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# The risk factors for hypertension among medical and dental students at a private medical college: Findings from a cross-sectional study

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Yes

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# The risk factors for hypertension among medical and dental students at a private medical college: Findings from a cross-sectional study

**Author(s):** Sainju N, Shah R, S G, Sankaran R

## Abstract

**Background:** Prevalence of hypertension in medical students in Nepal is not well defined. Risk of hypertension depends on life style, which is the result of person's knowledge and practice adopted at a young age. This study aims to determine the risk factors of hypertension among first and second year medical and dental students attending a medical college in Kathmandu.

**Methods:** This cross-sectional study was conducted in November 2014 at a private medical college at Kathmandu, Nepal. A total of 400 medical and dental students were surveyed in the study. A validated self-administered semi-structure questionnaire was used to assess risk factors of hypertension, and followed by physical examination with measurements of the height, weight and blood pressure. Data were analyzed by SPSS version 20. Chi-square test was applied to measure proportion differences between several study variables among male and female.

**Result:** Response rate for the survey was 87.75% (351/400). Majority of the respondents were male (55%) of age group 17-21 (Mean age= 19.79, SD= 1.4). About 11% male and 14.5% female were either pre-obese (over weight) or obese. Of the respondents 10% were active smokers of which 40 % smoked daily. Approximately, 40% of the respondents reported a habit of consuming alcohol (70.3% male and 29.7% female;  $p < 0.001$ ). Similarly, around 21% of the respondents consumed fruits less than once a week ( $p = 0.004$ ). Nearly half of the participants were found not to be exercising regularly. Hypertension was found in 32 males and 2 females ( $p < 0.001$ ). Nearly 40% of respondent had family history of one or more chronic non-communicable diseases (NCDs) like hypertension, diabetes, dyslipidemia, or thyroid disorder. A significant association between BMI and hypertension ( $p = 0.008$ ) was found, whereas, association between hypertension and other variables was not significant.

**Conclusion:** The prevalence of hypertension and pre hypertension among the study respondents was lower than in general population in urban areas. However, a well-structured awareness and interventional

programs for controlling modifiable risk factors of hypertension is desired, especially for those with more than one risk factors or strong family history.

## Background

Hypertension has greatest global share of deaths from cardiovascular, cerebral (stroke), and renal disease. It is an emerging global public health concern severely affecting developing and low income countries compared to developed countries.

In 2008, worldwide, approximately 40% of adults aged 25 and above had been diagnosed with hypertension; the number of people with the condition rose from 600 million in 1980 to 1 billion in 2008.<sup>1</sup> Similarly, hypertension has increased from 6% in 1981 to 18% in 2006 in Nepal.<sup>2</sup> Prevalence of hypertension in Nepal was reported to be 33.9 % in 2011<sup>3</sup>. A systematic review published in 2014 found the overall prevalence of hypertension and prehypertension in South Asian region to be 27% and 29.6%, respectively. The prevalence of hypertension was 17.9% in Bangladesh; 23.9% in Bhutan; 31.4% in India; 31.5% in Maldives; 33.8% in Nepal; 25% in Pakistan; and 20.9% in Sri Lanka.<sup>4</sup> According to World Health Organization, African region has the highest prevalence of hypertension affecting 46% of adults aged 25 and above, while the American the lowest prevalence at 35%. Compared to the developing countries, the prevalence of hypertension is lower in high earning countries.

One third of the total death (approximately 17 million) is caused by cardiovascular disease worldwide. Of these, annually 9.4 million deaths occur due to the complications of hypertension worldwide. At least 45% of deaths due to heart disease, and 51% of deaths due to stroke occur due to hypertension.<sup>1</sup> Behavioral risk factors, such as unhealthy diet, chronic use of alcohol, lack of physical activity, overweight, exposure to persistent stress, ageing and population growth are responsible for increasing prevalence of hypertension.

Nepal has witnessed an epidemiological transition with increasing prevalence of chronic non-communicable diseases (NCDs). Integrated prevention and control

strategies are the most effective approach with focus on the common risk factors and cutting across specific diseases.

The major risk factor for NCD's are associated with lifestyle and behavioral patterns, which are largely a result of practices adopted from young age itself. There are very few studies on risk factors for hypertension among medical and dental students in Nepal and hence, we decided to conduct this study to bridge that gap. The objective of the paper is to assess the prevalence of risk factors associated with hypertension among the medical and dental students.

