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ORIGINAL RESEARCH


# Relationship of Body Mass Index with Diet, Physical Activities, and Lifestyles of Dental Students

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## ABSTRACT

**Introduction:** The objective of the study was to investigate the prevalence of overweight issues and obesity by recording the body mass index (BMI) and explore the dietary habits, physical activities (PAs), and lifestyles of male students at the College of Dentistry, King Saud University.

**Materials and methods:** A custom-designed self-administrative form and questionnaire were used in this study for data collection. The first part of the form was used to record the participants' height and weight for the BMI. The participants were grouped as underweight (BMI < 18.5), normal weight (BMI = 18.5–24.9), overweight (BMI = 25–29.9), and obese (BMI > 30.0). The second part comprised questions related to the dietary habits, PAs, and lifestyles of the male dental students. Chi-squared test was used to generate the significance of each question at significance <0.05.

**Results:** A total of 211 male students (mean age 22.31 ± 2.10 years) participated in the study (response rate 78.1%). The findings revealed that 29 and 28% of the dental students were overweight and obese respectively. A statistically significant difference ($p < 0.05$) between the groups was found for the questions asked about time spent exercising per day ($p = 0.003$), time spent sporting per week ($p = 0.003$), and time spent watching television and internet surfing per day ($p = 0.012$).

**Conclusion:** The prevalence of overweight issues and obesity is high among the dental students compared with the general population of Saudi Arabia, and there is a need for intervention programs to combat obesity among the dental students. The awareness about PA, healthy diet/lifestyle, consequences of overweight and obesity on their health and profession must be increased among the dental students to avoid future complications.

**Clinical significance:** The impact of obesity on individuals' oral health and its influence on dental treatment protocols and postoperative procedures has been well documented. Dental students are more prone to obesity due to their lifestyle with less PA and disordered eating habits and, thereby, are prone to obesity-related health hazards.

**Keywords:** Body mass index, Dental students, Obesity, Physical activity, Questionnaire.

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## INTRODUCTION

Being overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health.[1] It is the most common nutritional disorder in developed countries and its percentage is increasing in the developing countries also.[2,3] Being overweight and obese can lead to adverse metabolic changes, including increases in blood pressure, unfavorable cholesterol levels, and increased insulin resistance. They raise the risk of coronary heart diseases, stroke, type II diabetes, atherosclerosis, gallbladder disease, hypertension, kidney failure, and many forms of cancers, particularly breast cancer. It has become one of the most serious public health challenges of the 21st century.[4,5]

An unhealthy diet is a major modifiable behavioral risk factor in the development of obesity. Although a variety of dietary recommendations for the management and prevention of obesity have been proposed, evidence

is inconsistent and varies between measures of dietary intake used. Furthermore, the role of diet in obesity-associated health disorders is an important consideration for the development of dietary guidelines.[6,7]

Physical inactivity ultimately leading to overweight condition and obesity is also a leading risk factor for the global deaths. The benefits of regular physical PA have been clearly set out across the lifespan. A strong body of evidence, comprising both observational and experimental research, indicates that regular participation in PA among young people provides immediate and long-term benefits for physical and psychological well-being.[8-10]

Saudi Arabia has become one of the fastest growing economies. In 2014, Saudi Arabia has become the 19th largest economy in the world. It is estimated that 90% of the Saudi Arabian population will live in cities by 2050. Increased urbanization and increased income have increased access to fast food and technology and resulted in many changes in the past few decades. These shifts in the dietary patterns and lifestyles as a result of television viewing, computer, Internet, and smartphones have resulted in rapid nutrition transition, along with subsequent rise in the overweight conditons and obesity among the Saudi children, adolescents, and adults.[11-15]

Many different techniques are used for the measurement of obesity, like the inexpensive technique of weight and height for BMI, waist–hip ratio, fat cell size and number, body density, bioelectrical impedance, dual energy X-ray absorptiometry, air displacement plethysmography, ultrasound, computed tomography, and magnetic resonance imaging. Each of these methods has advantages and limitations and varies in suitability depending on the characteristics of the population under the study and the time and resources available. The most frequently used method is the measurement of BMI, which is considered to be a reliable and desirable method to express the degree of overweight. Due to its simplicity and ease of application, it is one of the most widely used methods.[16-18]

Studies on the prevalence of obesity, dietary habits, PAs, and lifestyles among the dental professionals are scarce. Therefore, the major aims of this study were to investigate the prevalence of overweight and obesity according to the BMI and explore the dietary habits, PAs, and lifestyles among the male dental students at the College of Dentistry, King Saud University, Riyadh.

