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Original Research Article

Prevalence of diabetes mellitus, hypertension, and obesity and their correlation with quality of life among elderly people living in old age homes of Kamrup, Assam

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ABSTRACT

Background: The world population is rapidly ageing due to increased longevity and decreased mortality rates. The United Nations has declared 2021-2030 as the decade of healthy ageing. To attain this concept, the ultimate goal is to improve the quality of life (QoL) of elderly people by early detection and prevention of complications of non-communicable diseases. Changes in family structure and psycho-social values in today's era often compel the elderly to shift to old age homes (OAHs). Thus, this study aimed to estimate the prevalence of type 2 diabetes mellitus, hypertension, and obesity in the elderly living in OAHs and their correlation with QoL.
Methods: A community-based cross-sectional study was conducted at the OAHs of Kamrup (M), Assam for twelve months. A sample of 300 elderly living in OAHs was selected and data was collected using a pre-designed, pre-tested schedule. All the respondents were screened and evaluated for diabetes mellitus, hypertension and obesity. Their quality of life was assessed using WHOQOL-BREF and correlated with blood pressure, blood sugar values and anthropometric indicators.
Results: The prevalence of type 2 diabetes mellitus, hypertension and obesity were found to be 32.33%, 37% and 37.33% respectively. On spearman rank correlation the relation between blood pressure, random blood sugar values and anthropometric indicators with QoL was found to be significant.
Conclusions: This high prevalence necessitates the adoption of various strategies to combat the burden, promote healthy lifestyle behaviour and provide proper care with counselling to improve the QoL in elderly.

Keywords: Healthy ageing, Diabetes mellitus, Hypertension, Obesity, Quality of life, Old-age homes

INTRODUCTION

Sir James Sterling Ross quoted "You do not heal old age; you protect it and you extend it". These are in fact the principles of preventive medicine.[1] Ageing is a phenomenon that is natural, inevitable, and omnipresent. The world population is rapidly ageing due to increased longevity, decreased fertility, and mortality rates. As per World Population Prospects, one in 11 individuals was above 65 years in 2019, and by 2050, one in six people will be above 65 years of age.[2] In India, as per Census 2011, the population of senior citizens (people aged 60 years and above) is 10.38 crore in the country. Assam is also witnessing a demographic shift with a growing number of older adults. The elderly population constitutes 8% of the State's total population.

The United Nations (UN) General Assembly declared 2021–2030 as the UN Decade of Healthy Ageing and asked World Health Organization (WHO) to lead the implementation. The UN decade of healthy ageing is a global collaboration bringing together governments, civil society, international agencies, professionals, academia, the media, and the private sector for 10 years of concerted, catalytic, and collaborative action to foster longer and healthier lives.[3] Being able to live in environments that

support and maintain one's intrinsic capacity and functional ability is key to healthy ageing.[4]

Elderly people are at higher risk for multiple health challenges. Among them, non-communicable diseases (NCDs) like diabetes, hypertension, and obesity are highly prevalent irrespective of socio-economic status. NCDs have become a global health agenda because they cause global morbidity, disability, and death in later life [5]. Globally every year, 71% of deaths are due to NCDs. As per Indian Council of Medical Research (ICMR INDIAB) study published in 2023, the prevalence of diabetes in India is 10.1 crores and it is considered the diabetic capital of the world.[6] Diabetes is a metabolic disease characterized by chronic hyperglycemia, leading to damage to various organs and a reduction of life expectancy and quality of life.[7] Globally, approximately 60% to 70% of older adults currently suffer from hypertension, which is the main cause of stroke and ischemic heart disease, leading to premature deaths worldwide. Therefore, given the prevalence among older adults, hypertension is likely to have a significant influence on quality of life (QoL) in older adults. In the elderly, obesity results in the early onset of chronic morbidity and also initiates premature mortality. The WHO recognizes obesity as the greatest health threat of the 21st century as measured by body mass index (BMI). Abdominal obesity or high waist-to-hip ratio is found to be strongly associated with NCDs like diabetes and cardiovascular diseases.[8] The increasing burden of NCDs attributable to high BMI or high WHR represents both a threat and an opportunity for intervention to improve the QoL of the elderly population.

Thus, at this point, we need to reappraise the QoL of this vulnerable population. QoL among the elderly is an important area of concern as it reflects their health status and well-being and it remains to be a neglected issue in India. The WHO has provided a comprehensive definition for QoL: "individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns".

