ORIGINAL ARTICLE

FALLS PREVALENCE AND ITS RISK ASSESSMENT TOOLS AMONG MALAYSIAN COMMUNITY-DWELLING OLDER ADULTS: A REVIEW

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ABSTRACT

Falls in older adults is a major health issue globally. Falls prevalence reports vary based on the study settings. The importance of a fast, easy self-assessment tool to identify falls risk has been emphasised in numerous studies. The aim of our study was to pool information on the prevalence of falls and its risk assessment tools based on a scoping review. This information will be beneficial to inform current falls prevalence and to decide on the best falls risk assessment tool to be used among Malaysian community-dwelling older adults. Articles referred were based on the following electronic databases (MEDLINE Complete, CINAHL, Rehabilitation & Sports Medicine Source and SPORTDiscus) via EBSCOHOST, Science Direct, PubMed, Cochrane Library, Embase® and Google Scholar. Twelve studies were identified to meet the inclusion and exclusion criteria. Our review findings showed that current falls prevalence (between 4.2% and 61%) among Malaysian community dwelling older adults was consistent with the findings in Asia. Falls risk assessment tools used were similar to the ones used in other countries, taking the multiple falls risk factors in consideration.

Keywords: *Older adults, Falls risk, Prevalence, Risk Assessment, Community dwelling, Malaysia*

INTRODUCTION

Falls among older adults is a public health concern globally[1]. Fall is defined as "an event that causes a person coming to rest on the ground or floor or other lower level"[2]. It was estimated that there was a 30%-40% falls prevalence among older adults over the age of 65 years old[3,4]. Higher falls prevalence is reported among older adults aged 80 and older, reaching up to 50% of the population[5]. It is known that risk of falling increases with age[6,7].

Generally, the prevalence of falls among older adults in Asia varies in comparison to Western countries[8]. In Taiwan, the reported prevalence of falls in older adults was approximately 17% to 19 % with a 7% recurrent falls[9,10]. In urban-living older adults in China, the average prevalence of falls was 18%[11]. The incidence of falls among community-dwelling older adults was 34.1% in Korea[12]. Among Asian countries, India was ranked to have the highest falls rates (36.8%)[11],which is similar to western reports[13].

There is a variation in falls prevalence reports in older adults. This prevalence is dependent on various study settings that includes either community, residential institutions or among older adults with a specific condition. Similar to the worldwide reports, falls prevalence in Malaysian older adults varied based on the setting where the study was conducted. Falls data from different settings varies between 4.2% up to 98%[12-14]. In Malaysian community-dwelling older adults aged over 60 years, falls incidence ranged between 15% to 34%[15-18]. These figures corroborate with the global reports with one-third/fourth older adults experiencing a fall annually[19].

Early falls prevention management calls for early falls risk detection. The emphasis on the importance of a simple assessment tool to identify falls risk has been highlighted [20, 21]. For example, development of fall risk self-assessment questionnaire (FRQ) was deduced to assist in empowering independence for falls screening among older adults[22]. American/British Geriatrics Society Clinical Practice Guidelines has also recommended an annual falls risk assessment among older adults[23]. In a systematic review on falls assessment, it was suggested that timed up go (TUG) test was useful in informing falls risk[21]. Moreover, with advancement in technology, using inertial sensors for assessment of falls risk is promising[24].

Falls risk assessment tools suggested in a review were both standard (for example; 6-m walking speed, Elderly Cognitive Assessment Questionnaire, functional reach test, Geriatric Depression Scale and Timed up Go test) and non-standard tools (based on demographic data, comorbidities, falls history, medication intake and home evaluation hazards)[25]. The implication

of falls among older adults is debilitating[24] and may increase socio-economic burden[26].

Pooled information on the prevalence of falls and its risk assessment tools based on a scoping review will be beneficial to inform current falls prevalence trend and in deciding the best falls risk assessment tool to be used among Malaysian community-dwelling older adults. This data can assist in planning for falls prevention and management strategies in older adults. The objective of this review was to summarise the evidence on falls prevalence and its risk assessment tools used among Malaysian community-dwelling older adults.

