Observational assessment and correlates to blood pressure of future physicians of Bengal

P Das, M Basu[1], K Chowdhury[2], S Mallik[2], G Dhar[3], A Biswas[4]

Department of Community Medicine, Midnapore Medical College, Paschim Medinipur, West Bengal, [1]Community Medicine, IPGMER, Kolkata, [2]Community Medicine, CNMC, Kolkata [3]Community Medicine, NRSMC, Kolkata and [4]Pharmacology, NRS Medical College, Kolkata, India

Abstract

Intoduction: Hypertension is a modern day epidemic and growing public health problem. A sizable proportion of world populations suffer from prehypertension or hypertension.

Objectives: The present study was carried out to detect the prevalence of undiagnosed hypertension among undergraduate medical students and to identify the associated risk factors.

Materials and Methods: The study was observational in nature and was done in medical colleges of Bengal. Study tool was a predesigned, pretested, validated, and semi-structured questionnaire containing both open-ended and close-ended questions. Data were collected through self-administration, clinical, and anthropometric examination. The data were then tabulated, analyzed and interpretation was done by using percentage and Chi-square test.

Results: Most of the students (63%) were young adults, predominantly males (67%) and day scholars (71%). Almost one-third of them either suffered from hypertension or at risk of hypertension. Hypertension was found higher among male students. Family history of hypertension or diabetes mellitus was not associated with hypertension. Vegetarian or nonvegetarian diet or extra-salt consumption was also not associated with hypertension. Smoking was shown positively associated with hypertension but alcohol consumption was not. Higher per capita monthly income and overweight or obesity were shown positively associated with hypertension.

Conclusion: The overall prevalence of hypertension in this study was 13% and there were positive association of hypertension with multiple socio-demographic factors like age, sex, type of family, per capita monthly income, residence, BMI, smoking, etc.

Key words: Associated factors, hypertension, undergraduate medical students

Date of Acceptance: 06-Jan-2012

Introduction

Hypertension (HTN) is a modern day epidemic and growing public health emergency worldwide. It is identified as the number one global risk for mortality, responsible for 12.8% (7.5 million) of total deaths worldwide according to a new report issued by the World Health Organization (WHO).[1] The global prevalence of HTN has been increasing. In 2000 nearly 972 million adults (developed countries 333 million and developing countries 639 million) had HTN with a prevalence rate of 26.4% (26.6% male and 26.1% female) and this is projected to increase to 1.56 billion and a prevalence rate of 29.2% (29.0% in male and 29.5% in female) by 2025 (an increase by about 60%).[2] The prevalence of HTN varies around the world with the lowest prevalence in rural India (3.4% in men and 6.8% in women) and the highest prevalence in Poland (68.9% in men and 72.5% in women).[3] Incidence rate of HTN ranges from 3% to 18% depending on age, gender, ethnicity, and

Address for correspondence:
Dr. Palash Das,
Department of Community Medicine,Midnapore Medical College,
Paschim Medinipur, West Bengal, India.
E-mail:palashdasdr@gmail.com

Access this article online	
Quick Response Code:	Website: www.njcponline.com
	DOI: 10.4103/1119-3077.116884
	PMID:

