Research Article

PREVALENCE OF DIABETES, HYPERTENSION AND OBESITY AND ASSOCIATED FACTORS AMONG STUDENTS OF AJMAN UNIVERSITY, UNITED ARAB EMIRATES

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ABSTRACT

This study aims to assess the correlation of hypertension, diabetes, obesity with gender, smoking and physical activity in two hundred and fifty students of Ajman University in the United Arab Emirates. A structured questionnaire followed by a clinical examination performed for the two hundred and fifty students at Ajman University. Each student interviewed and assessed thoroughly. BMI was categorized into normal weight (< 25 kg/m^2), Overweight (25-29.9 kg/m^2) and Obese (≥ 30 kg/m^2); readings of systolic pressure of 140 mmHg or higher or diastolic pressure of 90 mmHg or higher considered hypertensive. Statistical analysis performed using SPSS, version 23.0 and data presented as means, standard deviation (SD) and percentages. The study indicated that 13.20 % of students have hypertension and 41.6 % are pre hypertensive. The mean systolic and diastolic pressure was 120.53 $\pm$ 14.29 and 76.19 $\pm$ 8.89 mm Hg respectively. The mean fasting plasma glucose concentration in students was 95.11 $\pm$ 18.53 mg/dl. Percentages of students with overweight and obesity were 22 % and 14.85 % respectively. The prevalence of hypertension, diabetes and obesity amongst students of Ajman University was close to that observed amongst comparable age groups in the world and specifically the Arab region.

Keywords: diabetes mellitus, Body mass index; obesity; hypertension, blood glucose

INTRODUCTION

Hypertension is a major risk factor for cardiovascular disease (CVD). Based on the World Health Organization records 2012; CVD is one of the leading causes of morbidity and mortality worldwide. Hypertension is the third leading cause of death in the world. One billion of the world's population has HTN, resulting in four million deaths per year. The mortality rates are 13 % worldwide[1,2].

The rates of Hypertension in some of the Arab region is as follow Saudi Arabia 26.1 %, United Arab Emirates 37.3 %, Oman 25.2 %, Jordan 16.3 % and Syria 40.6 %[3-7].

There is a strong correlation between obesity, which is one of the most common health problems worldwide and hypertension[8,9]. The prevalence of overweight in GCC adults reported 48 % amongst males and 35 % amongst females, while the prevalence of obesity reported to be 24 % amongst males and 40 % amongst females. World Health Organization figures indicated that 70.6 % of U.A.E[10]. Population is overweight and 34.5 % are obese. The prevalence for physical inactivity was 30.2 % being higher in females 39.4 % than males 37.0 %[11].

The Arab region has a high prevalence of diabetes mellitus (11.3 %) and smoking (30 % among men and 5 % amongst women)[12]. The UAE has one of the highest rates of type 2 diabetes in the world the International Diabetes Federation (IDF) revealed that, in 2017, 17.3 % of the U.A.E population between the ages 20 and 79 have type 2 diabetes. There are over 1 million people living with diabetes in the U.A.E., placing the country 15th worldwide for age-adjusted comparative prevalence[13].

Smoking is associated with an increased risk of progression of chronic diabetes-related complications[14].

With the above background, the purposes of the present study were to determine the prevalence and correlation of hypertension, diabetes, and obesity to identify the associated factors amongst students of Ajman University, U.A.E.

MATERIALS AND METHODS

Study Site

This study was conducted from September 2018 to February 2019, at the Research laboratories in the Pharmacy College at Ajman University, United Arab Emirates.

Sample

Two hundred and fifty students (107 males and 143 females) randomly selected from different faculties of Ajman University using multistage cluster sampling method. The baseline survey conducted with a 4-stage cluster sample in Ajman University. Criteria for inclusion of this study were being older than 18 years, studied at Ajman University, and for females not being pregnant. Individuals who did not meet one or more of these criteria excluded from the study.

Ethical Considerations

The institutional ethical committee approved the study, prior to the administration of the questionnaires (UH-2017.2.1), the intentions of the survey explained. The participants participated willingly, under no pressure. Participation was voluntary and all

participants joined with no incentives and signed the informed consents to take part in this study.

Data Collection

Trained interviewers using the pre-tested questionnaire interviewed students privately, person-to-person. Information on age, sex, educational level, and smoking collected.

