women (20.8%) were more satisfied with their bodies than underweight men (15.4%). In addition, 6.7% of the overweight men were satisfied with their bodies, and none of the overweight women were satisfied with their bodies. More details are shown in Table 3.

Monthly family income and educational level did not affect the level of body satisfaction. The results show that 20.1% of the students in the preclinical years were obese and more susceptible to gaining weight than the students in the clinical years, who represented only 10.7% of the obese category.

The results show that 20.1% of the students in the preclinical years were obese and more susceptible to gaining weight than the students in the clinical years, who represented only 10.7% of the obese category.

Body image perception was assessed using the body-silhouettes victimization methodology. Table 4 shows the results by sex with mention to the BMI connected (approximately) to each silhouette, bearing in mind, studies show that more girls (46.7%) than boys (44%) select the silhouettes corresponding to normal BMI (2-4).” Taking into consideration the actual BMI and body perceptions of participants who selected silhouette number two, 46 (20.8%) had normal BMIs, and 34 (55.7%) were underweight. Of those who chose silhouette three, 6 (6.1%) were overweight; and 54 (24.4%) had normal BMIs. Finally, in the case of silhouette four, 13 (13.3%) were overweight, and 73 (33%) had normal BMIs.

For physical fitness, among participants who chose silhouettes 2 to represent their body image, 37 (17.1%) said that they engage in vigorous physical activities, and 23 (14.1%) practice moderate physical activities. However, for those who chose silhouette number four, 46 participants (18.9%) said they practiced vigorous physical activities; and 34 (20.9%) engaged in moderate physical activities. Moreover, among participants who selected silhouette number 5, the proportion who engaged in vigorous physical activities was 47 (21.8%); and moderate physical activities was 32(19.6%). However, 46 (18.9%) of the participants who did not practice any vigorous physical activities selected silhouette 4.”

4. DISCUSSION

Body image and body shape create a complex concept, where the body image represents “the

subjective and intangible.” Contrariwise, body shape is “an objective and external measure of the human being.” The importance of each image and form is that humans communicate and socialize through them, and once one in all of them is affected, communication becomes non-assertive [17,18]. The results show a significant relationship between body satisfaction and gender ($P < 0.0001$) despite having diverse BMIs. Overweight and obese male and female participants had the lowest body satisfaction (65% and 88%). Studies have proven that men of normal weight show greater body satisfaction than men who are overweight. However, underweight females displayed higher body satisfaction than normal and overweight females. A study conducted in Poland demonstrated that underweight females had the lowest body dissatisfaction, whereas underweight males had the highest [5]. And in a study from Sharjah, UAE, most of the participants were dissatisfied with their body shape (249/308; 80.9%), with an almost similar distribution among males (120/150; 80%) and females (129/158; 81.6%) [2]. Ferrari et al. found that about 70% of university students in Brazil were dissatisfied with their body shape [19], and in a study from India, 19% of the participants reported being unsatisfied or very unsatisfied with their body image [20]. Moreover, in the Sharjah study, most males desired to gain more weight, whereas most females aspired to lose weight [2]. The reason behind that can be that underweight males perceive their muscles to be too small, which influences their decision to build muscle bulk. However, females are affected by the traditions and cultural patterns that promote thin bodies as a major standard for beauty and attractiveness. That is why we can extract different body images through BMI and gender [2,11,21-26]. Many serious negative effects and psychological issues appear in females as a result of their obsessive behavior towards their body image and their need to have an ideal thin body [6,11]. In our study, females who were too thin and had low BMIs described themselves as normal, while males described themselves as too thin. Conversely, females with high BMIs described themselves as too fat, while males described themselves as normal. This could be due to different factors: gender influences [27], socio-cultural patterns, and media images [28]. Radwan et al. reported a significant positive association between BMI and body image concerns. They reported that as the BMI rises, the Body Shape Questionnaire (BSQ) score also

