

## Prevalence of Hypertension, and Dietary Correlation with Blood Pressure in the Islamic Community of the District Murshidabad and Adjoining Areas

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### Abstract

The present study was undertaken to evaluate the current trend in hypertension and its prevalence and awareness within the people of Murshidabad district of West Bengal. Multistage cross-sectional survey was carried out in adults aged between 18 to 67 living in the district. Structured interview schedule was used to interview 2114 study subjects. The study showed mean systolic and diastolic BP were 129.99 ( $\pm$  15.95) mmHg and 81.50 ( $\pm$  9.47) mmHg, respectively. The overall prevalence of hypertension was 33.54% and the sex-specific prevalence was 36.25% and 26.38% for males and females respectively. Higher age group subjects specifically males were at high risk. Only 192 (27.08%) of 709 hypertensive subjects were aware of hypertension and was taking medicine and out of which only 79 (41.15%) subjects had BP under control. So from the study it can be concluded that prevalence of prehypertension was very high in the study subjects (50.78%) and around one-third of the subjects were hypertensive. The treatment and control of high blood pressure were also very low.

**Keywords:** Hypertension; Prevalence of HTN; Murshidabad; BMI.

### Introduction

Hypertension or high blood pressure is the major risk factor for public health because of its prevalence worldwide [1,8,16,19]. Around 7.5 million deaths or 12.8% of the total of all annual deaths worldwide occur due to high blood pressure [1,5]. Hypertension is a major risk factor for chronic heart disease, stroke, and coronary heart disease. Elevated Blood pressure is also associated with heart failure, peripheral vascular disease, renal impairment, retinal haemorrhage, and visual impairment.

The prevalence of Hypertension is increasing at an alarming rate throughout the globe [8] and particularly the countries with low and middle income, like India, are at higher risk [1]. Several studies in India suggest an increasing trend in its prevalence [11,13,14,21]. However, the data on

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trends of blood pressure distribution, hypertension prevalence, and awareness is scarce, fragmentary and heterogeneous. Particularly the data from the eastern region is poor [28]. These data are important in formulating key public health policies by the government, and non-government agencies. For Murshidabad condition is even worse the only data which is available on hypertension (HTN) is



the National Family Health Survey – 4, Ministry of Health and Family Welfare, Government of India [4]. The data is showing an overall reduction in the prevalence of hypertension from 2012-13 to 2015-16 from a total of 23.8% (age 18 years and above) to 5.2% (age 15-49 years) [3,4]. The recent trend of rapid urbanization, sedentary life, dietary changes, and change in sleeping habit is acting to increase the risk of HTN throughout India and the Globe. To assess the actual situation regarding prevalence and awareness of HTN prevailing in this area we conducted multistage crosssectional surveys from 2013 to 2018. These surveys enabled us to estimate the true nature of blood pressure prevalence and its management in this population over this time period.

## Materials and Methods

### *Study Area*

Murshidabad is a district in the state of West Bengal, India. According to the 2011 Census it has a total population of 7,103,807. Out of this total population 3,627,564 is male and 3,476,243 is female and most of them (5,703,115) lives in rural area only 1,400,692 live in urban area [2].

### *Study Design and sample size*

A multistage cross-sectional survey was carried out in the age group between 18 to 67 living in the selected area using a simple random sampling method. The minimum sample size calculated was 385 at 95% confidence level with permissible error as 5% and taking the most probable prevalence of hypertension as 50%. Considering the multistage nature of the study and to improve the accuracy 2114 individuals were surveyed.

### *Sampling methodology*

Multistage sampling was used, at first out of 26 blocks of the district 5 blocks were selected using simple random sampling. Camps were set at each block and eligible candidates were selected randomly for the study. Individuals were then interviewed with prior consent using a structured interview schedule.

### *Selection of study subjects*

Individuals of age group 18-67 were selected for the study, individuals suffering from serious physical or mental illness, pregnant women were excluded from the study.

### *Tools used in the study*

Pretested structured interview schedule, OMRON digital body weight scale and KRUPS mechanical weighing scale for weight measurement, portable stature meter for height measurement, anthropometric tapes and for B.P. measurement OMRON digital (model no HEM 4030 two in number) and Dr. Morepen Aneroid blood pressure monitors were used.

### *Blood Pressure and Anthropometric Measurements*

For Blood Pressure and Anthropometric Measurements, established methods were used.

