

Prevalence of Diabetes, Obesity, Hypertension and Associated Factors among Students of Al-albait University, Jordan

Ahmed Abu-Zaiton and Abdullah Al-Fawwaz

Department of Biological sciences, Al-albait University, Jordan

Abstract: This study aimed to assess the prevalence of diabetes, obesity, hypertension and associated factors in one hundred and twenty students of Al-albait University (AABU) in Jordan. Data were collected through interview using a structured questionnaire followed by clinical examination. The results indicated that the prevalence of diabetes, obesity and hypertension were (4.17, 8.33 and 10.83% respectively). The Mean fasting plasma glucose concentration in males was 94.69 ± 13.64 mg/dl as compared to 91.08 ± 11.15 mg/dl in females. In the present study, 10.83% of all students were hypertensive. The mean systolic and diastolic pressure for all students in this study was 119.09 ± 18.34 and 74.36 ± 15.52 mmHg respectively. The percentages of students with overweight and obesity were 21.67 and 8.33% respectively. This study highlights the importance of the associated factors such as smoking, physical inactivity and gender to the prevalence of obesity and hypertension. In view of the above results, it can be concluded that the prevalence of diabetes, obesity and hypertension among students of AABU was close to that observed among comparable age group in the general population.

Key words: Epidemiology • Hypertension • Pre diabetes • Overweight • Obesity.

INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disease with increasing prevalence and mortality worldwide [1]. Over the past 40 years there was an increase in the prevalence of diabetes mellitus that affecting approximately 10% of the global population [2, 3].

It is expected that the number of diabetic patients worldwide will increase to 366 million in 2030 [4, 5, 6]. According to International Diabetes Federation (IDF) summary report which indicates that some countries in the Arab regions have some of the highest rates of diabetes in the world [7, 8]. However, some estimates suggested that in the early part of the new millennium, the rates of diabetes in the Saudi population will be 16.7%, 19.5% in United Arab Emirates, 15.2% in Bahrain, 13.1% in Oman and about 14.4% in Kuwait [9, 10, 11, 12]. Nearly 10% of Egyptians were affected by Diabetes Mellitus type-2 in 2000 and this number is expected to increase to 13.3% in 2025 [13]. Diabetes Mellitus is the leading cause of mortality in Jordan [14, 15]. Jordan Ministry of Health with assistance from World Health Organization conducted a study indicated that 17% of Jordanians suffer from

diabetes, which is a leading cause of heart failure, kidney failure, blindness and retinal problems [16]. As there is a growing prevalence of obesity in children which predisposes to diabetes, the epidemic of diabetes will continue to rise. Diabetes affects both children and adults but in overweight people it is mostly more dangerous [17].

There is a strong correlation between obesity, which is one of the most common health problems worldwide and high blood glucose level, with an estimated 1.2 billion people affected by elevated blood glucose level [18].

Obesity is a major public health problem in both developed and developing countries. It is a risk factor for coronary heart diseases and it is strongly associated with diabetes and hypertension [19]. World Health Organization (WHO) figures indicated that 67.4% of Jordanians are overweight or obese, as measured by body mass indexes (BMI) of 25 or greater, in the study implemented between 2005 and 2006. There is a considerable evidence for an increased prevalence of hypertension in diabetic persons [20, 23].

Reliable data on hypertension and its associated risk factors in Jordan are scarce, the findings from a survey of three communities in Jordan, indicated that the prevalence

rates of hypertension is 16.1%; about one-half of all hypertensive were not aware of this problem and more than one-third of those who were aware had failed to achieve the desired blood pressure levels [21].

In Jordan, several studies [5, 16, 21] have focused on estimating the population distribution of major risk factors for cardiovascular disease and illustrated a high prevalence of hypertension and diabetes in different communities and different areas of Jordan.

With the above background, the purposes of the present study were to determine the prevalence of diabetes, obesity and hypertension and to identify the associated factors among students of Al-albait University, Jordan.

