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Original Article

Community Medicine Section

Burden of Hypertension and Diabetes among Urban Population Aged ≥ 60 years in South Delhi: A Community Based Study

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ABSTRACT

Introduction: India is going through a demographic transition, and the number of elderly is expected to increase both in absolute numbers, as well as in proportion. The elderly are one of the most vulnerable and high–risk group in terms of health status in any society, and more so for non- communicable diseases.

Aims: To estimate the prevalence of diabetes and hypertension among elderly persons and association with socio-demographic variables; & to assess the awareness, treatment and control status of those with diabetes and hypertension.

Materials and Methods: A cross-sectional community based study was carried out in a resettlement colony of South-east Delhi in Dakshinpuri Extension, Dr. Ambedkar Nagar. Elderly persons aged 60 years and above were selected by cluster random sampling. Information about self-reported diseases, socio-demographic variables was collected; fasting blood sugar and blood pressure were measured. Prevalence of diabetes and hypertension were calculated and association was tested by Chi-square test. Multivariate logistic regression analysis was used.

Results: A total of 710 elderly persons participated in the study. Diabetes was seen in 24.0% and 67% were hypertensive. Isolated hypertension was detected in 25.9%. No statistically significant difference by gender (p=0.11), age (p=0.16), education (p=0.31) and economic dependency (p=0.28), was seen in both diabetes and hypertension. Out of 167 persons with diabetes, 62.3% were on treatment and 33.6% were under control; while out of 477 hypertensives, 41% were under treatment and only one-third of them had their blood pressure under control.

Conclusion: This study highlighted a significant burden of non-communicable diseases amongst elderly persons in a low-middle class community in Delhi. It also showed the lack of awareness about their disease conditions and need for screening, diagnostic and treatment services at the primary level.

Keywords: Elderly, Health status, Non- communicable diseases

INTRODUCTION

India has seen a demographic transition in recent years, with an increase in the number of the elderly, both in absolute numbers, as well as in proportionate terms. In 2011, the population of elderly in India was 96 million i.e. 8% of the total population and is projected to increase [1]. The World Health Organization (WHO) projects that over the next 10 years, the largest increase in deaths from cardiovascular disease (CVD), cancer, chronic respiratory diseases and diabetes will occur in developing countries [2].

Non-communicable diseases, including accidents and injuries are responsible for 62% of total DALYs, in comparison to 38% contributed by communicable diseases, maternal and child health and nutrition together [3]. According to Survey on Causes of Deaths (2003-2004) NCDs are leading causes of death in the country, constituting 42% of all deaths [4]. Contrary to popular beliefs, people from the low-socio economic strata of society living in the urban area live in such vulnerable conditions, which are very conducive to life style diseases, are also vulnerable to NCDs. In a multicentric study conducted across ten cities in India in the year 2007 among elderly aged 60 years and above, the prevalence of hypertension was reported to be 38.2% [5]. As part of Chennai Urban Rural Epidemiology Survey (CURES), prevalence of hypertension was studied in the urban Chennai population of age ≥ 20 years. Stratified by age, the prevalence of hypertension among elderly ≥ 60 years was estimated to be 50.8% in men, and 51% in women. The prevalence of isolated systolic hypertension in this age group was 25.2% (21.4% in men, 30.2% in women) [6]. The prevalence of diabetes mellitus in Chandigarh was reported to be 27.1%. There was a higher prevalence of co-morbidities like hypertension, coronary artery disease and cerebrovascular attack among the elderly diabetics [7]. A study by Gupta et al., in Delhi in year 2000 among elderly aged 60 years and above, the prevalence of diabetes mellitus was reported to be 13.0% [8]. The elderly are one of the most vulnerable and high–risk group in terms of health status in any society. Elderly persons living in the resettlement colonies are unique in that they are neither very low in the socio-economic scale, nor are they affluent enough to afford private health care. But due to lifestyle changes, lack of social support and stress they are at high risk for non-communicable diseases which require lifelong medical treatment thereby imposing a great burden on the health system.

AIM

Hence this study was carried out in a resettlement colony of Delhi with the following aims: To estimate the prevalence of diabetes and hypertension among elderly person and its association with socio-demographic variables and to assess the awareness, treatment and control status of those with diabetes and hypertension.

MATERIALS AND METHODS

A community-based study was carried out in Dakshinpuri Extension, Dr. Ambedkar Nagar, a resettlement colony of South Delhi, which is the urban field practice area of Centre for Community Medicine, All India Institute of Medical Sciences since January 2002. This has a population of about 36,000 spread over ten blocks, in which there are approximately 1,500 elderly persons comprising about 4% of the population.

