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Original Research Article

Prevalence of hypertension and its associated modifiable risk factors among rural and urban adults of field practice area of Jhalawar Medical College, Jhalawar

Hemant Kumar Bindal[1], Lakhan Singh[2]*, Vinod Kumar[3], Deepak Kumar Dubey[3], Uma Shankar Shukla[3], Asif Ahmed Qurishi[3]

[1]District Tuberculosis Officer, Rajsamand, [2]Block Cheif Medical Officer, Rupbas, Bharatpur, Department of Medical, Health and Family Welfare, Government of Rajasthan, India
[3]Department of Community Medicine, Jhalawar Medical College, Jhalawar, Rajasthan

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***Correspondence:**
Dr. Lakhan Singh,
E-mail: drlakhan86@gmail.com

ABSTRACT

Background: The behavioral and biological risk factors, with a predisposition to the development of high blood pressure, are use of tobacco and alcohol, physical inactivity, obesity, increased fat, sodium intake, low fruit and vegetable intake. HT is called a "silent killer". Majority of people with hypertension are unaware of the problem because it may have no warning signs or symptoms. Objectives were assessment of the prevalence of hypertension and associated modifiable risk factors among adults in the practice area of rural and urban area of Jhalawar Medical College, Jhalawar.
Methods: The present observational cross-sectional study was conducted on adults of rural and urban dwellers of field practice area of Jhalawar Medical College, Jhalawar. By stratified random sampling method, 1418 participants were selected and included in our study during the study period that fulfilled our inclusion and exclusion criteria.
Results: The overall prevalence of hypertension found was 18.6%. In the present study, the association of hypertension with risk factors like tobacco use, BMI, and waist hip ratio was found to be significant in rural areas. While in urban areas, the prevalence of hypertension was found to be statistically significant with calorie intake, tobacco use, and BMI and waist hip ratio. The risk factor for calorie intake was found to have an insignificant association with rural areas.
Conclusions: The present study revealed that around one fifth of adults had hypertension. The prevalence of hypertension was significantly higher in urban areas than in rural areas.

Keywords: Among adults, Hypertension, Modifiable, Prevalence, Risk factors

INTRODUCTION

As global population increasing, life expectancy rising, and living standards are improving, causes of death across the world are changing.[1] The behavioral and biological risk factors, with a predisposition to the development of NCDs, are use of tobacco and alcohol, physical inactivity, overweight and obesity, increased fat and sodium intake, low fruit and vegetable intake, raised blood pressure (BP), blood glucose and cholesterol levels (WHO, 2013).[2]

The four main types of NCDs are cardiovascular diseases (like heart attacks, stroke and hypertension), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) and diabetes.[3] These diseases are a major threat to global health. Out of the 56.9 million global deaths in 2016, 40.5 million deaths (71%) were due to NCDs. The burden of these diseases is rising disproportionately among lower income countries and populations.[4]

HT is called a "silent killer". Majority of people with hypertension are unaware of the problem because it may have no warning signs or symptoms. Elevated blood pressure (hypertension) is a serious medical condition that significantly increases the risks of coronary heart diseases (CHD) and stroke.[5]

In 2015, an estimated 1.13 billion people worldwide have hypertension, most (two-thirds) living in low- and middle-income countries. 1 out of 4 men and 1 out of 5 women had hypertension. Less than 1 in 5 people with hypertension have the problem under control. Hypertension is a major cause of premature death worldwide.[6] It is estimated that the prevalence of HT ranges from 20-40% in urban adults and 12-17% among rural adults. The number of people with hypertension is projected to increase from 118 million in 2000 to 214 million in 2025, with nearly equal numbers of men and women. The actual burden of Hypertension in urban and rural India is often under estimated. Most of the cases go undetected and the patient's untreated leading to complications.[7]

Sadly, a large number of the affected individuals are not aware of their hypertensive status. While it is important to receive treatment for HT, it is also important to receive treatment that is effective.[8] According to the Registrar General of India, the prevalence of HT in urban and rural populations of India is 25.0% and 10.0%, respectively. Hypertension is directly responsible for 42.0% of CHD deaths and 57.0% of all stroke deaths in India.[9]

Large numbers of the affected individuals are not aware of their hypertensive status. It is also important to receive treatment that is effective. Our study is focused to find this unaware case of hypertension and gaps.