MATERIALS AND METHODS

Study Site: This study was conducted from October 2012 to January 2013, at Department of Biological Sciences laboratories, faculty of Science at Al-albait University, Al-mafraq-Jordan.

Sample: One hundred and twenty students (49 boys and 71 girls) were selected randomly from different faculties of AABU using multistage cluster sampling method. The baseline survey was conducted with a 2-stage cluster sample in the AABU. Criteria for inclusion in the study were being older than 18 years, having Jordanian nationality, studying in AABU and for females, not being pregnant. Individuals who did not meet one or more of these criteria were excluded from the study.

Data Collection: Students were interviewed privately, face-to-face, by trained interviewers using pre-tested questionnaire. Initially, information on age, sex, educational level, marital status and smoking was collected.

Blood Glucose: Both fasting and random blood glucose levels were measured in the physiology laboratory, Department of Biological Sciences at AABU by trained students. The glucometer was used for determining the level of blood glucose.

Blood Pressure: Before measuring the blood pressure, students were initially made to rest for 15 minutes then asked about tea or coffee consumption, physical activity, smoking and a full bladder (which might elevate blood pressure). Blood pressure of the participants was measured with mercury-based sphygmomanometers using

standard WHO criteria. Blood pressure was measured twice from the right arm with the student in the sitting position and the arm was placed at the heart level. There was at least a 30-second interval between the two measurements; thereafter the average of the two measurements was recorded as the individual's blood pressure.

According to the WHO definition, the normal blood pressure is 120/80 mmHg, individuals with systolic blood pressure ≥ 140 mmHg or those with diastolic blood pressure ≥ 90 mmHg were considered hypertensive, when the systolic pressure 120-139 and diastolic 80-89 this case was considered as pre-hypertension [24, 25].

Body Mass Index: Weight was measured while the subjects were minimally clothed without shoes using digital scales and recorded to the nearest 100 g. Height was measured in a standing position without shoes using a tape meter while the shoulders were in normal position. Body mass index was calculated as weight (kg) divided by height (m^2). To avoid subjective error, all measurements were done by the same investigator. According to the World Health Organization, overweight was defined as BMI 25–29.9 kg/m^2 and obesity as BMI ≥ 30 kg/m^2 [24].

Statistical Analysis: Statistical analysis was performed using SPSS, version 15.0 and data were presented as means, standard deviations (SD) and percentages.

RESULTS

A total of one hundred and twenty students' age, sex, obesity, physical activity, smoking and medication were summarized in Table 1 and 2. Prevalence of diabetes was present in males as 6.12% and pre diabetes 20.41% compared to females 2.82 and 14.08% respectively, (Table 2). The mean fasting plasma glucose concentration at presentation for the male was 94.69 ± 13.65 mg/dl compared with female at 91.08 ± 11.15 mg/dl. The maximum-recorded for fasting blood glucose concentration was 213 mg/dl.

As depicted in Table 2, 10.83 % of participants were hypertensive and the prevalence of pre-hypertension and pre-diabetic were associated with some factors such as smoking, physical inactivity and gender. The mean systolic pressure of the participants was 119.09 ± 18.34 mmHg and the mean diastolic pressure was 74.63 ± 15.52 mmHg. Pre-hypertension represent 13.33% for all participants in this study.

Table 1: Characteristics of the study participants according to gender.

Variables	Males	Females	Total
No. of students	49	71	120
Age (years)	21.42±2.54	19.71±2.55*	20.40±2.65
Weight (kg)	76.84±15.68	55.57±7.17	64.17±15.64
Height (cm)	174.24±7.76	159.96±5.82	165.74±9.68
BMI (kg/m ²)	24.28±3.96	21.88±3.1	22.85±3.67
Fasting blood glucose (mg/dL)	94.69±13.65	91.08±11.15	92.49±12.31
Systolic blood pressure (mmHg)	128.95±15.37	111.6±16.82	119.09±18.34
Diastolic blood pressure (mmHg)	77.74±11.16	71.80±12.89	74.36±15.52

*Results are expressed as Mean ± SD

Table 2: Prevalence of diabetes, hypertension and associated factors among AABU students. (Males: No. =49, Females: No. = 71)