The study population consisted of all persons aged 60 years and above residing in this area for more than 6 months, and willing to participate. Those who were unable to communicate and a reliable

informant was not available were excluded. Sample size was calculated by using the formula $N = 4pq/d^2$. Taking the prevalence of diabetes to be 13% [8], and 25% relative error, design effect of 1.5 and 10% non-response, the sample size was calculated to be 685. A cluster random sampling was done where each block was one cluster. All elderly persons in the randomly selected three blocks were recruited to the study. The information was collected by a trained investigator through house to house visits. If a person was not available after three visits, he/she was labelled as a non-responder. Data collection was carried out from Jan-June 2015. A structured questionnaire was prepared to collect information about socio-demographic variables including economic dependence. A person was considered economically independent if his/her source of personal income or any monetary benefit from a social scheme was perceived to be sufficient to maintain himself/herself. The elderly person was partially dependent if he/she had some personal income or any monetary benefit from a social scheme but that was not perceived to be sufficient to maintain himself/herself. The person was classified as economically dependent if he/she was totally dependent on other family members [9].

Self-reported diabetes and hypertension were those which have been diagnosed by a qualified person and confirmed by documentary proof.

Fasting blood glucose was measured using automated glucometer (Accu-chek glucometer) under strict aseptic precautions. An overnight fast of at least 8 hours was ensured, by asking the participant to note the time of last meal at night preceding the examination, and blood glucose was measured on empty stomach.

Blood pressure measurement was done using digital sphygmomanometer (Omron automatic blood pressure monitor, model HEM-7130) in right upper arm in the sitting position with feet kept firmly on the ground and arm kept at the level of heart. Systolic and diastolic blood pressure of two readings taken at five minutes interval was recorded. Blood pressures shows diurnal variation, so ideally the blood pressure should have been measured at the similar time of the day; however, as the survey was done through house-to house visits blood pressure was measured in different times of the day. Participants were informed a day prior to the visit for collection of fasting blood sample and were explained about the necessary precautions.

Diagnostic Criteria for Clinical Conditions

Hypertension

As per Joint National Committee VII criteria (Joint National Committee in measurement, diagnoses and evaluation of cardiovascular disorders), a systolic blood pressure of ≥140 mm Hg, and / or a diastolic blood pressure of ≥ 90 mm Hg measured on two separate occasions, with a minimum interval of at least five minutes between two measurements; or a self-reported history of taking antihypertensive medications, was defined as hypertension. An average of two readings was calculated for estimating the final blood pressure. Isolated hypertension was defined as systolic blood pressure of ≥140 mmHg [10]. Participants who were already hypertensive and taking treatment were considered to have their blood pressure controlled if their systolic blood pressure is ≤ 140 mm Hg, and/or diastolic blood pressure is ≤ 90 mm Hg.

Diabetes Mellitus

As per WHO-IDF 2005 (World Health Organization-International Diabetes Federation) criteria, diabetes mellitus was defined as fasting plasma glucose of ≥ 126 mg/dl after an overnight fast for at least 8 hours, or a person taking treatment for diabetes mellitus [11]. Participants who were already diabetic and taking treatment were considered to be controlled if the fasting blood glucose was <126 mg/dL.

ETHICS

Ethical clearance from the AIIMS Ethics Committee was obtained. Informed written consent was obtained from all the subjects. Those with medical problems were referred to AIIMS for appropriate management.

STATISTICAL ANALYSIS

Data was entered in MS Excel 2007 and analysed using STATA 11.0. Chi square was used to test the statistical significance of categorical variables. Diabetes and hypertension have multiple risk factors (independent variables) and some factors act synergistically to aggravate the disease conditions. We wanted to find out the effect of independent risk factors on the prevalence of diabetes and hypertension (dependant variables). In order to address the confounding effect of multiple risk factors, multivariate logistic regression analysis was done to measure the association between the dependent variables and independent variables.

RESULTS

A total of 851 elderly persons were approached for the study. Of these, 111 were not available even after three visits, and 30 refused to participate. So, a total of 710 elderly persons were recruited to the study, giving a non-response rate of 17%. Among the study participants, 413 (58.2%) were women more than half (56%) were economically partially independent and 661 (93%) were living with their families [Table/Fig-1].

