Intrinsic Risk Factors of Falls in Elderly

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Abstract

Background: Falls are common geriatric problems. The risk factors of falls are the intrinsic and extrinsic risk factors. Studies on falls are scarcely conducted in Indonesia, especially in Bandung. Therefore, this study was conducted to identify the intrinsic risk factors of falls among elderly.

Methods: A descriptive study was carried out from August to October 2013 at the Geriatric Clinic of Dr. Hasan Sadikin General Hospital Bandung. Fifty three participants were selected according to the inclusion and exclusion criteria using consecutive sampling. The determined variables in this study were classification of the risk of falls, demographic profile, history of falls, disease, and medications. After the selection, the participants were tested by Timed up-and-go test (TUGT). Moreover, an interview and analysis of medical records were carried out to discover the risk factors of falls. The collected data were analyzed and presented in the form of percentages shown in tables.

Results: From 53 patients, women (35.66%) were considered to have higher risk of fall than men (18.34%). The majority of patients (66%) with the risk of fall were from the age group 60–74 years. The major diseases suffered by patients were hypertension, osteoarthritis and diabetes mellitus. Drugs that were widely used were antihypertensive drugs; analgesic and antipyretic drugs and antidiabetic drugs.

Conclusions: There are various intrinsic risk factors of falls in elderly and each of the elderly has more than one intrinsic risk factor of falls. **[AMJ.2016;3(3):334–9]**

Keywords: Elderly, risk factor of falls, timed-up-and-go test

Introduction

The aging population increases around the world, especially in developing countries, among others in Indonesia. It is predicted that the percentage of elderly in Indonesia will increase from 7.59% in 2010 to 11.34% in 2020.[1] The escalation of percentage of elderly indirectly increases geriatric problems. The most common geriatric problem is falls. Falls are the main cause of morbidity, disability and mortality in elderly.[2]

Older age is divided into four age groups based on the WHO classification. The first is the middle age, which is the age group of 45–59 years. The second is the elderly, which is the age group between 60–74 years. The third is the old, which is aged between 75–90 years. The fourth is the very old, which is >90 years of age.[3]

In previous studies, risk factors of falling in elderly consist of two factors, namely the intrinsic and extrinsic factors. Intrinsic factors include history of falls, age, gender, living arrangements such as living alone, ethnicity, medication, medical conditions, impaired mobility and gait, sedentary behaviors, psychological status, nutritional deficiencies, impaired cognition, visual impairment and foot problems. Extrinsic factors include environmental status, footwear and clothing, and inappropriate walking aids or assistive devices.[4]

Although many studies had explored the risk factors of falls worldwide, studies about falls were scarce in Indonesia, especially about the intrinsic risk factors. By knowing the intrinsic risk factors of falls, the incidence of falls in elderly can be prevented. The objective of this study was to identify the intrinsic risk

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factors of falls in elderly.

Methods

A descriptive study was carried out from August to October 2013 in the Geriatric clinic of Dr. Hasan Sadikin General Hospital Bandung. Consecutive sampling was conducted involving 53 participants. The inclusion criteria for the participants were older adult patients aged >60 years and willing to participate in this study. The exclusion criteria were elderly who experienced disability and used assistive devices, such as wheelchairs and walking sticks. The determined variables in this study were classified into the following categories: the risk of falls (impaired mobility and gait), demographic profile, history of falls, disease, and medications. After being selected, the participants were tested by using the Timed Up-and-Go Test (TUGT) to determine the risk of falls. The participants were instructed to sit on a chair and immediately instructed to get up again from the chair then walk about 3m. Subjects were directed to turn around, return back to the chair and sit again. The examiner counted the duration of the subjects to finish the test. The TUGT was chosen because it has sensitivity and specificity of 87% to identify the risk of people to fall.[5] The TUGT time calculation will be classified into three groups. The TUGT results with <10 seconds are put in a normal group. The TUGT results with a span of 10–20 seconds are put into a group with risk of falling. The TUGT results with >20 seconds are put into a group with a higher risk of falling.[6]

Moreover, an interview and analysis of medical records were carried out to discover the risk factors of falls. All procedures were performed after approval from the Health Research Ethics Committee. The collected data were analyzed and presented in the form of percentages shown in tables.

