ความชุกและปัจจัยที่เกี่ยวข้องกับการจำกัดกิจกรรมเนื่องจากกลัวหกล้ม ในผู้สูงอายุที่อาศัยอยู่ในชุมชนในประเทศไทย
Prevalence and Correlates of Fear-related Activity Restriction in Community-dwelling Older Adults in Thailand

นิพนธ์ต้นฉบับ **Original Article**

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วารสารไทยเภสัชศาสตร์และวิทยาการสุขภาพ 2568;20(1):72-79.

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บทคัดย่อ

วัตถุประสงค์: เพื่อสำรวจความชุกของการจำกัดกิจกรรมเนื่องจากกลัวหกล้มและปัจจัยที่เกี่ยวข้องในผู้สูงอายุที่อาศัยอยู่ในชุมชนของประเทศไทย **วิธีการศึกษา:** การศึกษาแบบตัดขวางเก็บข้อมูลผู้สูงอายุจำนวน 175 คนใน 6 ชุมชน (เป็นชุมชนเมืองชนบทอย่างละ 3 แห่ง) ในจังหวัดชลบุรี สุ่มตัวอย่างแบบหลายขั้นตอน สัมภาษณ์โดยใช้แบบสอบถามข้อมูลส่วนบุคคล ความสามารถในการทำกิจวัตรประจำวัน ภาวะเกือบหกล้ม การหกล้ม การบาดเจ็บจากการล้ม การคาดการณ์ความยากลำบากเนื่องจากบาดเจ็บจากการหกล้ม และการจำกัดกิจกรรมเนื่องจากกลัวหกล้ม ประเมินการทรงตัวโดยทดสอบการยืนต่อเท้า และการมองเห็นด้วยแผ่นตรวจสายตา ทดสอบความสัมพันธ์ด้วยการทดสอบไคสแควร์ และการวิเคราะห์ถดถอยโลจิสติก **ผลการศึกษา:** ตัวอย่างส่วนใหญ่เป็นหญิง (118 ใน 175 คน) อายุเฉลี่ย 69.3 ปี (ช่วง 60 - 89 ปี) พบ 39.4% จำกัดกิจกรรมเนื่องจากกลัวหกล้ม ในเบื้องต้นพบว่าเพศ ภาวะเกือบหกล้มในสัปดาห์ที่ผ่านมา การมีประวัติเคยหกล้มใน 1 ปีที่ผ่านมา การบาดเจ็บจากการหกล้ม การคาดการณ์ความยากลำบากเนื่องจากบาดเจ็บจากการหกล้ม และการทรงตัวบกพร่องล้วนสัมพันธ์กับการจำกัดกิจกรรม การวิเคราะห์การถดถอยโลจิสติกพบว่าเพศหญิง (OR = 4.41, 95% CI = 1.88 - 10.34) และการทรงตัวบกพร่อง (OR = 4.34, 95% CI = 1.97 - 9.57) สัมพันธ์กับการจำกัดกิจกรรม **สรุป:** ความชุกของการจำกัดกิจกรรมจากการกลัวหกล้มในผู้สูงอายุไทย คือ 39.4% หรือ 4 ใน 10 เพศหญิงที่การทรงตัวบกพร่องมีแนวโน้มที่จะจำกัดกิจกรรมเนื่องจากความกลัวนี้ ควรสร้างความเข้าใจโดยใช้หลักฐานเชิงประจักษ์ที่เน้นการส่งเสริมการทรงตัว และลดความกลัวการหกล้มที่มากจนเกินไปในผู้สูงอายุไทย

คำสำคัญ: ความกลัวการหกล้ม; การหกล้ม; การจำกัดกิจกรรม; การทรงตัวบกพร่อง; ผู้สูงอายุ

