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REVIEW ARTICLE

Prevalence of Falls and Its Characteristics among Malaysian Older Adults: A Review

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ABSTRAK

Kejatuhan adalah isu kesihatan yang sering dikaitkan dengan warga emas di seluruh dunia. Kejatuhan boleh menyebabkan kesan negatif pada individu dan juga menyebabkan kematian dalam kes tertentu. Kajian semasa kejatuhan adalah amat terhad di Malaysia. Tujuan kajian ini adalah untuk merumuskan kajian semasa yang dijalankan di Malaysia yang mengenai prevalens dan ciri-cirinya. Artikel telah dikenalpasti melalui menggunakan pangkalan data elektronik berikut: EBSCOhost, ClinicalKey, ScienceDirect, Wiley Online Library, SpringerLink dan Google Scholar. Pemilihan artikel adalah terhad kepada artikel bahasa Inggeris yang diterbitkan antara tahun 2013 hingga 2019. Kajian ini menilai golongan warga emas yang berumur 60 tahun ke atas; sama ada di kediaman, komuniti atau institut perubatan. Sembilan artikel yang berkaitan telah dikenalpasti dan disiasat. Hasil kajian menunjukkan variasi yang ketara dengan julat 4-74 % dalam prevalens kejatuhan di kalangan warga emas di Malaysia. Salah satu kajian yang dijalankan dalam komuniti menunjukkan prevalens kejatuhan yang lebih rendah. Majoriti peristiwa kejatuhan berlaku pada waktu pagi seperti yang dilaporkan oleh tiga kajian iaitu sebanyak 49%-64.7%. Kejatuhan dalam kawasan bangunan adalah jumlah tertinggi lokasi jatuh dengan 50-87% manakala di luar bangunan adalah 13-49.3%. Lokasi di bilik mandi / tandas mempunyai peratusan kejatuhan tertinggi dalam bangunan. Kejatuhan yang menyebabkan kecederaan adalah antara 47% -82%. Perubahan pada prevalens kejatuhan dalam warga emas ditentukan oleh faktor-faktor seperti lokasi dan keadaan kesihatan. Maklumat yang dikumpulkan dalam kajian ini menunjukkan terdapat kekurangan alat ukur piawai bagi mengkaji ciri-ciri kejatuhan di Malaysia. Kajian prospektif diperlukan untuk menubuhkan prevalens dan hubungan faktor-kesan kejatuhan di Malaysia.

Kata kunci: ciri-ciri, kecederaan, kejatuhan, Malaysia, prevalens, warga emas

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ABSTRACT

Falls are major public health issues which highly associated with older adults worldwide. Falls can cause a negative debilitating effect on the individual and may lead to fatal injury in certain cases. Current studies on falls characteristics are limited in Malaysia. The aim of this study was to pool the current studies conducted in Malaysia regarding the fall and its characteristics. Articles were identified by using the following electronic databases; EBSCOhost, ClinicalKey, ScienceDirect, Wiley Online Library, SpringerLink and Google Scholar. Article identification was limited to English language which were published between 2013 to 2019. This study looked into older adults aged 60 years old and above; conducted either in a residential, community-dwelling or medical institute. A total of nine articles was identified and investigated. Studies indicate a huge variation in the prevalence falls among older adults in Malaysia ranging between 4-74%. A study that was conducted in the community indicated lower prevalence of falls. Majority of the falls occurred in the morning as reported by three studies which covered and ranged between 49-64.7%. Indoor accounted as the highest number of falls in term of location and ranged between 50-87% while outdoor falls were between 13-49.3%. Location in bathroom and toilet had the highest percentage of indoor falls. Fallers that sustained injury ranged between 47-82%. A variation on the fall prevalence among older adults was determined by factors such as location and existing medical conditions. Pooled information in our study indicates that there is lack of standardised measuring tools for falls characteristics in Malaysia. There is a need for large scale longitudinal prospective study to establish the prevalence and the causal-effect relationship of falls in Malaysia.

Keywords: characteristics, falls, injury, Malaysia, older adults, prevalence

INTRODUCTION

Falls were major public health issues which highly associated with older adults worldwide (Hill et al., 2018), although most are from Western countries. According to the World Health Organization (2018), falls were defined as "an event which results in a person coming to rest inadvertently on the ground or floor or other lower-level." Falls can cause a negative debilitating effect on the individual and may lead to fatal injury in certain cases (World Health Organization, 2007). Other implications of falling such financial burden (Cotter et al. 2005), depression (Iaboni & Flint 2013), injuries such as a fracture (Pi et al. 2015) and physical inactivity (Assantachai et al. 2003). Depression and fear of falling are associated with the impairment of gait and balance. This association mediated through cognitive, sensory, and motor pathways. The management of depression in fall-prone individuals

is challenging since antidepressant medications like selective serotonin reuptake inhibitors can increase the risk falls and fragility fractures. There is lack of information regarding the effect of fall rehabilitation programs on clinically significant depression. There was also an increase in the risk of falls as to the age increased (Kim 2016).

