

ORIGINAL RESEARCH

Prevalence of Hypertension among Medical Students

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Abstract

Background: Hypertension is one of the biggest health challenges, which is continuously increasing among young adults, especially students. The aim of the present study was to find out the prevalence, and associated factors and to provide necessary feedback to improve the effective delivery of health care services, with special reference to hypertension among medical students of DM WIMS, Medical College, Wayanad.

Methods: A descriptive cross-sectional study was conducted in a medical college of Wayanad, India. Data were collected on risk factors and assessments were carried out using standard equipment and procedures.

Results: The present research involved 594 undergraduate medical students between 19 to 22 years of age. BP distribution among the participants was 88.55 % normotensive, 11.11 % prehypertension and 0.34 % hypertension. The physical activities like vigorous, moderate and sedentary lifestyle were majorly present in normotensive group and also the family history of hypertension was predominantly seen in normotensive group in both SBP and DBP classified group.

Conclusions: Stress, diet, family history, physical activity and socioeconomic status were recognized as risk factors of hypertension. Hence it needs a powerful surveillance program to find the exact problem.

Keywords: SBP, DBP, Prevalence, Risk Factors, Medical Students

Introduction

In this rapidly changing human environment, the health of humankind is continuously shaped by globalization of unhealthy lifestyles, rapid urbanization and demographic aging. In the present world, both the developed and developing, there is a shift of non-communicable disease which have overtaken the infectious diseases as the world's primary cause of mortality.⁽¹⁾ In a human's life, adolescence is a crucial period of growth and maturation in which many changes occur and vast majority of adult patterns are established.^(2,3)

Hypertension is a common risk factor for cardiovascular disease and is a major public health problem.⁽⁴⁾ Worldwide it affects one in four adults⁽⁵⁾, resulting in over 10 million annual deaths.⁽⁶⁾ The developing and the low and middle income countries in the planet, contributes to about two thirds of the deaths due to hypertension.⁽⁷⁾ Many meta analyses studies have certainly demonstrated that treating and effectively lowering high blood pressure is associated with cardiovascular events and mortality.^(8,9) Several studies conducted in the Indian subcontinent suggest that, the onset of hypertension occurs relatively early in life.⁽¹⁰⁾ Most of the time, it is associated with clustering of multiple risk factors for cardiovascular diseases.⁽¹¹⁾

In the present study, we are trying to obtain reliable data on prevalence of hypertension among the medical students of DM WIMS, there by estimating the future burden of hypertension and to identify, potential risk factors among the study populations to target with preventive interventions.

Materials And Methods

The present descriptive cross-sectional study was conducted at DM WIMS medical college, Wayanad, between the months of October 2018 to November 2018. Ethical clearance was obtained from institutional ethical review committee of DM WIMS, Wayanad. Convenient sampling was done and a total of 594 undergraduate students studying in the Medical College formed the study population. All the participants willing to participate, those who are non-willing to participate and who have chronic illness and secondary hypertension were include in the study. The questionnaire was validated from the experts in the research from the department of Community Medicine in DM WIMS, Wayanad. Study participants were interviewed using a pre-designed, pre-tested, semi-structured questionnaire after proper explanation of purpose and need of the project. Data was collected by room visits in ladies and mens hostel using a structured questionnaire. We attempted to study 600 subjects from which we collected 594. 6 subjects were excluded because they were not interested to participate in study. Ethical clearance for the research was taken from the Ethics committee of the college. Written informed consent was obtained from each study participant before enrolment into the study. For a hypertensive individual, counselling was done, and referrals were made. Confidentiality was assured to the participants and maintained in the data collection process. Face to face interview was conducted to collect the data, so there were no dropouts and non-response.

Data were collected on blood pressure and socio-demographic details. The anthropometric measurements were carried out using standard equipment and procedures. Waist circumference ≥ 90 cm for men, and ≥ 80 cm for women cut off for defining abdominal obesity. Cut off value for hypertension was taken at 140/90 mm Hg. Knowledge about hypertension of study participants was assessed using “self-made validated questionnaire”. We continued to collect the data till required sample size was reached.

