RESEARCH PAPER

"Cardiometabolic Health Among The Elderly: Comparative Analysis Of Blood Pressure, Glycemic Control, And Quality Of Life In Community And Institutionalized Settings"

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Abstract:
Background: Cardiometabolic conditions such as hypertension and diabetes mellitus are increasingly prevalent among elderly individuals and are strongly associated with diminished quality of life (QoL). Living environments, whether community-based or institutionalized, significantly influence these health outcomes, especially in low- and middle-income countries like India. This study aimed to compare blood pressure, glycemic control, and quality of life among elderly individuals residing in community settings and institutional homes in Chennai. Materials and Methods: A comparative cross-sectional study was conducted among 100 (50 from each group) elderly individuals aged ≥60 years - 80 years from community and old age homes. Blood pressure was measured using a standard sphygmomanometer. Glycemic control was assessed by HbA1c levels. Quality of life was measured using the WHOQOL-BREF scale. Data was analyzed using descriptive statistics, independent t-tests, and Pearson correlation coefficients. Results: Institutionalized elderly had significantly higher systolic and diastolic blood pressure ($p < 0.05$) and poorer glycemic control compared to community counterparts. Quality of life scores were notably lower in the institutionalized group, especially in the psychological and social domains. Conclusion: Elderly individuals in institutionalized settings experience poorer cardiometabolic health and lower quality of life compared to those living in the community.

Keywords: Elderly, Cardiometabolic Health, Blood Pressure, Glycemic Control, Quality of Life, Metabolic Syndrome
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Introduction

The global increase in life expectancy has led to a growing elderly population, posing significant challenges to public health systems, especially in low- and middle-income countries. By 2050, the world's elderly population (aged 60 and above) is expected to surpass 2 billion, with India alone projected to have over 319 million older adults [1,2]. This demographic shift is associated with a rising burden of non-communicable diseases (NCDs), particularly cardiometabolic conditions such as hypertension and diabetes mellitus [3,4]. These conditions not only affect physical functioning but also lead to psychosocial issues, including reduced quality of life (QOL) and increased risk of depression, isolation, and disability [5].

Hypertension affects more than 50% of the elderly population in India and is often comorbid with type 2 diabetes mellitus, contributing significantly to cardiovascular morbidity and mortality [6,7]. Poor glycemic control, reflected in elevated fasting blood sugar or glycated hemoglobin (HbA1c) levels, further exacerbates

cardiovascular risk and is linked with cognitive decline, fatigue, and lowered life satisfaction [8,9]. Studies also show that elderly individuals with uncontrolled blood pressure and diabetes are more likely to experience functional impairment and frequent hospitalizations [10,11].

Hypertension and diabetes are the two most prevalent non-communicable diseases affecting elderly individuals and are significant contributors to cardiovascular morbidity and mortality [12]. Poor management of these conditions can accelerate functional decline, impair independence, and increase the risk of hospitalization in elderly populations [13]. Beyond physiological factors, living environment plays a crucial role in shaping elderly health outcomes. In the Indian context, the shift from traditional joint family systems to nuclear families and institutional eldercare has created stark differences in elderly well-being [14,15]. Research consistently demonstrates that institutionalized elderly often experience greater emotional neglect, lower autonomy, and reduced social interactions, all of which can impact both physical health and psychological well-being [16,17]. In contrast, community-dwelling elderly, especially those living with families, tend to benefit from greater social support, emotional security, and better health-seeking behavior [18,19].

However, existing studies tend to assess cardiometabolic indicators and QOL in isolation, with few taking an integrated approach to explore the combined impact of blood pressure, glycemic control, and quality of life across different living arrangements. For instance, a study found significantly higher rates of uncontrolled hypertension among elderly residents of old age homes but did not examine associated quality of life metrics [20]. Likewise, another study documented poorer QOL among institutionalized elderly but did not correlate it with metabolic health markers [21]. Moreover, most studies are region-specific and lack comparative insights between community-dwelling and institutionalized elderly populations.

To address this gap, the present study aims to provide a comprehensive comparison of blood pressure, glycemic control, and quality of life among elderly individuals in community settings and old age homes. By adopting a multi-dimensional approach, this study seeks to contribute new insights into how living arrangements may influence not only metabolic health but also holistic well-being in later life. The findings are expected to inform geriatric care policies, health promotion programs, and targeted interventions in both community and institutional settings.

