

STUDY OF PREVALENCE OF HYPERTENSION AND ITS ASSOCIATED RISK FACTORS AMONG 20-60 YEARS AGE GROUP POPULATION IN SAGAR CITY-A CROSS SECTIONAL STUDY.

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ABSTRACT

INTRODUCTION

The World Health Organization attributes hypertension, as the leading cause of cardiovascular mortality. According to NFHS-5, Overall prevalence of hypertension among age group 15 years and above in India is 29%. The sex specific prevalence is 33.1% for males and 24.9% for females. Overall prevalence of hypertension among age group 15-49 years in Madhya Pradesh is 14%. This study was undertaken to estimate the prevalence and associated risk factors of hypertension in Sagar city.

METHODOLOGY

A community based cross-sectional study was carried out among the people aged 20 to 60 years living in Sagar city. Multi-stage sampling method was used. The study was conducted from September 2022 to August 2023. Modified and pretested WHO stepwise approach to chronic

disease risk factor surveillance (STEPS) was used for data collection. Data was compiled using MS-Excel and analysis was done with the help of IBM SPSS 26.0.

RESULTS

Present study showed that prevalence of hypertension was 17.2% among study participants. Out of 550 study participants, 283 (51.5%) were male and 267 (48.5%) were females. Hypertension was found to be more in old aged male. Hypertension was found more in smokers, those who were consuming extra salt in diet and those who had family history of hypertension.

CONCLUSION

Present study showed that nearly one sixth of the study participants were found to be hypertensive. As the awareness of the hypertension status among hypertensive cases was very poor, improving the health education regarding hypertension to increase the awareness about hypertension is the need of the hour.

KEYWORDS

Hypertension, Prevalence, Risk factors, Cross-sectional

MAIN ARTICLE

INTRODUCTION

The World Health Organization attributes hypertension, as the leading cause of cardiovascular mortality. To address this problem, the World Hypertension League initiated a global awareness campaign on hypertension in 2005 and dedicated May 17 of each year as World Hypertension Day.[1] According to NFHS-5, Overall prevalence of hypertension among age group 15 years and above in India is 29%. The sex specific prevalence is 33.1% for males and 24.9% for females. [2] Overall prevalence of hypertension among age group 15-49 years in Madhya Pradesh is 14%. Out of them 17% of men and 11% of women have hypertension. The prevalence of hypertension is slightly higher among males than females with higher prevalence in urban area is reported. For both women and men, hypertension increases with age. [3] Hypertension (high blood pressure) is when the pressure in your blood vessels is too high

(140/90 mmHg or higher). Things that increase the risk of having high blood pressure include: older age, genetics, being overweight or obese, not being physically active, high-salt diet, drinking too much alcohol. [4]

If the systolic blood pressure and diastolic blood pressure values fall into different categories, the overall classification is determined based on the higher of the two blood pressures. Blood pressure is classified into one of four categories: normal, prehypertension, stage 1 hypertension and stage 2 hypertension. Prehypertension is not considered a disease, but identifies those who are likely to progress to stage 1 or stage 2 hypertension in the future. [5]

This study was undertaken in this direction to estimate the prevalence and associated factors of hypertension among study population so that preventive measure can be initiated to control hypertension.

MATERIALS AND METHODS

Study design, study duration, study population and study area

A community based cross-sectional study was conducted from September 2022 to August 2023 among 20-60 years age group population in Sagar city.

Sample Size and Sampling method: The sample size was calculated by using formula of estimating proportions.

$$N = Z^2pq/d^2$$

The sample size for the study was calculated by taking most probable prevalence of hypertension (in males, aged 45-49 years) in Madhya Pradesh as 30.2% (NFHS-5 Madhya Pradesh Fact Sheet)

Z= constant value at 95% confidence interval (1.96)

p = Expected prevalence of hypertension (30.2%)

q = Compliment of p (69.8%)

D = Absolute precision (5%)

N = Sample size

And after putting all these values the sample size comes out to be 324. Since sampling procedure was multistage, hence considering the design effect, the sample size was further be increased by one and half times. So, it became 486. After adding 10% of non-responding participants sample size comes out to be 535 and it was rounded off to 550.

Inclusion and exclusion criteria

Individuals aged 20 to 60 years age group and giving consent for the study in the selected study area of Sagar city were included. While Participants not giving consent to participate in the study, who were too sick to be interviewed and with whom anthropometry measurements can't be performed were excluded.

Selection procedure

Multi stage sampling method was used. There were 3 stages and for each stage different sampling design was used. First, 5 out of 48 wards were randomly selected using a simple random sampling method. Within each of these selected wards, households were then chosen using systematic random sampling. In the final stage, one member from the target age group was interviewed per selected household. If multiple eligible individuals were present in a household, one was selected randomly through a lottery method. In case of non-availability of eligible person in a selected household, at the time of survey, the adjacent household was selected. All participants were described about purpose of the study.