## MATERIALS AND METHODS

This cross-sectional, questionnaire-based research project was approved by the Ethical Committee of the College of Dentistry Research Center, King Saud University, Riyadh (College of Dentistry Research Center (Registration # FR 0028). The study was conducted from February 2013 to December 2013. Required data were collected through an anonymous questionnaire that was self-written and designed to suit the requirements of the current study. Questionnaires along with a cover letter stating the instructions, rationale, and purpose of the research as well as an informed consent were personally handed over to a conveniently selected sample of 270 male students and interns. A total of 211 (response rate 78.1%) students enrolled in the 1–5 level of bachelor of dental surgery program and interns participated in the study.

After the consent of the participating students, their age, level of study, height, and weight were recorded in the first part of the questionnaire. Anthropometric measurements were performed using calibrated equipment. Height was recorded to the nearest 0.1 cm, as the maximum distance to the uppermost position on the head from heels, with the individual standing barefoot using Harpenden stadiometers (Chasmors Ltd., London, UK). Body weight was measured to the nearest 0.1 kg using a SALTER 920 digital weighing scale (SALTER Ltd, Tonbridge, UK) with the participants wearing light scrubs. The BMI was calculated by dividing weight in kilograms by the square of height in meters ($kg/m^2$) for the participants. Underweight (BMI < 18.5), normal weight (BMI 18.5–24.9), overweight (BMI 25.0–29.9), and obese (BMI > 30.0)was the classification used to divide the participants into the four main study groups according to BMI and obesity.

The questionnaire was divided into three parts. In the first part of the questionnaire, five different questions were posed to participants regarding the dietary habits. This included the questions about number of meals, meals taken outside, snacks, and consumption of sweets and soft drinks per day for the participant. Each question in this part had four possible answers, and the participants were supposed to choose one of it.

The second part of the questionnaire included five questions regarding the PAs of the participants. This included the questions about physical exercise per week, hours spent during exercising, sports per week, walking hours per day, and reasons for not exercising among the participants.

In the third section of the questionnaire, the data regarding the participant's lifestyle were recorded. The participants responded to the questions related to the daily sleeping hours, study hours, time spent with peers, and time spent on screens.

The questionnaires were distributed by hand to all the willing participants, and they completed the questionnaire by hand and returned it. There was no time limit for completion of the questionnaire.

Descriptive statistics and frequency analysis of the collected data were done using Statistical Package for the Social Sciences version #21 (SPSS, Chicago, Illinois, USA). Chi-squared test was used for statistical analysis of the responses considering $p < 0.05$ as the cutoff level for significance.

## RESULTS

Of the 270 dental students approached, 211 students (response rate 78.1%) participated in the study and completed the questionnaires. Out of the 211 participants, the prevalence of underweight, normal weight, overweight, and obese was 9 (4%), 82 (39%), 61 (29%), and 59 (28%) respectively, according to the BMI.

The mean values for age, weight, height, and BMI for the participating students are shown in Table 1.

Response to questions related to the dietary habits showed no statistically significant difference among the groups (Table 2). The consumption of soft drinks among the obese students (21.4%) was much higher compared with the other groups.

A statistically significant difference was found for the questions asked about the time spent exercising per day and sporting per week among the participants (Table 3). The results showed that more than half of the obese students were not exercising or sporting weekly.

Among the questions related to lifestyle, questions about spending time on watching TV and Internet surfing per day revealed a statistically significant difference (Table 4). About 43% of the obese students were found to be spending more than 3 hours per day on the screens and Internet.

