Assessment of risk factors for hypertension and diabetes in penultimate and final year pharmacy students in a University in South-Western Nigeria.

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ABSTRACT

Background: It is vital to carry out risk factor assessment for diabetes and hypertension among undergraduate students, as they may be unaware of some risk factors that may predispose them to becoming diabetic and/or hypertensive.

Objectives: To carry out assessment of risk factors for hypertension and diabetes in penultimate and final year students of the Faculty of Pharmacy, University of Ibadan.

Methods: A cross-sectional study was conducted among 124 penultimate and final year students of the Faculty of Pharmacy, University of Ibadan. A pretested questionnaire was used to garner information on risk factors predisposing to hypertension and diabetes. Anthropometric measurements and objective readings were taken. Data was analyzed for descriptive and inferential statistics using SPSS version 23.

Results: Response rate was 84.7 % (105/124). There were 68 (64.8 %) female participants. The prevalence of hypertension was 7.6% and 43 (41.0%) were pre-hypertensive. None of the study population had diabetes, however, 4 (3.8%) were pre-diabetic. The waist circumference risk classification of participants shows 95 (90.5%), 6 (5.7%), 3 (2.9%) and 1 (1.0%) participants had least, increased, high and very high risk of developing hypertension respectively. Ten (9.5 %) participants were overweight, 2 (1.9 %) were obese and 5 (4.8 %) had abnormal waist-hip ratio.

Conclusion: The study revealed that risk factors for hypertension and diabetes exist among the undergraduate students studied and points to a need for targeted public health campaigns among students.

Key words: Risk factor assessment, Pharmacy students, Diabetes and hypertension.

Évaluation des facteurs de risque d'hypertension et de diabète des étudiants des deux dernières années de licence en pharmacie dans une université du sud-ouest du Nigéria.

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RESUME

Contexte: Il est essentiel de procéder à une évaluation des facteurs de risque pour le diabète et l'hypertension chez les étudiants du premier cycle, car ils peuvent ignorer certains facteurs de risque qui pourraient les prédisposer à devenir diabétiques et / ou hypertendus.

Objectifs: Évaluer les facteurs de risque d'hypertension et de diabète chez les étudiants des deux dernières années de la Faculté de Pharmacie, Université d'Ibadan.

Méthodes: Une étude transversale a été réalisée entre 124 étudiants de la dernière et de l'avant-dernière année de la Faculté de Pharmacie de l'Université d' Ibadan. Un questionnaire prétesté a été utilisé pour recueillir des informations sur les facteurs de risque prédisposant à l'hypertension et au diabète. Des mesures anthropométriques et des relevés objectifs ont été pris. Les données ont été analysées pour les statistiques descriptives et déductives à l'aide de la version 23 du logiciel SPSS.

Résultats: Le taux de réponse était de 84,7% (105/124). Il y avait 68 (64,8%) femmes participantes. La prévalence de l'hypertension était de 7,6% et 43 (41,0%) étaient pré-hypertensives. Personne dans la population de l'étude n'avait le diabète, cependant, 4 (3,8%) étaient pré-diabétiques. La classification du risque de circonférence de la taille des participants montre que 95 (90,5%), 6 (5,7%), 3 (2,9%) et 1 (1,0%) des participants présentaient respectivement le moindre risque, le risque accru, le risque élevé et le risque très élevé de développer une hypertension artérielle. Dix (9,5%) participants avaient un excessif, 2 (1,9%) étaient obèses et 5 (4,8%) avaient un rapport anormal de la taille et de la taille.

Conclusion: L'étude a révélé que les facteurs de risque d'hypertension et de diabète existent chez les étudiants de premier cycle étudiés et souligne la nécessité de campagnes de santé publique ciblées chez les étudiants.

Mots clés: évaluation des facteurs de risque, étudiants en pharmacie, diabète et hypertension artérielle.