Abstract

Objective: To examine prevalence of fear-related activity restriction and associated factors among community-dwelling older adults in Thailand. **Method:** We employed a cross-sectional study design to recruit 175 community-dwelling older adults from six study sites, three in rural and urban areas each, across Chon Buri province in the eastern region of Thailand using multistage sampling. Participants were interviewed using questionnaires to collect demographic information, activities of daily living, near fall events, fall, fall-related injuries, anticipation of difficulties from fall-related injuries, and fear-related activity restriction. Balance performance and visual acuity were assessed by a full tandem stance test and Snellen chart, respectively. Associations were tested using chi-squared tests and logistic regression. **Results:** Of 175 participants, the majority were female (118 of 175). Their mean age was 69.3 years (range 60 - 89 years). 39.4% restricted activities due to the fear. Univariate analysis showed that gender, near fall events in the past week, falling history in the past year, fall-related injuries, anticipation of difficulty from fall-related injuries, and poor balance performance were associated with activity restriction. Logistic analysis indicated female gender (OR = 4.41, 95% CI = 1.88 - 10.34) and poor balance performance (OR = 4.34, 95% CI = 1.97 - 9.57) were independently associated with fear-related activity restriction. **Conclusion:** The prevalence of fear-related activity restrictions due to fear of falling was 39.4% or 4 in 10 older participants. Older women with poor balance performance were more likely to restrict their activities due to this fear. Evidence-based interventions should be implemented to preserve balance performance and reduce fear might be beneficial for Thai community-dwelling older adults.

Keywords: fear of falling; falls; activity restriction; balance performance; older adults

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Introduction

Fear of falling (FOF) and falls are common issues in older adults that can lead to activity restriction in older populations. The prevalence of FOF ranges from 43.3% - 69.2%,[1-4] and the global prevalence of falls is 48.4% in community-dwelling older adults.[5] In previous studies, researchers reported significant association of FOF, falling history, and fall-related injuries with activity restriction[6] even in older adults with high physical functioning.[7] Fear-related activity restriction (FAR) is

a significant problem that leads to negative health outcomes in older people. The prevalence of FAR ranges from 29.3% to 69.2%.[3,8-10] In previous studies in north America, the United States of America and Canada, researchers found FAR prevalence in community-dwelling older adults between 29.3% and 74.5%. [8,11,12] Significant risk factors include personal mastery,[11] difficulty in basic activities of daily living (ADLs) and instrumental activities of daily living (IADLs),[12] lower limb strength,[8,12] poor balance performance,[8,11,12] visual contrast sensitivity,[12] and visual impairment.[8] In European studies, the Netherland and Belgium, researchers found that 33.2%-37.9% of community-dwelling older adults had FAR.[10,13] Advanced age,[10,13,14] female gender,[13,15] falling history,[10,13,15] poor perceived general health,[10] FOF,[15] and ADLs limitation,[14] were associated with FAR. In another study in Ireland, researchers found poor self-reported vision significantly associated with FAR, but visual acuity and visual contrast sensitivity were not significant.[16] In Asian studies, South Korea and Singapore, researchers found 28.9%-38.4% of community-dwelling older adults had FAR,[1,3] and correlates factors were low socioeconomic status, cognitive impairment, injurious fall, ADL difficulty,[1] depression, and sarcopenia.[3] Evidence from longitudinal study in South Korea revealed that FAR had a prominent impact on progressive acceleration of frailty over time and fueled future falls in older populations.[17] Researchers also found Korean community-dwelling older adults who reported FAR were more likely to experience decreased lifespans.[18]

Prior studies provide evidence for risk factors and outcomes of FAR, however, studies are limited to Western and other Asian older populations. The results from these studies may not represent older adults in Thailand due to differences in geographic environmental, cultural, and lifestyle factors. Only one study in Thailand examined FAR in Thai older adults living in suburban area, and researchers found the prevalence of 69.2% and FOF was only the significant factor associated with FAR.[9] Since this study focused only on Thai older adults living in suburban areas, the results from this study may have limited generalizability to all Thai community-dwelling older adults. Thus, in this study, we recruited older adults living in both rural and urban areas. In addition, new variables suggested by recent research including near fall events and anticipation of difficulty from fall-related injuries were examined since evidence from a systemic review suggested psychological construct play a significant role on FOF and FAR.[19] The purposes of this study were to 1) examine the prevalence of FAR, and 2) identify factors associate with FAR in community- dwelling older adults in Thailand. We hypothesized that participants' characteristics: age, gender, living status, fall-related variables: near fall events, falling history, injurious fall, anticipation of difficulty from fall-related injuries, and physical function: ADLs, IADLs, visual acuity, and balance performance, will be associated with FAR.

