Blood Pressure, Blood Sugar, Smokers and their Relationship with Physiological Variables of Some Risk Factors

Nada Saad Naji Al-Taee

Department of Environmental Pollution, Faculty of Environmental Sciences, AL-Qasium Green University, Iraq

Abstract

This study deals with the physiological measurements of fasting blood sugar (FBG), clinical blood pressure (CBP) and smokers and their association with risk factors (obesity,gender and age**)** among university students. A total of 257 students (77 females and 180 males) were registered. Including 41 healthy and 42 students who were FBG; 33 were healthy and 69 were suffering from CBP; 39 non smokers and 33 students who were smokers; aged 19-26 years. A statistically not-significant connection was found between FBG, CBP and smoking with obesity rates; buta significant difference between smoking and CBP with age and gender, respectively. These findings highlight the prevalence of FBG and CBP also smoking in students and its relation to certain risk factors such as obesity, sex and age among selected student groups.

Keywords: *Blood glucose, blood pressure, smoking, risk factors.*

Introduction

It is important to prove now that many factors such as obesity, sex and age are linked to BG, BP and smoking. The obesity is a hazard factor to many diseases, as diabetes and hypertension[1]. In 2030, around 438 million people worldwide (7.8%) in adult population are suffering from diabetes. This global rise in the propagation of diabetes is attributed to urbanization, population growth, aging and obesity[2]. According to[3]there is a significant impact of diabetes with gender, and women are more probability to develop diabetes than men. A study in Iraq found that the diabetes prevalence was 15.2% in female compared with 11.8% in males[4]. Despite the increasing burden of obesity and HBP in growing countries, there was limited information about BMI contribution in BP in these populations, especially among students. BMI is independently and positively connected with mortality and morbidity due to HBP, cardiovascular disease CVD and diabetes II[5]. For all BMI categories in study[6], age was higher with HBP and HBP in men than in women. The systolic-BP and diastolic-BP increased with age, both for men and women[7]. Smoking is one of the leading causes of death as well as the main challenge to public health all over the world[8]. Smoking is connected with low weight[9]. Lack of smoking propagation has been proposed as one of the agents connected with a high in obesity[10]. There may be a causal impact of smoking on weight because nicotine is a metabolic stimulant as well as appetite suppressant[11]. The difference in CVD risk among smokers and non-smokers is significant in middle age, particularly for men[12].

Corresponding Author:
Nada SaadNaji Al-Taee
Department of Environmental Pollution, Faculty of Environmental Sciences, AL-Qasium Green University, Iraq
e-mail: dr_n_saad_altaae@yahoo.com

Materials and Method

Criteria of participants: A sample of 257 students was selected randomly among students. About 83 participants of FBG with mean(X)±standard deviation (SD) of age were divided to: health (<100 mg/100cm^3; 21.97±1.49), pre-diabetes (100-125 mg/100cm^3; 21.83±1.59), diabetes (≥126 mg/100cm^3;21.77±1.09), and hypoglycemia (≤70 mg/100cm^3; 21.66±2.30). In addition, 102 participants of a CBP-level with X±SD of age, systolic blood pressure (mmHg), diastolic blood pressure (mmHg) and pulse pressure (Min) were divided as: normotensive (<120/<80; 21.38±1.706, 110.87±5.129, 72.16±6.126, 86.29±11.07), EPB,

elevated blood pressure (120-129/<80 mmHg; 21.96±2.007, 124.78±2.848, 75.71±4.767, 86.40±11.09), hypertension (130-139/80-89 or ≥140/90 mmHg; 22.00±1.647, 144.68±10.90, 90.41±6.873, 84.82±9.26), and hypotension (<90/60 mmHg; 20.28±1.603, 84.57±6.160, 56.57±3.101, 84.28±8.76). In addition, only 72 men were employed for smoking and the periods of cigarette smoking of 2-3 year with X±SD of age were divided into 39 non-smokers (control; 22.25±1.91), 9 light-Smokers (≤10 cigarette daily; 22.11±1.96), 16 moderate-smokers (11-20 cigarette daily; 22.06±1.80), and 8 heavy-smokers (≥ 20 cigarette daily; 22.25±1.90).