In the United States, fall prevalence among older adults aged 65 and above was around 28.2-36.3% (Cigolle et al. 2015). A study in Germany indicates there was 25.7-37.4% of falls prevalence in females and 16.3-28.9% in males (Rapp et al. 2014). Similarly, a longitudinal study in United Kingdom indicates fall prevalence between 20.8-33.2% in males but higher in females participant between 26.6-35.1% (Gale et al. 2016). In general, there was a lower prevalence of fall reported in Asian countries compared to Western countries (World Health Organization, 2007). A study in China reported prevalence of fall among older adults aged 60-year-old and above was 19.28% (Wu & Ouyang 2017). An epidemiology study that conducted across 10 states in India reported a 14% of fallers (Krishnaswamy & Usha 2006). A comparable report from Singapore also reported a fall prevalence of less than 15% (Dai et al. 2018).

Study on the characteristics of falls was scarce in Malaysia. It is important to understand the probable consequences and the nature of the falls especially for prevention, management measure and resource allocation. Knowing fall characteristics could help physiotherapist and other healthcare professionals to be well-informed and empowered better healthcare decision making. Thus, substantial research on falls characteristics needs to be conducted to fully understand and rectify the falls issues among older adult.

The aim of this study was to review the prevalence of falls and characteristics in current studies conducted in Malaysia regarding fall prevalence and its characteristics. This study looked into older individuals aged 60 years and above; summarised the fall prevalence either from a residential, community-dwelling or medical institute. This information collected is useful for fall preventive measures, in order to reduce falls related injuries among older adults.

MATERIALS AND METHODS

Search Strategy

Articles were identified using the electronic databases EBSCOhost (CINAHL Complete, MEDLINE Complete & Academic Search Complete), ClinicalKey, ScienceDirect, Wiley Online Library, SpringerLink, and Google Scholar. The search management was conducted using the following primary search terms; falls OR fall. The search strategy continued using the individual search term; AND Malaysia AND older adult AND elderly. All the electronic databases were conducted using a similar search strategy.

Study Selection

Study selection was divided into a three-stage process, where first stage

Table 1: Assessment form to choose articles

1.	Are these participants over 60 years old of age?
2.	Are these studies about falls in older adults?
3.	Are these studies conducted in Malaysia?
4.	Are these studies about falls characteristics?

was involved the articles identification to include only those which were written in English language articles and that published between 2013 to 2019. Articles were identified through systematic searching of the database according to their titles and abstracts which help in retrieving a substantial number of 1445 of articles. The second stage was used to screen and eliminate those articles not related to falls, duplicated, subject aged below 60 years, not related to fall characteristics and not conducted in Malaysia. The third stage where eligibility checking for the relevant articles were taken into consideration before final papers selection for full-text review. All articles were screened accordingly based on the requirement listed in Table 1.

Data Extraction

All articles were screened independently by the author through systematic searching of the database. Relevant information was retrieved from the articles including participant information (age, number of subjects, location), fall prevalence, standardised

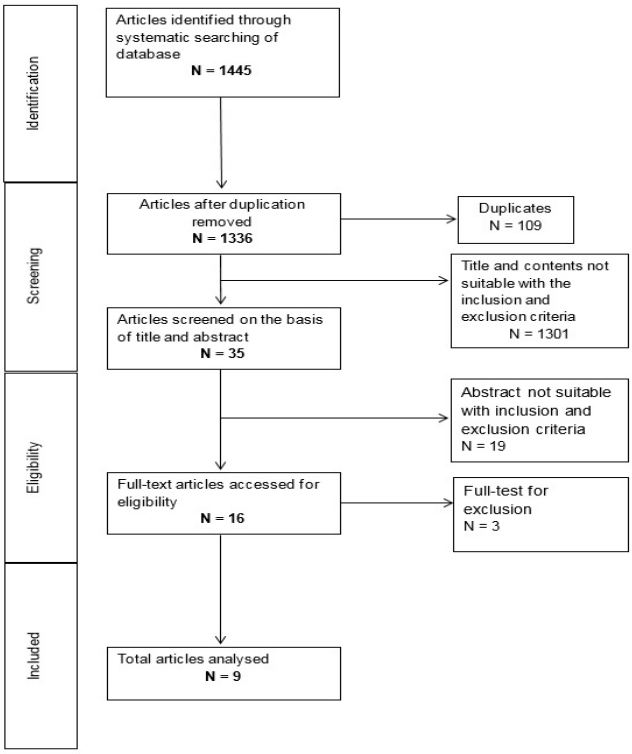

Figure 1: Study selection flowchart of published articles between the year 2013 to 2019

assessment tool, fall characteristics, result, recommendation, limitation and strength. In this study, appraisal tool to score study quality was not used as it is not a compulsory criterion for scoping a review (Colquhoun et al. 2014).

Study Identification

A total of 1445 articles were identified through systematic searching of database where 521 articles from EBSCOhost, 8 from Web of Science, 24 from ClinicalKey, 72 articles from ScienceDirect, 172 from Wiley Online Library, 67 from SpringerLink and 581 from Google Scholar. Studies were eliminated if not fulfil criteria as stated in Table 1. Nine studies were included in our review after excluding duplicated articles and articles that do not fulfil inclusion and exclusion criteria as indicated in Figure 1.

