



## COMPARING PHYSICAL ACTIVITY LEVELS AND HYPERTENSION RATES AMONG URBAN AND RURAL ADULTS IN THE BANGALORE METROPOLITAN AREA

### General Medicine

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### ABSTRACT

**Introduction:** The WHO as termed Hypertension as the SILENT KILLER. Most people with hypertension are unaware of the problem because it may have no warning signs or symptoms. For this reason, it is essential that blood pressure is measured regularly. When symptoms do occur, they can include early morning headaches, nosebleeds, irregular heart rhythms, vision changes, and buzzing in the ears. Severe hypertension can cause fatigue, nausea, vomiting, confusion, anxiety, chest pain, and muscle tremors. Hypertension rarely causes symptoms in the early stages and many people go undiagnosed. Those who are diagnosed may not have access to treatment and may not be able to successfully control their illness over the long term. **Objective:** To estimate the Prevalence of Hypertension and to describe the risk factor associated with Physical activity among adults of the Rural and Urban field practice area of RajaRajeswari Medical College and Hospital (RRMCH), Bangalore. **Method:** A Cross Sectional study was conducted on 675 Rural subjects (18 years and above) and 500 Urban subjects (18 years and above) during January 2019 to June 2020 through multistage sampling method. The participants were interviewed using a pretested structured standard questionnaire to obtain data on Demographic data, Dietary history, Alcohol consumption, Tobacco consumption, past medical history in adults. The data was collected and compiled in MS Excel and analyzed by using SPSS software version 24.0. **Result:** There was a significant association observed between Hypertension and Physical activity in both Rural and Urban study subjects. The prevalence of Hypertension was more in the low physical activity, in both Rural (51.7%) and Urban(71%) study subjects. **Conclusion:** In the present study, there is significant association between Physical activity with Hypertension among Rural (Chi-square ( $X^2$ ) = 38.7; DF = 2;  $p < 0.05$ ) and Urban study subjects (Chi-square ( $X^2$ ) = 45.7; DF = 2;  $p < 0.05$ ). There is a felt need for more community-based studies in Urban And Rural areas of our country (India) with a view to determine the geographic differences in the prevalence of Hypertension and to create awareness about the risk factors associated with it.

### KEYWORDS

Prevalence studies, Hypertension, Risk factors, Physical Activity factor, Cardiovascular diseases.

### INTRODUCTION

Hypertension has also been reported as the fourth contributor to premature death in developed countries and the seventh in developing countries thus it is clear that Hypertension is an enormous health problem and is one of the biggest health challenges of the 21st century. Hypertension, an iceberg disease could be described as a sleeping snake – which bites when it wakes up<sup>1</sup>.

Over the last few decades, traditional societies in many developing countries have experienced rapid and unplanned urbanization, which has led to lifestyles characterized by unhealthy nutrition, reduced physical activity, tobacco consumption, alcohol consumption. These unhealthy lifestyles are associated with as risk factors for chronic diseases such as Hypertension, Diabetes mellitus, Dyslipidemia and Obesity<sup>2</sup>.

### MATERIALS AND METHOD

#### Study Design and Study Setting

A Cross sectional study was conducted in Rural and Urban field practice area of Rajarajeswari Medical College and Hospital (RRMCH), Bangalore from January 2019 to June 2020. The Rural population under RRMCH, is about 8282 and total number houses are 2101. The Urban area, included layouts of Rajarajeswari Nagar, Municipal Ward Number 160, Bruhat Bengaluru Mahanagara Palike (BBMP). The total population is about 7745 people with about 5291 people who are aged 18 years and above (as per voters list).

#### Participants Of The Study

Considering the study done by Ismail I.M<sup>3</sup>, May 2016 the Prevalence of Hypertension in Urban is 23% and the prevalence in Rural is 18% was considered for this study to calculate the sample size. The sample size is calculated with an Allowable Error of 18%.

This study was conducted, based on the formula ( $n = 4PQ/L^2$ ), Where:  $n$  = required sample size,  $L$ =allowable error,  $P$ =prevalence. Furthermore, giving due allowance to non-response of 20%,

### SAMPLING METHOD

Estimating the difference between two population proportion with specified absolute Precision



Sample size (n = 1175)

675 in Rural area and 500 in Urban area



Using Probability Proportional to size of sample sizes for each area were calculated



Systematic Random sampling was used to choose the household in the respective areas.

In case \* houses were locked then the very next houses were considered.

The estimated sample obtained was 500 for Urban subjects and 675 for Rural subjects. Total subjects are 1175. All the 25 villages in the Rural area and 10 areas under urban ward number 160 were selected utilizing population proportional to size (PPS) sampling method. In the villages and wards, households and Individuals were selected by simple random sampling.

