

Original Research Article

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## Hypertension prevalence and associated risk factors in elderly people of Northern India

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### ABSTRACT

**Background:** Of the estimated 57 million global deaths in 2008, 36 million (63%) were due to non-communicable diseases (NCDs). In terms of attributable deaths, the leading behavioural and physiological risk factors globally are raised blood pressure (to which 13% of global deaths are attributed), followed by tobacco use (9%), raised blood glucose (6%), physical inactivity (6%) and being overweight or obese (5%). With this background the current study was planned to compare the prevalence and modifiable risk factors of hypertension amongst the rural and urban geriatric population.

**Methods:** The present cross-sectional study included 535 persons aged 60 years or more, belonging to the families residing in the field practice areas of Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly. House to house visits were made for face-to-face interview.

**Results:** The mean age of elderly was  $66.76 \pm 5.92$  years. The proportion of elderly who were apparently healthy was 10.1%. The most frequent morbidity found was hypertension (40%) followed in order by obesity (30.67%), arthritis (26.86%), diabetes (25.72%), gastroesophageal reflux disease (19.43%), chronic obstructive pulmonary disease (14.1%) and irritable bowel syndrome (3.62%). Hypertension was found to be positively associated with increasing age, not being with the spouse (separated, not married or widowed), being businessman, daily consumption of oil and salt, duration of use of tobacco, better socio-economic status, sedentary occupational physical activity and not getting support from the family.

**Conclusions:** Prevalence of hypertension is higher in urban area. Hypertension is associated with age, marital separation, fat and salt consumption, tobacco and sedentary occupation.

**Keywords:** Hypertension, Prevalence, Risk factors, Rural, Urban

### INTRODUCTION

Of the estimated 57 million global deaths in 2008, 36 million (63%) were due to non-communicable diseases (NCDs).<sup>1</sup> Population growth and increased longevity are leading to a rapid increase in the total number of middle-aged and older adults, with a corresponding increase in the number of deaths caused by NCDs. The total number

of annual NCD deaths is projected to reach 55 million by 2030 whereas annual infectious disease deaths are projected to decline over the next 20 years.

Behavioural risk factors are associated with four key metabolic and/or physiological changes raised blood pressure, increased weight leading to obesity, hyperglycaemia and hyperlipidaemia.

Non-communicable diseases share risk factors similar to prolonged exposure to three modifiable lifestyle behaviours smoking, unhealthy diet, and physical inactivity and result in the development of chronic diseases, specifically heart disease, stroke, diabetes, obesity, metabolic syndrome, chronic obstructive pulmonary disease, and some types of cancer.<sup>2,3</sup>

Implementation of lifestyles that favourably affect blood pressure has implications for both prevention and treatment of hypertension. Health-promoting lifestyle modifications are recommended for individuals with prehypertension and as an adjunct to drug therapy in hypertensive individuals. The dietary approaches to stop hypertension (DASH) trial convincingly demonstrated that over an 8-week period a diet high in fruits, vegetables, and low-fat dairy products lowers blood pressure in individuals with high-normal blood pressures or mild hypertension. Reduction of daily salt intake to <6 g (100 mEq) augmented the effect of this diet on blood pressure.<sup>4</sup>

With this background, the current study was planned to compare the prevalence and modifiable risk factors of hypertension amongst the rural and urban geriatric population.

## METHODS

This was a cross-sectional study, conducted over a period of one year, from 1st May 2013 to 30th April 2014. Subjects were included in the study who were aged 60 years or more of either sex, belonging to the families residing in the rural and urban field practice areas of Department of Community Medicine, Shri Ram Murti Smarak Institute of Medical Sciences (SRMS IMS) at Bareilly and willing to participate in the study while those were excluded who were very sick at the time of interview.

Sample size was calculated with an allowable error of 5% based on 18.5% prevalence of hypertension amongst rural north Indian population.<sup>5</sup> 260 elderlies each, were surveyed from both rural as well as urban areas making a total sample size of 520.

Information was collected on general demographic parameters, socio-economic status, lifestyle pattern and morbidities present. The morbidities considered were

obesity, hypertension, diabetes mellitus, arthritis, chronic obstructive pulmonary disease (COPD), gastroesophageal reflux disease (GERD) and irritable bowel syndrome (IBS).<sup>6-14</sup> Presence of morbidity was elicited by self-reporting, supplemented by history, clinical examination and scrutiny of relevant medical records and documents.

The risk factors studied included demographic data like area of residence, age, gender, religion, marital status, educational status, occupation, daily oil consumption (gms), daily salt consumption (gms), combined servings of fruits and vegetables eaten per day, daily energy intake (Kcals), stress measured by Holmes and Rahe scale, independence in daily activities measured by Katz activities of daily living (KADL) scale, Instrumental activities of daily living (IADL), alcohol consumption (AUDIT score), tobacco use, socio-economic status (SLI), occupational physical activity, emotional support, financial support, meet expenses and living arrangements.<sup>15-20</sup>

Data were entered using Microsoft Excel 2010 and statistical analysis was done using IBM SPSS v 20.0.0. Categorical variables were analysed using proportions and percentages. Association between categorical variables was established by Chi square and odds ratio (OR) with 95% confidence intervals (CI) where applicable. Continuous variables were summarized by mean and standard deviation (SD), and association tested by parametric tests.

