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Predictors of falls and falls-related injury in elderly with mild cognitive impairment

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ABSTRACT

Introduction: *Falls and Mild Cognitive Impairment(MCI) are two important causes of disability in the elderly.There is tremendous impact on falls in elderly with MCI. Falls and falls related injuries make elderly more prone to frailty. Time Up and Go test is a tool for identifying risk of falls in this group. Howeverthere is paucity of information regarding falls in cognitively impaired elderly.****Objectives:*** *1. To assess the risk of falls. 2. To find out the different predictors of falls in elders with MCI. 3. To assess different fall related injuries. Materials and* ***Methods:****A cross sectional community based study, was conducted in 10 randomly selected wards of Guwahati City. A total of 400 elders were studied. MCI was screened by Montreal Cognitive Assessment Scale, Timed Up and Go test was performed to assess the risk of falls. History of fall was obtained by asking questions on falls in last 12 months.* ***Results:*** *Overall falls prevalence was 19.5% whereas among MCI cases it was 39.74%fall in MCI was significantly associated with Gender and Timed Up and Go Test.Timed Up and Go Test is significantly associated with MCI among fallers. Chance of falls related injury is less in elders without MCI. Fracture was more in elders with MCI.Conclusion:Falls in elderly with MCI is significant issue which needs to be addressed in a holistic way.TUG can be used to assess the risk of falls in elderly with Mild Cognitive impairment.*

Keywords:*Falls, Cognitive Impairment, Time Go Test, Predictors, elderly*

INTRODUCTION

With increasing life expectancy, there is tremendous increase of morbidities and disabilities in old age. Falls and cognitive impairment are two important causes of morbidity and disability. A fall is defined here as an event which results in a person coming to a rest inadvertently on the ground or floor or other lower level.[1] Mild cognitive impairment (MCI) has been identified as a transition phase between normal cognitive ageing and early dementia.[2]

Fall itself is a significant cause of injuries, loss of confidence,increased morbidity, institutionalization and mortality in all older people.[3,4]Falls account for over 80% of injury-related admissions to hospital of people older than 65 years.[5,6] Senile Dementia is an important risk factor for serious falls, and falls are associated with loss of independence in demented patients.[7]Older adults with MCI were noted to have poorer Timed Up and Go (TUG) Test performance[8] and cognitive impairment was identified as an independent determinant of TUG score.[9]. Co-existence of two geriatric giants makes elders more vulnerable to frailty.However, there is paucity of information especially in Indian context regarding falls in elderly with MCI.So, the present study has been conducted to assess predictors of fall and falls related injuriesamongst elderly with Mild Cognitive Impairment (MCI).

MATERIALS AND METHODS

A cross-sectional, community- based study was conducted among elderly aged 60 years and above,from June to August 2015. Informed consent was obtained from the participants as well as from the caregiver/family members.Critically ill elderly,elderly with known/diagnosed neuropsychiatric, psychiatric or musculoskeletal diseases, severe dementia(onMini Mental State Examination score less than 15), were excluded from this study.Elders who were found to score >5 on 15 Geriatric Depression Scale(15 GDS) were also excluded. Considering the paucity of data on prevalence

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of falls, sample size was calculated considering p=0.5.[10]. Taking allowable error as 10%, the sample size was 400 applying the formula of $4PQ/L^2$. MCI was screened by The Montreal Cognitive Assessment (MoCA), a brief screening tool for MCI has a sensitivity of 90% for detecting MCI[11]. Timed Up and Go (TUG) Test was performed to assess the risk of falls. From the 31 wards of Guwahati City, 10 wards were selected randomly and from each ward, 40 elderly will be selected. House to house visits were made and data were collected in a predesigned and pretested schedule. History of fall was obtained based on previous falls in last 12 months. TUG Test was performed to assess the risk of falls.[12]History of chronic disease (more than 6 months) were asked. For inadequate vision,operational definition was made. Perceived difficulty in doing day to day activities due to poor vision has been considered as inadequate vision.

Table 1 Distribution of falls in relation to cognitive status

Impaired cognitive status	**Falls**					
	Yes (%)	%	No (%)	%	Total	%
Yes	31 (39.7)	68.89	14 (4.35)	31.11	45	100
No	47 (60.3)	13.23	308 (95.7)	86.76	355	100
Total	78 (100)		322 (100)		400	

P<0.05, df=1, chi square value=75.285

Table 2 showed the results of TUG test. Majority (66.67%) elders with MCI had showed impaired TUG test. A significant relationship was seen between MCI and TUG in elders with history of falls.

Table 2 Relationship of TUG results with MCI

MCI			TUG		Total	
	Normal	%	Impaired	%	No.	%
Yes	15 (6.61)	33.33	30 (17.34)	66.67	45	100
No	212 (93.39)	59.72	143 (82.66)	40.28	355	100
	227 (100)		173 (100)		400	

P<0.05, df=1, chi square value=10.278

In Table 3 in assessing the relationship of different variables of falls with MCI, gender and TUG were found to be significantly associated with MCI.

