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Original Research Article

PREVALENCE, GENDER DISPARITY, AND AWARENESS OF HYPERTENSION AMONG MULTI-DISCIPLINARY COLLEGE STUDENTS IN RAJKOT: A CROSS-SECTIONAL STUDY

Rajkumar G. Mahajan[1], Bharat R. Desai[2], Bharatkumar M. Gohel[3], Nidhi Mangrola[4]

[1]*Associate Professor, Department of Community Medicine, B.J. Medical College, Ahmedabad, Gujarat, India.*
[2]*Assistant Professor, Department of Community Medicine, Nootan Medical College and Research Center, Sankalchand Patel Univesity, Visnagar, Gujarat, India.*
[3]*Associate Professor, Department of Community Medicine, P.D.U. Government Medical College, Rajkot, Gujarat, India.*
[4]*Associate Professor, Department of Community Medicine, Kiran Medical College, Surat, Gujarat, India.*

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Corresponding Author:
Dr. Rajkumar G. Mahajan,
Associate Professor, Department of Community Medicine, B.J. Medical College, Ahmedabad, Gujarat, India.
Email: drrgm2006@yahoo.com

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ABSTRACT

Background: Hypertension is increasingly affecting younger populations, yet it remains largely undetected. This study aimed to determine the prevalence, awareness regarding status and treatment of pre-hypertension and hypertension among college students in Rajkot.

Materials and Methods: A cross-sectional study was conducted among 1,140 first-year students recruited from 26 colleges spanning Arts, Commerce, and Science streams. Proportionate lottery sampling was utilised to ensure a representative sample. Blood pressure was measured twice using a mercury sphygmomanometer with a ten-minute rest interval, with the average of the two readings determining classification based on JNC 8 guidelines.

Results: The study population was predominantly male (62.6%). The overall prevalence of pre-hypertension was 14.7%, and hypertension was 12.8%. Males showed a significantly higher prevalence of hypertension (14.9%) than females (9.4%; p=0.0038). Strikingly, only 7% of hypertensive students (10 of 146) were aware of their status prior to the study, though 80% of those who were aware were receiving treatment.

Conclusion: A substantial burden of elevated blood pressure exists alongside an alarmingly low awareness rate among college youth in Rajkot. There is an urgent need for routine, periodic campus-based screenings and early intervention programmes to prevent long-term cardiovascular complications.

Keywords: College students, Hypertension, Prevalence, Pre-hypertention.

INTRODUCTION

Non-communicable diseases (NCDs) are the leading cause of mortality worldwide, accounting for approximately 43 million deaths in 2021, representing nearly 75% of all non-pandemic-related deaths. Of these, 18 million deaths occurred before the age of 70 years, with 82% of premature deaths occurring in low- and middle-income countries.[1] Among NCDs, hypertension is one of the most important modifiable risk factors for cardiovascular diseases, stroke, chronic kidney disease, and dementia. According to the WHO Global Report on Hypertension, approximately 1.4 billion adults were living with hypertension worldwide in 2024, yet only about one in five individuals had their blood pressure adequately controlled through pharmacological treatment or lifestyle modification. The estimated global prevalence of hypertension among adults aged 30–79 years is approximately 33%.[2]

Hypertension is defined as a systolic blood pressure (SBP) of ≥140 mmHg and/or a diastolic blood pressure (DBP) of ≥90 mmHg, according to the Joint National Committee (JNC) criteria.[3] Despite being largely preventable and treatable, uncontrolled hypertension remains a major public health challenge and is responsible for more than 10 million deaths annually worldwide.[2] In India, the

burden of hypertension continues to increase. According to NFHS-6 (2023–24), the prevalence of hypertension among adults is 20.8% nationally and 21.6% in Gujarat, indicating a substantial public health burden in the state.[4]

Prehypertension, defined as an SBP of 120–139 mmHg and/or a DBP of 80–89 mmHg, is an important precursor to established hypertension and a significant predictor of future cardiovascular disease.[4] The prevalence of prehypertension has been reported to be 31% in the United States.[5] and 39% in Greece.[6] In India, studies have reported the prevalence of prehypertension ranging from 40% to 60%, highlighting the growing burden of elevated blood pressure among young adults. Early identification of prehypertension offers an opportunity to prevent progression to hypertension through timely lifestyle interventions.