### *Statistical Analysis*

The data collected through the survey was initially entered into Microsoft Excel and analysed using IBM SPSS version 20.

### *Definitions Used*

For Hypertension, Prehypertension, Isolated systolic/diastolic hypertension the classification of 7th report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7) was followed. And for BMI and WHR, classification of WHO was followed.

Hypertension is defined as systolic BP level of  $\geq 140$  mmHg and/or diastolic BP level of  $\geq 90$  mmHg or being previously diagnosed as hypertensive by any health professional.

Prehypertension is defined as 120-139 mmHg of systolic and/or 80-89 mmHg of diastolic BP.

The condition of systolic BP  $\geq 140$  mmHg and diastolic BP  $< 90$  mmHg is defined as Isolated systolic hypertension and systolic blood pressure  $< 140$  mmHg and diastolic blood pressure  $\geq 90$  mmHg as Isolated diastolic hypertension.

Awareness of Hypertension was defined as history of diagnosis of hypertension by a healthcare provider. And BP under control was defined as blood pressure  $< 140$  and  $< 90$  mmHg in subjects who were taking medications.

BMI  $< 18.5$  was classified as "underweight"; 18.50-24.99 as "normal";  $\geq 25.00$  as "overweight"; 25.0-29.99 as "pre-obese" and  $\geq 30.00$ , as "obese".

Abdominal Obesity was defined as WHR  $> 0.90$  in case of male and WHR  $> 0.85$  in case of female.

**Results**

Out of 2114 persons interviewed during the survey, 1534 (72.56%) were male and 580 (27.44%) were female. The number of female participants was low because most refused to undergo the anthropometric measurements. The overall (including both male and female) median age ( $\pm$  SD) of the study subjects was 29 ( $\pm$  12.57), for males it was 27 ( $\pm$  12.78) and for females, it was 33 ( $\pm$  11.77). More than half (55.82%) of the study subjects were married. On the obesity parameter (BMI), only 3.74% were obese 25.73% were overweight, a significant proportion (10.22%) were underweight, rest were normal. The mean BMI for male and female were respectively 22.79 ( $\pm$  3.37) and 24.13 ( $\pm$  4.10). According to abdominal obesity as measured by the waist-hip ratio (WHR) 48.06% (34.53%, 13.53% for male and female respectively) were at risk (Table 1).

*Abdominal Obesity (WHR)*

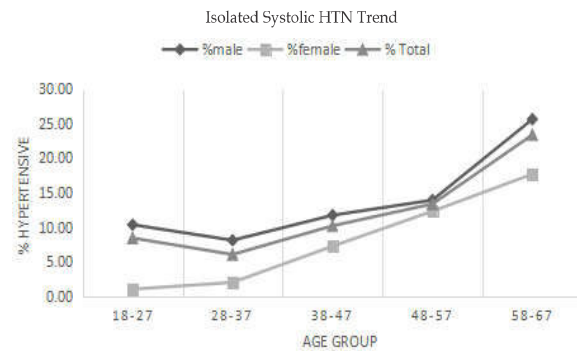
Male (>0.9)	730	34.53
Female (>0.85)	286	13.53
Total	1016	48.06

The mean ( $\pm$  SD) overall systolic and diastolic BP of the study subjects were 129.99 ( $\pm$  15.95) mmHg and 81.50 ( $\pm$  9.47) mmHg, respectively. Male study subjects had higher mean BP than the females in both systolic and diastolic category (131.71  $\pm$  15.02 vs 125.43  $\pm$  17.41 in case of systolic BP and 81.98  $\pm$  9.21 vs 80.22  $\pm$  10.01). In case of diastolic BP across the age class, BP shows an increase in trend with the increase in age in both male and female. In case of men, highest mean BP (both systolic and diastolic) were among the eldest group (57-67) while in females the highest mean systolic BP was among eldest two groups and highest diastolic BP was in age group 48-57 (Table 2).

