Original Research Article

The Association between Psychological Distress and Body Mass Index among Young Adults in Saudi Arabia

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Abstract

Objectives: To evaluate the association between psychological distress and BMI among young adults in Saudi Arabia. Methods: A cross-sectional study based on an 18-question self-reported survey on psychological distress was distributed to the students of KSAU-HS, KAU, and intermediate and high school students during the academic year of 2013-2014. According to the level of psychological distress, the participants were divided into three main groups using Kessler K6 scoring system, which is validated by the Australian National health Care Center (Health direct Australia) standards. The three groups are: (High range category K6= 30-20, Moderate range category K6= 19-12, Low range category K6= 11-6). We compared the mean levels of body mass index (BMI) to the three groups of psychological distress. Results: There were 722 participants with median age of 20 years, included in the final analysis. The higher BMI participants were associated with high Kessler K6 score; however, this correlation was not statistically significant. The correlation of Kessler K6 score across genders revealed that females have higher Kessler K6 scores than males \((p-value < 0.0001)\). In addition, married participants scored statistically significant higher Kessler K6 scores than single \((p-value < 0.0001)\). Other correlation of psychological distress with changes in Sleep hours and physical activity was statistically insignificant. Conclusion: Although the association between psychological distress and BMI was not statistically significant, there was a positive trending correlation between mean BMI and increasing psychological distress score. On the other hand, there were strongly significant correlations between female gender and married participants to increasing psychological distress.

Keywords: Psychological distress, Body mass index, adolescence

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Introduction

Young adults (15-29 years old) all over the world face great deal of difficulties in their daily life. This age group contains high school students, college students, and post graduates. Studying textbooks, doing assignments, taking exams, deciding their specialties, leaving home, looking for jobs, and initiating a life careers are some examples of stressors they might face. These stressors are not without negative consequences. The stress experienced by students might affect their general health, which in turn may have a negative impact on their academic performance. This negative impact on health can be exaggerated if associated with obesity (1).
Obesity, which is defined by a Body Mass Index (BMI) greater or equal to 30 is linked to a wide range of health threatening medical conditions such as cardiovascular diseases, diabetes mellitus, musculoskeletal disorders, and many others (2). Recently, the American Medical Association (AMA) has recognized obesity as a disease by itself that requires medical attention and treatment (Cite).

According to a recent report by the World Health Organization (WHO), in 2014, 13% of adults aged 18 years and over are obese (3). In Saudi Arabia, which is a young nation, 66.89% of the population is under the age of 64 years old and those below 15 years constitute about 30.37% of the total population (4). Obesity in 15 years and younger in our population is one of the highest in the world. It is considered a major concern of health, as obese children becomes obese adults particularly if it was at adolescence (5). In addition, the prevalence of obesity among females is higher than that of males (39.1% - 28.6%) respectively (6).

Many studies have suggested that prolonged stress causes the release of a hormone called cortisol which, causes weight gain and central obesity (7). A study, conducted on law enforcement officers in United States, showed a strong positive correlation between psychological distress and obesity defined by BMI (8). Psychological distress is the fifth leading cause of disability in Saudi Arabia (9).

Our study will discuss the stress level variation between males and females in our local population. Typically, males in Saudi Arabia endure most of the financial burdens associated with marriage even if the wife is working according to the Islamic teaching. This stressor will be added as an addition to the stress that is usually concomitant with marriage. On the other hand, females have to overcome their own set of difficulties. The conservative nature of the Saudi society may influence the idea of female dependence on their male chaperons. A prominent example are transportation-related issues, in which females need to be dependent on their chaperons or private drivers for transportation (10).

In general, the social stigma associated with mental disorders could prevent people from reporting psychological symptoms or even seeking help when needed. This may explain the shortage of psychological health studies info from Saudi Arabia and the estimated high prevalence of sub clinical psychological cases.