RESULTS

Articles retrieved from the electronic database preceding nine years between 2011 to 2019. Total of nine articles was identified and investigated regarding falls and its characteristics among older adults in Malaysia as indicated in Table 2. Seven of the studies were conducted among community-dwelling older adults (Azidah et al. 2012; Goh et al. 2016; Kadir & Hasim 2011; Romli et al. 2017; Tan et al. 2016; Yeong et al. 2016; Zia et al. 2016) and the remaining two studies were conducted among residential older adults (Ghazi et al. 2017; Kioh & Rashid 2018). Majority of the fall prevalence studies were evaluated in clear definition of fall and three studies (Azidah et al. 2012; Goh et al. 2016; Kadir & Hasim 2011) in conditioned-specific (stroke and diabetic) older adults population. Total of two studies (Romli et al. 2017; Tan et al. 2016) were conducted in longitudinal studies and the rest in cross-sectional studies. Fall prevalence was defined as retrospective falls occurred in the preceding 12 months except for one study (Tan et al. 2016) in the preceding six months.

Prevalence of Fall

Studies indicated a huge variation in prevalence of fall among older adults in Malaysia, ranging between 4-74% (Azidah et al. 2012; Ghazi et al. 2017; Goh et al. 2016; Kadir & Hasim 2011; Kioh & Rashid 2018; Romli et al. 2017; Tan et al. 2016; Yeong et al. 2016; Zia et al. 2016). Study that conducted in community indicated a lower prevalence of fall of 4.07% (Yeong et al. 2016) and 22.6% (Romli et al. 2017), as compared to residential older adults with 32.8% (Kioh & Rashid 2018) and 30% (Ghazi et al. 2017), and 12-74% for medical institution (Azidah et al. 2012; Goh et al. 2016; Kadir & Hasim 2011; Tan et al. 2016; Zia et al. 2016). Prevalence of fall among condition-specific older adults was between 12.9-29% (Azidah et al. 2012; Goh et al. 2016; Kadir & Hasim 2011) where well-defined older adults population was 4-74% (Ghazi et al. 2017; Kioh & Rashid 2018; Romli et al. 2017; Tan et al. 2016; Yeong et al. 2016; Zia et al. 2016).

Location

Table 2: Summary of reviewed studies related to falls prevalence and its characteristics among Malaysian older adults

No	Studies	Participants (Age, N, location)	Prevalence of falls (%)	Standardised Assessment tool	Falls Characteristics	Results	Recommendation	Limitation and Strength
1.	Tan et al. 2016	**Aged** (mean±SD) (76.2±6.3 years, N = 198 female **Location** Emergency Department at the University of Malaya Medical Center, Malaysia	74% female in the preceding 6 months	Barthel Index (10 items scale)	**Time of injury (%)** - 06.00-12.00 (49%) - 12.00-18.00 (22%) - 18.00-00.00 (16%) - 00.00-06.00 (13%) **Location of falls** -Indoor (70%) Bathroom (27%), Bedroom (24%), Kitchen (9%), Stairs (9%), Other (32%). -Outdoor (19%) Garden (57%), Others (43%). **Sustained injury** (82%) **Type of injury** - Fractures (37%) - Soft Tissues (46%) **Site of injury** - Head (25%), Upper - limb (20%) - Femur (16%) - Lower limb (14%) - Trunk/ vertebral (10%) - Others (15%) **Hospital Admission:** (26%)	Age ≥75 years was significantly associated with mortality at 1, 3, 5 and 10 years. Indoor falls and Barthel ≤18 were significantly associated with 1-year and 3-year mortality.	Future research should be directed at determining factors underlying the excess mortality among fallers and identifying potential solutions to improve outcomes among fallers attending the Emergency Department.	**Strength** The results provide crucial information for resource planning and healthcare decisions. **Limitation** Subjects predominantly from women and Chinese ethnicity.

No	Studies	Participants (Age, N, location)	Prevalence of falls (%)	Standardised Assessment tool	Falls Characteristics	Results	Recommendation	Limitation and Strength
2.	Goh et al. 2016	**Aged** (mean±SD) (66±7 years, N = 125 **Location** Primary Teaching Hospital, Malaysia	29% in the preceding 12 months.	1. Fall Efficacy Scale-International 2. Berg Balance Scale 3. Functional Ambulation Category 4. Fatigue Severity Scale 5. Montreal Cognitive Assessment 6. Patient Healthy Questionnaire-9 7. Fugl-Meyer Motor Assessment	**Falls frequency in the preceding 12 months** 1: (61%) ≥ 2: (39%) **Location of falls** Indoor: (60%) Outdoor: (40%) **Sustained Injury** (47.2%) **Hospital Admission** (25%)	Stroke was significantly more likely to experience recurrent falls and fear of falling. Participants with stroke reported greater concern for falling than did non-stroke control participants (P <.01). FES-I score >27 points (high concern for falling) was greater in the stroke group than in the non-stroke group (P < .01).	Future investigations should consider the inclusion of fear avoidance behaviour as an outcome because it may be the intermediate modulator for fear of falling and falls.	**Limitation** Small sample size and cross-sectional design; causal relationships could not be established. effects of risk factors of falling. **Strength** The study reported information on post-stroke falls and fear of falls.
3.	Kadir & Hasim 2011	**Aged** (mean±SD) (67.5±5.6 years, N = 131 **Location** Diabetic Clinic Universiti Sains Malaysia Hospital.	12.9% in the preceding 12 months.	1. Barthel's index 2. Tinetti Balance	**Falls frequency in the preceding 12 months** 1: (60.7%) ≥ 2: (39.3%) **Timing of falls** Morning (64.7%) **Location of falls** -Indoor (87%) -Outdoor (13%) **Type of injury** Mild or soft tissue injuries (76.4%) **Majority of falls had no eye witness** (52.9%)	Multivariate analysis indicates falls among older adult's men with diabetics showed that increasing age, neuropathy and orthostatic hypotension are associated with a higher risk of falls. High balance and gait scoring were significantly associated with reduced risk of falls in older adults men with diabetes.	Future study to focus more on diabetic men's health concerns which have been relatively neglected. Multi-component intervention programmes which combine medical, rehabilitative and environmental component can minimise the risk of falling without compromising the mobility and functional independence in the older adults.	**Limitation** The retrospective design of this study prone to recalled bias and causal relationships could not be established.

