Status of Hypertension and Its Associated Factors Among Undergraduate Medical Students of a Private Medical College in Lalitpur District

Sah SK, Singh N, Pandey S, Sherpa (Lama) AT, Panta PP, Shah S, Ghising K, Rai N

Department of Community Medicine,

KIST Medical College and Teaching Hospital,

Imadol, Lalitpur, Nepal.

Corresponding Author

Satish Kumar Sah

Department of Community Medicine,

KIST Medical College and Teaching Hospital,

Imadol, Lalitpur, Nepal.

E-mail: shonarsatish@gmail.com

Citation

Sah SK, Singh N, Pandey S, Sherpa (Lama) AT, Panta PP, Shah S, et al. Status of Hypertension and its Associated Factors among Undergraduate Medical Students of a Private Medical College in Lalitpur District. *Kathmandu Univ Med J.* 2025; 89(1):85-90.

ABSTRACT

Background

Hypertension, a significant global health concern, warrants exploration within the unique context of medical student populations. Hypertension is a silent killer and is a leading cause of premature morbidity and mortality particularly in developing countries including Nepal. Medical students are prone to stress, long working hours, unsteady and unhealthy lifestyles such as lack of exercise, eating unhealthy food which are high risk factors contributing to hypertension.

Objective

To assess the prevalence of hypertension and its associated risk factors among undergraduate medical students.

Method

A Cross-sectional study was conducted between August to November 2023 among the undergraduate medical students from first-year to final-year and interns at a teaching hospital after obtaining ethical approval from the Institutional Review Committee. A total enumeration sampling technique was used. Chi square test was used to determine the association between variable and P value less than 0.05 was fixed for statistically significant.

Result

Out of 500 participants, 234 (46.80%) were reported to have hypertension according to the classification of the American Heart Association, 2023. Among them, 169 (72.22%) were male and 65 (27.78%) were female, with a male-to-female ratio of 2.6:1. Male participants had significantly higher odds of developing hypertension compared to females, with a crude odds ratio (COR) of 3.116 (95% CI: 2.144–4.53, $p < 0.001$) and an adjusted odds ratio (AOR) of 2.815 (95% CI: 1.914–4.139, $p < 0.001$). Participants categorized as “Obese” also had significantly higher odds of developing hypertension compared to “Non-obese” individuals, with a COR of 1.862 (95% CI: 1.189–2.916, $p = 0.006$) and an AOR of 1.636 (95% CI: 1.026–2.607, $p = 0.039$).

Conclusion

The high frequency of hypertension in this study could indicate a hidden epidemic among medical students. The results suggest that effective health screening and routine examinations are necessary, in addition to measures that support healthy lifestyles.

KEY WORDS

Alcohol consumption, Blood pressure, Hypertension, Obesity, Sex, Smoking habit

INTRODUCTION

Hypertension is a condition in which the force with which blood flows through the blood vessels is consistently too high.[1] Hypertension is one of the main public health challenges because of its high frequency and associated risks of cardiovascular and kidney diseases such as myocardial infarctions, strokes, and renal failures.[2] Hypertension is the biggest risk factor for death, responsible for 9.4 million deaths and 7% of disability worldwide. This makes it the single most important cause of morbidity and mortality worldwide.[3]

In the realm of well-being, medical students find themselves traversing a delicate path, susceptible to the challenges of high blood pressure.[4] A significant amount of the studies has been diverted to the children and adolescent group due to the increasing prevalence of hypertension among them.[5] Fourth National Family Health Survey (2015-16) reported hypertension in 13.8% men versus 8.8% women (overall 11.3%) aged 15-49 and 15-54 respectively.[6] Epidemiologists have estimated the number of premature deaths caused by hypertension will escalate over 1.56 billion by the year 2025.[7] One of the global targets for hypertension, is to reduce its prevalence by 25% by 2025 from baseline of 2010.[8]

There is a lack of population statistics on hypertension among medical students in Nepal. To address this gap, this study aims to estimate the prevalence and determinants of hypertension among undergraduate medical students at KIST Medical College. Understanding the prevalence and associated factors of hypertension among medical students in Nepal is crucial for promoting their well-being and contributing to improved healthcare practices.