Providing care for the aged has never been a problem in India where a value-based joint family system was dominant. Changes in family structure from joint to nuclear family and contemporary changes in the psycho-social values often compel the elderly to shift from their homes to old age homes (OAHs).[9] A 2015-16 All India Senior Citizens Confederation (AISCCON) survey showed that 60% of elderly people living with their families face abuse and harassment, 66% are either 'very poor' or below the poverty line, and 39% have been either abandoned or live alone. Thus, it is seen that old age homes are becoming the need of present Indian society. In such situations, it is vital that these institutions provide the boarders with a comfortable place to stay and spend their lives with dignity and comfort.

Studies conducted in old age homes in various places in India showed a significant prevalence of NCDs.[10,11] The most prevalent NCDs were hypertension and diabetes in a few studies conducted in OAHs in India.[12,13] Understanding the NCDs burden in the OAHs and their correlation with the quality of life will help policymakers and caregivers in facilitating the goal of Healthy ageing. Thus, this study was undertaken in old-age homes of Kamrup (M), Assam to understand the burden of NCDs and their correlation with quality of life.

Aims and objectives

The primary objective was to estimate the prevalence of type 2 diabetes mellitus, hypertension, and obesity in elderly people living in old age homes of Kamrup (M), Assam and the secondary objective was to determine the correlation between QoL and blood sugar levels, blood pressure, body mass index (BMI), and waist-hip ratio (WHR) among elderly people living in old age homes.

METHODS

Study design

The study was a community-based cross-sectional study.

Study setting

The study was conducted at old-age homes of Kamrup (M), Assam.

Study period

The duration of the study was one year (from November 2022 to October 2023).

Study population

People aged 60 years and above and residing in old age homes in Kamrup (M) constituted the study population.

Inclusion criteria

People aged 60 years and above residing in old age homes of Kamrup (M) consented to participate in the study; and elderly people who have resided for at least 6 (six) months in the old age homes were included in the study.

Exclusion criteria

People who refused to give consent, and people who were seriously ill were excluded.

Sample size and sampling technique

The sample size was calculated by taking the prevalence of each T2DM, HTN, and obesity separately from a previous study and taking the highest value as 24%,

absolute error of 6%, and a 95% confidence interval, the sample size was calculated using the formula given and was found to be 202.[14]

$$N = \frac{4pq}{l^2} = 202$$

After adding the design effect of 1.4% the sample size was calculated to 283.73 and was rounded off to 300. A total of 15 old age homes are in Kamrup(M). From each old age home, 20 boarders were taken randomly who met the inclusion criteria till the desired sample size was met (Figure 1). If the desired sample was not obtained from one old-age home, then the elderly from another old-age home were taken into consideration.

Ethical considerations

The study protocol was reviewed and approved by the Institutional Ethics Committee of Gauhati Medical College and Hospital, Guwahati.

Informed consent was taken from all the respondents before data collection.

Data collection technique

Socio-demographic data

After obtaining informed consent, all the participants were interviewed using a pre-designed and pre-tested schedule through face-to-face interviews to collect data on socio-demographic variables.

Diagnosis of type 2 diabetes mellitus

All individuals who were already diagnosed as diabetic by a physician, and/or under treatment for diabetes (i.e., insulin and/or oral hypoglycemic agents) and having documented evidence were included in the study. Capillary blood glucose (CBG) was measured using a standardized digital glucometer (Accu-Sure, Microgene diagnostics system Pvt. Ltd.), and those respondents whose random blood sugar (RBS) values were ≥200 mg/dl with symptoms of diabetes on screening tests were included in the study.[15]

Diagnosis of hypertension

All individuals who were already diagnosed as hypertensive by a physician and/or under treatment for hypertension with anti-hypertensive drugs and documented evidence were included in the study. Blood pressure measurement was done with an OMRON automatic blood pressure monitor (OMRON Healthcare Co., Ltd, KYOTO, 617-002 Japan), and those boarders whose systolic blood pressure was ≥140 mmHg and/or diastolic blood pressure was ≥90 mmHg on two different occasions were included in the study.

Obesity status

Obesity was defined using anthropometric measurements like BMI and WHR. Measurements of height, weight, waist and hip circumference were done as per the guidelines of WHO using a digital bathroom scale, stadiometer, and a non-stretchable measuring tape in centimeters.

Participants were categorized for both males and females according to the WHO Asia Pacific guidelines (for BMI).

BMI range (kg/m^2)

BMI range included: underweight <18.5, normal (18.5-22.99), overweight (23-24.99), and obese ≥25.

Waist-hip ratio (WHR)

The WHO advises the following norms: at risk, for men >0.90 and women >0.85.