body size of the population studied.[4] The WHO estimates that 600 million people with high blood pressure (BP) are at risk of heart attack, stroke, and cardiac failure.[5] Across WHO regions, research indicates that about 62% of strokes and 49% of heart attacks are caused by high BP.[6] Kaplan defines HTN as that level of BP at which benefits of action (minus the risks and costs) exceed the risks and costs (minus benefits) of inaction.[7] Uncontrolled HTN is associated with serious end-organ damage including heart disease, stroke, blindness, and renal disease.[8] The prevalence of HTN is rapidly increasing in developing countries As more than 80% of the world's population lives in economically developing nations, it is very likely that the worldwide burden of illness due to HTN will continue to escalate unless measures are taken to blunt the expected increase in the prevalence of HTN.[9] At present, HTN is directly responsible for 57% of deaths due to stroke and 24% of deaths caused by heart attack in India.[10] Prevalence of HTN in people aged ≥20 years by world region and sex in 2000 and 2025 showed that in India in 2000 the combined urban and rural prevalence was 20.6% among males and 20.9% among females and in 2025 the projected rate will be 22.9% among males and 23.6% among females.[2] Gupta from Jaipur carried three epidemiological studies among persons aged >20 years in 1994, 2001, and 2003, which demonstrated rising prevalence, that is, 30%, 36%, and 51% among males and 34%, 38%, and 51% among females, respectively.[11-13] The Chennai Urban Rural Epidemiological Study (CURES) demonstrated the prevalence was 20%[14] and Mohan *et al.* at Chennai reported as 14%.[15] Majority of previous studies done on the prevalence of HTN in India was on older adults and elderly. But studies from various communities across India indicates an increase in prevalence of HTN among adolescents.[16] An increase in body weight and sedentary lifestyle show strong association with increase HTN prevalence among adolescents.[17] A study done in Singapore revealed the prevalence of HTN in young males was 1.6%.[18] Since majority of hypertensive patients remain asymptomatic, it is essential to identify the at risk individuals at younger age, in spite of relatively low prevalence in young adults because target organ damage is correlated to the duration of disease.[19] Even pre-HTN, which is the starting point of cardio vascular disease continuum, is associated with detrimental heart change in young people. The age group 18–22 years is important physically, mentally, and emotionally Medical students represent this group.

Among the modifiable risk factors of HTN obesity, sedentary lifestyle, low level of physical exercise, extra salt intake, alcohol consumption, smoking, fast food intake, and psychosocial stress are directly responsible for the development of the disease. All of these are common problems of this young age group. Nationally representative data in young adults are scanty in India as they are deemed to have lower risk of developing HTN. But this is on the rise and not detected due to inadequate screening at this age. The sentinel surveillance project from 10 regions of the country among those aged 20–69 years showed that the overall prevalence was 28%. Our belief is that some of the undergraduate medical students have sedentary life-style, do not exercise, eat fast and junk foods, smoke, consume alcohol, obese, and live stressful life.

The literature on prevalence of HTN and risk factors among medical students of West Bengal was scarce and so in view of the above context the present study was carried out to detect the prevalence of undiagnosed HTN among undergraduate medical students of tertiary care hospitals of Bengal and to identify the associated risk factors such as age, sex, dietary habit, smoking, alcoholism, exercise habit, etc.

Materials and Methods

The study type was observational and institution-based. Study design was cross-sectional. Study population was undergraduate medical students of tertiary care hospitals of Bengal from three batches. Study was conducted in 2011. Study tools were a predesigned, pretested, validated, and semistructured questionnaire containing both open-ended and close-ended questions, measuring tape, weighing machine, mercury column sphygmomanometer, and stethoscope. Study technique adopted was by administering a semi-structured questionnaire (interview), by anthropometric measurements and by BP recording (examination).

Study variables were demographic profile (age, sex), socio- economic profile (place of residence: day scholar/hostelite, type of family, per capita monthly income), family history of HTN and diabetes mellitus, dietary profile (dietary pattern, extra salt intake), smoking habit, alcohol consumption, physical activity, medical history (H/O HTN or its complications), medication history (such as use of antihypertensive drug, steroids, oral contraceptive pills (OCP), etc.). Outcome variables were height, weight, body mass index (BMI), and BP.

Sample size was 600 medical students of three batches. Sampling technique was convenient sampling of three batches that were within our reach. It was actually a census population. Inclusion Criteria: (1) Willing to give informed consent. (2) Age between 18 and 24 years. (3) Under antihypertensive medications. Exclusion Criteria: (1) Students with renal or renovascular disease, polycystic kidney, pheochromocytoma, Cushing syndrome, acromegaly, hypothyroidism, hyperparathyroidism. (2) Pregnancy. (3) Students under some medications, for example, OCP, anabolic steroids, etc. (4) Ex-smoker.

