Falls and Their Associated Factors: A National Survey of The Thai Elderly

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Abstract

Of the 7,713 subjects aged 50 and over in a multistage random sampling national survey of Thailand, 4,480 Thai elders aged 60 and over were interviewed in a study which aimed to determine rate, characteristics and the associated factors of falls in the last six months. Eight hundred and thirty-six elders (18.7%) had one or more falls. Female elders (21.5%) fell more often than their male counterparts (14.4%). There was no association between age and falls among Thai elder population. Most of the falls occurred outside (65%) and during the day time (85%).

Multiple regression analysis showed that independent factors associated with falls among male elder were a bad or fairly bad health, reported hypertension, problems with walking in the house, problems with crouching and a lack of electricity in the house. Independent factors associated with falls among female elders were a bad or fairly bad health, joint problems, illness which made her unable to have normal activities during the last year, problems with crouching, going to buy food everyday, very lonely feeling, having less than 3 meals a day, a lack of electricity in the house and living in a Thai style house or hut. This study revealed that environmental and intrinsic health factors which affected balance and gait were the main factors associated with falls among Thai elders. Nutritional status as a contributing factor to falling among elderly women was also suggested.

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Falls are a major health concern in the elderly population[1-5]. Falling is not an uncommon cause of morbidity such as fractures, subdural haematoma, soft tissue injuries or post-fall syndrome[4-13]. Moreover, it has been found that falling is a risk factor of mortality among elders[14-17]. In Thailand, the population structure is changing rapidly. It is estimated that the proportion of elder people in the population will be 18 per cent by the year 2020[18]. Although gerontological research is widely conducted in Thailand at present, no study of falls has been conducted. In 1995, a National Survey of the Welfare of the Elderly in Thailand (SWET) was conducted, in which history of falls and possible associated factors including health and socio-economic factors were also included. The present paper aimed at examining the rate, pattern and associated factors of falls among Thai elderly.

SUBJECTS AND METHOD

In 1995, a multistage random sampling national household survey of a National Survey of the Welfare of the Elderly in Thailand (SWET) was conducted. Seven thousand seven hundred and thirteen subjects at the age of 50 and over were interviewed by trained interviewers for data on frequency, time and place of falls which occurred within the last 6 months. Fall incidences excludes those resulted from overwhelming outside events, such as motor-vehicle accidents or violence. Personal data, socio-economic data, house condition, perceived health status, functional ability and other health data which might be associated with falls were collected. If subjects were not able to communicate or provide data (e.g. being sick, aphasia or impaired cognitive function) to the interviewers, their carers were interviewed. To determine falls and their associated factors among the Thai elders, data from subjects aged 60 and over were used in the analysis (n = 4,480).

The number of falls in the last 6 months were categorised into 3 categories i.e. no history of falling, one fall in the last six months and two or more falls in the last six months[19,20]. Univariate factors of falls were identified by using chi-square test, Mann-Whitney test or one-way analysis of variance wherever they were appropriate (alpha error < 5%). Multivariate factors were identified by entering these univariate factors into a multiple regression analysis (stepwise method) using falls as a dependent factor. The SPSS-PC programme was used for statistical analysis.

RESULTS

From the 7,713 subjects in this national survey, 4480 elders were recruited for the analysis. The means and its standard deviation for age was 69 and 8.2 years respectively (n = 4480). Age of the oldest subject was 110. Forty per cent of subjects were male. Seventy three per cent of the subjects lived in rural area. Characteristics and health status of these elderly subjects are shown in Table 1 and Table 2. Eight hundred and thirty-six elderly subjects (18.7%) reported that they had fallen in the last six months. Frequency of male and female elderly subjects is shown in Fig. 1. Ten point five per cent of all subjects had one fall. Eight point two per cent had two or more falls. Overall, 21.5 per cent of the female elders fell in the last six months, compared with 14.4 per cent of the male elders. Sixty-five per cent of falls occurred outside. Eighty-five per cent of the events occurred during day time. (Fig. 2)