Classification	SBP(In mm Hg)		DBP (In mm Hg)
Normal	<120	AND	<80
Pre-Hypertension	120-139	OR	80-89
Stage 1 Hypertension	140-159	OR	90-99
Stage 2 Hypertension	≥ 160	OR	≥ 100
Table 1: Classification of blood pressure in adults			

BMI	Interpretation
<18.5	Underweight
18.5-24.9	Normal
25-29.9	Overweight
30-39.9	Obese
≥ 40	Morbidly Obese
Table 2: Cut off values for BMI according to WHO steps protocol	

Statistical Methods

Data were entered in Microsoft Excel and analysed using SPSS version 20.0. Continuous data were summarized using mean, median, and standard deviation depending on the distribution of the data. Categorical data were summarized using percentages and proportions.

Results

The study consisted of 594 participants, and were between 19 and 22 years old. BP distribution among the participants was 88.55% normotensive, 11.11% prehypertension and 0.34% hypertension which is presented in Table 3.

Blood pressure	Frequency	Percentage
Normotensive	526	88.55%
Prehypertension	66	11.11%
Hypertension	2	0.34%
Total	594	
Table 3: Blood pressure classification among participants		

The population's SBP and DBP is classified into normotensive, prehypertension and hypertension according to sociodemographic risk factors. Among 594 patients, majority of the patients had one complaint in 83(70.9%) in normotensive group, followed by 34(29.1%) in prehypertensive group. More than one complaint was present in 15(65.2%) patients in normotensive group followed by 8(34.8%) of the patients in prehypertensive group. Stress was present majorly in normotensive patient group (n=358/85.9%) followed by prehypertensive group (n=59/14.15%). About 27(65.9%) of the patients were vegetarian in normotensive group and 14(34.1%) patients in prehypertensive group were vegetarian. The physical activities like vigorous, moderate and sedentary lifestyle were majorly present in normotensive group and also the family history of hypertension was predominantly seen in normotensive group. (Table 4)

Variable		Normal	Prehypertension	Hypertension
Complaints	No complaints	428	24	2
		94.3%	5.3%	0.4%
	One complaint	83	34	0
		70.9%	29.1%	0.0%
	More than one complaint	15	8	0
		65.2%	34.8%	0.0%
Stress	No	168	7	2
		94.9%	4.0%	1.1%
	Yes	358	59	0
		85.9%	14.1%	0.0%
Diet	Vegetarian	27	14	0

		65.9%	34.1%	0.0%
		499	52	2
Socioeconomic status	Non-vegetarian	90.2%	9.4%	0.4%
	BG prasad Class 0	6	0	0
		100.0%	0.0%	0.0%
	BG prasad Class 1	351	57	1
		85.8%	13.9%	0.2%
	BG prasad Class 2	94	8	1
		91.3%	7.8%	1.0%
	BG prasad Class 3	33	1	0
		97.1%	2.9%	0.0%
Physical activity	BG prasad Class 4	15	0	0
		100.0%	0.0%	0.0%
	BG prasad Class 5	27	0	0
		100.0%	0.0%	0.0%
	Vigorous	28	6	1
		80.0%	17.1%	2.9%
Family history of hypertension	Moderate	379	42	1
		89.8%	10.0%	0.2%
	Sedentary	119	18	0
		86.8%	13.1%	0.0%
	Yes	256	31	1
		88.9%	10.8%	0.3%
	No	270	35	1
		88.2%	11.4%	0.3%

Table 4: Association between SBP and different sociodemographic variables

The population's DBP is classified into normotensive, prehypertension and hypertension according to sociodemographic risk factors. Among 594 patients, majority of the patients had one complaint in 95(81.2%) in normotensive group, followed by 17(14.5%) in prehypertensive group and 5(4.3%) patients in hypertensive group. More than one complaint was present in 15(65.2%) patients in normotensive group followed by 7(30.4%) of the patients in prehypertensive group and 1(4.3%) patient in hypertensive group. Stress was present majorly in normotensive patient group (n=375/89.9%) followed by prehypertensive group (n=35/8.4%) and 7(1.7%) in hypertensive group. About 27(65.9%) of the patients were vegetarian in normotensive group, 12(29.3%) patients in prehypertensive group were vegetarian and 2(4.9%) patients were in hypertensive group. The physical activities like vigorous, moderate and sedentary lifestyle were majorly present in normotensive group and also the family history of hypertension was predominantly seen in normotensive group. (Table 5)

Variable		Normal	Prehypertension	Hypertension
Complaints	No complaints	406	19	29
		89.4%	4.2%	6.4%
	One complaint	95	17	5
		81.2%	14.5%	4.3%
	More than one complaint	15	7	1
		65.2%	30.4%	4.3%
Stress	No	141	8	28
		79.7%	4.5%	15.8%