## RESULTS

The mean age of elderly surveyed was  $66.76 \pm 5.92$  years with a range of 63 years to 96 years.

Table 2 shows socio-demographic characters of the population studied. Proportion of subjects married and living with their spouse was 66.1%. The religion of majority of the study subjects was Hindu. Socio-economic status (SES) was assessed using standard of living index (SLI). Most of the elderly belonged to medium SES (55.6%). The educational status of the studied population is low with 84.6% people having studied upto primary school or below. Occupation of majority of subjects was housewives followed by labourers and dependents.

**Table 1: Distribution of study subjects according to age and gender.**

Age (in years)	Female	Percentage	Male	Percentage	Total	Percentage
<b>60-70</b>	229	83.6	212	84.5	441	84.0
<b>71-80</b>	35	12.8	35	13.9	70	13.3
<b>81+</b>	10	3.6	4	1.6	14	2.7
<b>Total</b>	274	100.0	251	100.0	525	100.0

**Table 2: Distribution of study subjects according to socio-demographic characters (n=5252).**

Socio-demographic characters		Frequency	Percentage
Marital status	Currently married	347	66.1
	Never married	1	0.2
	Separated	5	1.0
	Widowed	172	32.8
Religion	Hindu	404	77.0
	Muslim	121	23.0
SES (SLI)	Low	65	12.4
	Medium	292	55.6
	High	168	32.0
Education	No formal schooling	168	32.0
	Below primary	160	30.5
	Primary	116	22.1
	Middle school	42	8.0
	High school	27	5.1
Occupation	Intermediate	12	2.3
	Retired	7	1.3
	Dependent	97	18.5
	Housewife	174	33.1
	Labourer	133	25.3
	Landless Agri. laborer	64	12.2
	Owner cultivator	15	2.9
	Business	35	6.7

**Table 3: Distribution of study subjects according to morbidities present.**

Morbidity*	Frequency	Percentage
Obesity	161	30.7
Hypertension	210	40.0
Diabetes mellitus	135	25.7
Arthritis	141	26.9
COPD	74	14.1
GERD	102	19.4
IBS	19	3.6
<b>No apparent disease</b>	<b>53</b>	<b>10.1</b>

\*Multiple responses.

**Table 4: Logistic regression analysis of 525 elderlies residing in rural and urban areas for hypertension.**

Variables	B	ODD's ratio	95% C.I. for ODD's ratio	
			Lower	Upper
Area	Rural	-	1.00	-
	Urban	0.04	1.04	0.47 1.29
Age (in years)	60-70		1.00	-
	71-80	0.13	1.14	0.53 1.39
	>80	0.18	1.20	0.56 1.45
Gender	Female		1.00	-
	Male	-0.21	0.81	0.37 1.06
Religion	Hindu		1.00	-
	Muslim	0.10	1.11	0.51 1.37
Marital status	Currently married		1.00	-
	Widowed	0.31	1.36	0.64 1.61
	Never married	0.25	1.29	0.61 1.54
	Separated	0.14	1.15	0.54 1.40

Continued.

Variables	B	ODD's ratio	95% C.I. for ODD's ratio	
			Lower	Upper
Educational status	No formal education	1.00	-	-
	Below primary	0.15	1.16	0.53 1.42
	Primary	0.19	1.21	0.55 1.47
	Middle school	-0.04	0.96	0.42 1.20
	High school	-0.05	0.95	0.44 1.20
	Intermediate	-0.12	0.89	0.41 1.12
Occupation	Dependent/retired	-	1.00	- -
	Housewife	0.09	1.09	0.51 1.34
	Labourer	-0.16	0.85	0.39 1.10
	Business	0.25	1.28	0.60 1.53
	Owner cultivator	0.06	1.06	0.47 1.31
	Landless agri laborer	-0.13	0.88	0.38 1.14
Daily oil consumption (gms)	≤10	-	1.00	- -
	10-20	-0.02	0.98	0.43 1.22
	20-30	0.03	1.03	0.46 1.29
	30-40	0.08	1.08	0.50 1.36
	> 40	0.19	1.21	0.57 1.46
Daily salt consumption (gms)	≤5	-	1.00	- -
	5-7	0.06	1.06	0.49 1.33
	7-9	0.07	1.07	0.50 1.32
	9-11	0.15	1.16	0.54 1.41
	>11	0.20	1.22	0.59 1.47
Combined servings of fruits and vegetables eaten per day <sup>15</sup>	< 5	-	1.00	- -
	≥5	-0.20	0.82	0.37 1.07
Daily energy intake (Kcals)	≤1000	-	1.00	- -
	1000-2000	-0.04	0.96	0.44 1.21
	>2000	0.11	1.12	0.54 1.37
Holmes et al	<150	-	1.00	- -
	150-299	0.02	1.02	0.45 1.27
KADL	1-2	-	1.00	- -
	3-4	-0.11	0.90	0.41 1.15
	5-6	-0.18	0.84	0.38 1.09
IADL	1-2	-	1.00	- -
	3-4	0.03	1.03	0.48 1.28
	5-6	-0.02	0.98	0.45 1.23
	≥7	0.08	1.08	0.51 1.35
AUDIT	≤6	-	1.00	- -
	11-15	0.10	1.11	0.52 1.36
Tobacco	Current user	-	1.00	- -
	Past user	-0.06	0.94	0.43 1.19
	Never user	-0.14	0.87	0.40 1.12
Tobacco initiation age	≤10	-	1.00	- -
	11-20	-0.02	0.98	0.47 1.26
	21-30	0.03	1.03	0.51 1.26
	31-40	0.08	1.08	0.52 1.34
	≥40	-0.12	0.89	0.43 1.14
Tobacco use duration	≤10	-	1.00	- -
	11-20	0.04	1.04	0.48 1.31
	21-30	0.10	1.11	0.54 1.34
	31-40	0.15	1.16	0.56 1.39
	≥ 40	0.19	1.21	0.59 1.44
SES (SLI)	Low	-	1.00	- -
	Medium	0.13	1.14	0.53 1.39
	High	0.20	1.22	0.57 1.49

