



“A study to assess the Chronic disease and co-morbidities pattern associated with the level of dependence of the activities of daily living amongst the geriatric population residing in both the urban and rural field practice areas of a medical college in Tamilnadu”.

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DOI: <https://doi.org/10.52845/mcrr/2024/07-06-1>

Abstract: Introduction: The rise in the occurrence of chronic diseases and co-morbidities leads to a steady increase in the prevalence of disability in the activities of daily living (ADL) and that could probably have a significant impact on the healthcare status amongst the geriatric population with disability.

Methodology: A cross-sectional study in the urban and rural field practice areas of a medical college in Tamilnadu, using a sample size of 402 elderly individuals. Using the pre-tested, semi-structured questionnaire; the socio-demographic variables, chronic disease variables, and a comprehensive Katz ADL assessment were used.

Results: The overall prevalence of ADL limitation amongst the elderly was seen in 49 (12.2%) elderly individuals mostly with a score of 5 (mildest form) was found in 36 (74%) of the elderly population. There was an association found between the co-morbidities and ADL limitation with a P value less than 0.05 (C.I.-95%) using the Pearson chi-square test using SPSS v.26.0.

Conclusions: The association between co-morbidities and ADL limitation calls for initiatives at the family and community level.

Keywords: Elderly, Activities of daily living, chronic disease, Katz assessment scale.

INTRODUCTION

The elderly population is usually defined as the people aged 60 years and above as per the United Nations, despite families and communities often using other socio-cultural referral ideas like grandparents and their age-related health conditions¹.

Chronic diseases were defined by the Centre for Communicable Diseases, United States as conditions that lasts for one year or more and require ongoing medical attention or limit the activities of daily living or both. Cardiovascular diseases, cancer and diabetes are the leading causes of death and disability among the elderly in the United States². During the year 2019, ischemic heart disease and stroke were the main causes of disability adjusted living years (DALYs) in both the 50-74 years; and more than 74 years age group³.

Co-morbidities often co-exist with chronic disease but these are mostly specific conditions, which enhance the prevalence of the disability in the elderly. There is always some amount of overlap in these areas. Multi-morbidity is defined as an elderly individual with two or more co-existing physical or mental health conditions⁴.

During the NSSO survey, 75th round about 21 % of the elderly population in India reported having at least one chronic condition. Around 29 % in urban areas and 17 % in rural areas suffer from chronic conditions in India. The ADL is used as the main indicator of an individual's functional status or as the level of functional dependence⁵. The greater the disability rates, there is the association of healthcare risks arising from various chronic diseases, illness, injury and co-morbidity^{6,7}.

The increased prevalence of chronic diseases in the elderly mostly leads to higher mortality and morbidity and often leads to disability. Currently, there are relatively less number of studies, with respect to the geriatric population and their prevalence of disabilities with chronic conditions and co-morbidities. Hence, this study was carried out in both the urban and the rural field practice areas of the medical college in Tamilnadu.

Aim & Objectives of the study: To estimate the prevalence of disability in activities of daily living and health care status (chronic disease assessment) amongst the geriatric population.

MATERIALS AND METHODS

An observational, cross-sectional study was done during the months from October 2020 to September 2022.

Inclusion criteria: The elderly individuals aged 60 years and above residing for more than one year in the field practice areas of the urban Health Training Centre (UHTC) and Rural Health Training Centre (RHTC) attached to Medical College and Research Centre, Tamilnadu; and those who gave consent to participate in this study were included.

Exclusion criteria: The seriously ill patients were excluded from the study.

Sampling frame: The total number of male and female elderly to be sampled was pre-determined in both the urban and rural areas. The list of all the elderly populations in both the urban and rural areas were found in the family registers at their respective urban and rural health training centers.

Sample size estimation: The sample size calculation was done on the basis of a study done by Anandraj et al in rural Pondicherry – 2017⁸. The prevalence of the disability in elderly in that particular study was 14%. Based on this prevalence, the sample size was calculated around 407 adjusting for 10 percent non-response rate. Simple random sampling was used during the data collection. The first person was selected by using the random number generator. The data collection was continued until the desired sample size was reached. The same procedure was carried out, both in the urban and rural field practice areas. In the final analysis, only data pertaining to 402 subjects was included as they were not able to be traced despite repeated attempts.