This paper will assess the association between psychological distress and BMI in individuals who responded to the study questioner over eight-week period. This particular association is an issue that has never been studied in our population. However, the increasing rate of incidence and prevalence of obesity in Saudi Arabia is might be associated with increasing socioeconomic status of the country for the last 30 years, predicting a worsen situation in the nearby future (11). In addition, this study aims to spread the awareness about the mental health and its relationship with obesity, the importance of seeking help, and eradicating the social stigma associated with mental disorders.

Methods:

This is a cross-sectional study based on an 18 questions survey (attached in the appendices A1 with participation consent form A2) The data for this study was obtained from a self-reported questionnaire that was distributed to the students. The study includes all students (722 participants) of KSAU-HS, KAU, intermediate and high school students who received a hard copy of the questionnaire and agreed to participate voluntarily in this study. They were asked to fill it out during the lecture time, subsequently hand it back to the research team through their representatives. In addition, an electronic form of the same questionnaire was designed using SurveyMonkey (an electronic platform for designing and collecting data via surveys). The link of the survey was distributed using Twitter aiming for graduate and post-graduate students. Through the SurveyMonkey platform, the data was automatically added and stored in a downloadable spreadsheet. This study focuses mainly on the association between the BMI and Psychological distress. However, we took into consideration the effects of other covariates, which will be discussed below. Moreover, the participants were asked to answer a 6 questions based on Kessler K6 criteria in order to assess the level of psychological distress. This study is approved by the Research Office of the college of medicine at King...
Saud bin Abdulaziz University for Health Sciences (KSAU-HS).

BMI as an Outcome Variable:

In this study BMI is used as a parameter to indicate obesity as an outcome variable. In order to calculate BMI, the subjects were asked to provide their height in centimeters (cm) and weight in kilograms (kg). Then we divided the weight in kg by the corresponding height in meters squared ($\frac{kg}{m^2}$).

According to the BMI result, the participants will be put into three categories (BMI < 24.99 kg/m² for underweight/normal, BMI 25-29.99 kg/m² for overweight, BMI ≥ 30 kg/m² for obese).

Psychological Distress as an Exposure Variable:

In this study Kessler K6 criteria is used to indicate psychological distress levels as an exposure variable. The Kessler K6 criterion has been widely used with approved validity as a screening method for psychological distress to assess the presence of a severe mental health disorder (12). The participants were asked to answer six key questions. Every question has five possible answers. The Kessler K6 criteria composed of the following six question: “during the last 30 days, how often do you feel (anxious, desperate, bored, very depressed that nothing cheer you up, require an effort to do something, you have no value). The answers categories based on the Australian National health Care Center (Health direct Australia) standards are: [always (score: 5), often (score: 4), some of the time (score: 3), rarely (score: 2), never (score: 1)] with a possible total score range from 6 to 30 point (13). According to the result the participants were categorized into three psychological distress groups: (High range category K6= 30-20, Moderate range category K6= 19-12, Low range category K6= 11-6). People in the high/moderate range categories are more likely to develop severe mental health disorders and need medical care. People in the low range category are usually considered in well mental status and they may benefit from the test to assist early intervention and further protective actions.

Covariates:

In this study we have also assisted the impact of stress-related covariates, which have been associated with increased psychological distress. The covariates included in this study are age, gender (male/female), marital status (single/ married), educational status (student/ graduate employed/ graduate unemployed), educational level (school student/ college student), the presence of chronic illness (presence), smoking (presence, amount, frequency), previous mental disorders (presence), sleeping hours (deprivation/ increment), and physical activity (presence and duration).

Data Management and Analysis Plan:

In order to process the data we used simple descriptive statistic. To explore our data, mean and standard deviation (S.D) were used to represent for normally distributed continuous variables, median and quartiles for skewed data. All proportions were represented in percentages. The comparison between two means was done using two independent sample t-tests. A chi-square test ($x^2$) for comparison between groups with $p-value < 0.05$ was considered significant.