Blood Pressure

Before measuring the students' blood pressure, students initially made to rest for 30 minutes then asked about tea or coffee consumption, physical activity, smoking and extent of bladder distention as it might elevate blood pressure[15]. Blood pressure of the students measured with a mercury-based sphygmomanometer using the standard WHO criteria. Arm placed at heart level, with the students at sitting position. Blood pressure measured twice from the right arm, with at least a 30-second interval between the two readings. The average of the two readings recorded as the individuals' blood pressure.

According to the WHO, the normal blood pressure is 120/80 mmHg. Readings of systolic pressure of 140 mmHg or higher or diastolic pressure of 90 mmHg or higher considered hypertensive. Readings of systolic pressure 120-139 mmHg or diastolic pressure 80-89 mmHg considered as pre-hypertensive[16].

Blood Glucose

Trained practitioner measured both fasting and random blood glucose levels at the college of pharmacy research laboratory in Ajman University. The glucose meter used to determine levels of blood glucose.

Body Mass Index

The subjects' weight recorded to the nearest 100 g using a digital scale. The weight of the subject measured with minimal clothing and without shoes. Height measured in a standing position, without shoes, using a tape meter while the shoulders were at normal position. Body Mass Index calculated as weight (kg) divided by height squared (m^2). To avoid subjective error, the same investigator did all measurements. Based on the World Health Organization, overweight is defined as BMI 25-29.9 kg/m^2 and obesity as BMI greater than or equal to 30 kg/m^2 or greater[17,18].

Statistical Analysis

Statistical analysis performed using SPSS, version 23.0 and data presented as means, standard deviation (SD) and percentages.

RESULTS

In Tables 1 and 2, a total of two hundred and fifty students' age group, sex, weight, physical activity, smoking and medication summarized. The response rate was 100 %. The percentage of male was 42.8 % While females 57.2 %. The mean age of students was between 18-20 years. The mean weight was 69.32 ± 18.73 kg with a mean height of 168.28 ± 10.41 cm. Prevalence of hypertension was 20.56 % in males and 7.6 % in females. Pre-hypertensive prevalence was 21.50 % in males and 21.68 % in females (Table 2). The mean systolic pressure of the two hundred fifty students was 120.53 ± 14.29 mmHg and the mean diastolic pressure was 76.19 ± 8.89 mmHg. Pre-hypertension represents 41.6 % for all participants in this study (Table 1). Prevalence of pre-hypertension was correlated to smoking (76.4 %) and physical inactivity (78.8 % of total students are physically inactive) (Table 2).

Prevalence of diabetes was found in 5.6 % of males while pre diabetes 21.5 % compared to females 6.29 % and 21.68 % respectively (Table 2). The mean percent of diabetes for the 250 students was 6 % while the mean of pre diabetes in the 250 students' was 21.6 %. The mean fasting plasma glucose concentration for males was 94.92 ± 18.68 mg/dl compared with females' 95.25 ± 18.48 mg/dl (Table 1). Table 3 shows the percentages of underweight, normal weight, overweight and obese subjects are 9.6 %, 53.6 %, 22 % and 14 % respectively (Table 3).

DISCUSSION

The results in this study revealed that prevalence of hypertension in males was higher than females, which can be attributed to their higher BMI 25.34 ± 5.91 and 23.49 ± 4.65 respectively (Table 1). Hypertension has been significantly associated with obesity[19]. In observational studies, people with hypertensions, pre-diabetics and diabetics have approximately twice the risk of cardiovascular disease in contrast to non-diabetic people with hypertension[20,21]. Hypertensive diabetic patients are also at increased risk for diabetes-specific complications including retinopathy and nephropathy[22]. Pre hypertensive prevalence was high 41.6 %, this may be correlated to the high smoking percentage 76.4 % and lack of physical activity 78.8 %[23]. Students advised to cease smoking and increasing physical activity. Pre-hypertensive students with systolic blood pressure 120-139 mmHg or/and diastolic pressure 80-89 mmHg were advised to changes in lifestyle behavioral therapy alone for a maximum of 3 months, if they are still hypertensive they should be treated pharmacologically[24].

