

Falls Characteristics of Malaysian Older Person in Klang Valley

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Abstract

Falls are a significant health concern and a leading cause of injuries among older persons. Falls can result in debilitating medical conditions such as fractures, head injuries, and soft tissue injuries. Environmental factors and age-related physical changes play a significant role in contributing to falls among older persons. Understanding the characteristics and risk factors associated with falls in older persons is important for developing effective prevention strategies and promoting successful ageing. This research aims to learn more about the fall characteristics among Malaysian older persons in Klang Valley. A cross-sectional study was conducted among 91 community-dwelling older persons aged 60 years old and above. Written consent was collected from participants. Demographic information, physical performance tests and fall characteristics were collected. Using SPSS® version 28, the data was analysed using Descriptive analysis and One Way ANOVA. Female gender, overweight, falling outdoor, bathroom, slippery surface and bruises are the most common characteristic reported in this study. One way, ANOVA analysis indicates a significant relationship between age, repeated fallers and using walking aids with fall risk group using Timed Up Go (TUG) test. This information may help empower healthcare professionals and caretakers to identify and subsequently manage and prevent fall risk in older persons.

Keywords: Older Persons, Falls Characteristics, Prevention Strategy, Physical Performance Test, Timed Up Go Test

Introduction

Falls are a significant health concern and a leading cause of injuries among older persons. The risk of falling increases with age, with one in four older persons experiencing a fall each year (Centers for Disease Control and Prevention, 2022). A few factors contribute to the increased risk of falling in older persons. Age-related physiological changes, such as reduced muscle strength Beudart et al (2016); Keller & Engelhardt (2013) and flexibility, impaired balance, and decreased reaction time can affect mobility and increase the likelihood of falling (Tinetti et al., 1988).

Falls can result in debilitating medical conditions such as fractures, head injuries, and soft tissues injuries such as sprains, strains, contusions, and lacerations, often leading to pain, reduced mobility, and impaired healing processes (Stevens et al., 2014), leading to increased healthcare costs and functional limitations [5], [6]. Falls can lead to psychological consequences such as a fear of falling, even without experiencing any physical injuries. This fear leads to avoidance of physical activity and social isolation that may cause further decline in overall health and well-being (Schoene et al., 2019).

Environmental factors play a significant role in contributing to falls among older persons; factors contributed such as slippery or uneven surfaces, inadequate handrails, poor lighting, and cluttered living spaces (Tinetti et al., 1988). Besides that, Age-related physical changes such as reduced vision, decreased muscle strength, impaired balance and coordination can also contribute to falls in older persons (Ambrose et al., 2013). Understanding the characteristics and risk factors associated with falls in older persons is important for developing effective prevention strategies and promoting successful ageing. To date, comprehensive studies in Malaysia on fall characteristics are limited. Therefore, this research aims to learn more about the fall characteristics among Malaysian older people particularly in Klang Valley.

Methodology

Design and Participation

This cross-sectional study was conducted in a senior citizen club in Klang Valley, Malaysia, with a total of 91 community-dwelling older persons aged 60 years old and above. Ethical clearance was obtained from the Committee for research ethics, Universiti Kebangsaan Malaysia (UKM 1.5.3.5/244/NN-060-2013). Verbal and written information regarding the study was provided to the participants and an informed written consent was obtained prior to participation in this study.

Participants need to adhere to the inclusion and exclusion criteria to be included in the study. The inclusion criteria are: 1) Community-dwelling older adults aged 60 years and above, 2) Able to read in Malay or English language and follow simple instructions, 3) Able to walk in a minimum distance of 7 meters with and without walking aids with minimal supervision. Meanwhile, the exclusion criteria are: 1) Unable to comprehend and follow instructions, 2) Acute illness: High fever, acute knee injury and having fractures that may have affected strength, balance and physical function and severe medical conditions such as unstable heart condition, and 3) Participants who are using medication that may affect the result.