METHODOLOGY

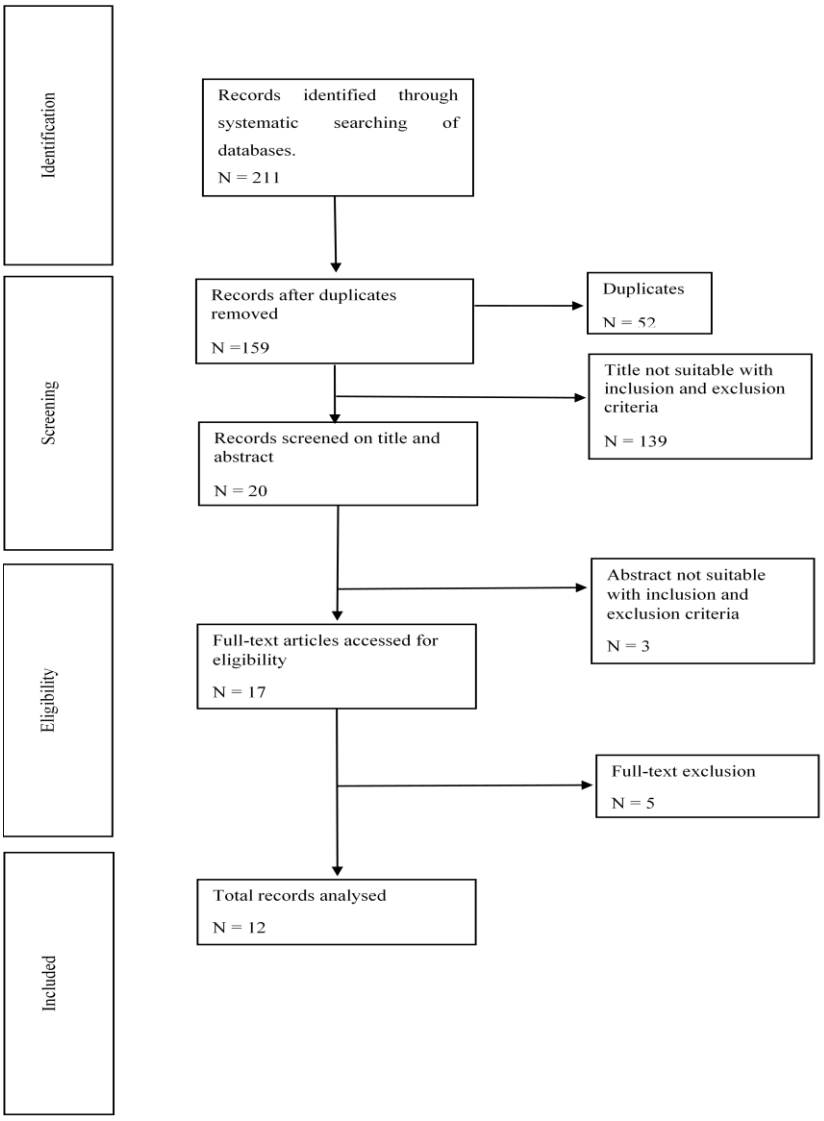
Search Strategy

Articles were searched using the following electronic databases (MEDLINE Complete, CINAHL, Rehabilitation & Sports Medicine Source and SPORTDiscus) via EBSCOHOST, Science Direct, PubMed, Cochrane Library, Embase® and Google Scholar. The search management was conducted with the following primary key search terms: 'falls OR fall`. The search was further carried out with individual search terms (older adult, community-dwelling and Malaysia) with combination of Boolean logic (AND). Similar search terms were used in each electronic database.

Study Selection

Search was limited to English language articles published between the years 2008 and 2016. All types of study design were deemed acceptable, as the number of prospective studies were limited. After the initial search, articles were selected according to their title and their abstract with a total of 211 related articles. The selected articles were then reviewed and eliminated for studies that took place in residential institutes, those that were not related to falls, duplicated articles, older adults below 60 years old and studies that were not conducted in Malaysia. The relevant articles were taken into consideration before the final papers were selected for full-text review. These articles were checked based on the requirement listed in Table 1. The overall articles searched and selected for the current review are as depicted in Figure 1.