Methods

In this cross-sectional study, FAR and correlates factors were examined in 175 community-dwelling older adults. The study was approved by the XXX Ethical Committee (ethic committee approval number: Sci 078/2561).

The study used the prevalence data from one of our other FOF studies in Thailand that is unpublished. The sample size was calculated using OpenEpi.[20] Using the FOF prevalence of 86%[21] and 95% confidence level to calculate sample size from 184,912 older adults living in Chon Buri,[22] 93 participants were required. G*Power 3.1[23] was utilized to calculate sample size for regression analysis, with 95% confidence level, medium effect size, power of the test 0.80, and 16 independent variables, requiring 143 participants. The total sample required 93-143 participants; however, we added 20% of sample to compensate of possible missing data, a total of 175 participants was recruited.

This study included older adults living in Chon Buri province (184,912 persons).[22] We utilized multistage sampling to draw 175 community-dwelling older adults from six study sites. First, we randomly selected three of 11 districts, and then randomly selected two sub-districts of each district, one in rural and another in urban area, yielding six different sub-districts across Chon Buri province. To be eligible, community-dwelling older adults had to be: 1) Thai nationality, 2) age 60 years or older, 3) no dementia based on the clock drawing test with score 0-3[24], and 4) willing to take part in the study. Older adults with positive clock drawing screening test for dementia were excluded.

Data collection

We approached municipal mayors to ask for permission to collect the data. Participants were recruited from social events, school of the elderly, or senior clubs in each study site. Before

data collection, prospective participants were informed about the study and signed the consent form. Participants were interviewed using questionnaires, and then visual acuity and balance performance were assessed using Snellen chart and a full tandem stance test. Compensation was paid as a gift cost 100 baths (approximately $3) for each participant. The data were collected during June to September 2018.

Research instruments

Demographic information

We developed a demographic questionnaire to capture participant age, gender, education, marital status, and living status.

Fear of falling, fear-related activity restriction, fall, and fall-related assessments

FOF refers to concerns about falls. A single question was used “At the present time, are you somewhat, very, or not at all fearful or concerned that you might fall or lose your balance?” not at all, somewhat fearful, and very fearful. The single item has been used in a previous study.[2]

FAR refers to avoiding or refraining from engaging in activities that the older adults used to do due to the fear of falling, such as walking, going to the market, and participating in social activities. FAR prevalence was ascertained by asking “How often do you avoid activities due to concerns about falling?” never, sometimes, often, or very often. This scale was used to assess activity restriction in prior study.[10] Participants were also asked to describe the most common activities they avoided.

A fall is defined as an unexpected event in which the participants come to rest on the ground, floor, or lower level.[25] Falling history was ascertained by a single question “How many times in the past year have you fallen? none, one, two or more times”

Near fall events refers to a loss of balance in which the person starts to fall but is able to catch himself or herself before landing.[25] Near fall events was assessed using the following questions “In the past week, have you felt so unsteady that you thought you might fall, but didn’t? with yes/no response options, How many times?”

Injurious fall means physical harm as a result of a fall resulting in medical attention including a hospitalization, fracture, joint dislocation, head injury, sprain or strain, bruising, swelling, laceration, or other serious injuries.[25] Injurious fall was assessed by the following questions. “Did you have any injuries as a result of your falls? no injuries, minor injuries, hospitalization due to hip fracture, and other injury requiring hospitalization”

Anticipation of difficulty from fall-related injuries refers to psychological harm as the person’s expects of difficulty from injurious fall. It was assessed by “How much difficulty do you think a fall injury would cause in your life?” The total score ranges from 0 to 10, where 0 indicates no difficulty and 10 indicates a lot of difficulty.[2]

Functional assessment

The Thai version of the modified Barthel Index was used to describe participants ability to care for themselves. It is comprised of 10 questions to assess 10 fundamental tasks for independent living, with the total score ranges 0-20. The score 11 or less indicates ADL limitation or dependency.[15] Instrumental activities of daily living refer to more complex activities required to live independently in the community, such as cooking, housekeeping, and using public transportation. IADLs were assessed by using the Chula ADL index. It includes five questions to assess complex activities required to live independently in the community. The total score ranges from 0-9. The score less than 9 indicates some IADLs limitation. These two scales are widely used in Thailand.[26]