Socio- economic variables		Number (%) N = 710
Gender	Men	297 (41)
	Women	413 (59)
Age	60 to 64 years	333 (46.9)
	65 to 69 years	178 (25.1)
	70 to 74 years	112 (15.8)
	≥ 75 years	87 (12.3)
Economic Dependence	Independent	59 (8.3)
	Partially dependent	401 (56.4)
	Fully dependent	250 (35.2)
Marital status	Currently married	450 (63.3)
	Single\separated\widowed	260 (36.6)
Living status	Living with family	661 (93.0)
	Living with spouse	42 (5.9)
	Living alone	8 (1.1)
Occupation	Homemaker	371 (52.2)
	Self-employed	105 (14.7)
	Non-Govt. employee	98 (13.8)
	Govt. employee	111 (15.6)
	Others	25 (3.5)
Education	No formal education	414 (58.3)
	Less than primary	56 (7.8)
	Primary school completed	162 (22.3)
	Secondary school completed or above	78 (10.9)

[Table/Fig-1]: Distribution of study participants by Socio- economic variables.

Prevalence of Diabetes Mellitus and Hypertension

Fasting blood sugar could be done for 693 participants. The prevalence of diabetes in this study was found to be 24.1% (n=167). There was no statistically significant difference between those without diabetes when analysed by age, gender, education, occupation and economic dependency [Table/Fig-2].

Blood pressure was measured for all the study participants and it was found that 477(67.2%) elderly persons were hypertensive.

Hypertension was more in women (68.5%) as compared to men (65.3%), but there was no statistically significant difference by gender, age, education and economic dependency [Table/Fig-3]. Multivariate analysis was done to find out the association of hypertension with socio-economic variables; however no statistically significant difference was seen with respect to age, gender, occupation, marital status or living status. Isolated Systolic Hypertension (ISH) was seen in 25.9% of the study participants, but a subgroup analysis on Isolated Systolic Hypertension by age or gender did not show any significant association [Table/Fig-4].

Socio- economic Variables	Diabetes		Chi-square p- value	Odds ratio	
	Present (n= 167)	Absent (n=526)		Unadjusted OR (95% C.I.)	Adjusted OR (95% C.I.)
Age (years)					
60-64	89 (27.6)	233 (72.4)		1.0	1.0
65-69	40 (23.1)	133 (76.9)	0.165	0.79 (0.54, 1.21)	0.89 (0.57, 1.39)
70-74	23 (20.3)	90 (79.7)		0.67 (0.40, 1.12)	0.82 (0.47, 1.45)
≥ 75	15 (17.7)	70 (82. 4)		0.56 (0.31, 1.03)	0.71 (0.36, 1.36)
Gender					
Men	61 (21.0)	229 (79.0)	0.110	1.0	1.0
Women	106 (26.3)	297 (73.7)		0.75 (0.52, 1.07)	0.58 (0.25, 1.37)
Educational Status					
No formal education	95 (23.4)	311 (76.6)	0.379	1.0	1.0
Primary Education	18 (34.0)	35 (66.0)		1.68 (0.91, 3.110	1.94 (1.02, 3.70)
Secondary Education	36 (22.8)	122 (77.2)		0.97 (0.62, 1.50)	0.99 (0.61, 1.64)
Higher secondary and above	18 (23.7)	58 (76.4)		1.02 (0.57, 1.81)	1.10 (0.56, 2.15)
Occupation					
Homemaker	97 (26.6)	268 (73.4)	0.286	1.0	1.0
Self- Employed	18 (17.5)	85 (85.2)		0.59 (0.33, 1.02)	0.78 (0.32, 1.91)
Non-Govt. employee	23 (24.0)	73 (76.0)		0.87 (0.52, 1.47)	1.16 (0.47, 2.88)
Govt. Employee	26 (24.3)	81 (75.7)		0.89 (0.54, 1.46)	1.22 (0.49, 3.01)
Others	3 (13.6)	19 (86.4)		0.44 (0.13, 1.51)	0.54 (0.14, 2.08)
Marital Status					
Single	51 (20.2)	202 (79.8)	0.066	1.0	1.0
Married	116 (26.4)	324 (73.7)		0.71 (0.49, 1.02)	0.63 (0.41, 0.98)
Living Status					
Living alone	1 (16.7)	5 (83.33)	0.705	1.0	1.0
Living with spouse	8 (19.5)	33 (80.5)		1.21 (0.12, 11.87)	0.70 (0.07, 7.35)
Living with family	158 (24.5)	488 (75.5)		1.62 (0.19, 13.96)	1.09 (0.12, 9.88)
Economic Dependency					
Independent	13 (22.8)	44 (77.9)	0.599	1.0	1.0
Partially Dependent	90 (22.0)	303 (77.1)		(0.52, 1.95)	0.92 (0.45, 1.89)
Fully Dependent	64 (26.4)	179 (73.7)		1.21 (0.61, 2.39)	0.92 (0.40, 1.99)