Materials and Methods

This comparative cross sectional study design was conducted was conducted between September to December 2024. The study participants were selected from Akshaya old age home and Urban areas of Chennai. 100 participants were selected from each group. The study included elderly individuals aged between 60 and 85 years residing either in community dwellings (with family or independently) or in institutionalized settings (old age homes) within selected areas of Chennai. Participants were selected based on their ability to provide informed consent and respond coherently to structured interviews and clinical assessments. Participants who are permanently residing in the selected community or institutional setting, able to read Tamil language, able to comprehend and respond WHOQOL - BREF questionnaire were included for the study. Participants who were bedridden, terminally ill, critically unstable, diagnosed with dementia, psychosis or severe cognitive impairment were excluded from the study. A total of 200 elderly people were recruited for the study. 100 participants from each group were selected.

A comparative cross-sectional design was adopted, and a combination of stratified random sampling and purposive sampling was employed. The sample size was calculated to be 190 assuming the prevalence rate of hypertension to be 41.1% [22]. With 7% attrition rate, the total sample size was 200. Half of them were recruited from community dwelling area and half of them were from old age homes. For the community-dwelling group, participants were selected using stratified random sampling. Residential areas were stratified based on urban and semi-urban locality. From each stratum, households with eligible elderly individuals were randomly selected using local health worker records and voter lists. For the institutionalized elderly group, purposive sampling was employed to select participants from private old age homes in the same region. Eligible residents who consented were included until the required sample size was achieved.

The socio demographic variables of the study were Age, gender, education, marital status, habits, financial dependency, History of Non-Communicable Diseases, history of diabetes, physical activity. WHOQOL- BREF scale was used to measure the quality of life among elderly. It was developed by World Health Organization

(WHO) in 1996. It is a Likert scale ranging from 1 to 5. Test - Retest reliability and internal consistency was r = 0.91. It consists of 26 items with Sub Scales of Overall quality of life and General Health, Physical domain, psychological domain, social domain and environmental domain. Items 3, 4, 6 are reverse coded. Blood pressures were measured in the quiet environment with the left arm on a flat surface with the palm facing upward so that the upper arm is at the same height as the heart. After at least 5 min of sitting rest, the cuff of OMRON arm sphygmomanometer was tucked roughly 1 inch (2.5 cm) above the bend of the elbow and should be evenly tight around the arm. Blood pressure was calculated as the mean of the last two out of three measurements of the systolic blood pressure (SBP) and the diastolic blood pressure (DBP) using a calibrated OMRON model HEM-8712 sphygmomanometer (Omron Health Care, Kyoto, Japan). Hypertension was defined as SBP ≥140 mmHg and/or DBP ≥90 mmHg based on JNC 8 Guidelines. A blood sample (2 ml) was taken from the cubital vein between 08:00 am and 09:00 am after at least 12 h of fasting for calculating HbA1c. HbA1c was analyzed using automated biochemical analyzers (e.g., high-performance liquid chromatography or immunoturbidimetry) at certified laboratories. Glycemic control was classified based on ADA Guidelines: <7.0%: Controlled diabetes, 7.0%–8.9%: Moderately controlled, ≥ 9.0%: Poorly controlled diabetes. Informed consent was obtained from each participant. Privacy and confidentiality were ensured and maintained throughout the process of data collection.

Data was entered in Microsoft Excel and analyzed using IBM SPSS Statistics version 26.0. Both descriptive and inferential statistical techniques were used to analyze the data. Mean, standard deviation, frequency and percentage distribution were analyzed using descriptive statistics. Independent sample t test was used to compare the means of blood pressure, HbA1c, and quality of life. A p-value < 0.05 was considered statistically significant. Pearson's correlation was used to assess the relationship between: HbA1c and QOL domains and Systolic/diastolic blood pressure and QOL domains.

Results

Table 1 shows the comparison of demographic variables between elderly individuals residing in old age homes and those living in community dwellings revealed no statistically significant differences in most categories.