**Table 1:** Background Characteristics of study subjects variables N (2114) Proportions (%).

Age group		
18-27	975	46.12
28-37	460	21.76
38-47	329	15.56
48-57	248	11.73
58-67	102	04.82
<b>Sex</b>		
Male	1534	72.56
Female	580	27.44
Other	0	00.00
<b>Marital Status</b>		
Married	1180	55.82
Unmarried	930	43.99
Other (divorced widow widower etc)	4	00.19
<b>BMI</b>		
Underweight	216	10.22
Normal	1275	60.31
Overweight	544	25.73
Obese	79	03.74

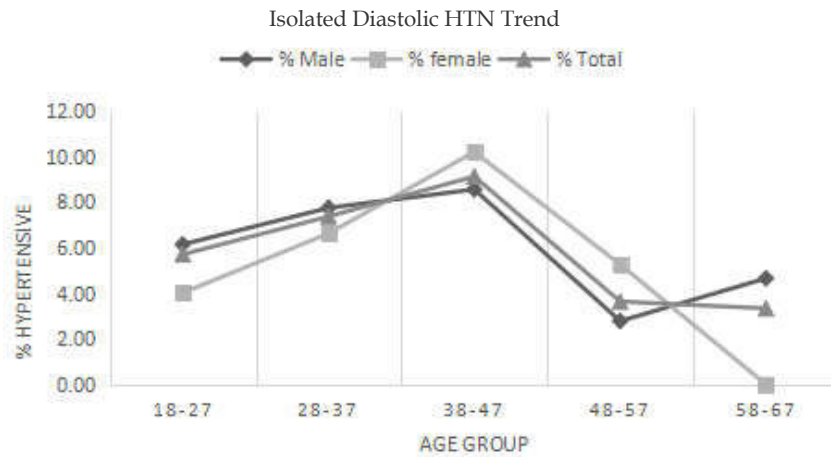
Table 3 depicts the prevalence of isolated systolic and isolated diastolic HTN across age and gender. The prevalence of overall isolated systolic HTN was found to be 9.00% and isolated diastolic HTN 6.35%. Like BP the prevalence of isolated HTN was higher in males than in females. One interesting point about isolated HTN is that highest



**Graph 1:** Trend in Isolated Systolic HTN

**Table 2:** Mean Systolic and Diastolic BP (mmHg) by age and gender

Age groups (years)	N=2115	Systolic BP (mean $\pm$ SD)			Diastolic BP (mean $\pm$ SD)		
		Male	Female	Total	Male	Female	Total
18-27	975	128.97 $\pm$ 13.05	117.73 $\pm$ 11.06	126.66 $\pm$ 13.45	80.30 $\pm$ 08.90	76.80 $\pm$ 08.96	79.58 $\pm$ 09.02
28-37	460	130.47 $\pm$ 12.96	121.68 $\pm$ 14.86	127.47 $\pm$ 14.25	82.73 $\pm$ 08.72	79.96 $\pm$ 09.41	81.78 $\pm$ 09.05
38-47	329	132.62 $\pm$ 14.80	130.88 $\pm$ 17.44	131.98 $\pm$ 15.81	83.87 $\pm$ 08.92	83.74 $\pm$ 10.91	83.82 $\pm$ 09.68
48-57	248	137.27 $\pm$ 17.88	140.27 $\pm$ 19.58	138.23 $\pm$ 18.45	84.39 $\pm$ 09.95	84.23 $\pm$ 09.24	84.34 $\pm$ 09.71
57-67	102	149.31 $\pm$ 19.08	140.79 $\pm$ 26.66	147.30 $\pm$ 21.27	85.40 $\pm$ 09.92	80.46 $\pm$ 11.33	84.24 $\pm$ 10.44
Total	2114	131.71 $\pm$ 15.02	125.54 $\pm$ 17.72	130.02 $\pm$ 16.04	81.98 $\pm$ 9.21	80.25 $\pm$ 10.07	81.50 $\pm$ 09.48
		F = 44.230	F = 41.407	F = 68.403	F = 15.276	F = 13.723	23.675
Significance		df = 4	df = 4	df = 4	df = 4	df = 4	df = 4
		p < 0.001	p < 0.001	p < 0.001	p < 0.001	p < 0.001	p < 0.001



**Graph 2:** Trend in Isolated Diastolic Blood Pressure

prevalence of isolated systolic HTN was found at age class 58-67 whereas this class had one of the lowest prevalence of diastolic HTN. The diastolic HTN was most frequent at age class 38-47 (Graph 1 and 2). The overall prevalence of HTN was 33.54% that is one-third of the population was under the grip of hypertension. The sex-specific prevalence was 36.25% for males and 26.38% for females. The overall prevalence of prehypertension was 52.39%. prevalence of prehypertension in male was 54.36% while in females it was 47.13% (Table 4).