Recognizing the growing burden of NCDs, India became the first country to adopt the WHO Global Monitoring Framework and Action Plan for NCDs, which includes reducing the prevalence of raised blood pressure as one of its major targets.[7] Early detection and effective management of hypertension are essential to reduce long-term cardiovascular morbidity and mortality. Routine blood pressure screening and timely intervention can substantially reduce disease progression and associated complications.[8] However, hypertension among young adults often remains undiagnosed because this age group is infrequently screened and is generally perceived to be at low risk.

Although numerous studies have assessed the prevalence of hypertension among adults, relatively few have focused on college-going youth. Moreover, most studies conducted among college students have been limited to a single academic discipline, such as medical or engineering students, thereby restricting the generalizability of their findings to the broader student population. Evidence regarding the prevalence of hypertension, gender differences, awareness of hypertension status, and treatment practices among students from multidisciplinary colleges remains limited, particularly in western India.

Therefore, the present study was undertaken to determine the prevalence of prehypertension and hypertension among first-year students from multidisciplinary colleges in Rajkot city. In addition, the study aimed to assess the awareness of hypertension status and treatment practices among students identified with hypertension.

MATERIALS AND METHODS

A cross-sectional study was conducted among college going student of Rajkot city. According to census 2011, the total population of Rajkot city is 12, 86, 995 which gives it a ranking of 27th populous city in India (out of total 497 cities).[9]

Sample size and sampling

The estimated sample size was 1140 by taking anticipated prevalence of the hypertension among youth 13% and relative error of 15%.[10,11]. As of October 2016, the Saurashtra university had 61 affiliated colleges (17 Arts, 28 Commerce, and 16 Science) with a total enrolment of 13,823 students, including 1,969 (14.2%) in Arts, 9,811 (71.0%) in Commerce, and 2,043 (14.8%) in Science. Out of total 1140, 171 (15%) students from Arts, 789 (70%) students from Commerce and 171 (15%) students from Science were taken by proportionate sampling method. Total 3 colleges from Arts, 20 colleges from Commerce stream and 3 colleges from Science stream were selected by lottery method. The students from the first year were selected for the study.

After taking prior permission from the principal of the college, the data were collected through pre tested and semi structured questionnaire after explaining about the purpose of the study. After completion of forms, blood pressure of each student was measured.

The BP was measured using a mercury sphygmomanometer with an appropriate-size cuff. During the measurement, the subject's right arm was placed at the same level as their heart to ensure accuracy. Two recordings for each subject were taken, with a 10-minute interval between each recording. The final reading was the average of the two recordings. According to the Joint National Committee (JNC) 8 report, BP categories are defined as follows:[4]

- Hypertension refers to sustained high BP, with SBP of 140 or more, or DBP of 90 or more,
- Pre-hypertension refers to an SBP of 120-139 mmHg or a DBP of 80-89 mmHg,
- Normal BP refers to an SBP of 90-119 mmHg and a DBP of 60-79 mmHg and
- Hypotension refers to an SBP below 90 mmHg and a DBP below 60 mmHg.
- Data entry was done in Microsoft Office Excel and analysis was done using the software package Epi Info from CDC, Atlanta, U.S.A.

RESULTS

A total of 1140 students were enrolled from the 26 selected colleges of Rajkot city. Overall mean age of the study participants was 18.9±1.4. Male predominance was reported with 62.6% male and 37.4% female. Majority of the students belonged to Hindu (95.5%) community. Family history of hypertension was present in 166 (14.6%) patients and among them 7 (0.7%) students, both father and mother were having history of hypertension. Overall prevalence of nicotine addiction was 16%.

