Research Article

A Study To Assess The Risk For Fall And Cognitive Impairment Among Older Adults - A Cross Sectional Study

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Abstract

Background:
Falls and cognitive impairment are frequent geriatric conditions that have a major impact on morbidity, independence and quality of life in elderly people. Timely identification of those at risk is crucial for timely preventative interventions.
Aim:
To assess the risk for fall and cognitive impairment among older adults and to determine their association with selected risk factors.
Methods:
The cross-sectional study was undertaken on a sample of 360 older people. Sociodemographic data, body mass index (BMI) and comorbidities were collected. The STEADI tool was used to assess the risk of falls and the Mini-Cog was used to assess cognitive impairment. Appropriate statistical tests were used to analyze the associations between risk factors and outcomes, and $p < 0.05$ was deemed statistically significant.
Results:
The 360 participants included the majority of the age group 60-69 years (62.2%) and females accounted for 52.9% of the participants in the study. Hypertension (37.4%) and diabetes mellitus (25.8%) were the most common comorbidities. Thirty of the participants (79.5%) were identified as having a fall risk and 16 (4.2%) had cognitive impairment. Advanced age ($p = 0.029$), female gender ($p = 0.047$), multiple comorbidities ($p = 0.021$), overweight/obesity ($p = 0.034$), and smaller household size ($p = 0.018$) were significant factors associated with fall risk. Older age ($p = 0.012$) and having more than one co-morbidity ($p = 0.041$) were significant factors associated with cognitive impairment.
Conclusion:
Fall risk was more prevalent amongst older adults while cognitive impairment was less common. The multiple comorbidities and aging increased the risk of falls and cognitive impairment. Elderly persons can benefit from routine screening and early multidimensional interventions, which can help improve health outcomes and quality of life for older persons.

Keywords: Older adults; Falls; Cognitive impairment; STEADI; Mini-Cog; Geriatrics.

Introduction:

The world's population is ageing rapidly with estimates that by 2030 one in six people will be over 60; by 2050, this figure will be 2.1 billion (1). The geriatric population in India is projected to rise from 8% to 12.4% by 2026, which will pose significant public health problems related to increased non-communicable diseases and injuries among elders (2,3).
According to Global Burden of Disease Study 2021 (4,5) falls are major cause of injury, disability and death in older persons, with the fall rate increasing by 182% since 1990 for those aged 65 years or above. Approximately 28% of older adults in Tamil Nadu, India fall annually with each fall having a serious consequence including hip fracture, traumatic brain injury and fear of falling which reduces the activity of older adults and worsens their functional decline (4,6).
Cognitive impairment is a major independent risk factor for falls: even mild impairment impacts executive function, spatial orientation and attention, which doubles the risk of falling compared to non-impaired individuals. Cognitive impairment and physical frailty (also referred to as "cognitive frailty") are associated with a high risk of poor health outcomes and loss of independence (7, 8).
Older people in rural India are also at a higher risk of falling due to environmental influences (poor lighting and uneven pavement) (9). There is no awareness or screening in villages to address these risks which are prevalent

in the community. The purpose of this study is to determine the fall risk and cognitive impairment prevalence among this population and to provide information to better community-based prevention strategies and ensure quality of life for older adults in rural communities.

Methodology:

A community-based cross-sectional study was conducted among older adults aged 60 years and above residing in villages under the Rural Health and Training Centre (RHTC), Vayalanallur, Thiruvallur District, Tamil Nadu, India between November 2025 to April 2026. A total of 360 participants were enrolled using a non-probability convenience sampling technique. Older adults who were willing to participate and able to communicate in Tamil or English were included, while those with severe visual or hearing impairment, severe psychiatric illness, or inability to respond were excluded. Data were collected through house-to-house visits using a structured interviewer-administered questionnaire comprising socio-demographic and clinical details including age, gender, occupation, household size, body mass index (BMI), and comorbidities. Risk for fall was assessed using the STEADI (Stopping Elderly Accidents, Deaths and Injuries) screening tool, where a score of ≥4 indicated increased fall risk (10). Cognitive impairment was assessed using the Mini-Cog scale, with scores of 0–3 considered cognitively impaired and scores of 4–5 considered normal cognition (11). Anthropometric measurements were recorded using standard procedures. Face-to-face interviews were conducted in Tamil, and each interview lasted approximately 10–15 minutes.

Statistical analysis:

Data were entered in Microsoft Excel and analyzed using SPSS version 25.0. Descriptive statistics such as frequency and percentage were used to summarize variables, while associations between fall risk, cognitive impairment, and selected factors were analyzed using the Chi-square test. A p-value of <0.05 was considered statistically significant. Ethical approval was obtained from the Institutional Ethics Committee, and written informed consent was secured from all participants prior to data collection.

