

Original Research Article

Functional health and cognitive impairment: insights from elderly residents in old-age homes in Delhi

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ABSTRACT

Background: The study aims to determine the relationship between functional health and cognitive impairment in elderly residents of old-age homes in Delhi.

Methods: A descriptive cross-sectional study was conducted among 121 elderly residents from 6 selected old age homes in Delhi. Interviews were conducted using Katz ADL, Lawton IADL, and Mini-cog tools.

Results: The study found that 3.3% of the study population had one ADL disability, 10.7% had 2 or more ADL disability, 18% of the respondents had one IADL disability, 47% with 2 or more IADL disability, and 57% of the residents who participated in the study were found to have a cognitive impairment. A significant association was found between ADL and IADL to self-rating of health and also, in addition to that, IADL is seen higher with increasing age, cognitive impairment, and those with less interest in working. Cognitive impairment was found more in females, with increasing age, those with lesser education, those with no income, no family contact, no emotional support, and those with no interest in working. No significant association was found between cognitive impairment and ADL in this study.

Conclusions: This research focuses on identifying modifiable factors that can improve the well-being of elderly residents in old age homes, aiming to enhance geriatric care strategies. Regular cognitive assessments, along with tailored interventions, are essential to support both cognitive and functional health. Creating a supportive environment through social engagement and personalized care can help mitigate cognitive decline, improving overall quality of life.

Keywords: Activities of daily living, Cognitive impairment, Elderly, Functional health, Instrumental activities of daily living, Old-age homes

INTRODUCTION

Aging is often associated with a decline in physical, and cognitive functioning, which may lead to a loss of independence in activities of daily living (ADL) and instrumental activities of daily living (IADL), leading to a decline in the overall quality of life of older adults.¹ Several physical changes occur as we age and it differs from person to person. Some will be healthy and very active while others will be frail with multiple health

conditions.² Cognitive impairments are the precursor for dementia and are estimated to be around 25% to 26% and the prevalence of dementia is around 5.1% to 6.4% in community-based studies in India.³ Cognitive ability is a term referring to an individual's ability to process thoughts that should not deplete on a large scale in healthy individuals. It is defined as the ability of an individual to perform the numerous mental activities most closely related to learning and problem-solving. Cognitive impairment is characterized by declines in memory, attention, and cognitive function, which greatly

affect the quality of life. The World Alzheimer Report stated that over 46 million people were living with dementia worldwide in 2015 and this number is expected to reach 131.5 million by 2050. In comparison, there is a high probability that this condition will progress to dementia. brief neuropsychological tools, such as mini-cog, montreal cognitive assessment, mini-mental state examination, etc. can be used to detect mild cognitive disorders.⁴

Functional ability combines “the intrinsic capacity of the individual, the environment a person lives in, and how people interact with their environment.” Functional ability includes the ability to meet basic needs to ensure an adequate standard of living like diet, clothing, housing, and healthcare, the ability to learn, grow, and make decisions like strengthening the person’s autonomy, dignity, integrity, freedom and independence, the ability to be mobile for completing daily tasks and participating in activities, the ability to build and maintain relationships and the ability to contribute to society by caring for family, assisting others, mentoring younger people volunteering, etc.⁵ Functional status is often assessed by the activities of daily living score and instrumental activities of daily living score. The ADLs is a term used to collectively describe “fundamental skills required to independently care for oneself, such as eating, bathing, and mobility”. It was first coined by Sidney Katz in 1950. The inability to perform ADLs results in poor quality of life and unsafe conditions, which makes them dependent on other individuals and/or mechanical devices. Basic ADLs or physical ADLs are those skills required to manage one’s basic physical needs, including personal hygiene or grooming, dressing, toileting, transferring or ambulating, and eating. The Instrumental Activities of Daily Living (IADLs) include more complex activities related to the ability to live independently in the community, such as managing finances and medications, food preparation, housekeeping, transportation, shopping, and laundry. Aging is a natural process that may present as a decline in the functional status of patients and is a common cause of subsequent loss of ADLs. A cognitive or mental decline, and musculoskeletal, neurological, circulatory, or sensory conditions are other causes. The most frequently used checklists are the Katz Index of Independence in ADL and the Lawton IADL scale.⁶