Data collection procedure was as follows. All medical students of the 2007–2008, 2008–2009, and 2009–2010 batches were invited to participate in the study. They were informed that they were chosen for the study. They were explained about the purpose of the study and their informed verbal consent was taken. The students were assured that participation was voluntary, not compulsory, and that the records would be kept in locked files and would not be made available to anyone without the subject's knowledge. They were also assured about the anonymity and confidentiality that there would not be personal identification in any publication without prior consent of the participant. The study had two principal components (1) administration of a questionnaire and (2) clinical examination (anthropometric measurements and BP recording). Then the participants were given the self-administered questionnaire to get filled by themselves. After verifying the questionnaire, the anthropometric measurements were taken by standard techniques and the same apparatus was used for all to minimize any error and the instruments were checked from time to time. The height was measured against a wall with the help of a measuring tape and full centimeter was taken. The participants were instructed to be bare-footed, to keep heels together, standing erect on a flat surface, heels, buttocks and back pressed against the vertical wall and the head positioned in the Frankfort horizontal plane and the arms hanging freely to the side. For weight measurement, participants were instructed to be bare-footed, a properly calibrated mobile weighing machine was used and the nearest 500 g was taken. BMI was calculated using the internationally accepted standard formula—dividing the weight in kilogram by square of height in meter [weight in Kg/(height in Meter)2].

Finally their BPs were measured using a properly calibrated standardized mercury column sphygmomanometer and an appropriate sized cuff encircling at least 80% of arm in the seated posture, feet on the floor, not cross-legged, on the right upper arm supported at heart level, with the help of a stethoscope by auscultatory method at brachial artery. The instrument was standardized comparing with results obtained by a similar instrument of the hospital. The students were told to take rest for 5–10 minutes and made sure that nobody smoked for at least 30 minutes before measurements. At least two separate measurements were made 5 minutes apart and their average readings were considered. Systolic BP is the point at which the first of two or more sounds were heard (Korotkoff phase 1) and diastolic is that point just before disappearance of the sounds (Korotkoff phase 5). Definition of HTN was based on 7th report of Joint National Committee (JNC 7) of HTN, which provides a classification of BP for adults aged 18 years or older as follows: Normal: systolic and diastolic $<$120/80 mm of Hg, Pre-HTN: systolic 120–139 or diastolic 80–89 mm of Hg, Stage 1 HTN: systolic 140–159 or diastolic 90–99 mm of Hg and Stage 2 HTN: systolic $\geq$160 or diastolic $\geq$100 mm of Hg.

Those with normal BP and pre-hypertensive level were grouped as 'normal' and those in the hypertensive Stage 1 or 2 were categorized as 'hypertensive'. The participants with history of HTN and on antihypertensive drugs were also labeled as hypertensive.

Current smoker was defined as someone who at the time of study used to smoke either daily or occasionally. Nonsmokers were individuals who never smoked at all or smoked 1 year preceding the study. Regarding consumption of alcohol a "current drinker" was defined as one who consumed one or more drinks of any type of alcohol in the year preceding the study. Extra salt intake was considered as anybody who used extra salt after the food has been cooked. Physical activity referred to any type of vigorous or moderate rhythmic physical activity for at least 30 minutes a day in 4 days a week other than routine daily activities.

The data were then tabulated, analyzed and interpretation was done by proper statistical tests (by using percentage and Chi-square test).

Results

A total of 600 undergraduate medical students were studied by a self-administered questionnaire and physical examination. The response rate was 98%. It was seen [Table 1] that most of the students (63%) were in the age group of 23–24 years, males (67%) and day scholars (71%). Majority (82.5%) was from nuclear families and 61.5% students had their per capita monthly income between Rs.5000 and 20,000.

The overall prevalence of HTN was found to be 13%, among which 11% had Stage 1 and 2% had Stage 2 HTN. Out of remaining 174, another 21% were prehypertensive. Hence, almost one-third of them either suffered from HTN or were at risk of HTN. It is seen [Table 2] that as age advanced, prevalence of HTN was found very high (40%) in 23–24 years age than in the 21–22 years group.

