

# Role of Dietary Management and Physical Activity in Control of Hypertension in Rural Areas of Punjab-A Cross-sectional Study

Harjot Singh<sup>1\*</sup>, Priyanka Devgun<sup>1</sup>, Manisha Nagpal<sup>1</sup>, Paramjot Bindra<sup>2</sup>, Mansimar Kaur<sup>1</sup>, Amarveer Mehta<sup>3</sup>

<sup>1</sup>Department of Community Medicine, Sri Guru Ram Das Institute of Medical Sciences and Research, Vallah, Punjab, India.

<sup>2</sup>Department of Operations, Sri Guru Ram Das University of Health Sciences, Sri Amritsar, Punjab, India.

<sup>3</sup>Department of Community Medicine, FH Medical College, Satauli, Uttar Pradesh, India.

## Abstract

**Introduction:** As reported by WHO, hypertension is the third ‘killer’ disease, accounting for one in every eight deaths worldwide. Many modifiable and non-modifiable risk factors are found to be associated with the disease.

The present study aims to determine the role of dietary management and physical activity in the control of hypertension in a given population.

**Material and Methods:** A cross-sectional study was conducted that. Study included all hypertensive patients (290) from the field practice area of a tertiary care institute. A self-constructed, pretested questionnaire was used to enquire about the socio-demographic factors and other risk factors associated with hypertension. The data was analyzed using SPSS 23 and valid conclusions were drawn by using the chi-square test.

**Results:** Out of 290 patients, 204 (70.3%) were females and 86 (29.7%) were males. Univariate analysis identified decreased salt intake, decreased fatty food consumption, physical activity, stress management, and spiritual help as highly significant factors affecting hypertension. On multivariate analysis, physical activity, stress management and spiritual help were found to be significant.

**Conclusion:** The study showed that physical activity, stress management and spiritual help were significantly associated with hypertension control among the elderly. Measures should be taken to create awareness about lifestyle modifications in the control of hypertension.

**Keywords:** Humans, Male, Female, Aged, Cross-Sectional Studies, Sodium Chloride, Dietary, Life Style, Hypertension, Surveys and Questionnaires, Demography, World Health Organization.

## INTRODUCTION

Approximately 63% of total deaths in India are due to non-communicable diseases, raised blood pressure is among the most important risk factors for cardiovascular diseases (CVDs). Moreover, poor compliance and follow-up remain a poorly controlled disorder due to lack of awareness.<sup>[1]</sup> Hypertension is a “silent killer”; a chronic medical condition characterized by rise in systolic and diastolic blood pressure to more than 140/90 mm of Hg.<sup>[2]</sup> The condition is on the rise in developing countries like India due to epidemiological, nutritional, demographic, socio-economic and lifestyle transitions.

This iceberg nature of the disease makes the early diagnosis difficult, so regular and periodic screening is essential before resulting in various cardiovascular and other complications. Therefore, hypertension is usually diagnosed with complications, particularly in developing countries where there is low health-seeking behavior for a general checkup.<sup>[3]</sup>

**Address for correspondence:** Harjot Singh,

Department of Community Medicine, Sri Guru Ram Das Institute of Medical Sciences and Research, Vallah, Punjab, India  
E-mail: drharjotbirgi@gmail.com

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Various factors, including gene-gene, gene-environment, and environment-environment interactions, cause hypertension.<sup>[4]</sup> Some are modifiable, while others are non-modifiable. Modifiable risk factors for hypertension are obesity, excessive salt intake, intake of saturated fats, high-calorie intake, low consumption of fruits and vegetables, alcohol consumption, physical inactivity, sustained stress and social determinants like globalization of unhealthy lifestyles, urbanization, economic condition, social status etc. Non-modifiable risk factors include age, sex and genetic factors.<sup>[5]</sup> The nonpharmacological approach to control hypertension (HT) includes lifestyle change using nutritional and exercise interventions.<sup>[6]</sup>

## AIMS AND OBJECTIVES

### Aim

To determine role of dietary management and physical activity in control of hypertension

### Objectives

- To study role of dietary management in control of hypertension
- To study role of physical activity in control of hypertension.

## MATERIAL AND METHODS

The study was done in the Rural Health and Training Centre (RHTC) attached to Department of Community Medicine, Sri Guru Ram Das Institute of Medical Sciences and Research, Amritsar. RHTC comprises 11 villages where home-based comprehensive health care is provided. It covered total population of 25,771 as per the last received quarterly report of RHC.