	Yes	375	35	7
		89.9%	8.4%	1.7%
Diet	Vegetarian	27	12	2
		65.9%	29.3%	4.9%
	Non vegetarian	489	31	33
		88.4%	5.6%	6.0%
SES BG prasad classification	Class 0	6	0	0
		100.0%	0.0%	0.0%
	Class 1	347	28	34
		84.8%	6.8%	8.3%
	Class 2	93	9	1
		90.3%	8.7%	1.0%
	Class 3	31	3	0
		91.2%	8.8%	0.0%
	Class 4	14	1	0
		93.3%	6.7%	0.0%
Class 5	25	2	0	
	92.6%	7.4%	0.0%	
Physical activity	Vigorous	28	3	4
		80.0%	8.6%	11.4%
	Moderate	369	29	24
		87.4%	6.9%	5.7%
	Sedentary	119	11	7
86.7%		8.1%	5.2%	
Family history	Yes	245	22	21
		85.1%	7.6%	7.3%
	No	271	21	14
		88.6%	6.9%	4.6%
Table 5: Association between DBP and different sociodemographic variables				

Discussion

This study was performed at DM, WIMS medical college, Wayanad. The aim of this study was to evaluate the prevalence of prehypertension and hypertension in young adult medical students in Wayanad and try to correlate the blood pressure with known risk factors of hypertension. Research has shown an increase of hypertension in a population over 25 years old.¹² This study was designed to evaluate if hypertension was present, and in that case how prevalent the hypertension is in a population under 25 years of age. The higher CVD risk is found associated with SBP.¹³ Research has shown that some risk factors for developing hypertension are genetics, male gender, being overweight, stress, lack of exercise, diet, smoking and high intake of alcohol.¹⁴ The questionnaire that were handed out to the participants were designed to hold questions regarding known risk factors for hypertension. The purpose of the questionnaire was to get a broader understanding of which known risk factors the studied population were exposed to. The study consists of 594 medical students. Most participants were resting for approximately five minutes but were talking or laughing while the examiner was measuring the BP. The decrease in the resting time and talking before or during the measurement are two sources of error since both could lead to an increase in the BP.¹⁵ The participants BP were measured in the same order during the three appointments. In the present study, about 88.55% were normotensive, 11.11% prehypertensive and 0.34%

hypertensive. This study has a higher prevalence of prehypertension compared to the earlier study. One reason for this could be the study's number of participants. If this study had consisted of a larger population the result could have been more equal to that of Peltzer et al.¹⁶

This study cannot make any assumption regarding the hypertension found, whether it is primary or secondary hypertension. Further medical evaluation is needed to establish the type of hypertension (primary or secondary). Almost every study participant (90%) added some salt to the diet. The high salt intake could be one variable for explaining the high prevalence of hypertension in the population. One of the questions in the questionnaire asked about the participants exercise habits. The question did not define what activities could be included as exercise. Therefore, the examiners do not know what activities the participants have included. Some may have included walking while others may only have included harder physical activities. In the study, 16 participants claimed to feel stressed when answering the question in the questionnaire. This question was designed as a yes or no question and therefore only gave the examiners information regarding if the participants felt stressed or not. It did not give any information about the levels of stress the students experienced. It would have been better if the question were designed in such a way that the participants categorized their stress level from 1 to 5. The question did not give any information regarding for how long period of time the student had been stressed. The examiners do not know if the stress were temporary or chronic.

This study could help improve the health of young students and suggest that information regarding hypertension and the prevention of it should be distributed among the population in Wayanad, considering the high prevalence of prehypertension. Development of CVD can be prevented by measuring the BP on a regular basis. If prehypertension can be detected at an early stage it can be prevented from developing into hypertension if certain pro-active measures are taken. These measures could be lifestyle changes such as more exercise, less salty food and quit smoking.¹⁶⁻¹⁸ Measurement of the BP is a cheap, easily accessible method and BP screenings could lead to less development of CVD. One study suggested BP screening every second year in normotensive individuals and screening every year in individuals with prehypertension.¹⁵ A limitation of this study is the small population used in the data collection and the fact that no statistical analyses were done.

The researchers did not have enough knowledge about statistics or SPSS to be able to analyse the data collected. If statistical analyses were performed, conclusions about which risk factors that causes the most hypertension in young adults in Wayanad could have been drawn. The prehypertension and hypertension groups are not exposed to more or higher known risk factors than the participants in the normotensive group. The participant's answers have been very diverse, and no common denominators can be found when comparing with other people in the BP class.

