

Relationships between Environmental Factors and a History of Falling with the Fear of Falling (FOF) among Elderly in the Community

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Abstract--- Falls among community-dwelling older people are a major issue worldwide. Falls are one of the effects of the aging process. Increased risk of falls in the elderly is caused by intrinsic and extrinsic factors and occurs due to multifactorial issues. The purpose of this study was to analyze the relationship between the environment and history of falling towards the fear of falling among elderly in the community. This study used a descriptive-analytic cross-sectional design. Sampling was carried out using a cluster random sampling technique with a sample of 210 elderly in Surabaya and Lamongan district. The respondent were recruited through Posyandu Programs. The independent variables were environmental factors and history of falling, while the dependent variable was the fear of falling among the elderly. The research instrument used was a home fall prevention checklist for older adults, Open questions on the history of falling among the elderly, and the Falls Efficacy scale (FES-I) were used to measure the fear of falling. Analysis was carried out using the Chi Square test with degrees of freedom = 0.05. Results: statistical test results showed a relationship of environmental factor with a fear of falling ($p=0.001$) and there was a relationship of history of falling with a fear of falling ($p=0.001$). A risky home safety environment and a history of falling will cause the risk of fear of falling among the elderly.

Keywords--- Elderly; Fear of falling; History of falling; Environment, Safety

I. INTRODUCTION

Falls among community-dwelling older people are a major issue worldwide [1]. Falls and fall-related injuries, or even a fear of their consequences, represent crucial causes of decline in the quality of life: being housebound, long-standing pain, functional disability and mortality among older adults [2]. Risk factors for falls among community-dwelling older adults are well established; the strongest predictors of a fall include lower extremity weakness, history of falling, gait and balance deficits, use of psychotropic medications [3], and environmental factors [2]. Fear of falling is also a risk factor for falls in the elderly [4]. Fear of falling is defined as an enduring concern about falling which leads to an individual avoiding activities that he is able to do [5]. The fear of falling in the elderly often leads to undesirable health effects such as activity restrictions, falls, depression [4], [6], social isolation and reduced quality of life even though the elderly have no history of previous falls [6], [7]. Fear of falling is considered a common and serious problem in the elderly [5]. Fear of

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falling has been considered both as a consequence and as a determinant of falls [8]. Therefore, the factors related to fear of falling still need to be investigated.

Falling in the elderly is a serious problem in society along with the increasing population of the elderly in the world [1]. It is estimated that one third of the elderly who live in the community experience regular falls [9], [10]. Falls affect around 30% of those aged over 65 years old living in the community, and about half of those who fall do so continually [8]. Fall is an event that often occurs among the elderly, and is a threat to their health. Every year, approximately 30% - 40% of elderly people aged 65 years or older who live in communities have experienced falling once a year [11], and half of them experience falls several times a year [7], and the risk increases proportionally with age [12].

Indonesia has an increasing number of elderly people. Indonesia, from 2015, has entered the era of the aging population (population aging) because the number of residents aged 60 years and over (elderly population) exceeds the 7 percent rate. In 2017, there were 23.66 million elderly people in Indonesia (9.03%). It is predicted that the elderly population will number (27.08 million) by 2020, in 2025 (33.69 million), in 2030 (40.95 million) and in 2035 (48.19 million). In Indonesia, there are 19 old structured provinces; East Java ranks third in the old structured provinces (12.25%) after Yogyakarta and Central Java. The distribution of the elderly is evenly distributed between urban and rural areas [13]. Based on the estimated incidence of falls in the elderly at 40%, in 2020 it is predicted that 10.83 million elderly will experience a fall.

A fall which is preceded by fear of falling or vice versa provides important momentum in the lives of the elderly, because the fall is able to drastically change the lives of elderly people who were previously independent, making them dependent or even experience disability. Sometimes falls also result in death [14]. Several studies have identified factors related to the risk of falls including the presence of osteoporosis, history of falls, environment, fear of falling. Falls are influenced by physical, psychological, social, and environmental factors [15]. This study aims to analyze the relationship between environmental factors and a history of falls on the fear of falling in the elderly who live in the community.

