

Prevalence of Hypertension among Medical Students and its Lifestyle Determinants

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Abstract:

Background: Hypertension is a major public health problem worldwide. It is a risk factor for most of coronary heart diseases and cardiovascular diseases. Strategies to prevent and treat hypertension in younger age groups and adolescents including medical students have been applied and evaluated by the world health organization.

Objectives: To determine the prevalence of both hypertension and prehypertension among medical students in medical colleges and to study the association of different factors with hypertension disease.

Subjects and Methods: A descriptive cross-sectional study was conducted in medical colleges of Al-Anbar University-Iraq. The study period was from 1st Jan to 10th March 2019. A total of 273 undergraduate medical group students both female and male participated in this study from three colleges: Medicine, Pharmacy, and Dentistry College. Blood pressure, height, and weight were measured using standardized instruments. SPSS Statistics for Windows, Version 24.0 was used to analyze data. Both Cross-tabulation and Chi-square tests of significance were done.

Results: The prevalence rate of hypertension in this research study was 9.9%, of them 18.0% and 3.3% were males and females respectively. Prehypertension was 17.2% of the total sample. Risk factors highly associated with hypertension ($P=0.0001$) were male gender, stress, high salt intake, smoking habits and increased BMI. While there was no significant association between dietary risk factor and hypertension in our study.

Conclusion: The high overall prevalence of hypertension (9.9%) and of prehypertension (17.2%) with overall prevalence of hypertension and prehypertension together (27.1%) represent a call for the establishment of screening system for early detection at primary health care level. Community-based health education programs on the importance of the examination and follow-up processes for early detection of hypertension and prehypertension is recommended.

Keywords: Prevalence, Hypertension, Pre-hypertension, Medical students

Introduction

Hypertension is a serious community health problem worldwide. More than nine million deaths annually related to hypertension disease. Through routine medical investigations a lot of patients of hypertension are detected accidentally^(1, 2).

Prehypertension in young adults increases the probability for developing hypertension in older ages. Hypertension increases the risk of different critical health illness for example cardiovascular diseases and stroke, kidney failure, and eye diseases. It is noticed that lifestyle in a lot of regions in the world has been changed from traditional to modern life. This matter led to young people and adolescence suffering from hypertension due to fast food, sedentary lifestyle, advanced technology, and other modified life and dietary style characterized by low physical activity, increase diets of high calories, which are rich in fat and sugar⁽³⁾.

Hypertension is related to increased chance of coronary heart diseases and myocardial infarction, this happens to a lower risk with prehypertension people. Mild elevation of blood pressure leads to increased thickness of wall of arteries. The early discovering of hypertension is important in identification of factors that can be

modified for prevention of cardiovascular diseases, as Qureshi et al mentioned in his study⁽⁴⁾.

Several studies have reported different prevalence rate of hypertension among medical students ranging between 6% and 21.3⁽⁵⁻⁷⁾. Non-modifiable risk factors such as gender (male), older age, and positive family history were found to be associated with hypertension, while various modifiable risk factors were found to be linked with hypertension including lack of physical activity, tobacco smoking, alcohol consumption, and higher body mass index^(1,8,9).

Dietary attitudes were also found associated with hypertension, for example low consumption of fruits and vegetables⁽¹⁰⁾, consuming fat foods⁽¹¹⁾, fast foods⁽¹²⁾.

The aim of this study is to determine the prevalence of hypertension and prehypertension among medical students in three medical group colleges and the relationship of different factors with hypertension.

Methodology

This is a descriptive cross-sectional study that was carried out on medical colleges of Al-Anbar University. A total of 273 medical students were included in this study (122 male and 151 female) from 3 colleges: Medicine, Pharmacy,

and Dentistry College. The study period was from 1st January to 10th March 2019. Those who have certain diseases and on medications like corticosteroids were excluded. Informed consent was obtained from students to participate in this study.

Data on socio-demographic characteristics were collected from participants' students. Also, lifestyle factors such as cigarette smoking, physical activity, and dietary habits. Weight was measured using digital scale to the nearest 0.1 kg with only light clothing, and for the determination of height, subjects were asked to take off their shoes, stand upright with their head up and the heel, buttock, and occiput against the wall. Height was recorded to the nearest 0.5 cm. Body Mass Index (BMI) was calculated using the formula "Weight (Kg)/ Height² (m).