There are many known risk factors which the examiners are not considering in the questionnaire. The examiners could have analysed the blood of the participants to screen for a high cholesterol or a high blood sugar. If all known risk factors would have been analysed it would have been too much data for the research and therefore the examiners had to select the risk factors most suitable for a questionnaire. To screen the blood of the participants, equipment and access to a laboratory for analysis would have been required which would have been too expensive.

This study suggests further studies on this subject. Other populations than students should be studied due to the higher knowledge of the human physiology and diseases among the medical students compared to individuals that have no medical training. The aim of this study has been accomplished. The prevalence of prehypertension and hypertension among young adult medical students in Wayanad have been evaluated. Since no statistical analyses were

done, this study cannot tell if one of the risk factors evaluated causes hypertension in a higher degree than other in the young population in Wayanad.

Conclusions

This study finds the prevalence of hypertension among medical students in Wayanad to be 0.34%, with an additional 11.11% of the students having prehypertension. Due to the fact that no statistical analyses were done, this study cannot make any conclusions regarding which risk factors causing hypertension among young students in Wayanad. This study proposes further studies on the subject using a larger population with analysis of statistics and having more risk factors being taken into consideration.

References

1. World Health Organization. A Global Brief on Hypertension-World Health Day 2013;2013. doi:10.1136/bmj.1.4815.882-a
2. Health needs of adolescents. Report of a WHO expert Committee Geneva, World Health Organization 1977 (WHO Technical Report Series, No. 609)
3. Tanner JM. Growth at adolescence, with a general consideration of the effects of hereditary and environmental factors upon growth and maturation from birth to maturity, 2nd ed. Oxford, Blackwell, 1962
4. Poulter NR, Prabhakaran D, Caulfield M. Hypertension. *Lancet*. 2015;386(9995):801-802
5. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. *Lancet*. 2005;365(9455):217-223
6. Collaborators GBD, Forouzanfar MH, Alexander L, et al. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks in 188 countries, 1990-2013: a systematic analysis for the global burden of disease study 2013. *Lancet*. 2015;386(10010):2287-2322
7. Arima H, Barzi F, Chalmers J. Mortality patterns in hypertension. *J Hypertens*. 2011;29(Suppl. 1):S3-7
8. Ettehad D, Emdin CA, Kiran A, et al. Blood pressure lowering for prevention of cardiovascular disease and death: a systematic review and meta-analysis. *Lancet*. 2016;387(10022):957-967
9. Law MR, Morris JK, Wald NJ. Use of blood pressure lowering drugs in the prevention of cardiovascular diseases; meta-analysis of 147 randomised trials in the context of expectations from prospective epidemiological studies. *BMJ*. 2009;338:b1665.
10. Gupta R, Misra A, Vikram NK, et al. Younger age of escalation of cardiovascular risk factors in Asian Indian subjects. *BMC Cardiovasc Disord*. 2009;9:28
11. Jeemon P, Prabhakaran D, Goenka S, et al. Impact of comprehensive cardiovascular risk reduction programme on risk factor clustering associated with elevated blood pressure in an Indian industrial population. *Indian J Med Res*. 2012;135(4):485-493
12. Ha NT, Duy HT, Le NH, Khanal V, Moorin R. Quality of life among people living with hypertension in a rural Vietnam community. *BMC Public Health*. 2014;14(833):833.
13. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. *JAMA*. 2003. The Journal of the American Medical Association; 289(19):2560-72.
14. Habib GB, Virani SS, Jneid H. Is 2015 the primetime year for prehypertension? Prehypertension: a cardiovascular risk factor or simply a risk marker? *J Am Heart Assoc*. 2015;4(2):e001792.
15. Frese EM, Fick A, Sadowsky HS. Blood pressure measurement guidelines for physical therapists. *Cardiopulm Phys Ther J*. 2011;22(2):5-12.

16. Peltzer K, Pengpid S, Sychareun V, Ferrer AJG, Low WY, Huu TN et al. Prehypertension and psychosocial risk factors among university students in ASEAN countries. *BMC CardiovascDisord*. 2017;17(1):230.
17. Seravalle G, Grassi G. Obesity and hypertension. *Pharmacol Res*. 2017;122:1-7.
18. Collier SR, Landram MJ. Treatment of hypertension: lifestyle and/or medication. *Vasc Health Risk Manag*. 2012;8:613-9.