AI. METHODS

This research was a cross-sectional survey of community-dwelling older adults living in rural and urban in East Jawa province of Indonesia. To be eligible for this study, older adults had to be at least 60 years of age, non-wheelchair bound, and able to hear. The respondents were recruited through Posyandu Programs. A total of 210 respondents participated in this study. The independent variables were environmental factors and a history of falls, while the dependent variable was the fear of falling on the elderly. The research instruments used were a home fall prevention checklist, open questions about the history of falls, and the FES-I. A home fall prevention checklist for older adults was used to identify hazards in elderly people's homes and consisted of 17 questions. This questionnaire referred to CDC's STEADI [16]; there are five objects in the home environment that are considered conditions that pose a risk of falling for the elderly: stairs & steps, floors, bedrooms, bathrooms, and kitchen. Fall history was asked about in the elderly with an open question, "How many times have you fallen during the past year?" The Falls Efficacy Scale-International (FES-I) was used to assess concern about falls during 16 activities which were both basic and demanding physical and social activities. For each item, there were four response items: [1] "not at all concerned"; [2] "somewhat concerned"; [3] "fairly concerned" and [4] "very concerned". A sum score was calculated, ranging from 16 to 64 points (Figueriedo, 2018). The total score was categorized as being afraid of falling low (score 16-19), moderate (20-27), high (28-64). The data were analyzed with a Chi-Square test with degrees $\alpha = 0.05$. This study has been declared ethical with approval from the Health Research Ethics Commission at the Faculty of Nursing Universitas Airlangga with certificate number

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BI. RESULTS

The results showed that 210 elderly participated in this study consisting of 108 elderly living in the city of Surabaya and 102 elderly living in Lamongan Regency, East Java province, Indonesia. The total number of female respondents was 190 (90%). Based on age, the age range of 60-65 years had the highest number of respondents, namely 155 elderly (74%). Based on work, the majority of respondents had a job as a housewife, namely 77 elderly (37%). Respondents also had a history of falling: 33 (16%) had fallen once, 24 (11%) experienced > 1 fall in the last year, and most had never experienced a fall, 153 (73%). Most respondents experienced a moderate fear of falling, totaling 78 (37%).

Table 1. Characteristics of respondents (n=210)

	CATEGORY	TOTAL (n)	(%)
Sex	Male	20	10%
	Female	190	90%
	TOTAL	210	100%
Age	60-65 years old	155	74%
	66-75 years old	46	22%
	>75 years old	9	4%
	TOTAL	210	100%
Job	Farmer	43	20%
	Merchant	8	4%
	Employer	11	5%
	Entrepreneur	4	2%
	House wives	77	37%
	Non Employee	67	32%
	TOTAL	210	100%
History of falling	Never	153	73%
	once	33	16%
	More than 1 time	24	11%
	TOTAL	210	100%
Environmental status	No risk	35	16,7%
	At risk	175	83,3%
	TOTAL	210	100%
Fear of falling	Low	58	27%
	Moderate	78	37%
	High	74	35%
	TOTAL	210	100%

The majority of elderly people were living in environments making them at risk of falling 175 (83.3%). This shows that they live in environments that are less safe so that they are at risk of falling. Elderly respondents who had an environmental risk of falling and also experienced a high fear of falling totaled 49 (23.3%), but it was also found that 9 (4.3%) elderly who had an environment which did not put them at risk had a high fear of falling.

Most of the elderly did not have a history of falling, totaling 153 (72%), but 42 elderly also experienced a high fear of falling (20%). For the elderly who had a history of falling, 33 (15.7%) had fallen once during the past year and those who had fallen more than once totaled 24 (11.4%).

Tabel 2. The relationship between the environment and a history of falls with fear of falling in the elderly (n=210)

Environment status	Fear of Falling (FOF)							
	Low		Moderate		High		Total	
	f	%	f	%	f	%	f	%
No Risk	13	6.2%	13	6.2%	9	4.3%	35	16.7%
At Risk	61	29%	65	31%	49	23.3%	175	83.3%
TOTAL							210	100%
p value = 0.001								
History of Falling	Fear of Falling (FOF)							
	Low		Moderate		High		Total	
	f	%	f	%	f	%	f	%
Never	52	24.7%	59	28.1%	42	20.1%	153	72.9%
once	3	1.4%	14	6.7%	16	7.6%	33	15.7%
More than 1 time	2	1%	5	2.4%	17	8%	24	11.4%
TOTAL							210	100%
p value=0.001								

The results of the analysis using the Chi-Square test showed a significant value of $p = 0.001$, demonstrating that there was a relationship between the environment and the fear of falling among the elderly. The results of tests about falling ruatua showed that there was a significant value of $p = 0.001$, and so it was concluded there was a relationship between a history of falls with a fear of falling in the elderly.

