ASSESSING GERIATRIC DISABILITY AND ITS ASSOCIATED FACTORS AMONG THE URBAN POPULATION OF TAMIL NADU, INDIA: A PREVALENCE STUDY

Premanandh Kandasamy[1], Rajalakshmi Mahendran[1], Shankar Radhakrishnan[2]
[1] Department of Community Medicine, Sri Manakula Vinayagar Medical College & Hospital, Puducherry, Pondicherry University, India
[2] Vinayaka Missions Kirupananda Variyar Medical College and Hospital, VMRF (DU), India
shnkrradhakrishnan@gmail.com

ARTICLE INFO

ABSTRACT

Background: Disability among the geriatric population is a major health issue. Assessment of disability among the elderly population is useful in terms of identifying the needs, setting priorities, and allocating resources. **Purpose**: To assess the disability level among the geriatric population and to identify factors associated with disability. **Methods**: Used prevalence study among 384 participants in the age group between 60 and 80 years. Eligible households for interviews were selected using systematic random sampling (every 5th household). Trained interviewers carried out the study by direct interviews at the individuals' residences using the WHODAS 2.0 questionnaire. Individuals with normal cognitive status (abbreviated mental test score >6) were included in the study. In determining the overall level of disability, the International Classification of Functioning scale were used: extreme disability (96 to 100%), severe disability (50 to 95%), moderate disability (25 to 49%), mild disability (5 to 24%) and no disability (0 to 4%). **Results**: Around 32.8% of the study population reported no disability, 40.9% disability was reported by most, and moderate level of disability 24.0%. Analysis of the factors associated with disability level showed the existence of significant relationships between disability score >24 and factors like age, marital status, family type, living arrangement and physical activity of more than 150 hours per week. **Conclusion**: Higher disability rate was noted among the elderly in the study population. Increasing age, single member /nuclear family, divorced/widowed individuals, and inadequate physical activity were the factors significantly associated with increasing disability level.

Keywords: disability level, geriatrics, ICF, WHODAS 2.0 questionnaire.

INTRODUCTION

Aging is an irreversible and progressive process. As age increases, physiological mechanism efficiency decreases, resulting in limitation of functional ability and an increase in morbidity in the elderly people (Tiwari and Pandey, 2012). In the 21st century an ageing population is one of the most important issues, accounting for 12.3% of the global population. In 1994 the percentage of persons aged 60 years and above was 9% and in 2014 it was 12% and it is expected to reach 21% by 2050.2 Data on the proportion of elderly people in India showed that Tamil Nadu has 13.6% proportion of elderly people, the second largest in the country (Chacko et al., 2017).

The number of people living with disability increases as a result of aging of the population (Tak and Kuiper, 2013). Because of ageing, there is a gradual decline in functional ability, decreased lower limbs strength and impaired balance which affects individual daily routine activities such as climbing upstairs, walking, getting up from a chair and reduces the ability to respond adequately to disturbances such as slipping (Padmavathy and Dongre, 2018; Victor et al., 2015).

The definition of disability as given by the International Classification of Functioning, Disability and Health (ICF) as an umbrella term for impairments includes limitation of activities and restrictions of participation in social life. Disability has been defined as a limitation or lack of ability to perform an activity which is considered normal for a human being Agrawal, 2016). Disability among the geriatric population is a major health issue. Although advances in healthcare have reduced mortality among the elder population, chronic disease has increased because of an increase in longevity, which causes specific disability in the geriatric population. Disability can be classified into those who can perform their daily routine activities with the help of devices, those with extreme mental limitations, physical functioning which requires special care and, in-between the above two groups, persons disabled in one or two domains or who have mild cognitive impairment.

Assessment of disability level among the elderly population is useful in terms of identifying their needs, setting priorities, and allocating resources. The conceptual framework of disability developed by the World Health Organization describes disability as a multi-dimensional concept in relation to health condition, social participation restrictions, daily activity limitations, and factors which include environmental and personal factors. The International Classification of Functioning, Disability and Health (ICF) was initiated by the WHO to address the need for a functional description of a disability. The WHO had developed the Disability Assessment Schedule-3.6 (WHODAS 2.0) based on the ICF. WHODAS 2.0 is a good-quality and validated disability assessment tool that can be used for both epidemiological and clinical studies (Ust˙un et al., 2010).