Figure 1 – Flow chart showing retrieval and selection process of articles in the present review



Data Extraction
The articles were screened independently by two authors and disagreement was resolved by discussion. Data was extracted by the first author and cross-checked by the second author. The number of participants, prevalence/risk of falls, falls risk assessment tools, results, strength and limitation in each study were recorded. Appraisal tool to score study quality was not used as it is not a compulsory criterion in scoping review[27].

RESULTS

Study Identification
A total of 211 related articles were identified through electronic searching with 30 articles from EBSCOHOST, 39 from Science Direct, 11 from PubMed, 3 from Cochrane Library, 7 from Embase® and 121 from Google Scholar between the years 2008 to 2016. Next, studies that do not fulfil criteria in Table 1 were eliminated. Only 12 studies were included in our review after excluding duplicated articles, articles not meeting inclusion and exclusion criteria; and non-full text articles (Table 2).

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 participants community-dwelling older adults?
4	Are these studies conducted in Malaysia?

Falls Prevalence and its risk assessment
In a total of 12 studies, falls related topic among community-dwelling older adults in Malaysia was investigated. Falls prevalence was investigated in nine studies[12, 13, 16, 28-33] while the remaining three[15, 34, 35] studies reported falls risk using standardised assessment tool. In a total of seven[12, 13, 16, 30-33] and two[32, 33] studies falls prevalence occurrence was evaluated in well-defined and condition-specific (stroke and with a disability) community-dwelling older adults respectively. Falls prevalence was defined as the occurrence of retrospective falls in the previous one year [12, 13, 16, 28-32], except for one which was measured in the past 6 months[33].

Falls prevalence varied among studies encompassing falls prevalence in older adults with a prevalence of 4.2% to 61%[12, 13, 16, 28-31]. Falls occurrence in older adults with condition-specific was 8.6% to 31%[32,33]. There was a 13% to 76% falls risk in older adults, evaluated using falls risk assessment tools such as Physiological Profile Approach (PPA)[15] and Biodex Balance System SD (BBS)[34]. Falls risk score using PPA with a mean score was reported in one study[35].

Location
A total of 36 to 4842 older adults aged 60 years and above participated in these local Malaysian studies. Six studies were performed at clinics or hospital settings[13, 30-32] and two studies were performed in the senior citizen clubs[15, 35]. Two studies were performed in several states[33, 34] and the remaining two studies were carried out in a single state in Malaysia[12, 16]. Note that, all studies were performed in Peninsular Malaysia.

Falls Assessment tools used
A variety of falls assessment tools were used in these studies and included standardised and non-standardised tools. The standardised assessment tools used are as presented in Table 2. The non-standardised assessments were related demographic data encompassing different races, education levels, gender, age, marital status, household income and housing characteristics. In one study, anthropometry information such as weight and height was also included[34]. Medical conditions, visual assessment, falls history and characteristics (sustained injuries, the location where injury occurred, condition after injury and circumstances surrounding the fall) was included in another study[16]. Medication data was categorised as either according to British National Formulary 67 Edition or general drugs intake[13, 16, 28-32]. Blood pressure measurements both in supine and standing positions were included in three studies[29-31].

The standardised assessment was categorised into functional measures, various outcome measures, cognitive measures, physical performance measures and falls risk measures. Functional measures were Instrumental Activities of Daily Living (IADLs), Activity of Daily Living (Barthel's index), Personal Activities of Daily Living (PADLs), Functional Ambulation Category (FAC)[16,28, 32, 33]. Outcome measures used were The Patient Health Questionnaire (PHQ-9), Fugl-Meyer Assessment, British National Formulary 67th Edition Medication Classification, Fatigue Severity Scale (FSS), Home-screen scale (HSS), Safety house checklist (SHC) and Activity Specific Balance Confidence Scale (ABC-6)[16,32,35]. Cognitive measures included were Elderly Cognitive Assessment Questionnaire (ECAQ), Geriatric Depression Scale (GDS 15), Anticholinergic Cognitive Burden (ACB) Scale and The Montreal Cognitive Assessment (MoCA)[13, 16, 30, 32, 34, 35]. Physical performance measures encompassed of Berg Balance Scale (BBS), Tinetti Gait & Balance Score, Ten-Step Test (TST), Short Physical Performance Battery (SPPB), Functional Reach Test (FRT), Static Balance Test (SBT), Timed Up Go (TUG) test, Dominant /left/right

Hand-Grip Strength (HGS) test and Gait Speed test (GST)[15, 28, 30-32]. There were three Falls Risk measures found in the reviewed studies; 16-item Fall Efficacy Scale- International (FES-I), Physiological Profile Approach (PPA) and Biodex Balance System SD (BBS)[15, 32, 34, 35].