Blood pressure was measured using a standard mercury sphygmomanometer on two different times, with at least 10 min gap, the average reading was considered as the final reading. Student was guided to sit in 90 degree sitting position and Prehypertension was defined as systolic blood pressure 120–139 mmHg or diastolic blood pressure 80–89 mm Hg. Hypertension was defined as systolic blood pressure ≥ 140 mm Hg or diastolic blood pressure ≥ 90 mmHg. BMI was classified according to the WHO adult BMI classification into normal (18.5–24.9), overweight (25–29.9), and obese (≥ 30)⁽¹⁰⁾.

Collected data were coded and analyzed using Statistical Package for the Social Sciences (IBM SPSS Statistics for Windows), Version 24.0. Cross-tabulation and Chi-square test of significance were done between all factors studied as age, gender, BMI, physical activity, fruits and vegetables intake, family history of hypertension with the prevalence of prehypertension and hypertension. P value equal or less than 0.05 was considered as the level of significance. Logistic regression was done to demonstrate the effects of risk factors on hypertension.

Results:

The study's participants consisted of 273 medical students (mean age 20.8 ± 1.75 , range = 18–25 years), 122 of which (44.7%) were males and 151 (55.3%) were females. Table 1 shows the socio-demographic characteristics of the study participants. The students enrolled were from College of Medicine (44.3%), College of Pharmacy (24.5%), and College of Dentistry (31.1%). According to the educational year, 23.4%, 24.9%, 21.2%, 14.7%, 9.9% and 5.9% of the study participants were enrolled in 1st, 2nd, 3rd, 4th, 5th and 6th year of medical schools, respectively. The residence of more than two thirds of the students (68.5%) were in hostels, 25.6% with their families at home while only 5.9% rent houses with others.

Table 1: The distribution of medical students according to Socio-demographic characteristics.

Participants' characteristics	No. (n=273)	%
Age (years): <19	34	12.5
19-20	84	30.8
21-22	100	36.6
23 and above	55	20.1
Gender : Male	122	44.7
Female	151	55.3
College: Medicine	121	44.3
Pharmacy	67	24.5
Dentistry	85	31.1
Grade: 1 st	64	23.4
2 nd	68	24.9
3 rd	58	21.2
4 th	40	14.7
5 th	27	9.9
6 th	16	5.9
Residence: Hostel	187	68.5
Home	70	25.6
Rent with others	16	5.9
Perceived family income: Very good	43	15.8
Good	130	47.6
Fair	100	36.6

Figure 2 shows that 27 students out of 273 were having hypertension according to the JNC-7 definition of prehypertension and hypertension, thus the prevalence of hypertension in the study sample was found to be 9.9%, of them 22 (18.0%) males and 5 (3.3%) females.

Prehypertension was detected among 47 students which constituting 17.2% of the total sample (25.4% males and 10.6% females). The other 72.9% of the students were having normal blood pressure.