Collection of data and measurement: The data were gathered utilizing a self-administered questionnaire. It is built on several axes such as: age, smoking case, duration of smoking, the number of cigarettes smoked per day, the family history of diabetes and physical activities. The criteria for selecting students were that no one should suffer any medical complication such as heart disease, stroke or any other disorder. BG was measured in the morning after fasting for at least 8-10 hours, using the active glucose Accu-chek meter. BP was measured by the electronic pressure device by taking the pressure rate while students rested for at least 10-15 minutes.

Measurement of obesity: The obesity was estimated using body mass (BMI) index, measured by weight in kilograms (kg) divided by a height in the meters squared [kg/m^2]; BMI classification was based on WHO as: normal weight, 18.5-24.9; underweight, less than 18.5; and overweight 25-29.9. The waist circumference, (WC), is measured by placing the measurement meter tightly on the waist (cm) and the WC/risk level are classified as follows: Low (Women <80 and Men <90), high (Women 80-88 and men 94-102),andvery high>102 for smokers men.

Statistical analysis: The descriptive analysis was also used to show the X±SD of the results. Gender, age and obesity were statistically tested by Chi-square (χ^2) test at $p<0.05$.

Results And Discussion

Fasting blood glucose and obesity, sex and age: In Table 1: A statistically insignificant in BMI between FBG classes and healthy,although the highest percentage of pre-diabetes was obese compared with healthy. The statistically insignificant in WC of FBG levels compared with control, although the highest percentage was observed in diabetes from Low of WC and hypoglycemia from a high of WC risk level. The prevalence of diabetes (77.77) in males, and pre-diabetes (66.66) also hypoglycemia (66.66) in females. Statistically insignificant in age in FBG categories,although the highest rate of pre-diabetes and diabetes was found in both gender in the 21-22 age group, and a higher proportion of hypoglycemia in the 23-24 age group compared to health.

Clinical blood pressure level and obesity, gender and age: In Table 2: No-significant relationship between the level of CBP and obesity measured by BMI and WC, although the highest rate of EBP and hypertension was overweight and obese compared to normotensive, respectively. Hypertension and EBP are the highest in low and high of WC risk level compared with normotensive, respectively. The male had a high percentage of hypertension (82.76) and a high percentage of hypotension (85.71) in female compared with normotensive. EBP and hypertension appeared 21-22 and 23-24 years of age, compared to normotensive, respectively.

Smoking status with obesity (BMI and WC) and age: In Table 3: A statistically not-significant in obesity with BMI $\chi^2= 5.652$ among smoking status. A statistically not-significant in CW risk level of smokers compared to non-smokers. And a significant in age in which the high percentage was appeared at age (21-22)years of light-smokers followed by low percentage appeared at age (23-24) years of moderate-smoker compared to non-smokers. In addition to high percentage that noted at age (21-22) years in light-smokers, moderate-smokers, and heavy-smokers compared to control, and heavy-smokers has been shown in age 25-26 years compared with non-smokers of a same age. Obesity is connected with poorer control of BP-levels and BG-levels making people with diabetes more susceptible to micro-vascular and cardiovascular diseases[13]. Other studies have shown a strong epidemiological link between the development of diabetes and obesity[14]. When the study trends[15]were studied by BMI groups, disease increased only among those who have obese (18.0% to 20.1%), indicating that much of the rise in the prevalence of diabetes is due to the growing prevalence of obesity[16], and diabetes was less prevalent in males than in females in Iraq community[17]. In Turkey, there was a statistically non-significant relation between BP and sex[18]. Although this study was statistically insignificant in age with FBG,the results were favorable with[19] the prevalence of disease and hazard factors among people aged 15 Years and older in