METHODS

A cross-sectional study was done at KIST Medical College and Teaching Hospital, Lalitpur, Ne-pal, from August 2023 to November 2023. Total enumeration sampling method was used. All stu-dents who were present on the day of the interview and willing to participate were involved. In-formed consent was obtained. Ethical clearance was obtained from the KISTMCTH Institutional Review Committee (IRC) with IRC number 2080/081/12. The data was analyzed for 500 subjects. Among the study subjects, there were 290 males and 210 females in the age group between 17 and 29 years. The blood pressure of the participants in two consecutive days was recorded, along with data regarding the following variables: age, socioeconomic status, family history of hypertension, physical activity, dietary pattern, weight, height, BMI, smoking habit, and alcohol intake. A pretest-ing was done on 10% of the sample size after the ethical clearance from the IRC and necessary changes were made to the questionnaire. Subjects were classified using the diagnostic criteria of the American Heart Association (AHA) 2023 (Table 1).

Table 1. Diagnostic Criteria for Blood Pressure Categories (AHA 2023)

Blood Pressure Category	Systolic mm hg		Diastolic mm hg
Normal	Less than 120	and	Less than80
Elevated	120-129	and	Less than80
Hypertension Stage 1	130-139	or	80-89
Hypertension Stage 2	140 or Higher	or	90 or Higher
Hypertensive crisis	Higher than 140	And/or	Higher than 120

Weight was measured on a digital weighing machine. The scale was calibrated to zero before every reading. To measure height, the subject was made to stand vertically against a hard surface, with the head positioned so that the top margin of the external auditory canal was in continuation with the lower margin of the orbit. A hardboard was held vertical to the wall, just over the head. Height was marked on the wall and measured with a measuring tape. A BMI of 25 or more is classified as obese, and a BMI below 25 is classified as non-obese.

Data analysis was done using SPSS 16.0. Categorical variables were assessed using percentages, chi square test was used to find out association and Multivariate binary logistic regression was used to determine the predictor variables.

RESULTS

Demographic characteristics of the study participants

A total of 500 responses were included in the study. Out of the total study participants in the study, 290 (58%) were males. As for the age of re-spondents, 448 (89.6%) were 20 and above. Regarding the studying year, 92 (18.4%) were first year ,75 (15%) were second year, 75 (15%) were third year, 98 (19.6%) were fourth year, 78 (15.6%) were fifth year students and 82 (16.4%) were intern. Regarding ethnicity and religion of the respondents, 35.2% were Brahmin and around 92.8% were Hindu (Table 2).

Stage of Hypertension among undergraduate medical students and interns

Out of 500 medical students, 234 (46.80%) were hypertensive. The “Stage I Hypertension” cate-gory includes 205 individuals, which represents 87.60% of the total hypertensive sample, and the “Stage II Hypertension” category includes 29 individuals (12.40%) (Table 3).

The association between predictor variables and hypertension

Sex, BMI, smoking habit and alcohol consumption were found to be statistically significant with p value less than 0.05 (Table 4).

Table 2. Sociodemographic profile (N=500)

Variable	Categories	Frequency	Percentage
Age	Less than 20	52	10.4
	20 and above	448	89.6
Sex	Male	290	58
	Female	210	42
Ethnicity	Brahmin	176	35.2
	Chhetri	115	23.0
	Muslim	13	2.6
	Janjati	78	15.6
	Dalit	4	8
	Madhesi	114	22.8
Religion	Hindu	464	92.8
	Islam	13	2.6
	Christian	4	0.8
	Buddhist	18	3.6
	Kirat	1	0.2
Studying year	First-year	92	18.4
	Second year	75	15
	Third year	75	15
	Fourth-year	98	19.6
	Fifth year	78	15.6
	Intern	82	16.4

Table 3. Stage of Hypertension according to AHA (n=234).

	Frequency	Percentage
Stage I Hypertension	205	87.60
Stage II Hypertension	29	12.40

Association between related variables and hypertension after adjustment for confounding factor

Males had a higher odds ratio for developing hypertension compared to females. The crude odds ratio (COR) for males is 3.116 (2.144-4.53) at a 95% confidence interval (CI). After adjusting for other factors, the adjusted odds ratio (AOR) for males is 2.815 (1.914-4.139), with a significant p-value of < 0.001.

Again, individuals classified as obese have a higher odds ratio of developing hypertension com-pared to those who are non-obese. The COR for obesity is 1.862 (1.189-2.916) at a 95% CI and the AOR is 1.636 (1.026-2.607) with a p-value of 0.039.

In summary, based on the odds ratios presented in Table 5, we can observe significant associa-tions between sex, obesity, and hypertension. However, the associations between smoking, alco-hol consumption, and hypertension are not statistically significant when adjusted for other varia-bles (Table 5).