Table 1: Socio-Demographic profiles of the study population ($n = 600$)

Characteristics	Number	(%)
Age (in years)		
≤20	102	17.0
21–22	378	63.0
23–24	120	20.0
Gender		
Male	402	67.0
Female	198	33.0
Place of residence		
Day-scholar	426	71.0
Hostelite	174	29.0
Type of family		
Nuclear	495	82.5
Joint	105	17.5
Per capita monthly income (Rs)		
<5000	69	11.5
5000–20,000	369	61.5
>20,000	162	27.0

Prevalence of HTN was tabulated according to gender and it was found higher among male students (15%) than among female students (9.1%).

It was revealed among the study population [Table 3] that prevalence of HTN was high (14%) among the students who had family history of HTN and was less (11.6%) among the students who had no family history of HTN. Significant difference was not found in these two groups. It was seen that among the students, 77.5% had family history of diabetes and 13.5% of them were hypertensive and 11.1% were hypertensive among nondiabetic families and this difference was not statistically significant. Majority of the study population consumed nonvegetarian/mixed food (88.5%) and prevalence of HTN was 13.5% among these students compared with those who reported consumption of vegetarian food (8.7%). More than two-thirds (76.55%) students took extra salt in their diet and HTN was more prevalent (13.72%) among this group and HTN was less prevalent in students who did not consume extra salt and this difference was nonsignificant. Based on the history of intake of tobacco smoking, it was seen that 14.5% of these undergraduate medical students had smoking habit and prevalence of HTN was obviously higher (58.6%) among smokers than nonsmokers (5.3%) and this difference was statistically significant. It was quiet alarming that 14% of the study population consumed alcohol and HTN was more prevalent (14.28) among alcohol consumers

Table 2: Distribution of hypertension according to age and gender (n = 600)

	No hypertension		Hypertension		Total		Significance
	N	%	*N*	%	*N*	%	
Age (in years)							
≤20	96	94.2	06	5.8	102	100.0	$\chi^2 = 83.79$ $P < 0.05$
21–22	354	93.7	24	6.3	378	100.0	
23–24	72	60.0	48	40.0	120	100.0	
Gender							
Male	342	85.0	60	15.0	402	100.0	$\chi^2 = 3.95$ $P < 0.05$
Female	180	90.9	18	9.1	198	100.0	
Total	522	87.0	78	13.0	600	100.0	

Table 3: Prevalence of hypertension according to various social factors (n = 600)

Presence or absence of factors		Hypertension absent		Hypertension present		(χ^2, P value)
		Number	%	Number	%	
Family H/O Hypertension	Present	294	86.0	48	14.0	$\chi^2 = 0.75$ $P > 0.05$
	Absent	228	88.4	30	11.6	
Family H/O DM	Present	402	86.5	63	13.5	$\chi^2 = 0.55$ $P > 0.05$
	Absent	120	88.9	15	11.1	
Dietary habit	Vegetarian (Vegan)	63	91.3	06	8.7	$\chi^2 = 1.28$ $P > 0.05$
	NonVegan/Mixed	459	86.4	72	13.6	
Extra salt intake	Yes	396	86.3	63	13.7	$\chi^2 = 0.91$ $P > 0.05$
	No	126	89.4	15	10.6	
Smoking habit	Yes	36	41.4	51	58.6	$\chi^2 = 160.00$ $P < 0.05$
	No	486	94.7	27	5.3	
Alcohol consumption	Yes	72	85.7	12	14.3	$\chi^2 = .15$ $P > 0.05$
	No	450	87.2	66	12.8	
Physical exercise	Yes	210	87.5	30	12.5	$\chi^2 = .09$ $P > 0.05$
	No	312	86.7	48	13.3	
Place of residence	Day-Scholars	384	90.1	42	9.9	$\chi^2 = 12.80$ $P < 0.05$
	Hostelites	138	79.3	36	20.7	
Type of family	Nuclear	441	89.0	54	11.0	$\chi^2 = 10.93$ $P < 0.05$
	Joint	81	77.1	24	22.9	
PCMI (Rs)	<5000	57	82.6	12	17.4	$\chi^2 = 30.36$ $P < 0.05$
	5000–20,000	339	91.9	30	8.1	
	>20,000	120	74.0	42	26.0	
BMI (Kg/m^2)	<18.5	48	84.2	09	15.8	$\chi^2 = 77.32$ $P < 0.05$
	18.5–24.9	315	95.5	15	4.5	
	25.0–29.9	111	84.1	21	15.9	
	≥30	48	59.3	33	40.7	

