

Original Article

Associations between falls and psychosocial factors, self-rated health, disability and sleep among community dwelling older people in Malaysia

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ABSTRACT

Background/Objective: Falls among older people leads to major consequences, which affects their quality of life. The causes are multifactorial, a combination of intrinsic and extrinsic factors, which include psychosocial and functional factors. This study aimed to determine the association between falls and the psychosocial factors, self-rated health, disability and sleep among community dwelling older people in Malaysia.

Methods: This study utilized the first wave data from the Towards Useful Ageing (TUA) cohort. A total of 1993 adults aged ≥ 60 years with no diagnosed psychiatric illness; without and with mild or moderate cognitive impairment were included in the analyses. Risk of falls, psychosocial factors (perceived stress, life satisfaction, loneliness, depression, social support, and sleep duration) and functional factors (disability and independence of activities of daily living) were assessed using a pre-tested questionnaire.

Results: The proportion of older people with a history of falls was 18.6%. The results of multiple logistic regression revealed aged between 75-84 years (OR=1.61; 95% CI=1.20, 2.15; $p=0.001$), aged ≥ 85 years (OR=3.32; 95% CI=1.23, 8.65; $p=0.014$), women (OR=1.67; 95% CI=1.31, 2.11; $p < 0.001$), and at risk of depression (OR=1.39; 95% CI=1.02, 1.89; $p=0.035$) were significantly associated with falls. Fewer hours of sleep in a day was associated with increased risk of falls (OR=0.91; 95% CI=0.84, 0.98; $p=0.017$). The Malays (OR=0.52; 95% CI=0.33, 0.84; $p=0.007$) and Chinese (OR=0.45; 95% CI=0.27, 0.73; $p=0.014$) ethnic groups were less likely to falls when compared to Indian and others ethnicity.

Conclusion: Knowing these predictors for falls could facilitate in identifying older people who might benefit from early falls prevention interventions in the community.

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INTRODUCTION

Fall is defined as “an unexpected event in which the participants come to rest on the ground, floor, or lower level”,¹ and nearly 30% of older people fall at least once a year.² Nationwide studies in Malaysia reported up to 19.1%^{3,4} of older people reported at least one fall in the previous 12 months. On the other hand, the estimates of fall rates vary

widely from 4.1% to 27.3% annually among community dwellers.^{5,6} This is probably due to discrepancies on the demographics of the older people, living arrangements, presence of diseases and the use of different instruments to ascertain falls. With population ageing, the incidence of falls and falls related injuries among older people are expected to increase exponentially, which will incur higher health and social care costs.⁷

Numerous studies have been performed to determine the risk factors associated with falls in older people. These include but are not limited to demographic characteristics such as age⁸ and gender,⁹ medications used,¹⁰ lifestyles factors⁹ and environment conditions.⁴ In the local context, living alone and indigenous ethnic groups had been associated with increased risk of falls.⁶

In comparison to developed countries where only approximately 20% of fallers will need medical attention, a higher percentage at 60% of fallers in Malaysia experienced resultant injury that needed medical attention in the preceding 12 months.¹¹ Falls is a major medical issue among older people due to its health economic and social burden and require further investigation. Falls are multifactorial, culmination of various combinations of intrinsic and extrinsic factors which also include psychosocial and functional factors.¹² Previous local studies on psychosocial and functional risk factors are scarce, and often limited to either small sample size or institutionalized older people. Hence, this study aimed to determine the association between falls and the psychosocial factors, self-rated health, disability and sleep among community dwelling older people in Peninsular Malaysia.

METHODS

Participants

The present study utilized data derived from a national longitudinal study - Towards Useful Ageing (TUA) project, wave I. It was a study on aging that focused on a wide range of neuroprotective factors among a population-based sample of Malaysian older people. Participants were recruited using a multi-stage random sampling method from four states in Malaysia that have the highest numbers of older people aged 60 years and above. The methodology of this study had been described elsewhere.^{13,14} Briefly, this study recruited older people aged ≥ 60 years who were either normal or with mild cognitive impairment and was not diagnosed with psychiatric illness. Those with moderately severe or severe cognitive impairment (mini mental state examination scores below 15) were excluded.