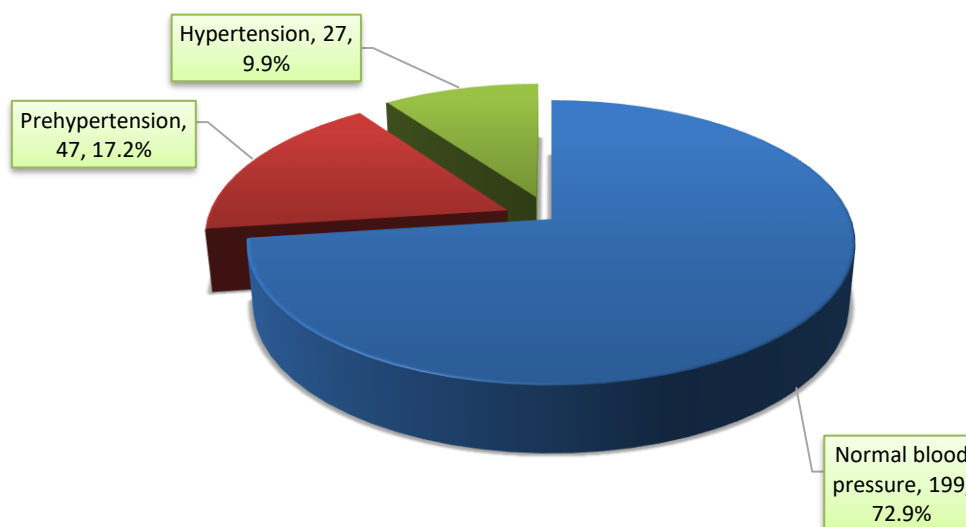


Figure 1: The prevalence of hypertension and prehypertension in the study sample

Risk factors of hypertension were illustrated in Table 2. Smokers constituted 11.7% among all medical students; physical inactivity (both mild and sedentary) was 65.9% while only 12.8% were having exercises 5 days or more in a week. Positive family history of hypertension was found among 46.2%. More than half of the sample (55.7%) said that sometimes they had psychosocial stress, while 16.8% were always under such stress. Over weight and obesity prevalence was 37.0% among students (28.9, 8.1%) respectively. Time spent on mobile per day was 5 hours and more by

nearly 40% of all students, 3-4 hours by 36.6%, and only 1-2 hours by 23.4%. Regarding dietary risk factors, 10.6% of the students have a lot of salt intake, 20.5% have too much tea and coffee per day, 7.0% had high calorie drinks. Other dietary intake include vegetable consumption, 68.1% had consumed vegetables less than 7 days per week, 42.9% consumed fruits less than 3 days per week,. On the other hand fast food, soft drinks and fatty food was consumed by 54.9%, 54.6% and 66.3% accordingly.

Table 2: Distribution of medical students according to risk factors of hypertension

		No.	%
Smoking:	Smokers	32	11.7
	Non smokers	237	86.8
	Ex-smokers	4	1.5
Physical activity:	5 days+/week	35	12.8
	3-4 days/week	58	21.2
	1-2 days/week	103	37.7
	None	77	28.2
Family history of HT:	Yes	126	46.2
	No	147	53.8
BMI:	Under weight	8	2.9
	Normal	164	60.1
	Overweight	79	28.9
	Obese	22	8.1
Psychosocial stress:	Always	46	16.8
	Sometimes	152	55.7
	No	75	27.5
Time spent on Mobile:	1-2 hrs	64	23.4
	3-4 hrs	100	36.6
	5 hrs and above	109	39.9
Salt intake:	Too frequent	60	22.0
	Fair	188	68.9
	Little	25	9.2
Tea & coffee intake:	Too frequent	56	20.5
	Fair	141	51.6
	Little	76	27.8
High calorie drinks:	Yes	19	7.0
	Sometimes	48	17.6
	No	206	75.5
Vegetable intake:	7 days/ week	87	31.9
	Less than 7 days/week	186	68.1
Fruit intake:	3 days/ week	156	57.1
	Less than 3 days/week	117	42.9
Fast food intake:	Once a week	123	45.1
	More than once/week	150	54.9
Soft drinks:	Once a week	124	45.4
	More than once/week	149	54.6
Fatty food:	3 days/ week	92	33.7
	Less than 3 days/week	181	66.3

Table 3 demonstrated the relationship between hypertension, prehypertension and various risk factors. The association was significant with increasing age, gender (males had more prevalence than females), residence at hostels or in rent places with others,

In Table 4, logistic regression reveals that gender, physical inactivity, stress,

excess salt intake, and high BMI are significantly associated with hypertension. Smoking habits, positive family history, physical inactivity, psychosocial stress, high salt intake and obesity. Dietary risk factors were not found to be significantly associated with hypertension in our study.