As indicated in the data collection flow chart: In Figure 1, informed consent was obtained after delivering verbal and written information to the potential participants. Before a physical performance test, participants were interviewed for sociodemographic information and falls-related characteristics. The interviews and the physical performance tests were assessed by a few healthcare professionals

Demographic Information and Falls Characteristics

Age, gender, race, education level, marital status, body mass index, history of falls, smoking status, and the number of comorbid conditions were all asked about in the demographic questions. In addition, the participants were also asked about falls-related characteristic questions such as regarding the location of falls, area of falls, the reason for falls and the people's condition after falling. An average of 15 minutes were spent collecting the information from participants. Information regarding retrospective falls was taken based on fall history for the past 18 months.

Physical Performance Test

The Timed Up Go test (TUG) is a physical performance test for testing the mobility of lower limb function in older persons (Coelho-Junior et al., 2018). Previous studies indicate that TUG had been robust in informing fall risk (Ibrahim, Singh, Shahar, et al., 2017; Park, 2018). Time was taken when participants rose from an armless chair with a height of roughly 47cm, participant need to walk for 3 meters, turned and walked back to the chair and sat down (Ibrahim, Singh, Shahar, et al., 2017). The test has also proven to have high test-retest reliability (ICC 0.98-0.99) (Podsiadlo & Richardson, 1991; Shumway-Cook et al., 2000).

Statistical Analysis

Upon completion of data collection, the data were analysed using Statistical Package for the Social Sciences (SPSS®) version 28. The sociodemographic information and falls characteristic were analysed using descriptive by reporting the mean and standard deviation for continuous variables, and frequencies for categorical variables. Further analysis, One Way ANOVA was conducted to identify the relationship between groups at fall risk (TUG) and retrospective fallers with multiple variables.

Results

The study was conducted among 91 Malaysian older persons with an average age of 67 years old. Most of the participants were female which makes up more than half of the population and the majority of the participant were Malay descendants. Most of the participants have secondary schools as the highest level of education and tertiary education as the second highest level of education. The mean average body mass index (BMI) of participants at 26.3 kg/ m², categorized as overweight (World Health Organization, 2021).

Marital status indicates more than three-quarters of the participants are married and less than two per cent are divorced. Retrospective fall recalled reported less than a quarter of experience falling for the past 12 months, and less than ten per cent are smokers. However, almost half of the participants reported having three or more medical conditions. For the physical performance test TUG, the mean average indicates low falls risk with a reported time of about nine seconds as indicated in Table 1.

Classification of fallers in Table 2 using reported falls recalled with an average of 67 years old and the female gender experienced the most falls. Reported having overweight BMI and

secondary school as the highest level of education in both faller and non-faller groups. The faller group also reported having more than two medical conditions and more than two types of medication intake. Non-faller group on the other hand has a mean average of less than two medication intakes. Both fallers and non-faller also reported the majority of participants were nonsmokers.

Falls characteristics indicate almost half of the fallers group experience falling more than once in the past 12 months. The most common location of falling was outdoors representing more than half of the participants. The bathroom reported the highest number of falls occurred followed by stairs, the hall and the kitchen area. However, no falls were reported to occur in the bedroom. The result also reported more than half having fallen in more than one location. The majority cause of falling was slipping followed by missing steps. About twenty per cent reported not remembering the causes of the fall. On the other hand, more than ninety per cent of fallers reported being able to stand independently after falling. The most common condition experienced after falling was bruise reported by more than thirty per cent, fracture by about thirty per cent and about twenty per cent reported no injury.

Classification of falls risk based on TUG reported a mean average of 70 years old and males have the majority risk of falling. Malay descent reported more than three-quarters of the participant and secondary school as the highest level of education. BMI with a mean average of 27.6, classified as overweight (World Health Organization, 2021). The majority are married, nonsmokers and have three and more medical conditions. The average mean for the TUG was 12.7 seconds.