INTRODUCTION

Hypertension is a common, important and major global public health problem.[1] A study carried out in Nigeria revealedthat there were more than 20.8 million cases of hypertension in Nigeria among people aged at least 20 years in 2010, affecting one in three men and one in four women, with the figures set to rise to 39 million cases by 2030.[2]A review of prevalence among adults from 1990 to 2009 showed combined prevalence of 22% and range from a minimum of 12.4% to a maximum of 34.8%.[3]In 2004, Castelli explained that its prevalence is on the increase in developing countries where adoption of western lifestyle is not on the decline.[4] Hypertension is twice as high in Nigeria compared with East African countries; and less than 20% of Nigerians are aware that they have the condition.[2]

Pre-hypertension is a significant risk for progression to hypertension thereby increasing the risk for cardiovascular diseases and cerebrovascular events.[5-10]It is defined as individuals with blood pressure (BP) above optimal levels, but not clinical hypertension, i.e., systolic BP 120-139 mmHg or diastolic BP of 80-89 mmHg. Individuals with prehypertension have a greater risk of developing hypertension later in life.[3] Framingham states that prehypertension is strongly associated with an increased risk of myocardial infarction and coronary artery diseases.[9]

Many factors have been identified as risk factors for hypertension. Socio-demographic factors, such as gender, advanced age, family history of hypertension, diabetes mellitus and behavioral factors, like body mass index, sleep duration, smoking, and alcohol/caffeine consumption are significant predictors of hypertension.[11]

Globally, the prevalence of type 2 diabetes and risk factors for cardiovascular disease have seen an upward trend in recent years.[12] Although independent conditions, these diseases can be classified as 'lifestyle' related diseases as they share a number of common modifiable risk factors such as obesity, hypertension and low physical activity level. Prevention, diagnosis and treatment of these two diseases require approaches which take into consideration the overlap in risk factors. It was estimated that in 2011, 366 million people were living with diabetes worldwide.[13]More worrying still is that the incidence of diabetes is increasing dramatically and 50% of people living with the condition are currently undiagnosed.[13]

Type 2 diabetes mellitus has clear modifiable risk factors. The most important of the modifiable factors is being overweight or obese. Also inclusive are poor diet and lack of physical activity. The National Institute for Health and Care Excellence (NICE) states that providing structured lifestyle intervention in high risk adult populations can prevent or delay the onset of type 2 diabetes.[14]In 2005, the World Health Organization (WHO) reported that the prevalence of obesity in sub-Saharan African countries was in the range of 3.3% and 18.0%, and that obesity had become a leading risk factor for diabetes mellitus and cardiovascular diseases in the urban areas of Africa.[15] According to theAmerican Diabetes Association (ADA), the cut-off value for impaired glucose tolerance (IGT) is 140-200 mg/dL, the range for impaired fasting glucose (IFG)is 100-125 mg/dL and glycated hemoglobin (HbA1c) level of 5.7% to 6.4% indicates prediabetes.[16]

Overweight and obesity are complex health problems that affect more than two-thirds of U.S. adults.[17]There are many health conditions associated with overweight and obesity including hypertension, coronary heart disease, and type 2 diabetes.[18]A major risk factor for diabetes is excessive adiposity, which is often a consequence of poor diet and physical inactivity. The risk for developing diabetes increases as weight increases. Compared to a healthy weight person, an overweight individual is three times more likely to develop diabetes within 10 years.[19]According to the third report of the National Cholesterol Education Program, individuals with diabetes are also at an increased risk of developing coronary heart disease.[20] Lifestyle interventions with an emphasis on behavior modification and weight reduction have been effective in lowering the incidence of diabetes.[21]

Lifestyle changes including healthy eating patterns, increased physical activity, and weight management often improve the risk factors associated with obesity. A very good lifestyle approach is the Therapeutic Lifestyle Changes (TLC). It is recommended by various health organizations including American Diabetes Association, American Heart Association, and The Obesity Society, among others as a sound therapeutic strategy for overweight or obese persons at risk for type 2 diabetes and/or coronary heart disease.[22] The components of TLC include: diet (reduced intakes of saturated fats, trans-fats, and cholesterol; dietary options for maximizing low density lipoprotein reduction and reducing coronary heart disease risk), weight management, increased regular physical activity. TLC diet features a eating plan that includes many lower energy density foods including fruit, vegetables, whole grains, lean meats, poultry, seafood, legumes, and low-fat dairy products.

Overall, University students are often exposed to environmental conditions such as cigarette smoking, inefficient nutrition from cheap energetic diets,

sedentary life style,which can lead to an increase in cardiovascular disease risk prevalence.[23]It therefore becomes imperative to create awareness on healthy living habits to curb the unguarded western lifestyle adoption, especially among University students. There is need to create public awareness about the need for regular medical checkup as this helps with early diagnosis and slows down disease progression. This study aimed at carrying out routine health checks with special focus on diabetes and hypertension, and also investigated the risk factors that predispose to developing these diseases. The essence was to toe the line of caution and prevention, which is the best cure.