Studied factors	Males		Females		Total	
	No.	%	No.	%	No.	%
Pre-diabetics	10	20.41	10	14.08	20	16.67
Diabetics	3	6.12	2	2.82	5	4.17
Pre-hypertension	8	16.33	8	11.27	16	13.33
Hypertension	8	16.33	5	7.04	13	10.83
Smoking status						
Yes	23	46.94	5	7.04	28	23.33
No	26	53.06	66	92.96	92	76.67
Sporting						
Yes	26	53.06	48	67.61	74	61.67
No	23	46.94	23	32.39	46	38.33
Medication						
Yes	5	10.2	17	23.94	22	18.33
No	44	89.8	54	76.06	98	81.67

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

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

Body weight status	Body Mass Index Kg/m ²	Mean ± SD	No.	%
underweight	< 18.5	17.6±0.89*	20	16.67
Normal	18.5 – 24.9	21.69±1.79	64	53.33
Overweight	25.0 – 29.9	26.27±0.78	26	21.67
Obese	= 30.0	31.02±0.51	10	8.33

*Results are expressed as Mean ± SD

Table 3 shows that the percentages of underweight, normal weight, overweight and obese subjects are 16.67, 53.33, 21.67 and 8.33%, respectively.

DISCUSSION

The results in this study showed that diabetes is more common in males than females, which is partly due to a more sedentary lifestyle, smoking and nutrition.

In general, levels of fasting blood glucose up to 100 (mg/dL) are considered normal [22, 26], Persons with levels between 100 and 126 mg/dL may have impaired fasting glucose or pre-diabetes [27]. These levels are considered risk factors for type 2 diabetes and its complications [28, 29]. Results in this study are comparable to study conducted in Qatar, which found diabetic prevalence rates of 5.9% among adult Qatari population [30].

In this study, students were considered diabetics when fasting blood glucose levels were 126 mg/dL or higher and random blood glucose levels were higher than 200 mg/dL [15]. High levels of glucose most frequently indicate diabetes, but many other diseases and conditions can also cause elevated glucose [28]. There are many data in our study sample that indicated high blood sugar classified as Pre-diabetes which define as a condition in which individuals have blood glucose levels higher than normal but not high enough to be classified as diabetes [26]. People with pre-diabetes have an increased risk of developing type 2 diabetes [27].

Hypertension has been significantly associated with diabetes [31]. In observational studies, people with both diabetes and hypertension have approximately twice the risk of cardiovascular disease in contrast to non-diabetic people with hypertension [28, 32]. Hypertensive diabetic patients are also at increased risk for diabetes-specific complications including retinopathy and nephropathy [5, 33].

The prevalence of high blood pressure among the participants was 14.28% which is lower than that found in general Jordanian population [23], this difference may be due to the younger age of the students in the current study.

Students with a systolic blood pressure of 120–139 mmHg and diastolic blood pressure of 80–89 mmHg should be given lifestyle behavioral therapy alone for a maximum of 3 months and then, if they were not achieved, they should also be treated pharmacologically [25, 31].

Because diabetes and high blood pressure share certain physiological traits they tend to occur together and the effects-such as increased fluid volume, increased arterial stiffness and impaired insulin handling- caused by each disease tend to make the other disease more likely to occur [31, 32].

Diabetes and high blood pressure are likely to occur together simply because both diseases share a common set of risk factors such as body mass [34]. The risk of both diabetes and high blood pressure is significantly increased with being overweight [5, 21].

Studies showed that the obesity has become a major health problem and is closely associated with different health problems [19]. An increased prevalence of obesity among students of AABU has been shown to be associated with increased high blood glucose and high blood pressure. We believe that the increase in overweight and obesity prevalence can be explained in part by nutritional habits, lifestyle and fast food consumption with excessive

carbohydrate and fat content. The low physical activity of students may have effects on the increasing prevalence of obesity.