**Table 1:** Mean values of age, weight, height, and BMI

| *Variables* | *Mean ± SD (n = 211)* |
|---|---|
| Age | 22.31 ± 2.10 |
| Weight | 81.12 ± 23.05 |
| Height | 172.00 ± 14.44 |
| Body mass index | 28.65 ± 15.70 |

SD: Standard deviation

**Table 2:** Response to questions related to dietary habits

| | *0* | *1* | *2* | *3* | *>3* |
|---|---|---|---|---|---|
| *Q1: Number of meals per day?* | | | | | |
| UW (%) | – | 0 | 62.5 | 12.5 | 25 |
| NW (%) | – | 2.4 | 48.8 | 42.7 | 6.1 |
| OW (%) | – | 1.7 | 50.8 | 39.0 | 8.5 |
| Obese (%) | – | 5.3 | 36.8 | 47.4 | 10.5 |
| p = 0.431 | | | | | |
| *Q2: How many meals you take outside per day?* | | | | | |
| UW (%) | 12.5 | 37.5 | 50.0 | 0.0 | 0.0 |
| NW (%) | 12.2 | 59.8 | 22.0 | 4.9 | 1.2 |
| OW (%) | 5.1 | 57.6 | 35.6 | 1.7 | 0.0 |
| Obese (%) | 10.5 | 50.9 | 28.1 | 7.0 | 3.5 |
| p = 0.494 | | | | | |
| *Q3: How many snacks do you take per day?* | | | | | |
| UW (%) | 12.5 | 37.5 | 12.5 | 25.0 | 12.5 |
| NW (%) | 15.9 | 43.9 | 29.3 | 8.5 | 2.4 |
| OW (%) | 17.9 | 46.4 | 25.0 | 7.1 | 3.6 |
| Obese (%) | 8.8 | 42.1 | 33.3 | 8.8 | 7.0 |
| p = 0.710 | | | | | |
| *Q4: How many times do you take soft drinks per day?* | | | | | |
| UW (%) | 0.0 | 37.5 | 50.0 | 0.0 | 12.5 |
| NW (%) | 20.7 | 40.2 | 20.7 | 14.6 | 3.7 |
| OW (%) | 16.9 | 35.6 | 32.2 | 8.5 | 6.8 |
| Obese (%) | 16.1 | 28.6 | 21.4 | 12.5 | 21.4 |
| p = 0.052 | | | | | |
| *Q5: How many times do you take sweets per day?* | | | | | |
| UW (%) | 25.0 | 12.5 | 37.5 | 25.0 | 0.0 |
| NW (%) | 18.3 | 48.8 | 20.7 | 9.8 | 2.4 |
| OW (%) | 18.6 | 54.2 | 18.6 | 3.4 | 5.1 |
| Obese (%) | 14.3 | 46.4 | 30.4 | 5.4 | 3.6 |
| p = 0.405 | | | | | |

UW: Underweight; NW: Normal weight; OW: Overweight

## DISCUSSION

This study has provided information about prevalence of obesity (BMI > 30.0) and overweight (BMI > 25.0–29.9) among dental students and its correlation with their diet, PA and lifestyle. The required information was collected via custom designed, self-administered questionnaire. The response rate of the questionnaire (78.1%) was found to be satisfactory. Although many studies are carried out about the prevalence of obesity among the general population, similar studies for the dental students are scarce. To the authors' knowledge, this may be the first study of such a kind. The results of this study provide evidence of a high prevalence of increased weight and obesity among the dental students of King Saud University, Riyadh, Kingdom of Saudi Arabia (KSA), based on the calculated BMI. The 29% prevalence of overweight observed among male students in this study is more than double the values of 13.8% of overweight adolescents of Riyadh, KSA and 13.4% of overweight adolescents of Jeddah, KSA. The prevalence of 28% obese male students is also higher than the 20.5% obesity rates observed in Riyadh, KSA and 13.5% obesity rates in Jeddah, KSA.[11,12]

This high prevalence of the overweight and obese among the dental students reflects the profound changes in social and behavioral patterns of the dental students compared with the general community. This high prevalence among the dental students may be related to their dietary habits, which are usually irregular timings of meals, improper quality of food, eating of too much junk food, and eating mostly outside their homes. The results of the study displayed in Table 2 clearly show that the