Table 1: Characteristics of the study participants according to gender

No. of students	107	143	250
Age (years)	86.92 % (18-20)	76.92 % (18-20)	81.20 % (18-20)
Weight (kg)	80.16 ± 19.73	61.21 ± 13.02	69.32 ± 18.73
Height (cm)	177.61 ± 6.61	161.3 ± 6.55	168.28 ± 10.41
BMI (kg/M^2)	25.34 ± 5.91	23.49 ± 4.65	24.28 ± 5.30
Blood glucose (mg/dL)	94.92 ± 18.68	95.25 ± 18.48	95.11 ± 18.53
Systolic blood pressure (mmHg)	127.55 ± 12.87	115.28 ± 13.01	120.53 ± 14.29
Diastolic blood pressure (mmHg)	76.72 ± 8.97	75.79 ± 8.84	76.19 ± 8.89

*Results expressed as Mean ± SD

Table 2: Prevalence of diabetes, hypertension and associated factors among Ajman University students
(Males: No. = 107, Females: No. = 143)

	Males	Males	Females	Females	Total	Total
	Number	Percentage	Number	Percentage	Number	Percentage
Smoking						
Yes	68	63.55	123	86.01	191	76.4
No	39	36.45	20	13.99	59	23.6
Exercise						
Yes	26	24.3	27	18.88	53	21.2
No	81	75.7	116	81.12	197	78.8
Medication						
Yes	2	1.87	6	4.2	8	3.2
No	105	98.13	137	95.8	242	96.8
Blood Sugar						
Normal	78	72.9	103	72.03	181	72.4
Pre-diabetes	23	21.5	31	21.68	54	21.6
Diabetic	6	5.6	9	6.29	15	6
Blood Pressure						
Normal	30	28.04	83	58.04	113	45.2
Pre-Hypertension	55	51.4	49	34.27	104	41.6
Hypertension	22	20.56	11	7.69	33	13.2

* Systolic blood pressure 120-139 mmHg or diastolic blood pressure 80-89 mmHg

Table 3: Anthropometric reference indices of obesity and overweight for Ajman University students

Underweight	< 18.5	17.27 ± 1.15	24	9.6
Normal	18.5-25	21.90 ± 1.90	134	53.6
Overweight	25-29.9	26.90 ± 1.50	55	22.0
Obese	> 30	34.22 ± 4.60	37	14.8

*Results expressed as Mean ± SD

In general, levels of fasting blood glucose up to 100 mg/dl considered normal[25], Persons with levels between 100 and 126 mg/dl may have impaired fasting glucose or pre-diabetes[26]. In this study, students considered diabetic when fasting blood glucose were higher than 126 mg/dl. Diabetes prevalence for the 250 students was 6 % in students, with mean fasting blood glucose levels of 94.92 mg/dl in males and 95.25 mg/dl in females. Results in this study are consistent with a study conducted in Qatar, which found diabetic prevalence rates of 5.9 % among adult Qatari population[27]. Percentage of pre-diabetes was 21.6 %, these blood sugar levels are considered risk factors for type 2 diabetes and its complications[28]. Due to the fact that high blood pressure and diabetes share certain physiological traits, they tend to occur together[29]. The increased fluid volume, impaired insulin handling, and increased arterial stiffness caused by both diseases tend to make the other disease more likely[30]. Over weight and Obesity among Ajman University students were of (22 % and 14.8 %) respectively. This increased prevalence is most likely associated with the increased blood glucose level and hypertension[31]. The increase in overweight and obesity prevalence can be partly explained by the high percentage of physical inactivity (78.8 %), lifestyle, nutritional habits and fast food consumption with excessive carbohydrate and fat content[31]. All body weight status: underweight, normal, overweight and obese were found in the two hundred and fifty-student sample (Table 3).

In conclusion, the prevalence of diabetes, obesity and hypertension among students of Ajman University was close to that observed in the United Arab Emirates and the Middle East. There was a significant correlation between body mass index and prehypertension, high glucose levels. Smoking and lack of physical activity also were risk factors for hypertension, diabetes, and obesity. Overweight is significantly associated with pre hypertension, high glucose levels. The high prevalence of overweight/obesity obtained in the study supports the need to promote and implement the utilization of obesity and diabetes screening at the national level.

CONCLUSION

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