**Study Design:** A cross-sectional study.

**Selection of Study Population:** Total of 315 cases of hypertension were registered in records being maintained at Rural Health Centre, Mallunangal. Subsequently, the residential address of these patients was taken from the family folders being maintained at Rural Health Centre. House-to-house visits were made to homes of these cases of hypertension for the purpose of study. During home visits, if any patient was not found, he/she was contacted again at his/her home by paying the next visit. A total of 290 hypertensive cases were enrolled for the study and the remaining 25 cases were excluded.

### Inclusion Criteria

- All the known and registered cases of hypertension.
- Those who were available and willing to participate.

**Exclusion criteria:** Pregnant females and not willing to participate

**Method of Data Collection:** The information was collected from patients using a structured and pretested proforma. Informed consent was taken and confidentiality was maintained. General information regarding socio-demographic characteristics was also recorded. Socioeconomic status was estimated according to the Udai Pareek scale.<sup>[7]</sup>

Blood pressure was recorded from the subject's right arm in sitting position using a digital sphygmomanometer. Two measurements on each study participant were taken 30 minutes apart. The systolic blood pressure was taken to be the pressure at which the first korotkoff sound was heard and the diastolic blood pressure was the pressure at which the fourth korotkoff sound was just barely audible. The blood pressure of more than 140/90 mm of Hg for up to 60 years of age and more than 150/90 mm of hg for 60 years and above were taken as uncontrolled hypertension and less than that will be taken as controlled cases of hypertension.<sup>[8]</sup>

Body weight was measured with the subjects standing motionless on the analog type of adult weighing machine, feet about 15 cm apart and weight equally distributed on each leg. Subjects were instructed to wear minimum outerwear and no footwear while weight was measured in kilograms and rounded off to 500 gm. Height was measured in centimeters with the subjects in an erect position against a vertical surface and with the head positioned so that top of the external auditory meatus levels with inferior margin of the bony orbit using roll-up measuring tape.

Obesity was measured by calculating body mass index (BMI) (In kg/m<sup>2</sup>)

$$\text{BMI} = \frac{\text{Weight in Kilogram (Kg)}}{\text{Height in meter square (m)}^2}$$

Classification of study subjects on the basis of BMI as per WHO guidelines were done as follows:<sup>[9]</sup>

### Classification BMI

- Underweight <18.50
- Normal range 18.50–24.99
- Overweight: ≥ 25.00
- Pre-obese 25.00–29.99
- Obese class I 30.00–34.99
- Obese class II 35.00–39.99
- Obese class III ≥40.00

Physical activity: Individuals was graded into 3 groups

- Heavy activity group: Farmers who worked actively in the field and laborers both men and women.
- Medium activity group: Shopkeepers, skilled workers, land owners and women doing household work.
- Light activity group: Retired men and women leading a sedentary life, professionals like doctors, traders, and office staff.
- Others

### Data Analysis

The data was compiled and statistically analyzed using the Statistical package for social sciences (SPSS Software 23.0 version) IBM Chicago and valid conclusions drawn. Chi square test was used to find the association between modifiable risk factors and status of hypertension.

## RESULTS

### Uday Pareekh Scale was used to Assess the Socio-economic Status

Table 1 shows that out of 290 participants, 155 (53.4%) study subjects were above the age of 60 years. This shows that the number of hypertensive patients increased with age. In all, 204 (70.3%) were females and 86 (29.7%) were males. About 139 (47.9%) of hypertensives belonged to general category, 76 (26.2%) belonged to the scheduled caste and 75 (25.9%) belonged to the scheduled tribe or other backward class. Going by their religion, 277 (95.52%) were Sikhs followed by 13 (4.48%) who belonged to other religions, including Hindu, Muslim and Christian. The maximum no. of hypertensives 181 (62.4%) were illiterate, followed by 60 (20.7%) up to primary level, 41 (14.1%) up to middle education and 8 (2.8%) were in high school and above. The majority of patients 151 (52.1%) belonged to lower middle class, 78 (26.9%) to lower class and 58 (20%) to middle class and 3 (1.0%) belonged to upper middle class.

### Multiple Answers Given

Table 2 shows various other methods for control of hypertension. Out of 290 participants, 240 participants made efforts to control hypertension. Out of 240, 235 subjects (97.9%) had controlled hypertension by reducing salt intake in diet. Whereas 212 (88.3%) had decreased their fatty food intake by consuming less of street food from outside, 125 (52.1%) started doing physical activity for control, 18 (7.5%)