In conclusion, the prevalence of diabetes, obesity and hypertension among students of Al-albait University was close to that observed among comparable age group in the general population. The under-weight, overweight and obesity do exist in the studied sample. Several socio-economic and lifestyle factors contributed to the development of overweight and obesity between the students.

Smoking, physical inactivity and gender were associated factors with the risk of Pre-hypertension, hypertension, pre-diabetics and diabetics. No significant correlation was found between prevalence of hypertension and diabetes and other variables such as age and medication.

REFERENCES

1. Sowers, J. and G. Bakris, 2000. Antihypertensive Therapy and the Risk of Type 2 Diabetes Mellitus. N. Engl. J. Med., 342: 969-970.
2. Bhaskar, V. and S. Ajay, 2009. Antihyperglycemic and antihyperlipidaemic activities of root extracts of *Calotropis procera* (Ait.) R.Br on streptozotocin induced diabetic rats. Jordan Journal of Biological Sciences, 2: 177-180.
3. Moses, A., M. Leonard, E. Gatebe, H. Rotich, M. David, M. Votha, W. Isaac. N deritu and W. Kungu, 2013. Antifungal Activity of Eight Selected Medicinal Herbs Used for the Treatment of Diabetes, Malaria and Pneumonia in Kisii Region, Southwest Kenya. World Journal of Medical Sciences, 8(1): 74-78.
4. Sangameswaran, B. and K. Ilango, 2010. Evaluation Anti-hyperglycemic and antihyperlipidaemic activities of *Andrographis lineata* Nees on Streptozotocin induced diabetic Rats. Jordan Journal of Biological Sciences, 3: 83-86.
5. Omara, M., Y. Khader, A. Dauod, N. Al-Akour, A. Khassawneh, E. Al-Ashker and E. Al-shdifat, 2009. Glycaemic control among patients with type 2 diabetes mellitus treated in primary care setting in Jordan. primary care diabetes, 3: 173-179.
6. Wild, S, G. Roglic and A. Green, 2004. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030, Diabetes Care. 27: 1047-1053.
7. Al-Ajlan, A., 2007. Diabetic scenario in Arabs. Saudi Med. J., 28: 473-475.