Study Tool & data collection

Modified and pretested WHO stepwise approach to chronic disease risk factor surveillance (STEPS) was used. Questionnaire was used for data collection after taking informed consent. Height, weight and blood pressure were measured using standardized equipments and procedure. Weight of participant was measured in kilograms using (well-calibrated scales) standard procedures. For this, person standing with minimal movement and his or her hands by his or her side. Moreover, the shoes and excess clothing of participant were removed. Then, their heights were measured using measuring tape. The height measurement began with ensuring the wall and floor were level and straight. Participants stood with their back against the wall, heels, feet, and knees together, looking straight ahead. A horizontal scale was aligned from the highest point of their head to mark the wall with a pen. After moving aside, the mark

was measured vertically to the floor using a tape measure. Participants were instructed to relax for 5 minutes before blood pressure measurement. Blood pressure was assessed in a seated position on the right arm using a standardized digital instrument with an appropriate cuff size. Two readings were taken 10 minutes apart, and the average was calculated as per JNC-8 guidelines. Participants diagnosed with hypertension or on anti-hypertensive medication were referred to the nearest healthcare facility for further evaluation and management as needed.

Joint National Committee (JNC-8) guidelines

Category	Systolic blood pressure (in mm/Hg)	Diastolic blood pressure (in mm/Hg)
Normal	<120	<80
Pre-hypertensive	120-139	80-89
Stage 1 hypertensive	140-159	90-99
Stage 2 hypertensive	>160	>100

BMI was calculated as weight in kilograms divided by height in meters square. BMI was categorized as underweight, normal, overweight and obese.

Body Mass Index Classification

Body Mass Index (BMI)	Classification
Underweight	Below 18.5
Normal	18.5 to 24.9
Overweight	25 to 29.9
Obese	30 and above

Ethical Consideration

The ethical clearance for the study was taken from the institutional ethical committee, Bundelkhand medical college, Sagar (M.P.) Certificate number IECBMC/2022/75.

Statistical analysis plan

Data was compiled using MS-Excel and analysis was done with the help of IBM SPSS 26.0. Data was expressed as frequency, proportion or mean. Chi square test was used. Level of significance was kept at P-value of <0.05.

RESULTS

The present study was conducted among 550 participants. Out of 550 study participants, 283 (51.5%) were male and 267 (48.5%) were females. Majority of the study participants 210 (38.2%) were of 31 to 40 age group, 448 (81.5%) were married & 523 (95.1%) were Hindus. Out of 550 study participants, 70 (12.7%) were govt. employee, 156 (28.4%) were non-govt. employee, 104 (18.9%) were self-employed, 47 (8.5%) were student & 164 (29.8%) were home maker. Majority of them 246 (44.7%) were graduate (Table 1).

Table-1: Distribution of study participants according to different socio-demographic variables

Variables	Categories	Number (n)	Percentage (%)
Age-group (Years)	21 to 30	72	13.1
	31 to 40	210	38.2
	41 to 50	84	15.3
	51 to 60	184	33.5
	Total	550	100
Gender	Male	283	51.5
	Female	267	48.5
	Total	550	100
Marital Status	Unmarried	88	16
	Married	448	81.5
	Divorced	3	0.5
	Widow	11	2
	Total	550	100
Religion	Hindu	523	95.1
	Muslim	21	3.8
	Sikh	3	0.5
	Christian	2	0.4
	Other	1	0.2
	Total	550	100
Total number of family members	1 to 4	112	20.4
	5 to 8	333	60.5
	9 and above	105	19.1

	Total	550	100
Total monthly income of family	<50000	205	37.3
	50000 and above	345	62.7
	Total	550	100
Per capita monthly income	< 5000	117	21.3
	5001 and above	433	78.7
	Total	550	100
Educational status	Illiterate	28	5.1
	Primary School	42	7.6
	Middle school	37	6.7
	High school	57	10.4
	Higher secondary	69	12.5
	Graduate	246	44.7
	Post Graduate	71	12.9
	Total	550	100
Occupation	Govt. Employee	70	12.7
	Non govt. employee	156	28.4
	Self-employed	104	18.9
	Student	47	8.5
	Home maker	164	29.8
	Retired	1	0.2
	Unemployed	6	1.0
	Refused	2	0.4
	Total	550	100

Out of 550 study participants, 95 (17.2%) were hypertensive & 455 (82.8%) were non-hypertensive. Out of hypertensive, 73(13.3%) had systolic hypertension and 45 (8.2%) had diastolic hypertension (Table 2)

Table-2: Distribution of study participants according to level of their blood pressure as per Joint National Committee (JNC-8) guidelines