No	Studies	Participants (Age, N, location)	Prevalence of falls (%)	Standardised Assessment tool	Falls Characteristics	Results	Recommendation	Limitation and Strength
4.	Azidah et al. 2012	**Aged** (mean±SD) (66.9±5.81 years, **N** = 288 **Location** Tertiary centre in the East Coast of Peninsular Malaysia.	18.8% in the preceding 12 months.	1. Barthel's Index 2. Tinetti Balance 3. Semmes-Weinstein Monofilament	**Timing of falls** - Morning (57.4%) - Afternoon (38.9%) - Evening (3.7%) **Location of falls** - Indoor (87%) - Bathroom (38.9%) - Bedroom (22.2%), Living - Room (25.9%), - Others (13.0%). **Outdoor (13%)** **Type of injury** - Mild Bruises (79.6%) - Muscle Pain (14.8%) - Fracture Limb (5.5%) **Fallers (Gender)** - Males (31.5%) - Females (68.5%)	Diabetes, female sex, age group more than 75 years old, the presence of retinopathy and orthostatic hypotension are factors that are associated with a higher risk for falls among older adults.	Nil.	**Limitation** The retrospective design of this study prone to recall bias and may underestimate the actual number and seriousness of falls. The cognitive ability not accessed in this study hence poor memory subjects are more likely subjected to recall bias.
5.	Yeong et al. 2016	**Aged** (mean±SD) (70.21±7.24 years, **N** = 811 **Location** Districts in the state of Perak, Malaysia.	4.07% in the preceding 12 months.	International Physical Activity Questionnaire (IPAQ)	**Location of falls** - Indoor (75.8%) - Bathroom (20%) - Bedroom (8%) - Kitchen (20%) - Stairs (8%) - Living room (16%), - Outside compound (28%) **Outdoor** (24.2%)	Indigenous older adults (Adjusted odd ratio, AOR = 6.06, 95% CI = 1.10–33.55, p = 0.039) and living alone (AOR = 2.60, 95% CI = 1.04–6.50, p = 0.042) were shown to be factors associated with falls.	Social support and provision of health education to increase awareness among older adults. Primary care physicians can provide comprehensive geriatric assessment for older adults.	**Limitation** The study was cross-sectional in design; causal relationships could not be established and the possibility of recall bias for cognitive testing.

No	Studies	Participants (Age, N, location)	Prevalence of falls (%)	Standardised Assessment tool	Falls Characteristics	Results	Recommendation	Limitation and Strength
6.	Kioh & Rashid 2018	**Aged** (≥60 years) **N** = 357 **Location** Nursing homes in the state of Penang, Malaysia.	32.8% in the preceding 12 months.	1. Fall Risk Assessment Tool (FRAT) 2. The Geriatric Depression Scale (GDS)	Falls frequency in the preceding 12 months 1: (58.6%) 2: (41.4%)	Depression and the presence of respiratory illnesses are strongly associated with the prevalence of falls. Higher history of falls was also at higher risk of falls	Anti-depression medications consumed should be monitored and the replacement of pharmacologic to non-pharmacologic therapy among older adults who are depressed should be considered where feasible.	**Limitation** Lack of temporality and convenience sampling methods increases the probability of obtaining a biased sample leading to the possibility of over representation Recall bias is another possibility considering the participants were asked about previous falls past 12 months.
7.	Romli et al. 201	**Aged** (mean±SD) (68.71±0.39 years, **N** = 1489 **Location** Older adult population residing in greater Kuala Lumpur.	22.6% in the preceding 12 months.	1. Katz Index 2. Lawton–Brody scales 3. Home Falls and Accidents Screening Tool (HOME FAST)	Falls frequency in the preceding 12 months 1: (65.7%) 2: (34.3%) **Location** Indoor (65.7%) Outdoor (45.1%)	Hazards were frequently identified (>30%) in the toilet and bathroom areas (no grab rail, no non-slip mat, distant toilet), slippery floors, no bedside light access and inappropriate footwear. Lower educational attainment, traditional housing, Chinese ethnicity, the greater number of home occupants, lower monthly expenditure, poor vision and younger age were the factors independently associated with home hazards.	Identify home hazards and recommend home modifications after the older person falls in order to prevent fall recurrence. A prospective study using prospective reporting of falls, such as using a fall diary or falls notification through phone calls or postcards.	**Limitation** A cross-sectional design, the limitation is expected of where any causal-and effect relationship is unable to be determined.