Relationship between different variables of falls with MCI was studied. The data were subjected for analysis using appropriate methods like Chi-square test and p value.

RESULTS

Table 1 revealed the distribution of falls among community dwelling elderly in reference to cognitive status,out of 400 elderly interviewed, 45(11.25%) were found to have MCI on Montreal Cognitive Assessment scale. As a whole, falls prevalence was 19.5%(78/400).Occurrence of falls was reported in majority of elderly with MCI(68.89%). A statistically significant relationship (p<0.05) was observed between falls and MCI.

Table 3 Relationship of predictors of fall with Mild Cognitive Impairment

Predictors	Mild Cognitive Impairment				Total (n=78)	P value
	Yes (n=31)	%	No (n=47)	%		
Age					No %	
60-74	6 (19.35)	37.5	10 (21.24)	62.5	16 100	>0.05
75-84	23 (74.19)	41.82	32 (68.08)	58.18	55 100	
>85	2 (6.45)	28.57	5 (10.64)	71.43	7 100	
Gender						
Male	22 (70.96)	59.46	15 (31.91)	40.54	37 100	<0.05
Female	9 (29.03)	21.95	32 (68.09)	78.05	41 100	
Comorbid conditions						
≥2	11 (35.48)	35.48	20 (42.55)	64.52	31 100	>0.05
3	8 (25.81)	40.00	12 (25.53)	60	20 100	
>3	12 (38.71)	44.44	15 (31.91)	55.56	27 100	
Vision						
Normal	7 (22.58)	30.43	16 (34.04)	69.57	23 100	>0.05
Impaired	24 (77.42)	43.64	31 (65.96)	56.36	55 100	
TUG						
Normal	9 (29.03)	18.75	39 (82.98)	81.25	48 100	<0.05
Impaired	22 (70.97)	73.33	8 (17.02)	26.67	30 100	

Table 4 states that out of 31 MCI cases, more common injuries are lacerations and sprains. Again, out of the total cases with falls, 38.30% of elderly without MCI did not encounter any injuries in comparison to elders with MCI who did not revealed any injuries (19.35%). Out of total cases who experienced falls during the last one year,54(69%)had history of falls related injuries. Fractures was reported more by elderly with MCI(9.68%) than elderly with normal cognition(2.13%).

Table 4 Falls related injuries and MCI

Type of injury	MCI				Total	
	Yes (n=31)	%	No(n=47)	%	(n=78) No	%
No Injury	6 (19.35)	25	18 (38.30)	75	24	100
Yes (n=54)						
Laceration	10 (32.26)	32.26	21 (44.68)	67.74	31	100
Contusion	4 (12.90)	80	1 (2.13)	20	5	100
Sprain / Strains on joints	8 (25.81)	57.14	6 (12.76)	42.86	14	100
Fracturcs	3 (9.68)	75	1 (2.13)	25	4	100

DISCUSSIONS

There is wide variation in the prevalence of falls as well as MCI due to different methodological approach, screening instrument, social and environmental landscapes. Balance, gait and impaired executive functions are associated with risk of falls.[13]Studies have shown that those with MCI or mild AD had significantly reduced balance and limb

coordination compared with cognitively-intact individuals.[14] Impaired physiological function, structural and functional brain abnormalities are also associated with impaired cognition, including executive functions.[15] The finding of present study of significant association between falls and MCI were in conformity with other studies.[13,16,17,18,]

Older women with MCI demonstrated greater number of falls risk factors than older women without MCI.[19] This finding is in consistent with the finding of present study. The observation of non-significant association of age, number of co-morbid conditions,vision among the fallers with MCI could be attributed to small sample size. However, the significance of TUG test in elderly with MCI was found in our study which is in conformity with other studies.[20,21,22] Although vision is an important predictor of falls [23], but in relation to MCI , a non-significant association was found.

Rate of fall-injury is seen to be somewhat lower in the present studythan published literatures.[24]. The reason behind the reported low injury may be attributed to lower executive and memory functions among the cognitively impaired group. However fall injury is more in cognitively impaired elderly which may be attributed to difficulty in coordination and impairment in executive functions in protecting oneself from injuries.

Limitation of the study is we could not go for neuro-psychological evaluation for MCI. Some radiological investigations could not be done due to resource limitations. A temporal relationship could not be established due to cross-sectional design of the study.

CONCLUSION

Risk screening for falls is crucial in elderly with MCI. TUG test can be done to assess the risk of fall and to prevent falls-related injuries. Considering the increased occurrence of serious injuries like fractures among the MCI group of elderly, it is really necessary to do fall assessment so that effective interventions could be undertaken. However further indepth studies with larger sample size is required in this regard.

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