Data collection

The extracted data used for analysis in this study included: 1) socio-demography: age, sex, ethnicity, education, marital status, living arrangement, employment, income; 2) history of falls in the last one year; 3) psychosocial factors (perceived stress, risk of depression, satisfaction with life, loneliness,

social network, social support, self-perceived success, perceived quality of life, self-rated health, duration of sleep; and 4) functional factors (disability and activities of daily living).

The outcome in this present study was history of falls and participants were asked if they have fallen in the past 12 months. The level of stress was measured using the 4-items Cohen's Perceived Stress Scale¹⁵ with responses scored as 0 (never) to 4 (very often). Higher scores suggested greater stress. As for risk of depression, it was measured using the 15-items Geriatric Depression Scale.¹⁶ One point was awarded for each question with a total score of 15 with scores of ≥ 5 suggestive of risk of depression. Satisfaction with Life Scale measures global cognitive judgments of satisfaction with one's life, which has 5 items.¹⁷ Higher scores indicated greater satisfaction.

Loneliness was assessed using 3-item scale and each item had three response categories namely hardly ever, some of the time, and often.¹⁸ Higher scores suggested greater loneliness. Satisfaction with social support was assessed using the Lubben Social Support Network Scale¹⁹ and Medical Outcome Study of Social Support survey.²⁰ The 6-item Lubben Scale assessed kin and non-kin ties social network to screen for social isolation in older people. The scores ranged from 0 to 30 and scores of less than 12 suggested social isolation. The Medical Outcome Study of Social Support Survey comprised 19 items. It measured perceived availability of social support on a four-point Likert Scale namely 0 (none of the time), 1 (some of the time), 2 (most of the time), and 3 (all the time). Higher score was indicative of greater social support.

Flourishing Scale is an 8-item questionnaire with seven-point Likert Scale (1-strongly agree, 2-agree, 3-slightly agree, 4-neither agree nor disagree, 5-slightly disagree, 6-disagree, 7-strongly disagree).²¹ It measured human functioning ranging from positive relationships, to feelings of competence, to having meaning and purpose in life. Higher score indicated negative feelings. Quality of life, self-rated health and sleep pattern were ascertained using a closed ended question. Disability was assessed using the WHO Disability Assessment Schedule (WHODAS),²² with higher score suggested greater disability. Assessment of Activities of Daily Living (ADL) emphasized on questions related to personal care such as bathing, dressing, toileting, transferring, feeding and continence. Scores ranged between 0 and 6. Scores of 5-6, 3-4 and ≤ 2 suggested independence in ADL, moderately dependent and very dependent respectively.

Data analyses

Data was analysed using SPSS version 22.0. Descriptive data was described as mean and standard deviation or median and interquartile range for continuous data and as frequency and percentages for categorical data. Missing data of the variables in this study ranged from 0.04% to 4.28%. No imputation was done for missing data which explains the

differences in denominator for each variables. Univariate approaches of logistic regression was applied to determine factors associated with history of falls and the results are presented as odds ratio and 95% confidence interval (95% CI). We regrouped the Indian and others ethnic groups as one and the secondary and tertiary educations as one for the purpose of logistic regression analysis in view of the small numerator. Multivariate logistic regression model was developed using a stepwise backward likelihood ratio with 0.100 significant levels for an addition of the variable to predict risk of falls. We included all variables as factors in the logistic regression model to obtain the adjusted odds ratio (OR) for predicting risk of falls. The findings presented were based on the final model selection from the stepwise method. The findings were reported as adjusted odds ratio (OR), 95% confidence interval (CI) and p-value (<0.05) to determine the strength of contribution of each predictor towards history of falls. We did not adjust for age, gender or other variables since the emphasis in this study was centered on identifying subgroups with highest risk and not on the identification of causal risk factors. A sub-analysis on the sleeping duration among those with history of falls was performed to determine any association with age, sex and ethnicity, as this has not been explored in the Asian population.