Study Instruments:

A pre-tested, semi-structured and a validated questionnaire were used in this study to estimate the prevalence of disability in the elderly and the chronic disease pattern. The questionnaire included the following sections with specific questions in each section. The questionnaire was divided into two sections:

1. Section I & II – Socio-demographic variables and chronic disease variables.

2. Section III – Comprehensive Katz assessment for ADL.

Section I: Socio-demographic variables:

Age, gender, education, income, religion, occupation, type of family, residential status, marital status, the total number of family members, socio-economic status using the modified updated BG Prasad scale⁹, personal habits and the average dietary pattern.

Section II: Chronic disease and co-morbidities pattern:

The following questions were used for the chronic disease assessment; i.e., the presence or absence of chronic disease, co-morbidity pattern and its duration, treatment, complications, compliance, reasons for poor compliance in medications (viz: the medical compliance is defined by the Centre for disease control, CDC², United States as “the extent to which a patient acts in accordance with the prescribed interval; and dose of a dosing regimen), history of recent hospitalization in the last one year and its duration with any specific cause for the same¹⁰.

Section III: Katz disability assessment:

The six functions as originally described by Sidney Katz⁶ for ADL, the following functions were studied in the comprehensive manner exclusively at the field level: Bathing, Dressing, Feeding, Transferring, Toileting and Continence.

After obtaining the Institutional Ethical clearance, from the Institutional Ethical Committee, Medical College and research centre. All the 402 participants were chosen for face-to-face interviews and were conducted on a household basis.

Statistical analysis:

The comparison tables were used appropriately for this study. Data were expressed in numbers, percentages and proportions. The association between the independent variables and the dependent variable (Katz scale) were tested by Pearson’s Chi-square tests with appropriate P values. The P - value of less than 0.05 was considered to be significant, and was mentioned alongside the tabulation. All statistical analysis was done using MS EXCEL 2007 and the SPSS Version 26.0.

RESULTS

Table-1: The distribution of chronic diseases, co-morbidities, habitual and dietary habits amongst the elderly study population in both the urban and rural area of a field practice area covering a medical college in Tamilnadu, (n=402).

	Urban	Rural	Total
Chronic disease			
Yes	17 (7.9)*	30 (16)	47 (11.7)
No	198 (92.1)	157 (83.9)	355 (88.3)
Co-morbidity			
Yes	123 (57.2)*	122 (65.2)	245 (60.9)
No	92 (42.8)	65 (34.7)	157 (39)
Personal habits			
Smoking	3 (1.4)*	11 (5.9)	14 (3.5)
Tobacco Usage	11 (5.1)	8 (4.2)	19 (4.7)
Alcohol	2 (0.9)	4 (2.1)	6 (1.5)
Others (betel nut, pan and quid)	10 (4.6)	6 (3.2)	16 (4)
No habits	189 (87.9)	158 (84.5)	347 (86.3)
Diet			
Vegetarian	2 (0.9)*	7 (3.7)	9 (2.2)
Mixed	213 (99)	180 (96.2)	393 (97.8)

*Denotes percentage in brackets

In our study, it revealed that the chronic disease was prevalent in 47 (11.7%) of the elderly population. There were 17 (7.9%) elderly in the urban area with chronic disease and 30 (16%) in the rural area. The above table showed that 245 (60.9%) elderly suffered from co-morbid conditions. There was not a significant difference in co-

morbid conditions in both the urban and rural elderly population (Table - 1).

Our study revealed the other causes for co-morbidities in 19 (38.8%) cases with disability through the Katz assessment amongst the elderly population. Our study revealed that 14 (28.9%) elderly suffered from common causes for co-morbidities had disability viz: Katz assessment (Table – 5).

Table-2: The distribution of different types of chronic conditions amongst the elderly study population in both the urban and rural areas of a field practice area covering a medical college in Tamilnadu, (n=402).

Type of chronic disease	Urban	Rural	Total
Coronary heart disease	4 (1.9)*	7 (3.7)	11 (2.7)
Cerebro-vascular accident	1 (0.5)	9 (4.8)	10 (2.5)
Surgical	0 (0)	0 (0)	0 (0)
Ortho	5 (2.3)	7 (3.7)	12 (3)
Respiratory	2 (0.9)	3 (1.6)	5 (1.2)
Gastrointestinal	2 (0.9)	1 (0.5)	3 (0.7)
ENT	1 (0.5)	0 (0)	1 (0.2)
Renal	1 (0.5)	1 (0.5)	2 (0.5)
Leprosy	0 (0)	1 (0.5)	1 (0.2)
Filariasis	0 (0)	1 (0.5)	1 (0.2)
Dermatology	1 (0.5)	0 (0)	1 (0.2)
Visual impairment	0 (0)	0 (0)	0 (0)
Absent chronic conditions	198 (92)	157 (84)	355 (88.3)

*Denotes percentage in brackets

Table-3: The distribution of types of co-morbidities amongst the elderly study population in both the urban and rural areas of a field practice area covering a medical college in Tamilnadu, (n=402).

