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Research Article

Prevalence of Diabetes and Hypertension among Geriatric Population in a Rural Village of Mysore

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A B S T R A C T

Introduction: Globally, the population is ageing rapidly. Between 2015 and 2050, the proportion of the world's population over 60 years will nearly double. Diabetes and Hypertension are the most important morbidities faced by geriatric population. This study will help us to understand the depth of the problem and thereby help us in framing strategies to prevent future cardiovascular events in the population.

Objectives: To estimate the prevalence of Diabetes and Hypertension and to study the associated factors among Geriatric population of rural Mysore.

Methodology: A cross-sectional study was conducted on a sample of 110 geriatric individuals at Hosakote, a rural field practice area of Mysore Medical College employing systematic random sampling technique. House to house visit was done and data was collected using a pre-tested, semi-structured questionnaire. Height, weight and blood pressure of the subjects were recorded using standard techniques, and body mass index was calculated. The diabetic status was confirmed by treatment records and random blood sugar measurement.

Results: The overall prevalence of Diabetes and Hypertension was 26.4% and 45.5% respectively. Among diabetics, prevalence in males was 16.3% and in females was 10%. Among hypertensives, prevalence in male was 30% and female was 15.4%. The mean and standard deviations of systolic BP was 138.6±21.8 mm hg, Diastolic BP 84±8.2 mm hg, RBS was 161± 86 mg/dl, BMI was 21.8± 3.6, waist hip ratio was 0.92±0.05.

Conclusion: There was a high prevalence of diabetes and hypertension in our geriatric population which entails improved care for the same at the primary level.

Keywords: Blood Pressure, Chronic Diseases, Geriatric, Diabetes, Elderly, Hypertension, Non-communicable Diseases, Retinopathy

Introduction

Globally, the population is ageing rapidly. Between 2015 and 2050, the proportion of the world's population over 60 years will nearly double. In India elderly form 8.6% of the population, this proportion is expected to grow to 11%

in 2025 and 19% in 2050.[1] As the demographic transition occurs it is important to prioritize the health care needs of elderly. World health organization has given the concept of healthy ageing which is the process of developing and maintaining the functional ability that enables well-being in older age. With increasing age, numerous underlying physiological changes occur, and the risk of chronic disease rises. By age 60, the major burdens of disability and death arise from age related losses in hearing, seeing and moving, and non-communicable diseases.[2] At the present stage of India's health transition, chronic diseases contribute to an estimated 53% of deaths and 44% of disability-adjusted life-years lost.[3] More than half of the burden of non-communicable disease occurs in the 45-plus age group in India.[1] As people age, they are more likely to experience multi-morbidity, that is the presence of multiple chronic conditions at the same time.[2] Diabetes and Hypertension are the most common chronic disease in elderly. Indian prevalence of self-reported Diabetes and High Blood Pressure among elderly was 10.1% and 21% respectively.[4] Hypertension stands out as the major risk factor for cardiovascular morbidity and mortality in the elderly population. The risk from hypertension has been demonstrated for stroke, left ventricular hypertrophy, congestive heart failure, coronary and peripheral artery diseases, vision impairment, end-stage renal disease, cognitive impairment, and dementia.[5] Diabetes in the elderly is associated with a large number of comorbidities. Kidneys and eyes are more likely to be affected. Diabetic elderly often suffers from falls and fractures, neuropathy, cognitive decline, drug-related hypoglycemia, visual impairment, etc. Mortality due to cardiovascular causes increases due to greater risk of arteriosclerosis.[6] Studying in detail about these conditions particularly in rural areas where there is a gap of knowledge, will help us to understand the depth of the problem and thereby help us in framing strategies to prevent future cardiovascular events in the population.

This study aims to estimate the prevalence of diabetes and hypertension and associated risk factors among elderly in a rural village of Mysore.