[Table/Fig-2]: Distribution of elderly persons with diabetes by socioeconomic variables

Socio economic Variables	Hypertension		Chi square p- value	OR (95% C.I.)	
	Present (n= 477)	Absent (n=233)		Unadjusted (95% C.I.)	Adjusted (95% C.I.)
Age (years)					
60-64	217 (65.2)	116 (34.8)	0.647	1.0	1.0
65-69	121 (68.0)	57 (32.0)		1.13 (0.77, 1.67)	1.17 (0.78, 1.76)
70-74	77 (68.1)	36 (31.7)		1.14 (0.73, 1.80)	1.11 (0.67, 1.82)
≥75	62 (72.1)	24 (27.9)		1.38 (0.82, 2.33)	1.39 (0.78, 2.46)
Gender					
Men	194 (65.3)	103 (34.7)	0.370	1.0	1.0
Women	283 (68.5)	130 (31.5)		0.87 (0.63, 1.19)	0.98 (0.47, 2.02)
Educational Status					
No formal education	284 (68.6)	130 (31.4)	0.220	1.0	1.0
Primary	31 (55.3)	25 (44.6)		0.57 (0.32, 1.00)	0.65 (0.36, 1.17)
Secondary education	107 (66.1)	55 (34.0)		0.89 (0.61, 1.31)	0.99 (0.64, 1.54)
Senior Secondary and above	55 (70.5)	23 (29.5)		1.09 (0.64, 1.86)	1.23 (0.67, 1.54)
Occupation					
Homemaker	257 (69.3)	114 (30.7)	0.031	1.0	1.0
Self- Employed	63 (59.4)	43 (40.6)		0.65 (0.42, 1.02)	0.62 (0.29, 1.32)
Non-Govt. Employee	68 (69.4)	30 (30.6)		1.01 (0.62, 1.63)	1.00 (0.45, 2.24)
Govt. Employee	78 (70.9)	32 (29.1)		1.08 (0.68, 1.72)	0.97 (0.44, 2.15)
Others	11 (44.0)	14 (56.0)		0.35 (0.15, 0.79)	0.35 (0.13, 0.90)
Marital Status					
Single	183 (70.4)	77 (29.6)	0.167	1.0	1.0
Married	294 (65.3)	156 (34.7)		1.26 (0.91, 1.75)	1.14 (0.77, 1.68)
Living Status					
Living alone	6 (75.0)	2 (25.0)	0.892	1.0	1.0
Living with spouse	28 (66.7)	14 (33.3)		0.67 (0.12, 3.74)	0.78 (0.13, 4.69)
Living with family	443 (67.1)	217 (32.9)		0.6 8 (0.14, 3.40)	0.71 (0.13, 3.73)
Economic Dependency					
Independent	41 (69.4)	18 (30.5)	0.631	1.0	1.0
Partially Dependent	273 (68.2)	127 (31.8)		0.94 (0.52, 1.71)	0.79 (0.42, 1.51)
Fully Dependent	163 (64.9)	88 (35.1)		0.81 (0.44, 1.50)	0.69 (0.35, 1.38)

[Table/Fig-3]: Distribution of elderly persons with Hypertension by socioeconomic variables.

Demographic Variables	Hypertension		Isolated systolic hypertension	
	n	Prevalence (95% CI)	n	Prevalence (95% CI)
Total	710	67.2 (63.7, 70.6)	710	25.9 (22.7, 29.1)
Age (years)				
60-64	333	65.2 (60.0, 70.3)	333	20.4 (16.1, 24.8)
65-69	178	67.9 (61.0, 74.9)	178	28.1 (21.4, 34.8)
70-74	113	68.1 (59.4, 76.9)	113	25.7 (17.5, 33.8)
≥75	86	72.1 (62.4, 81.6)	86	43.0 (32.3, 53.7)
Gender				
Men	413	68.5 (64.0, 73.0)	413	25.9 (21.7, 30.1)
Women	297	65.3 (59.8, 70.8)	297	25.9 (20.9, 30.9)

[Table/Fig-4]: Prevalence of hypertension & Isolated systolic hypertension according to age & gender.