#### Tools and Technique

In this study the instruments used included the Physical instruments (Mercury Sphygmomanometer, Stethoscope, Weighing machine (accurate to 0.5 kilogram), Measuring tape) and a Questionnaire. Socio demographic data and risk factors (Alcohol consumption, Tobacco

consumption, Diet history, Family history of diseases, Obesity) of Hypertension were assessed by interviewing the subjects with the help of a pre designed and pre texted Performa<sup>4</sup>.

**Operational Definition Of Hypertension**

JNC-7: Hypertension: is defined when Systolic Blood Pressure ≥140 mm Hg or Diastolic Blood Pressure ≥ 90 mm Hg. The study subjects were classified as Pre- Hypertensive, Stage-1 Hypertension, Stage-2 Hypertension based on the Joint National Committee -7criteria<sup>5</sup>.

**Physical Activity<sup>6</sup>**

Physical activity was assessed based on the Occupation of subjects, and Leisure time activity was not considered.

**Met:** Metabolic equivalent is the ratio of persons working metabolic rate relative to the resting metabolic rate. One MET is defined as the cost of sitting quietly, and is equivalent to a calorific consumption of 1 kcal/kg/hour. Applying MET values to type of activity enables one to calculate total physical activity.

**Sedentary Activity:** Activities that involve little or no physical activity at all are called the sedentary activities. Like cashier, receptionist, software engineers, long distance drivers.

**Moderate Intensity Physical Activity At Work:** Any activity which takes moderate physical effort and makes a person breathe somewhat harder than the normal. Like cleaning, Washing (beating and brushing carpets, wringing clothes ,Gardening, Milking cows, Planting and harvesting crops , Digging dry soil, Weaving, Woodwork , Mixing cement, Labouring, Tending animals.

**Moderate Intensity Physical Activity At Leisure Time:** Any activity which takes moderate physical effort and makes a person breathe somewhat harder than the normal. Like Cycling, Jogging, Dancing, Horse-riding, Tai chi, Yoga, Pilates, Low-impact aerobics, Cricket.

**Vigorous Intensity Physical Activity At Work:** Any activity which takes hard physical effort and makes a person breathe Much harder than the normal. Like Forestry, Sawing hardwood, Ploughing, Cutting crops, Gardening, Grindin , Labouring, Loading furniture, Instructing spinning, Instructing sports aerobics, Cycle rickshaw driving.

**Vigorous Intensity Physical Activity At Leisure Time:** Any activity which takes hard physical effort and makes a person breathe much harder than the normal. Like Soccer, Rugby, Tennis, High-impact aerobics, Aqua aerobics, Ballet dancing, fast swimming.

**Categorisation Of Physical Activity**

For calculating physical activity in terms of a categorical indicator, the total time spent during the week, number of days and the intensity of the physical activity were taking into account and the following three levels of physical activity was signified

High physical activity: Any person fulfilling at least one of the following criteria;

- Vigorous intensity activity on at least three days achieving a minimum of 1500MET minutes a week.
- A combination of walking, moderate to high physical activity on seven or more days accounting to minimum of 3000MET minutes per week.

Moderate physical activity: individual fulfilling at least one of the following criteria;

- Three or more days of vigorous intensity activity for at least 20 minutes a day.
- Five or more days of moderate intensity activity or walking for 30 minutes a day.
- Five or more days of combination of walking, moderate or vigorous intensity activity achieving a minimum of 600MET minutes a week.
- Low physical activity: an individual who does not meet any of the above two categories high and moderate fall under this category.

**Inclusion and Exclusion Criteria**

All adults, 18 years and above in Urban and Rural areas of RRMCH, of who were permanent residents and also residents staying for more than 6 months were considered. Pregnant women, persons less than 18 years and those not interested in the study were Excluded.

**Ethical Approval Was Taken.**

**Statistical Analysis**

All the data collected was compiled and entered in Microsoft Excel worksheet and analyzed using the Microsoft Excel worksheet and SPSS (Statistical Package for Social Sciences) software v.24.0. Descriptive statistics and tests of Significance like Chi-square test were used as required. To find the risk factors, Odd's Ratio was used to find out the association of various risk factors with Hypertension.

**RESULTS**

In this study, Out of the total 1175 study subjects, from Rural there are 675 study subjects and from Urban there are 500 study subjects respectively. Majority of the study population belong to the age group 29-39 Years with 44.9% in Rural area and 51.6% in Urban area. The married study subjects in the Rural area were 89% and in Urban area were 84% respectively. There were 85% Hindus in Rural and 76.6% in Urban area, followed with 11.1% Muslims in Rural and 16.4% in Urban area. Majority of the study subjects were part of the Nuclear family, 41.5% in Rural and 61.2% in Urban area. This is due to the migration of people from Rural to Urban in search of job.