Ethiopia. A significant connection was also found in[20]on college students between age, overweight, and sex, as well as between BGelevation with gender. Many people own a classification of BP without knowing it. The results of the current study were consistent with[21], where a positive relationship was absorbed between obesity and hypertension, also[22] which observed a positive connection between hypertension and BMI. The current study shows that male students had a high percentage of hypertension compared with a healthy and female students, and is close to[23]. It is also appropriate with[24] that there is a positive connection with BP and increasing age. The low prevalence of smoking has little impact, often less than 1%, on increasing the prevalence of obesity and reducing the healthy weight of the population[25]. The BMI of smokers appeared a diminishing trend compared with nonsmokers[26]. No-significant variation in the physical mean parameters such as obesity are found when calculating X±SD in smokers and passive-smoker[27]; but my results do not identical the results of[28], it was observed that both cigarette consumption and smoking frequency had positive effects with weight loss in adolescents. There has been a significant elevate over the past decade in the numbers of smokers of college age[29]. Various studies have reported that the spread of smoking raises between the first to last year among college students, confirming the fact that the early years of the university are important to target anti-smoking activities[30]. The University of Karbala, smokers (45.7%) smoked before the age of 18 years, and were positively correlated with male sex and growing age[31].

Table 1: Fasting blood glucose classes and obesity rates measured by BMI (kg/m^2) and WC (cm), sexes and age (years).

BMI	Fasting blood glucose classes								Total
	Health	N(%)	Pre-diabetes	N(%)	Diabetes	N(%)	Hypoglycemia	N(%)	
Normal	28	68.29	20	66.66	7	77.77	2	66.66	57
Under weight	1	2.43	2	06.66	0	00.00	0	6.57	3
Over weight	12	29.26	6	20.00	2	22.22	1	33.33	21
Obese	0	0.00	2	6.66	0	0.00	0	0.00	2
Total	**41**	**100**	**30**	**100**	**9**	**100**	**3**	**100**	**83**
WC									**Total**
Low	30	73.17	21	70.00	8	88.88	1	33.33	60
High	11	26.82	9	30.00	1	11.11	2	66.66	23
Total	**41**	**100**	**30**	**100**	**9**	**100**	**3**	**100**	**83**
Sex									**Total**
Male	19	46.34	17	33.33	7	77.77	1	33.33	44
female	22	53.65	13	66.66	2	22.22	2	66.66	39
Total	**41**	**100**	**30**	**100**	**9**	**100**	**3**	**100**	**83**
Age									**Total**
19-20	6	14.28	6	26.66	1	11.11	1	33.33	14
21-22	20	44.64	13	53.33	5	55.55	0	00.00	38
23-24	12	33.92	9	13.33	3	33.33	2	66.66	26
25-26	3	7.14	2	6.66	0	00.00	0	0.00	5
Total	**41**	**100**	**30**	**100**	**9**	**100**	**3**	**100**	**83**

Table 2: Clinic blood pressure level and obesity rates measured by BMI (kg/m^2) and WC (cm), sexes and age (years).

BMI	Clinic blood pressure level								Total
	Normotensive	N(%)	EPB	N(%)	Hypertension	N(%)	Hypotension	N(%)	
Under weight	2	6.06	2	6.06	2	6.90	0	0.00	6
Normal	22	66.7	18	54.6	16	55.2	5	71.4	61
Overweight	7	21.2	11	33.3	8	27.6	2	28.6	28
Obese	2	6.06	2	6.06	3	10.4	0	0.00	7
Total	**33**	**100**	**33**	**100**	**29**	**100**	**7**	**100**	**102**
WC									**Total**
Low	25	75.75	22	66.67	22	75.86	5	71.43	74
High	8	24.24	11	33.33	7	24.14	2	28.57	28
Total	33	100	33	100	29	100	7	100	102
Sex									**Total**
Male	18	54.55	21	63.64	24	82.76	1	14.28	64
Female	15	45.45	12	36.36	5	17.24	6	85.71	38
Total	**33**	**100**	**33**	**100**	**29**	**100**	**7**	**100**	**102**
Age									**Total**
19-20	11	33.33	8	24.24	3	10.35	4	57.14	26
21-22	12	36.36	10	30.30	16	55.17	2	28.57	40
23-24	8	24.24	12	36.36	7	24.14	1	14.28	28
25-26	2	6.060	3	9.090	3	11.11	0	0.00	8
Total	**33**	**100**	**33**	**100**	**29**	**100**	**7**	**100**	**102**