METHODS
Study design
This was a cross-sectional study carried out among the penultimate and final year students of the Faculty of Pharmacy, University of Ibadan for the 2014/2015 academic session. A pretested questionnaire was used to collect data from the respondents; objective and anthropometric measurements of the participants were also taken. Total sampling was done for the entire penultimate and final year students.

Data collection instruments
The questionnaire consisted of two sections. The first section addressed the socio-demographic data of the respondents while the second section addressed the behavioral risk factors. A data collection form was also used to collect data on blood pressure reading, blood glucose reading and anthropometric measurements.

Data collection procedure
Sequel to securing participants' informed consent to participate in the study, the questionnaire was administered. The fasting blood glucose reading was taken with ACCU-CHECK™ glucometer after an overnight fast. Blood pressure was taken with ACCOSON™ sphygmomanometer, and then repeated after 2 weeks. The average of the blood pressures taken was reported. Anthropometric measurements was done using SECA™ height scale, TANSON™ weighing scale and a tape rule for the waist and hip circumference.

Data analysis
Data collected was analyzed using SPSS version 23. Descriptive statistics like frequency counts and percentages was used to summarize data and inferential statistics likeChi-square and Fisher's exact tests was used to assess relationships between categorical variables.RESULTS
The response rate was 84.7%: a total of 124 questionnaires were administered and 105 questionnaires were retrieved for statistical analysis. Sixty-eight (64.8%) participants were female.The descriptive statistics indicating the mean and standard deviation for some continuous variables is as shown in Table 1.

Table 1: Descriptive statistics for some continuous variables

Variables	Mean	Standard Deviation
Age (years)	21.83	1.7350
Systolic Blood Pressure (mmHg)	112.21	9.1140
Diastolic Blood Pressure (mmHg)	76.21	7.2000
Weight (kg)	59.28	8.2468
Height (m)	1.65	0.0715
Waist circumference (cm)	73.00	6.1093
Hip circumference (cm)	93.25	6.7160
Fasting blood glucose (mg/dL)	82.30	10.1720
BMI raw value (kg/m^2)	21.39	2.3678
Waist-hip ratio	0.78	0.0491
Average daily sleep duration (hours)	6.15	0.9942

Eighty-six (82.9 %) were within 18 -22 years of age, 16 (15.2 %) were 23 – 27 years and 3 (2.9 %) were above 27 years. Fifty-three (50.5%) participants had a family history of chronic disease. Other descriptive statistics for participants' demographic and family history data is presented in Table 2.

Table 2: Descriptive statistics for some demographic and family history data

Variable	Frequency	Percent
Specific Chronic Disease in Family History		
Hypertension	36	67.9
Diabetes	8	15.1
Diabetes & hypertension	6	11.3
Rheumatism	1	1.9
Asthma	2	3.8
When last did you do a medical checkup?		
< 1 year	24	22.9
1-2 years	16	15.2
3-4	28	26.7
> 4 years	37	35.2
Average daily sleep duration		
4 hours	3	2.9
5 hours	23	22.3
6 hours	45	43.7
7 hours	20	19.4
8 hours	12	11.7

The comparison between participants' gender and level of study with some descriptive statistics is as shown in Tables 3 and 4 respectively.

Table 3: Gender comparison of descriptive statistics

Variables	Mean	Std. Deviation	N	Mean	Std. Deviation	N
Gender	**Female**			**Male**		
Age (years)	21.57	1.4180	68	22.30	2.1460	37
Systolic Blood Pressure (mmHg)	109.25	8.0790	68	117.65	8.4600	37
Diastolic Blood Pressure (mmHg)	74.76	6.5040	68	78.86	7.7360	37
Weight (kg)	57.29	8.2282	68	62.92	7.0292	37
Height (m)	1.62	0.0560	68	1.71	0.0624	37
Waist circumference (cm)	71.89	6.3025	68	75.04	5.2239	37
Hip circumference (cm)	94.35	6.8357	68	91.24	6.0782	37
BMI raw value (kg/m^2)	21.37	2.4140	68	21.43	2.3128	37
Waist-hip ratio	0.76	0.0366	68	0.82	0.0434	37
Fasting blood glucose (mg/dL)	81.72	9.8010	68	83.38	10.8760	37
Average daily sleep duration (hours)	6.32	0.9633	67	5.84	0.9864	36