One-way ANOVA was conducted between fallers and non-fallers using retrospective falls recalled group to evaluate the relationship with other socio-demographic information. The ANOVA assumption of normality and homogeneity were not violated. However, no significant result was indicated upon analysis. Further way ANOVA analysis for falls risk using the TUG test with a cutoff point of 11.3 seconds based on a previous longitudinal large-scale study in Malaysia (Ibrahim et al., 2017). After meet the assumption of normality and homogeneity, indicate a significant relationship with age $F(1) = 5.80$, $p = 0.018$; the number of falls $F(1) = 7.94$, $p = 0.012$; and using walking aids $F(1) = 12.55$, $p = < 0.001$.

Figures and Tables

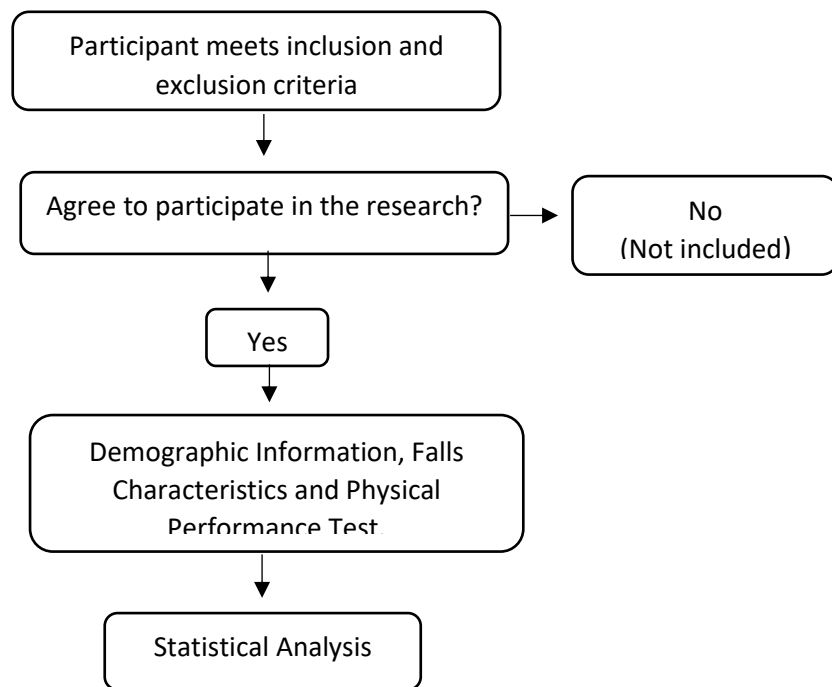


Figure 1. Flow Chart for Data Collection

Table 1

Sociodemographic Information and physical performance test.

Variables	Mean or % (n=91)	Standard Deviation
Age	67.3	6.0
Gender		
Male	44	
Female	56	
Race		
Malay	68.1	
Chinese	27.5	
Indian	4.4	
Level of Education		
No Education	2.2	
Primary	16.5	
Secondary	50.5	
Tertiary	30.8	
Body Mass Index kg/m ²	26.3	4.5
Marital Status		
Married	72.5	
Single	5.5	
Divorced	2.2	
Widow/ Widower	19.8	
Falls History (past 12 months)		
Yes	18.7	

No	81.3	
Smoking status		
Smokers	7.7	
Non-smokers	92.3	
No. of comorbid		
0	12.1	
1	20.9	
2	24.2	
≥ 3	42.8	
Physical Performance Test (Timed Up Go)	9.2	2.0