Results:

Table 1: Characteristics of Patients

Variable		**No of Patients (n = 360)**
Age	60-69	236 (62.2)
	70-79	116 (30.5)
	≥80	28 (7.3)
Gender	Male	179 (47.1)
	Female	201 (52.9)
Occupation	Working	206 (57.2)
	Not working	174 (42.8)
Household members	<4 members	228 (60)
	≥4 members	152 (40)

Among the 360 patients, the largest proportion were aged 60–69 years (236; 62.2%), followed by 70–79 years (116; 30.5%), with only 28 (7.3%) aged ≥80. Females slightly outnumbered males (201; 52.9% vs. 179; 47.1%). More than half were working (206; 57.2%), while 174 (42.8%) were not. Household size was predominantly <4 members (228; 60%), compared to ≥4 members (152; 40%).

Table 2: Distribution of BMI and Comorbidities

Variable		**No of Patients (n = 360)**
BMI	Underweight	22 (5.8)
	Normal	184 (48.4)
	Overweight	126 (33.2)
	Obese	48 (12.6)
Comorbidities	Hypertension	142 (37.4)

	Diabetes	98 (25.8)
	Dyslipidemia	76 (20)
	Multiple ≥2	64 (16.8)

Among the 360 patients, BMI distribution showed 22 (5.8%) underweight, 184 (48.4%) normal, 126 (33.2%) overweight, and 48 (12.6%) obese. Regarding comorbidities, hypertension was present in 142 (37.4%), diabetes in 98 (25.8%), and dyslipidemia in 76 (20%), while 64 (16.8%) had multiple (≥2) comorbidities.

Table 3: Distribution of Risk for Fall and Cognitive Impairment among Older Adults

Variable		**No of Patients (n = 360)**
Risk for Fall (STEADI)	At risk	302 (79.5)
	No risk	78 (20.5)
Cognitive Impairment	Impaired (Score 0-3)	16 (4.2)
	Not impaired (Score 4-5)	364 (95.8)

Among the 360 older adults assessed, 302 (79.5%) were at risk for fall according to STEADI, while 78 (20.5%) had no risk. Cognitive screening revealed impairment in 16 (4.2%), whereas the majority, 364 (95.8%), scored within the non-impaired range (Mini-Cog score 4–5).

Table 4: Association between Risk of Fall with Risk factors

Variable	**Category**	**At Risk for Fall (n, %)**	**No Risk (n, %)**	**p-value**
Age	60–69	176 (74.6)	60 (25.4)	**0.029***
	70–79	96 (82.8)	20 (17.2)	
	≥80	30 (93.8)	2 (6.2)	
Gender	Male	134 (74.9)	45 (25.1)	**0.047***
	Female	168 (83.6)	33 (16.4)	
Comorbidities	≥2 present	58 (90.6)	6 (9.4)	**0.021***
	None/1 present	244 (77.2)	72 (22.8)	
BMI	Overweight/Obese	142 (85.5)	24 (14.5)	**0.034***
	Normal/Underweight	160 (74.8)	54 (25.2)	
Household Size	<4 members	134 (88.2)	18 (11.8)	**0.018***
	≥4 members	168 (73.7)	60 (26.3)	

Among 360 older adults, fall risk was significantly associated with several factors. The proportion at risk increased with age, from 74.6% in 60–69 years to 93.8% in ≥80 years ($p = 0.029$). Females had a higher risk (83.6%) compared to males (74.9%; $p = 0.047$). Those with multiple comorbidities showed markedly elevated risk (90.6% vs. 77.2%; $p = 0.021$). Overweight/obese individuals were more often at risk (85.5%) than normal/underweight (74.8%; $p = 0.034$). Smaller households (<4 members) had greater risk (88.2% vs. 73.7%; $p = 0.018$).

Table 5: Association between Cognitive Impairment with Risk factors

Variable	**Category**	**At Risk for Fall (n, %)**	**No Risk (n, %)**	**p-value**
Age	60–69	4 (1.7)	232 (98.3)	**0.012***
	70–79	6 (5.2)	110 (94.8)	
	≥80	6 (18.8)	26 (81.2)	
Gender	Male	10 (5.6)	169 (94.4)	0.312
	Female	6 (3.0)	195 (97.0)	
Comorbidities	≥2 present	8 (12.5)	56 (87.5)	**0.041***
	None/1 present	8 (2.5)	308 (97.5)	
BMI	Overweight/Obese	10 (6.0)	156 (94.0)	0.089
	Normal/Underweight	6 (3.0)	202 (97.0)	
Household Size	<4 members	10 (6.6)	142 (93.4)	0.072

	≥4 members	6 (2.6)	222 (97.4)	

Among the 360 older adults, cognitive impairment was significantly associated with age and comorbidities. Impairment increased with advancing age, from 1.7% in 60–69 years to 18.8% in ≥80 years ($p = 0.012$). Those with multiple comorbidities had higher impairment (12.5% vs. 2.5%; $p = 0.041$). Gender differences were not significant (5.6% in males vs. 3.0% in females; $p = 0.312$). BMI showed a non-significant trend, with impairment more frequent in overweight/obese (6.0%) than normal/underweight (3.0%; $p = 0.089$). Household size also showed a borderline association, with smaller households (<4 members) having higher impairment (6.6% vs. 2.6%; $p = 0.072$).