Variables	Frequency(n)	Percentage
Systolic Blood Pressure		
Normal (<120)	332	60.4
Pre-hypertension (120-139)	145	26.4
Stage-1 Hypertensive (140-159)	66	12.0
Stage-2 Hypertensive (>159)	7	1.3
Total	550	100
Diastolic Blood Pressure		
Normal (<80)	410	74.5

Pre-hypertension (80-89)	95	17.3
Stage-1 Hypertensive (90-99)	40	7.3
Stage-2 Hypertensive (>99)	5	0.9
Total	550	100
Hypertension		
Present	95	17.2
Absent	455	82.8
Total	550	100

Table 3 provides a detailed overview that hypertension was statistically associated with Socio-demographic factors like Age ($p = 0.001$) & Gender ($p = 0.001$). Hypertension was found to be more in old aged male. Hypertension was statistically associated with risk factors like smoking habit ($p = 0.039$) and extra salt consumption habit ($p = 0.020$).

Table-3: Association of hypertension with different socio-demographic variables and risk factors

Variables	Categories	Present	Absent	Total	Statistical tests
Age-group (Years)	21 to 40	33 (11.7%)	249 (88.3%)	282 (100%)	$\chi^2=12.568$ (df=1) $p = 0.001^*$
	41 to 60	62 (23.1%)	206 (76.9%)	268 (100%)	
Gender	Male	63 (22.3%)	220 (77.7%)	283 (100%)	$\chi^2=10.153$ (df=1) $p = 0.001^*$
	Female	32 (12.0%)	235 (88.0%)	267 (100%)	
Smoking habit	Current smoker	45 (21.5%)	164 (78.5%)	209 (100%)	$\chi^2=4.278$ (df=1) $p = 0.039^*$
	Non-smoker	50 (14.7%)	291 (85.3%)	341 (100%)	
smokeless tobacco product consumption habit	Yes	43 (21.5%)	157 (78.5%)	200 (100%)	$\chi^2=3.930$ (df=1) $p = 0.047^*$
	No	52 (14.9%)	298 (85.1%)	350 (100%)	
Alcohol consumption habit	Yes	42 (21.4%)	154 (78.6%)	196 (100%)	$\chi^2=3.681$ (df=1) $p = 0.055$
	No	53 (15%)	301 (85%)	354 (100%)	
Type of diet	Vegetarian	28 (15.7%)	150 (84.3%)	178 (100%)	$\chi^2=0.438$ (df=1)

	Non-Vegetarian	67 (18%)	305 (82%)	372 (100%)	p =0.508
Consumption of fruits	Yes	87 (17.1%)	422 (82.9%)	509 (100%)	$\chi^2=0.155$ (df=1) p =0.693
	No	8 (19.5%)	33 (80.5%)	41 (100%)	
Consumption of extra salt	Yes	49 (21.7%)	176 (78.3%)	225 (100%)	$\chi^2=5.408$ (df=1) p =0.020*
	No	46 (14.2%)	279 (85.8%)	325 (100%)	
Consumption of processed food	Yes	47 (22%)	166 (78%)	213 (100%)	$\chi^2=5.589$ (df=1) p =0.018*
	No	48 (14.2%)	289 (85.8%)	337 (100%)	

*Statistically significance

Hypertension was more likely to occur in those who had family history of hypertension, family history of diabetes, family history of Stroke/Transient Ischemic Attack & Overweight and Obesity (Table 4).

Table-4: Association of hypertension with different variable

Variables	Categories	Present	Absent	Total	Statistical tests
Work involving vigorous intensity physical activity	Yes	34 (16.4%)	173 (83.6%)	207 (100%)	$\chi^2=0.167$ (df=1) p =0.683
	No	61 (17.8%)	282 (82.2%)	343 (100%)	
Work involving moderate intensity physical activity	Yes	33 (14.4%)	196 (85.6%)	229 (100%)	$\chi^2=2.250$ (df=1) p =0.134
	No	62 (19.3%)	259 (80.7%)	321 (100%)	
Family history of hypertension	Yes	50 (21.6%)	182 (78.4%)	232 (100%)	$\chi^2=5.142$ (df=1) p =0.023*
	No	45 (14.2%)	273 (85.8%)	318 (100%)	
Family history of diabetes	Yes	52 (21.5%)	190 (78.5%)	242 (100%)	$\chi^2=5.373$ (df=1) p =0.020*
	No	43 (14%)	265 (86%)	308 (100%)	
	No	53 (15%)	301 (85%)	354 (100%)	