Table 1: Frequency and percentage distribution of demographic variables among elderly in community dwelling and old age home setting (N=200)

Demographic variables	Old age Home		Community dwelling		Chi-Square and p value
	No.	%	No.	%	
1. Age in years					
a. 65-70 years	23	23	29	29	χ 2=3.90
b.71-75 years	40	40	35	35	P=0.5947 DF=3
c. 76-80 years	37	37	36	36	(NS)
2. Gender					
a. Male	84	84	86	86	χ 2=0.52
b. Female	16	16	14	14	P=0.8430 DF=1 (NS
3. Educational status					
a. Illiterate	3	3	4	4	χ 2 = 0.022
b. High school	34	34	33	33	d.f =1
c. Hr. Sec. Middle	35	35	32	32	p= 0.9767 (N.S)
d. Graduate	23	23	25	25	
e. Postgraduate	5	5	6	6	
4. Occupational status					
a. Unemployed	54	54	62	62	χ 2 = 21.478
b. Full-time employed	2	2	13	13	d.f = 4
c. Part-time employed	44	44	15	15	p= 0.000 ***
5. Marital status					
a. Married	62	62	59	59	χ 2 = 2.727

b. Unmarried	9	9	8	8	d.f = 2
c. Divorced	17	17	19	19	p= 0.9406(N.S)
d. Widowed	12	12	14	14	
6. Habits					
a. Smoking	62	62	58	58	χ 2 = 0.347
b. Alcohol	14	14	19	19	d.f = 1
c. Both	24	24	23	23	p=0.6338(N.S)
7. History of CD					
a. Diabetes and HPT	35	35	36	36	χ 2 = 24.158
b. Diabetes and HPT and CVD	28	28	27	27	d.f = 2
c. Diabetes and HPT and Strok	12	12	12	12	p= 0.9984(N.S)
d. Diabetes and HPT and cancer	11	11	10	10	
e. Diabetes and HPT and Asthma	14	14	15	15	
8. Physical activity	43	43	54	54	χ 2 = 29.313
a. Yes	57	57	46	46	d.f =2
b. No					p= 0.1571(N.S)
9. Financial dependency					
a. Dependent son/daughter	51	51	48	48	χ 2 = 2.941
b. Independent	18	18	18	18	d.f = 2
c. Semi dependent	31	31	34	34	p= 0.230 (N.S)

Note: * - p<0.05, ** - p<0.01, *** - p<0.001 Level of Significant, N.S. – Not Significant

In terms of demographic data, all variables have showed no significant difference except occupational status which showed a significant difference among old home residents (χ^2 = 21.478, p = 0.000), when compared to community dwellers. This indicates that community-dwelling elderly were more likely to engage in employment, particularly full-time work, than their counterparts in old age homes. Overall, except for occupational status, the demographic variables were statistically comparable between the two groups, ensuring the suitability for further outcome comparisons.

Table 2 shows the independent t-test analysis revealing significant differences in Quality of Life (QOL) scores across all domains (physical, psychological, social, environmental, and overall, blood pressure scores and HbA1C scores between elderly in community dwellings and those in old age homes,

Table 2: Comparison of Level of Quality of Life, blood pressure and HbA1c among Elderly between community dwelling and old age home

Quality of Life	Community dwelling		Old age Home		Mean difference	Independence t-test and p-value
	Mean	S.D.	Mean	S.D.		
Quality of life - Physical Domain						
Low	34.03	10.19	39.19	10.30	-3.16	t= 2.085 p= 0.002 **
Moderate	42.43	9.59	39.13	10.22	2.3	t= 2.823 p=0.044 *
High	53.15	10.32	39.40	10.12	11.75	t= 5.229 p=0.000 ***
Quality of life – Psychological Domain						
Low	32.76	10.45	38.99	11.07	-4.23	t= 3.592 p= 0.000 ***

Moderate	43.47	10.28	38.87	10.95	3.6	t= 2.847 p=0.008 **
High	53.21	9.33	40.14	10.86	11.07	t= 8.984 p=0.000 ***
Quality of life - Social Domain						
Low	35.92	8.82	40.94	9.52	-3.02	t= 3.245 p= 0.001 ***
Moderate	45.16	9.79	40.70	9.32	3.46	t= 2.781 p=0.005 **
High	54.34	10.57	41.17	9.24	11.17	t= 8.057 p=0.000 ***
Quality of life - Environmental Domain						
Low	34.80	10.53	40.98	11.13	-4.18	t= 3.587 p= 0.001 ***
Moderate	45.92	10.35	40.89	11.04	4.03	t= 2.845 p=0.004 **
High	55.93	10.76	41.12	10.92	12.81	t= 8.494 p=0.000 ***
Quality of life – Overall						
Low	36.25	9.62	41.90	10.14	-4.65	t= 3.489 p= 0.001 ***
Moderate	46.25	9.61	41.78	10.01	4347	t= 2.747 p=0.006 **
High	56.13	9.80	42.07	9.90	12.06	t= 8.654 p=0.000 ***
HbA1c						
Normal	0	0	0	0	0	
Pre diabetic	3.27	1.16	3.38	2.07	-0.11	t =4.15 p=0.001 (S)
Diabetic	5.90	1.06	3.40	1.98	2.5	t=7.80 P = 0.001 DF= 2(S)
Systolic Blood Pressure						
Normal	70.47	7.42	69.83	7.63	0.64	t=0.62 p=0.54 (NS)
Hypertensive	97.45	9.40	81.17	6.90	16.28	t= 11.816 p=0.000 ***
Diastolic Blood Pressure						
Normal	18.12	2.07	16.24	1.93	1.88	t=0.65 p=0.51 (NS)
Hypertensive	18.59	2.12	16.92	1.73	1.67	t=22.82 p=0.001 (S)