According to the Longitudinal Ageing Study in India (LASI) report (2020), 24% of the elderly aged 60 and above reported having at least one Activity of Daily Living (ADL) limitation, and 14% reported having two or more ADL limitations. 48% of elderly age 60 and above reported having at least one instrumental Activities of Daily Living (IADL) limitation and more than a third (37%) of the elderly reported having two or more IADL limitations. Difficulty in using the toilet facility was found to be the most common ADL limitation. Among IADL limitations, getting around in unfamiliar places is the most common difficulty reported by the elderly. A quarter (25%) of the elderly aged 60 and above needed a

helper to perform ADL/IADL.⁷ Studies conducted by Setiyani et al in Indonesia showed that the cognitive function of the nursing home residents was significantly lower than their community counterparts.¹ A community-based study conducted by Sozanska et al on the elderly population in Poland found that 35.75% of the participants had at least one IADL disability, the most common one being related to walking farther than the normal walking distance/moving within the community and at least one problem with ADLs was reported by 17.13% of the participants, most common were bathing and showering (8.38%) and dressing (6.52%).⁸ The most significant modifiable factors for the occurrence of disability were found to be the presence of barriers in the participant’s environment, poor relations with relatives, a lack of social contacts, multi-morbidity, and pain. Multiple studies such as Muhammad et al and Kumar et al have shown that ADL and IADL are closely related to the cognitive function of the individual.^{9,4} The study conducted by Samuel et al stated that residents of free homes have more prevalence of cognitive impairment, compared to paid homes and community-dwelling elderlies, and the study also found that increasing age, low education, lower income, female gender, and disability were found to have an association with cognitive impairment.¹⁴

With the increasing prevalence of cognitive impairment among the elderly, particularly in institutional settings like old age homes, the importance of understanding the relationship between functional health status and cognitive decline is crucial. With cognitive decline affecting approximately 25% of older adults in India, the ability to perform activities of daily living (ADLs) and instrumental activities of daily living (IADLs) becomes vital for preserving independence and quality of life.³ As mental health issues are projected to rise, examining these connections is essential to develop targeted interventions that enhance both cognitive and functional capabilities. Therefore, this research initiative aims to investigate the prevalence of cognitive impairment and functional status among elderly residents in old age homes in Delhi. It also explores the relationship between these factors and other variables such as socio-demographics, health conditions, emotional support, and environmental influences.

METHODS

Study design

A descriptive cross-sectional study was conducted in selected old age homes in Delhi from March 2023 to February 2024.

Study area

The study included 6 old age homes, comprising 3 government-run and 3 private facilities.

Study population

Residents who are staying in old age homes for more than 1 month and aged more than 60 years. The exclusion criteria were residents who were acutely ill and unable to communicate (due to any disability/psychotic and neurocognitive illness, and not in the condition to respond).

Sampling frame and sample size

Based on a previous study, 85.7% of the residents in OAHs have one or more chronic illnesses. Considering a 95% confidence level, 5% margin of error, and 10% non-response, the total sample size considered was 216. To meet the sample size, 6 OAHs were considered. With inclusion criteria, out of 247 residents residing in the selected 6 OAH, 94 were diagnosed with psychiatric illness, and 8 were acutely ill during the period of study, therefore, 145 were qualified for this study, and high non-response, interviews were taken from 121 residents. With time constrain and difficulty in getting the approval, the number of participants is less than the sample size. The total sample size from the government OAHs was 42 and almost double the number of Govt. was taken from private. i.e.79 participants, in the ratio of 1:2.

Study instruments

Lawton IADL scale: This scale was developed by Lawton and Brody in 1969 to assess the more complex ADLs necessary for living in the community. The scale takes 10 to 15 minutes to administer and contains eight items, with a summary score from 0 (low function) to 8 (high function).¹¹ Similar to the LASI study, here we will categorize respondents into “No disability”, “only 1 disability” and “2 or more disabilities”.⁷

Kalz ADL scale: It is the most appropriate instrument to assess functional status as a measurement of the client’s ability to perform activities of daily living independently. The Index ranks adequacy of performance in the six functions of bathing, dressing, toileting, transferring, continence, and feeding. Participants will be scored yes/no for independence in each of the six functions. Although no formal reliability and validity reports were found in the literature, the tool is used extensively as a flag signaling functional capabilities of older adults in clinical and home environments.¹² Similar to the LASI study, here we will categorize respondents into “No disability”, “only 1 disability” and “2 or more disabilities”.⁷