Summary of the findings

In three studies the predictors of falls and factors that contributed to the risk of falling were analysed. Medical condition, mobility limitation, sensory deficit and age of the participants were found to be the predictors of falls[34]. In addition, depressive symptoms[16], women and being older (age 70-74 years)[12] were noted to contribute to falls at home among older adults. Similarly, females, with history of stroke, older in age, poor balance and gait scores, orthostatic hypotension, peripheral neuropathy, intake of ≥ 2 antihypertensive medications, polypharmacy, intake ≥2 fall-risk-increasing drugs (FRID) and Anticholinergic Cognitive Burden (ACB) scale score of ≥1 was demonstrated to be associated factors of falls in five studies[28-32].

As for objective Static Balance Test (SBT), it was reported to be a significant predictor of physiological falls risk in one study[15]. A significant correlation ($p<0.05$) between physiological falls risk and several physical performance tests that included Ten-Step Test (TST) ($r=0.25$), Static Balance Test (SBT) ($r=0.23$), Short Physical Performance Battery (SPPB) ($r=-0.33$) and Timed up Go (TUG) ($r=0.27$) was reported[15].

In two studies, the characteristics of falls were analysed. Prevalence of falls was 20% to 60 % and most of the falls occurred inside the house[13,16]. The most common locations of falls were bathrooms and stairs and the majority of these fallers sought medical attention[13]. Falls commonly occurred due to slips and majority of the fallers sustained mild tissue injuries (40%)[13, 16].

DISCUSSION

The aim of this review was to identify the prevalence and its risk assessment tools used among Malaysian community-dwelling older adults. Falls prevalence in our review among Malaysian community-dwelling older adults varied from as low as 4.2%[12] and as high as 61%[30]. It is noteworthy that this range is wider compared to the general global (35%) and Asian (18% to 37%) falls prevalence reports[8, 11, 36]. The explanation for this wide variation in the prevalence of falls could be due to study site (clinics /hospital / senior club's / community settings), urban or rural areas of data collection, sample size, age of participants (60 years and above) and falls prevalence reports based on self-reported history or tested falls risk.

Falls prevalence results from older adults who visited clinics and hospitals was 45%[13, 29-31]. This higher falls prevalence is expected as older adults visiting clinics or hospitals are likely to have medical conditions that could have led to higher risk of falls. Many medical conditions have been shown to be associated with falls[2]. As for studies that were carried out at other settings besides clinics or hospitals, falls prevalence was much lower (about 27% and below). This prevalence is between other falls prevalence (18% to 37%) reported among Asian older adults [8, 11]. However, in three studies where falls was assessed using falls risk measures, falls risk was found to be between 13% to 76%[15, 34, 35].

When assessing falls risk using Physiological Profile Approach (PPA), 13% older adults were categorised to have a high falls risk[15]. PPA is a valid and reliable tool to measure falls risk based on composite scores of a few physiological falls risk factors that include balance, vision, proprioception, reaction time and muscle strength[37]. Moreover, previous study has shown that PPA has a predictive accuracy of 75% for measuring fall risk among older adults[38, 39]. In contrast, higher falls risk was reported using Biodex Balance System SD (BBS)[34]. This may be due to the fact that only overall stability is measured to represent falls risk when using Biodex Balance System SD (BBS)[34].

Falls risk Assessment tools used

The non-standardised risk assessment tools in Malaysia were similar to other falls studies. It includes demographic data, medical history, falls history, medication intake and anthropometry information. The usage of non-standardised assessments may not be able to provide accurate assessment and may lead to underestimation or overestimation of falls risk[40]. This may have an impact on the findings of future falls related studies if used on its own. However, the limitation of non-standardised assessment may be minimised by including standardised tools.