Table 2

Baseline Characteristics according to retrospective fallers and non-fallers

Variable	Fallers (n = 17) (18.7%)	Non-fallers (n = 74) (81.3%)	P value
Age	67.59 ± 6.24	67.28 ± 5.95	0.798
Age Group			0.213
60-69	9 (52.9%)	51 (68.9%)	
≥70	8 (47.1%)	23 (31.1%)	
Gender			0.061
Males	4 (23.55%)	36 (48.6%)	
Females	13 (76.5%)	38 (51.4%)	
Body Mass Index	27.38 ± 4.66	26.1 ± 4.41	0.226
Education Level			0.925
No Education	1 (5.9%)	1 (1.4%)	
Primary Education	2 (11.8%)	13 (17.6%)	
Secondary Education	9 (52.9%)	37 (50.0%)	
Tertiary Education	5 (29.4%)	23 (31.1%)	
Number of comorbidities	2.53 ± 1.59	2.01 ± 1.22	0.083
Number Medication intake	2.18 ± 1.55	1.65 ± 1.25	0.146
Smoking Status			
Yes	2 (11.8%)	5 (6.8%)	

No	15 (88.2%)	69 (93.2%)	
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Table 3

The pattern of falls among older persons who fell in previous 12 months.

Variables	Frequency (%)
Falls more than once in previous 12 months	8 (47.0%)
Location of falls	
Indoor	7 (41.0%)
Outdoor	10 (59.0%)
Common area of falls	
Stairs	2 (12.0%)
Bathroom	3 (18.0%)
Hall	1 (6.0%)
Kitchen	1(6.0%)
Bedroom	0 (0.0%)
More than one location	10 (58.0%)
Cause of falls	
Slipping	10 (58.0%)
Miss step	2 (12.0%)
Hit object	1 (6.0%)
Unconscious	1 (6.0%)
Not sure	3 (18.0%)
Physical ability after falls	
Able to stand independently	16 (94.0%)
Need help to stand	1 (6.0%)
Admitted to hospital	0 (0.0%)
Condition after fall	
Bruise	6 (35.0%)
Scar	2 (12.0%)
Bleeding	1 (6.0%)
Fracture	5 (29.0%)
No injury	3 (18.0%)

Table 4

Baseline Characteristics according to falls risk using TUG.

Variables	Mean or % (n=14) 15.4%	Standard Deviation
Age	70.8	4.6
Gender		
Male	57.1	
Female	42.9	
Race		
Malay	85.7	
Chinese	14.3	
Level of Education		
Primary	28.6	
Secondary	57.1	
Tertiary	14.3	
Body Mass Index kg/m ²	27.6	4.1
Marital Status		
Married	57.1	
Single	14.3	
Widow/ Widower	28.6	
Smoking status		
Smokers	7.1	
Non-smokers	92.9	
No. of comorbid		
0	14.3	
1	21.4	
2	7.1	
≥ 3	57.2	

Table 5

Relationship between groups at fall risk (TUG) with multiple variables.

Variables	SS	df	Mean Square	F	p
Age	196.368	1	196.37	5.80	0.018*
No. of falls	6.944	1	6.944	7.937	0.012*
Using walking aid	0.242	1	0.242	12.551	<0.001**

Note. *indicates $p < 0.05$; **indicates $p < 0.01$, ss=sum of squares, f=f-ratio analysis of variance (ANOVA),.

Discussion

This study aimed to learn more about the fall characteristic among Malaysian older persons in Klang Valley. The demographic profile indicates that the majority of participants are having secondary school as the highest level of education which is consistent with the previous studies on older persons in Malaysia (Leeves & Soyiri, 2015; Yunus et al., 2017). The prevalence of falling is about one in six older persons in the past 12 months, similar to a

previous local and international study (Sahril et al., 2020; Siqueira et al., 2011). The mean average of the TUG test is also about the same time as past local studies on community-dwelling older persons which is about nine seconds (Samah et al., 2018).

The baseline characteristic of the faller group indicates have higher age mean average and a higher percentage of age group higher than 70 years old which is consistent with a past study that indicates the falls rate increase as age increases (Rubenstein, 2006). The female gender also indicates having a much higher fall risk which is consistent with a systematic review which indicates the female gender has a higher risk of falling (Ambrose et al., 2015). The faller group also has higher medication intake which is supported in a recent longitudinal study in ageing populations (Zaninotto et al., 2020).

