Prevalence of Obesity and Uric Acid and Their Relationship among Saudi Adults in Makkah Region

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Authors' contributions

This work was carried out in collaboration among all authors. Author ZMA managed the literature searches, designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors ZABZ and BAF managed the analyses of the study. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

This research aims to determine the prevalence of obesity and uric acid among male adults in Makkah region as well as the association between obesity and uric acid level among Makkah adults as a whole. Twenty-six (26) male adults aged between 26 and 60 years participated in this study. Height, weight and blood samples were collected by the researcher. The study results showed 38.5% of participants were overweight and 38.5% were obese. Another significant finding was 57.7% of participants had high uric acid (≥ 7 mg/dL). In regards to the relationship between body mass index (BMI) and uric acid (UA), this study reported a positive non-significant correlation between BMI and UA, indicating that increased BMI correlated with increased UA levels. Therefore, adhoc intervention programs dedicated to reducing obesity and uric acid should be initiated in Makkah region to reduce risk.

Keywords: Obesity; body mass index; uric acid; Makkah; Saudi Arabia.

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1. INTRODUCTION

The prevalence of non-communicable disease is rapidly increasing. According to the World Health Organisation (WHO), it is expected by 2020 that non-communicable diseases will account for 80 per cent of the worldwide burden of disease, causing 7 out of 10 deaths in developing countries, with 50% of them early deaths (affecting those under 70 years of age) [1,2]. At present time, overweight status, obesity and UA are serious public health problems worldwide [3,4,5]. High BMI is a major risk factor for coronary heart disease, type 2 diabetes (T2D), hypertension and early death [1]. Similarly, increased UA has been associated with increased risk of cardiovascular disease (CVD), T2D, hypertension, dyslipidaemia and metabolic syndrome [5,6,7].

Obesity and increased UA are major risk factors for cardiovascular disease and early death and are rising with the adoption of modern lifestyles, which affects the rates of morbidity and mortality [1,5,8,7]. High BMI has been reported to contribute to many health problems, such as coronary heart disease, high blood sugar and high blood pressure. A U-shaped relationship between obesity, all-cause death and CVD death has also been established [1,9].

Increased BMI and levels of UA are serious public health issues and should be addressed through educational and prevention programmes. Management of those diseases includes changes in lifestyle, including healthy eating habits, maintaining optimal body weight and participating in regular physical activity [1,10, 11].

The current prevalence of chronic non-communicable diseases is rising rapidly. According to a recent study, by the year 2020 non-communicable diseases will account for three-quarters of all deaths worldwide [1]. Several studies have reported a high prevalence of obesity in Saudi Arabia as well as other countries and is rising due to the adoption of modern lifestyles [12,13,14,15]. The number of people with obesity also differs by race, sex and ethnicity, which subsequently affects morbidity and mortality.

A paucity of research on the prevalence of obesity, uric acid and their correlations in Saudi Arabia, especially in Makkah region, exists. Current research has proven to be outdated and no research in this area has been conducted in Makkah region. Available research on the prevalence of obesity and uric acid in several countries show a high incidence of obesity and uric acid, which might increase the risk of CVD.

Most of the studies conducted in Saudi Arabia were survey-based and highlighted the risk factors in other regions. There are no similar studies in this region; therefore, this study will be administered in Makkah region. The purpose of this study was to determine the prevalence of obesity and UA and to assess their relationship among individuals in Makkah region and we hope by this study that we can attract some attention to develop awareness and screening programs for obesity and UA as Makkah has the holiest place for muslim people and has a special concern by the Saudi Arabia Government.

2. METHODS

An online consent form was administered to participants who were recruited by email and through WhatsApp groups by various researchers. Data on dietary habits and smoking status were collected using electronic questionnaire methods over a two-month period (October–November 2020). A total of 26 people agreed to participate; all participants were males.

Anthropometric measurements, including weight and height, were obtained. Height was measured without footwear using a height measuring rod with platform stadiometre to an accuracy of 0.1 cm. Body weight was determined by a bio-impedance body composition device (Omron BF511) to an accuracy of 0.1 kg. To identify overweight and obese individuals in this study, the researcher followed the criteria established by the WHO: overweight defined as BMI of 25–29.9 kg/m^2, obesity defined as BMI $\geq$ 30 kg/m^2 [1,4].