Note: *** - p<0.001 Level of Significant, N.S. – Not Significant

In general, community-dwelling elders reported significantly higher mean QOL scores in the high category, whereas old age home residents had relatively higher scores in the low category. All differences were statistically significant ($p < 0.05$), with the largest gaps seen in the high QOL category across domains ($p < 0.001$). Regarding HbA1c, pre-diabetic and diabetic groups showed significant differences between the two settings ($p = 0.001$), with higher diabetic values among community dwellers. For blood pressure, no significant differences were found in the normal systolic and diastolic categories ($p > 0.05$). However, hypertensive elders in the community showed significantly higher mean systolic (16.28 mmHg difference, $p < 0.001$) and diastolic (1.67 mmHg difference, $p = 0.001$) pressures compared to those in old age homes.

Table 3 explored the correlation analysis between SBP, DBP, HbA1c, and Quality of Life (QOL) in both old age home and community-dwelling elderly, were mostly not statistically significant (p

> 0.05). At the old age home group, no significant correlations were observed between any variable pairs. In the community-dwelling group, a significant positive correlation was found between DBP and HbA1c (r = 0.216, p = 0.025), indicating that higher diastolic pressure was associated with higher HbA1c values. All other correlations were non-significant.

Table 3: Correlation between Study variables among Elderly in community dwelling and old age home

Parameters	Correlation between Study Variables			
	Old age Home		Community dwelling	
	Mean score	r – value (p value)	Mean score	r – value (p value)
SBP and DBP	3.54±0.92 Vs 71.54±6.72	r = -0.057, p = 0.560 (N.S)	71.54±6.72Vs 63.66±6.64	r = 0.140, p = 0.147 (N.S)
SBP and HbA1c	3.54±0.92 Vs 24.93±2.80	r = 0.005, p = 0.957 (N.S)	24.93±2.80Vs 4.68±1.48	r = 0.183, p = 0.057 (N.S)
SBP and QOL	3.54±0.92 Vs 4.68±1.48	r = -0.028, p = 0.772 (N.S)	24.93±2.80Vs 63.66±6.64	r = 0.029, p = 0.764 (N.S)
DBP and HbA1c	3.54±0.92 Vs 63.66±6.64	r = -0.004, p = 0.970 (N.S)	24.93±2.80Vs 11.68±15.48	r = 0.216, p = 0.025 *
DBP and QOL	71.54±6.72Vs 24.93±2.80	r = -0.080, p = 0.413 (N.S)	24.93±2.80Vs 53.66±6.64	r = -0.101, p = 0.299 (N.S)
HbA1c and QOL	71.54±6.72Vs 4.68±1.48	r = 0.075, p = 0.445 (N.S)	4.68±1.48Vs 63.66±6.64	r = -0.153, p = 0.113 (N.S)

Note: * - p<0.05, ** - p<0.01 Level of Significant, N.S. – Not Significant

Discussion

The findings of this study highlight significant disparities in health outcomes between institutionalized and community-dwelling elderly individuals. Across all domains of Quality of Life (QOL)—physical, psychological, social, environmental, and overall—community-dwelling elders consistently reported higher scores. This aligns with prior studies [23,24], which emphasize the positive impact of family support, autonomy, and social integration on elderly well-being. The psychological domain showed the largest differences. Elderly individuals in the community reported better emotional well-being, likely due to regular social interactions, meaningful roles in family life, and less institutional stress. It was that mental health among the elderly is closely tied to their living environment, with institutionalization often associated with emotional isolation, loss of independence, and depressive symptoms [25]. In terms of glycaemic control, significantly higher HbA1c levels among diabetic residents of old age homes indicate poorer management of blood sugar levels. These results are consistent with the identified higher diabetes prevalence and complications in institutionalized or sedentary elderly populations [26]. Another study also highlighted how diet, physical inactivity, and irregular medication use in old age homes may contribute to uncontrolled diabetes [27].