In most of the articles reviewed in our study a standardised assessment tool was used. Since falls was a result of multiple risk factors[26], standardised assessment tools used were related. It included a comprehensive evaluation of falls risk intrinsic and extrinsic factors. Intrinsic factors comprised of assessments of functional, various outcome, cognitive, physical performances and falls risk measures. Extrinsic measures were Home-screen scale (HSS) and Safety house checklist (SHC).

The reason for combined use of falls risk assessment tools related to both intrinsic and extrinsic risk factors is supported by the fact that simple physical performance measures may not be able to accurately inform falls risk among community-dwelling older adults[41]. Hence, it is vital to have combined standardise and non-

standardised falls risk assessment tools in an attempt to identify all existing risk factors for falls. Studies focusing on falls characteristic, implication and intervention among Malaysian community-dwelling older adults were limited.

One of the main limitations found in our review was that in most studies, participants did not represent overall Malaysian community-dwelling older adults. Larger community-based studies are required and have been addressed by our research team recently[17,18]. Moreover, most of the prevalence of falls in our review was found to be retrospective in manner[12, 13, 16, 28-33]. Therefore, it may be difficult to identify the causal relationship between studied variables. Participants may have been subjected to recall bias in retrospective falls incident reports and this could have reduced the accuracy and reliability of the results. Future falls related studies based on prospective study design are required. Our current review addressed the gap on falls prevalence as well as its risk assessment tools used in Malaysian older adults that were not available in a recent review of falls in Southeast Asia that included Malaysia[25].

CONCLUSIONS

In conclusion, our review findings indicated that there were no nationally represented information on falls prevalence and falls risk assessment tools used among Malaysian community-dwelling older adults. Falls prevalence among community dwelling older adults was consistent with the findings in Asia. The falls risk assessment tools used were also similar to the ones used in other countries. More prospective falls prevalence reports and falls risk assessment tools among community dwelling older adults are imperative to provide further evidence and understanding in preparation for the transition to an ageing nation.

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CONFLICT OF INTEREST

The authors declare that there was no potential conflict of interest.

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TABLES/ FIGURE

Table 2: Summary of reviewed studies related to falls prevalence and its risk assessment among Malaysian community-dwelling older adults.

No.	Studies	Participants (Age, N, location)	Prevalence/ Risk of falls (%)	Standardised Assessment tool	Results	Strength / limitation
1.	Azhar, Hisham, and Yusof (2013)[34]	**Aged** ≥65 years **N** = 212 **Location**: Peninsular of Malaysia categorized four zones: North, South, East and West	Categorized falls risk by using Biodex Balance System SD (BBS). High Risk: 76% Low Risk: 24%	1. Biodex Balance System SD (BBS) 2. Elderly Cognitive Assessment Questionnaire (ECAQ)	Predictor that contributed to risk of falls: Medical condition OR = 10.63; CI = 1.617-69.950; p = 0.014 Mobility limitation OR = 5.94; CI = 1.344-26.208; p = 0.019 Sensory deficit OR = .27; CI = 0.098 –0.741, p = 0.011 Age of the participants OR = 1.36; CI = 1.228 – 1.512, p = 0.001	**Strength** The combination of standardised and non-standardised Fall Risk assessment tools were used.
2.	Goh et al. (2016)[32]	Aged ≥60 **N** = 125 **Location**: Primary Teaching hospital in Malaysia	Prevalence: 26% non-stroke and 31% stroke participant experienced fall during the past 12 months	1. Fugl-Meyer Assessment 2. Charlson Comorbidity Index 3. 16-item Fall Efficacy Scale-International (FES-I) 4. The Montreal Cognitive Assessment (MoCA) 5. The Patient Health Questionnaire (PHQ-9) 6. Berg Balance Scale (BBS) 7. Functional Ambulation Category (FAC) 8. Fatigue Severity Scale (FSS)	Female gender was associated with falls in the non-stroke group Fear of falling in the stroke group was associated with functional ambulation level and balance. Functional ambulation level explained 22% of variance in fear of falling in the stroke group Patients with stroke were likely to experience recurrent falls and fear of falling.	**Limitation** Small sample size and cross-sectional design study. **Strength** This study reported information on post-stroke falls and fear of falls.
3.	Kadir and Hashim (2011)[28]	**Aged** (67.5±5.6 years and the mean) **N** = 131 **Location**: Diabetic Clinic Universiti Sains Malaysia Hospital.	Prevalence: 12.9% fell in the previous year, (87% indoors, 65% morning), 8.4% recurrent fallers, 53% un-witnessed	1. Activity of Daily Living (Barthel's index) 2. Tinetti Gait and Balance Score	Falls were associated with age, balance and poor gait score, orthostatic hypotension, and peripheral neuropathy ($p < 0.05$)	**Strength** Information on falls among older adults with diabetes was provided in this study.