Though, studies have reported the disability level among elderly population in South India, most of them were hospital based and on selected population, there is a paucity of data on community-based assessment of disability on elderly population using a standardized tool. A community-based assessment of disability assists in understanding the burden of disability, thereby the need for assistance in this age group can be predicted.

This study objective was to assess the disability level among the geriatric population and to identify factors related to disability such as sociodemographic characteristics, physical activity, and marital status.

METHOD

Population, Sample, and Data Collection

This prevalence study was carried out in Maduranthakam town of Tamil Nadu, South India which is the urban training center field practicing area of our medical college. Maduranthakam has a population of 30.796, according to the 2011 census of India (Census, 2011). The study was carried out for a duration of three months between November 2020 and January 2021. Individuals aged between 60 to 80 years were selected as study participants. Using a prevalence of 49 percent moderate disability (Goswami et al., 2019) and with 95% confidence level and 5% absolute precision, the required sample size was estimated to be 384. Eligible households for interviews were selected using systematic random sampling (every 5th household). Trained interviewers carried out the study by direct interviews at the individuals' residences using the WHODAS 2.0

questionnaire. One eligible participant from each of the selected households was included in the study. One study participant was selected randomly, in case a household had more than one eligible participant. Assessing the disability level in the place of residence is of added value as it allows the problems faced by the elderly in performing daily activities to be highlighted. Individuals who gave informed consent were screened initially with an abbreviated mental test score and those individuals with normal cognitive status (score > 6) were included in the study.

Data Analysis and Measurement

WHODAS 2.0 is a user friendly, easy to administer questionnaire for assessing disability level in both community and hospital settings. WHODAS 2.0 assesses disability levels under six domains of Life (Cognition, Mobility, Self-care, Getting along, Life activities & Participation). WHODAS 2.0 has been validated and proven useful for assessing the disability levels in the elderly population Biritwum and (Biritwum *et al*., 2016). The instrument has been both validated with high internal consistency (Cronbach's alpha, α 0.86) and reliability (intra-class correlation coefficient: 0.98). In this study, an interviewer-administered 36-item version was used to assess disability. Individuals were questioned regarding how much difficulty they had in performing a given task and graded each item on a 5-point Likert scale (1–5), where 5 indicates extreme difficulty in performing a given task and 1 indicates no difficulty in performing a given task. This is used to determine individuals' disability. As per the manual, the original scale was converted to a score from 0 to 100, in which higher scores indicate severe disability (0 means no difficulty; 100 means very high degree of difficulty). In calculating the overall level of disability, the following International Classification of Functioning, Disability and Health scale was used: no disability (0 to 4%), mild disability (5 to 24%), moderate disability (25 to 49%), severe disability (50 to 95%), and extreme disability (96 to 100%) (Usẗun *et al*., 2010).

Descriptive and inferential data analysis was done using SPSS Version 21.0 software. The Mann–Whitney *U* test (quantitative data) and chi-squared test (qualitative variables) were used to find the relationships between the variables and overall disability score above 24%.

Study participants were divided into two groups for analysis purposes: disability score 0 to 24 (which includes no & mild disability) and disability score above 24 (moderate disability & above). A logistic regression analysis was used to find the factors related to the overall disability score of above 24% determined by WHODAS 2.0. P-value < 0.05 was considered statistically significant.

Ethical Clearance

A written and informed consent was obtained from all the study participants. The study was conducted after getting approval from the Institution Ethical Committee of our institute.

RESULT

Table 1. Distribution of the individuals as per socio-demographic variables (N = 384).