IV. DISCUSSION

The results showed that environmental factors are associated with fear of falling among the elderly who live in the community. These results are reinforced by the results of previous studies which concluded that home safety status and demographic variables could have effects on falls and fear of falling in elderly individuals [7].

The results showed that the majority of elderly people living in homes that were at risk of falling fell and found various conditions that were not safe for the elderly. Based on the home fall prevention checklist questionnaire, four objects were found in elderly homes that put them at risk, sequentially from the highest is the condition of the kitchen, floor conditions, bedroom conditions, and stairs. These risky environmental conditions can make the elderly fear falling, because they worry about falling during their activities at home. These results are like the findings of previous studies which stated that barriers in homes produce more serious injurious falls than barrier-free homes [2]. The condition of the kitchen in this study showed that most of the elderly still placed objects that are used on a high shelf (45.2%), and step stool sturdy (23.3%). The floor conditions inside the house were risky, i.e. there were papers, shoes, books, or other objects on the floor (21.4%), and when walking through a room, they had to walk around furniture (19.5%). The risky bedroom conditions included the light not being near the bed and being hard to reach (15.2%). Meanwhile, for the stairs a risk factor was identified as a lack of handrails or handrails only on one side (13.8%). The majority of elderly in this study assessed the condition of the kitchen as the most risky place; if viewed demographically the majority of respondents were women in the age range 60-65 years and they were housewives, so they were still independent in terms of cooking in the kitchen and meeting family needs.

The results showed that most of the elderly experienced a fear of falling at moderate and high levels. Fear of falling is defined as a persistent feeling related to the risk of falling during one or more activities of daily living [17]. Based on the results of the FES-I questionnaire, the five activities which scored highest for FOF were identified from a score of 16 daily activities which often caused concern among the elderly. Sequentially these concerns were as follow: 1). very worried when walking on slippery floors, 2). worried when walking up and down an incline, 3). worried when walking on uneven surfaces, 4). worried when going up and down stairs, 5) worried when reaching for an object in a higher place or objects on the floor.

The results of this study clearly illustrate the relationship between environmental factors on fear of falling. Elderly people who have a risky environment in the kitchen with problems placing items used on high shelves cause the elderly to feel afraid of falling, that is, worry when reaching for objects in high places. Meanwhile the condition of many objects scattered on the floor, including spilled liquid on the floor, also causes fear of falling, which is fear when walking on a slippery and uneven floor.

The history of falling among the elderly in this study showed the distribution for elderly people who had never experienced a fall (72.9%), had fallen once (15.7%), had fallen more than once (11.4%). The majority of elderly people who had fallen had a fear of falling at moderate and high levels. These results are in accordance with research in Iran which states that people who have a history of falling have also expressed more fear of falling and the elderly with two or more fall experiences had demonstrated further fear of falling [7]. An individual who falls may subsequently develop fear of further falls [18]. Falls and fear of falling are common syndromes with potentially serious outcomes in older community-dwelling adults. This, in turn, may set off a “vicious cycle” of falls, fear of falling, and the many adverse outcomes that can result, such as functional decline, a decrease in quality of life, and institutionalization [18].

Environmental factors, a history of falls, and fear of falling all have a relationship. An environment that is risky can cause falls, and become a fall experience for the elderly, while the experience of falling either just once or falling repeatedly will provide trauma that causes the elderly to feel worried about falling. It has been revealed before that FOF induces psychological trauma and negative effects on activity in older adults; FOF is the result of falls, but it can also cause falls [4]. Another study revealed that home safety among older people who had fallen once did not differ significantly from those who had fallen twice or more. This could be because older people who had fallen two times or more had experienced falls outside home compared to those who had fallen one time [7].

V. CONCLUSION

A risky home safety environment and a history of falling will cause a fear of falling among the elderly. The home safety environment is very important to ensure the elderly can carry out their activities safely without worrying about falling. Fall history can have a psychological impact, which is the fear of falling. Therefore, it is necessary to consider interventions to prevent the fear of falling by creating a safe environment and minimizing post-fall worries in the elderly.