## Methods

We conducted a cross-sectional study in one private medical college located in Bhaktapur district, Nepal. The population frame consisted of the entire students of basic science subjects (MBBS and BDS). All students ( $n=400$ ) who were studying basic science (1<sup>st</sup> and 2<sup>nd</sup> year) participated in the study. Ethical clearance was obtained from Institutional review committee of that college. Prior to data collection, students were informed about objective of the study, their voluntary participation, anonymity and confidentiality of data. We took written consent from study participants. We applied a self administered semi-structured questionnaire. The following variables were included in the study: age, sex, smoking habit, alcohol consumption, fruits intake, dietary habits, exercise, and history of non communicable diseases. Height and weight were measured using standardized equipment and procedure.

Hypertension was defined as per joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VII) criteria. Body mass index (BMI) was defined based on WHO classification. BMI equivalent to 25-29.9 was considered as pre obese and  $BMI \geq 30$  as obese.

Analysis was performed in IBM SPSS version 20. In descriptive statistics, mean, SD and percentage (%) were computed. Next, a chi-square test/Fisher exact test was applied to compare proportion differences of several variables among male and female. P-value was set at  $\alpha=0.05$ .

## Results

Out of 400, the response rate was 87.5% response rate(351) were enrolled in the study; out of which 193 were male and 158 were female with mean age being

19.47 $\pm$ 1.37 years.

Table 1 describes sex-wise back ground information and life style related variables of Respondents. Majority of the respondents were male (55%). Most of them are of age 17-21(54.4% male and 45.6% female). Forty six (46) respondents were either pre-obese or obese (of which 23 were male and 23female). Nearly one in ten respondents smoked (and 2 in five 2/5of them of them were daily smokers) with male predominance. Two out of 5 respondents consumed alcohol (70.3% male and 29.7% female;  $c^2=22.7$   $p < 0.001$ ). Nearly half of the students rarely did the exercise. Two fifth of the respondent consumed fruits  $\leq 1$  day/week ( $p = 0.004$ ). One third of the respondents consumed meat  $>2$ /week (63.6 % male and 36.4%;  $c^2=18.2$   $p=0.003$ ). Half of the student consumed 1-2 lit of water/ day (56.3% male and 46.4% female;  $c^2= 24.4$   $p < 0.001$ ). Six out of 10 respondent consumed junk food  $\geq 1$ /day ( $p=0.001$ ). Thirty two (32) male and 2 female were found to be pre hypertensive or hypertensive ( $c^2=23.3$   $p < 0.001$ ). Nearly 40% of respondent had had family history of one or more chronic NCDs (hypertension, diabetes, thyroid disorder).

Table 2 explains association relationship between background variables, life style related factors and hypertension. There is association between relationship between BMI and hypertension ( $c^2=11.7$   $p=0.008$ ). Rests of the variables were not associated with hypertension ( $p > 0.05$ ). Though the association between hypertension in respondent and family history of hypertension is not significant, odds ratio is 1.7(lower limit 0.58; upper limit 5.02)

## Discussions

We studied prevalence of hypertension, and its risk factors in otherwise healthy medical and dental students. Our study found a significant number of subjects were essentially sedentary, without much physical exercise, active smoker and or with lack of healthy dietary practice, all of which are considered as strong risk factors for hypertension.

Framingham Heart Study, a cohort study showed an increased risk of progression to hypertension from pre hypertensive stage than from normotensive stage.<sup>5</sup> Therefore, identifying people in pre hypertensive state is equally important. Our study showed that 9.7% of the subjects had either pre hypertension or hypertension which lays within the range as reported previously the reported prevalence of hypertension among the medical students from studies around the

globe varies greatly. Study conducted in undergraduate medical students of medical college of Odisha, India, showed that prevalence of pre hypertension and hypertension was 67%<sup>6</sup>; a similar study in a medical college in Uttar Pradesh showed 21.33% hypertensive cases among medical students.<sup>7</sup> Thilio Kumar G et al. reported in their study of first year medical student showed 46.7% had either hypertension or pre hypertension<sup>8</sup>; but a study conducted by Giri S et al Institute of Medicine, Kathmandu showed only 1.2% self reported cases of hypertension<sup>9</sup>. The cause of relatively lower prevalence rate of hypertension observed in our study is unclear but we speculate this is partly due to young age of study population..

We found that prevalence of hypertension was higher in male. This association between hypertension and sex seemed to be statistically significant ( $P < 0.001$ ). This is in line with the study by Srivastava AK et al.<sup>10</sup> who also found more cases of hypertension in males than females.