**Table 1:** Distribution of participants according to their socio-demographic features

Parameters		Number (N=290)	Percentage (%)
Age	<40 years	13	4.5
	40–60 years	122	42.1
	>60 years	155	53.4
Sex	Male	86	29.7
	Female	204	70.3
Caste	Scheduled caste	76	26.2
	ST/OBC	75	25.9
	General	139	47.9
Religion	Sikh	277	95.5
	Others	13	4.5
Educational status	Illiterate	181	62.4
	Up to primary level	60	20.7
	Middle Education	41	14.1
	High school and above	8	2.8
*Uday Pareekh scale was used to assess the socioeconomic status	Upper middle class	3	1.0
	Middle class	58	20.0
	Lower middle class	151	52.1
	Lower class	78	26.9

**Table 2:** Distribution of participants according to measures taken to control hypertension other than anti-hypertensive medication<sup>#</sup>

Measures taken to control BP	Total (n=240)	%age
Decreased salt intake	235	97.9
Physical exercises/yoga	125	52.1
Decreased alcohol consumption	18	7.5
Stress management by taking anti-anxiety drugs	154	64.2
Decreased fatty food	212	88.3
Spiritual help	52	21.7
Consumption of salads & fruits	17	7.1

#Multiple answers given

males decreased alcohol consumption, 52 (21.7%) sought spiritual help to control their hypertension and 17 (7.1%) added salads and fruits to their daily food intake. Decreased smoking was excluded due no response by patients.

The Table 3 shows that subjects who are normal or underweight 116, 62 (55.2%) had controlled hypertension, whereas 52 (44.8%) had uncontrolled hypertension. Out of 174 obese patients, 59 (34.5%) had controlled hypertension while 115 (65.5%) had uncontrolled hypertension. So odds of study subjects having controlled hypertension were 2.3 times higher among those who were normal or underweight in comparison to obese subjects. The difference was statistically significant (OR=2.338, 95% CI=1.5-3.9, p<0.001). Table illustrates the distribution of hypertensive patients according to relation between status of hypertension with efforts made for controlling hypertension. Among 240 patients who made efforts, 120 had controlled hypertension and 120 who had uncontrolled hypertension. In 50 patients who made no efforts, 4 had controlled hypertension in comparison to 46 who had uncontrolled hypertension. So the patients who made efforts are eleven times more likely to have controlled hypertension. The difference was statistically significant (OR=11.500, 95% CI=4.014-32.947, p<0.001). This table depicts the distribution of hypertensives according to the relation between status of hypertension with requisite physical activity. Out of 290, only 125 patients performed physical activity out of which 66 patients performed requisite physical activity (more than 30 minutes/day), 51 (77.3%) had controlled hypertension and 15 (22.7%) had uncontrolled hypertension. Among 22 patients who performed physical activity for less than 30 minutes/day, 5(22.7%) had controlled hypertension and 17 (77.3%) had uncontrolled hypertension. However, 37 patients who performed physical activity but not for fixed time, 22 (59.5%) had controlled hypertension and 15 (40.5%) had uncontrolled hypertension. So the patients who performed requisite physical activity (more than 30 minutes/day) were more likely to have controlled hypertension. The difference was statistically significant ( $\chi^2=21.117$ , df = 2, p<0.001).

Table 4 illustrates that on univariate analysis, decreased salt intake, decreased fatty food consumption, physical

**Table 3:** Distribution of participants according to the relation of the status of hypertension with modifiable risk factors

Modifiable risk factors	Status of hypertension				Statistical values		
	Controlled no. % age		Uncontrolled no. % age		X <sup>2</sup>	Df	p-value
<b>Nutritional Status</b>							
Normal/ Underweight	62	51.6	52	31.3	12.173	1	<0.001 (s)
Obese	59	48.4	115	68.7			
Total	124	100.0	166	100.0			
<b>Efforts Made</b>							
Yes	120	96.8	120	72.3	29.823	1	<0.001 (s)
No	4	3.2	46	27.7			
Total	124	100.0	166	100.0			
<b>Requisite Physical Activity</b>							
Yes	51	65.4	15	31.9	21.117	2	<0.001 (s)
No	5	6.4	17	36.2			
Not fixed time	22	28.2	15	31.9			
Total	78	100.0	166	100.0			

activity, stress management, and spiritual help were identified as highly significant factors affecting hypertension. But on multivariate analysis, physical activity, stress management and spiritual help were significant.