Quality of life

It was described using the WHOQOL-BREF (26 items). QOL was categorized as good and poor taking the general norms for the WHOQOL-BREF scores for different domains from a study.[16]

Statistical analysis

The data collected during the study was entered into Microsoft excel spreadsheet and analyzed using Stata-14 software. A p value of <0.05 was considered statistically significant for all the statistical procedures.

RESULTS

A total of 300 respondents participated in the study. More than half (58.66%) of the elderly were females. The majority of the study population (96%) was Hindu by religion. A total of 81.66% of the elderly were widows/widowers and only 3% were married. The majority of the elderly (75.33%) were dependent on others for financial support (Table 1).

The age group distribution among the elderly living in old age homes of Kamrup (M), Assam were as follows- 58% belonged to young-old (60-69 years), 29% to middle-old (70-79 years), and 13% to very-old (80-89 years) categories (Figure 2).

The prevalence of type 2 diabetes mellitus was 32.33% (n=97) and it was found to be more in females (34.09%) than males (29.84%). The prevalence of hypertension was found to be 37% and it was found to be higher in males (42.74%). The prevalence of obesity taking BMI into account was 37.33% and it was found to be higher in females (43.18%). The prevalence of central obesity

calculated using WHR was 69.33% which was again higher in females (72.72%) (Table 2).

Table 1: Baseline socio-demographic characteristics of study subjects (n=300).

Characteristics	Male (n=124), N (%)	Female (n=176), N (%)	Total (n=300), N (%)
Age (years)			
60-69	65 (52.42)	110 (62.5)	175 (58.33)
70-79	43 (34.67)	43 (24.43)	86 (28.66)
80 and above	16 (12.90)	23 (13.07)	39 (13)
Religion			
Hindu	118 (95.16)	170 (96.59)	288 (96)
Muslim	6 (4.84)	4 (2.72)	10 (3.33)
Christian	0 (0)	2 (1.13)	2 (0.66)
Marital status			
Married	7 (5.64)	2 (1.13)	9 (3)
Widow/ widower	104 (83.87)	141 (80.11)	245 (81.66)
Unmarried	13 (10.48)	33 (18.75)	46 (15.33)
Financial status			
Dependent	85 (68.54)	141 (80.11)	226 (75.33)
Inde-pendent	39 (31.45)	35 (19.88)	74 (24.66)

*Figures in brackets indicate column-wise percentage

Table 2: Prevalence of type 2 diabetes mellitus, hypertension and obesity.

Diseases	Male (n=124), N (%)	Female (n=176), N (%)	Total (n=300), n (%)
Known diabetics (on medication)	29 (23.38)	43 (24.43)	72 (24)
Newly diagnosed	8 (6.45)	17 (9.65)	25 (8.33)
Total diabetics	37 (29.84)	60 (34.09)	97 (32.33)
Known hypertensive (on medication)	25 (20.16)	32 (18.18)	57 (19)
Newly diagnosed	28 (22.58)	26 (14.77)	54 (18)
Total hypertensive	53 (42.74)	58 (32.95)	111 (37)
Obesity (with respect to)			
BMI ≥25	36 (29.03)	76 (43.18)	112 (37.33)
WHR (male >0.90, female >0.85)	80 (64.51)	128 (72.72)	208 (69.33)

*Figures in brackets indicate column-wise percentage

The distribution of data of the 4 domains of WHOQOL-BREF (PHY-physical health, PSY-psychological, SOC-social relationships, ENV-environment) has been shown in a box-whisker plot (Figure 3). The mean WHOQOL-BREF score for the environmental domain was maximum (76.72±4.44) and minimum for the physical domain (67.44±10.64). QoL was categorized as poor taking the general norms for the WHOQOL-BREF scores for different domains from a study (Table 3).[16]

Table 3: Scores of WHOQOL-BREF various domains among study subjects (n=300).

Variables	Mean	Standard deviation (SD)	Poor QoL cut-off
Domain 1 (physical health)	67.44	10.64	<73.5
Domain 2 (psychological)	71.12	8.38	<70.6
Domain 3 (social relationships)	70.56	8.51	<71.5
Domain 4 (environment)	76.72	4.44	<75.1

Among hypertensives (n=111), a significant correlation was found between poor QoL physical domain and systolic blood pressure (SBP) and diastolic blood pressure (DBP) values. A significant correlation was also found between RBS and WHR values with poor QoL in the physical domain (Table 4).

Table 4: Correlation of blood pressure values, RBS, BMI and WHR with physical health domain of WHOQOL-BREF.