No	Studies	Participants (Age, N, location)	Prevalence of falls (%)	Standardised Assessment tool	Falls Characteristics	Results	Recommendation	Limitation and Strength
8.	Ghazi et al. 2017	**Aged** (mean±SD) (80±1.24 years, **N** = 50 **Location** Old folks home in Kuala Lumpur, Malaysia.	30% in the preceding 6 months.	Katz Index	**Reasons for falling** - Tripped (20%) - Slipped (26.7%) - Loss of balance (6.7%) - Legs gave way (26.7%) - Not sure (20%) **Location of falls** - On one Level (40%) - Bathroom (26.6%) - Bedroom (26.7%), - Garden (6.7) **Sustained injury** (66.7%) **Type of injury** - Fractures (40%) - Bruises (30%) - Cuts (20%) - Back Pain (20%) **Hospital Admission** (50%)	There is no association between the sociodemographic activity of daily living, number of comorbidities and number of medication with falls.	Nil.	**Limitation** Small sample size and the communication barrier between researcher and participants, prevent them from obtaining accurate information.
9.	Zia et al. 2016	**Aged** (≥65 years) **N** = 428 **Location** Emergency Department, Primary Care clinics and Geriatric clinics, Malaysia.	61.4% in the preceding 12 months.	1. Anticholinergic cognitive burden (ACB) scale 2. Timed Up and Go (TUG) 3. Functional Reach (FR) 4. Grip Strength (GS)	**Location** - Indoor: (50.7%) - Outdoor: (49.3%) **Sustained Injury** (49.4%)	Univariate analysis indicates a significant association between an ACB score of 1 with falls (OR, 1.8; 95% CI; 1.1–3.0; p = 0.01). Multivariate analysis indicates a significant association between TUG, FR, GS and falls after adjusting for age, gender and number of comorbidities	Future studies should also include adequately sensitive assessments of higher mental function as well as lower limb function.	**Limitation** A cross-sectional study; causal relationships could not be established.

A total of 50 to 1489 older adult's participant aged 60-year-old and above enrolled in these local Malaysian studies. There were five studies conducted in a medical institution (hospital and clinic) (Azidah et al. 2012; Goh et al. 2016; Kadir & Hasim 2011; Tan et al. 2016; Zia et al. 2016), two studies in the residential home (Ghazi et al. 2017; Kioh & Rashid 2018) and two studies in community-dwelling older adults. Note that, all studies were conducted in Peninsular Malaysia.

Falls Characteristics

Majority of the falls occurred in the morning as reported by three studies which contributed to 49-64.7% of prevalence (Azidah et al. 2012; Kadir & Hasim 2011; Tan et al. 2016), followed by afternoon as stated in two studies for 22% and 38.9% of prevalence (Azidah et al. 2012; Tan et al. 2016). Indoor fall accounted for the most number of fall location ranging from 50-87% while outdoor fall was between 13-49.3% (Azidah et al. 2012; Goh et al. 2016; Kadir & Hasim 2011; Romli et al. 2017; Tan et al. 2016; Yeong et al. 2016; Zia et al. 2016). Two studies indicated that location in the bathroom/ toilet has the highest percentage of indoor falls (Tan et al. 2016; Yeong et al. 2016). Fallers that sustained injury were around 47-82% (Ghazi et al. 2017; Goh et al. 2016; Kadir & Hasim 2011; Tan et al. 2016; Zia et al. 2016). Sustained injury including soft tissue injuries and fracture accounted for 46-94.4% (Azidah et al. 2012; Ghazi et al. 2017; Kadir & Hasim 2011; Tan et al. 2016) and 5.5-40% , respectively (Azidah et al. 2012; Ghazi et al. 2017; Tan et al. 2016). One study had reported the fall-related site of anatomical injury; including head (25%), upper Limb (20%), femur (16%), lower Limb (14%), vertebral (10%) and others (15%) (Tan et al. 2016). Hospital admission had been reported in three studies with prevalence between 25-50% (Ghazi et al. 2017; Goh et al. 2016). The retrospective study had reported a 58-61% of single fall freaquency and 39-41.4% of two or more falls frequency (Goh et al. 2016; Kadir & Hasim 2011; Kioh & Rashid 2018).