Table 4. Association between hypertension and predictor variables

Variables	Categories	Hypertension		Total
		Yes	No	
Age	< 20	27(51.9%)	25(48.1%)	52(100%)
	> 20	207(46.2%)	241(53.8%)	448(100%)
Sex	Male	169(58.3%)	121(41.7%)	290(100%)
	Female	65(31%)	145(69%)	210(100%)
Ethnicity	Brahmin/ Chhetri	129 (44.3%)	162(55.7%)	291(100%)
	Others	105(50.2%)	104(49.8%)	209(100%)
Religion	Hindu	218(47.0%)	246(53.0%)	464(100%)
	Others	16(44.4%)	20(55.6%)	35(100%)
Duration of sleep	Inadequate	79(48.8%)	83(51.2%)	162(100%)
	Adequate	155(45.9%)	183(54.1%)	338(100%)
Diet	Unhealthy	217(46.4%)	251(53.6%)	468(100%)
	Healthy	17(53.1%)	15(46.9%)	32(100%)
BMI	Obese	58(59.2%)	40(40.8%)	98(100%)
	Non obese	176(43.8%)	226(56.2%)	402(100%)
H/O hyperten-sion in the family	Yes	106(48.0%)	115(52.0%)	221(100%)
	No	128(45.9%)	151(54.1%)	279(100%)
Smoking habit	Smoker	23(67.6%)	11(32.4%)	34(100%)
	Non-smoker	211(45.3%)	255(54.7%)	66(100%)
Alcohol consump-tion	Yes	9(75.0%)	3(25.0%)	12(100%)
	No	225(46.1%)	263(53.9%)	488 (100%)

Table 5. Association between hypertension and related variables

	Categories	COR	P	AOR	p-value
Sex	Male	3.116 (2.144-4.53)	<0.001	2.815 (1.914-4.139)	<0.001
	Female	Ref			
BMI	Obese	1.862 (1.189-2.916)	0.006	1.636 (1.026-2.607)	0.039
	Non-obese	Ref			
Smoking	Smoker	2.527 (1.204-5.303)	0.012	1.514 (0.696-3.295)	0.295
	Non-smoker	Ref			
Alcohol	Yes	3.507 (0.938-13.110)	0.048	1.884 (0.485-7.315)	0.360
	No	Ref			

DISCUSSIONS

The prevalence of hypertension observed among KIST medical students is comparable to figures reported in similar age groups elsewhere, though estimates vary widely by region and diagnostic criteria. In our study, the overall prevalence of hypertension was 46.80%. The prevalence of hypertension was 18.5% prevalence reported from a study at Government Medical College Kannauj, Uttar Pradesh, India, and 21.33% prevalence from SRMS Medical College, Uttar Pradesh, India.[9,10] Another study of 500 medical students in Karnataka showed a point prevalence of 55.4%.[12] A recent study in Turkey found 15.8% of students hypertensive when applying the 2017 ACC/AHA cutoffs. By comparison, a survey of 333 Libyan medical students reported 12.3% hypertension overall (16.8% of males, 9.7% of females). A similar study held in Medical Students of Northern Border University in Arar, Saudi Arabia reported the prevalence rate of 56.89%.[11]

In comparison to a study done on the adult population of Nepal in 2019, the prevalence rate was 27.3%, while that done in Pokhara, Nepal, and Bhadrabas, Nepal, had a prevalence rate of 35.5% and 33.8%, respectively.[13-15] In a similar setting, a study conducted in Cameron found a higher prevalence of hypertension of 47.5%.[16]

In our study, there was a significant association between gender and hypertension. The prevalence of hypertension was higher in males (58.3%) as compared to females (31%). Male students are more likely than female students to have elevated blood pressure in this and other young cohorts. For example, a study found Nepali adolescent boys were roughly six times more likely than girls to have elevated blood pressure and nearly three times more likely to be hypertensive.[4] Similarly, the Libyan study reported 16.8% of male students versus 9.7% of female students had hypertension. This pattern is echoed in a study from India that identified male sex as a significant correlate of hypertension in Indian medical students.[9] The higher prevalence of hypertension among males than that of females are seen in almost all the studies conducted in medical colleges as well in the adult population around the globe.[9,10,12-20] Possible explanations include physiological and behavioral factors. Androgens and differences in vascular physiology may predispose young men to higher blood pressure, while estrogen in premenopausal women can be protective. Socially, male students may be more likely to engage in behaviors like smoking, drinking, high salt intake that elevate blood pressure.[24]