Balance performance was assessed using a full tandem stance test by asking participants to place one foot in front of other, toe touching heel, and hold this position for 10 seconds. Scoring less than 10 seconds indicates a risk for falling.[27]

Distance visual acuity was assessed using a Snellen chart hanging 6 meters away with

a vision score of less than 6/12 indicating visual impairment and the older adults were at risk for falling.[28]

All measures using in this study were validated and have been used in previous studies.[2,10,24-28]

Statistical analysis

Minitab version 17 was used to perform all statistical analyses. Descriptive statistics showed no missing data for all variables. Univariate analyses were conducted using chi-square tests, Fisher’ s exact tests, or t- tests. FAR was dichotomized to activity restriction versus no activity restriction, then binary logistic regression was used to assess associations of FAR with demographic and health- related variables, including age, gender, living status, near fall events,

falling history, visual acuity, balance performance, ADLs, and anticipation of difficulty from fall-related injuries.

Required assumptions of logistic regression were checked. The cross-tabulation table showed adequacy of expected frequencies of categorical variables (gender, near fall events, falling history, visual acuity, balance performance, and activity restriction). We found complete separation of near fall events. In other words, all participants who experienced near fall events in the past week reported FOF. Living status and ADLs had expected frequencies less than five; therefore, near fall events, living status, and ADLs were dropped from the multivariate analyses. With 3 standardized deviation criteria, no significant outliers were identified. There was no multicollinearity among continuous predictors. Variance inflation factors (VIFs) were less than five in all predictors which indicated independence of errors. The interaction terms of each predictor and its natural logarithm were not statistically significant which indicated that the assumption of linearity of logit was met. We compared expected and observed variances with all independent variables in the model which indicated good fit with p values > .05 by deviance and Pearson criterion. Also, dispersion (approach 1) indicated that the model's predicted and observed variance were nearly no dispersion; therefore, the residuals were independent.

Results

Table 1 shows participants' characteristics. Of 175 participants, most of them were females (67.4%), mean age = 69.3 years (SD 6.3), 22.9% experienced near fall events within a week prior to the study, 28% fell in the past year, and 41.7% were injured from a fall, mainly minor injuries. More than nighty percent of participants anticipated difficulty from fall-related injuries with a mean of 8 out of 10 (range 0=10, SD=3.3). Overall participants had high functional performance. None reported limitations in ADLs, while 14.9% had some limitation of IADLs, mainly inability to use public transportation independently. Based on the testing, 24.6% of participants had poor balance and were at increased risk for falling whereas 42.3% had visual impairment and were classified as at risk for falls.

Table 1 Participants' characteristics (N= 175).

Variables	*Means* ± SD or *n* (%)
Age (years)	69.3 ± 6.3
Gender	
Male	57 (32.6)
Female	118 (67.4)
Living status	
Live alone	11 (6.3)
Live with spouse or other family members	164 (93.7)
Frequency of fall in the past 12 months	
No	126 (72)
One or more falls	49 (28)
Injurious fall	
No	109 (58.3)
Yes	66 (41.7)
Near fall events in the past week	
No	135 (77.1)
Yes	40 (22.9)
Anticipation of difficulty from fall-related injuries	8 ± 3.3
Independent in ADLs	175 (100)
Deficits in IADLs	26 (14.9)
Poor balance performance	
No	132 (75.4)
Yes	43 (24.6)
Poor visual acuity	
No	101 (57.7)
Yes	74 (42.3)

Note. Data are presented as means ± SD or n (%).

SD = standard deviation, ADLs = basic activities of daily living, IADLs = instrumental activities of daily living

Prevalence of fear-related activity restriction

Table 2 reveals FOF prevalence of 81.7%. FAR was reported by 39.4% of participants. Of those with FAR reported the frequency as follows: 42.1% sometimes; 39.1% very often; and 18.8% often restricted their activities. Common activities participants reported avoiding were reaching, going out, and visiting a crowded place.