Variables	Correlation coefficient	P value
Hypertension		
SBP	-0.2578	0.0000
DBP	-0.1891	0.0000
Type 2 diabetes mellitus		
RBS	-0.3069	0.0000
Obesity		
BMI	-0.0805	0.1642
Central obesity		
WHR	-0.3011	0.0000

Table 5: Correlation of blood pressure values, RBS, BMI, and WHR with psychological domain of WHOQOL-BREF.

Variables	Correlation coefficient	P value
Hypertension		
SBP	-0.0968	0.0943
DBP	-0.1566	0.0066
Type 2 diabetes mellitus		
RBS	-0.1057	0.0674
Obesity		
BMI	-0.1508	0.0089
Central obesity		
WHR	-0.2431	0.0000

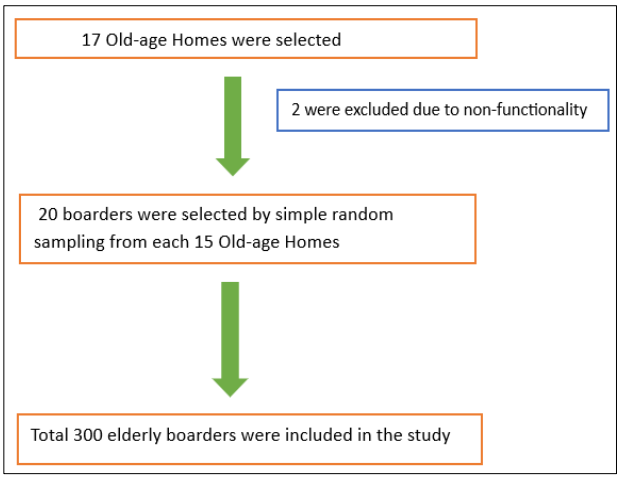

Figure 1: Flowchart showing inclusion of participants in the study.

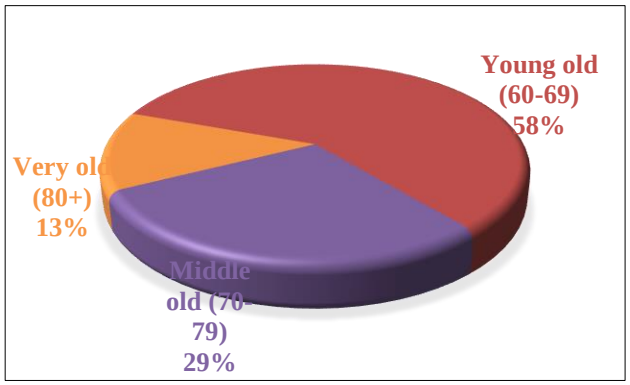

Figure 2: Percentage of elderly living in old-age homes according to various age groups.

A significant correlation between DBP, and BMI values with poor QoL was found in the psychological domain. As expected, WHR had a significant correlation with poor QoL in the psychological domain (Table 5).

No significant correlation was found between SBP, DBP, RBS, BMI, and WHR values with QoL in the social and environmental domains (Tables 6 and 7).

Table 6: Correlation of blood pressure values, RBS, BMI and WHR with social domain of WHOQOL-BREF.

Variables	Correlation coefficient	P value
Hypertension		
SBP	0.0151	0.7945
DBP	0.0403	0.4866
Type 2 diabetes mellitus		
RBS	0.0408	0.4814
Obesity		
BMI	0.0206	0.7229
Central obesity		
WHR	0.0406	0.4833

Table 7: Correlation of blood pressure values, RBS, BMI, and WHR with environmental domain of WHOQOL-BREF.

Variables	Correlation coefficient	P value
Hypertension		
SBP	-0.0282	0.6264
DBP	0.0021	0.9710
Type 2 diabetes mellitus		
RBS	-0.0998	0.0845
Obesity		
BMI	-0.0265	0.6478
Central obesity		
WHR	-0.0405	0.4848

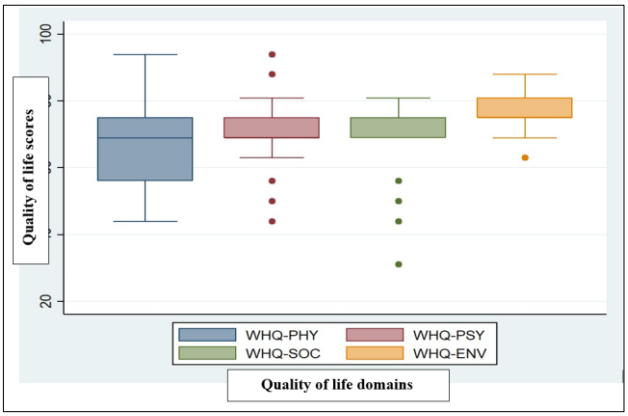

Figure 3: Box and whisker plot showing the distribution of data of the 4 domains of WHOQOL-BREF (PHY-physical health, PSY-psychological, SOC-social relationships, ENV-environment).