## DISCUSSION

The present study is a cross-sectional study conducted in the rural field practice area (RHC, Mallunangal) of the Department of Community Medicine (located at distance of 30 km) Sri Guru Ram Das Institute of Medical Sciences and research, Amritsar. There are 11 villages (total population 25,771) with home-based comprehensive health care. All the known hypertensive patients (290) are included (based on last quarterly report of RHC, Mallunangal). As per records obtained from register of RHC, Mallunangal, the demographic profile of selected respondents comprised of 53.4% of subjects belonging to age group above the age of 60 years and there were higher number of females 70.3% as compared to males 29.7%. Study showed that about 139 (47.9%) of hypertensives belong to the general category, 76 (26.2%) belong to the scheduled caste and 75 (25.9%) belong to the scheduled tribe or other backward class. About 95.52% of hypertensives belonged to Sikhs religion, the maximum no. of hypertensives i.e. 62.4% were illiterate. The majority of patients 52.1% belonged to lower middle class, 78 (26.9%) to lower class and 58 (20%) to middle class and 3 (1.0%) belonged to upper middle class. Similar results were observed in study by others except slight variation which may be due to change in study area.<sup>[10-12]</sup> However, 240 (82.8%) are making effort to control blood pressure out of which 97.9% control hypertension by reducing salt intake, 88.3% by decreasing fatty food intake, 52.1% by physical activity, 7.5% males by decreasing alcohol intake, 21.7% sought spiritual help to control their hypertension and 7.1% by adding salads and fruits to their daily food intake. Decreased smoking is

excluded as there were no responses. Similar observations were made in Nigeria.<sup>[13]</sup> As the worldwide prevalence of hypertension continues to increase, the primary prevention of hypertension has become an important global public health initiative. Physical activity is commonly recommended as an important lifestyle modification that may aid in the prevention of hypertension.<sup>[14]</sup> The patients who perform requisite physical activity (more than 30 minutes/day) are more likely to have controlled hypertension. The difference is statistically significant (X<sup>2</sup>=21.117, df = 2, p<0.001). Similar results were observed in other studies.<sup>[15,16]</sup> Among the total hypertensive patients, 174 (60%) were categorized as overweight, followed by 109 (37.6%) who were categorized as normal and only 7 (2.4%) were categorized as underweight. Anxiety, stress and environmental factors play a vital role in inducing hypertension. A study conducted in Bihar reported that among hypertensives, overweight and obese were 56.14%.<sup>[17]</sup> The significant percentage of overweight (60%) itself was a predisposing factor for hypertension. Also, subjects with normal BMI status could be exposed to triglycerides or fat-rich diet, making them susceptible to hypertension. The mechanisms leading to hypertension in obese persons are not completely known. Landsberg emphasized the primacy of eating behavior in the determination of obesity, metabolic abnormalities and the subsequent increase in BP and suggests that obesity is linked with hypertension through the sympathoadrenal system.<sup>[18]</sup>

On univariate analysis, factors significantly affecting hypertension included decreased salt intake, decrease fatty food consumption, physical activity, stress management, spiritual help and regular medication. On multivariate analysis, only physical activity, stress management and spiritual help were associated significantly and decreased salt intake, decrease fatty food consumption were not significant. However, it was observed that the amount of salt intake

**Table 4:** Multivariate regression showing relation of hypertension status with practices regarding control of hypertension

Practices regarding control of hypertension	Status of hypertension		Crude OR (95%CI)	p-value	Adjusted OR (95%CI)	p-value
	Controlled	Uncontrolled				
Decreased Salt Intake						
Yes	119	116	10.259	0.000(sig.)	0.561 (0.128-2.457)	0.443
No	5	50	(3.951-26.638)			
Decreased Fatty Food Consumption						
Yes	115	97	9.089	0.000 (sig.)	1.683 (0.498-5.684)	0.402
No	9	69	(4.314-19.152)			
Physical activity						
Yes	87	38	7.920	0.000 (sig.)	2.842 (1.288-6.272)	0.010 (s)
No	37	128	(4.670-13.433)			
Stress Management (Pharmacological)						
Yes	91	63	4.508	0.000 (s)	2.160 (1.012-4.613)	0.047 (s)
No	33	103	(2.716-7.484)			
Spiritual Help						
Yes	36	17	3.586	0.000 (S)	2.945 (1.122-7.729)	0.028 (s)
No	88	149	(1.902-6.760)			

and saturated fats in the diet was exceedingly higher than the recommended daily intake. It is observed that even on substantial deduction of salt and saturated fats in diet, the quantity remains higher than their daily intake, making them susceptible to uncontrolled hypertension parameters. In 2010 a survey conducted in Uttarakhand province which showed that on logistic regression analysis, BMI, age and stress were independent predictors of hypertension in males and BMI and age were independent predictors of hypertension in females.<sup>[19]</sup> Similar results were seen in the Lucknow district.<sup>[12]</sup>

## CONCLUSION

The study showed that physical activity, stress management and spiritual help were significantly associated with hypertension control among the elderly. Measures should be taken to create awareness about lifestyle modifications in the control of hypertension.

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## CONFLICT OF INTEREST

Nil

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