Family history of Angina/Heart attack	Yes	26 (29.5%)	62 (70.5%)	88 (100%)	$\chi^2=11.043$ (df=1) p =0.001*
	No	69 (14.9%)	393 (85.1%)	462 (100%)	
Family history of Stroke/Transient Ischemic Attack	Yes	22 (26.8%)	60 (83.2%)	82 (100%)	$\chi^2=6.159$ (df=1) p =0.013*
	No	73 (15.6%)	395 (84.4%)	468 (100%)	
Body Mass Index	<25 (Under-weight & normal)	50 (14.6%)	292 (85.4%)	342 (100%)	$\chi^2=4.454$ (df=1) p =0.035*
	≥25 (Over-weight & obese)	45 (21.6%)	163 (78.4%)	208 (100%)	
	No	48 (14.2%)	289 (85.8%)	337 (100%)	

*Statistically significance

DISCUSSION-

The prevalence of hypertension in the present study was found to be 17.2%. In contrast, Midha T *et al* (2018) [6] in their study found it to be 18.5%, Chattopadhyay A *et al* (2014) [7] 13.88%, Lebbie A *et al* (2017) [8] 12% and %, Srivastava A K *et al* (2012) [9] 10.5%. Variations in prevalence between present study and others may arise from social & cultural differences, dietary and lifestyle disparities, alongside demographic factors and age span differences, as well as variations in research methodologies. The prevalence of hypertension in the present study was found to be more in males (22.3%) than females (12.0%). Same findings were also reported by Ng N *et al* (2012) [10], Yadav S *et al* (2008) [11], Aanand K *et al* (2007) [12] & they found that prevalence of hypertension was more in males (34.4%) than females (28.7%). One of the possible explanations for this gender disparity in hypertension prevalence could be partially due to biological sex difference and partially due to behavioural risk factors like smoking, alcohol consumption, or physical activity. In present study, out of 282 study participants who were in age group of 21 to 40 years, 33 (11.7%) were hypertensive. Out of 268 study participants, who were in age group of 41 to 60 years, 62 (23.1%) were hypertensive

and this difference was found to be statistically significant ($p = 0.001$). Similarly, Madhu Priya *et al* (2016) [13] reported that hypertension increases significantly ($p < 0.001$) with advancing age. As people age, the walls of the aorta and arteries become stiffer, which significantly contributes to the higher incidence of hypertension observed in older individuals.

In present study, 209 (38%) study participants were current smoker, out of them 45 (21.5%) study participants were hypertensive & 341 (62%) study participants were non-smoker, out of them 50 (14.7%) study participants were hypertensive & P value comes out to be 0.039, which indicates that the study participants who were smoking had more chances of having hypertension. Similarly, Ruano N CI *et al* (2015) [14] reported that there was slight increase in Blood pressure in smokers than non-smokers ($p < 0.05$). Research indicates that nicotine the main active ingredient in tobacco products stimulates the release of epinephrine and norepinephrine & stimulates sympathetic nervous system that increases blood pressure. Out of 550 study participants, 200 were having smokeless tobacco products consumption habit. Prevalence of hypertension was significantly higher (21.5%) among smokeless tobacco product users as compared to non-tobacco user (14.9%). Similarly, Srivastav S *et al* (2017) [15] conducted a study & they also found that prevalence of hypertension among smokeless tobacco users was higher than non-tobacco users ($p = 0.002$). Consuming excessive salt leading to fluid retention. This raises blood pressure against the walls of blood vessels. There were 225 study participants who consumed excess salt (salt intake $> 5\text{gm/day}$) out of which, 49 (21.7%) were found to be hypertensive. Out of 325 study participants who had not taken excess salt, 46 (14.2%) were found to be hypertensive, and this result was found to be statistically significant ($p = 0.020$), i.e hypertension was seen more in persons taking excess salt. Same observations were also found in studies conducted by Chattopadyay *et al*, (2014) [7] also reported increased blood pressure among those persons who were adding extra salt in their meal. Out of 232 study participants who had family history of hypertension, 50 (21.6%) were found to be hypertensive, while out of 273 who had no family history of hypertension, 45 (14.2%) found to be hypertensive, and this result was found to be significant ($p = 0.023$). Ranasinghe P *et al* (2015) [16] conducted a study and results shows that the prevalence of hypertension was significantly higher in those with a Family history of hypertension.

Limitations

We had selected wards of the Sagar City for our study; therefore rural Area of Sagar district was not included in the study. Stress is a major risk factor for hypertension. It could also be considered in the present study for accurate results. The cross-sectional study design is one

time observation of any disease and its associated risk factors, which restricts examining causal associations.

CONCLUSIONS

From the results of this study, it can be concluded that the prevalence of hypertension is high (17.2%) in Sagar city. Hypertension was found to be more in old aged male. Hypertension was found more in smokers, those who were consuming extra salt in diet, those who had family history of hypertension & Overweight and Obese person. As the awareness of the hypertension status among hypertensive cases was very poor, improving the health education regarding hypertension to increase the awareness about hypertension is the need of the hour.

CONFLICTS OF INTEREST

None

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