Table 1: Sociodemographic profile of the patients (N=1140)

	Variables	Value
1.	Mean age (mean ± S.D. in years)	18.9±1.4
2.	Sex	Frequency (percentage)
	Male	714 (62.6%)
	Female	426 (37.4%)
3.	Socio economic class	Frequency (percentage)
	Upper class	684(60.0%)
	Middle class	214(18.8%)
	Lower class	242(21.2%)
4.	Religion	Frequency (percentage)
	Hindu	1089(95.5%)
	Muslim	50(4.4%)
	Christian	1(0.1%)
5.	H/o Hypertension	Frequency (percentage)
	Father	105 (9.2%)
	Mother	54 (4.7%)
	Both	7 (0.7%)
6.	Taking nicotine (smoking/ chewing)	Frequency (percentage)
	Yes	179(16%)
	No	940(84%)
	Total	1119(100%)

According to JNC 8 classification of blood pressure, overall prevalence of pre- hypertension and hypertension was 14.7% and 12.8% respectively. Out of all 1140 students 826 were found normotensive. Prevalence of hypertension among male (14.9%) was high as compared to female (9.4%). (p=0.0038) Among 146 hypertensive students, only 10 (7%) patients were aware of their hypertensive status. Out of all student who were aware of their status, majority of student (80%) were taking treatment.

Table 2: Prevalence of the hypertension among study participants (N=1140)

Blood Pressure	Male	Female	Total
Normal	487(68.2%)	339(79.5%)	826(72.5%)
Pre-hypertension	121(16.9%)	47(11.3%)	168(14.7%)
Hypertension	106 (14.9%)	40 (9.4%)	146 (12.8%)
Total	714(100%)	426(100%)	1140(100%)
χ^2 (Normal + Pre-hypertension vs Hypertension stage I+II) = 7.1, df=1, p=0.0038			
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Figure 1 illustrates the distribution of blood pressure status, awareness, and treatment among the study participants. Of the 1,140 students screened, 994 (87.2%) were normotensive, while 146 (12.8%) were hypertensive. Among the hypertensive students, only 10 (6.8%) were aware of their hypertensive status before the study, whereas 136 (93.2%) were newly detected during screening. Of the 10 students who were aware of their condition, 8 (80%) were receiving regular treatment and 2 (20%) were not on regular treatment.

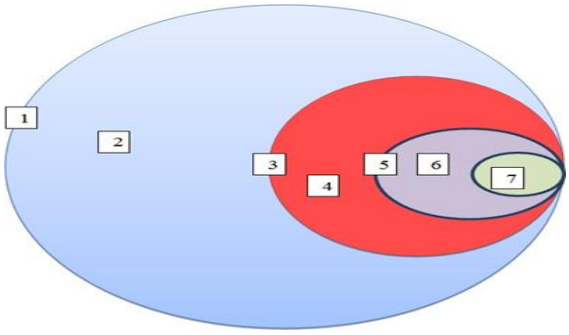

Figure 1: Distribution of hypertension status, awareness, and treatment among college students in Rajkot (N = 1140).

Legends given in above figure are described in following table

Table 3: ?

S.N.#	Category	N	n	Percentage
1)	Representative sample	1140	1140	100%
2)	Normotensive	1140	994	87 %
3)	Hypertensive	1140	146	13 %
4)	Unaware	146	136	93 %
5)	Aware	146	10	7 %
6)	Aware and on treatment	10	8	80 %
7)	Aware and not on regular treatment	10	2	20 %

DISCUSSION

In present cross-sectional study, the attempt was made to know the prevalence of the hypertension among college going students whose mean age of the was 18.9±1.4 years with male preponderance (62.6%).