**Table 3:** Response to questions on physical activities

| | 0 | 1 | 2 | 3 | >3 |
|---|---|---|---|---|---|
| *Q1: How many times you do physical exercises per week?* | | | | | |
| UW (%) | 25 | 37.5 | 12.5 | 12.5 | 12.5 |
| NW (%) | 25.6 | 26.8 | 14.6 | 14.6 | 18.3 |
| OW (%) | 33.9 | 23.7 | 13.6 | 11.9 | 16.9 |
| Obese (%) | 55.4 | 23.2 | 10.7 | 3.6 | 7.1 |
| p = 0.158 | | | | | |
| *Q2: How many hours do you spend exercising per session?* | | | | | |
| UW (%) | 37.5 | 12.5 | 33.3 | 25 | 12.5 |
| NW (%) | 32.1 | 33.3 | 24.7 | 3.7 | 6.2 |
| OW (%) | 33.9 | 35.6 | 27.1 | 1.7 | 1.7 |
| Obese (%) | 51.8 | 37.5 | 8.9 | 0 | 1.8 |
| p = 0.003 | | | | | |
| *Q3: How many times do you sport per week? (Swimming, football, volleyball, etc.)* | | | | | |
| UW (%) | 50 | 12.5 | 25 | 0 | 12.5 |
| NW (%) | 25.6 | 29.3 | 24.4 | 6.1 | 14.6 |
| OW (%) | 42.4 | 18.6 | 11.9 | 16.9 | 10.2 |
| Obese (%) | 49.1 | 36.4 | 10.9 | 1.8 | 1.8 |
| p = 0.003 | | | | | |
| *Q4: How many hours do you walk daily other than routine walking?* | | | | | |
| UW (%) | 37.5 | 0 | 50 | 12.5 | 0 |
| NW (%) | 20.7 | 23.2 | 24.4 | 13.4 | 18.3 |
| OW (%) | 29.3 | 27.6 | 17.2 | 10.3 | 15.5 |
| Obese (%) | 32.1 | 37.5 | 17.9 | 3.6 | 8.9 |
| p = 0.122 | | | | | |
| *Q5: Is/are there any reason/s you cannot or should not exercise?* | | | | | |
| | *Lazy* | *Medical* | *Lack of time due to academics* | *Finance* | *Other* |
| UW (%) | 16.7 | 16.7 | 50 | 0 | 16.7 |
| NW (%) | 19.7 | 7.6 | 63.6 | 6.1 | 3 |
| OW (%) | 29.8 | 4.3 | 63.8 | 0 | 2.1 |
| Obese (%) | 30.9 | 7.3 | 54.5 | 5.5 | 1.8 |
| p = 0.499 | | | | | |

UW: Underweight; NW: Normal weight; OW: Overweight

**Table 4:** Response to questions on lifestyle

| *Q1: How many hours do you sleep per day?* | | | | | |
|---|---|---|---|---|---|
| | <6 | 6–8 | 8–10 | 10–12 | >12 |
| UW (%) | 12.5 | 37.5 | 37.5 | 12.5 | 0 |
| NW (%) | 22 | 53.7 | 14.6 | 8.5 | 1.2 |
| OW (%) | 16.9 | 52.5 | 23.7 | 5.1 | 1.7 |
| Obese (%) | 23.2 | 37.5 | 28.6 | 5.4 | 5.4 |
| p = 0.513 | | | | | |
| *Q2: How many hours do you study per day?(other than college hours)* | | | | | |
| | 0 | 1 | 2 | 3 | >3 |
| UW (%) | 12.5 | 12.5 | 50 | 0 | 25 |
| NW (%) | 14.8 | 32.1 | 25.9 | 13.6 | 15.3 |
| OW (%) | 20.3 | 23.7 | 27.1 | 13.6 | 15.3 |
| Obese (%) | 21.4 | 21.4 | 21.4 | 8.9 | 26.8 |
| p = 0.521 | | | | | |
| *Q3: How many hours do you spend with your friends per day?* | | | | | |
| | 0 | 1 | 2 | 3 | >3 |
| UW (%) | 12.5 | 0 | 25 | 25 | 37.5 |
| NW (%) | 15 | 30 | 21.2 | 16.2 | 17.5 |
| OW (%) | 5.2 | 2.4 | 24.1 | 15.5 | 32.8 |
| Obese (%) | 21.1 | 21.1 | 12.3 | 15.8 | 29.8 |
| p = 0.215 | | | | | |
| *Q4: How many hours do you spend watching TV, Internet surfing per day?* | | | | | |
| | 0 | 1 | 2 | 3 | >3 |
| UW (%) | 0 | 12.5 | 62.5 | 12.5 | 12.5 |
| NW (%) | 11.2 | 8.8 | 26.2 | 22.5 | 31.2 |
| OW (%) | 3.5 | 26.3 | 19.3 | 21.1 | 29.8 |
| Obese (%) | 0 | 22.2 | 16.7 | 18.5 | 42.6 |
| p = 0.012 | | | | | |