Materials and Methods

Study Area

This study was conducted in a rural area of south Indian city, Mysore during June - October 2017. It is the cultural capital of Karnataka. Hosakote which is in rural Mysore, is the rural field practice area of Mysore Medical College. Hosakote consists of five villages. Residents aged more than 60 years of that particular village for more than 6 months in field practice area were included in the study. Elderly patients who were seriously and acutely ill, those who could not speak, those who were mentally ill and those who did not give consent were not included in the study. The sample size was calculated to be 110 using the standard sample size formula, by using 10.1% as the quoted prevalence, at 5% level of significance and 6% absolute error.[4]

The sample was distributed into 5 villages using probability proportionate to size technique. In Karnataka 7.5% of the population constitutes the geriatric population and hence the sample was distributed as follows:

Table 1.Sample distribution

Hosakote	Total population (20680)	Expected geriatric population	Sample distribution (n=110)
Tumanuralli	4412	331	23
Moodahalli	3608	271	19
Hulimavu	4120	309	22
Hosakote	5480	411	29
Immavu	3060	230	17

Every village was visited and the houses were selected by systematic random sampling. If the selected house was closed/no geriatric individual was present in that house then the next house was approached.

Study Tools

The selected persons were interviewed after taking informed consent. Socio-demographic variables were recorded using pretested semi-structured questionnaire. Random blood sugar was measured using standard Accu-Check glucometer and the reading was noted down. Blood pressure was measured using standard mercury sphygmomanometer, two readings were taken and the average of the two was considered as final. Waist and hip circumference were measured using measuring tape in centimeters. Height was measured using a stadiometer and weight using a digital weighing scale after ensuring standardization. In order to screen for at least one long term complication of diabetes and hypertension, fundoscopic examination of eyes of the diagnosed patients was carried out by a trained Ophthalmologist.

Definition of Outcome Variables

Diabetes: Any subject with an available prescription for the disease from a registered medical practitioner and all the subjects whose measured Random blood sugar was above 200 mg/dl.

Hypertension: Any subject with prescription for the disease from a registered medical practitioner and all the subjects whose Systolic Blood Pressure was more than 140 mm hg or Diastolic Blood Pressure was more than 90 mm hg or both.

Definition of Study Variables

Tobacco Consumption: Past: more than one year back;

Current: current tobacco user and Never: not used ever.

Alcohol Consumption: Past: more than one year back; Current: current alcohol user and Never: not used ever.

Retinopathy

All diabetic and hypertensive subjects who were screened and were declared positive for retinopathy by an ophthalmologist.

Statistical Analysis

It was done using SPSS trial version 20 (SPSS Inc; Chicago, IL, USA). The level of significance was fixed at P<0.05.

Results

A total of 110 geriatric individuals were included in the final analysis. The socio demographic variables among the study population showed that 58% of them were males, Majority were married (63%), half the study population were literate (49%), 90% belonged to Hindu religion, more than half (63.7%) were engaged in semi-skilled/unskilled occupation, Majority of the population belonged to Class III and Class IV socio-economic status and 62% were economically dependent. The overall prevalence of Diabetes and Hypertension was 26.4% and 45.5% respectively (Figure 1 and 2). Among diabetics, prevalence in males was higher as compared to females (16.3% vs 10%). Among hypertensives, prevalence in males was nearly twice as compared to females (30% vs 15%). More than half of the individuals above 80 years of age (55.6%) were diabetic, hypertensive or both (Table 2).