than nonconsumers (12.8%). Difference of prevalence of HTN between alcohol consumers and nonconsumers was found not significant. Less than half of the students (40%) had the habit of exercise and hypertensive prevalence was less (12.5%) among persons who had done physical exercise and higher among those (13.3%) who was not having any healthy habit like walking, jogging, etc. The prevalence of HTN was found high among hostelites (20.7%) than day-scholars (9.9%). Students who belonged to joint families showed more proportion (22.9%) of HTN than nuclear families (11.0%). As per-capita monthly income increased, the proportion of HTN was found higher [Table 3].

When we studied the interrelation between prevalence of HTN with BMI, it was seen that 22% of the study population was overweight and another 13.5% was obese. So the prevalence of overweight and obesity was 35.5% (BMI > 25). Prevalence of HTN was found high among obese (40.7%) and overweight (15.9%) population than others.

Discussion

The present observational, descriptive, cross-sectional study was done as an attempt to assess the prevalence of HTN among undergraduate medical students of Bengal and to find out the association of different bio-social factors with HTN among them. The overall prevalence of HTN was found to be 13% (stage 1: 11% and stage 2: 2% according to JNC 7 criteria) in the present study, which was almost similar to a study by Mandal (19.8%) in West Bengal,[20] Al-Jarky (7%) in Kuwait,[21] Todkar in Maharashtra[22] (7.24%), and Mahmood in Uttar Pradesh[23] (10.81%) but relatively high from a similar study of Singapore (1.65%) among young adult military recruits (another 2% had white-coat HTN) [18] and 2.9% in Chetla of West Bengal[24] among adolescents. However, this prevalence was much lower than 44% of another study in Benin city,[25] 30.6% in Nigeria in young adults,[26] 22% in Brazil[27] among young military personnel, 30.4% in Surat in bank employees,[28] and 24% in south Gujarat.[29] The national prevalence of HTN in 2004 was 25% in urban and 10% in rural inhabitants.[30] Though the prevalence of HTN was relatively low in young compared with the older age group, it remains important to detect cases early, as appropriate treatment may mitigate long-term cardiovascular risks and reduce target organ damage. In this study the prevalence of pre-HTN was 21%, which was more or less similar to a study of Bareilly district of Uttar Pradesh (25.4%)[23] and also similar to the trends reported world-wide but very much lower than 80% of another study in young military adults by Roy.[31] In our study, the age range of the students were between 18 and 24 years and like other studies there was a positive relationship between prevalence of HTN and increasing age[20-23,29,32] and this was statistically significant. ($\chi^2 = 83.79$, P value < 0.05).

In the present study, the prevalence of HTN was more in males, which was consistent to some studies,[21,28] but dissimilar to some other studies[20] where either there was no significant relationship[28,33,34] or more in females.[20,22] This finding was statistically significant ($\chi^2 = 3.95$, P value < 0.05).

In this study, we observed that BMI had a direct relationship with HTN. The respondents with high BMI had significantly more BP and the difference was statistically significant ($\chi^2 = 77.32$, $P < 0.05$). This finding was corroborative with findings of many other similar studies.[20-22,27-29,31-34] Obesity was found to be 17% in young medicos of Delhi. [25] This high BMI may be attributable to the fact that most medical students came from the affluent strata of the society. Obesity might be probably due to sedentary lifestyle, their diet rich in saturated fat and cholesterol and these factors may predispose to cause HTN at a younger age. Attempts were made to relate prevalence of HTN with the known determinants (lifestyle habits, like diet, extra salt intake, physical exercising, smoking, and alcohol consumption), which was similar to some previous studies.[20,22,28,29,31] Decreased physical activity and sedentary lifestyle coupled with obesity are determinant for HTN revealed from our study and other studies also.[20,21,28,29,31,33]

Nonvegetarian recipes contain more fat and salt which is a dietary hazard of HTN. In the present study prevalence of HTN was more among nonvegetarians than vegetarians, which was seen from other studies also.[20,28]

Smoking was associated with elevated BP seen from our study and many other epidemiological studies from different parts of the world also reported that there was a significant positive relationship between HTN and smoking[20-22,28,29] ($\chi^2 = 160.00$, $P < 0.05$).