rises and, therefore, increases the risk of the development of eating disorders (ED). This means that high BMIs predict greater body dissatisfaction and anxiety [17]. This illustrates that males possibly pay less attention to their nutritional status or don't consider it as a problem, leading to the consequences of chronic degenerative diseases associated with obesity [6]. On the other hand, a study from India shows that the majority of underweight and overweight females perceived themselves as normal (72% and 88.9%, respectively), with a weak positive correlation between participants' actual BMI category and their image perception ($\rho = 0.297$, $P = 0.018$), which indicate a lack of awareness about the healthy-body image [20]. Regarding physical activity, either moderate or vigorous, and following a diet, there was a difference in the rate between male and female students, where female students followed diets more than their male counterparts, without significant difference (57.9% vs. 42.1%, $P > 0.05$). In addition, the portion of males engaging in physical activities was significantly higher than the females (52.8% vs. 47.2%, $P = 0.001$). One of the studies from Sharjah presented similar results, females tended more to follow diets (61.4%) than practice exercise (25% engaged in physical activities), while 56.2% of the males practiced exercise, and only 38.6% were following diets [2]. Also, in a study from Italy, men were more physically active than women, practicing more physical activity weekly (6.7 ± 4.2 h/week vs. 4.2 ± 3.8 h/week; $P < 0.0001$) [6]. Limited facilities and social traditions are some of the causes for low physical activity among females in Saudi Arabia [13]. In this study, depression among females due to low body satisfaction could be a cause for the low level of physical activity by decreasing their desire to exercise. This reason was reported and confirmed by several researchers: low body satisfaction acts as an obstacle to participating in physical activity, especially among females, the lower the physical activity levels [29,30]. Overall, an interesting finding during this study is that even with the low number of participants who were overweight or obese (less than a fourth), a high rate of body dissatisfaction (BID) was noted. This might be explained by the concept that BID is a subjective element of an individual's body image and, therefore, represents the level of satisfaction with one's own body size or actual body components; whereas BMI is an actual product of one's height and weight. This is often of concern since BID has been found to be associated with eating disorders.

Table 1. Characteristics of participants (N =460)

| Variables | | Frequency (N=460) | Percent |
|----------------------------|----------------------------|--------------------------|----------------|
| Gender | Female | 253 | 55 |
| | Male | 207 | 45 |
| Educational level | Preclinical | 191 | 42 |
| | Clinical | 269 | 58 |
| Smoking status | Smoker | 78 | 17 |
| | Nonsmoker | 360 | 78.3 |
| | Ex-smoker | 22 | 4.8 |
| Nationality | Saudi | 437 | 95 |
| | Non-Saudi | 23 | 5 |
| BMI* levels (BMI: Kg / m2) | Underweight (<18.49) | 62 | 13.5 |
| | Normal Weight (18.5-24.99) | 221 | 48 |
| | Overweight (25-29.99) | 98 | 21.3 |
| | Obese (>30) | 79 | 17.2 |
| Follow diet | Yes | 121 | 26.3 |
| | No | 339 | 73.7 |
| Why follow diet | To lose weight | 99 | 21.5 |
| | To gain weight | 10 | 2.2 |

*BMI: body mass index

Table 2. Sociodemographic and general characteristics of participants (N=460)

| Variable | Mean ± SD |
|-------------------------|------------------|
| Age | 21.978±1.7085 |
| Weight (kg) | 67.54±20.858 |
| Height (cm) | 165.41±11.025 |
| Body mass index (kg/m2) | 24.8044±11.897 |

