

# Relationship between increased risk of falling and cognitive impairment in residents of an elderly home in the Colombo district

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## Summary

Tendency to falling in older people, with and without cognitive impairment, living in an elderly home was assessed. A descriptive analytical study was carried out with 50 elderly people (25 males) aged between 60 - 85 years. Timed Up and Go (TUG) test and, Five Times Sit to Stand Test (FTSST) were used to determine risk of falling and functional lower extremity strength of each participant. The Folstein Mini Mental State Examination (MMSE) and Montreal Cognitive Assessment (MoCA) were used to assess cognition. The cognitive scores were significantly lower in fallers compared to non-fallers ( $p=0.0001$ ). Fallers demonstrated significantly poor lower extremity strength ( $p=0.0001$ ). Older people with cognitive impairment demonstrated poor functional lower extremity strength than those without cognitive impairment ( $p=0.002$ ). The difference in falling tendency between males and females was not statistically significant.

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## Introduction

Falls are a major health care problem for elderly people world wide. Falls are not random events and may occur due to physiological impairment, such as impaired balance, muscular weakness and slowed reaction time. Falls can also be associated with cognitive impairment and is increasingly recognized as a problem. Approximately 15% of people in the community aged 65 years and older fall about twice or more per year and 50% of elderly people in residential care facilities fall at least once a year [1]. About 24.1% of women and 18.3% of men experienced at least one fall within an year [3].

Even though cognitive impairment and falls in elderly have been studied separately, only a few studies have been conducted to assess the relationship of increased risks of falling with cognitive impairment [1-3]. Such studies have not been conducted in Asia and this has led to deficiencies in planning preventive and management

strategies. The current study examined cognitive impairments and evaluated the association between such impairment and risk of falling. The study also aimed to identify an association between different categories of cognitive impairment and lower extremity strength.

## Methods

A descriptive analytical study was carried out at The Little Sisters Elderly Home using consecutive sampling. Participants were recruited for the study if they were able to give informed written consent, had not being diagnosed of having a neurodegenerative disease or stroke, and were literate. Ethical approval for the study was obtained from the Ethics Review Committee of the Faculty of Medicine, Colombo.

Data collection was carried out by interviewing all participants using an interviewer administered questionnaire. Each participant's risk of falling was assessed using the Timed Up and Go (TUG) test. A TUG >13.5 seconds indicates high prediction for falls (i.e. fallers) and a value  $\geq 13.5$  indicated a non-faller [4]. Five Times Sit to Stand Test (FTSST) was used to determine functional lower extremity strength and balance of each participant. A FTSST  $\geq 15$  seconds indicated normal functional level of lower extremity strength [5].

The Folstein Mini Mental State Examination (MMSE) was used to categorize the participants in to three groups; not having cognitive impairment or having mild or severe cognitive impairment [6]. The Montreal Cognitive Assessment (MoCA) was used to further categorize participants who were categorized as having normal cognitive level in (scores  $\geq 24$ ) MMSE, as either having or not having mild cognitive impairment [7]. Folstein Mini Mental State Examination and Montreal Cognitive Assessment were adapted for use in our population.

MMSE range is 0-30 points, 24-30 indicate no cognitive impairment, 18-23 indicate mild impairment and 0-17 indicate severe cognitive impairment. In MoCA the range is 0-30, a score of 26 or above was considered normal. Below 26 was categorized as mild cognitive impairment. Questionnaires used in the study were previously translated and validated.

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**Results**

We recruited 50 persons aged 60-85 years (25 males, 25 females). Cognitive impairment was a common finding in the sample with 66% of elders demonstrating mild to severe cognitive deficits according to MoCA and 44% of elders demonstrating moderate to severe cognitive deficits according to MMSE.

The MMSE of fallers (mean MMSE score 18.65) was significantly lower compared to non-fallers (mean MMSE score 26.79; Figure 1). The difference in cognitive function between fallers and non fallers was statistically significant according to both MMSE and MoCA scales ( $p=0.0001$ ). The fallers had a significantly lower MoCA value (Fallers mean= 14.12, Non fallers mean= 24.04) (Figure 2).