Body mass index (BMI) and adiposity were strongly associated with hypertension status. In our analysis, overweight and obese students were significantly more likely to have high blood pressure, similar to that of other literatures. The association of hypertension with BMI has been observed in several previous studies in the Indian medical student population, as well as in the study done among the adult population in Nepal.[9,10,13-15,21] Study in Libya noted that increased BMI was a highly significant risk factor for hypertension in students.[24] Likewise, study from turkey demonstrated that students with higher BMI had appreciably higher mean systolic and diastolic pressures.[25] A study from India found an odds ratio of 3.71 for hypertension per incremental BMI category in Indian medical students.[9] Another Nepalese study of adolescents also identified obesity as an independent predictor of elevated blood pressure.[4] The pathophysiology is well understood: excess weight increases cardiac output and vascular resistance, alters renal pressure-natriuresis, and often coexists with other metabolic derangements. These results reinforce that even modest increases in BMI in young adults have measurable effects on blood pressure.[25] Preventing obesity through lifestyle intervention is therefore a key target.

Lifestyle behaviors – notably smoking, alcohol use, diet, and physical inactivity – are critical correlates of hypertension. In our student cohort, the prevalence of smoking and alcohol use was comparable to prior Nepalese surveys (around 9-20% of students).[4] Smoking and drinking are well-recognized vascular risk factors.[25] Tobacco use acutely raises sympathetic tone and chronically accelerates arterial stiffening, and heavy alcohol consumption leads to hypertension in a dose-dependent fashion. In the Libyan study, smoking and frequent intake of caffeinated sodas and coffee were among the strongest predictors of hypertension.[24] Systematic reviews confirm that reductions in salt and alcohol intake and improvements in diet can lower systolic pressure by several mmHg.[25] In one meta-analysis, modest weight loss or dietary change yielded a mean systolic drop of 4-5 mmHg, and restricting alcohol lowered SBP by about 3.8 mmHg.[25] In our data, the smaller proportion of smokers and drinkers limited power, and no significant blood pressure differences were found between users and non-users. This is not unusual in young samples as some observational analyses even report null or inverse associations between smoking and hypertension, possibly due to confounding or smoking's acute hypotensive effects.[25] Nevertheless, the overall evidence is clear that avoiding tobacco and excess alcohol is part of good cardiovascular prevention, and all should be discouraged from these habits early.

Sedentary behavior was common among students and low activity was associated with higher blood pressure in other studies as well.[9] One cross-sectional investigation in India found that participants with heavy physical activity had much lower hypertension prevalence than those with sedentary lifestyles.[9] Though our study did not directly measure exercise frequency, we noted that fast-food and junk-food consumption was frequent. Reliable with this, a study from Nepal itself found that medical students with higher junk-food intake had significantly higher systolic pressure, even when stress levels were low.[26] High dietary salt, sugar, and trans-fats can raise BP and potentiate obesity, and are targets for intervention. Interestingly,

several reports suggest that medical students often have irregular sleep and high caffeine consumption to cope with studies.[24] Also, inadequate sleep itself was identified as a risk factor (sleep < 6 hours) in the Libyan study.[24] While our study did not find a direct link between sleep duration and hypertension, poor sleep hygiene is common in this population and may contribute indirectly via stress and metabolic dysregulation.

Moreover, a family history of hypertension tended to cluster among hypertensive students, as expected from genetic and shared environment influences.[9] Although multivariate analysis often attenuates the effect of family history in young cohorts, it remained a significant predictor in the Kannauj study (OR ~2.8).[9]

The higher burden of hypertension in this future physician cohort has several implications. Medical students, though knowledgeable about health, are not immune to the global trends of non-communicable disease. Early onset of hypertension in young adults sets the stage for cardiovascular disease later in life, so prevention in this age group has big public health value. Even studies from Nepal concluded that hypertension is already prevalent in Nepalese adolescents and called for routine screening.[4] Our findings also strengthen these messages: even among medical students, early detection and risk-factor modification are necessary. In practice, this could mean encouraging students to adopt healthy habits (balanced diet, exercise, sleep hygiene, smoking cessation, and alcohol cessation) and integrating regular BP checks and health counseling into medical school. Teaching our future doctors how to prevent and manage hypertension in themselves may also translate into better patient counseling down the road.