Standardised Assessment Tools

Standardised assessment tools that employed in these studies can be grouped into falls risk measure, physical performance measure, functional measure, cognitive measure and other outcome measures. The tools under fall risk measure are including Fall Efficacy Scale-International (FES-I), Fall Risk Assessment Tool (FRAT) and Home Falls and Accidents Screening Tool (HOME FAST) (Goh et al. 2016; Kioh & Rashid 2018; Romli et al. 2017). The physical performance measure-related tools are Fugl-Meyer Motor Assessment, Berg Balance Scale, Tinetti Balance, Semmes-Weinstein Monofilament, Timed Up and Go (TUG), Functional Reach (FR) and Grip Strength (GS) (Azidah et al. 2012; Goh et al. 2016; Kadir & Hasim 2011; Zia et al. 2016). The functional measure tools consist of Barthel Index, Functional Ambulation Category, Katz Index and Lawton-Brody Scales (Azidah et al. 2012; Ghazi et al. 2017; Goh et

al. 2016; Kadir & Hasim 2011; Romli et al. 2017; Tan et al. 2016). Cognitive measure tools are Montreal Cognitive Assessment and Anticholinergic Cognitive Burden (ACB) scale (Goh et al. 2016; Zia et al. 2016). Another standardised outcome measure-tool like Fatigue Severity Scale, Patient Healthy Questionnaire-9, International Physical Activity Questionnaire (IPAQ) and The Geriatric Depression Scale (GDS) are also being employed (Goh et al. 2016; Kioh & Rashid 2018; Yeong et al. 2016).

Recommendation

Eight out of nine studies had recommended various fall-related assessments, intervention or future studies. Fall assessments had been recommended by three studies which include a comprehensive geriatric assessments by a physician for older adults (Yeong et al. 2016), identification of home hazards to prevent falls recurrence (Romli et al. 2017) and inclusion a higher sensitivity assessments for mental function and lower limb (Zia et al. 2016). Intervention for falls had been mentioned in three studies which include multi-component intervention with a combination of medical, rehabilitation and environmental (Kadir & Hasim 2011); social support and provision of health education (Yeong et al. 2016); and anti-depression drugs provision among residential older adults (Kioh & Rashid 2018). Future studies are recommended to focus on prospective falls report (Romli et al. 2017), those factors for excessive mortality among fallers and identifying solution to improve the outcome among fallers (Tan et al. 2016); inclusion of fear-avoidance behaviour as an outcome for fear of falling and falls (Goh et al. 2016) and the study on the male diabetic patients (Kadir & Hasim 2011).

Summary of Findings

Older age was significantly associated with prevalence of falls as reported in three studies (Azidah et al. 2012; Kadir & Hasim 2011; Tan et al. 2016). Two studies had shown a correlation between older adults with diabetes and orthostatic hypotension with a higher fall risk (Azidah et al. 2012; Kadir & Hasim 2011). Indigenous people (Yeong et al. 2016), higher falls history (Kioh & Rashid 2018), an older adult with respiratory illness (Kioh & Rashid 2018) and history of stroke (Goh et al. 2016) also significantly associated with falls.

Outcomes measure that applied in two studies had reported a low Barthel index of faller older adults was significantly associated with fall (Goh et al. 2016; Tan et al. 2016). Physical performance test such as TUG, Functional Reach, Gait Speed and Tinetti balance in multivariate and univariate analysis also revealed an association with falls (Kadir & Hasim 2011; Zia et al. 2016). Other outcomes measure such as Fall FES-I (Goh et al. 2016), GDS (Kioh & Rashid 2018) and ACB scale score of 1 had demostrated a significant association with falls in univariate analysis (Zia et al. 2016).

DISCUSSION

The aim of the study is to identify the current prevalence of falls and also identify the fall characteristics among Malaysia older adults. Nine relevant articles were identified in the prevalence of falls and its characteristic either among residential or community-dwelling older adults in Malaysia. Currently, there is no any fall study had been conducted in East Malaysia. All articles retrieved were retrospective in nature; observation in design with no intervention similar to a previous review study in Malaysia (Shaharudin et al. 2018). The advantages of prospective studies as compared to retrospective studies where it minimise the recall bias and the possibility to under estimate the population at risk (Sedgwick, 2014).

There was a huge variation of falls prevalence among Malaysian older adults due to a different location in data collection. The higher prevalence was reported on the residential area (Ghazi et al. 2017). Parallel with previous study, there was a higher percentage of fall risk among residential older adults (Rapp et al. 2012; Singh et al. 2014). Thus, more future study should be conducted among residential older adults with larger sample size. The prospective study was recommended as it can prevent recall bias in reporting fall prevalence.

This review also summarised that most fall occurs indoor (Azidah et al. 2012; Goh et al. 2016; Kadir & Hasim 2011; Romli et al. 2017; Tan et al. 2016; Yeong et al. 2016; Zia et al. 2016). This finding was supported by another study where a higher prevalence of indoor falls was detected among older adults (Duckham et al. 2013). A prospective longitudinal study from South Korea also reported there was a higher indoor fall prevalence among older adults (Kim 2016). Falls usually happened in the morning (Azidah et al. 2012; Kadir & Hasim 2011; Tan et al. 2016) with most activities were conducted which may explain the higher fall prevalence among older adults.

Bathroom/toilet was associated with the highest number of falls occurrence (Tan et al. 2016; Yeong et al. 2016). A systematic review study had explained that the urgency of going to the toilet, the anxiety of not able to reach the toilet on time and cognitive ability to perform multiple tasks (walking, negotiating household obstacles and hold bladder) could lead to high risk of falls within vicinity of bathroom/ toilet (Chiarelli et al. 2009). Other consideration of higher falls prevalence is due to slippery bathroom/toilet surfaces (Chiarelli et al. 2009). Bathroom location was twice likely a person to sustain an injury as compared to other places (Stevents et al. 2014).