Various studies suggest that high BMI is one of the major risk factors for hypertension. Obesity, especially central obesity, has been consistently associated with hypertension and increased risk of cardiovascular diseases. Populations based studies indicate that at least two-thirds of the prevalence of hypertension can be directly attributed to obesity.<sup>11</sup> We found statistically significant association between hypertension and obesity ( $p=0.008$ ) which validates our study. However, the association seems to be spurious, it may be due to disparity of sample size between obese/overweight and non-obese subjects.

A number of prior studies including the one done by Wilks et al.<sup>12</sup> showed that adults who spent more energy in the activities of daily living had lower BP. However, our study could not identify statistically significant associations between hypertension and physical inactivity. It is likely that duration of lack of physical exercise is more significant in determining the risk of hypertension than mere presence or absence of it. Since we had not enquired the duration of lack of physical exercise in our subjects, therefore it is not surprising that we were not able find any significant association between them. We speculate, similar reason for not finding significant association between hypertension and smoking, fast food consumption, vegetables and fruit intake. However, Payab M et al found a significant association was found between fast food consumption, BP levels, and anthropometric indices in their study in Iranian Children and adolescents.<sup>13</sup> Likewise, in our study smoking was also not associated with hypertension. It is a well-known

fact that people often either under estimate the amount of smoking or shy away from admitting their smoking habit. In our study, smoking was a self reported variable and we believe these factors might have also played role in why it was not significant.

Our study is not without limitations. Being a cross section study with relatively small sample size are our major limitations. Although we assessed presence or absence of risk factors for hypertension, being a cross section study, we were unable to assess how long the risk factors have been present in the subjects. As duration of these risk factors also plays significant role in determining risk of developing hypertension overtime, mere presence or absence may not give us full picture. The study was conducted on the medical and dental students with smaller sample size; therefore, the findings of this study cannot be generalized. We had opportunity to take only single measurement of blood pressure, which may not be sufficient to diagnose hypertension in the subjects.

In the future it would be better to carry out multi centric research for generalizing results. At the same time measurement of blood pressure at regular interval may show more specific results.

## Conclusion

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The prevalence of hypertension among the medical and dental students in a private medical college was lower than that in the general popular in urban centers. This may be because of relative young age of the study population and better health-seeking behavior, and or healthy lifestyle. However, a well structured nutritional and physical activity awareness strategies and intervention programmes specially for those with more than one risk factors or strong family history of hypertension or other chronic NCDs is highly desired.

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Biochemistry lab for their utmost cooperation during the data collection.

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## Illustrations

### Illustration 1

Table 1: Sexwise background and lifestyle variables

Table 1: Sex-wise background and lifestyle related variables of respondents

Variables	Male	Female	Total (%)	
<b>AGE-GROUP</b>				
<b>17-21</b>	185 (54.4)	155(45.6)	340(100)	$\chi^2=1.44$
<b>22-31</b>	8(72.7)	3(27.2)	11(100)	P=0.229
<b>BMI</b>				
<b>Underweight</b>	32(50)	32(50)	64(100)	$\chi^2=2.1$
<b>Normal</b>	138(57.3)	103(42.7)	241(100)	P=0.5
<b>Pre-obese</b>	19(52.8)	17(47.2)	36(100)	
<b>Obese</b>	4(40)	6(60)	10(100)	
<b>Current smoker(n=351)</b>				
<b>Yes</b>	43(97.7)	1(2.3)	44(100)	$\chi^2=35.1$ (Yates correction applied)
<b>No</b>	150(48.7)	157(51.3)	302(100)	P<0.001
<b>Status of current smoker(n=44)</b>				
<b>Daily</b>	19(100)	0(0)	19(100)	
<b>Occasional</b>	23(92)	2(8)	25(100)	P=0.31(fisher test)
<b>ALCOHOL(n=346)</b>				
<b>Yes</b>	97(70.3)	41(29.7)	138(100)	$\chi^2=22.7$
<b>No</b>	92(44.2)	116(55.8)	208(100)	P<0.001
<b>EXERCISE</b>				
<b>Daily</b>	68(73.1)	25(26.9)	93(100)	$\chi^2=26.3$
<b>&gt;2 days/wk</b>	23(59)	16(41)	39(100)	P<0.001
<b>2 days/wk</b>	21(67.7)	10(32.3)	31(100)	

**MEAT CONSUMPTION**

>1/day	9(81.8)	2(18.2)	11(100)	$\chi^2=18.2$
1/day	12(50)	12(50)	24(100)	P=0.003
>2/wk	77(63.6)	44(36.4)	121(100)	
1/wk	67(51.5)	63(48.5)	130(100)	
<1/wk	14(63.6)	8(36.4)	22(100)	
Never	13(31)	29(69)	42(100)	