Hence, this research is therefore planned with the aim of assessing the prevalence hypertension and associated risk factors among adults in the practice area of rural and urban area of Jhalawar Medical College, Jhalawar.

Objectives

This study was conducted with the objectives to assess the prevalence of hypertension among adults of field practice areas of Jhalawar Medical College, Jhalawar and to find out any association of hypertension with modifiable risk factors (anthropometric measurements, physical activities and life style habits.

METHODS

The present observational cross-sectional study was conducted on adults of rural and urban dwellers of field practice area of Jhalawar Medical College, Jhalawar.

The study was initiated after obtaining ethical approval from institutional ethical committee in July 2019 to June 2020.

Sample size

The sample size for the study was calculated based on reference study done by Singh et al Rewa city; Madhya Pradesh showed a 21.3% prevalence of hypertension among the study population.[10] Using the formula $n=3.84pq/l^2$, the sample size was calculated to be 1418.

Selection criteria

Study participants were included in the study that was in the age group of 18-60 years, of the selected village/ward, who had given consent for inclusion in the study. Adult of selected village/ward if, was not present on the day of study. Those who declined to participate did not give written consent, pregnant women and were <18 or >60 years of age were not included in the study.

Data collection

Study participants were selected by a Stratified Random Sampling method by sampling by lottery method at the time and day of study. A pre-tested, semi-structured questionnaire was used for data collection that was build based on literature review and was reviewed and validated by 5 arbitrators and modified accordingly. The questionnaire has 2 parts: part I- questions about the participants' socio-demographic characteristics such as name, age, gender, education, occupation etc. Part II- questions regarding risk factors for hypertension like- physical activity was asked and Physical examination parameters like height, weight and blood pressure were recorded by investigator. The blood pressure measurements were recorded by mercury sphygmomanometer. The mercury sphygmomanometer was calibrated daily.

Informed consent

We explained our purpose of study to all individual participants in local language and then written and informed consent was obtained from each participant for being included in the study before starting interview

Measurements of study[11]

Blood pressure

Participant from each selected house was suggested to sit in the room and the procedure of blood pressure measurement, height and weight measurement were explained to allay anxiety and fear. After taking rest for at least 10 minutes, blood pressure was measured. Three readings were made at a minimal interval of 3 minutes. Mean value of last two readings were used for subsequent analysis.

Normal: SBP<140 and DBP<90 elevated: SBP 140-159 and/or DBP 90-99, raised: SBP≥160 and/or DBP≥100.

Height

Height of each adult was measured by measuring tape. Height was measured without shoes. The adult stood upright. Nearest one cm. reading was considered for measurement.

Weight

Weight was measured without shoes to nearest 0.1 kg using portable digital weight machine previously calibrated. Weight measured in their regular cloths. The subject was made to stand straight on the weighing machine.

BMI

It is defined as weight (kg) divided by square of height (m). Classification of overweight and obesity was done according to WHO recommendations. The classification is as follows: normal BMI (18.5-24.9) kg/m^2, grade 1 overweight BMI (25.0-29.9) kg/m^2, grade 2 overweight BMI (30.0-39.9) kg/m^2, grade 3 overweight BMI>40 kg/m^2.

Waist-hip ratio

Waist and hip circumference were measured, to the nearest centimeter by using non stretchable measuring tape. Waist was measured at the level of the midpoint between inferior margin of last rib and the upper margin of the iliac crest at the mid-axillary plane with the subject standing. The measure was taken over light clothing. In subjects with pendulous abdomen the true circumference was estimated by inclining the tape downwards anterior to the umbilicus. Hip circumference was measured in the standing position; the maximum circumference in the horizontal plane was measured over the buttocks. Waist hip ratio (WHR) was measured as an indicator of central obesity. WHR, defined as waist circumference (cm) divided by hip circumference (cm). WHR of greater than 0.95 for men and greater than 0.85 for women were considered abnormal.

Physical activity[12]

Physical inactivity

Very little activity, and infrequent use of muscles e.g. bed rest.