CONFLIC OF INTEREST

No conflict of interest has been declared.

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REFERENCES

- [1] M. H. Romli, M. P. Tan, L. Mackenzie, M. Lovarini, and P. Suttanon, "Falls amongst older people in Southeast Asia : a scoping review," *Public Health*, vol. 145, pp. 96–112, 2016.
- [2] T. Tanaka *et al.*, "Environmental and physical factors predisposing middle-aged and older Japanese adults to falls and fall-related fractures in the home," *Epidemiol. , Clin. Pract. Heal.*, pp. 1–6, 2018.
- [3] C. Casteel, J. Jones, P. Gildner, J. M. Bowling, and S. J. Blalock, "Falls Risks and Prevention Behaviors Among Homebound and Non-Homebound Older Adults," *J. Appl. Gerontol.*, pp. 1–22, 2016.
- [4] S. Lee and E. Oh, "Comparison of Factors Associated with Fear of Falling between Older Adults with and without a Fall History," *Int. J. Environ. Res. Public Health*, vol. 15, no. 982, 2018.
- [5] K. Makino *et al.*, "Fear of falling and gait parameters in older adults with and without fall history," *Geriatr. Gerontol. Int.*, pp. 1–5, 2017.
- [6] H. Makizako *et al.*, "Impact of fear of falling and fall history on disability incidence among older adults : Prospective cohort study," *Intewrnational J. Geriatr. Psychiatry*, vol. 33, pp. 658–662, 2018.
- [7] H. Mortazavi, M. Tabatabaeichehr, M. Taherpour, and M. Masoumi⁴, "Relationship Between Home Safety and Prevalence of Falls and Fear of Falling Among Elderly People : a Cross-sectional Study," *Mater Sociomed*, vol. 30, no. 17, pp. 103–107, 2018.
- [8] D. Figueiredo and M. Neves, "Falls E ffi cacy Scale-International : Exploring psychometric properties with adult day care users," *Arch. Gerontol. Geriatr.*, vol. 79, no. September, pp. 145–150, 2018.
- [9] D. Kendrick *et al.*, *Exercise for reducing fear of falling in older people living in the community (Review)*. John Wiley & Sons, Ltd, 2014.
- [10] Y. Otaka, M. Morita, T. Mimura, M. Uzawa, and M. Liu, "Establishment of an appropriate fall prevention program : A community-based study," *Geriatr. Gerontol. Int.*, vol. 17, pp. 1081–1089, 2017.
- [11] E. A. Phelan, J. E. Mahoney, J. C. Voit, and J. A. Stevens, "A s s e s s m e n t and Management of Fall Risk in P r i m a r y C a r e S e t t i n g s," vol. 99, pp. 281–293, 2015.
- [12] L. J. Coe *et al.*, "An Integrated Approach to Falls Prevention: A Model for Linking Clinical and Community Interventions through the Massachusetts Prevention and Wellness Trust Fund," *Front. Public Heal.*, vol. 5, no. 38, pp. 1–10, 2017.
- [13] Badan Pusat Statistika, *Lanjut usia 2017*. 2017.
- [14] Y. Hee, C. Olfat, M. Barbara, W. Savitri, S. Carlson, and V. Krishnan, "The effects of a multicomponent intervention program on clinical outcomes associated with falls in healthy older adults," *Aging Clin. Exp. Res.*, vol. 30, no. 9, pp. 1101–1110, 2018.
- [15] B. K. Lind and H. Kim, "A Comprehensive Assessment of Risk Factors for Falls in Community-Dwelling Older Adults," *J. Gerontol. Nurs.*, vol. 44, no. 10, pp. 40–48, 2017.
- [16] CDC and C. for D. C. and Prevention, "Check for Safety." CDC, 2017.
- [17] M. O. Whipple, A. V Hamel, and K. M. C. Talley, "Fear of falling among community-dwelling older adults : A scoping review to identify effective evidence-based interventions," *Geriatr. Nurs. (Minneapolis)*, vol. 39, no. 2, pp. 170–177, 2018.
- [18] S. M. Friedman, B. Munoz, and S. K. West, "Falls and Fear of Falling : Which Comes First? A Longitudinal Secondary Prevention," pp. 1329–1335, 2002.