Table 3: Association of risk factors with hypertension and pre- hypertension

Risk factors	Hypertension No. (%)	Pre Hypertension No. (%)	Normal B Pr No. (%)	P value
Age: <9 years	4 (11.8)	9 (26.5)	21 (61.8)	0.030*
19-20	9 (10.7)	7 (8.3)	68 (81.0)	
21-22	5 (5.0)	22 (22.0)	73 (73.0)	
23 years & above	9 (16.4)	9 (16.4)	37 (67.3)	
Gender: Male	22 (18.0)	31 (25.4)	69 (56.6)	0.0001*
Female	5 (3.3)	6 (10.6)	130 (86.1)	
College: Medicine	12 (9.9)	24 (1.8)	85 (70.2)	0.060
Pharmacy	9 (13.4)	4 (6.0)	54 (80.6)	
Dentistry	6 (7.1)	19 (22.4)	60 (70.6)	
Grade: 1 st	8 (12.5)	16 (25.0)	40 (62.5)	0.070
2 nd	4 (5.9)	9 (13.2)	55 (80.9)	
3 rd	6 (10.3)	8 (13.8)	44 (75.9)	
4 th	3 (7.5)	7 (17.5)	30 (75.0)	
5 th	1(3.7)	6 (22.2)	20 (74.1)	
6 th	5 (31.3)	1 (6.3)	10 (62.5)	
Perceived income: Very good	2 (4.7)	7 (16.3)	34 (7.1)	0.254
Good	10 (7.7)	22 (16.9)	98 (75.4)	
Fair	15 (15.0)	18 (18.0)	67 (67.0)	
Residence: Hostel	20 (10.7)	35 (18.7)	132 (70.6)	0.030*
Home	3 (4.3)	8 (11.4)	59 (84.3)	
Rent with others	4 (25.0)	4 (25.0)	8 (50.0)	
Smoking habits: Smokers	9 (28.1)	8 (25.0)	15 (46.9)	0.001*
Non smokers	17 (7.2)	38 (16.0)	182 (76.8)	
Ex- smokers	1 (25.0)	1 (25.0)	2 (50.0)	
Physical activity: 5 days+/week	0 (0)	7 (20.0)	28 (80.0)	0.050*
3-4 days/week	2 (3.4)	8 (13.8)	48 (82.8)	
1-2 days/week	12 (11.7)	18 (17.5)	73 (70.9)	
None	13 (16.9)	14 (18.2)	50 (64.9)	
Family history of HT: Yes	18 (14.3)	24 (19.0)	84 (66.7)	0.040*
No	9 (6.1)	23 (15.6)	115 (78.2)	
BMI: Under weight	0 (0)	1 (12.5)	7 (87.5)	0.0001*
Normal	4 (2.4)	19 (11.6)	141 (86.0)	
Overweight	13 (16.5)	22 (27.8)	44 (55.7)	
Obese	10 (45.5)	5 (22.7)	7 (31.8)	
Psychosocial stress: Always	17 (37.0)	15 (32.6)	14 (30.4)	0.0001*
Sometimes	6 (3.9)	28 (18.4)	118 (77.6)	
No	4 (5.3)	4 (5.3)	67 (89.3)	
Mobile time: 1-2 hrs	5 (7.8)	14 (21.9)	45 (70.3)	0.817
3-4 hrs	11 (1.0)	16 (16.0)	73 (73.0)	
5 hrs and above	11 (10.1)	17 (15.6)	81 (74.3)	
Salt intake: Too frequent	20 (33.3)	17 (28.3)	23 (38.3)	0.0001*
Fair	6 (3.2)	24 (12.8)	158 (84.0)	
Little	1 (4.0)	6 (24.0)	18 (72.0)	
Tea & coffee intake: Too frequent	5 (8.9)	6 (0.7)	45 (80.4)	0.597
Fair	15 (10.6)	28 (19.9)	98 (69.5)	
Little	7 (9.2)	13 (17.1)	56 (73.7)	
High calorie drinks: Yes	4 (21.1)	4 (21.1)	11 (57.9)	0.195
Sometimes	2 (4.2)	11 (22.9)	35 (72.9)	
No	21 (10.2)	32 (15.5)	153 (7.3)	
Vegetable intake: 7 days/ week	5 (5.7)	16 (18.4)	66 (75.9)	0.290
Less than 7 days/week	22 (11.8)	31 (16.7)	133 (71.5)	
Fruit intake: 3 days/ week	12 (7.7)	24 (15.4)	120 (76.9)	0.192
Less than 3 days/week	15 (12.8)	23 (19.7)	79 (67.5)	
Fast food: Once a week	10 (8.1)	17 (13.8)	96 (78.0)	0.221
More than once/week	17 (11.3)	30 (20.0)	103 (68.7)	
Soft drinks: Once a week	10 (8.1)	16 (12.9)	98 (79.0)	0.111
More than once/week	17 (11.3)	31 (20.8)	101 (67.8)	
Fatty food: 3 days/week	9 (9.8)	14 (15.2)	69 (75.0)	0.815
Less than 3 days/week	18 (9.9)	33 (18.2)	130 (71.8)	