Twenty three univariate factors associated with falls were identified. (Table 3) These univariate factors were entered into a multiple regression analysis using falls as a dependent factor. For all subjects, the 10 independent factors associated with falls were: problems with crouching, bad or fairly bad health, illness which made him/her unable to have normal activity during the last year, a lack of electricity in the house, female sex, problems with walking in the house, taking less than 3 meals a day, joint problems, going to buy food every day, and very lonely feeling. (Table 4) Subgroup analysis for identifying multivariate factors of falls in male and female subjects was done. Five and nine independent factors were determined in male and female subgroups respectively. (Table 4)

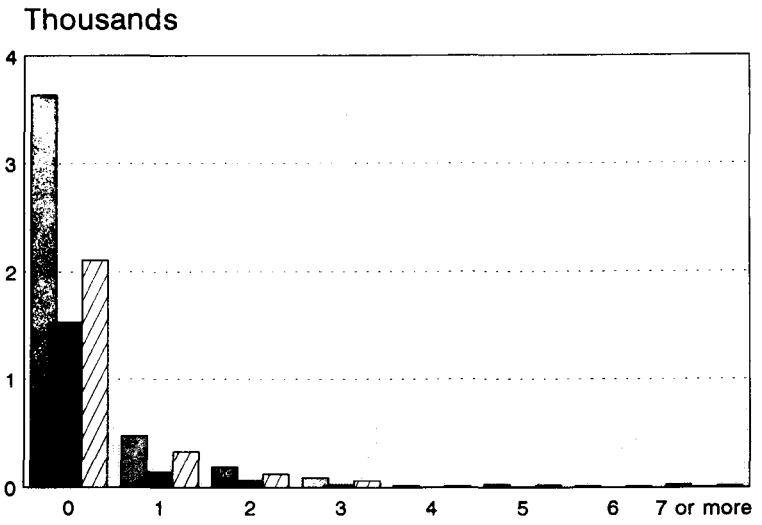
Among the subjects with falls, 83 per cent of the subjects who reported that they lacked electricity, fell outdoors while 64 per cent of the subjects who reported that they had electricity, fell outdoors (p = 0.0001). For the subjects who fell in house, however, 33.3 per cent of the subjects who reported that they lacked electricity fell at night compared to 28.6 per cent of the subjects who reported that they had electricity (no statistical significance).

Table 1. Characteristics of all elderly subjects, subjects with falls and subjects without falls.

Characteristics	Elderly subjects		
	all n = 4,480	with falls n = 836	without falls n = 3,644
Age in years: mean (SD)	70 (8.1)	70.1 (8.1)	69.9 (8.1)
% male	40	30.9	42.1
Marital status (%)			
married (lives together)	46.7	42	47.8
separated	7.6	9.6	7.2
divorced	0.7	1	0.7
widow	42.8	45.1	42.3
single	2.2	2.4	2.1
% lived in rural area	72.9	76.1	72.1
Education level (%)			
no	33.7	37.6	32.8
primary school	59.5	56.6	60.2
secondary school	4.8	3.8	5
higher	2	2	2
Mean family income in Baht (SD)	78,240 (108,202)	65,913 (78,536)	80,901 (113,441)
Number of meals per day			
1	0.4	0.7	0.4
2	15.9	19.1	15.1
3	83.7	80.2	84.5

Table 2. Health status of all elderly subjects, subjects with falls and subjects without falls.

Health status	Elderly subjects		
	all n = 4,480	with falls n = 836	without falls n = 3644
Perceived health status (%)			
very good	9.4	5.1	10.4
good	25.4	20.3	26.6
moderate	30.5	28.3	31
fairly bad	23.8	31.3	22.1
bad	10.9	14.8	9.9
Felt very lonely (%)	13.2	17.7	12.2
Performance			
% able to dress without difficulty	96.9	96.1	97.1
% able to bath without difficulty	93.4	90.1	94.6
% able to walk without difficulty	83	74.3	85
% able to crouch without difficulty	60.2	46.7	63.4
Diseases/problems			
hypertension (%)	23.2	28.3	22
heart diseases (%)	14	17.7	13.2
diabetes mellitus (%)	6.2	7.4	5.9
joint problems (%)	41.4	51	39.2
paralysis/paresis (%)	3.1	4.7	2.8
Number of drugs used per day			
0	36.8	31	38.2
1-2	44.9	46.1	44.6
3-5	17	21	16.1
6-10	1.3	1.9	1.1



	0	1	2	3	4	5	6	7 or more
Total	3.64	0.469	0.187	0.091	0.02	0.028	0.014	0.027
Male	1.533	0.143	0.064	0.029	0.006	0.007	0.001	0.008
Female	2.107	0.326	0.123	0.062	0.014	0.021	0.013	0.019

Number of falls

Fig. 1. Frequency of falls among Thai elderly subjects by sex.