Table 4: Level of study comparison of descriptive statistics

Variables	Mean	Std. Deviation	N	Mean	Std. Deviation	N
Level of Study	**400 Level**			**500 Level**		
Age (years)	21.32	1.3960	60	22.51	1.9140	45
Systolic Blood Pressure (mmHg)	114.33	8.9400	60	109.38	8.6510	45
Diastolic Blood Pressure (mmHg)	77.60	6.5460	60	74.36	7.6760	45
Weight (kg)	60.28	8.2731	60	57.93	8.1084	45
Height (m)	1.65	0.0859	60	1.65	0.0466	45
Waist circumference (cm)	74.08	6.2666	60	71.56	5.6455	45
Hip circumference (cm)	94.25	7.0921	60	91.92	6.0016	45
BMI (kg/m^2)	21.88	2.3733	60	20.74	2.2235	45
Waist-hip ratio	0.79	0.0502	60	0.78	0.0479	45
Fasting blood glucose (mg/dL)	83.88	10.0040	60	80.20	10.1210	45
Average daily sleep duration (hours)	6.05	0.9900	59	6.27	0.9968	44

None of the participants was diabetic, however, 4 (3.8 %) were prediabetic. Fifty-four (51.4 %) participants had normal blood pressure, 43 (41.0 %) were prehypertensive while 7 (6.7 %) and 1 (1.0 %) had stage 1 and stage 2 hypertension respectively. Other data for objective measurements are as shown in Table 5.

Table 5: Descriptive statistics for some objective measurements

Variables	Range	Frequency	Percent
	Waist Circumference (cm)		
Least risk	Female: < 70		
	Male: < 80	95	90.5
Increased	Female: 70 – 89		
	Male: 80 – 99	6	5.7
High risk	Female: 90 - 109		
	Male: 100 – 120	3	2.9
Very high risk	Female: > 110		
	Male: > 110	1	0.9
	Body Mass Index (Kg/m^2)		
Underweight	< 18.5	10	9.5
Normal	18.5 – 24.9	83	79.0
Overweight	25 – 29.9	10	9.5
Obese		2	1.9

Comparison of blood pressure and blood glucose categories with gender of participants is shown in Table 6.

**Table 6: Comparison of blood pressure and blood glucose categories with gender of the participants**

	Gender			
	Female		**Male**	
Variables	Frequency	Percent	Frequency	Percent
Blood pressure categories				
Normal	44	41.9	10	9.5
Prehypertension	22	21.0	21	20.0
Stage I hypertension	2	1.9	5	4.7
Stage II hypertension	0	0.0	1	1.0
Blood glucose categories				
Normal (< 100 mg/dL)	67	63.8	34	32.4
Prediabetes (100 – 125 mg/dL)	1	1.0	3	2.8

Key		
Systolic	**Diastolic**	**Inference**
<120 mmHg	<80 mmHg	Normal
120-139mmHg	80-89 mmHg	Prehypertension
140-159 mmHg	90-99 mmHg	Stage 1 Hypertension
>160 mmHg	>100 mmHg	Stage 2 Hypertension

Only 1 (1.0 %) of the participants smoked cigarette while 3 (2.9 %) consumed alcohol. Ninety-one (86.7%) participants did not have a deliberate meal plan to factor in balanced diet, 14(13.3%) had deliberate meal plan to factor in balanced diet. One hundred and two (97.1 %) participants do not have a meal time table. Ninety-one (86.7 %) did not have a deliberate plan to factor in balanced diet. Other responses to questions on healthy living habits are presented in Table 7.

Table 7: Responses to questions on healthy living habits

Variables	Frequency	Percent
How often do you take vegetables?		
Daily	2	2.8
2 – 3 days per week	26	36.6
Weekly	40	56.3
Rarely	3	4.3
How often do you take fruits?		
Daily	5	4.9
2-3 days per week	26	25.5
Weekly	41	40.2
Monthly	25	24.5
Rarely	5	4.9
How often do you exercise?		
Daily	28	26.7
2 – 3 days per week	9	8.6
Weekly	21	20
Monthly	25	23.8
Rarely	22	20.9
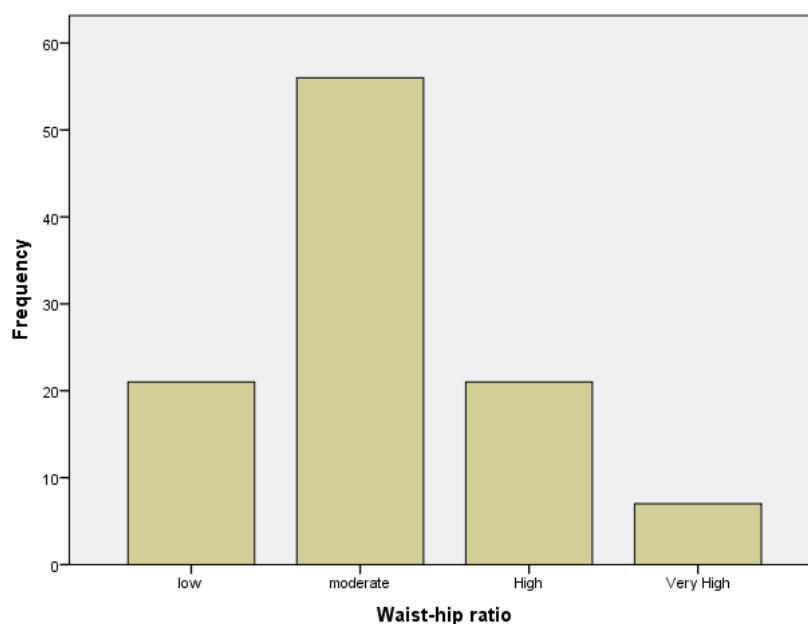
Figure 1: Waist-hip ratio of participants