Lack of physical activity

Insufficient physical activity, light, short-lived or infrequent activity.

Moderate physical activity

Walking briskly (5.6 km per hour), climbing, gardening and dancing, walking short distances, bicycling (less than 16 km/hour), Weight training (a general light workout), yogasanas, playing with children.

Vigorous physical activity

Running/jogging (8 km per hour), bicycling (more than 16 km per hour), swimming, brisk walking (7 km per hour), weight lifting (vigorous effort) and competitive sports, digging & cutting wood.

Data analysis

All data was entered in MS-Excel: 2007. Data were analyzed via SPSS 23.0 (Trail version) and the Chi square statistical test was used in the data analysis. P value less than 0.05 were considered significant.

RESULTS

This community-based cross-sectional study was conducted at field practice area, of Jhalawar Medical College, Jhalawar. An equal number (709) of study participants were selected from both the field practice areas.

Table 1: Association of area of residence with hypertension.

Area of residence	Hypertension		Total	χ^2	P value
	Yes	No			
Rural	79	630	709		
	11.1%	88.9%	100.0%		
Urban	185	524	709		
	26.1%	73.9%	100.0%	52.297	<0.0001*
Total	264	1154	1418		
	18.6%	81.4%	100.0%		

The above table shows the prevalence of hypertension to be 26.1% in urban area and 11.1% in rural area. Overall prevalence of hypertension found was 18.6%. Hypertension prevalence in the urban area was more when compared with the rural area, which was found to be statistically significant (chi square 52.297 and p<0.0001).

As shown from Table 2 proportion of hypertension was more, 23.1% in lack of physical activity participants followed by 10.0% and 8.0% in moderate physical activity and Vigorous Physical Activity participants respectively in rural area. This was statistically significant. (Chi square =21.059; p value <0.00007).

In urban area, proportion of hypertension was 27.5% in moderate physical activity participants followed by 24.9% and 21.1% in lack of physical activity and vigorous physical activity participants. This difference was statistically insignificant (chi square =1.602; p value <0.449).

Table 2: Association of type of physical activity with hypertension in rural and urban area.

Area of residence	Type of physical activity	Hypertension						Chi square	P value
		Yes		No		Total			
		N	%	N	%	N	%		
Rural	Lack of physical activity	27	23.1	94	76.9	117	100.0	18.979	<0.00007*
	Moderate physical activity	25	10.0	225	90.0	250	100.0		
	Vigorous physical activity	27	8.0	311	92.0	338	100.0		
	Total	79	11.1	630	88.9	709	100.0		
Urban	Lack of physical activity	48	24.9	145	75.1	193	100.0	1.602	0.449
	Moderate physical activity	121	27.5	319	72.5	440	100.0		
	Vigorous physical activity	16	21.1	60	78.9	76	100.0		
	Total	185	26.1	524	73.9	709	100.0		

Table 3: Association of body mass index (BMI) and waist hip ratio with hypertension in rural and urban area.

Variables			Hypertension						Chi square	P value
			Yes		No		Total			
			N	%	N	%	N	%		
Body mass index	Rural	Under weight	5	2.3	211	97.7	216	100	37.045	<0.0001*
		Normal	52	12.9	350	87.1	402	100		
		Grade I overweight	17	21.8	61	78.2	78	100		
		Grade II overweight	5	38.5	8	61.5	13	100		
		Grade III overweight	0	0.0	0	0.0	0	0.0		
		Total	79	11.1	630	88.9	709	100		
	Urban	Under weight	8	7.6	97	92.4	105	100	57.272	<0.0001*
		Normal	93	23.5	303	76.5	396	100		
		Grade I overweight	52	34.2	100	65.8	152	100		
		Grade II overweight	28	53.8	24	46.2	52	100		
		Grade III overweight	4	100.0	0	0.0	4	100		
		Total	185	26.1	524	73.9	709	100		
Waist hip ratio	Rural	Normal	49	9.0	495	91.0	544	100	10.763	0.001*
		Raised	30	18.2	135	81.8	165	100		
		Total	79	11.2	630	74.8	709	100		
	Urban	Normal	88	19.1	372	80.9	460	100	32.926	<0.0001*
		Raised	97	39.0	152	61.0	249	100		
		Total	185	26.1	524	73.9	709	100		