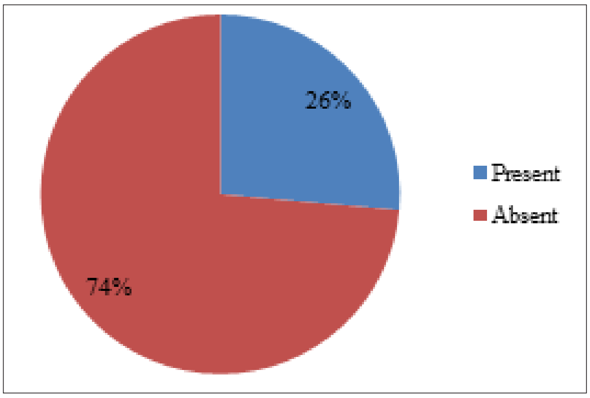

Figure 1.Prevalence of Diabetes in rural geriatric population

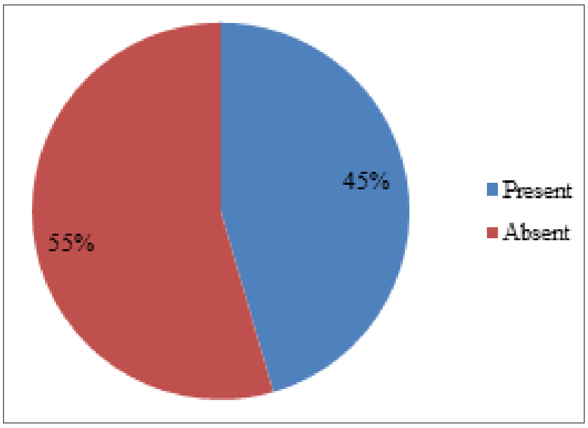

Figure 2.Prevalence of hypertension in rural geriatric population

The factors tobacco and alcohol use were found to be significantly associated with hypertension (P<0.05) (Table 2). The mean and standard deviation of systolic BP was 138.6±21.8 mm hg, Diastolic BP 84±8.2 mm hg, RBS was 161± 86 mg/dl, BMI was 21.8± 3.6, waist hip ratio is 0.92±0.05 (Table 3). The proportion of retinopathy among the diabetics and hypertensive was 37.3%. There was a significant association between the compliance to treatment and presence of retinopathy (P <0.05) and those who were irregular on treatment had 14 times higher odds of having retinopathy (Table 4).

Discussion

In our study we have found that the prevalence of Diabetes is 26.3. A national urban survey by Ramachandra A et al. showed diabetes prevalence of 29.1% in 60-69 years of age and 25.9% in above 69 years age which is similar to our study results.[7] Also prevalence of diabetes in different age groups in Chennai-The Chennai urban rural epidemiology study (CURES) by Mohan V et al. showed almost similar result of 33.6% in 60-69 years of age and 27.2% in above 69 years of age.[8] Another study by Borra S et al. in rural Andhra Pradesh also produced a similar result with 24% prevalence of diabetes in the elderly.[9] However a study done by Radhakrishnan S et al. in Tamilnadu the prevalence of diabetes was 36%.[10] In another study done by Prakash M et al. in rural Maharashtra the prevalence was 40.5%.[11] Both of the above studies had shown a higher prevalence rate compared to our study, which may be attributed to the difference in geographical location.

Table 2.Association of socio-demographic factors with diabetes and hypertension

Characteristics	Diabetes		P value	Hypertension		P value
	Present	Absent		Present	Absent	
Age						
60-69	18 (27.3%)	48 (72.7%)	0.060	27 (41%)	39 (60%)	0.527
70-79	6 (17%)	29 (83%)		18 (51.4%)	17 (48.6%)	
>=80	5 (55.6%)	4 (44.4%)		5 (55.6%)	4 (44.4%)	