8. Geoffrey, W., V. Alistair, E. Louise and D. Thomas, 2009. Obesity, diabetes and longevity in the Gulf: Is there a Gulf Metabolic Syndrome? *International journal of diabetes mellitus*, 1: 43-54.
9. Al-Nuaim, A., 1997. Prevalence of glucose intolerance in urban and rural communities in Saudi Arabia. *Diabetic Med.*, 14: 595-602.
10. Habiba, A., M. Roos, A. Bernsen, T. Sara and B. Al Azzani, 2008. Carbohydrate-Food knowledge of Emirati and Omani Adults with Diabetes: Results of a pilot study. *Int. J. Diabetes and Metabolism*, 16: 28- 25.
11. Ministry of Health, 2004. Center for Disease Control (CDC) Report, Jordan.
12. Udezue, E., A. Bzour and S. Jawabreh, 2007. Atypical diabetic presentation in Saudi Arabian adolescents. *Int. J. Diabetes and Metabolism*, 15: 4-8.
13. Khaled, K., A. Morsy, A. Sadek and S. Gawad, 2010. Peripheral neuropathy in type-II diabetic patients attending diabetic clinics in Al-Azhar University Hospitals. *International Journal of diabetes mellitus*. 2: 20-23.
15. Khoury, S., D. Massad and T. Fardous, 1999. Mortality and causes of death in Jordan 1995-96: assessment by verbal autopsy. *Bulletin of the World Health Organization*, 77: 641-650.
16. Younis, E., A. Badheeb, H. Ajlouni, S. Kareem and K. Ajlouni, 2001. Prevalence of missed hyperglycemia among Jordan University Hospital mortality discharges, 1995-97. *Eastern Mediterranean Health Journal*, 7: 46-50.
17. American Diabetes Association, 1998. Economic consequences of diabetes mellitus in the U.S. in 1997. *Diabetes care.*, 21: 296-309.
18. Bagriacik, N., H. Onat, B. Ilhan, T. Tarakci, Z. Oşar, M. Ozyazar, H. Hatemi G. and Yildiz, 2009. Obesity profile in Turkey. *Int. J. Diabetes and Metabolism*. 17: 5-8.
19. Ahmad, M., H. Tukan and H. Takruri, 2006. Obesity and Overweight in Young Adult Females of Northern Badia of Jordan. *Mal J Nutr*, 12: 157-166.
20. Khader, Y, O. Irshaidat, M. Khasawneh, Z. Amarin, M. Alomari and A. Batieha, 2009. Overweight and Obesity Among School Children in Jordan: Prevalence and Associated Factors. *Matern Child Health J*. 13:424-431. DOI 10.1007/s10995-008-0362-0
21. Doreen, M., L. Alun, A. Danielle, W. Lawrence and M. Peter, 2006. Association of socio-economic status with diabetes prevalence and utilization of diabetes care services *BMC Health Services Research*, 6: 124-127. doi: 10.1186/1472-6963-6-124.
22. Jaddou, H., A. Bateiha and K. Ajlouni, 2000. Prevalence, awareness and management of hypertension in a recently urbanised community, eastern Jordan. *Journal of human hypert*, 14: 497-501.
23. Imafidon, K. and F. Amaechina, 2010. Effects of Aqueous Seed Extract of *Persea americana* Mill. (Avocado) on Blood Pressure and Lipid Profile in Hypertensive Rats. *Advances in Biological Research* 4(2): 116-121.
24. Zindah, M., A. Belbeisi, H. Walke and A.H. Mokdad, 2008. Obesity and Diabetes in Jordan: Findings from the Behavioral Risk Factor Surveillance System. 2004. *Preventing chronic disease Journal*, 5: 1.
25. Report of the Expert Committee, 1997. Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care*, 20: 1183-1197.
26. Stevo, J., M. Silja and P. Paolo, 2001. Antihypertensive treatment of patients with diabetes and hypertension. *American Journal of Hypertension*. 14:310-316. doi: S0895-7061(01)02237-3
27. Lorian, M., C. John, R. Kim, C. Ronald, K. Jeff and M. Arya, 2010. Physical activity and health-related quality of life in individuals with prediabetes. *Diabetes Research and Clinical Practice*, 90: 15-21.
28. Cosson, E., E. Tchatchouang, I. Banua, B. Nguyena, S. Chiheb, H. Baa and P. Valensi, 2010. A large proportion of pre-diabetes and diabetes goes undiagnosed when only fasting plasma glucose and/or HbA1c are measured in overweight or obese patients. *Diabetes and Metabolism*, 36: 312-318.
29. Andreas, B., H. Harald, W. Christian, V. Marianne, D. Ulla and M. Michael, 2003. Is fasting blood glucose a reliable parameter for screening for diabetes in hypertension?. *American Journal of Hypertension*, 16: 297-301.
30. Mousa, A., A. Abujbara and K. Ajlouni, 2009. Approach to dysglycemia: Do we need to treat impaired glucose tolerance and impaired fasting glucose. *International Journal of Diabetes Mellitus* 1: 22-25.
31. Abdulbari, B., M. Zirrie, I. Janahi, O. Abdulla, D. Al-Hamaq, M. Musallam and N. Wareham, 2009. Prevalence of diagnosed and undiagnosed diabetes mellitus and its risk factors in a population-based study of Qatar. *Diabetes Research and Clinical Practice*, 84: 99-106.

32. Sowers, J.R., M. Epstein and E.D. Frohlich, 2001. Diabetes, hypertension and cardiovascular disease: an update. *J. Hypertension*, 37: 1053-1059.
33. David, C., M. Paul, M. Samia, E. Julie and J. Robert, 2007. Blood pressure and risk of developing type 2 diabetes mellitus: The Woman's Health Study. *European heart Journal*, 28: 2937-2943.
34. Ali Aberoumand, 2011. Studies of Starch Modification and its Uses in Food and Non-Food Industries Products. *World Journal of Dairy and food sciences*, 6(2):115-124.