No	Variable	n (%)
1.	**Age (years)**	
	60–64	168 (43.8)
	65–69	111 (28.9)
	70–74	61 (15.9)
	75 and above	44 (11.4)
2.	**Sex**	
	Male	166 (43.2)
	Female	218 (56.8)
3.	**Educational level**	
	No formal schooling	138 (35.9)
	Primary	107 (27.9)
	Middle	92 (23.9)
	High	26 (6.8)
	Secondary and above	21 (5.5)
4.	**Family**	
	Single and Nuclear Family	103 (26.8)
	Extended Family	281 (73.2)
5.	**Marital status**	
	Never married / widowed / separated divorced.	135 (35.2)
	Currently married	249 (64.8)
6.	**Past Occupation**	
	Home maker	134 (34.9)
	Govt. and Private Sector	121 (31.5)
	Own business	76 (19.8)
	Laborer and others	53 (13.8)
7.	**Economical in-dependency status**	
	Dependent	84 (21.8)
	Partial dependent	180 (46.9)
	Independent	120 (31.3)
8.	**Living arrangement**	
	Single	35 (9.1)
	Living with spouse	68 (17.7)
	Living with spouse and children	203 (52.8)
	Living with children	78 (20.4)
9.	**Living children**	
	No children	8 (2.1)
	Either son(s) or daughters(s) only	84 (21.8)
	Both son and daughter	292 (76.1)
10.	**Ownership of house**	
	Own	308 (80.2)
	Rented	76 (19.8)

Source: primary data

Demographic profile of the study population: Table 1 shows the social & demographic features of the participants. This study included 384 individuals aged from 60 – 80 years with most of them aged from 60 to 64 years (48.3%). Most of the study participants were females (56.8%). The percentage of individuals with no formal education was 35.9%. Most of the study participants (27.9%) completed primary school, followed by individuals who had completed middle school (23.9%). Most of the study participants were currently married (64.8%) and living in an extended family (73.2%). 9.1% of the study participants were living alone and 80.2% of them living in their own house. Participants were classified into dependent, partially dependent, and independent based on their economic dependency status. Most of the study participants (46.9%) were partially dependent on others.

Table 2. Disability level among the study population.

Disability	Domain	N (%)
Disability domains WHODAS 2.0 Mean (SD)	Cognitive functions	16.2 (18.4)
	Mobility	30.2 (21.6)
	Self-care	18.6 (8.5)
	Getting along	16.6 (24.6)
	Life activities	34.3 (28.6)
	Participation in community Life	27.4 (18.6)
Overall level of disability N (%)	None	126 (32.8)
	Mild	157 (40.9)
	Moderate	92 (24.0)
	Severe	9 (2.3)

Source: primary data

Table 2 shows the disability level among the study population. Around 32.8% of the study population reported no functional limitations. WHODAS 2.0 disability scores were categorized into no disability (score between 0 to 4), mild disability (score between 5 to 24), moderate disability (score between 25 to 49), severe disability (score between 50 to 95) and extreme disability (score between 96 to 100).

Among the remaining study participants, mild level (40.9%) disability was reported by most, followed by moderate level of disability (24.0%). No participant reported an extreme level of disability. In the study population, the domain most affected was conducting household activities, followed by mobility and participation in community life. Getting along with others, self-care, personal hygiene, and eating were the domains least affected among the study population. Among the mobility domain, most of the study population reported severe difficulty with prolonged standing (58.4%) and long-distance walking (72.7%).

Table 3. Analysis of factors associated with the disability score.

Variable	WHODAS 2.0 summary score (0 - 24) Mean (SD) N (%)	WHODAS 2.0 summary score (25 - 100) Mean (SD) N (%)	P value
Age	68.4 (3.7)	72.4 (4.2)	0.03
Gender			
Female	155 (71.1)	63 (28.9)	0.18
Male	128 (77.1)	38 (22.9)	
Education			
No formal schooling	95 (68.8)	43 (31.2)	
Primary & middle	148 (74.3)	51 (25.7)	0.95
High school & above	39 (83.0)	8 (17.0)	
Family			
Single and Nuclear Family	39 (37.8)	64 (62.2)	0.001
Extended Family	164 (81.5)	37 (18.5)	
Marital status			
Never married/divorced/widowed/separated.	86 (63.7)	49 (36.3)	0.001
Currently married	197 (79.1)	52 (20.9)	
Economic dependency status			
Dependent	62 (73.8)	22 (26.2)	
Partially dependent	123 (68.3)	57 (31.7)	0.53
Independent	88 (73.3)	32 (26.7)	
Living arrangement			
Living alone	37 (57.0)	28 (43.0)	
Living with spouse only	86 (68.3)	40 (31.7)	0.001
Living with spouse and children	97 (84.3)	18 (15.7)	
Living with children	63 (80.7)	15 (19.3)	
Physical activity of minimum 150 mins/week			
Yes	125 (85.6)	21 (14.4)	0.01
No	158 (66.4)	80 (33.6)	
Economic dependency status			
Dependent	62 (73.8)	22 (26.2)	
Partially dependent	123 (68.3)	57 (31.7)	0.53
Independent	88 (73.3)	32 (26.7)	