Continued.

Variables	B	ODD's ratio	95% C.I. for ODD's ratio	
			Lower	Upper
Occupational physical activity	Vigorous	-	1.00	-
	Moderate	0.01	1.01	0.47 1.26
	Sedentary	0.12	1.13	0.53 1.38
Emotional support	Yes	-	1.00	-
	No	0.08	1.08	0.53 1.33
Financial support	Yes	-	1.00	-
	No	0.11	1.12	0.52 1.34
Meet expenses	Self earning	-	1.00	-
	Supported by family	0.02	1.02	0.47 1.29
Living arrangement	Alone or with children		1.00	-
	With spouse	-0.04	0.96	0.46 1.23
	With spouse and children	-0.12	0.89	0.44 1.16
	With children and grand children	-0.07	0.93	0.43 1.18
	With spouse, children and grand children	-0.13	0.88	0.40 1.13

IADL: instrumental activity of daily living.

**Table 5: Hosmer and Lemeshow goodness-of-fit test.**

Step	Chi-square	df	Sig.
1	6.702	8	0.569

Table 3 reveals that proportion of elderly who were apparently healthy was 10.1%. The most frequent morbidity found was hypertension (40%) followed in order by obesity (30.67%), arthritis (26.86%), diabetes (25.72%), GERD (19.43%), COPD (14.1%) and IBS (3.62%).

On applying logistic regression hypertension was found to be positively associated with increasing age, not being with the spouse (separated, not married or widowed), being businessman, daily consumption of oil and salt, duration of use of tobacco, better socio-economic status, sedentary occupational physical activity and not getting support from the family while it was negatively associated with male gender, better education, occupations such as labourer, consuming five or more combined servings of fruits and vegetables per day, independence in activities of daily living, not having used tobacco and living with children and/or grandchildren. It was not found associated with area of residence, religion, Holmes et al stress score, instrumental activities of daily living, alcohol use disorders identification test (AUDIT) score, age of initiation of tobacco and how daily expenses are met.

Hosmer and Lemeshow Goodness-of-fit Test showed that the logistic regression model fit well in the situation and on the data. The Cox and Snell R Square value of 0.517 also shows that the regression line fits reasonably well to the data.

## DISCUSSION

The overall mean age was  $66.76 \pm 5.92$  years which was similar to the WHO Multicentric study in elderly.<sup>21</sup>

Of the total population surveyed, 84% were in 60-70 years of age group followed by 13.33% in 71-80 years of age group while the remaining 2.67% were above 80 years of age. The trend was similar to that found in the WHO multicentric study in elderly and study by Khokhar et al.<sup>21,22</sup>

Prevalence of hypertension was found to be 40.0% which was in accordance with the study of Prakash et al Udaipur, who reported it to be 48%. It was higher than reviewed by Anchala et al who reported overall prevalence of hypertension in India, after weighting the regional population size, was 29.8%. This difference in our study was observed due to elderly age group of the study population resulting in higher prevalence of hypertension.<sup>5,23</sup>

On applying logistic regression hypertension was found to be positively associated with increasing age, not being with the spouse (separated, not married or widowed), being businessman, daily consumption of oil and salt, duration of use of tobacco, better socio-economic status, sedentary occupational physical activity and not getting support from the family while it was negatively associated with male gender, better education, occupations such as labourer, consuming five or more combined servings of fruits and vegetables per day, independence in activities of daily living, not having used tobacco and living with children and/or grandchildren. It was not found associated with area of residence, religion, Holmes et al stress score, instrumental activities of daily living, AUDIT score, age of initiation of tobacco and how

daily expenses are met.<sup>16</sup> These observations were in accordance with the results of study done by Peltzer et al, Africa.<sup>23,24</sup>

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**Conflict of interest:** None declared

**Ethical approval:** The study was approved by the Institutional Ethics Committee

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