Univariate associations with activity restriction

Table 3 shows univariate associations of FAR with participants' characteristics and their health-related variables. Gender, falling history, near fall events, balance performance, and anticipation of difficulty from fall-related injuries were individually associated with FAR. Older women were more likely than men to restrict their activities, X^2 (1) = 19.78, p < .001. Older females who experienced falling, near fall

events, balance problem, and had greater concern of difficulty from fall-related injuries were more likely to restrict their activities than their peers. There was no significant association between FAR with other demographic and health-related variables.

Table 2 Prevalence of fear-related activity restriction (N= 175).

Variables	*N* (%)
Fear of falling	**143 (81.7)**
Fear-related activity restriction	
Yes	69 (39.4)
No	106 (61.6)
Frequency of fear-related activity restriction	
Sometimes	29 (42.1%)
Often	13 (18.8%)
Very often	27 (39.1)

Table 3 Univariate associations of fear-related activity restriction (N= 175)

Variables	Fear-related activity restriction		
	Yes (n = 69)	No (n = 106)	P-value
Age (years)	69.6 ± 6.9	68.9 ± 5.9	0.409
Gender			
Male	9 (15.8)	48 (84.2)	< 0.001*
Female	60 (50.9)	58 (49.2)	
Living status			
Live alone	2 (18.2)	9 (81.8)	0.204
Live with spouse or family members	67 (40.9)	97 (59.2)	
Frequency of fall in the past 12 months			
No	41 (32.5)	85 (67.5)	0.003*
One or more fall	28 (57.1)	21 (42.9)	
Injury from a fall			
No	31 (28.2)	79 (71.8)	< 0.001*
Yes	38 (58.5)	27 (41.5)	
Near fall events in the past week			
No	43 (31.9)	92 (68.2)	< 0.001*
Yes	26 (65)	14 (35)	
Poor balance performance			
No	40 (30.3)	92 (69.7)	< 0.001*
Yes	29 (67.4)	14 (32.6)	
Poor visual acuity			
No	35 (34.7)	66 (65.4)	0.131
Yes	34 (45.9)	40 (54.1)	
Anticipation of difficulty from fall-related injuries	8.7 ± 2.6	7.6 ± 3.7	0.025*
ADLs	19.7 ± 0.6	19.6 ± 0.9	0.375
IADLs	8.7 ± 0.9	8.9 ± 0.4	0.058

Note: Data are presented as means ± SD or n (%). * = significant at alpha level .05, ADLs= basic activities of Daily Living, IADLs= Instrumental activities of daily living, Chi-squared tests or t-tests at alpha level < .05

Multivariate associations with activity restrictions

Table 4 presents multivariate associations of FAR with demographic and health- related variables. Significant predictors of FAR included gender and balance performance. Older females were over four time more likely than older males to restrict their activities due to the fear (OR 4.41, 95% CI 1. 88- 10. 34) . Compared with those without balance problems, older adults who had poor balance performance were 4.43 times (OR 4.43, 95% CI 1.14- 90.73) more likely to restrict their activities.

Table 4 Multivariate associations of fear-related activity restriction with participants' characteristics and health-related variables

Variables	Fear-related activity restriction	
	Odds ratio	95% CI
Age	NS	
Gender		
Male	1	Reference
Female	4.41	1.88-10.34
Falling history in a previous 12 months		
No fall	1	Reference
One of more falls	1.79	0.84-3.82
Anticipation of difficulty due to falling	NS	
Poor balance performance		
No	1	reference
Yes	4.34	1.97-9.57
Poor visual acuity		
No	1	reference
Yes	NS	

Note. Binary logistic regression at alpha .05, NS= non statistically significance

Discussions and Conclusion

In this cross-sectional study, we found a FAR prevalence of 39.4% which is comparable with previous studies in South Korea,[1] Singapore,[3] the Netherland,[10] and Belgium,[13] but lower than studies in the US.[11,12] Compared to the previous study in suburban area of Thailand,[9] we found lower prevalence of FAR. It is possible that the differences are due to the participants we recruited. Many actively participated in social events so may have higher functional performance compared with the general population. Additionally, in our study, we included older adults from rural areas, who may be more active than urban older adults. Our participants did not report ADLs limitation and only 14.9% had some IADLs deficits while the national health examination study showed community-dwelling Thai older adults had 12.8% of ADLs and 15.3% of IADLs dependencies.[29] The finding may suggest the disparity of FAR prevalence by living areas. Further study is needed to examine the rural-urban differences in FAR among Thai older adults living in community.