Source: primary data

Table 3 illustrates the associated factors with the disability score > 24. Analysis of the factors associated with disability level showed the existence of significant relationships between disability score >24 and factors of age, family, marital status, individual living arrangement and physical activity of more than 150 hours per week. No significant relationship was found with the factors of gender, education level and economic dependency status.

Table 4. Logistic regression model shows factors related to disability score >24.

Variable	Disability score > 24		
	Odds ratio	95% CI	P value
Age	1.22	1.09 -1.42	0.01
Family			
Extended Family	Ref		
Single and Nuclear Family	2.12	1.74 – 2.35	0.001
Marital status			
Currently married.	Ref		
Never married / widowed / separated / divorced	2.83	2.52 – 3.23	0.01
Physical activity of minimum 150 mins/week			
Yes	Ref		
No	2.52	2.11 – 2.82	0.001

Source: primary data

A logistic regression model showed age (OR = 1.22), type of family (OR = 2.12), marital status (OR = 2.83), and physical activity (OR = 2.52), and more than 150 hours per week were positively associated with disability score > 24.

DISCUSSION

Across countries the prevalence of disability among the elderly population has been found to vary (Olaya, *et al*., 2016). As per the 2011 census, around 5% of the geriatric population in India suffer from some kind of disability (Pamar and Saikia, 2018). But in the census, the social and other contextual factors which affects the level of disability were excluded. However, individual studies done in India using different tools and technology reported a higher range of disability ranging from 17.9% to 47% (Gupta *et al*., 2014; Chakrabarty *et al*., 2010).

In our study, the majority (40.9%) of the study participants had mild disability. 24.0% of the study participants had moderate disabilities and 2.3% had severe disability. 32.8% of the study participants reported no difficulty in carrying out the activities mentioned under different domains of life (Cognition, Mobility, Self-care, Getting along, Life activities & Participation) in the WHODAS 2.0 questionnaire.

In a study among elderly persons in New Delhi, using the WHODAS 2.0 (score >4 was classified as disabled), disability prevalence of 70.4% was reported. The respective figures for mild, moderate, severe, and extreme disability being 28.0%, 49%, 19.2% and 3.8% were reported in the study.[17] Virus et al. also reported disability among elderly persons aged > 75

years using the WHODAS 2.0 questionnaire; the corresponding age adjusted disability prevalence figures were 39.17%, 15.31%, and 10.14% for mild, moderate, and severe/extreme disability, respectively.

Disability assessments are used to determine an individual's physical and mental limitations in any given domain. Various studies have used different scales of measurement and definitions of disability to determine disability in an individual. The variability in the prevalence of disability is due to the usage of different scales and measurements to assess disability. Frederica et al. reported that the questionnaire-based method is appropriate for assessing the health and disability in different populations (Federici *et al*., 2017). To compare disability between different populations, a standardized instrument like WHODAS 2.0 should be used.

Among the six domains of life assessed for disability, daily life activities domain (mean = 34.3, SD = 28.6) showed the maximum level of mean disability compared with other domains of life. The observed high disability may be due to lack of adaptation to the activities, reduced functional abilities and difficulty in getting help. The disability in participation of social life had a mean level of 27.4 (SD = 18.6) Limitation in functional ability may reduce the participation in social activities in older adults. However, studies have shown that maintaining social relationships and life activities such as improving self-esteem have a favorable effect on health in senior individuals (Berkman *et al*., 2000). A study by Kono et al. reported that a decreased participation in social life was an important forecaster of worsening health conditions in the older population (Kono *et al*., 2004). Elderly people should be advised to actively participate in social life.