*Significant difference

Table 4: Logistic regression of risk factors affecting hypertension

	B	S.E	Wald	d.f.	P value	OR
Age	-0.025	0.194	0.016	1	0.898	0.975
Gender	-1.670	0.731	5.214	1	0.022*	0.188
Income	0.563	0.468	1.446	1	0.229	1.756
Residence	-0.649	0.524	1.539	1	0.215	0.522
Smoking	-0.630	0.683	0.853	1	0.356	0.532
Inactivity	1.452	0.449	10.447	1	0.001*	4.271
Famhistory	0.503	0.577	0.759	1	0.384	1.654
Stress	-1.407	0.473	8.844	1	0.003*	0.245
Salt intake	-1.478	0.561	6.956	1	0.008*	0.228
Tea& Coffee	-0.105	0.434	0.058	1	0.809	0.900
Highcalorie	.0196	0.518	0.144	1	0.705	1.217
BMI	1.521	0.471	10.440	1	0.001*	4.576
Constant	-2.024	4.400	0.212	1	0.645	0.132

Discussion:

The overall prevalence of hypertension in this study was 9.9% (18.0% and 3.3% in males and females respectively), and of prehypertension prevalence of 17.2%. The overall prevalence of hypertension and prehypertension together is 27.1% which is similar to the prevalence of hypertension and pre-hypertension together which was found in a study in Palestine ⁽¹³⁾ but lower than that reported by Alanazi *et al* in Saudi Arabia which was 56.89%. ⁽¹⁴⁾

The prevalence of hypertension alone in this study is (9.9%) among medical students which is similar to that reported by Ghazi *et al* in Malaysia (10%) ⁽¹⁵⁾, but lower than that reported among medical students in the Al-Qassim Province of Saudi Arabia 14.6% ⁽¹⁶⁾ and in Uganda 14% ⁽⁶⁾.

The risk factors associated with hypertension which have significantly associated with hypertension, such as sedentary lifestyle, gender (male), high consumption of salt, cigarette smoking, obesity, and stress. Several studies reported higher prevalence of hypertension among males compared to females ⁽¹⁶⁻¹⁷⁾. This difference in prevalence rate by gender still unclear; however, the role of androgens in regulating blood pressure gives some clue to differences between genders ⁽¹⁸⁾.

An association between BMI and hypertension was found in this report. The prevalence of hypertension was found to be 45% among obese participants (BMI ≥ 30) which is similar to another study that reported 45.48% of hypertensive had high BMI ⁽¹⁹⁾. Other studies had shown BMI to be a strong predictor of hypertension ^(16,20). Although the exact mechanism by which increased body weight lead to hypertension is still unclear, a previous research suggest that in obese people, the combination of insulin resistance, increased sympathetic activity, and increased leptin levels could be the mechanism behind this ⁽²¹⁾.

This study showed that current smoking is also a significant risk factor for hypertension which is in agreement with other studies through the stimulation of the sympathetic nervous system; smoking has hypertensive effect ^(22, 23). Medical students undergo a lot of psychological distress especially during initial years of training which has been demonstrated by various studies ^(24, 25). Also, high salt intake was found significantly associated with elevated blood pressure; this is in agreement with other studies. ^(26, 27)

Unlike previous studies ^(15, 18, 28), this study did not find significant association between inadequate vegetable and fruit

consumption, soft drink, fatty foods, fast food consumption and hypertension.

The limitation of this study is that follow up was not conducted for those with high blood pressure. In conclusion, the high overall prevalence of hypertension (9.9%) and of prehypertension (17.2%) with overall prevalence of hypertension and prehypertension together (27.1%) represent a call for the establishment screening system for early detection at primary health care level. Participation in sports should be recommended for all medical students to prevent them going towards the tendency of physical inactivity. One of the primary prevention of hypertension is a call for lifestyle modification from younger age, to introduce the importance of balanced diet, avoid salty food and regular exercise.

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