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Sex						
Male	18 (28%)	46 (72%)	0.621	33 (51.6%)	31 (48.4%)	0.174
Female	11 (24%)	35 (76%)		17 (37%)	29 (63%)	
Marital Status						
Married	18 (26%)	51 (74%)	0.540	29 (42%)	40 (58%)	0.644
Unmarried	2 (50%)	2 (50%)		2 (50%)	2 (50%)	
Widow	9 (24.3%)	28 (75.7%)		19 (51.4%)	18 (48.6%)	
Education						
Literate	12 (22.6%)	41 (77.4%)	0.393	19 (35.8%)	34 (64.2%)	0.051
Illiterate	17 (29.8%)	40 (70.2%)		31 (54.4%)	26 (45.6%)	
Socioeconomic status						
Class I	2 (25%)	6 (75%)		4 (50%)	4 (50%)	
Class II	6 (24%)	19 (76%)	0.977	9 (36%)	16 (64%)	0.636
Class III	15 (28.3%)	38 (71.7%)		24 (45.3%)	29 (54.7%)	
Class IV	6 (25%)	18 (75%)		13 (54.2%)	11 (45.8%)	
Economic Dependency						
Independent	14 (33.3%)	28 (66.7%)	0.192	19 (45.2%)	23 (54.8%)	0.971
Dependent	15 (22%)	53 (78%)		31 (45.6%)	37 (54.4%)	
Tobacco						
Present	8 (31%)	18 (69%)	0.673	8 (31%)	18 (69%)	0.003
Past	1 (14.3%)	6 (85.7%)		7 (100%)	0 (0.0%)	
Never	20 (26%)	57 (74%)		35 (45.5%)	42 (54.5%)	
Alcohol						
Present	8 (50%)	8 (50%)	0.060	4 (25%)	12 (75%)	0.002
Past	1 (14.3%)	6 (85.7%)		7 (100%)	0 (0.0%)	
Never	20 (23%)	67 (77%)		39 (44.8%)	48 (55.2%)	
BMI						
Undernourished	4 (22.2)	14 (77.8%)	0.622	8 (44.4%)	10 (55.6%)	0.055
Normal	14 (25.5%)	41 (74.5%)		19 (34.5%)	36 (65.5%)	
Pre-obese	6 (40%)	9 (60%)		8 (53.3%)	7 (46.7%)	
Obese	5 (22.7%)	17 (77.3%)		15 (68.2%)	7 (31.8%)	
Waist hip ratio						
Normal	4 (25%)	12 (75%)	0.893	6 (37.5%)	10 (62.5%)	0.489
Abnormal	25 (26.6%)	69 (73.4%)		44 (46.8%)	50 (53.2%)	

Table 3.Mean and standard deviation of variables in the study population

Characteristics	Diabetics mean (SD)	Hypertensives mean (SD)	Total mean (SD)
BMI	21.7 (4.23)	22.7 (3.89)	21.84 (3.68)
Waist/hip ratio	0.91 (0.05)	0.93 (0.06)	0.92 (0.05)
Waist (cms)	87.2 (9.8)	87.1 (8.8)	86.6 (7.7)
Hip (cms)	95.2 (7.7)	93.1 (7.9)	93.4 (6.7)
Systolic BP (mmHg)	135.1 (26.2)	153.1 (23.3)	138.65 (21.8)
Diastolic BP (mmHg)	84.4 (8.0)	89.3 (7.6)	84.04 (8.2)
Random blood sugar (mg/dl)	227.2 (105.4)	175.4 (105.3)	161.03 (86)

Table 4.Association between compliance to treatment and retinopathy in diabetes mellitus and hypertension

Compliance to treatment	Retinopathy present	Retinopathy absent	P-value	Odds ratio
Regular on treatment	15 (47%)	17 (53%)	0.000	1
Irregular on treatment	23 (92%)	2 (8%)		13.03 (2.6-64.7)

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In our study the prevalence of hypertension among elderly was 45%. It was similar to a study done by Premkumar et al. in central India which showed a prevalence of 43.8% in rural Maharashtra.[12] However a study done by Radhakrishnan S et al. in Tamilnadu the prevalence of Hypertension was 59%.[10] In a study by Prakash M et al. in rural Maharashtra the prevalence was 59.5%.[11] In a multicentric study by WHO in Bangladesh and rural Trivandrum in India showed an overall prevalence of Hypertension in elderly as 66%.[13] The above studies showed a higher prevalence than our study, these studies have also showed higher prevalence of diabetes, the reason maybe different geographical location and sampling techniques. The small sample size in our study can also be a reason contributing for this underestimation.