Analysis of the factors associated with disability score > 24 showed with increasing age, single member /nuclear family, divorced/ separated/widowed individuals, and inadequate physical activity increased the odds of having disability score >24.

Studies have reported that there is an association between sociodemographic variables (age, sex, level of education, physical activity, marital status, and profession disability) and disability (Perales *et al*., 2014). Many studies have reported that females have

higher disability levels than males (Chakrabarty *et al*., 2010; Virue´s-Ortega *et al*., 2011).

Gupta *et al*. in Haryana found that the prevalence of disability was greater among men and increases with age, is commonly seen among elders who were unmarried and who have a history of chronic diseases such as diabetes and Chronic Obstructive Pulmonary Disease (COPD) (Gupta *et al*., 2014). However, in our study no significant difference in the gender-wise disability level was found.

A decreased level of disability was reported in our study in individuals living in an extended family, currently married, and having adequate physical activity. Studies have also shown that the level of disability in the geriatric population rises with an increase in the number of chronic debilitating diseases. Gerontological studies have reported that elderly individuals who were economically stable had a decreased level of disability. However, in this study no significant association (p value $=$ 0.53) was found between economic independent status and disability level. Gupta *et al*. also reported that economic dependency was not associated with disability (Gupta *et al*., 2014).

A good response rate and community-based study were the strengths of this study. The data was collected by trained interviewers. However, being a cross-sectional study conducted in an urban area, temporality of association with the findings cannot be confirmed and study findings are not generalizable to the whole population.

CONCLUSION

A higher disability rate was noted among the elderly in the study population. Study findings suggest that measures should be taken to improve the performance in daily life activities and elderly people should be encouraged to actively participate in social life. Increasing age, single member/nuclear family, divorced/widowed individuals, and inadequate physical activity were the factors significantly associated with increasing disability level.

SUGGESTIONS

Proactive measures should be initiated to limit disability in the elderly. Public health policies focusing on the primary prevention of disability in the elderly population should be initiated. Elderly people should be encouraged to involve in more participation in social life and improve self-esteem.

REFERENCES

Agrawal A. 2016. Disability among the elder population of India: A public health concern. *Journal of Medical Society, 30*(1), 15-9. http://dx.doi.org/10.4103/0972-4958.175791

Audinarayana, N., & Sheela, J. 2013. Physical disability among the elderly in Tamil Nadu: patterns, differentials and determinants. *Health Popul Perspect Issues*, *25,* 26–37.

Berkman, L. F., Glass, T., Brissette, I., & Seeman, T. E. 2000. From social integration to health: Durkheim in the new millennium. *Social Science & Medicine , 51(*6), 843–857. https://doi.org/10.1016/s0277-9536(00)00065-4

Biritwum, R. B., Minicuci, N A. E. Yawson et al. 2016. Prevalence of factors associated with frailty and disability in older adults from China, Ghana, India, Mexico, Russia and South Africa. *Maturitas, 91*, 8–18. https://doi.org/10.1016/j.maturitas.2016.05.012

Census. 2011. *Primary Census Abstracts, Registrar General of India.* Ministry of Home Affairs, Government of. India, https://censusindia.gov.in/census.website/data/data-visualizations/PopulationSearch_PCA_Indicators.