MINI-COG: It is a neuropsychological test that has been effective in detecting patients with dementia and has a high sensitivity and specificity for detecting cognitive impairment. The test, consisting of a clock drawing test (CDT) and a three-item recall test, takes only 3 min to administer, making it suitable for use in a primary care setting. The three-item recall is scored as a maximum of

three points, one for each correctly recalled word. CDT is where the patient is asked to spontaneously draw a clock displaying a particular time where a 3-point technique is used for scoring, 1 point for drawing a circle, 1 point for drawing the correct numbers on the clock, and 1 point for drawing the hands in the correct position, a score of 3 is considered normal. 2 points for a normal clock or 0 (zero) points for an abnormal clock drawing. A normal clock must include all numbers (1-12), each only once, in the correct order and direction (clockwise). There must also be two hands present, one pointing to the 11 and one pointing to 2. Hand length is not scored in the Mini-Cog© algorithm. The goal was to identify clock drawings that would be seen as “normal” or “not normal” by most people.¹⁰ In this study, 5 is considered normal and 4 or less were considered to have cognitive impairment.

Data analysis

The primary data was collected from the elderly residents using a semi-structured questionnaire. The collected data was tabulated and analysis was performed using Excel and IBM-SPSS Version 20®, presenting results through frequency tables, graphs, and statistical measures such as mean and chi-square tests (p value <0.05).

RESULTS

In this study, 6 OAHs were selected, of which 3 were government and 3 were private. There was a total of 247 residents under all the 6 OAHs, but only 121 participated in the study. The mean age of the participants was 73.2±9.6 years. 42.1% (51/121) were males and 57.9% (70/121) were females. 35.5% (43/121) fall into the age group 60 to 69 years (youngest old), 34.7% (42/121) fall into the 70 to 79 years (middle old) age group, and rest 29.8% (36/121) are those who are 80 years and above (oldest old).

Prevalence of ADL, IADL, and cognitive impairment

Out of 121 participants, 104 (86%) had no ADL-related disability, 4 (3.3%) had one ADL disability, and the rest 13 (10.7%) had 2 or more ADL disability. It was found that 16 (13.3%) need help to take a bath, 13 (10.7%) need help in dressing up, 9 (7.5%) need help in using the toilet, 10 (8.3%) need help in getting up and lying down in bed, 5 (4.1%) have no control over urination and defecation, and 2 (1.6%) need help in having food (Figure 1). Out of 121, 46 (38%) have no IADL disability, 18 (14.9%) have one IADL disability, and 2 or more ADL disability were found in 57 (47.1%). It was found that around 47 (38.9%) are unable to use phone to make calls, 50 (41.4%) said that they need someone to accompany them, as they are unable to walk by themselves, 58 (47.9%) stated that they are unable to go for shopping by themselves, 39 (32.3%) stated that they cannot prepare meals by themselves, 16 (13.2%) stated that they need help in doing house chores, 18 (14.9%) stated that they are not able to do the laundry, 4 (4.1%) of them were not able to take medication on

time by themselves, and 6 (4.9%) stated that they cannot take care of their finance (Figure 2). Out of 121, 69 (57%) were found to have cognitive impairment, and 52 (43%) had no cognitive impairment.

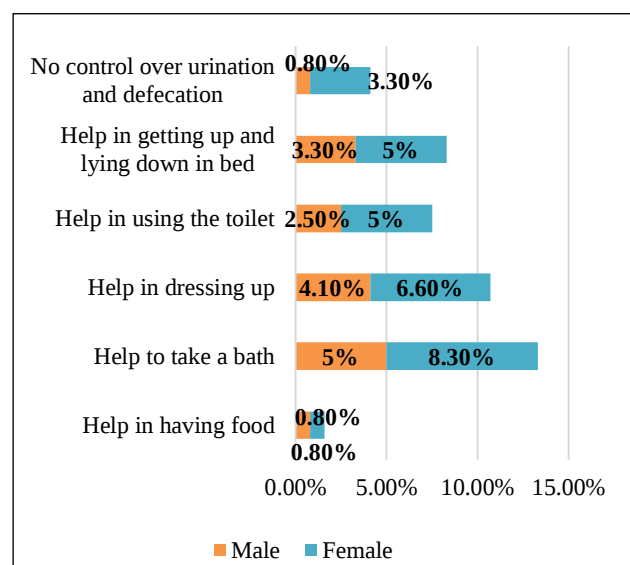


Figure 1: Distribution of disability in doing activities of daily living.