DISCUSSION

This study included all types of old age homes i.e., government, private, and trust managed old age homes. The elders from each home were selected randomly for the study. Henceforth the study results were representative of elders in other old age homes and the findings could be extrapolated to other similar homes in India.

The prevalence of hypertension in this study was 37% out of which the self-reported prevalence was 19% and the newly diagnosed prevalence of hypertension during the study was 18% which was lower than the self-reported prevalence rate of 32% according to the report.[17] Similar findings were observed in the study done on the morbidity profiles of the elderly in old age homes in Chennai which showed the prevalence of hypertension was 39.5%.[12] Another two studies done on the morbidity pattern of the elderly in OAHs showed almost similar prevalence of hypertension.[13,18]

The present study showed a 32.33% prevalence of type 2 diabetes mellitus. Another similar study done on the morbidity profile and quality of life of inmates in old age

homes in Udupi district, Karnataka, showed a prevalence of 36.7% of diabetes mellitus.[13] This high prevalence might be due to increased incidence, increased awareness, periodic screening services, and increased survival of diabetes patients in old age due to better management. Thus, this high prevalence of diabetes mellitus and hypertension showed the need for regular health check-ups at these old-age homes and treatment adherence for elderly people suffering from these diseases to avoid complications such as cerebrovascular accidents, chronic kidney disease, and nerve damage in the future.

The WHR is a quick measure of fat distribution that may indicate a person's overall health. People who carry more weight around the middle part of the body than around their hips may be at a higher risk of developing metabolic health conditions. WHR was high in around 69.33% of elderly people in this study which was low as compared to 79% of elderly people mentioned in the study.[19]

In India, the sex ratio of the elderly population aged 60 and above is 1065. Since 1991, the sex ratio (females per 1,000 males) among the elderly has been climbing steadily leading to the feminization of the aged, while the sex ratio of the general population remains the same.[20] In this present study, the percentage of elderly women (58.66%) was more than elderly men (41.33%) in old-age homes.

The majority of the elderly in this study were widowed (81.66%) and 80.11% of elderly women were widowed in this study, which was consistent with the findings of another study.[21] Increased incidence of widowhood among the elderly is a critical indicator of vulnerability in society indicating that the loss of a spouse in old age adds significant vulnerability to the life of surviving partner.[22] Thus, the elderly may have resorted to OAHs as they had no one to look after them at home after the death of their spouses.

A significant correlation was found between poor QOL in the physical and psychological domain with high SBP and DBP values, RBS values, and WHR values. The WHOQOL-BREF mean score for the environmental domain was maximum (76.72±4.44) and was minimum for the physical domain (67.44±10.64). Chronic conditions affect the QoL of elderly people, contributing to disability and the decline of independent living, and thus, increasing the need for long-term care.[23,24] Therefore, the health care delivery system for elderly people should be oriented towards the early detection, treatment, and rehabilitative care of chronic diseases aimed at improving functions, postponing deterioration and disabilities, and preventing complications. To plan such services, it is necessary to determine the problems and needs of the elderly in light of current knowledge.

There are some limitations to our study. Firstly, the measurement of capillary blood glucose was done by a glucometer device instead of venous blood glucose estimation due to logistical issues. Secondly, the correlation of serum blood glucose level values with quality of life might be affected due to the use of only RBS values. If we could have used fasting blood sugar (FBS) and glycosylated hemoglobin (HbA1C) values, we might have found different prevalence of type-2 diabetes mellitus. Additionally, in this study, we aimed to understand the overall older-aged scenario, but stratified analysis separately for males and females could have added more insights to the findings.

CONCLUSION

Although the process of ageing, disorders, and disabilities of old age cannot be totally prevented, suitable measures can be taken that would retard this progress in the elderly population, thereby leading to a longer period of health and thus preserving their quality of life. The findings of this study suggest the need for increasing awareness and more emphasis needs to be given to the prevention and management of chronic diseases to improve overall health status among the elderly. Provision for geriatric care with counselling should be arranged in these institutions. The government health policies are required to be aligned to meet the greater needs of older people. Thus, with these measures, we aim to foster a compassionate and supportive environment for the elderly population in OAHs so that they can lead a fulfilling life in their golden years.

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