Key:

Sex	Age (years)	Low	Moderate	High	Very high
	20-29	<0.83	0.83-0.88	0.89-0.94	>0.94
Male	30-39	<0.84	0.84-0.91	0.92-0.96	>0.96
Female	20-29	<0.71	0.71-0.77	0.78-0.82	>0.82

Source is from the study by Heyward and others.[24]The Chi-square and Fisher's exact tests only gave a significant association between gender and diastolic blood pressure with p value 0.022 Pearson and 0.014 respectively.Only 9 (8.6%) participants had their lipid profile tests carried out recently.

DISCUSSION

There was no incidence of diabetes among the study population, however, four participants were prediabetic. Over the past decade, studies have consistently shown that the development of type 2 diabetes can be prevented by lifestyle modification in high risk individuals, particularly those with pre-diabetes or in early stages of the disease.[21,25,26] Early identification of people with pre-diabetes and undiagnosed diabetes is therefore an important approach to prevent type 2 diabetes.[22]

Almost one-half participants were prehypertensive and a little below one-tenth were hypertensive. The prevalence of pre-hypertension among our study population was similar to that of other studies.[27-29] In a study among first year medical students at SRM Medical College Hospital and Research Center, India, 37.2 % were pre-hypertensive and 9.5 % were hypertensive.[30] In our study, the prevalence of hypertension was higher among males. This is in line with the study done by Srivastavaand others, who also found more cases of hypertension in males than females, while for prehypertension it was similar among the genders.[31]

Prehypertension is a major risk factor for hypertension. Considering the percentage of the prehypertensive participants, it is important to address lifestyle modifications aimed at preventing the progression to hypertension. According to the Framingham heart study, pre-hypertensive individuals have two times higher risk of progression to hypertension than normotensive people.[32] Increased baseline BP leads to increased rate of development of hypertensionwhich is proved by many longitudinal studies.[33-34] A study predicted that progression to hypertension is four times higher in pre-hypertension than that of students with normal BP.[35]

More than three-quarters of the family history of chronic disease indicated by the participants was hypertension which indicates the prevalence of hypertension in our society. This is in agreement with the study done by Kadiri that in sub-Saharan Africa, hypertension is the most rapidly rising cardiovascular disease and affecting over 20 million people. He also maintained that in Nigeria, hypertension is the commonest non-communicable disease with over 4.3 million Nigerians above the age of 15 years classified as being hypertensive.[36]

In our study, about one-tenth participants were overweight 1.9 % were obese. It is important to curb this trend, as being overweight and obese are risk factors for both hypertension and diabetes. A study amongst Egyptian university students gave the prevalence of cardiovascular risk factors as follows: sedentary life 49%, family history 40.3%, obesity 16.8%, hypercholesterolaemia 15.6%, smoking 4.9%, high blood pressure 3.3 % and high blood glucose 2.0%.[37] Fasting lipid profile was not carried out in this study. It could have helped to further assess the risk factors.

CONCLUSION

The study revealed that risk factors for hypertension and diabetes exist among the undergraduate students studied and points to a need for targeted public health campaigns among students. Well-structured nutritional and physical activity awareness strategies and intervention programs, especially for those with more than one risk factor, strong family history of hypertension and other chronic non-communicable disease is highly encouraged. The results from this study indicate the need for orientation programs to inform the population of university students on chronic degenerative diseases generally and especially hypertension.

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