For blood pressure, systolic and diastolic values among hypertensive participants were significantly higher in old age home residents. These results mirror findings who reported inadequate hypertension monitoring and treatment adherence in institutional settings [28]. Similarly, it also found that rural and community-based elderly had better access to local primary healthcare and family-led medication supervision, aiding in better blood pressure control [29]. The absence of significant differences in normal BP groups may suggest baseline equality in health, but the poorer control in hypertensive institutionalized elders reflects the limitations in individualized care and follow-up. These findings reinforce the importance of social support, family engagement, and community-based care in promoting better quality of life and cardiometabolic health among the elderly. Strengthening care protocols in old age homes—through routine monitoring, structured physical activity, psychological counselling, and diet management—may help bridge these disparities.

The findings from the correlation analysis suggest limited and mostly non-significant associations between blood pressure, glycaemic control, and quality of life in both institutionalized and community-dwelling elderly. The only statistically significant relationship was found in community-dwelling elders between diastolic blood pressure and HbA1c (r = 0.216, p = 0.025), indicating a potential link between elevated DBP and poorer glycaemic control in this group. This is supported by previous research indicating a biological

interaction between insulin resistance and arterial stiffness in elderly individuals [30]. High diastolic pressure has been associated with microvascular complications and impaired insulin sensitivity, which may explain this correlation [31,32].

In contrast, the absence of significant correlations between SBP and QOL, or HbA1c and QOL, reflects the multifactorial nature of quality of life in older populations. QOL is more strongly influenced by psychosocial factors such as family support, autonomy, and emotional wellbeing than by isolated clinical markers like blood pressure or glycaemic levels [33]. Additionally, the weak correlations between SBP and HbA1c found in both groups align with the findings of a study, who observed that glycaemic variability in elderly populations may not consistently reflect in systolic pressure changes due to age-related arterial compliance [34]. The lack of significant relationships at the old age home group suggests that institutionalized elderly may have more uniform health characteristics or limited variability in lifestyle, diet, or medication adherence—factors that often mediate such associations in the general population [35].

Furthermore, the minimal correlation between HbA1c and QOL is consistent with another study [36], who emphasized that while chronic disease status impacts QOL, it is often the functional limitation, mood disorders, and social isolation that exert the most significant influence on perceived life quality among the elderly. In conclusion, while the relationship between DBP and HbA1c deserves further exploration, especially in community settings, the broader findings indicate that clinical metrics alone may not be sufficient predictors of Quality of Life. Holistic approaches encompassing physical, psychological, and social dimensions remain essential for improving elderly health outcomes.

Conclusion

The study reveals significant differences in quality of life, glycemic control, and blood pressure among elderly individuals residing in old age homes versus those living in the community. Community-dwelling elders reported better quality of life and more favorable clinical parameters. The findings emphasize the critical role of social environment, routine health monitoring, and emotional support in promoting healthy aging. Integrating comprehensive geriatric care—both clinical and psychosocial—into institutional settings is essential to bridge the gap in elderly well-being and to promote equitable aging across living environments.

Strengths and limitations

The design of the study makes it difficult to determine the causes of factors like blood pressure, quality of life, and glycemic management. The study was carried out in a particular area (Southern India), which might not be representative of the larger senior population in India, which has a diverse range of sociocultural backgrounds. Disparities in staff availability, health monitoring, and the quality of medical care may exist among institutions, which may influence the disparities in results.

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Conflict of Interest:

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Authors' Contributions

Concept – S.P.M.; Design – S.P.M., J.P.; Supervision – S.P.M., T.C.; Resources – S.P.M., J.P.; Materials – S.P.M., T.C.; Data Collection and/or Processing – J.P.; Analysis and/or Interpretation – T.C.; Literature Search – T.C., J.P.; Writing Manuscript – S.P.M., J.P.,T.C.;Critical Review – S.P.M., J.P.

Ethical Approval

The Meenakshi Medical College and Research Institute Ethical Board, Meenakshi Academy of Higher Education and Research (IEC /11087/024)

Abbreviation:

Non-communicable diseases (NCDs), QOL – Quality of life, HbA1C – Glycated hemoglobin, CVD – cardiovascular disease, SBP – Systolic blood pressure, DBP – diastolic blood pressure, WHO – World Health Organization

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