**WATER CONSUMPTION**

<1 lit	26(35.1)	48(64.9)	74(100)	$\chi^2=24.4$
1-2lit	96(53.6)	83(46.4)	179(100)	P<0.001
>2 lit	70(72.9)	26(27.1)	96(100)	

**JUNK FOOD CONSUMPTION**

>1/day	31(55.4)	25(44.6)	56(100)	$\chi^2=19.3$
1/day	66(43.4)	86(56.6)	152(100)	P=0.001
>3/wk	43(67.2)	21(32.8)	64(100)	
1/wk	24(58.5)	17(41.5)	41(100)	
Rarely	29(76.3)	9(23.7)	38(100)	

**HYPERTENSION**

Hypertensive	32(94.1)	2(5.9)	34(100)	$\chi^2=23.3$
Normal	161(50.8)	156(49.2)	317(100)	P<0.001

**DIABETES**

Yes	2(100)	0(0)	2(100)	P=0.50 <sup>#</sup>
No	175(54.9)	144(45.1)	319(100)	

**FAMILY HISTORY****HYPERTENSION**

Yes	33(55)	27(45)	60(100)	$\chi^2=0.00$
No	153(54.9)	125(45.1)	277(100)	p=0.98

**DIABETES**

Yes	24(49)	25(51)	49(100)	$\chi^2=0.8$
No	161(55.9)	127(44.1)	288(100)	P=0.37

## Illustration 2

Table 2: Association between background variables, lifestyle related factors and hypertension

Table 2: Association between background variables, life style related factors and hypertension

Variables	Pre/Hypertensive	Normal	Total	
<b>AGE-GROUP</b>				
<b>17-21</b>	32(9.4)	308(90.6)	340(100)	$\chi^2=$ 0.94
<b>22-31</b>	2(18.2)	9(81.8)	11(100)	P=0.33
<b>BMI</b>				
<b>Underweight</b>	3(4.7)	61(95.3)	64(100)	$\chi^2=11.7$
<b>Normal</b>	21(8.7)	220(91.3)	241(100)	P=0.008
<b>Pre-obese</b>	9(25)	27(75)	36(100)	
<b>Obese</b>	1(10)	9(90)	10(100)	
<b>SMOKING(n=351)</b>				
<b>Non-Smoker</b>	28(9.3)	274(90.7)	302(100)	_*
<b>Ex smoker</b>	0(0)	5(100)	5(100)	
<b>Current smoker</b>	6(13.6)	38(86.4)	44(100)	
<b>Status of current smoker(n=44)</b>				
<b>Daily</b>	19(100)	0(0)	19(100)	
<b>Occasional</b>	23(92)	2(8)	25(100)	
<b>ALCOHOL(n=346)</b>				
<b>Yes</b>	11(8)	127(92)	138(100)	$\chi^2=0.89$
<b>No</b>	23(11.1)	185(88.9)	208(100)	P=0.345
<b>EXERCISE</b>				
<b>Daily</b>	15(16.1)	78(83.9)	93(100)	_*
<b>&gt;2 days/wk</b>	5(12.8)	34(87.2)	39(100)	
<b>2 days/wk</b>	2(6.5)	29(93.5)	31(100)	
<b>1 day/wk</b>	4(11.1)	32(88.9)	36(100)	

<b>1/day</b>	1(4.2)	23(95.8)	24(100)	
<b>&gt;2/wk</b>	16(13.2)	105(86.8)	121(100)	
<b>1/wk</b>	11(8.5)	119(91.5)	130(100)	
<b>&lt;1/wk</b>	2(9.1)	20(90.9)	22(100)	
<b>Never</b>	2(4.8)	40(95.2)	42(100)	

**WATER CONSUMPTION**

<b>&lt;1 lit</b>	3(4.1)	71(95.9)	74(100)	$\chi^2=8.9$
<b>1-2lit</b>	14(7.8)	165(92.2)	179(100)	P=0.12
<b>&gt;2 lit</b>	16(16.7)	80(83.3)	96(100)	

**JUNK FOOD CONSUMPTION**

<b>&gt;1/day</b>	5(8.9)	51(91.1)	56(100)	$\chi^2=5.9$
<b>1/day</b>	9(5.9)	143(94.1)	152(100)	P=0.207
<b>&gt;3/wk</b>	10(15.6)	54(84.4)	64(100)	
<b>1/wk</b>	5(12.2)	36(87.8)	41(100)	
<b>Rarely</b>	5(13.2)	33(86.8)	38(100)	