Falls participants that sustained an injury was 47-82% (Ghazi et al. 2017; Goh et al. 2016; Kadir & Hasim 2011; Tan et al. 2016; Zia et al. 2016). A higher percentage of faller that sustained injury was recorded in India, at about 67% (Tripathy et al. 2015). This result was supported by an epidemiology study in Australia, wherev about 60% of older adults were sustained an injury after falling. In this review, soft tissue injuries due to fall was accounted for

46-94.4% (Azidah et al. 2012; Ghazi et al. 2017; Kadir & Hasim 2011; Tan et al. 2016); while fracture was 5.5-40% (Azidah et al. 2012; Ghazi et al. 2017; Tan et al. 2016). This is coherent with a longitudinal fall prospective study, where the soft tissue injuries was accounted for 50.6% while fracture was 37.4% (Pohl et al. 2014). This review also reported a hospital admission-related fall which was 25-50% (Ghazi et al. 2017; Goh et al. 2016). This is supported by some epidemiology studies where about 30% of fallers underwent hospitalisation and resulting medical cost up to 50 billion dollars annually (Centers for Disease Control and Prevention 2017; Florence et al. 2018).

This study only included articles published in English with full-text availability. Electronic database only limited to EBSCOhost, ClinicalKey, ScienceDirect, Wiley Online Library, SpringerLink and Google Scholar.

CONCLUSIONS

In summary, a variation on the fall prevalence was determined by several factors such as location and existing medical condition. Pooled information in our study indicates that there still a lack of standardised measuring tools for falls characteristics in Malaysia. There is a need for large scale longitudinal prospective study to determine the prevalence and the causal-effect relationship of falls, as well as suggestion to include psychological assessments to delve further into faller psyche and mental health in Malaysia. Findings on falls prevalence and its characteristics will help the physiotherapists and healthcare providers to reduce the impact of falling especially among the elderly population is rapidly increasing.

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REFERENCES

Assantachai, P., Praditsuwan, R., Chatthanawaree W., Pisalsarakij, D. 2003. Risk factors for falls in the Thai elderly in an urban community. *J Med Assoc Thai* **86**(2): 124-30.

Azidah., A.K., Hasniza, H., Zunaina, E. 2012. Prevalence of falls and its associated factors among elderly diabetes in a tertiary center, Malaysia. *Curr Gerontol Geriat Res* 2012: 1-5

Centers for Disease Control and Prevention. 2017. Home and Recreational Safety. Important Facts about Falls. https://www.cdc.gov/homeandrecreationalsafety/falls/adultfalls.html [May 2019]

Chiarelli, P.E., Mackenzie, L.A., Osmotherly, P.G. 2009. Urinary incontinence is associated with an increase in falls: a systematic review. *Aust J Physiotherapy* **55**(2): 89-95.

Cigolle, C.T., Ha, J., Min, L.C., Lee, P.G., Gure, T.R., Alexander, N.B., Blaum, C.S. 2015. The epidemiologic data on falls, 1998-2010: More older Americans Report Falling. *JAMA Inter Medicine* **175**(3): 443-5.

Colquhoun, H.L., Levac, D., O'Brien, K.K., Straus, S., Tricco, A. C., Perrier, L. 2014. Scoping reviews: time for larity in definition, methods, and reporting. *J Clin Epidemiology* **67**(12): 1291-4.

Cotter, P. E., Timmons, S., O'Connor, M., Twomey, C., O'Mahony, D. 2005. The financial implications of falls in older people for an acute hospital. *Irish J Medical Science* **175**(2): 11-3.

Dai, W., Tham, Y.C., Chee, M.L., Tan, N., Wong, K.H., Majithia, S. 2018. Falls and recurrent falls among adults in a multi-ethnic asian population: the singapore epidemiology of eye diseases study. *Scientific Reports* **68**(1): 1-9.

Duckham, R.L., Procter-Gray, E., Hannan, M.T., Leveille, S.G., Lipsitz, L.A., Li, W. 2013. Sex

differences in circumstances and consequences of outdoor and indoor falls in older adults in The MOBILIZE Boston Cohort Study. *BMC Geriatrics* **13**(1): 1-11.

Florence, C.S., Bergen, G., Atherly, A., Burns, E., Stevens, J., Drake, C. 2018. Medical costs of fatal and nonfatal falls in older adults. *J American Geriatr Soc* **66(**4): 693-8.

Gale, C.R., Cooper, C., Aihie Sayer, A. 2016. Prevalence and risk factors for falls in older men and women: The English Longitudinal Study of Ageing. *Age and Ageing* **45(**6): 789-94.

Ghazi, H.F., Elnajeh, M., Abdalqader, M.A., Baobaid, M.F., Rosli, N.S.R., Syahiman, N. 2017. The prevalence of falls and its associated factors among elderly living in old folks home in Kuala Lumpur, Malaysia. *Int J Community Med Public Health* **4**(10): 3524-9.

Goh, H., Nadarajah, M., Hamzah, N.B., Varadan, P., Tan, M.P. 2016. Falls and fear of falling after stroke: a case-control study. *PM&R* **8**(12): 1-8.