Ethical conduct

This study was approved by the Medical Research Ethics Committee, Universiti Kebangsaan Malaysia. Study participants provided verbal and written consent prior to participation.

RESULTS

A final sample of 1,993 older people were included for the analysis for this study. Among the 1,993 older people, 370 (18.6%) had a history of falls in the last one year (Table 1). Of those who had fallen in the last one year, 166 (44.9%) had fallen two or more times. Among those who fell, 181 (48.9%) did not sustain any injuries. About 24 (6.5%) and 60 (16.2%) reported to have sustained injuries and fractures, respectively but only 41 (11%) required hospitalisation. Most of the participants were in the 60-74 year old age group (82.5%), men (50.3%), of Malay ethnicity (63.6%), of primary education level (59.8%), married (71.8%) and were either living with spouse, family or friends (90.2%) (Table 1). The sociodemographic factors associated with falls were people aged ≥ 75 years ($p=0.003$) and women ($p < 0.001$) as shown in Table 1.

Characteristics of the participants based on psychosocial and functional factors are as summarised in Table 2. Univariate analysis showed that factors associated

with falls were those at risk of depression ($p=0.018$), lack social support ($p=0.042$) and reduced hours of sleeping in a day ($p=0.027$). Table 3 presents the findings of the multivariate logistic regression of factors associated with falls in our study population. The factors associated with falls were: aged between 75-84 years (OR=1.61; 95% CI=1.20, 2.15; $p=0.001$), aged ≥ 85 years (OR=3.32; 95% CI=1.23, 8.65; $p=0.014$), women (OR=1.67; 95% CI=1.31, 2.11; $p < 0.001$), and at risk of depression (OR=1.39; 95% CI=1.02, 1.89; $p=0.035$). The Malays (OR=0.52; 95% CI=0.33, 0.84; $p=0.007$) and Chinese (OR=0.45; 95% CI=0.27, 0.73; $p=0.014$) ethnic groups were less likely to falls when compared to Indian and others ethnicity. The hours of sleep in a day was associated with fall; with every one unit increase in sleeping hours the risk of falls decreased by 9% (OR=0.91; 95% CI=0.84, 0.98; $p=0.017$). In this study, there was no collinearity between the factors associated with falls. The sub-analysis on sleeping hours among those with history of falls found an association between sleeping hours and ethnicity ($p=0.033$). The post-hoc LSD analysis showed the Malay (6.13 \pm SD 1.74 hour) had less mean sleeping hours compared to the Chinese (6.72 \pm SD 1.52 hours) (results not shown in table). No association was found between other ethnic groups or for age and gender.

DISCUSSION

Our study found that women were significantly more likely to fall. The results also showed older people aged 75 years and older, and those at risk of depression and had shorter

Table 1. Socio-demographic factors associated with falls (n=1,993)

Factors	Total, n (%)	History of falls, n (%)	OR (95% CI)	p value
Age				
60-74 years ^a	1,644 (82.5)	283 (17.2)		
75-84 years	328 (16.5)	80 (24.4)	1.55 (1.17, 2.06)	0.002*
≥ 85 years	21 (1.1)	7 (33.1)	2.41 (0.96, 6.01)	0.61
Sex				
Male ^a	1,002 (50.3)	151 (15.1)		
Female	991 (49.7)	219 (22.1)	1.60 (1.27, 2.01)	<0.001*
Ethnicity				
Malay	1,267 (63.6)	235 (18.5)	0.56 (0.35, 0.88)	0.012*
Chinese	626 (31.4)	106 (16.9)	0.50 (0.31, 0.81)	0.005*
Indian and others ^a	100 (5.0)	29 (29.0)		
Highest level of education				
No formal education	330 (16.6)	70 (21.2)	1.17 (0.83, 1.67)	0.369
Primary school	1,191 (59.8)	212 (17.8)	0.945 (0.72, 1.24)	0.687
Secondary education and higher ^a	472 (23.6)	88 (18.6)		
Marital status				
Married ^a	1,430 (71.8)	260 (18.2)		0.483
Unmarried	563 (28.2)	110 (19.5)	1.09 (0.85, 1.40)	
Living arrangement				
Alone	196 (9.8)	37 (18.9)	1.02 (0.70, 1.49)	0.906
Living with others ^a	1,797 (90.2)	333 (18.5)		