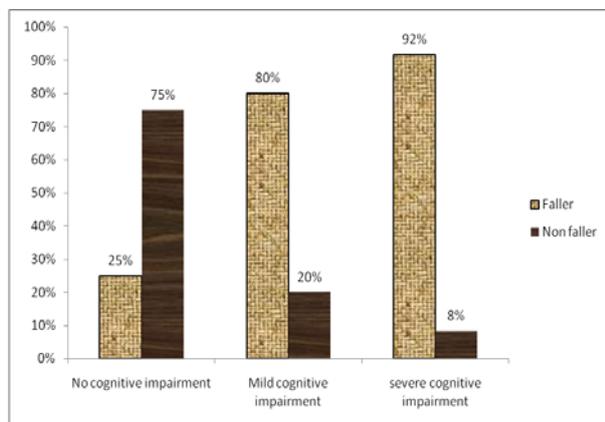


Figure 1. **MMSE cognitive status vs. Falling tendency.**

This graph shows percentage of participants in relation to falling tendency (Y axis) compared with the level of cognition according to the MMSE scale (X axis). Majority of the people who were having severe cognitive impairment (92%) were having a significantly higher falling tendency ( $p=0.001$ ).

Fallers demonstrated a significantly lower functional lower extremity strength and balance. There is statistically significant difference between falling tendency in the people with poor lower extremity strength and normal lower extremity strength ( $p=0.0001$ ). Older people with cognitive impairment demonstrated poor functional lower extremity strength and balance. Cognitive function according to MMSE and lower extremity strength demonstrated a positive correlation and the correlation was statistically significant ( $r=0.469, p=0.001$ ). There was a significant difference in cognitive function between people with poor lower extremity strength and normal lower extremity strength according to the MoCA scale ( $p=0.002$ ).

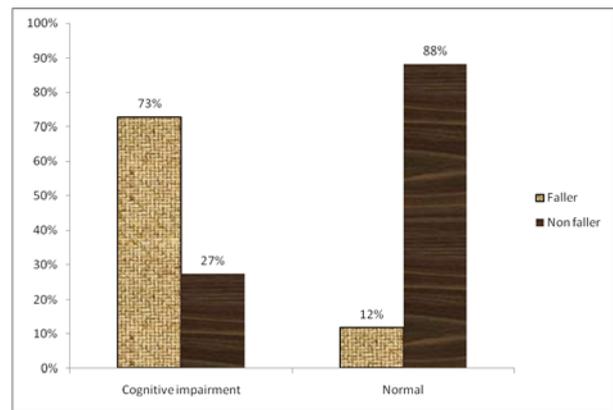


Figure 2. **MoCA cognitive status vs. Falling tendency.**

This graph shows percentage of participants in relation to falling tendency (Y axis) compared with the level of cognition according to the MoCA scale (X axis). Majority of cognitively impaired people (73%) had significantly higher falling tendency ( $p=0.0001$ ). When cognitive level deteriorates tendency of falling has increased.

Our study showed that when age increased, cognitive functions deteriorate. MMSE score and age of the sample showed a significant negative correlation ( $r=-0.312, p=0.027$ ). MoCA score and age of the sample showed statistically significant negative correlation ( $r=-0.406, p=0.003$ ). Although the falling tendency among elderly males (30%) was higher than that of the females (22%), the difference was not statistically significant ( $p=0.258$ ).

**Discussion**

Cognitive impairment is increasingly recognised as a clinical problem among the elderly and the current study showed that older people with cognitive impairment had a greater risk of falling than older people without cognitive impairment. The number of elderly who had a fall (52%) was similar to that reported in the WHO Global report on falls prevention [8]. According to that report approximately 30-50% of people living in long-term care institutions fall each year. Among those with severe cognitive impairment (24%) majority were fallers (91.7%). The current study also supports findings of previous studies that there is a relationship between functional lower extremity strength with cognitive impairment.

We were able to find significant correlations between the level of cognitive functioning, lower extremity strength and risk of falling in elderly people living in a care home. This study suggests screening for fall risk in elderly people requires specific attention to these two aspects.

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