Demographic Variables		Total diabetics	On treatment N (%)	Controlled N (%)
	Total	N= 167	N=104(62.3)	N=35 (33.6)
Gender	Women	106	69 (65.1)	24(34.7)
	Men	61	35 (57.4)	11 (31.4)
Age (years)	60 – 64	89	53 (59.5)	20 (37.7)
	65 – 69	40	30 (75.0)	6 (20.0)
	70 – 74	23	15 (65.2)	7 (46.6)
	75+	15	6 (40)	2 (33.3)

[Table/Fig-5]: Treatment and control status among diabetic persons.

Demographic Variables		Total hypertensives	On treatment N (%)	Controlled N (%)
	Total	N=477	N=197 (41.2)	N=65 (32.9)
Gender	Women	283	138 (48.7)	51(36.9)
	Men	194	59 (30.4)	14 (23.7)
Age (years)	60 – 64	217	93 (42.8)	29 (31.2)
	65 – 69	121	51 (42.1)	20 (39.2)
	70 – 74	77	31 (40.2)	8 (25.8)
	75+	62	22 (35.5)	8 (36.4)

[Table/Fig-6]: Treatment & control status among Hypertensive persons.

Treatment and Outcome in Patients with Hypertension and Diabetes

Out of 167 persons with diabetes, 104 (62.3%) were on treatment and 35 (33.6%) were under control [Table/Fig-5]. Similarly, of the 477 patients detected with hypertension in this study, 197 (41.2%) were under treatment and only one-third of them had their blood pressure under control [Table/Fig-6].

DISCUSSION

This community based study was conducted among 710 elderly persons residing in an urban resettlement colony of Delhi. The overall prevalence of hypertension was 67%, which was higher than the study by Gupta et al., which reported a much lower prevalence (13%) from Delhi [8]. CURES study in urban Chennai also reported a lower prevalence (50.8%) as compared to this study [6]. Another study from an urban slum in Delhi reported a prevalence of 39% among elderly persons [12]. The reasons for these differences could be because of different time period, sample size and study settings. The prevalence of Isolated Hypertension in this study was 25.9%, which was similar to the CURES study which reported a prevalence of 25% [6]. Socio-demographic variables were not found to be statistically significantly associated in the present study, whereas a study by Ghosh et al., and Meshram et al., showed significant association between age and gender [13,14]. There was a gap in the awareness, treatment and control of hypertension in this study.

A study from an urban slum of Delhi reported similar findings, where amongst those detected with hypertension, 28.6% were aware of their condition; while only 60.7% were on treatment. Half (53%) of those on treatment had their blood pressure under control [12].

In this study, 24% of elderly persons had diabetes. This was similar to a study in Chandigarh, which reported the prevalence of diabetes to be 27.1% [7] and 23.7% from urban south India [15] and prevalence varies from 30% in Maharashtra [16] to 16.3% in Trivandrum [17]. A study from a Delhi in similar settings reported the prevalence of impaired fasting blood glucose to be 19.8% (95% CI 16.3–23.7) and was higher among women. In this study, there was no statistically significant difference between those without diabetes when analysed by age, gender, education. Similar findings were also reported from other studies in urban India [18,19]. Studies from other Asian nations such as Thailand and Hong Kong have reported lower prevalence rates of 14% and 15%, respectively [20,21]. Of the diabetics in the study, 62.3% were on treatment, while only one-third were under control. A similar study in Delhi also showed that one-third of the diabetic participants were aware of their condition; two-thirds of these were on treatment and three-fourths of those on treatment had controlled fasting blood sugar level [22] Similarly, the Indian Council of Medical Research-India Diabetes (ICMR-INDIAB) Study conducted in a representative population of three states of India (Tamil Nadu, Maharashtra, and Jharkhand) and one Union Territory (Chandigarh) observed good glycaemic control only in 31.1% of urban subjects [23].

LIMITATIONS

Blood pressures shows diurnal variation, but blood pressure was measured in different times of the day. This may have introduced a measurement bias. The sample size was calculated using a relative error of 25%, which is high for a cross-sectional study. This could have decreased the precision of the study. Comorbidity in diabetes and hypertension is known but in this study we do not have data regarding those participants with co-existing diabetes and hypertension; factors associated with co-existing morbidities may be different which have not been captured in the study.

CONCLUSION

This study highlighted a significant burden of non-communicable diseases amongst elderly persons in a middle class community in Delhi. It also showed the need for services at the primary level. In addition to health system strengthening, there is a need to create awareness about NCDs through strong advocacy measures and also help in improving the health status of the elderly persons.

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