A direct correlation was found between alcohol intake and HTN. Higher prevalence of HTN was observed among study population with history of alcohol consumption than the study population with no history of alcohol consumption. Similar findings were also seen by Mondal,[20] Desai,[28] Kumar,[29] Todkar,[22] and Sadhukhan.[32]

Since a long time, extra salt intake has been considered to a positive risk factor of HTN and we too found this in higher proportion, which was proved by other studies.[20,22,32]

In the present study, it was seen that whose parents had a positive history of HTN and/or diabetes were likely to have high BP. Other studies also supported this fact.[18,20]

Conclusion

The overall prevalence of HTN in this study was 13% and there were positive association with age, sex, type of family, per capita monthly income, place of residence, BMI, and smoking.

References

1. Mathers C, Stevens G, Mascarenhas M. Global health risks: Mortality and burden of disease attributable to selected major risks. Geneva, Switzerland: World Health Organization; 2009. Available from: http://www.who.int/healthinfo/global_burden_disease/global_health_risks/en/index.html [Last accessed on 2010 Jan 12].
2. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of Hypertension: Analysis of worldwide data. Lancet 2005;365:217- 23.
3. Ulasi II, Ijoma CK, Basden JC, Onwubere, Arodiwe E, Onodugo O, *et al*. High Prevalence and Low Awareness of hypertension in a market population in Enugu, Nigeria. Int J Hypertens 2011;2011:869675.
4. Hajjer I, Kotechen JM, Kotechen TA. Hypertension: Trends in Prevalence, incidence and control. Annu Rev Public Health 2006;27:465-90.
5. Cardiovascular Diseases-Prevention and Control. WHO cardio vascular disease strategy. 2001-02.
6. WHO. The World Health Report 2002- Reducing Risks, Promoting Healthy Life.
7. Kaplan NM, Victor RG. Hypertension in the population at large. In: Kaplan's Clinical Hypertension. Editors Kaplan NM, Victor RG. 10th edition. Published by Lippincott Williams & Wilkins, Philadelphia, 2010; Page 3 -4.
8. Khakurel S, Agarwal RK, Hada R. Pattern of end stage renal disease in a tertiary care center. JNMA J Nepal Med Assoc 2009;8:126-30.
9. Whelton PK. Epidemiology and the Prevention of hypertension. J Clin Hypertens 2004;6:636-42.
10. Kounteya Sinha TNN. Average blood pressure falls globally, shoots up in India. The Times of India. 2011, Feb 4,06.03 am;IST:1.
11. Gupta R, Prakash H, Majumdar S, Sharma S, Gupta VP. Prevantion of coronary heart disease and coronary risk factors in an urban population of Rajasthan. Indian Heart J 1995;47:331-8.
12. Gupta R, Gupta VP, Sama M, Bhatnagar S, Thanvi J, Sharma V, *et al*. Prevention of Coronary heart disease and risk factors in an urban Indian population. Jaipur Heart Watch Study-2. Indian Heart J 2002;54:59-66.
13. Gupta R, Sama M, Thanvi J, Rastogi P, Kaul V, Gupta VP. High prevalence of multiple coronary risk factors in Punjabi Bhatia community. Jaipur Heart Watch-3. Indian Heart J 2004;56:646-52.
14. Mohan V, Deepa M, Farooq S, Datta M, Deepa R. Prevention, awareness and control of hypertension in Chennai-The Chennai Urban Rural Epidemiology Study (CURES-52). J Assoc Physicians India 2007;55:326-32.
15. Mohan V, Deepa R, Rani SS, Premalatha G. Prevalence of coronary artery disease and its relationship to lipids in a selected population in South India. J Am Coll cardiol 2001;38:682-7.