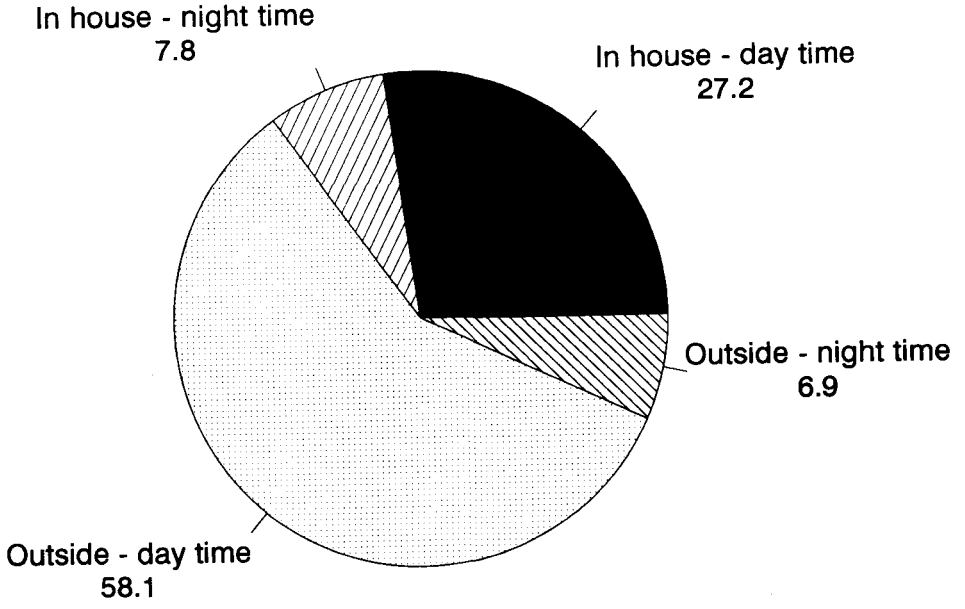


Fig. 2. Distribution of falls by time and place.

Table 3. Univariate factors associated with falls among Thai elderly.

Univariate factors	Subjects with falls (% column)	Subjects without fall (% column)
1. female****	69.1	57.9
2. marital status - separated or divorced or widow or single*	58	52.2
3. perceived their health to be bad or fairly bad****	46.1	32
4. perceived their health to be worse than that of other people of their own age****	34.8	25.2
5. reported hypertension****	28.3	22
6. reported heart disease***	17.7	13.2
7. reported paresis/paralysis****	4.7	2.8
8. reported joint problems****	51	39.1
9. had illness which made him/her unable to have normal activity during the last year****	41.4	28.2
10. took drug daily or almost daily during the last six month****	53.9	45.9
11. took high number of drugs (3 or more)****	22.8	17.2
12. had problems with seeing****	71.6	65.1
13. had problems with bathing****	10	5.5
14. had problems with walking in house****	25.7	14.9
15. had problem with crouching****	53.3	36.6
16. had problems with using stairs****	26.1	17.3
17. went to buy food every day**	32.2	25.8
18. felt very lonely****	16.9	11.7
19. took meals alone***	39.1	32.8
20. took less than 3 meals a day***	19.7	15.5
21. lacked electricity in house****	7.2	3.2
22. Thai style house or hut*	49.1	44
23. house condition was not good***	15.6	11.1

* There is statistically significant difference (p value < 0.05)
** There is statistically significant difference (p value < 0.01)
*** There is statistically significant difference (p value < 0.005)
**** There is statistically significant difference (p value < 0.001)

Table 4. Multivariate factors associated with falls of all, male and female subjects identified by multiple regression analysis using falls as the dependent factor.