Co-morbidity	Urban			Rural			Grand
	Male	Female	Total	Male	Female	Total	
Diabetes mellitus	13 (13.1)*	8(6.9)	21 (9.8)	6(7.5)	8(7.5)	14 (7.5)	35 (8.7)
Hypertension	12 (12.1)	8(6.9)	20 (9.3)	9 (11.3)	15 (14)	24(12.8)	44 (11)
Ischemic heart disease	1 (1)	2(1.7)	3 (1.4)	8 (10)	1(0.9)	9 (4.8)	12 (3)
Hemiplegic	0 (0)	0 (0)	0 (0)	1(1.3)	0 (0)	1(0.5)	1 (0.2)
Others (GI, RS, Joint disorders, Surgical and Endocrine)#	12 (12.1)	20(17.2)	32 (14.8)	11(13.7)	24(22.4)	35(18.7)	67 (16.7)
Two co-morbidities	23 (23.2)	21(18.1)	44 (20.5)	14(17.5)	23(21.5)	37(19.7)	81 (20.1)
More than 2 co-morbidities	1 (1)	2(1.7)	3 (1.4)	0 (0)	2(1.8)	2 (1.06)	5 (1.2)
Nil	37 (37.4)	55(47.4)	92(42.8)	31(38.7)	34(31.8)	65(34.7)	157 (39)
Total	99 (46)	116(54)	215(100)	80(42.8)	107(57.2)	187(100)	402 (100)

*Denotes percentage in brackets

Our study showed that chronic conditions like Cardiovascular cases 11 (2.7%) and Cerebro-vascular cases 10 (2.5%) were seen in the elderly population and there were no chronic conditions in nearly 355 (88.3%) in the study population (Table – 2).

Our study revealed that the majority of the elderly 81 (20.1) had two co-morbidities with more males 23 (23.2%) in urban areas and more females 23 (21.5%) in rural areas. Others were 67 (16.7%), Hypertension 44 (11%), Diabetes mellitus 35 (8.7%) of the elderly population. In our study,

we found that most of the co-morbidities lasted for 6-12 years in 146 (36.3%) followed by 45 (11.2%) that lasted for 13-18 years in the study population. In this, the rural area showed a predominance for the co-morbidities that lasted for 6-12 years in 81 (43.3%) of the elderly population against the urban area with 65(30.2%) elderly. In the comorbidities that lasted for 19 – 24 years, there were 26 (6.5%), 25 – 30 years there were 13 (3.2%) and in more than 30 years there were only 4 (1%) individuals amongst the elderly population respectively. In nearly 157 (39%) there were no comorbidities (Table- 3).

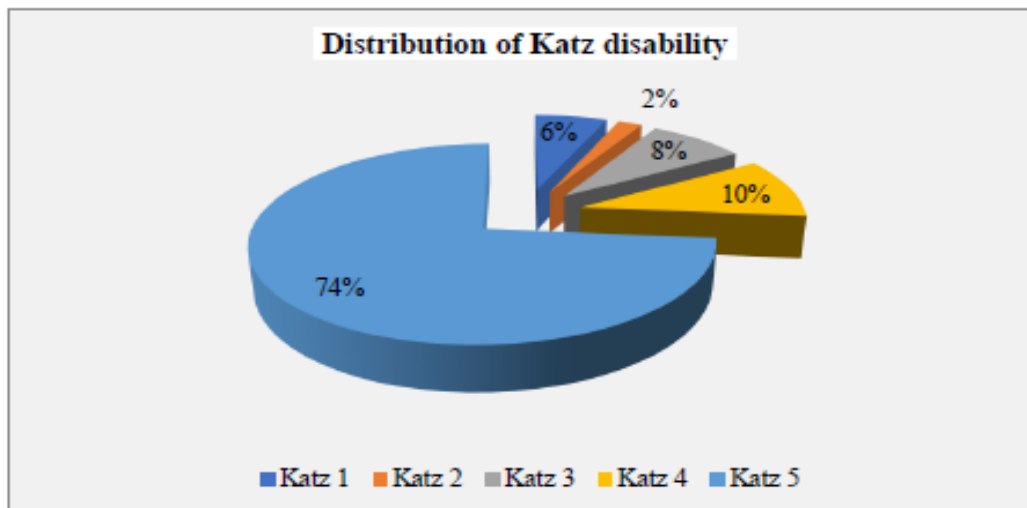
Table-4: The distribution of complications of co-morbidities, compliance and reasons for poor compliance amongst the elderly study population in both the urban and rural areas of a field practice area covering a medical college in Tamilnadu, (n=402).