16. Kaur S, Kapil U, Singh P. Pattern of chronic diseases amongst adolescent obese children in developing countries. Curr Sci 2005;88:1052-6.
17. Selvan MS, Kurpad AV. Primary prevention: Why focus on children and young adolescents. Indian J Med Res 2004;120:511-8.
18. Gan SKE, Loh CY, Seet B. Hypertension in young adults. An under-estimated problem. Singapore Med J 2003;44:448-52.
19. Fagard RH, Staessen JA, Thij I. Prediction of Cardiac Structure and Function by repeated Clinic and Ambulatory Blood Pressure. Hypertension 1997;29:22-9.
20. Mandal PK, Sinha Roy AK, Chatterjee C, Mallik S, Manna N, Sardar JC, Chakrabarty D, Sau M. Burden of hypertension and its risk factors in an urban community of India: Are we aware and concerned? Sudan. J. Public Health 2010;5:130-5.
21. Al-Jarky F, Al-Awadhi N, Al-Fadli H, Tahific AS, RazzakAl-Sebai A, Al-Mousawi M. Prevalence of hypertension in young and middle aged Kuwaiti Citizens in Primary Health Care. Kuwait Med J 2005;37:116-9.
22. Todkar SS, Gujarathi VV, Tapare VS. Period prevalence and socio-economic factors of hypertension in rural Maharashtra: A cross-sectional study. Indian J Community Med 2009;34:183-7.
23. Mahmood SE, Srivastava A, Shrotriya VP, Shaifali I, Mishra P. Prevalence and epidemiological correlates of hypertension among labours. Natl J Community Med 2011;2:43-7.
24. Saha I, Paul B, Dasgupta A. Prevalence of hypertension and variation of blood pressure with age among adolescants in Chetla, India. Tanzan J Health Res 2008;10:108-11.
25. Ukoh VA. Admission of hypertensive patients at the University of Benin Teaching Hospital, Nigeria. East Afr Med J; 2007 84:329-35.
26. Ekore RI, Ajayi IO, Arije A. Case finding for hypertension in young adult patients attending a Missionary hospital in Nigeria. Afr Health Sci 2009;9:193-9.
27. Wenzel D, Maria J, de Sauza P, Souza SB. Prevalence of arterial hypertension in young military personnel and associated factors. Rev Saude Publica 2009;43:1-7.
28. Mohmmedirfan M, Desai VK, Kosambia JK. A study on effect of life style risk factors on prevalence of hypertension among white collar job people of Surat. Internet J Occup Health 2011;1.
29. Kumar P, Desai VK, Kaviswar A. Prevalence of hypertension among the Employees of a Mega Industry of Surat City. Indian J Community Med 2002;27:19-25.
30. Gupta R. Trends in hypertension epidemiology in India. J Hum Hypertens 2004;18:73-8.
31. Roy S, Kulkarni B, Sreenivas A. Prevalence of Pre-hypertension in young military adults and its association with overweight and dyslipidemia. Indian J Med Res 2011;134:162-7.
32. Bhattacraryya S, Ganarajan B, Ramesh Bhat M. Correlation between the blood groups, BMI and pre-hypertension among medical students. J Chin Clin Med 2010;5:78-82.
33. Shaikh WA, Mi Patel, Singh JK. Association of Adiposity with PP among Gujarati Indian Adolescents. Indian J Community Med 2010;35:406-8.
34. Sadhukhan SK, Dan A. Multifactorial analysis of blood pressure variations in a rural community of West Bengal. Indian J Community Med 2005;30:57-9

How to cite this article: Das P, Basu M, Chowdhury K, Mallik S, Dhar G, Biswas A. Observational assessment and correlates to blood pressure of future physicians of Bengal. Niger J Clin Pract 2013;16:433-8.

Source of Support: Nil, **Conflict of Interest:** None declared.