Results

The demografic profile ofthis study revealed that most of the participants who attended the geriatric clinic were 60–74 years old and female. Moreover, most of them still lived with other members of the family, such as brother, sister, husband, wife, children, and / or grandchildren. Only a small percentage of them lived alone (Table 1).

Most of the participants had history of falls especially among the 60–74 years old (Table 2).

Out of 53 participants, the maximum TUGT result was 53 seconds and the minimum TUGT result was 10 seconds meaning that all participants had the risk of falls. The variation of mean at each group showed that the highest mean was at >90 years old group (Table 3).

There were three major diseases, namely hypertension (85%), osteoarthritis (70%) and diabetes mellitus (53%) and these distribution occured at the group of participants who had

Table 1 Characteristics of Participants

Characteristics	n (%)
Age (years)	
60–74	36 (68)
75–90	16 (30)
>90	1 (2)
Gender	
Male	34 (18)
Female	66 (35)
Living arrangement	
Live with others	96 (51)
Live alone	4 (2)
Mean of age (years old)	72.43
Standard deviation of age	6.643

Table 2 History of Falls

Age Group (years)	History of Falls			n
	Yes	No	Inconclusive	
60-74	15	9	12	36
75-90	6	7	3	16
>90	1	0	0	1
Total	22	16	15	53

Table 3 TUG Test According to Age

Age Group (years old)	n	Mean of TUGT Results (seconds)
60-74	36	21.80
75-90	16	16.44
>90	1	43

Note: TUG Test= timed-up-and-go test

history of falls as well (Table 4)

There were three major medications widely used by numerous patients at the Geriatric clinic of Dr. Hasan Sadikin General Hospital Bandung, those were the antihypertensive agent (27%), analgesic and antipyretic (16%), and antidiabetic (11%) agent. Other medications varied according to the treatment of the disease such as calcium supplements, anticidal drugs, vertigo drugs, anticoagulant drugs, antibiotic, bone resorption drug, and beningn prostate hyperplasia (BPH) drugs and others. Moreover, each participant used more than three drugs (Table 5).

Discussion

The risk factors for falls have been identified in numerous studies. This study was consistent with other studies implicating causal factors in falling. The group of 60–74 years old was the group with the highest risk of falls. Based on previous studies, the increase in age would increase the risk of falls. The aging process in

Table 4 Diseases and Impairments

Diseases/Impairments	n (%)
Hypertension	45 (85)
Osteoarthritis	37 (70)
Diabetes Mellitus	28 (53)
Hyperlipidemia	14 (26)
Coronary artery disease	10 (19)
Osteoporosis	5 (9)
Chronic obstructive pulmonary disease	4 (8)
Heart failure	3 (6)
Cognitive impairment	1 (2)
Visual impairment	11 (21)
Depression	4 (8)
Malnutrition	4 (8)

Table 5 Characteristics of Medications

Category	n (%)
Antihypertensive	80 (27)
Analgesic and Antipyretic	49 (16)
Antidiabetic	33 (11)
Calcium Supplement	27 (9)
Antacidal, Antireflux and Ulceration	27 (9)
Vitamin	25 (8)
Antidyslipidemia	17 (6)
Antiasthma and COPD	9 (3)
Others	24 (8)

Note: COPD= chronic obstructive pulmonary disease

the elderly leads to less postural control that may play an important role in most of the falls incidents. Aging makes impairment of balance and low of strength of the muscle and bone structures.[7] Changes involved during the aging process include proprioception, range of motion, and muscle strength. In addition, there is a change in posture, gait, functional mobility and sensory systems. These lead to the abnormality of balance that cause falls. Another study stated that a person with impaired balance or gait had higher risk of falls compared to a person who did not have those kind of problems in the future.[8] The World Health Organization (WHO) stated that elderly women and the elderly who lived alone had higher risk of falls.[4]