Type of the complication from co-morbidities	Urban	Rural	Total
Cardiovascular	1 (0.5)*	2 (1)	3 (0.7)
Neurology	1(0.5)	3(1.6)	4 (1)
Ortho/Surgery	1(0.5)	2 (1)	3 (0.7)
Ophthalmological	3(1.4)	3(1.6)	6 (1.5)
Renal	1(0.4)	1(0.5)	2 (0.5)
Vision	1(0.4)	0 (0)	1 (0.2)
Nil	207(96.3)	176 (94.1)	383(95.3)
Medications compliance			
Regular	73 (34)*	70(37.4)	143(38.8)
Irregular	12 (5.6)	11 (5.9)	23(2.5)
Nil medications	130 (60.4)	106 (56.7)	236(58.7)
Reasons for irregular treatment			
Cost	2 (0.9)*	1(0.5)	3 (0.7)
Side effects	1(0.5)	1(0.5)	2 (0.5)
Alternative medicine	4(1.9)	0 (0)	4 (1)
Poor mobility	2(0.9)	6(3.2)	8 (2)
Dementia	0 (0)	1(0.5)	1 (0.2)
Lack of family support	3(1.4)	2 (1)	5 (1.2)
No reason	73(94.4)	70(94.1)	143(94.3)
Not on treatment	130 (60.5)	106 (56.7)	236 (58.7)

*Denotes percentage in brackets

The above tables showed that the complications of the co-morbidities were observed in 19 (4.7%) of the elderly population with more in the rural elderly in about 11 (5.9%) and 8 (3.7%) of the urban elderly population. Our study revealed that 143 (38.8%) of the elderly population were taking regular medications for the co-morbidities, however;

23 (2.5%) were irregular in their treatment. The above table showed that there were no specific reasons in 143 (94.3%) individuals for not taking regular medications. Around 8 (2%) due to poor mobility the elderly population were on irregular treatment (Table-4).



Distribution of the Katz disability scores between 1 and 5 (excluding 6 being normal).

Figure 1: The distribution of the Katz disabilities scores amongst the study population in both the urban and rural area of a field practice area covering a medical college in Tamilnadu, (n=49).

Distribution of Katz disability assessment based on their scores between 1 and 5 (excluding 6 out of 6 being normal).

Table-5: The distribution of the Katz disability and co-morbidities with distance travelled amongst the study population and their association in both the urban and rural area of a field practice area covering a medical college in Tamilnadu, (n=49).

Co-morbidities	Katz disability assessment		Grand total	Chi-square test	P-value
	Urban	Rural	Total		
Diabetes mellitus	2 (9.5)*	1(3.6)	3 (6.1)	$\chi^2 = 44.584$ @28df	P = 0.024**
Hypertension	3 (14.3)	4 (14.3)	7 (14.3)		
Cardiovascular diseases	0 (0)	2(7.1)	2 (4)		
Stroke	0 (0)	2(7.1)	2 (4)		
Others (skin, hearing, vision, joint, surgical and endocrine)	11 (52.3)	8 (28.6)	19 (38.8)		
Nil	5 (23.8)	11(39.3)	16 (32.6)		
** denotes P value < 0.05 and is significant					
Association between Katz disability assessment and the chronic disease variables amongst the study participants were the following (n=49):					
1. Chronic disease				0.678 #	
2. Compliance in medications				0.095#	
3. Recent hospitalizations				0.230#	
# denotes P value >0.05 and is insignificant.					