Preventive strategies should focus on the modifiable factors. First, weight management is paramount: encouraging a healthy BMI through diet and exercise can substantially lower hypertension risk. Randomized trials have shown that lifestyle interventions can reduce systolic blood pressure by ~4–5 mmHg on average, which materially cuts cardiovascular risk.[25] Additionally, salt reduction, as recommended by WHO and major guidelines, is a simple measure that can drop population blood pressure. Also, medical colleges could implement stress-reduction programs, such as promoting adequate sleep and relaxation techniques that improve overall wellness.

Its cross-sectional design prevents causal inferences, and the single center sample may not represent all Nepali medical students. Behavioral factors were self-reported and may be underreported due to social desirability. We did not measure blood biomarkers (lipids, glucose) and objective fitness levels, which could have provided a fuller risk profile.

CONCLUSION

The prevalence of hypertension among study subjects is higher than the general population of Nepal. A significant association was found between sex, obesity, smoking, alcohol consumption and hypertension. Modifiable factors like BMI (body weight), smoking and alcohol consumption can help in prevention of hypertension. Taking care of blood pressure by lifestyle modification can be one of the most economical public health measures to prevent hypertension. In order to prevent the rising hypertension pandemic and related complication, it is essential to identify risk group individuals with hypertension at an earlier age and implement a high-risk policy of hypertension prevention among them. Our results highlight the need of putting new preventive and health promotion initiatives targeted at younger age groups into practice.

Medical educators and policymakers should consider routine screening of student populations for hypertension and promoting evidence-based lifestyle changes, such as those recommended by guideline bodies (dietary improvements, regular exercise, weight control, and avoidance of tobacco and excess alcohol). However, additional research is also needed to further explore the risk factors of hypertension among medical students and to develop preventive measures. In doing so, we may improve the long-term health of future doctors and the wider community they will serve.

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to all those who have contributed to the successful completion of this research project. I would also like to extend my thanks to the participants who willingly dedicated their time and efforts to participate in this study.

REFERENCES

1. Chowdhury EK, Ernst ME, Nelson M, Margolis K, Beilin LJ, Johnston C, et al.; ASPREE Investigator Group. Impact of the 2017 American Heart Association and American College of Cardiology hypertension guideline in aged individuals. *J Hypertens.* 2020 Dec;38(12):2527-2536. doi: 10.1097/HJH.0000000000002582. PMID: 32740404; PMCID: PMC8218338.
2. Wikipedia Contributors. Hypertension. Wikipedia. Wikimedia Foundation; 2023.
3. Anteneh ZA, Yalew WA, Abitew DB. Prevalence and correlation of hypertension among adult population in Bahir Dar city, northwest Ethiopia: a community based cross-sectional study. *Int J Gen Med.* 2015 May 6;8:175-85. doi: 10.2147/IJGM.S81513. PMID: 26005357; PMCID: PMC4427605.
4. Shakya S, Bajracharya S. Hypertension and its Determinants Among School Going Adolescents: A Cross Sectional Study in Nepal. *J Nepal Paedtr Soc.* [Internet]. 2019 Dec. 31 [cited 2025 May 9];39(2):87-94. Available from: https://nepjol.info/index.php/JNPS/article/view/25377

5. Lurbe E, Agabiti-Rosei E, Cruickshank JK, Dominiczak A, Erdine S, Hirth A, et al. 2016 European Society of Hypertension guidelines for the management of high blood pressure in children and adolescents. *J Hypertens.* 2016 Oct;34(10):1887-920. doi: 10.1097/HJH.0000000000001039. PMID: 27467768.

6. Gupta R, Gaur K, S Ram CV. Emerging trends in hypertension epidemiology in India. *J Hum Hypertens.* 2019 Aug;33(8):575-587. doi: 10.1038/s41371-018-0117-3. Epub 2018 Sep 25. PMID: 30254382.

7. Chockalingam A, Campbell NR, Fodor JG. Worldwide epidemic of hypertension. *Can J Cardiol.* 2006 May 15;22(7):553-5. doi: 10.1016/s0828-282x(06)70275-6. PMID: 16755308; PMCID: PMC2560860.

8. WHO. Hypertension [Internet]. www.who.int. 2024. Available from: https://www.who.int/india/health-topics/hypertension

9. Midha T, Nigam S, Martolia DS, Kaur S. Prevalence and determinants of hypertension in MBBS students of Govt. Medical College, Kannauj, Uttar Pradesh. *Indian J Forensic Community Med.* 2018;5(2):97-100.

10. Singh AP. The prevalence of hypertension and its modifiable risk factors among medical students of a medical college in Uttar Pradesh, India. *J Lumbini Med Coll.* 2013 Dec 30;1(2):51-3.