For laboratory analysis and all biochemical measurements, early morning uric acid levels were taken by a capillary finger stick performed by the researcher after subjects completed an overnight fast lasting 10–12 hours. A household portable analyser, the BeneCheck 3in1 Cholesterol, Uric Acid and Glucose Monitoring Metre (model no. BK6- 12M&1, Taiwan), was used to analyse uric acid level. The metres were set as instructed, using the code numbers on the provided test strip bottle. The test was performed on the spot, using blood from the finger of the participants on a test strip that turns on the metre once inserted. The test strip was lined up with

the edge of a blood droplet from the participant to allow the blood droplet to be drawn into the narrow channel of the test strip. UA level displayed was then recorded. The blood sample was obtained in accordance with the WHO guidelines on drawing blood [16,1]. Participants with uric acid levels ≥ 7 mg/dL were considered to have high uric acid in this study [5].

2.1 Statistical Analysis

Continuous data are reported as mean ± standard deviation and categorical variables as frequencies and number (percentage). Comparative analysis involving two variables was performed using an independent sample t-test, while analyses involving more than two variables used tests with one-way ANOVA. Statistical analysis was performed using SPSS software version 23. The p-values <0.05 were considered to be statistically significant.

3. RESULTS

Data were obtained from physiological and health measurements and survey responses. All participants were from Makkah region. The study participants consisted of 26 individuals who had volunteered to participate in this study. Table 1 displays the anthropometric, health and lifestyle variables of the study participants. Fig. 1 displays the prevalence of overweight status and obesity and Fig. 2 displays the prevalence of UA level.

Table 1. Anthropometric, health and lifestyle variables of the sample

Variables	
Age (years)	41.58 (9.01)
Height (cm)	170.96 (6.15)
Weight (kg)	87.52 (18.07)
BMI (kg/m^2)	29.86 (5.33)
Normal weight	23.1%
Overweight	38.5%
Obesity	38.5%
Smoking status	
No	84.6%
Yes	15.4%
Fast food	
No	26.9%
Yes	73.1%
Uric acid (mg/dL)	7.26 (1.44)
≥ 7 mg/dL	57.7%

Note. Data expressed as mean ± SD with their corresponding percentages (%)

The mean age of participants was 41.58 years (SD = 9.01) and ranged from 28 to 60 years. 73.1% participants ate fast foods, whereas 84.6% were not smokers. Overweight subjects accounted for 38.5% of participants and 38.5% were obese. Participants with high uric acid (≥ 7 mg/dL) consisted of 57.7% of subjects. In regards to the relationship between BMI and UA, this study reported a positive non-significant correlation between the two indices (r = 0.289, n = 26, p = 0.152), implying that increases in BMI correlated with increased UA levels.

4. DISCUSSION

No study has determined the prevalence of overweight status, obesity and uric acid among male adults in Makkah region. Furthermore, there is a dearth of available information regarding the prevalence of three indices in Kingdom of Saudi Arabia (KSA). This study's aim was to assess the prevalence of obesity and UA and relative correlations among male adults in Makkah region in KSA.

Findings of this study indicate a significant number of participants possess a high BMI (including overweight status and obesity), as displayed in Fig. 1. Such gain in body weight is of concern to health stakeholders and parties interested in public health due to association of high BMI to increased risk of CVD. According to Altowerqi et al. [1], obesity is a risk factors for many chronic diseases such as hypertension, T2D and some types of cancers. The prevalence of overweight status and obesity in the current study was consistent with a previous study performed by Shaikhomar & Header [17] that revealed a high prevalence of overweight status and obesity among hospital patients in Makkah city. Additional findings indicated that overweight status is more prevalent than obesity among hyperuricemic patients and normouricemic subjects. The results of the current study are similar to the findings of Shaikhomar's recent study performed in Aseer area. According to Alqarni [14], the prevalence of overweight status and obesity among hospital doctors in Aseer region was 23.2% and 36%, respectively. In comparison, the prevalence of obesity in Makkah region was lower than its prevalence in Hail region of 63.6%, as reported by to Alqarni [14]. Dietary behaviours, lifestyle habits and environmental factors may play a vital role in the rising rates of overweight and obese populations in Aseer and Hail regions.
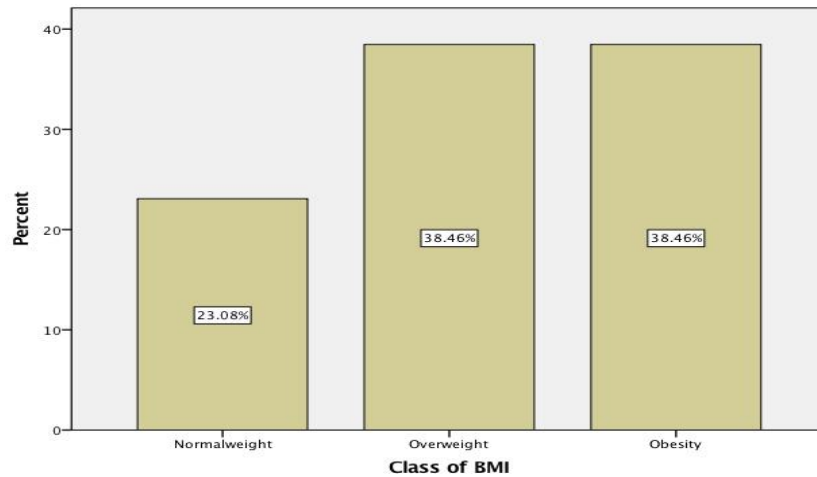
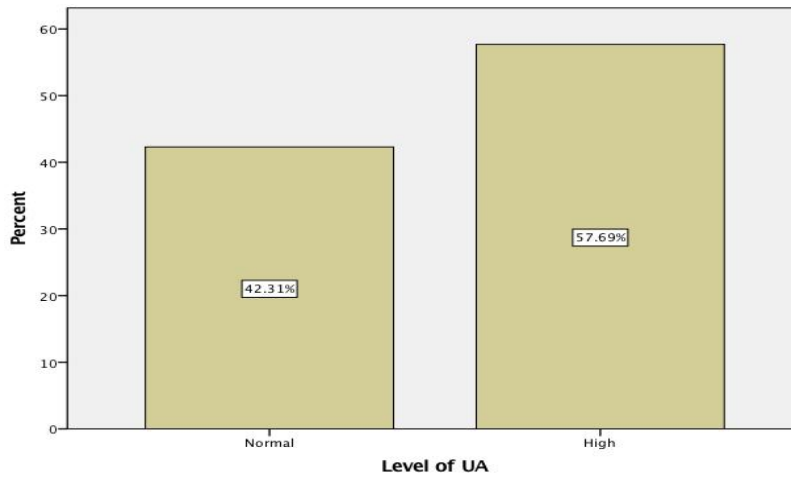**Fig. 1. Prevalence of overweight status and obesity among study participants**