Relationship with sociodemographic factors

No relationship was found between disability in carrying out ADL to gender, age, duration of stay, education, and location. No significant relationship was found between disability in carrying out ADL to gender, duration of stay,

education, and location. The relationship between age ($p=0.001$) and IADL was found to be statistically significant. There is a significant relationship between increasing age ($p<0.005$) and gender ($p<0.008$) to cognitive impairment. Females are found to have more cognitive impairment. A significant relationship was found between age ($p<0.008$), gender ($p<0.005$), and education ($p<0.00$) to cognitive impairment was found statistically significant (Table 1).

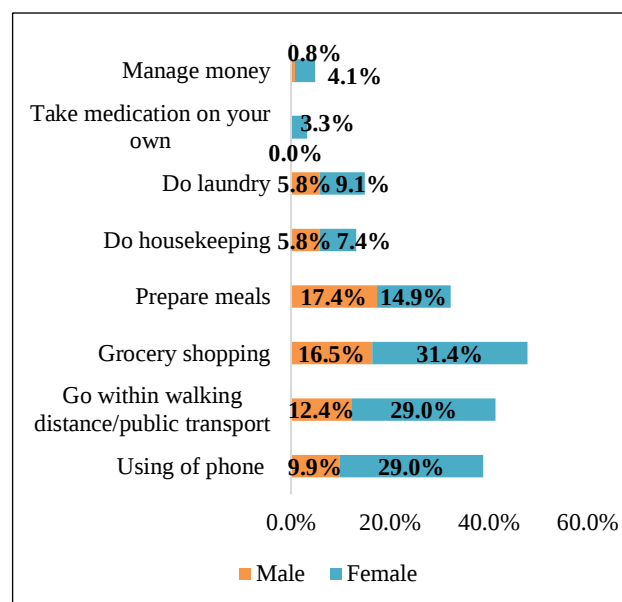


Figure 2: Distribution of disability in carrying out instrumental activities of daily living.

Table 1: Relationship of Disability in Activities of daily living (ADL), Instrumental Activities of daily living (IADL) and cognitive impairment (CI) with sociodemographic factors.

		Nil, N (%)	Only 1, N (%)	2 or more, N (%)	P value
ADL					
Gender	Male	46 (90.2)	1 (2)	4 (7.8)	0.507
	Female	58 (82.9)	3 (4.2)	9 (12.9)	
Age	Youngest-old	39 (90.7)	1 (2.3)	3 (6.7)	0.16
	Middle-old	35 (83.3)	0 (0)	7 (16.7)	
	Oldest-old	30 (83.4)	3 (8.3)	3 (8.3)	
Duration of stay	Upto 1 year	45 (83.3)	2 (3.7)	7 (13)	0.616
	1 to 4 years	45 (84.9)	2 (3.8)	6 (11.3)	
	More than 4 years	14 (100)	0 (0)	0 (0)	
Education	Illiterate	31 (91.2)	0 (0)	3 (8.8)	0.912
	Upto 4th grade	17 (85)	0 (0)	3 (15)	
	Upto 8th grade	18 (81.8)	1 (4.5)	3 (13.6)	
	Upto 12th grade	11 (84.6)	1 (7.7)	1 (7.7)	
	Graduate and above	26 (83.9)	2 (6.5)	3 (9.6)	
Location of previous residence	Rural	32 (94.1)	0 (0)	2 (5.9)	0.26
	Urban	72 (83.7)	4 (4.7)	10 (11.6)	
Type of OAH	Private	64 (81)	4 (5.1)	11 (13.9)	0.086

Continued.