In Rural and Urban, most common age group is 18-31 years (Rural 28.1%, Urban 29.4%); followed by 32-45 years (Rural 39% , Urban 46% ). In the age group 18-31 years , female subjects were higher in both Rural (39.3%) and Urban (32.4%) areas.

The prevalence of Hypertension was more in the low physical activity, in both Rural (51.7%) and Urban (71%) study subjects.

In Rural areas, those who have moderate physical activity have the ODDs of 0.11 times more likely to be Hypertensive than those indulged in High physical activity and the difference is statistically significant. (p=<0.0001).

Similarly In Urban areas, those who have moderate physical activity have the ODDs of 0.03 times more likely to be Hypertensive than those indulged in High physical activity and the difference is statistically significant. (p=<0.0001).

In Rural areas, those who have low physical activity have the ODDs of 0.14 times more likely to be Hypertensive than those indulged in High physical activity and the difference is statistically significant. ( p = < 0.0001).

Similarly In Urban areas, those who have low physical activity have the ODDs of 0.07 times more likely to be Hypertensive than those indulged in High physical activity and the difference is statistically significant. (p= 0.0001).

**Table 1. Distribution Of Study Subjects According To Socio-demographic Characteristics In Rural And Urban Areas**

SOCIO-DEMOGRAPHIC CHARACTERISTICS OF STUDY POPULATION			
Characteristics	RURAL (n=675) (%)	URBAN (n=500) (%)	TOTAL N=1175 (%)
<b>SEX</b>			
Male	441(65.3%)	318(63.6%)	759(64.6%)
Female	234(34.7%)	182(36.4%)	416(35.4%)
<b>MARITUS STATUS</b>			
Married	601(89%)	423(84%)	1024(87.15%)
Unmarried	40(6%)	45(9%)	85(7.23%)
Others*	34(5%)	32(6%)	66(5.62%)
<b>RELIGION</b>			
Hindu	574(85%)	383(76.6%)	957(81.4%)
Muslim	75(11.1%)	82(16.4%)	157(13.4%)
Christian	26(3.9%)	35(7%)	61(5.2%)
<b>TYPE OF FAMILY</b>			
Nuclear	280(41.5%)	306(61.2%)	586(49.9%)
Joint	190(28.1%)	119(23.8%)	309(26.3%)
Three Generation	197(29.2%)	69(13.8%)	266(22.6%)
Others*	8(1.2%)	6(1.2%)	14(1.2%)
<b>TYPE OF HOUSE</b>			
Pucca	485(71.9%)	393(78.6%)	878(74.7%)
Semi-Pucca	69(10.2%)	64(12.8%)	133(11.3%)
Kutchra	121(17.9%)	43(8.6%)	164(14%)

\*Include: widowed, separated

Table 1 depicts the Socio Demographic characteristics of the study population and their distribution among Rural and Urban areas respectively.

In the study, out of 1175 subjects, 759(64.6%) are Male subjects and 416(35.4%) are Female subjects.

In the Rural area, the Male subjects are 441(65.3%) and Females subjects are 234(34.7%). In the Urban area, the Male subjects are 318(63.6%) and Female subjects are 182(36.4%).

Majority of the study subjects are Married: 1024(87.15%), while Unmarried are 85(7.23%) and Divorced and separated are 66(5.62%). In Rural area, 601(89%) are married and In Urban area, 423(84%) are married.

Hindus were majority 957(81.4%) of the total subjects, followed by Muslims 157(13.4%) and Christians with 61(5.2%).

Most 586(49.9%) of the subjects are living in a Nuclear family. In Rural area, subjects living in a Joint family were 190(28.1%) compared to Urban area, 119 (23.8%) subjects are living in the Joint family. In Rural, 197(29.2%) are living in Three generation family as compared in to the Urban area, with 69(13.8%).

In Urban area, 393(78.6%) of the subjects are having Pucca house compared to 485(71.9%) in Rural area. The overall majority of the people in the study are having a Pucca house 878(74.7%), followed by 133(11.3%) who have semi pucca and 164(14%) have a Kutch house.