4.	Lim et al. (2014)[12]	**Aged** ≥60 years, **N** = 4842 **Location**: Households were stratified by state and urban/rural settings, Malaysia.	Prevalence: 4.2% participants experienced falls in the previous year.	NIL	The most common types of injury were a fall (n=205), cuts (n=43), and being struck by objects (n=14) The most common injury locations were the kitchen (n=81), garden (n=65), bathroom/toilet (n=45), living room (n=26), bedroom (n=22), and stairs (n=21) Home injury rates were significantly higher among women than men (7.4% vs. 3.9%, p<0.001). Married older adults were less likely to have a home injury compared to older adults who were divorced/widowed or single (4.9% vs. 8.0% vs. 8.0%) Predictors that contributed to home injury were :Women (OR = 1.87; CI = 1.37-2.55) and Age (70-74) (OR = 1.45, CI = 1.02-2.07)	**Limitation** This study did not include mortality cases secondary to home injuries or other types of injuries.
5.	Momtaz et al. (2012)[33]	**Aged** ≥60 years **N** = 400 **Location**: Thirteen Malaysian states and the Federal Territory of Kuala Lumpur	Prevalence: 16.4% participants experienced falls for unmet need and 8.6% for needs met among older adults with disability during the past 6 months	1. Personal Activities of Daily Living (PADLs) 2. Instrumental Activities of Daily Living (IADL)	18.0% older adults with functional disability were found to have unmet needs Unmet needs statistically increased odds of falls(OR = 2.10; CI = 1.01-4.43; p≤ 0.05)	**Limitation** Cross-sectional study, which might limit its ability to capture the causal relationship among studied variables. All data was collected using self-reporting method. Secondary data was used in this study.
6.	Rizawati, M., & Mas Ayu, S. (2008)[16]	**Aged** ≥60 years **N** = 516 **Location**: Masjid	Prevalence: 27.3% participants experienced falls during the past 12 months	1. Home-screen scale (HSS) 2. Safety house checklist(SHC) 3. Housing characteristics 4. Geriatric Depression Scale (GDS 15) 5. Elderly Cognitive Assessment	74.5% had experienced one episode of falls 12.8% had two episode of falls 12.8% had three or more episode of falls	**Limitation** This study could be subjected to selection bias as not all older adults selected participated.

		Tanah community, Melaka, Malaysia		Questionnaire (ECAQ) 6. Activity of Daily Living (Barthel's index)	Perceived of falls 39% slipped 25.5% tripped 17% bodily imbalance Sustained Injury 38.3% mild to soft tissue injuries 6.4% joint dislocation and fractures Falls occurrence 66.7%, inside home 19.1% outdoors 14.2% away from home Predictor that contributed to home falls among older adults was Depressive mood(OR = 1.9; CI = 1.1-3.3)	
7.	Singh et al. (2015)[15]	**Aged** ≥ 60 **N** = 94 female, 47 males **Location**: Senior Citizens Club in Kuala Lumpur, Malaysia.	Categorized falls risk by using PPA High Risk 13% Low Risk: 87%	1. Physiological Profile Approach (PPA) 2. Ten-Step Test (TST) 3. Short Physical Performance Battery (SPPB) 4. Functional Reach Test (FRT) 5. Static Balance Test (SBT) 6. Timed Up Go (TUG) 7. Dominant Hand-Grip Strength (DHGS) 8. Gait Speed Test (GST)	50% of the participants in the high risk of falls had a history of falls. Significant correlation with Physiological Falls Risk (PPA) Ten-Step Test (TST) (r=0.25) Static Balance Test (SBT) (r=0.23) Short Physical Performance Battery (SPPB) (r=−0.33) Timed Up Go (TUG) (r=0.27) Identified Falls risk Predictor was Static Balance Test (SBT) (OR = 2.12; CI = 1.26-3.57)	**Strength** Study may be used as a guide for initial falls screening to categorise high and low physiological falls risk among community-dwelling older adults **Limitation** A larger number of participants and prospective falls incidence data may be beneficial in establishing precise cut-off values and predictive validity of falls risk using objective measurements of postural sways.
8.	Singh et al. (2012)[33]	**Aged** ≥56 **N** = 36 female **Location**: Senior citizen's club, Malaysia	Falls risk score by using PPA; mean (standard deviation) Experimental Week 0: 1.59 (1.510) Week 6: 0.45 (1.05) Control Week 0: 1.99 (1.91)	1. Physiological Profile Approach (PPA) 2. Activity Specific Balance Scale (ABC-6)	Virtual reality balance exercise group (VRBG) and conventional balance exercise groups had significant decrease in Physiological Profile Approach (PPA) ($p < 0.001$) and Activity Specific Balance Scale (ABC-6) ($p < 0.01$) after the interventions.	**Limitation** Physical activity levels of the participants were not measured at baseline measurements. **Strength** Randomized control study regarding falls intervention.