DISCUSSION

In the present study, the chronic conditions were seen in 47 (11.7%) elderly patients. Out of which joint disorders were found in 12 (3%), coronary heart disease in 11 (2.7%) and cerebrovascular disease in 10 (2.5%). There were rare conditions like Leprosy and filariasis with one elderly in each of these conditions. According to **an LASI – a longitudinal ageing study in India by Palak Sharma et al**, in a large study population of 31,464 who had 6185 (19.71%) joint disorders, 1629 (5.19%) coronary heart diseases and 858 (2.73%) cerebrovascular disease elderly patients in their survey¹¹. This large study in comparison with the present study had similar proportions with which we could understand the distribution of chronic diseases in the elderly population in India. In another study conducted by the **Dutch POLS survey (2001 – 2007) Bart Klijs**, the major chronic conditions amongst the elderly were joint disorders (arthritis) and then followed by cardiovascular diseases¹².

In the current study, the co-morbidities among the elderly were found to be more with Hypertension 44 (11%), Diabetes mellitus 35 (8.7%), and others (gastrointestinal, respiratory, surgical and endocrine) were 67 (16.7%). The elderly patients with two co-morbidities constituted 81 (20.1%) in the majority of the elderly population and more in the urban area. Duration of most of the co-morbidities was between 6 – 12 years in 146 (36.3) elderly and around 19 (4.7%) had some complications already amongst them. The prevalence of Hypertension and diabetes amongst the elderly was 30.33% and 18.7% respectively with joint disorders around 65% in one study conducted by **Pranay et al** in Vadodara district, Gujarat. Hypertension ranked first individually when compared to other conditions in this study as well. Although much higher than the present study in comparison probably due to the greater number of participants in around 600 elderly population within a quite large geographical context¹³. In a study conducted by **Deepak Sharma et al** in the Shimla hills of north India, the prevalence of Hypertension and Diabetes amongst the

elderly were 162 (40.5%) and 23(5.8%) respectively and musculoskeletal cases were around 220 (55%) with other co-morbidities as well¹⁴.

In the present study, the **overall prevalence of functional disability was around 49 (12.2%)**. Amongst the elderly population nearly 36 (8.9%) scored 5 in the Katz assessment and the rest 13 (3.2%) scored between 1 and 4 using the Katz functional disability scale. In a multilevel study using cross-sectional data from 23,694 adults aged more than 60 years of age in the **SABE, Columbia nationwide survey** conducted by **S.M. Ballesteros et al**, the overall prevalence of functional impairment for the **basic activities of daily living was 22%**¹⁵. In a community-based cross-sectional study conducted amongst 322 elderly individuals aged more than 60 years in the rural area of Haryana by **Zahid A. Khan et al**¹⁶ using the **Barthel index and the Katz index**, the prevalence of disability was found to be around 21.4% and 18%. Amongst the 58 (18%) disability by the Katz assessment, 36 (23.4%) were females and 22 (13.1%) were males.

A community-based study from the West Bengal rural district by **Chakrabarty et al** revealed the prevalence of ADL amongst the elderly population to be around **16.16%** using the Katz ADL measurement¹⁷. According to the study done by **Rozzini et al**, using the Barthel index and the Geriatric index of co-morbidity (GIC). After applying the Cox regression using disease modeling covariates (adjustment for age, gender, cognition, depression and disease severity), there was a strong association between the ADL and the GIC in the study with 493 patients and was found to be the best predictor of mortality¹⁸.

CONCLUSIONS & RECOMMENDATIONS

Factors like co-morbidities alone were strongly associated with the Katz disability assessment (ADL) with a P- value less than 0.05 (C.I-95%). Due to the co-morbidities in the elderly population with disabilities, there is a strong demand for providing supportive elderly health care services at the

primary care level itself. The usual targeted services like the domiciliary elderly health care visits could be promulgated by the Community Health Centers (CHC) and the Mobile Medical Units (MMU). The MMU team visits could be further strengthened. The various other forms of Instrumental ADL assessment and their chronic disease pattern could be studied in different parts of India for comparison. Eventually, through the non-communicable diseases (NPPCDCS) – NCD programme, the screening and diagnostic facilities could focus more substantively on the elderly with ADL and co-morbid conditions.

Acknowledgements

The authors would like to thank our field staff, departmental statistician and the CRMI of the Trichy SRM Medical College Hospital and Research Centre, Irungalur, Tiruchirapalli.

Financial support: Nil.

Conflict of interest: None declared.

Ethical approval: The study was approved by the Institutional Ethics Committee (IEC), Trichy SRM Medical College Hospital & Research Centre, Tiruchirapalli.

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