^aReference group; OR=odds ratio; 95% CI=95% confidence interval; * $p < 0.05$ =statistical significance.

sleeping hours have significant risk of falls. This is the first large scale Malaysian study that provides falls prevalence and psychosocial falls predictors among multi-ethnic community dwelling older people.

The prevalence of falls in our study was similar to previous studies in Malaysia among older people in community⁵ and with dementia.⁴ These prevalence ranged between 18.8% and 27.3%. Being older than 75 years was found to be a predictor of falls in our present study, similar to previous Malaysian studies among community dwelling older people. Moreover, a positive significant correlation exist between age and physiological falls risk.²³ With increasing age, there are multiple physiological functional decline such as slower postural response and coordination, reduced muscle mass and strength and balance, and decline in cognitive function.²⁴ All of these factors have been shown to increase the risk of falls among older people.

Our study found that being women was associated with falls. Previous studies showed mixed findings with regards to the association between falls and gender. In some, the prevalence of women who fell were higher than men.⁹ However, other studies found no effects on gender.^{4,5,25}

Women have more rapid decline in muscle strength and gait speed compared to men,²⁶ which probably explains why women are more susceptible to falls.

Among the psychosocial factors assessed in our study, older people who were at risk of depression was demonstrated to be associated with falls. Community dwelling older people with depressions are three times more susceptible to falls than those without depression.²⁷ In addition, older people with depression at baseline were more likely to fall in the following one year. Declined physical performance and depression may co-exist among older people, leading to higher risk of falls.²⁸

Fewer hours of sleep in a day was another factor associated with falls in our study. Sleeping hours that are less than 5 hours in a day were associated with increased incidence of falls at least once in a year in previous studies.²⁹ Excessive daytime sleepiness, which could be a result of less hours of sleep, has been shown to be associated with falls among older people.³⁰ Normal aging is accompanied by changes in sleep quantity and quality with decreased sleep time and increased sleep fragmentation.³¹ The disruption of sleep and circadian rhythm may contribute to the impairment of

Table 2. Associations between falls and psychosocial factors, self-rated health, disability and sleep

Factors	Total, n (%)	History of falls	OR (95% CI)	P value
At risk of depression, n=1,993; n (%)				0.018*
None ^a	1,690 (84.6)	299 (17.7)		
At risk	303 (15.2)	71 (23.4)	1.42 (1.06, 1.91)	
Lubben Social Support Network Scale, n=1,565; n (%)				0.831
Good social network ^a	922 (58.9)	171 (18.5)		
Isolated	643 (41.1)	122 (19.0)	1.03 (0.80, 1.33)	
Quality of life, n=1,993 ; n (%)				0.714
Good ^a	1,851 (92.9)	342 (18.5)		
Not satisfied	142 (7.1)	28 (19.7)	1.08 (0.71, 1.67)	
Self-rated health, n=1,993; n (%)				0.720
Satisfied ^a	1,793 (90.0)	331 (18.5)		
Not satisfied	200 (10.0)	39 (19.5)	1.07 (0.74, 1.55)	
Cohen Perceived Stress Scale, n=1978				0.717
Mean±SD	3.10±3.02	3.15±3.02	1.01 (0.97, 1.05)	
Satisfaction with Life Scale, n=1,985				0.869
Mean±SD	30.07±6.21	30.02±6.19	0.99 (0.98, 1.01)	
Loneliness, n=1,989				0.342
Mean±SD	3.25±0.88	3.28±0.87	1.06 (0.93, 1.19)	
MOSSSS, n=1,971				0.042*
Mean±SD	39.76±14.65	38.36±14.65	0.99 (0.98, 1.00)	
Flourishing Scale, n=1,980				0.161
Mean±SD	13.67±6.65	14.11±6.23	1.01 (0.99, 1.02)	
WHODAS, n=1,971				0.114
Mean±SD	6.44±8.96	7.11±8.71	1.01 (0.99, 1.02)	
Sleeping hours/day, n = 1,963				0.027*
Mean±SD	6.47±1.50	6.31±1.70	0.92 (0.86, 0.99)	