Ethical considerations: Ethical committee approval is attached in appendices A3

Results:

Demographic data

Our sample was 722 participants. Their median age was: 20 year-old (minimum: 14, maximum: 57, IQT: 6) and 51.2% of them were females (n=370). 71.1% of our sample were from Jeddah, 13.4% were from Makkah, 7% were from Riyadh, 2% were from Madinah, and the rest were from all over the country. 20.9% of them were married. In terms of the employment status: 78.2% of the sample was students, 11% were employed, and 10.8% were unemployed. College students constituted 47.17% of the total population (n=334). In terms of the co-morbidities, 15% of them were suffering from different co-morbidities (atopy: 6.5%, asthma: 5.1%, diabetes: 2%, hypothyroidism: 1%). In our sample, the smoking prevalence was about 6.8%. The BMI mean was 24.2 with S.D: 6.77, and the Kessler K6 score mean was 15.8 with S.D: 5.11. Regarding the number of hours slept per day: 56% of the sample sleep between 6 and 8 hours, 24.3% sleep more than 8 hours, 19.7% sleep less than 6 hours. In terms of the physical activity done per week, our sample had a median of 3 hours per week. 22% of them have
less than one hour per week of physical activity and 20.7% have one to two hours per week of physical activity. The frequency of distribution of Kessler k6 scores and BMI scores is visualized in graph no. 1 and no. 2, as seen in our population. In the following correlational analysis only significant results were presented with a \( r = value \).

Graph 1: The Frequency of distribution of BMI scores as Seen in our population

Graph 2: The Frequency of Distribution of Kessler K6 Scores As Seen In Our Population

**Correlation studies**

**Correlation between BMI and the Kessler K6 Score:**

There is a positive correlation between BMI and Kessler K6 score; higher BMI participants have high Kessler K6 score. However, this correlation was not statistically significant. The correlation can be visualized in graph No.3.

**Correlation between Number of Hours Slept per Day and Kessler K6 Score:**

When comparing the number of hours slept per day to the Kessler K6 score, there was no statistically significant difference in their mean score.

**Correlation between Physical Activity and Kessler K6 Score:**

A comparison between physical activity represented by number of exercise hours per week and Kessler K6 score showed no significant statistical correlation between them.

**Correlation between the presence of Co-morbidities and BMI:**

In a subgroup analysis that focused on the participants with co-morbidities (n=103) in correlation to their BMI, a statistically significant higher BMI values were linked to the presence of a co-morbid status \( r = value < 0.002 \).

**Correlation between Gender and BMI:**

When comparing our female participant (n=367) to males (n=328) in regard to their BMI results, no statistical variance significance was found.

**Correlation between Gender and Kessler K6 Score:**

When comparing the Kessler K6 score between males and females using independent sample t-test, there was statistically significant higher Kessler K6 score in female participants than males \( r = value < 0.0001 \).

**Correlation between Marital Status and Kessler K6 Score:**

When comparing the Kessler K6 score between married and single participants using independent sample t-test, there were statistically significant higher Kessler K6 score in married participants than singles \( r = value < 0.0001 \).

**Correlation between Educational level and Kessler K6 Score:**
In subgroup analysis based on the educational level, we found the college students have prominent higher Kessler K6 scores than others with a \( (p - \text{value} < 0.0001) \).

Graph 3: The Correlation between BMI and Psychological Distress (Kessler K6 Scores) as depicted by scatter plotting.

Discussion:

This study investigates the presence of a positive correlation between increasing BMI and increasing psychological distress in a section of students ranging from middle school to college graduates. Our analysis revealed the presence of a positive trend between higher BMI results across participants and higher levels of psychological distress (higher Kessler K6 score), however, this correlation was not statistically significant. An analysis of the associated covariates revealed a positive association of increasing psychological distress with the female gender along with married participants. Other correlation of psychological distress with changes in Sleep hours and physical activity was statistically insignificant.

Many previous studies have explored this relationship in different populations and came up with different conclusions. One study was conducted on law enforcement officers in the United States of America, showed a positive relationship between BMI and Psychological distress with prominent statistical significance in females using the Kessler K6 scoring system (8). Another literature review that investigated the association between workload and body weight showed no support of any association (14). However, there were no studies that investigated this association before in students. This group was of an interest to us because we believe that students face many stressors. The stress experienced by students might affect their general health and academic performance especially if associated with obesity (1).