This study had a similar result with the WHO study. Most of the participants were women. On the other hand, only a small percentage of the elderly lived alone. This situation is possibly related to the Indonesian culture that it is the responsibility of the children to take care of their parents. A further study should be conducted to identify the factors contributing to falls in elderly who lived with other family members. The majority of patients at risk of falling had experienced previous falls. Numerous studies claimed that the previous falls history is a strong risk factor for repeated falls in the future.[4,7,9]

One study suggested that the majority of chronic disease on older adult with risk of falling were osteoarthritis, hypertension, hearing deficits, and visual deficits.[10] Another study indicated that risk factors which are common in older adult are orthopedic abnormalities and neurologic diseases, because they affect gait and balance.[11] Meanwhile, multivariate logistic regression analysis in another study stated that the disease with highest odds ratio is stroke, followed by heart disease, osteoarthritis, kidney disease, and hypertension respectively.[12]

Most of the patients with the risk of falls and most of the patients with a history of falls suffered from hypertension, osteoarthritis, and diabetes mellitus. The incidence of hypertension was the highest in elderly with risk of falls. This result is predicted to be caused by the effects of antihypertensive drugs. Most antihypertensive drugs had side effects such as orthostatic hypotension.[13] Osteoarthritis caused a decrease in body function, muscle weakness and impaired balance.[14] Meanwhile, the risk of falls in patients with diabetes was associated with decreased proprioception sensory and reduced vision capabilities.[15] In a previous study, elderly with diabetes are at high risk of developing hypoglycemia (blood glucose <4 mmol/L). Hypoglycemia could lead to poor balance and increase risk of falls.[16]

A previous study found that the psychotropic drug was strongly associated with the risk of falling. The use of sedative and hypnotic drugs, antidepressants, and benzodiazepines are strongly associated with falls in elderly.[17] Another study stated the drugs that might increase the risk of falls were psychotropic drugs, such as antipsychotics, antidepressants, and sedatives, and cardiovascular drugs, such as diuretics, antiarrhythmics and digoxins.[13] In a sample of hospitalized patients, central nervous system (CNS) agents were significantly associated with falls.[18] Importantly, several of the most frequent manifestations of adverse drug incidents were risk factors themselves for falling, these

adverse drug effects include orthostatic/ postural hypotension), bradycardia, cognitive changes, and dizziness.[17]

Antihypertensive drugs were most widely used by patients with high risk of falling. One side effect of antihypertensive drugs was orthostatic hypotension, which was the risk factor of fall.[13] The second most used drugs were analgesic and antipyretic drugs. Analgesics, including both opioid and nonsteroidal anti-inflammatory drugs (NSAIDs), anticonvulsants, and antidepressants might cause side effects such as sedation, lethargy, confusion, double vision, motor incoordination, dizziness, and weakness.[19] The third most used drugs were antidiabetic drugs. Previous studies stated that several antidiabetic drugs had a strong relationship with falls. It was caused by long-term drug use which was closely linked to greater risk of hypoglycemia. Patients typically use four or more drugs. It is called polypharmacy, which was also the risk factor of falling.[20]

However, this study faced major limitations. First, the study experienced major bias. Patients less remember when answering questions due to collecting information that led to lack of information from the patients. Bias also occurred on the contradiction between the information obtained directly from the patient and information obtained from medical records. Second, the lack of samples and limited time of the study. Third, the minimum overview information on risk factors of falls in elderly. Therefore, researchers suggest that future studies should concern more deeply on falls risk factors.

In conclusion, the clinical pattern of elderly with high risk of fall were advanced age and female. Most of them had hypertension, osteoarthritis, and diabetes mellitus. Pharmacological treatment being most used were antihypertensive, analgesic and antipyretic, and antidiabetic drugs. Therefore, older adult patients should always be accompanied by family members or caregivers in their daily activities. For drug use, clinicians should seek to reduce the amount of medication, because this study found that patients at risk of falling were using four or more different kinds of drugs (polypharmacy).

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