		Nil, N (%)	Only 1, N (%)	2 or more, N (%)	P value
	Government	40 (95.2)	0 (0)	2 (4.8)	
IADL					
Sex	Male	24 (47.1)	7 (13.7)	20 (39.2)	0.208
	Female	22 (31.4)	11 (15.7)	37 (52.9)	
Age	Youngest-old	24 (55.8)	9 (20.9)	10 (23.3)	0.001*
	Middle-old	15 (35.7)	6 (14.3)	21 (50)	
	Oldest-old	7 (19.4)	3 (8.3)	26 (72.2)	
Duration of stay	Upto 1 year	18 (33.3)	8 (14.8)	28 (51.9)	0.642
	1 to 4 years	24 (45.3)	7 (13.2)	22 (41.5)	
	More than 4 years	4 (28.6)	3 (21.4)	7 (50)	
Education	Illiterate	6 (17.6)	9 (26.5)	19 (55.9)	0.17
	Upto 4th grade	9 (45)	2 (10)	9 (45)	
	Upto 8th grade	10 (45.5)	2 (9)	10 (45.5)	
	Upto 12th grade	8 (61.5)	2 (15.4)	3 (23.1)	
	Graduate and above	13 (41.9)	3 (9.7)	15 (48.4)	
Location of previous residence	Rural	13 (38.2)	5 (14.7)	16 (47.1)	0.888
	Urban	33 (38.4)	13 (15.1)	40 (46.5)	
Type of OAH	Private	33 (41.8))	11 (13.9)	35 (44.3)	0.506
	Government	13 (31)	7 (16.7)	22 (52.4)	
Cognitive impairment		With CI (N (%))		Without CI (N (%))	P value
Gender	Male	22 (43.1)		29 (56.9)	0.008*
	Female	47 (67.1)		23 (32.9)	
Age	Youngest-old	16 (37.2)		27 (62.8)	0.005*
	Middle-old	28 (66.7)		14 (33.3)	
	Oldest-old	25 (69.4)		11 (30.6)	
Type of OAH	Private	40 (50.6)		39 (49.4)	0.051
	Government	29 (69)		13 (31)	
Education	Illiterate	30 (88.2)		4 (11.8)	0.0*
	Upto 4 th grade	14 (70)		6 (30)	
	Upto 8 th grade	15 (68.2)		7 (31.8)	
	Upto 12 th grade	2 (15.4)		11 (84.6)	
	Graduation and above	7 (22.6)		24 (77.4)	
Duration of stay	Upto 1 year	32 (59.3)		22 (40.7)	0.82
	1 to 4 years	30 (56.6)		23 (43.4)	
	More than 4 years	7 (50)		7 (50)	

*Statistically significant

Table 2: Relationship of disability in Activities of daily living (ADL), Instrumental Activities of daily living (IADL) and cognitive impairment (CI) with other factors.

		Nil, N (%)	Only 1, N (%)	2 or more, N (%)	P value
ADL					
Self-rating of health	Very good	38 (97.4)	0 (0)	1 (2.6)	0.013*
	Good	44 (88)	2 (4)	4 (8)	
	Fair, poor	22 (68.7)	2 (6.3)	8 (25)	
Contact with family	Absent	61 (91)	1 (1.5)	5 (7.5)	0.178
	Present	43 (79.6)	3 (5.6)	8 (14.8)	
Emotional support	Absent	67 (90.5)	1 (1.4)	6 (8.1)	0.142
	Present	37 (78.7)	3 (6.4)	7 (14.9)	
Financial status	No income	70 (88.6)	1 (1.3)	8 (10.1)	0.222
	Dependent on family	24 (77.4)	3 (9.7)	4 (12.9)	
	Financially independent	10 (90.9)	0 (0)	1 (9.1)	
Interest in working	Absent	74 (82.2)	3 (3.3)	13 (14.4)	0.08

Continued.

		Nil, N (%)	Only 1, N (%)	2 or more, N (%)	P value
	Present	30 (96.8)	1 (3.2)	0 (0)	
IADL					
Self-rating of health	Very good	22 (56.4)	8 (20.5)	9 (23.1)	0.005*
	Good	17 (34)	6 (12)	27 (54)	
	Fair, poor	7 (21.9)	4 (12.5)	21 (65.6)	
Interest in working	Absent	29 (32.2)	10 (11.1)	51 (56.7)	0.001*
	Present	17 (54.8)	8 (25.8)	6 (19.4)	
Contact with family	Absent	25 (38.9)	12 (17.9)	30 (44.8)	0.571
	Present	21 (38.9)	6 (11.1)	27 (50)	
Emotional support	Absent	26 (35.1)	14 (18.9)	34 (45.9)	0.278
	Present	20 (42.6)	4 (8.5)	23 (48.9)	
Financial status	No income	29 (36.7)	13 (16.4)	37 (46.8)	0.221
	Dependent on family	10 (32.3)	3 (9.7)	18 (58.1)	
	Financially independent	7 (63.6)	2 (18.2)	2 (18.2)	
Cognitive impairment		With CI, N (%)	Without CI, N (%)		P value
Self-rating of health	Very good	19 (48.7)	20 (51.3)	0.433	
	Good	31 (62)	19 (38)		
	Fair, poor	19 (59.4)	13 (40.6)		
Financial status	No income	51 (64.6)	28 (35.4)	0.034*	
	Dependent on family	15 (48.4)	16 (51.6)		
	Financially independent	3 (27.3)	8 (72.7)		
Contact with family	Absent	45 (67.2)	22 (32.8)	0.012*	
	Present	24 (44.4)	30 (55.6)		
Emotional support	Absent	49 (66.2)	25 (33.8)	0.01*	
	Present	20 (42.3)	27 (57.4)		
Interest in working	Absent	60 (66.7)	30 (33.3)	0.0*	
	Present	9 (29)	22 (71)		