In our study, higher BMI was associated with higher level of psychological distress represented by the Kessler K6 scoring system. However, this affiliation was not statistically significant. In a subgroup analysis studied only patients with chronic morbidities, the correlation was positive and of a strong statistical significance. In these patients, chronic diseases act as continuous internal stress source leading to repetitive sympathetic system activation thus increased glucocorticoids excess. Which in turn will influence obesity and increased food uptake by inhibiting leptin hormone (Satiety hormone) and activation of neuropeptide Y (NPY) (15). Furthermore, in a subgroup analysis that focused on current university students showed a strong statistical significance. This might be due to the wide range of participants’ age. The inclusion of intermediate and high school students, who may have lower stress levels might have caused the analysis to drive toward the null (no association).

Regardless of the BMI the female gender was strongly linked with higher level of psychological distress (higher Kessler K6 score) than their male counterpart. Higher level of distress in Saudi female students might be due to social restrictions in the conservative Saudi society. The Saudi society is a family oriented community were the eldest male members play the main role in making the family decisions and deciding their fate. Dr. Elamin found that older, employed, married, and less educated males have more traditional view toward females. The traditional view is concerned with the idea that females are ought not to participate in the higher education and daily working live and assume more home-oriented roles (16). However, these external social factors were not present in other studies from the United States that showed the same trend of increasing distress in females, which may suggest a psychological and biological variation in females perception of stressors despite the various social stressors present in a particular community (17).

Psychological distress can promote weight gain through different means such as unhealthy stress coping mechanism, bad life behaviour, and lack of...
physical activities. Normally individuals when facing a stressful situation will alter their diet in terms of quality and quantity (18). Some will substitute healthy diet choices to unhealthy high sugar high fat diet. While others will increase their food consumption which in turn will reflex on a progressive weight gain and higher BMI (19).

In addition, our analysis explored the effect of sleep on the psychological status. Dr. Leproult found that decreased hours of sleep led to an increase in the level of cortisol by 45% in the second day. Which can be translated as increased body stress (20). In our analysis we found no statistical significance between hours slept per day and Kessler K6 score across the three categories of sleep. Taking into consideration the young population included in this study, Dr. Terman found that young adolescent bodies were able to compensate efficiently to the loss of sleep without a significant drop in body and mind performance (21).

The significant association between marital status and increasing psychological distress as seen in our analysis can be explained by the increased social and financial responsibilities associated with marriage especially in young couples (22).

Limitations and strengths

This paper might be associated with some drawbacks that could have an impact on the results. First of all, this study was based on a self-reported questionnaire were recall bias might be involved. Such bias may take effect through overestimation of the height or underestimation of the weight especially in females. However, this bias might be the cause that has driven the analysis against the hypothesis of the study (toward the null). The cross sectional design has many limitation of its own. First, it explores the data in a “one point in time” which might not reflect the causality, efficacy, and temporal sequence opposed by the study variables. Moreover, the individual stressor exposure was not reflected by the questionnaire, which will need a specific interview that is not applicable to this study. In addition, this study didn’t investigate the effect stimulants like alcohol and caffeine on the level of the stress, which call for a subsequent investigation.

On the other hand, this study is one of the earliest that focuses on students from a psychological point of view in respect to obesity in our community. It also addresses the changes that manifest across different educational levels. We also explored the effect of marriage and its burden in this age group unlike other studies that explored this correlation.

Conclusion / Recommendations:

In Summary, an increased psychological distress showed positive correlation to the BMI without a prominent statistical significance. The positive association was greatly influenced by the gender, were females showed higher prevalence of psychological distress and stronger correlation in comparison to the males. Subgroup analyses showed that being married, college student, or having non-communicable chronic co-morbidities increases your risk of having a higher psychological distress. This article shed light on the significance of different variables on the psychological well-being of an individual and encourages further research to explore the longitudinal effects of the positively associated factors on the younger population for a physically and mentally healthier and more productive society.

Conflict Of interest

No potential conflict of interest relevant to this article was reported. The findings and conclusions in this report are those of the authors.

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References:


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