			Week 6: 1.34 (1.50)				
9.	Sazlina et al. (2008)[13]	**Aged** ≥60 **N** = 151 **Location:** Primary care Clinic in Kuala Lumpur, Malaysia	Prevalence: 47.0% participants experienced falls over the previous 12-months period.	1. Elderly Cognitive Assessment Questionnaire (ECAQ)	57% reported recurrent falls. Majority (61%) of falls occurred in the home Two most common places of falls were the bathroom (27%) and stairs (27%). 61% of older people who fell, sustained an injury and most sought medical attention	**Limitation** Study results may not be generalised to Malaysian older adults.
10.	Zia et al. (2015)[29]	**Aged** ≥ 65 years **N** = 358 **Location**: Emergency Medicine, Primary Care clinics and Geriatric Medicine clinics, Malaysia	Prevalence 56% participants experienced two falls or one injurious falls over the preceding 12-months period.	1. Medication classification according to the British National Formulary, 67th Edition	Minimal standing systolic BP (SBP) was significantly lower among fallers 128 ± 27.3 mmHg Diuretics were associated with orthostatic hypotension (OR = 2.2; CI = 1.1-4.4) α-blockers were associated with minimal standing systolic BP (SBP) (Mean Difference = 13.5; CI = 3.6-23.4) ≥ 2 antihypertensives was associated with recurrent and injurious falls (OR = 1.97; CI = 1.2–3.1)	**Limitation** In this case–control study, causal relationship between antihypertensive therapy and falls was not established.
11.	Zia et al. (2016)[31]	**Aged** ≥65 years **N** = 358 **Location**: Emergency Medicine, Primary Care clinics and Geriatric Medicine clinics in a large	Prevalence 56% participants experienced two falls or one injurious falls over the preceding 12-months period.	1. Timed up & go Test (TUG) 2. Functional Reach Test (FR) 3. Hand Grip Strength Test (GS) 4. Medication classification according to the British National Formulary, 67th Edition	Significantly associated with an increased risk of falls. Polypharmacy OR = 2.23; CI 1.39–3.56; p = 0.001 Use of two or more fall-risk increasing drugs (FRID) (OR 2.9; CI = 1.9–4.5; p = 0.0001)	**Strength** Information of medications and falls in older adults.

		teaching hospital in Kuala Lumpur, Malaysia				
12.	Zia et al. (2016)[30]	**Aged** ≥65 years **N** = 428 **Location**: Emergency Department, Primary Care clinics and Geriatric clinics, Malaysia.	Prevalence: 61% of the participants experienced two or more falls or one injurious fall in the preceding 12 months	1. Timed up & go (TUG) 2. Functional Reach (FR) 3. Left Hand Grip Strength (LGS) 4. Right Hand Grip Strength (RGS 5. Anticholinergic Cognitive Burden (ACB) Scale 6. Medication classification according to the British National Formulary, 67th Edition	Significant association between an Anticholinergic Cognitive Burden (ACB) Scale score of ≥1 with falls OR = 1.8; CI = 1.1–3.0; p = 0.01 .	**Limitation** Causal relationships could not be established in this cross sectional study