*Statistically significant

Table 3: Relation of cognitive impairment (CI) with ADL AND IADL.

		With cognitive impairment N (%)	Without cognitive impairment N (%)	P value
ADL	Nil	58 (55.8)	46 (44.2)	0.626
	Only 1	2 (50)	2 (50)	
	2 or more	9 (69.2)	4 (30.8)	
IADL	Nil	14 (30.1)	32 (69.9)	0.00*
	Only 1	11 (61.1)	7 (38.9)	
	2 or more	44 (77.2)	13 (22.8)	

*Statistically significant

Relationship with other factors

The relationship between self-rating of health and disability in ADL ($p=0.013$) was found to be statistically significant. The relationship between interest in working ($p=0.001$), and self-rating to health ($p=0.005$) to IADL was found statistically significant. A significant relationship was found between interest in working ($p<0.00$), contact with the family ($p=0.012$), and financial status ($p=0.034$) to cognitive impairment was found statistically significant (Table 2).

Relationship of cognitive impairment with ADL and IADL

A significant relationship was found between cognitive impairment and IADL with a p value less than 0.00, meanwhile, no significant relationship was found between cognitive impairment and ADL (Table 3).

DISCUSSION

In the study, the age distribution of the residents in youngest-old, middle-old, and oldest-old is 35.5%,

34.7%, and 29.8% respectively, with a mean age of 73.2 ± 9.6 . 42% were male and 58% were females.

In this study, 3.3% of the study population was found to have one ADL disability, 10.7% had 2 or more ADL disability, which was lesser than LASI study, where 24% were found to have at least one ADL disability, and 17% in the study conducted by Sozanska et al.⁸ The most common ADL disability was found to be difficulty in taking a bath (13.2%), followed by dressing up and getting in and out of the wheelchair. Nearly 18% of the population have one IADL disability, and 2 or more IADL disability was seen in 47.1%, which is much higher than the community studies conducted by LASI study and Sozanska et al.^{7,8} The most common IADL disability is the inability to go shopping alone (48%) and go for a walk alone (41.3%), followed by difficulty in using the phone and preparing meals in around one-third of the residents each. The prevalence of IADL disability in OAHs is found to be much more than the prevalence found in community-based studies, where the most common IADL disability was walking alone and doing shopping in both community and OAHs. ADL and IADL disability were found to affect the self-rating of health. In addition, IADL is seen more with increasing age, cognitive impairment, and those with less interest in working. No relationship was found between disability in carrying out ADL to gender, age, duration of stay, education, and location. No significant relationship was found between disability in carrying out ADL to gender, duration of stay, education, and location.

In this study, 57% of the residents who participated in the study were found to have a cognitive impairment. Cognitive impairment was found more in females, with increasing age, those with lesser education, those with no income, no family contact, no emotional support, and those with no interest in working. Similar to that of the study conducted by Setiyani et al, Kumar et al, Han et al and Samual et al where the incidence of cognitive impairment was found to be 55% and cognitive impairment is found to have a significant association to ADL, increasing age, marital status, low education level, lower income and gender.^{1,4,13,14} In this study, cognitive impairment is found to be only related to IADL disability and not to ADL disability. A strong association between IADL disability and cognitive impairment was also found in a study conducted by Makino et al.¹⁵ It confirms that those with IADL disability have higher chance of having cognitive impairment.

CONCLUSION

Establishing a connection proved challenging with certain residents because of distrust and skepticism from previous traumatic experiences and few were hesitant to share personal information. It is important to note that all the measures were self-reported, making them susceptible to subjective errors. An age-friendly atmosphere in the OAH can be established by incorporating features like

handrails, non-slip flooring, and more to enhance residents' comfort and reduce their risk of accidents. Considering the residents' declining mental and functional health, measures should be taken to boost social and physical activities among the residents.

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