Prevalence of hypertension and gender disparity

Overall prevalence of pre- hypertension and hypertension was 14.7% and 12.8% respectively in present study with male predominance (male: 14.9% and female: 9.4%). In a study conducted among college student by Reddy V et al,[12] reported comparable findings. In this study, the prevalence was 15% among male and 4.8% among female but the difference was not found statistically significant. In a cross-sectional study conducted in Hyderabad by Srinivas S et al,[13] found total prevalence of pre-hypertension and hypertension 26.9% and 4.8% respectively. Similarly, among undergraduate students in Andhra Pradesh, the pre-hypertension rate was noted at 15.9% with male predominance.[14] Community based cross sectional study was conducted among people of 15- 64 age-group in Gujarat by Bhagyalakshmi A et al.[10] In this study prevalence of hypertension among participant of 15-24 age group was found to 11%. This high rates of pre-hypertension, hypertension and gender disparity findings of our study align with a comprehensive nationwide analysis of young Indians aged 15–24 by Khan et al.[15] It was highlighted that the prevalence of hypertension and pre-hypertension was 35.7% and 5.1% respectively with significant difference between male and female. The higher prevalence among males may be attributable to greater tobacco use, higher sympathetic activity, dietary practices, and lower healthcare-seeking behaviour reported among young men.

Family history of the Hypertension

In a study conducted among medical college student in Tamilnadu by Ibrahim R et al,[16] found higher (23.8% in father and 15% in mother of participants respectively) prevalence of parental history of hypertension compared to present study (9.2% in father and 4.7% in mother of participants respectively). Similarly, Bansal et al,[17] also observed that 36.8% students have positive family history of hypertension. Possible reason for variation could be that the participants might not be aware of current status of hypertension of their parents.

Prevalence of Nicotine addiction

In present study overall prevalence of nicotine addiction was found 16%. A cross-sectional study conducted in two districts (Rajkot and Morbi) by Matariya Z et al,[18] found overall prevalence of 8.2% and among male it was found to 11.8%. In another cross-sectional study conducted by Kandula S. et al[19] also found low prevalence of nicotine addiction. Prevalence of tobacco addiction was found in 8% study population by Manna N et al,[20] in Kolkata college student.

Awareness of Hypertension

Among 146 hypertensive students, only 10 (7%) patients were aware of their hypertensive status in present study while among students who were aware of their status, majority of student (80%) were taking treatment. In study conducted by Gooding et al,[21] in USA among young adults reported that 74.9% participants were unaware regarding their status of hypertension. In a community-based assessment evaluating young adults (20–39 years) in South India, Geevar et al. (2022) found that among young adults with hypertension, only 31.4% knew about their condition, while just 15.3% were taking treatment and 23.4% managed to control their blood pressure. The awareness levels for hypertension in rural parts of India ranged from a low of 12% in Car Nicobar islands,[22] to a high of 43% in Kerala.[23] The awareness levels for HTN were consistently above 35% in almost all studies from urban areas.[24] These alarmingly low awareness rates indicate massive gap, highlighting how urgent need to set up routine or periodic blood pressure screenings in college campuses.

Strengths and Limitations

A major strength of this study is its diverse, multi-disciplinary sampling design, which avoids the discipline-specific bias seen in previous research. By enrolling 1140 students across the Arts, Commerce, and Science streams using proportionate sampling, our findings provide a highly authentic reflection of the broader college student community. Blood pressure was measured twice rather than relying on a single reading.

Conversely, the study has a couple of limitations. First, our sampling was strictly limited to first-year students, which means the findings might not fully apply to older university cohorts. Second, relying on self-reported family history introduced potential recall bias, as many students may not know their parents' actual blood pressure status. Blood pressure classification was based on measurements obtained during a single visit; therefore, white-coat hypertension cannot be excluded.

CONCLUSION

This cross-sectional study highlights a significant burden of cardiovascular risk with striking gender disparity among college-going students in Rajkot.

The most critical finding of this institutional screening is the alarmingly low level of awareness indicating vast majority of hypertensive youth remain undiagnosed and untreated. This diagnostic gap indicates the urgent need to implement routine, periodic blood pressure screenings across all college campuses. Establishing early detection initiatives alongside targeted healthy lifestyle interventions is vital to mitigate long-term cardiovascular

complications and prevent premature mortality in this young population.

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