Table 3. Association of participants' satisfaction about their body image with their body mass index and education level

| *BMI | Satisfaction about their body image | | | P value |
|----------------------------|--|---------------------------|----------------------|----------------|
| | Very satisfied | somewhat satisfied | Not satisfied | |
| Underweight (<18,49) | 13(21%) | 31(50%) | 18(29%) | 0.0001** |
| Normal Weight (18.5-24.99) | 47(21.3%) | 142(64.3%) | 32(14.5%) | |
| Overweight (25-29.99) | 4(4.1%) | 49(50%) | 45(45.9%) | |
| Obese (>30) | 0 | 22(27%) | 57(72.2%) | |
| Educational level | | | | |
| Preclinical | 23(12%) | 104(54.5%) | 64(33.5%) | 0.117 |
| Clinical | 41(15.2%) | 140(52%) | 88(32.7%) | |

Table 4. Body Image perception classified by BMI and Sex

| Variable | Silhouettes | | | | | | | | | P value |
|---------------|-------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---------|----------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| Female | 24(9.5%) | 50(19.8%) | 44(17.4%) | 68(26.9%) | 32(12.6%) | 19(7.5%) | 9(3.6%) | 6(2.4%) | 1(0.4%) | 0.0001** |
| Male | 5(6.3%) | 32(15.5%) | 20(9.7%) | 21(10.1%) | 49(23.7%) | 42(20.3%) | 22(10.6%) | 12(5.8%) | 4(1.9%) | |
| BMI*-category | | | | | | | | | | |
| Underweight | 20(32.8%) | 34(55.7%) | 4(6.6%) | 3(4.9%) | 0 | 0 | 0 | 0 | 0 | 0.0001** |
| Normal | 9(4.1%) | 46(20.8%) | 54(24.4%) | 73(33%) | 31(14%) | 6(2.7%) | 1(0.5%) | 1(0.5%) | -0 | |
| Overweight | 0 | 1(1%) | 6(6.1%) | 13(13.3%) | 41(41.8%) | 28(28.6%) | 8(8.2%) | 1(1%) | 0 | |
| Obese | 0 | 0 | 0 | 0 | 9(11.4%) | 27(34.2%) | 22(27.8%) | 16(20.3%) | 5(6.3%) | |

5. CONCLUSION

The findings of the current study covered the knowledge of the relationship between body satisfaction, BMI, and body image. The findings indicated that BMI and gender can be associated with different body satisfaction among university students. Underweight females and males have high body satisfaction, which can lead to dangerous behaviors to maintain low body weight, which causes negative health consequences. On the other hand, underweight individuals with higher body satisfaction were more ready to participate in healthy weight control behaviors than their peers who were dissatisfied with their body image. This means that while designing programs aimed to prevent obesity and improve body image, there is a need to apply a holistic approach and not only focus on the weight, where participants should be provided with information about the negative physical and psychological consequences of being either underweight or overweight, and how to keep normal body weight through healthy weight control behaviors. This study can provide helpful information for designing effective health promotion programs that are tailored to students' needs. Also, there is a need for further studies to detect the factors associated with the low rate of females doing physical activities in order to control these factors and eliminate them. Awareness and education programs should be disseminated in academic settings to encourage healthy weight concepts and improve recognition of proper body image perception among all students.

6. LIMITATIONS AND STRENGTHS

This study has some limitations. First, the study was limited only to medical students from the second year to the sixth year in a single medical college, which affects its generalizability. Second, The BMI calculations were based on self-reported measures of weight and height, which may have caused inaccuracy owing to response bias. Body dissatisfaction has not been assessed by means of a specific instrument. The body silhouettes method is based on self-reporting. Then, it is possible to analyze differences with respect to self-reported weight or actual weight as well as other measures. In this study, we emphasized some self-reported measures more than body image dissatisfaction scores as usually are measured by several questionnaires. This study also has strengths. The response rate of the sample size is high.

Also, this study is the first of its type to be done in our institution. We recommended that future research includes face-to-face interviews to avoid the possibility of false positives.

DISCLAIMER

The products used for this research are commonly and predominantly used products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company; rather, it was funded by the personal efforts of the authors.

CONSENT

As per international standards or university standards, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

Ethical approval was taken from the institutional review board (IRB) of KAUH (Reference No 614-19).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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