Multivariate factors	All subjects	Male subjects	Female subjects
Female	*		
Perceived their health to be bad or fairly bad	*	*	*
Reported hypertension		*	
Reported joint problems	*		*
Had illness which made him/her unable to have normal activity during the last year	*		*
Had problems with walking in house	*	*	
Had problems with crouching	*	*	*
Went to buy food every day	*		*
Felt very lonely	*		*
Took less than 3 meals a day	*		*
Lacked electricity in house	*	*	*
Thai style house or hut			*

DISCUSSION

This study revealed the rate of falls among Thai elders through the national survey. History of falls were collected only for falls that occurred during the past six months because we wanted to minimise the problem of underreportage among Thai elders which might make the rate of falls lower than it should be. In order to compare with the rate reported in other studies, a one-year prevalence rate of falls among Thai elders is estimated to be more than 25 per cent which does not differ from the rates reported in other studies[1,3,5,10,21-27]. However, the prevalence rate of falls in this study is higher than that found among Japanese elders[28,29]. There was a significant difference in the rate of falls between sexes, as found in most of the previous reports. A higher rate of falling among Thai elderly women was demonstrated and a number of factors might have contributed to this apparent sex difference including difference of balance and gait, difference in type and level of activities and the phenomenon of underreportage in men[1,9,10,23,25,30-32].

As found in the Japanese elders[33], most incidences occurred outside the houses. This differs from the findings in Western countries[16,34-37]. This may be explained by a relatively young community population and rather inappropriate or unfriendly outdoor-environment for the elders in Thailand. According to Thai culture, moreover, Thai people particularly the elders usually sit on the floor and walk in the house less often than the elders in the western countries which might reduce the chances of a fall indoors. Thai elders tend to have lower level of activity, less autonomy and spend more time indoors when their age increases. These are probably the main reasons for the lack of an association between the rate of falls and age among Thai elderly population.

This study demonstrated that most falls occurred outdoors and during daytime and that going to buy food every day was an independent factor of falls which suggested that a high level of activity was a contributing factor to falls among Thai elders. This corresponds with many previous studies[10,16,23,26,38-40]. It is very interesting that the type of house (Thai style house or hut) was a multivariate factor of falls in female elders. The Thai house rests on poles with the floor about 1-2 meters above the ground. Dwellers have to climb steep ladders or stairs up and down. Many poor families stay in huts which are always located in poor areas. This study suggested that the environment was an essential determinant of falls among Thai elders particularly the elderly women.

An association between falls and a lack of electricity in the house was found in remote or poor areas. This supported the notion that falls related to the seeing ability and/or environmental conditions. Although there was no statistical significance of association between lacking electricity in house and indoor falls at night, the rate of falling in the house at night of the elders who lacked electricity was higher than that of the elders who had electricity. Visual acuity, adaptation to dark, peripheral vision, contrast sensitivity and accommodation affected by age-related changes and conditions such as cataracts, macular degeneration, glaucoma and visual perception abnormality may be particularly important in predisposing the elders to falls[23,41-46].

Crouch is an an independent factor of falls. One needs to have a good sense of balance, strong leg and trunk muscles, no serious joint problems and no postural hypotension which are all essential factors for having activity without falling[1,9,10,21,23,30,31,47-49]. It is interesting to consider whether promoting crouching ability could prevent falls among Thai elders[47]. However, joint and mobility problems are independent factors of falls[23].

Bad or fairly bad health and illness which made him/her unable to have normal activities during the last year were multivariate factors. This suggests that poor health status was clearly associated with falls. It has been found in many studies that chronic diseases, disabilities, recent contact with a doctor and high frequency of using medical services appears to increase the risk of falling among the elderly persons[1,9,10,21,26,28,30,39,40,50-52]. Feeling very lonely, an independent factor associated with falls among the female elders, might reflect depression and/or a lack of carer support. Depression and use of antidepressants have been reported as risk factors of falls in the elders[1,10,53,54].

In our study, an association between number of meals per day and falls suggested nutritional status as a contributing factor to falls. Inadequate intake of essential nutrients such as vitamin A, thiamine, vitamin B12 and iron cause neurological abnormalities, anaemia or visual problems. Pro-

tein-calorie malnutrition causes a reduction of muscle mass and imbalance of energy expenditure in the body which may affect gait and balance. However, a direct relationship between malnutrition and falls among the elders is not clearly established[55,56]. Our finding suggested that at least Thai elderly women should take three meals a day, the traditional practice of humans for centuries.