^aReference group; OR=odds ratio; 95% CI=95% confidence interval; *p <0.05=statistical significance; ADL=Activities of Daily Living; MOSSSS=Medical Outcome Study Social Support Survey; WHODAS=WHO Disability Assessment Schedule; SD=standard deviation.

behavioural and neurocognitive functions, which are similar risk factors of falls. We also found the Malay ethnicity slept less hours than the Chinese among those with history of falls. However, the reason for this is not known and require further evaluation in future studies in this region.

Our study found that Malay and Chinese ethnic groups were less likely to fall when compared to combined Indian and others ethnic groups. It is worth to note that in our study others ethnicity included indigenous people. These findings were similar to previous studies in Malaysia found that prevalence of falls was highest among the Indian and indigenous ethnicities.^{3,6} Further studies looking at the different ethnic groups health status is warranted to understand their risk of falls.

The present study evaluated only psychosocial factors of falls as well as self-rated health, disability and sleep. First, this study used retrospective data and excluded older people with moderately severe and severe dementia, which imposed a limitation to the transferability of the findings into practice. Secondly, history of fall was based on recalling on events over past 12 months. As highlighted in a recent study,³² prospective falls is desirable but requires more resources. In addition, there is good agreement between recalled falls report and prospective falls data, namely with recurrent falls.³³ Thirdly, the findings of this study did not explore other falls risk factors such as excessive daytime sleepiness and environmental factors. Other falls risk factors that includes polypharmacy and comorbidities are considered separately in another publication. In the present study, older adults with history of falls were advised to seek further assessment and treatment at their nearest primary health care facilities.

At present, most falls prevention interventions are focused at improving physical wellbeing. Future studies need to explore falls prevention interventions that incorporates psychosocial education. Our study results showed that psychosocial fall risk factors such as at risk of depression and having less hours of sleep in a day contribute to falls among older people. Hence, psychosocial related falls risk factors should be considered in falls assessment and management strategies among older adults.

In conclusion, our present study identified several factors associated with falls among community dwelling older people. Older people aged 75 and older, women, those at risk of depression and having less hours of sleep in a day were significant psychosocial predictors of falls. Knowing these predictors for falls could facilitate in identifying older people who might benefit from early

falls prevention interventions in the community. Further comprehensive geriatric assessment is also imperative to identify other intrinsic risk factors of falls.

CONFLICTS OF INTEREST STATEMENT

The authors report no conflict of interest related to the work.

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Table 3. Multivariate logistic regression on factors associated with falls

Predictors	Beta	SE	OR	95% CI	p value
Age					
60-74 years ^a					
75-84 years	0.46	0.15	1.61	1.20, 2.15	0.001*
≥85 years	1.20	0.49	3.32	1.23, 8.65	0.014*
Sex					
Male ^a					
Female	0.51	0.12	1.67	1.31, 2.11	<0.001*
Ethnicity					
Malay					
Chinese	-0.65	0.24	0.52	0.33, 0.84	0.007*
Chinese	-0.81	0.25	0.45	0.27, 0.73	0.014*
Indian and Others ^a					
Depressive symptoms					
None ^a					
At risk	0.33	0.16	1.39	1.02, 1.89	0.034*
MOSSSS	-0.01	0.04	0.99	0.99, 1.00	0.083
Sleeping hours/day	-0.09	0.39	0.91	0.84, 0.98	0.017*

^aReference group; OR=odds ratio; 95% CI=95% confidence interval; *p <0.05=statistical significance; MOSSSS=Medical Outcome Study Social Support Survey; Chi square (8)=5.139, p=0.743, R²=20.043.

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