**Table 3:** Prevalence of isolated systolic hypertensive and isolated diastolic hypertensive by age and gender

Age groups N=2114 (years)	Isolated systolic HTN (N = 1922)			Isolated diastolic HTN (N = 1922)			
	Male	Female	Total	Male	Female	Total	
18-27	964	79	02	81	47	08	55
28-37	448	24	03	27	23	10	33
38-47	285	22	07	29	16	10	26
48-57	165	15	07	22	03	03	06
58-67	60	11	03	14	02	00	02
Total	1922	151	22	173	91	31	122

Out of 2114 study subjects interviewed, 192 (27.08%) were aware of hypertension and taking medicine. out of these 192 subjects taking medicine only 79 (41.15%) had their blood pressure under control (Table 5).

**Table 4:** Prevalence of hypertension and prehypertension by gender and age groups among the study subjects (N= 1922); excluding known Hypertensives (those taking medicine).

Category	n	Age groups (years)				
		18-27	28-37	38-47	48-57	58-67
Men	1401	765	297	188	108	43
Normal	217	137	40	27	13	00
Prehypertension	762	431	169	96	50	16
HTN stage 1	338	170	67	53	32	16
HTN stage 2	84	27	21	12	13	11
Women	521	199	151	97	57	17
Normal	181	93	56	24	05	03
Prehypertension	246	90	72	45	31	08
HTN stage 1	67	12	18	23	10	04
HTN stage 2	27	04	05	05	11	02

**Table 5:** awareness of hypertension.

Category	n (individuals with HTN)	No. of individuals taking medicine	% aware of HTN and taking medicine	No. having BP under control after taking medicine	% having BP under control after taking medicine
Male	556	133	23.92	55	41.35
Female	153	59	38.56	24	40.68
Total	709	192	27.08	79	41.15

## Discussion

India, like all other developing countries, is going through a rapid demographic and epidemiological transition and like all other developing countries the prevalence of hypertension is increasing [8, 27]. This increase in prevalence is particularly true in recent years after the introduction of mobile phones and internet [6]. And as to be expected Murshidabad is not an exception, in this study the prevalence of both prehypertension and hypertension was found to be very high which was 52.39% and 33.54% respectively.

The prevalence of hypertension in the present study (33.54%) was in parity with many of the other studies in India [6,10,13, 8,25]. However this prevalence of Hypertension 33.54% (male- 36.25% and female 26.38%) was much higher than it was reported in the National Family Health Survey - 4 Ministry of Health and Family Welfare Government of India ( NFHS-4 2016)[4]. NFHS-4 2016 has used JNC6 criteria and prevalence for stage-1, stage-2 and stage -3 hypertension was 7.4, 0.0, 0.0 respectively for men and 5.0, 1.6, 0.3 respectively for women. The current study followed the JNC-7 criteria, it has only two stages and the prevalence of stage -1 and stage-2 was 24.13% and 6.00% respectively for men and 12.86% and 5.18% respectively for women. This huge difference may be due inclusion of younger subjects and exclusion of elderly in the NFHS -4 2016 study (age 15-49 years).

For all stages of hypertension, the sex-specific prevalence was much higher in male than in females. Higher prevalence of hypertension in male was also reported by many of the similar studies [9,22,12]. This may be due to biological difference between two sex or due to behavioural risk factor difference, such as smoking, alcohol consumption, or difference in stress or physical activity.

Hypertension was found to be positively co-related with age irrespective of sex. Change in vascular system with age might be one of many underlying causes of this co-relation [20,26]. A number of studies demonstrated similar findings of an increase in the prevalence of hypertension with the advance in age [7,20,23].

On BMI parameter this study found 25.73% study subjects were overweight and 3.74% were obese. A very high proportion of study subjects (48.06%) had abdominal obesity based on waist hip ratio cut-off 0.9 for male and 0.8 for females. The higher prevalence of Hypertension was may be due to higher prevalence of overweight and obese

study subjects as reported by many of the similar studies [24,15,17].

## Conclusion and Recommendation

The systemic study carried out in the district Murshidabad shows a very high prevalence of both prehypertension and hypertension in this district and thus makes the people of the district vulnerable to hypertension associated chronic diseases. Older age group people were found to be at more risk than the younger generation and specifically, males are at higher risk of being hypertensive than females. Initiatives are needed to improve the surveillance systems for the proper assessment of the disease burden and to develop key public health policies. For early detection of hypertension, community-based screening campaigns are also recommended.

### *Limitations of the Study*

Among many others, the cross-sectional design was the most important limitation of this study, because it restricts association between cause and effect.

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