Hypertension is an important risk factor of stroke which is a common cause of paralysis/paresis. However, paralysis/paresis was not an independent factor of falls in the Thai elderly population. It has been found that a nocturnal fall of blood pressure and silent cerebrovascular damage are common in hypertensive elders[573]. Silent stroke in hypertensive elders might be a hidden associated factor of falls among Thai elderly men. The rate of postural hypotension increases in hypertensive elders who take anti-hypertensive agents[58,59] and may increase the chance of falling. Moreover, diuretics, the most common anti-hypertensive agent used by hypertensive old persons, was found associated with falls and/or fractures[21,60,61]. It is interesting that hypertension was associated with falls in men but not in women which differed from the findings of Yasumura and colleague[28].

Although many univariate factors identified in this study have been reported in many studies, such as number and frequency of drugs used, they were not independent factors associated with falls among Thai elders. A prospective study is necessary to determine predisposing factors to falling in order to identify high risk elders and to get information about the consequences of falls. Only a cross-sectional study, such as the present study, can be conducted as a national survey and provide crucial data of the nation.

SUMMARY

Eight hundred and thirty-six elders (18.7%) had one or more falls in the past six months. Female elders (21.5%) fell more often than their male counterparts (14.4%). There was no association between age and falls among Thai elderly population. Most of the falls occurred outside (65%) and during the day time (85%). This study revealed that environmental and intrinsic health factors which affected balance and gait were the main factors associated with falls among Thai elders. Nutritional status as a contributing factor to falling among elderly women was also suggested.

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หกล้มและปัจจัยร่วม: การสำรวจระดับชาติในประชากรสูงอายุไทย

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จากประชากร 7,713 คนที่มีอายุ 50 ปีหรือมากกว่าในการสำรวจระดับชาติในประเทศไทย ข้อมูลของผู้สูงอายุที่มีอายุตั้งแต่ 60 ปีขึ้นไปจำนวน 4,480 คนได้รับการวิเคราะห์เพื่อให้ได้อัตรา ลักษณะและปัจจัยของการหกล้มในระยะ 6 เดือนที่ผ่านมา พบว่าผู้สูงอายุจำนวน 836 คน (18.7%) หกล้มหนึ่งครั้งหรือมากกว่า ผู้สูงอายุหญิงหกล้มมากกว่าผู้สูงอายุชาย ไม่พบความสัมพันธ์ระหว่างอายุกับการหกล้ม การหกล้มส่วนใหญ่เกิดนอกบริเวณบ้าน (65%) และเกิดในเวลากลางวัน (85%)

จากการวิเคราะห์ multiple regression พบปัจจัยอิสระของการหกล้มในประชากรสูงอายุชายได้แก่ "การรับรู้สถานะสุขภาพว่าแย่หรือค่อนข้างแย่", "มีโรคความดันโลหิตสูง", "มีความลำบากในการเดินภายในบ้าน", "มีปัญหาในการย่อนั่ง" และ "ไม่มีไฟฟ้าใช้ในบ้าน" ปัจจัยอิสระของการหกล้มในผู้สูงอายุหญิงได้แก่ "การรับรู้สถานะสุขภาพว่าแย่หรือค่อนข้างแย่", "มีโรคข้อ", "เกิดการเจ็บป่วยที่เป็นผลให้ไม่สามารถมีกิจกรรมตามปกติในระยะหนึ่งปีที่ผ่านมา", "มีปัญหาในการย่อนั่ง", "ไปจ่ายตลาด–ซื้ออาหารทุกวัน", "รู้สึกเหงาเปล่าเปลี่ยว", "รับประทานอาหารน้อยกว่าสามมื้อต่อวัน", "ไม่มีไฟฟ้าใช้ในบ้าน" และ "อาศัยในบ้านทรงไทยหรือกระท่อม" การศึกษานี้แสดงให้เห็นว่าสภาพแวดล้อมและปัจจัยทางสุขภาพที่มีผลต่อการทรงตัวและท่าเดินเป็นปัจจัยสำคัญของการหกล้มในประชากรสูงอายุไทย และภาวะโภชนาการในประชากรสูงอายุหญิงอาจเป็นปัจจัยของการหกล้ม

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