UW: Underweight; NW: Normal weight; OW: Overweight

percentage of eating three meals or more is higher for the overweight and obese students. The percentage of eating outside, consumption of snacks, cold drinks, and sweets is also higher for the overweight and obese students as compared with the students with normal weight. This needs to be taken into consideration whenever a dietary education program is established for these overweight and obese students.

The PA contributes up to 50% of total daily energy expenditure, and there is evidence that active individuals have a healthier body weight and composition than inactive individuals.[19-21] Physical inactivity and unhealthy diets are considered among the leading causes of major noncommunicable diseases, including cardiovascular disease, type II diabetes, and certain types of cancer, thus contributing substantially to the global burden of disease, death, and disability in the Arab countries.[13] The high prevalence of physical inactivity among Saudis remains a major public health concern.[14] The results of our study revealed that it is also a concern among the participating students. The obese and overweight students are more physically inactive compared with the normal weight students. The percentage of the obese and overweight students who will not exercise or spend less time in exercising, sporting, or walking was higher as compared with the students with normal weight.

Education at Schools of Health Sciences is considered a time of high stress with remarkable challenges to personal well-being for students.[22] Academic stress describes the prevalence and implications of study-related stress among students and the negative impact that it has on their performance.[23] Dyrbye et al[24] described a number of factors including academic pressure, large course workload, financial concerns, sleep deprivation, and exposure to patients' suffering and deaths as having been identified as stressor factors that negatively influence students. Several studies have shown increased levels of stress during periods of academic examinations that may lead to anxiety, emotional distress and impairment of recalling information skills, attention, working memory, and executive functions.[25,26] In our study, more than half of all the participating students reported that lack of time due

to academics was the reason for not exercising. Another major reason for not exercising among the overweight and obese students was laziness. The academic stress and curriculum overload probably are also a major cause of being overweight and obese among the students of the current study, with the students not finding enough time for regular exercising and have tendency toward eating irregular meals.

During the past three decades, Saudi Arabia has undergone enormous changes in lifestyle. The increase in urbanization and income results in increased access to fast food, Internet, and technology, which is related to increasingly being overweight and obese in developing countries like Saudi Arabia. The lifestyle is becoming more and more sedentary and energy expenditure is reduced. These dramatic lifestyle changes have undoubtedly considerable negative impacts on social health. There is increased use of the Internet and television, more sleeping hours, and less PAs.[10] These were evident from the results of the current study in which the obese and overweight students were found to spend more time on Internet surfing, watching television, and studying compared with the normal weight students.

To the authors' knowledge, this is the first study that presents data on the prevalence of the overweight and obese and its correlation to diet, PAs, and lifestyles among the dental students of Saudi Arabia. The importance of physical health for the dental professionals cannot be overemphasized. Knowledge and awareness of healthy diets, importance of PAs, and dangers of modern lifestyles among dental school students look inadequate. It is, therefore, recommended that health education and information about healthy eating habits and lifestyles be included in the dental school curriculum. This will help our dental students to realize the importance of physical health in the dental profession from the beginning of their career. Although the current study provided some information, there is a need for conducting further detailed studies across the dental schools all over the country to address this important subject.

## CONCLUSION

From the results of the study, we can conclude that the incidence of being overweight and obese is high among dental students, which is an alarming sign. The dental students who are overweight and obese were found to be physically inactive and spending more time on the screens than the normal weight students. The awareness about PA, healthy diet/lifestyle, and consequences of overweight and obesity on their health and profession must be increased among the dental students to avoid future complications.

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