Table 3 depicted that in rural area highest proportion of hypertension 38.5% was observed among participants who were having BMI- grade II overweight followed by 21.8, 12.9, 2.3 and 0.0 in grade I overweight, normal BMI, underweight and grade III overweight participants respectively. In urban area highest proportion 100% was observed among participants who were having BMI-grade III overweight followed by 53.8%, 34.2%, 23.5% and 7.6% in grade II overweight, grade I overweight, normal BMI and underweight participants respectively. A statistically significant difference was observed in prevalence of hypertension with BMI in both rural area (chi square =37.045; p value =0.0001) and urban area (chi square =57.272; p value <0.0001).

In rural area highest proportion of hypertension 18.2% was observed among participants who have raised waist hip ratio as compared to those who have normal waist hip ratio (9%), also in urban area highest prevalence 39.0% was observed among participants who have raised waist hip ratio as compared to those who have normal waist hip ratio (19.1%). A statistically significant difference was observed in prevalence of hypertension with waist hip ratio in both rural area (chi square =10.763; p value =0.001) and urban area (chi square =32.926; p value <0.0001).

Table 4 depicted that proportion of hypertension to be found more among the subjects who use any kind of tobacco product in both rural 18.2% and urban area 32.6%. The association of proportion of hypertension with use of any kind of tobacco product was found statistically significant in both rural area (chi square =6.584; p value =0.010) and urban area (chi square =5.193; p value =0.022).

Table 4: Association of use any kind of tobacco product and alcohol consume with hypertension in rural and urban area.

Variables			Hypertension						Chi square	P value
			Yes		No		Total			
			N	%	N	%	N	%		
Use any kind of tobacco product	Rural	Yes	43	18.2	248	81.8	291	100.0	6.584	0.010*
		No	36	8.6	382	91.4	418	100.0		
		Total	79	11.1	630	88.9	709	100.0		
	Urban	Yes	58	32.6	120	67.4	178	100.0	5.193	0.022*
		No	127	23.9	404	76.1	531	100.0		
		Total	185	26.1	524	73.9	709	100.0		
Consume alcohol	Rural	Yes	6	7.8	71	92.2	77	100.0	0.979	0.322
		No	73	11.6	559	88.4	632	100.0		
		Total	79	11.1	630	88.9	709	100.0		
	Urban	Yes	12	25.0	36	75.0	48	100.0	0.032	0.858
		No	173	26.2	488	73.8	661	100.0		
		Total	185	26.1	524	73.9	709	100.0		

The proportion of hypertension was found to be 7.8% and 25.0% among the subjects who consume alcohol in rural and urban area respectively. The association of proportion of hypertension with alcohol consumption was found statistically insignificant in both rural area (chi square =0.979; p value =0.322) and urban area (chi square =0.032; p value =0.858).

DISCUSSION

Present study depicted prevalence of hypertension to be 11.1% in rural area and 26.1% in urban area. Overall prevalence of hypertension was found to be 18.6%. Hypertension prevalence in the urban area was more when compared with the rural area, which was found to be statistically significant (chi square 52.297 and p<0.0001).

Overall prevalence of hypertension observed in present study (18.6%) was comparable to the rates obtained by Mohan et al 20%, Singh et al 21.3%, and Ismail et al 21.0%.[9,10,13] High prevalence to present study were obtained by Raghupathy et al 29.8%, Ramakrishnan et al 30.7% and Singh et al 32.9%.[14-16] However study by Kishore et al 14.1%, Singh et al 10.36% and Hariharan et al 10.7% obtained low prevalence than present study.[17-19]

The prevalence of hypertension was found to be 11.1% in rural area which was comparable to study by Ghosh 10.6%, Singh et al 10.36%.[19,20] A Higher prevalence to the present study, was reported in studies by Marinayakanakoppalu et al 25.0%, Ismail et al 18.3%.[7,9]

The prevalence of hypertension was found to be 26.1% in urban area in present study was comparable to study by Raja 26.2%, Raghupathy et al 29.8%.[14,21] High prevalence to present study was reported in study by Singh et al 32.9%, and Raghupathy et al 33.8%.[14,16] However study by Ismail et al 23.7%, Wang et al 22.7% reported low prevalence in urban area than present study.[9,22]