Table 3: Smoking status and obesity rates measured by BMI (kg/m^2) and WC (cm), and age (years).

BMI	Smoking status								Total
	Non-smoker	N(%)	Light smokers	N(%)	Moderate smokers	N(%)	Heavy smokers	N(%)	
Under weight	1	2.56	0	0.00	2	12.5	0	0.00	3
Normal	28	71.79	6	66.66	10	62.5	4	50.00	48
Overweight	10	25.64	3	33.33	4	25.00	4	50.00	21
Total	**39**	**100**	**9**	**100**	**16**	**100**	**8**	**100**	**72**
WC									**Total**
Low	35	89.74	8	88.88	15	93.75	8	100.0	66
High	3	7.69	1	11.11	1	6.25	0	0.00	5
Very high	1	2.5	0	0.00	0	0.00	0	0.00	1
Total	**39**	**100**	**9**	**100**	**16**	**100**	**8**	**100**	**72**
Age									**Total**
19-20	9	23.07	1	11.11	2	12.50	0	0.00	12
21-22	13	33.33	6	66.66	10	62.50	5	62.50	34
23-24	11	28.20	1	11.11	1	6.25	2	25.00	15
25-26	6	15.38	1	11.11	3	50.00	1	12.50	11
Total	**39**	**100**	**9**	**100**	**16**	**100**	**8**	**100**	**72**

Conclusion

There was insignificant association between obesity and cases, but significant differences between age and sex with smoking rate and CBP level among students.

Conflict of Interest: Author declares no conflict of interest.

Ethical Clearance: This research was reviewed by the Research Review Board of the Department of environmental pollution at the University of Al-Qasim Green.

Funding: This current study was self-funded.