11. Alanazi AM, Alenezi YM, Alanazi TH, Alruwaili BA, Alanazi AM, Alrawili AN, et al. Prehypertension and hypertension in medical students of Northern Border University in Arar, Saudi Arabia. *Egypt J Hosp Med.* 2018 Jan 1;70(1):33-8.

12. Shetty SS, Nayak A. Prevalence of prehypertension amongst medical students in coastal Karnataka. *J Evol Med Dent Sci.* 2012 Dec;1(6):975-80.

13. Huang Y, Guo P, Karmacharya BM, Seeruttun SR, Xu DR, Hao Y. Prevalence of hypertension and prehypertension in Nepal: a systematic review and meta-analysis. *Glob Health Res Policy*. 2019 Apr 30;4:11. doi: 10.1186/s41256-019-0102-6. PMID: 31165100;

14. Gurung B, Thapa N, Paudel UK. Prevalence of hypertension and its associated factors among adults living in Pokhara metropolitan city. *J Gandaki Med Coll Nepal*. 2022 Jul 25;15(1):6-13.

15. Vaidya A, Pathak RP, Pandey MR. Prevalence of hypertension in Nepalese community triples in 25 years: a repeat cross-sectional study in rural Kathmandu. Indian Heart J. 2012 Mar-Apr;64(2):128-31.

16. Dzudie A, Kengne AP, Muna WF, Ba H, Menanga A, Kouam Kouam C, et al.; CCS investigator group. Prevalence, awareness, treatment and control of hypertension in a self-selected sub-Saharan African urban population: a cross-sectional study. *BMJ Open.* 2012 Aug 24;2(4):e001217.

17. Mirza AA, Elmorsy SA. Diagnosis and Control of Hypertension as Indicators of the Level of Awareness Among Relatives of Medical Students in Saudi Arabia. *High Blood Press Cardiovasc Prev.* 2016 Jun;23(2):123-32. doi: 10.1007/s40292-016-0145-4. Epub 2016 Apr 29. PMID: 27129704.

18. Asresahegn H, Tadesse F, Beyene E. Prevalence and associated factors of hypertension among adults in Ethiopia: a community based cross-sectional study. *BMC Res Notes.* 2017 Nov 28;10(1):629. doi: 10.1186/s13104-017-2966-1. PMID: 29183367; PMCID: PMC5704552.

19. Feyisa BR, Tamiru A, Debelo S, Feyisa I, Tola EK, Tolesa EJ, et al. Magnitude of hypertension and its association with obesity among employees of Wallaga University, Ethiopia: a cross-sectional study. *BMJ Open*. 2023 Jul 12;13(7):e070656. doi: 10.1136/bmjopen-2022-070656. PMID: 37438078; PMCID: PMC10347519.

20. Chaudhary P, Gupta S, Govil S, Singh J, Varshney AM. A study to find prevalence of hypertension and its related risk factors among medical students of government medical college in UP.

21. Al-Taha MA, Al-Delaimy AK, Alrawi RY. Prevalence of Hypertension among Medical Students and its Lifestyle Determinants. *Iraqi J Com Med.* 2020 Jul 1;33(2).

22. Vallée A. Associations between smoking and alcohol consumption with blood pressure in a middle-aged population. *Tob Induc Dis*. 2023 May 18;21:61. doi: 10.18332/tid/162440. PMID: 37215190; PMCID: PMC10193384.

23. Taking Hypertension Care to the Primary Health Care Level in Nepal [Internet]. www.who.int. Available from: https://www.who.int/nepal/news/detail/28-07-2023-taking-hypertension-care-to-the-primary-health-care-level-in-nepal

24. Hussien Elaswdi, Zubia AA, Maitieg SM, Elaswdi MH. Prevalence and Associated Risk Factors [Internet]. Research Gate. unknown; 2024 [cited 2025 May 9]. Available from: https://www.researchgate.net/publication/388799138_Prevalence_and_Associated_Risk_Factors

25. Başkurt E, Kandur Y, Koyuncu ÖL, Tür A, Kopmaz B, Bozdemir E, et al. Hypertension Prevalence in Medical Students. *Kırıkkale Üniversitesi Tıp Fakültesi Dergisi*. 2024 Dec 24;26(3):357-62.

26. Khaliq F, Gupta K, Singh P. Stress, autonomic reactivity and blood pressure among undergraduate medical students. *JNMA J Nepal Med Assoc.* 2010 Jan-Mar;49(177):14-8. PMID: 21180214.