Hill, K.D., Suttanon, P., Lin, S.I., Tsang, W.W.N., Ashari, A., Hamid, T.A.A., Burton, E. 2018. What works in falls prevention in asia: a systematic review and meta-analysis of randomized controlled trials. *BMC Geriatrics* **18**(1): 3.

Iaboni, A., Flint, A.J. 2013. The complex interplay of depression and falls in older adults: a clinical review. *Am J Geriatr Psy* **21**(5): 484-92.

Kadir, A.A., Hasim, H. 2011. Prevalence of falls in elderly men with diabetes in diabetic clinic Universiti Sains Malaysia Hospital, Malaysia. *J Men's Health* **8**(1): 91-3.

Kim, S.H. 2016. Risk factors for severe injury following indoor and outdoor falls in geriatric patients. *Arch Gerontol Geriatr* **62**(1): 75-82.

Kioh, S.H., Rashid, A. 2018. The prevalence and the risk of falls among institutionalised elderly in Penang, Malaysia. *Med J Malaysia* **73**(4): 212-9.

Krishnaswamy, B., Usha, G. 2006. *Falls in older people*: National/ Regional Review India. https://www.who.int/ageing/projects/SEARO.pdf [April 2019}

Ou, L.C., Chang, Y.F., Chang, C.S., Chao, T.H., Lin, R.M., Sun, Z.J., Wu, C.H. 2016. Relationship between the FRAX® score and Falls In Community-Dwelling Middle-Aged and Elderly People. *Osteoporos Sarcopenia* **2**(4): 221-7.

Pi, H.Y., Hu, M.M., Zhang, J., Peng, P.P., Nie, D. 2015. Circumstances of falls and fall-related injuries among frail elderly under home care in China. *Int Journal Nursing Sci* **2**(3): 237-42.

Pohl, P., Nordin, E., Lundquist, A., Bergstrom, U., Olsson, L.L. 2014. Community-dwelling older people with an injurious fall are likely to sustain new injurious falls within 5 years: a prospective long term follow up study. *BMC Geriatrics* 1-7.

Rapp, K., Becker, C., Cameron, I.D., Klenk, J., Kleiner, A., Bleibler, F., Büchele, G. 2012. Femoral fracture rates in people with and without disability. *Age and Ageing* **41**(5): 653-8.

Rapp, K., Freiberger, E., Todd, C., Klenk, J., Becker, C., Denkinger, M., Fuchs, J. 2014. Fall incidence in Germany: results of two population-based studies and comparison of retrospective and prospective falls data collection methods. *BMC Geriatrics* **14**(1): 4-11.

Romli, M.H., Tan, M.P., Mackenzie, L., Lovarini, M., Kamaruzzaman, S.B., Clemson, L. 2017. Factors associated with home hazards: findings from the malaysian elders longitudinal research study. *Geriatr Gerontol Int* **18**(3): 387-95.

Sedgwick, P. 2014. Retrospective cohort studies: advantages and disadvantages. *BMJ*. https://www.bmj.com/content/347/bmj.f6726 [April 2019}

Shaharudin, M.I., Kaur, D., Singh, A., Shahar, S. 2018. Falls prevalence and its risk assessment tools among malaysian community-dwelling older adults: a review. *Malaysian J Public Health Med* **18**(2): 35-8.

Singh, D.K.A., Manaf, Z.A., Yusoff, N.A.M., Muhammad, N.A., Phan, M.F., Shahar, S. 2014. Correlation between nutritional status and comprehensive physical performance measures among older adults with undernourishment in residential institutions. *Clin Inter Aging* 1415-23.

Stevents, J.A., Mahoney, J.E., Ehrenreich, H. 2014. Circumstances and outcomes of falls among high risk community-dwelling older adults. *Injury Epidemiology* **1**(1): 1-9.

Tan, M.P., Kamaruzzaman, S. B., Zakaria, M.I., Chin, A.V., Poi, P.J.H. 2016. Ten-year mortality in older patients attending the emergency department after a fall. *Geriatr Gerontol Int* **16**(1): 111-7.

Tripathy, N.K., Jagnoor, J., Patro, B.K., Dhillon, M.S., Kumar, R. 2015. Epidemiology of falls among older adults: A cross sectional study from Chandigarh, India. *Injury* **46**(9): 1801-5.

World Health Organization 2007. WHO Global Report on Falls Prevention in Older Age. *Comm Health*. https://doi.org/978 92 4 1563536 [April 2019}

World Health Organization 2018. Falls. Retrieved from World Health Organization website: https://www.who.int/news-room/fact-sheets/detail/falls [May 2019}

Wu, H., Ouyang, P. 2017. Fall prevalence, time trend and its related risk factors among elderly people in China. *Arc Gerontol Geriatr* **73:** 294-99.

Yeong, U.Y., Tan, S.Y., Yap, J.F., Choo, W.Y. 2016. Prevalence of falls among community-dwelling elderly and its associated factors: a cross-sectional study in Perak, Malaysia. *Malays Fam Physician* **11**(1): 7-14.

Zia, A., Kamaruzzaman, S., Kyaw, P., Tan, M. P. 2016. Anticholinergic burden is associated with recurrent and injurious falls in older individuals.

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