The pattern of falls in this study indicates that fallers mainly occur outdoors. However, past studies reported otherwise (Kelsey et al., 2010). Nonetheless, there is only a small percentage difference between outdoor and indoor groups. On a different note, bathrooms have the highest percentage of fallers which is consistent with a past study (Ng et al., 2022; Rosen et al., 2013; Stevents et al., 2014). The bathroom has a greater risk of having falls injury due to the small space with porcelain surfaces, hard floors and metal fixtures (Stevens et al., 2014). It is recommended to practice safe practices in the bathroom such as wearing nonslip shoes, easily accessible toiletries, and installing shower mats, non-skid tubs and grab bars (Stevens et al., 2014). In addition, home modification is a key component in ageing-in-place in promoting a safe environment and reducing fall-related injuries (Ng et al., 2022). Slipping is reported to have four times higher than the second highest cause of falls, miss-step. This is consistent with the study that reported bathroom is the most common place for falling. The nature of a bathroom that tends to be slippery leads to a greater risk of falling (Sophonratanapokin et al., 2012). It is also suggested to have a home hazards assessment and to have non-slippery and age-friendly access to the bathroom for fall prevention strategies (Sophonratanapokin et al., 2012). Even so, more than 90 per cent of the participants reported being able to stand independently after falls. On the other hand, most fall injuries are bruises similar to the previous study in China (Yu et al., 2009); followed by fractures. The prevalence of fractures in older persons also mainly occurs due to falls (Ambrose et al., 2015). Fractures due to falling also have been reported in China and Brazil (Siqueira et al., 2011; Yu et al., 2009).

This study also reported fall risk based on the TUG test. In general, most fall-risk participants have overweight BMI and reported having three and more existing medical conditions which are similar to past studies (Chang et al., 2011; De Rekeneire et al., 2003; Siqueira et al., 2011). ANOVA analysis reported no significant relationship based on retrospective falls recalled. However, there is a significant relationship indicated with age, the number of repeated fallers and using walking aids with the TUG test. This is because TUG's ability to access the comprehensive aspect of basic physical mobility positively correlates with physical performance attributes such as balance, gait speed and functional ability (Podsiadlo & Richardson, 1991). Thus, the TUG test can provide a more robust indicator for fall risk as compared to retrospective falls recalled. Increasing ages have commonly been reported as an increased risk of falling (Knutson et al., 2009; Rubenstein LZ, 2006). Loss of muscle mass and strength is inevitable as part of the ageing process. (Beaudart et al., 2016; Keller & Engelhardt, 2013). The reduction in muscle mass among older persons has led to reducing in physical performance (Bettio et al., 2017). Reduction in physical performance has been a critical

predictor of falls (Delbaere et al., 2010). Repeated fallers are also related to increased fall risk (Fleming et al., 2008). It is said that recurrent fallers may have poorer physical performance which is consistent with this study's findings (Boyé et al., 2015). TUG has also been shown to be robust in identifying recurrent fallers based on prospective longitudinal studies in China (Kang et al., 2017). The use of walking was shown to have a slower walking pace due to fear of falling and having a more unconventional gait pattern. In addition, the use of walking aid also indicates having higher risk factors for future falls (Metteling & Cambier, 2015). Persons that has poor balance and low functional capacity tend to use walking aids for mobility and protection from future falls. Those characteristics had been commonly associated with poor general health conditions. The increase in fall risk among walking aid users because it is required high attention even after extensive training to use the device (Wright & Kemp, 1992). Future study, to include prospective studies on falls characteristic to draw stronger causative conclusions and reduce exposure to recalled bias.

Conclusion

In conclusion, this study indicates that increasing ages, recurrent fallers and the use of walking aids are significantly associated with fall risk among older persons. This data may help to empower healthcare professionals and caretakers to identify and subsequently manage and prevent falls risk in older persons. This may reduce the risk of injuries, hospitalization, loss of independence and decline in the overall well-being of older persons. Additionally, the information provided may also be used as a guide for future prospective studies regarding fall characteristics, especially among Malaysian older persons.

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