The factors studied for association with diabetes in our study were age, sex, socio-economic status, economic dependency, BMI, waist/hip ratio, tobacco and alcohol use, none of them was significantly associated with diabetes. The already known risk factors were studied and none was significantly associated with diabetes in our study the reason may be because of limited sample size in our study. In a study by Radhakrishnan S et al showed a similar result with smoking being the only factor associated with diabetes in elderly.[10] Another study done by Prakash M et al. in Maharashtra also showed a similar result, age was the only factor studied to be significantly associated with diabetes in elderly.[11] However a national urban survey by Ramachandra A et al. as in contrast to other studies showed significant association of monthly income, BMI, Waist/Hip ratio with diabetes in elderly.[7] The same factors were checked for association with Hypertension in our study, Education, Tobacco and alcohol use were significantly associated. Our results were similar to a multicentric study by WHO in Bangladesh and rural Trivandrum which showed a significant association of hypertension with education, alcohol, tobacco, BMI and waist/hip ratio.[13] It was also comparable to a study done by Seow LSE et al. in Singapore which showed that age, ethnicity, marital status, education, employment status, BMI, exercise, and smoking, but excluding gender, were associated with hypertension prevalence, awareness, and control.[14] Another study by Hazarika NC et al. in Assam also showed the determinants of hypertension in elderly derived by multiple logistic regression analysis to be age, intake of extra salt, alcohol and body mass index (BMI).[15]

In our study, there was an increase in prevalence of both diabetes and hypertension as the age increases, more than half the individuals above 80 years of age had diabetes, hypertension or both, but it was not statistically significant. The Chennai urban population study by Shanthirani CS et al. reported an increasing prevalence of hypertension with 8% in age below 40 years, 28% between 40-60 years and 54% in age group >60 years.[16] Jaipur urban study by Gupta R et al. reported a prevalence of 15.4% amongst those under 40 years age, 34.7% between 40-49 years age and 58% in age groups ≥50 yrs.[17] The Delhi urban study by Chadha SL et al. with hypertension criteria of ≥160/90 mmHg showed a prevalence of 6.34% under 45 years age, 22.35% between ages 45-54 years and 28.17% in age group ≥55 years.[18]

The mean and SD of BMI in our study was 21.84 (3.68) which was similar to a study by Prakash et al in Maharashtra with mean and SD of BMI as 22.06 and 4.66, Hazarika NC et al. also showed a mean(SD) of BMI as 19.08 (3.68).[11, 15] This shows that the BMI in elderly population is normal, However the mean BMI among diabetics in our study was 21.7 which was less than that estimated from National Urban Survey by Ramachandran A et al which showed a mean BMI of 25 in diabetics.[7] This finding suggests that in our study the BMI is normal in diabetics. The mean systolic and diastolic BP in our study was 138.6 and 84, it was higher among hypertensive 153.1 and 83.3, which was comparable to a study by Hazarika et al showing 150.52 and 88.22 of systolic and diastolic BP.[15] The mean and SD of random blood sugar (RBS) in the diabetics and hypertensive were 227.2 mg/dl (105.4) and 175.4 mg/dl (105.3), whereas in total study population the RBS was 161.03 mg/dl (86). The mean RBS was high in diabetics and hypertensive, the standard deviation in these groups were also higher than the total population this implies presence of extreme higher values of RBS in both these groups.

In our study we have screened for only one microvascular complication namely retinopathy which is common in both diabetes and hypertension. The proportion of retinopathy in our study was 37.3% which was higher than that in National Health and Nutritional Examination Survey (NHANES) data which reported a crude prevalence of diabetic retinopathy at 29.5% among patients age 65 years and older with diabetes.[19] The compliance to treatment was significantly associated with retinopathy and the non-compliance had 13 times more odds of getting retinopathy this may be the reason for high prevalence of retinopathy in our study. Due to limited resources in our study the other factors related to retinopathy was not studied.

Conflict of Interest: None

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