Fig. 2. Prevalence of UA level among study participants

According to the study results, the mean BMI is higher than values reported in previous research conducted in Makkah city. The high mean of BMI may be related to the high percentage of consumption of fast foods among the study participants, evidenced by a result 73.1% in this study.

Our findings also reported 57.69% of study participants possess higher UA than previously discovered. The prevalence of high uric acid level in the current study is higher than reported by Shaikhomar & Header [17], who published that 23.4% of males investigated had high uric acid. In regards to mean uric acid, the result of our study was lower than reported by Shaikhomar & Header [17]. Regarding the relationship between BMI and UA, our findings are consistent with the numerous studies that revealed a positive relationship between BMI and uric acid [18,19,20,17,7].

Despite the preliminary findings of this research, there exists a belief that this study is pioneering in the assessment of the prevalence of overweight status, obesity and uric acid in Makkah region. Furthermore, this is the first study to assess the association between BMI and UA among male adults in Makkah region, and therefore, the results are of great importance, despite being conducted on small number of participants.

The present study has some limitations, one of which is the small number of participants and they were all men and another the time limit due to the COVID-19 outbreak; however, after the pandemic moment (COVID-19) future research

can be carried out on expressive number of participants include females to investigate the prevalence of overweightness and uric acid level. In addition, information on dietary habits and smoking were self-reported, which may lead to some bias. Our study recommends regular screening for overweight status, obesity and uric acid level. Data obtained from screening could be used by health care stakeholders and researchers in creating educational programmes to reduce the risk of overweight status, obesity and uric acid. Such programmes may prevent the development of chronic diseases that could affect quality of life and create economic burden in respect of public health care.

5. CONCLUSION

Our study is one of the few studies on overweight status, obesity and uric acid in the KSA and the first to assess the prevalence of overweightness, obesity and uric acid among male adults in Makkah region. We found that overweight status, obesity and uric acid prevalence is high among male adults in Makkah region. Furthermore, there is a positive correlation between BMI and uric acid. Consequently, high BMI and uric acid levels may result in negative effects on the health outcomes of Makkah people. In accordance with the Saudi Arabia Government Vision 2030 and the 2020 National Transformation Plan, our study will assist health care stockholders and the Saudi Arabia government in decreasing the percentage of obesity in our population. Our study will therefore allow a clearer view of the health status of people in Makkah region. The findings of this study will assist in health promotions and development of strategies for prevention and control of the risk factors for CVD.

CONSENT AND ETHICAL APPROVAL

This study was approved by the research chair of Prince Khalid Al-faisal for development of Makkah and holy sites (project # DSRUQU.PKC-42-9). The researchers explained the content of the consent document to study participants with assurance of confidentiality.

ACKNOWLEDGEMENTS

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/64340