**Table 2. Association Of Physical Activity with Hypertension Among Rural And Urban Study Subjects.**

Factor	Rural				Factor	Urban				
	Physical Activity	Hypertension YES (n=143) (%)	NO (n=532) (%)	OR (95% CI)		p value	Physical Activity	Hypertension Yes (n=142) (%)	No(n=358) (%)	Or (95 CI) %
High	21 (14.7%)	12 (2%)	1		High	17 (12%)	3 (1%)	1		
Moderate	48 (33.6%)	235 (44%)	0.11 (0.05 - 0.25)	< 0.0001	Moderate	24 (17%)	132 (37%)	0.03 (0.008 - 0.11)	< 0.0001	
Low	74 (51.7%)	285 (54%)	0.14 (0.06 - 0.31)	< 0.0001	Low	101 (71%)	223 (62%)	0.07 (0.02 - 0.27)	0.001	

Table 2, shows association of Hypertension with physical activity among Rural and Urban study subjects. The prevalence of Hypertension was more in the low physical activity, in both Rural (51.7%) and Urban(71%) study subjects. There was a Significant association observed between Hypertension and Physical activity in both Rural and Urban study subjects.

**DISCUSSION**

Association Between Physical Activity And Hypertension

**Physical Activity**

The Regular physical activity using large muscle groups, such as walking, running, or swimming, produces cardiovascular adaptations that increase exercise capacity, endurance, and skeletal muscle strength<sup>1</sup>.

Habitual physical activity also prevents the development of coronary artery disease (CAD) and reduces symptoms in patients with established cardiovascular disease. There is also evidence that exercise reduces the risk of other chronic diseases, including type 2 Diabetes<sup>8</sup>, Osteoporosis<sup>9</sup>, Obesity<sup>10</sup>, Depression<sup>11</sup>, and Cancer of the Breast<sup>12</sup> and Colon.

United States National Institute of health defines physical activity as

“bodily movement produced by skeletal muscles that requires energy expenditure and exercise as a planned, structured, and repetitive bodily movements done to improve or maintain one or more components of physical fitness”.

Gupra R, concluded in his study that CVDs, both CHD and Stroke, are the most important causes of Mortality and Morbidity in Indian women. These are driven by changing lifestyles, low physical activity, high calorie intake and high fat diet.

Physical inactivity denotes a level of activity less than that needed to maintain good health<sup>13</sup>.

Midha T<sup>14</sup>, et al, concluded in a study on the prevalence and determinants of Hypertension in Lucknow district, Uttar Pradesh. The study inferred that the people who were physically inactive were at the increased risk of developing Hypertension.

In the present study, there is significant association between Physical activity with Hypertension among Rural (Chi-square (X<sup>2</sup>) = 38.7; DF = 2; p = < 0.05) and Urban study subjects (Chi-square (X<sup>2</sup>) = 45.7; DF = 2; p = < 0.05).

Out of 143 Hypertensives, The prevalence of Hypertension was more in the low physical activity, in both Rural (51.7%) and Urban (71%) study subjects.

In the present study more than half of the hypertensive study subjects did not have any physical activity. Physical activity was quantified in order of type of exercise (moderate intensity and vigorous intensity and low intensity), frequency of exercise and duration of exercise more than 30 minutes a day.

Physical exercise<sup>15</sup> causes release of nitric oxide from the endothelial cells of the blood vessels which causes Vasodilation and reduces peripheral vascular resistance. Those who exercise on regular bases have lower resting heart rates and they are able to consume greater volume of oxygen in turn lowering their systolic BP. Regular physical activity reduces the systolic BP by 4mmHg to 9mmHg

Robert H F<sup>16</sup>, et al, in their study of meta-analysis of randomised controlled intervention trial and a description of studies in which different training regimens were compared, concluded that training from 3 to 5 times per week during 30 to 60 minutes per session at and intensity of about 40% to 50% of net maximum exercise performance appears to be effective with regard to BP reduction.

In another study by Pengcheng Hui<sup>17</sup>, et al, showed that both high and moderate levels of recreational physical activities were associated with decreased risk of hypertension.

Midha T<sup>18</sup>, et al, concluded in their study that physically inactive persons were at higher risk of developing hypertension as compare to persons who had regular physical activity.

Gupta R<sup>19</sup>, et al, in their study showed that physical inactivity was a risk factor for the development of hypertension.

A study done by Jajoo UN<sup>20</sup>, et al, in rural area of Sewagram, Maharashtra found that moderate and light physical activity among the study population had a higher risk of having hypertension, that is 1.5 times in males and 1.7 times in females compare to the subjects were engaged in heavy physical activity.

**CONCLUSION**

In the present study, there is significant association between Physical activity with Hypertension among Rural (Chi-square (X<sup>2</sup>) = 38.7; DF = 2; p = < 0.05) and Urban study subjects (Chi-square (X<sup>2</sup>) = 45.7; DF = 2; p = < 0.05).

Various factors has contributed to this rising trend, attributable to several indicators of economic progress such as increase life expectancy, urbanization and its attendant lifestyle changes including increasing salt intake and the overall epidemiological transition India is experiencing currently. The increased awareness and detection of the disease has contributed immensely for this trend. There are significant health and economic gains attached to early detection, adequate treatment and good control of hypertension.

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