Compared to previous studies in other countries, variations in the prevalence rates of FAR may be explained by differences in the definition of aging in Asian versus Western countries, cultural difference, environment, and lifestyle related to Thai style housing.[30] There are, however,

other possible explanations for these findings that falling history, physical function, and the utilization of different measures may play a role in the differences.

As expected, we found univariate associations of FAR with female gender, near fall events, falling history, poor balance performance, and anticipation of difficulty from fall-related injuries; however, age, living status, and visual acuity were not significant. Our finding is in line with previous studies and a systematic review, FAR was significantly higher in older women than men. [3,9,10,14,19] The significance holds in the multivariate analysis. It is possible that older women trend to have weaker musculoskeletal function and balance problem than older men since evidence from previous studies revealed that poor balance performance associated with FAR.[8,11,12,16,19]

Older people often develop FOF and restrict daily activities after a fall.[1,14,17] In this study, we found that near fall events, falling in the past year, and anticipation of difficulty from having a fall were significantly associated with FAR. As evidence from longitudinal cohort studies indicated that avoidance of activities fuels frailty,[17] balance problem,[8,11] functional impairments,[8,11,12,15] future fall,[1,15,17] while shortening lifespan.[18] Intervention to address FAR in community-dwelling older adults would be of benefit to preserve physical function and save lives of older people.

Several studies have shown an association between poor balance performance and FAR.[8,11,12] In this study, we found balance performance associated with FAR in both the univariate and multivariate analyses. These could be because older adults who had difficulty with postural control try to avoid activities to prevent a fall. However, decreased physical activity can accelerate decline including poorer lower extremity performance,[12] frailty,[17] and worsening IADLs disability.[12] Interventions to promote balance performance and appropriate physical activity would help address these concerns.

Contrary to previous studies,[9,10] and a systematic review,[19] we did not see a significant association with advanced age. It is possible that older participants in this study still have high functional status since we recruited older people who are still active. We also found FAR was not associated with living alone, this finding is in line with a large number of studies as reported in a review by Denkinger et al. [19] This study did not support evidence found in previous studies that FAR associated with visual acuity,[8,12,14] since we found poor visual acuity was not associated with FAR. It is possible that perceived poor vision may be more important than visual function examined by visual acuity and contrast sensitivity tests. As in one study, researchers found poor self-reported vision associated with FAR, but visual acuity and contrast sensitivity were not significant.[16] However, in this study, we did not include perceived poor vision. The discrepancy warrants for further investigation. For multivariate analysis, however, only female gender and poor balance performance remained significant. These findings are consistent with some researchers[10,15] who found significant association of female gender and activity restriction. Our finding supported evidence from previous studies that showed balance performance associated with FAR.[8,11,12,16,19] It is possible that physical functioning, psychological factors, and self-perceived sensory impairments may be more important factors to FAR than poor sensory function tests in older adults. Further study is suggested to investigate the mechanisms of fear of falling and activity restriction.

Study limitations and strengths

Our study is limited by the cross-section design, so causality cannot be determined. Further, the study participants had higher functional status than the general older population which may limit generalizability. As a result, further studies with broader populations and longitudinal designs are recommended. However, the study has several strengths, including the different geographic regions included, the range of potential risk factors related to FAR, and physical assessment of function and vision, which provides stronger evidence than self-reported data.

Conclusion

Fear of falling and activity restriction are common in Thai older adults, even those with a high level of functioning. This decrease in physical activity can result in functional disability and increase the risk of future falls. We recommend that healthcare providers should prioritize addressing FAR by utilizing both physical and psychological interventions to alleviate activity restrictions and eventually slow down frailty, sarcopenia, and promote older adult health.

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