Chacko T. V., Thangaraj P., Muhammad G. M. 2017. Epidemiology of fall and its risk factors among elders in a rural area of Coimbatore, India. *International Journal of Community Medicine and Public Health, 4,* 3864-9. https://doi.org/10.18203/2394-6040.ijcmph20174265

Chakrabarty, D., Mandal, P. K., Manna, N., et al. 2010. Functional disability and associated chronic conditions among geriatric populations in a rural community of India. 2010. *Ghana Medical Journal, 44*(4), 150–154.
https://doi.org/10.4314/gmj.v44i4.68913

Federici, S., Bracalenti, M., Meloni, F., & Luciano J. V. 2017. World Health Organization disability assessment schedule 2.0: An international systematic review. *Disability and Rehabilitation, 39(*23), 2347–2380. https://doi.org/10.1080/09638288.2016.1223177

Ganesh, K. S., Das, A., & Shashi, J. S. 2008. Epidemiology of disability in a rural community of Karnataka. *Indian J Public Health, 52*(3), 125–129. https://pubmed.ncbi.nlm.nih.gov/19189833/

Goswami A. K, Ramadass, S., Kalaivani, M, Nongkynrih, B., Kant, S., & Gupta, S. K. 2019. Disability and its association with sociodemographic factors among elderly persons residing in an urban resettlement colony, New Delhi, India. *PLoS ONE 14*(9), e0222992. https://doi.org/10.1371/journal.pone.0222992

Gupta P., Mani K., & Rai SK., et al. 2014. Functional disability among elderly persons in a rural area of Haryana. *Indian Journal of Public Health, 58*(1), 11–16. https://doi.org/10.4103/0019-557x.128155

Kono, A., Kai, I., Sakato, C., & Rubenstein, L. Z. 2004. Frequency of Going Outdoors: A Predictor of Functional and Psychosocial Change among Ambulatory Frail Elders Living at Home. *The Journals of Gerontology. Series A, Biological Sciences andMedical Sciences, 59*(3), 275–280. https://doi.org/10.1093/gerona/59.3.m275.

Olaya, B., Moneta, M. V., Koyanagi, A . 2016. Thejoint association of depression and cognitive function with severe disability among community-dwelling older adults in Finland, Poland and Spain. *Experimental Gerontology, 76*, 39–45.

Padmavathy L., Dongre A. R. 2018. Characteristics of fall among older people in rural Puducherry. *Indian Journal of Community Medicine, 43*, 327-8. https://doi.org/10.4103/ijcm.ijcm_160_18

Parmar, M. C. & Saikia, N. 2018. Chronic morbidity and reported disability among older persons from the India Human Development Survey. *BMC Geriatr December, 18*(1), 1–12. https://doi.org/10.1186/s12877-018-0979-9

Perales, J., Martin, S., & Ayuso-Mateos, J. L., et al. 2014. Factors associated with active aging in Finland, Poland, and Spain. *International Psychogeriatrics, 26*(8), 1363–1375. https://doi.org/10.1017/s1041610214000520

Tak, E., Kuiper, R., Chorus, A., & Rock, M. H. 2013. Chorus et al .Prevention of onset and progression of basic ADL disability by physical activity in community dwelling older adults: a meta-analysis. *Ageing Research Reviews, 12*(1), 329–338. https://doi.org/10.1016/j.arr.2012.10.001

Tiwari S. C., Pandey N. M. 2012. Status and requirements of geriatric mental health services in India: an evidence-based commentary. *Indian J Psychiatry, 54*(1), 8-14. https://doi.org/10.4103/0019-5545.94639

Ust¨un, T. B., Kostanjsek, N., Chatterji, S., Rehm, S., & World Health Organization. 2010. *Measuring Health and Disability Manual for WHO Disability Assessment Schedule .WHODAS 2.0.* WHO, Geneva, Switzerland.
https://www.who.int/publications-detail-redirect/measuring-health-and-disability-

manual-for-who-disability-assessment-
schedule-(-whodas-2.0)

Virue´s-Ortega, J., de Pedro-Cuesta, J., & Seijo-
Martı´nez, M., et al. 2011. Prevalence of
disability in a composite > 75 year-old
population in Spain: a screening survey
based on the International Classification of
Functioning. *BMC Public Health, 11*(1),
1–9. https://doi.org/10.1186/1471-2458-
11-176

Vitor, P. R. R., Oliveira, A. C. K., & de, Kohler
et al. 2015. Prevalence of falls in elderly
women. *Acta Ortopédica Brasileira, 23*(3),
158–161. https://doi.org/10.1590/1413-
78522015230300816