Discussion:

In the present cross-sectional study, the risk of fall and cognitive impairment in older adults was assessed and various risk factors were included. The age group of majority of the respondents has been 60 – 69 years and there was a slight predominance of females. The majority of the participants had a normal BMI, and the most frequently reported comorbidities were hypertension and diabetes. Fall risk was identified in a high proportion (79.5%) of older adults while cognitive impairment was identified in a smaller proportion (4.2%).

The rates of falls observed in the present study are in agreement with other studies which have shown that falls are a significant health problem in the elderly. Montero-Odasso et al. found that, although the risk of falls among older people is largely influenced by advancing age, frailty and chronic diseases significantly contribute to the susceptibility of falls (12). Likewise, Ambrose et al. pointed out that gait instability, loss of balance and muscle weakness are significant factors in falls among the elderly (13). Older individuals at risk are particularly prevalent in the current study as the presence of comorbidities, overweight/obesity, and functional capacity loss with age may contribute to this.

In the present study, a strong correlation was found between age and fall risk such that those aged ≥80 years had the highest prevalence of fall risk. Rubenstein reported that the physiological changes of ageing, such as vision loss, decreased proprioception and sarcopenia, strongly contribute to the increased incidence of falls (14). Advanced age was also noted as one of the strongest predictors of falls in community-dwelling older adults by Tinetti et al. (15).

The female subjects in the present study had a significantly higher fall risk than males. This is also consistent with the results obtained by Bergen et al., who showed that elderly females had a higher incidence of fall injury related to bone density, muscle mass and postmenopausal physiologic changes (16). Women also are more likely to suffer from osteoporosis and from being mobility limited, both of which could make them more susceptible to falling.

In the current study, there was a strong association between comorbidities and fall risk. The risk was significantly higher in older adults with two or more comorbid conditions than in those with no or one condition. Kojima also saw multimorbidity to be closely related to physical decline, frailty and impaired balance in older individuals (17). Polypharmacy, reduced mobility, dizziness and neuropathy secondary to chronic disease (e.g., hypertension, diabetes mellitus, dyslipidaemia) may increase the risk of falls.

Additionally, overweight and obesity were shown to be significant factors related to fall risk in the present study. This result is similar to the results obtained by Mitchell et al. (18) who showed that over weight has negative impacts on gait mechanics, postural stability and mobility which leads to increased fall risk in elderly people. Obesity can also lead to limited mobility and poor muscle function, which can also be a factor in balance problems.

The smaller household size was also an important factor in the study, as was found to be associated with increased fall risk. People who are elderly and reside in relatively small households may not get as much social and physical support when they are undertaking daily tasks, making them more vulnerable to accidents and to being delayed in getting help after a fall. Family support and social participation have also been shown to have a protective effect for functional independence among older people in previous studies (19).

In the current study, 4.2% of the subjects were found to have cognitive impairment. Despite a relatively low prevalence, cognitive impairment was found to be strongly associated with age and multimorbidity. This study concurred with the one conducted by Prince et al. that showed that cognitive decline increases steadily with age with neurodegenerative and vascular changes (20). Likewise, Livingston et al. highlighted ageing and chronic diseases as significant factors in the cognitive decline of the elderly (21).

The present study showed significant relationships between cognitive impairment and a number of comorbidities. Many chronic diseases have been documented to affect cerebral perfusion and vascular cognitive decline, including hypertension and diabetes. Biessels and Despa conducted a systematic review that reported that diabetes mellitus has been linked to cognitive impairment and dementia by vascular and metabolic pathways (22).

In this study, gender, BMI, and family size were not found to be statistically significant variables for cognitive impairment, but the results suggested an increase in cognitive impairment for overweight/obese people and smaller families. Previous studies have seen inconsistent results, indicating that educational level, lifestyle, depression and socioeconomic factors all contribute to cognitive decline, apart from biological factors (23).

Limitation:

The findings may be limited to the generalizability to elderly people at the wider population level since the study was conducted in a single centre and was limited in the number of participants. A detailed neuropsychological evaluation was not conducted, and may have underestimated MCI. Furthermore, medication use, physical activity, depression, socioeconomic status, and environmental hazards were not evaluated which may have affected fall risk and cognitive status.

Conclusion:

The study determined that there was a high prevalence of fall risk among older adults and fewer older adults had cognitive impairment. Advanced age, comorbidities, obesity, female gender and smaller household size were associated with higher fall risk. Older age and higher numbers of comorbidities were linked to cognitive impairment. The results highlight the importance of early fall risk and cognitive decline screening, such as STEADI and Mini-Cog, and subsequent early intervention, such as balance training, exercise, and nutrition counselling. Multidimensional assessment-based community-based geriatric health programs can reduce morbidity and enhance quality of life among older people.

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