In our study proportion of hypertension was 22.3% in lack of physical activity participants followed by 10.0% and 8.0% in moderate physical activity and vigorous physical activity participants in rural area. This was statistically significant. Similar to present study Shrivastava et al and Ismail et al observed that hypertension was higher among the participant who have lack of physical activity.[9,23] However other study by Sharma et al observed no association of hypertension with physical activity.[24]

In urban area, proportion of hypertension was 27.5% in moderate physical activity participants followed by 24.9% and 21.1% in lack of physical activity and vigorous physical activity participants. This association was statistically insignificant. Mandal et al found similar result to our study, while Saju et al found that prevalence was lower among persons who did regular vigorous intensity exercise versus those who did moderate intensity exercise.[8,25] Higher proportion of hypertension in our study could be due to participants who were having hypertension start doing physical activity.

In present study it was depicted that in rural area highest proportion of hypertension 38.5% was observed among participants who were having BMI- grade II overweight followed by 21.8%, 12.9%, and 2.3% in grade I overweight, normal BMI and underweight participants respectively. In urban area highest proportion 100% was observed among participants who were having BMI-grade III overweight followed by 53.8%, 34.2%, 23.5% and 7.6% in grade II overweight, grade I overweight, normal BMI and underweight participants respectively. As the BMI increased, risk of getting hypertension also

increased. A statistically significant difference was observed in prevalence of hypertension with BMI in both rural and urban area. Similar to present study other studies by Mohan et al, Singh et al, Ismail et al, Raja and Rush et al also found that hypertension significantly associated with BMI.[9,10,13,21,26]

Present study shown that in rural area highest proportion of hypertension 18.2% was observed among participants who have raised waist hip ratio as compared to those who have normal waist hip ratio (9%), also in urban area highest prevalence 39.0% was observed among participants who have raised waist hip ratio as compared to those who have normal waist hip ratio (19.1%). A statistically significant difference was observed in prevalence of hypertension with waist hip ratio both in rural and urban area. Similar to present study, other studies by Mohan et al, Singh et al, Ismail et al and Wang et al also observed that prevalence of hypertension statistically associated significantly with waist hip ratio.[9,10,13,22]

In present study proportion of hypertension found to be more among the subjects who use any kind of tobacco product in both rural 18.2% and urban area 32.6%. The association of proportion of hypertension with use of any kind of tobacco product was found statistically significant in both rural and urban area. Similar to our study, other studies by Mandal et al, Singh et al, Shrivastava et al., and Saju et al were also found a significant association of hypertension with use of tobacco product (smoking).[8,10,23,25]

Present study depicted that proportion of hypertension was found to be 7.8% and 25.0% among the subjects who consume alcohol in rural and urban area respectively. The association of proportion of hypertension with alcohol consumption was found statistically insignificant in both rural and urban area. Similar to our study, other study by Sharma et al also observed that prevalence of hypertension was not associated with alcohol consumption.[24] In contrast to our study, other study by Ismail et al, Tripathy et al, Marinayakanakoppalu et al, and Ghosh et al found significant association of hypertension with alcohol consumption.[7,9,20,27]

CONCLUSION

Present study revealed overall prevalence of hypertension was 18.6%. Prevalence of hypertension was significantly higher in urban area (26.1%) than rural area (11.1%). Though prevalence of hypertension in rural area is low when compared to urban, it can be observed that it is increasing over time to match the urban rate. In present study association of hypertension with risk factors like tobacco use, BMI and waist hip ratio found to be significant in rural area. While in urban area prevalence of hypertension was found to be statistically significant with tobacco use, and BMI and waist hip ratio.

Recommendations

There is a need to improve the surveillance systems and implementation of community-based screening programs to improve awareness and early detection of hypertension. In rural area main emphasis should be given to reduce body weight, quitting tobacco use and life style modification. In urban area emphasis should be given to interventions like weight management, increased physical activity, and reduction in tobacco and alcohol use are required and recommended by improving the screening; early detection, early treatment and early control of hypertension can reduce the damage to target organs, clinical events and improving the prognosis.

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