**DIABETES**

<b>Yes</b>	1(50)	1(50)	2(100)	P=0.18#
<b>No</b>	30(9.4)	289(90.6)	319(100)	

**FAMILY HISTORY****HYPERTENSION**

<b>Yes</b>	4(6.7)	56(93.3)	60(100)	$\chi^2=0.94$
<b>No</b>	30(10.8)	247(89.2)	277(100)	P=0.332

**DIABETES**

<b>Yes</b>	5(10.2)	44(89.8)	49(100)	$\chi^2=0.00$ 1
<b>No</b>	29(10.1)	259(89.9)	288(100)	P=0.977

**DYSLIPIDEMIA**

<b>Yes</b>	1(12.5)	7(87.5)	8(100)	$\chi^2=0.53$
<b>No</b>	33(10)	296(90)	329(100)	P=0.819

**THYROID**

## Reviews

### Review 1

**Review Title:** Review on - The risk factors for hypertension among medical and dental students at a private medical college: Findings from a cross-sectional study

Posted by Dr. Aswini Dutt. R on 02 Sep 2015 06:11:12 AM GMT

1	Is the subject of the article within the scope of the subject category?	
2	Are the interpretations / conclusions sound and justified by the data?	
3	Is this a new and original contribution?	
4	Does this paper exemplify an awareness of other research on the topic?	
5	Are structure and length satisfactory?	
6	Can you suggest brief additions or amendments or an introductory statement that will increase the value of this paper for an international audience?	
7	Can you suggest any reductions in the paper, or deletions of parts?	
8	Is the quality of the diction satisfactory?	
9	Are the illustrations and tables necessary and acceptable?	
10	Are the references adequate and are they all necessary?	
11	Are the keywords and abstract or summary informative?	

**Rating:** 7

**Comment:**

The pathophysiological basis for the above results claimed need further explanation.

More review of literature needed.

**Invited by the author to make a review on this article? :** Yes

**Experience and credentials in the specific area of science:**

I have published 30 articles in the field of hypertension, metabolic disorders. Associate editor and editorial member of 7 reputed journals. Reviewer of nearly 15 journals.

**Publications in the same or a related area of science:** Yes

**References:**

Dutt RA, Kumar NSS, Ramaswamy C, Bhat MR, Murthy NHL. A Comparative study of Blood Pressure, Heart Rate Variability and Metabolic risk factors in Software professionals. National Journal of Physiology, Pharmacy & Pharmacology 2011;1(2):51-56. Dutt RA, Chandra S, Shivalli S, Padubidri JR, Bhat KS. Work related stress in middle aged white collar workers: Focus on cardiometabolic parameters. International Journal of basic and applied physiology 2014;3(1):331-36. Bhat MB, Shenoy JP, Dutt RA, Kumar NSS, Kalpana B, Bhat SK, Shet U. Influence of dietary habits on blood pressure in preadolescent boys of Coastal Karnataka. National Journal of Physiology, Pharmacy & Pharmacology 2013;3(1)9-13.

**How to cite:** Dutt. R A. Review on - The risk factors for hypertension among medical and dental students at a private medical college: Findings from a cross-sectional study [Review of the article 'The risk factors for hypertension among medical and dental students at a private medical college: Findings from a cross-sectional study' by Sainju N]. WebmedCentral Hypertension 1970;6(9):WMCRW003238

## Review 2

**Review Title:** The risk factors for hypertension among medical and dental students at a private medical college: Findings from a cross-sectional study

Posted by Dr. Shakila Srikumar on 22 Jul 2015 02:48:31 AM GMT

1	Is the subject of the article within the scope of the subject category?	
2	Are the interpretations / conclusions sound and justified by the data?	
3	Is this a new and original contribution?	
4	Does this paper exemplify an awareness of other research on the topic?	
5	Are structure and length satisfactory?	
6	Can you suggest brief additions or amendments or an introductory statement that will increase the value of this paper for an international audience?	
7	Can you suggest any reductions in the paper, or deletions of parts?	
8	Is the quality of the diction satisfactory?	
9	Are the illustrations and tables necessary and acceptable?	
10	Are the references adequate and are they all necessary?	
11	Are the keywords and abstract or summary informative?	

**Rating:** 7

**Comment:**

Not applicable

**Invited by the author to make a review on this article? :** Yes

**Experience and credentials in the specific area of science:**

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