References

1. US Department of Health and Human Services. Healthy People With Understanding and Improving Health and Objectives for Improving Health. 2 vols. Washington, DC: US Government Printing Office. 2000.
2. Chan JC, Malik V, Jia W. Diabetes in Asia: Epidemiology, risk factors, and pathophysiology. JAMA. 2009;301:2129-40.
3. Ovbiagele B, Markovi D, Fonarow G. Recent US patterns and predictors of prevalent diabetes among acute myocardial infarction patients. Cardiology Research and Practice 2011;1-8.
4. Abdulrahman MA. Risk factors survey for non-communicable diseases in Duhok City. DuhokMed J 2010;4:69-83.
5. Pi-Sunyer FX. Medical hazards of obesity. Ann Intern Med 1993;119:655-660.
6. Slagter SN, Vliet-Ostaptchouk JV, Vonk JM. Associations between smoking, components of metabolic syndrome and lipoprotein particle size. BMC Medicine 2013;11:195.
7. McLean RM, Williams S, Mann JI. Blood pressure and hypertension in New Zealand: results from the 2008/09 Adult Nutrition Survey. Journal of the New Zealand Medical Association 2013; 126(1372): 66-79.
8. Kume A, Kume T, Masuda K. Dose-dependent effect of cigarette smoke on blood biomarkers in healthy volunteers: Observations from smoking and non-smoking. Journal of Health Sciences 2009;55:259-264.
9. Albanes D, Jones DY, Micozzi MS. Associations between smoking and body weight in the US population: analysis of NHANES II. Am J Public Health 1987;77:439-444.
10. Chou SY, Grossman M, Saffer H. An economic analysis of adult obesity: results from the behavioral risk factor surveillance system. J Health Econ 2004;23:565-587.
11. Pinkowish M. Hand in glove: smoking cessation and weight gain. Patient Care 1999;33:134.
12. Keto J, Ventola H, Jokelainen J. Cardiovascular disease risk factors in relation to smoking behaviour and history: a population-based cohort study. Open Heart 2016;3:1-9.
13. Nemesure B, Suh-Yuh W, Hennis A. Hypertension, type 2 diabetes, and blood groups in a population of African Ancestry. Ethnicity and Disease 2006;16:822-829.
14. UK Prospective Diabetes Study. Characteristics of newly presenting type 2 diabetic patients: estimated insulin sensitivity and islet b-cell function. Multicentre study. Diabet Med1988;5: 444-448.
15. Bhupathiraju SN, Hu FB. Epidemiology of obesity and diabetes and their cardiovascular complications. Circulation Research 2016;118:1723-1735.
16. Menke A, Casagrande S, Geiss L, et al. Prevalence of and trends in diabetes among adults in the United States 1988-2012. JAMA 2015;314:1021-1029.
17. Mansour AA, Al-Maliky AA, Kasem B, et al. Prevalence of diagnosed and undiagnosed diabetes mellitus in adults aged 19 years and older in Basrah, Iraq. Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy 2014; 7.
18. Tavşanli NG, Köken S, Akıncıoğlu SÜ. Results of scanning for diabetes, obesity and blood pressure: a sample from Manisa in western Turkey. J Diabetes MetabDisord Control 2018;5:20-24.
19. Aynalem SB, Zeleke AJ. Prevalence of diabetes mellitus and its risk factors among individuals aged 15 years and above in Mizan-Aman town, southwest Ethiopia, 2016: A cross sectional study. International Journal of Endocrinology 2018;2018:7.
20. Lima ACS,Araújo MFM, Freitas R. Risk factors for type 2 diabetes mellitus in college students: association with sociodemographic variables. Rev. Latino-Am. Enfermagem 2014;22:484-490.
21. Sachdev B. Prevalence of hypertension and

associated risk factors among Nomad Tribe groups. Antrocom Online Journal of Anthropology 2011;7(2):1973-2880.

22. EL-Sayed MK, Amin H. ABO blood groups in correlation with hypertension, diabetes mellitus type II, and essential hypertension. Asian J Pharm Clin Res 2015;8(5):236-243.
23. Shams S, Ajmal H, Khan S. Association of ABO blood groups with blood pressure among the students of abdulwalikhan university. Mardan J Appl Environ Biol Sci. 2014;4(8S):300-303.
24. Tesfaye F, Nawi NG, Van Minh H. Association between body mass index and blood pressure across three populations in Africa and Asia. Journal of Human Hypertension 2007;21:28-37.
25. Flegal KM.The effects of changes in smoking prevalence on obesity prevalence in the United States. American Journal of Public Health. 2007; 97(8):1510-1514.
26. LeuShipa SA, Rana MM, Miah MF, et al. Effect of intensity of cigarette smoking on leukocytes among adult men and women smokers in Bangladesh. Asia Pac J Med Toxicol 2017;6:12-19.
27. Nighute S, Khatoon M, Awari A. Numerical alteration of different white blood cells in chronic tobacco smokers. Journal of Recent Advances in Applied Sciences 2013;28:100-103.
28. Jong-Hyuck K, Wi-Young S. Association of smoking frequency and cigarette consumption with obesity in Korean adolescents. BratislLekListy 2012;113:599-603.
29. Houston TP, Kolbe LJ, Eriksen MP. Tobacco-use cessation in the 90s—not "adults only" anymore. Preventive medicine 1998;27:A1-2.
30. Aslan D, Bilir N, Özcebe H. Prevalence and determinant of adolescent smoking in Ankara, Turkey. Turkish journal of cancer 2006;36:49-56.
31. Al Mousawi A. The Prevalence of smoking among Karbala/Iraq University students in Iraq in 2005. Tobacco Use Insights 2014;7:9-14.