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Fear of Falling in Elderly at a Tertiary Hospital Rehabilitation Clinic: A Cross-Sectional Study

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Abstract

Introduction: Fear of falling (FOF) in older people can restrict physical activity. In comparison, long-term physical activity reduction may lead to declining physiological function of older people, ultimately decreasing overall quality of life. Comprehensive research on the prevalence of fear of falling in older people is needed to prevent the negative cycle of repeated falls and improve the quality of life of older people.
Methods: A descriptive cross-sectional study with a questionnaire and interview to examine the variables of FOF (measured by FES-I), age, sex, fall history, and physical activity (measured by IPAQ-SF). Bivariate analysis used the Spearman correlation or Fisher Exact test to describe the association between FOF and each variable.
Results: From 35 elderly patients of the medical rehabilitation outpatient clinic at Dr. Soetomo General Academic Hospital, the prevalence of low FOF is 17.1%, moderate FOF is 51.4%, and high FOF is 31.4%. The level of physical activity is significantly associated with the fear of falling (p=0.012), with the most significant prevalence of high FOF found in the elderly group with low activity (50%).
Conclusion: The highest FOF prevalence is a moderate FOF level and correlates with physical activity. Further research is needed with a more significant number of heterogeneous subjects so that multivariate tests can be carried out by considering other variables that have yet to be investigated in this study.

Keywords: elderly, falls, fear of falling, physical activity

Introduction

The proportion of the elderly population keeps increasing in East Java province. It comprises 5,546,386 people or covers 13.57 percent of overall citizens, making East Java determined as an aging population.[1] On one side, this signifies a successful development and improvement of healthcare, which contributes to elongating life expectancy. However, on the other side, the percentage of people with complaints of illness is also growing, which is reflected in rising morbidity rates.[2] creating a healthy aging process is challenging for healthcare providers.

Aside from non-communicable diseases such as diabetes mellitus, hypertension, and COPD, another health problem that mainly impacts the elderly is falls. A study from Indonesia Family Life Survey (IFLS-5) data revealed that at least 12.8 percent of older people in Indonesia experienced one or more injurious falls in the last 2 years.[3] Falling could result in severe injuries, for example, fractures, head injuries, decreased mobility, and death. Even if there is no physical effect of falling, older people could get psychological effects such as anxiety, depression, and, ultimately, fear of falling.[4]

Fear of falling in the elderly could emerge from a history of falling or almost falling.[4,5] This fear may lead to restriction of physical activity, which might worsen their functionality and mobility in the long term. Consequently, older people who fear falling will decrease their overall quality of life.[6] Hence, comprehensive research on the fear of falling among older people is needed to prevent the negative cycle of recurrent falls and increase their quality of life. Information on the fear of falling prevalence also would be essential in reducing the number of falls.

A prior study from a nursing home in Surabaya reported that 49.7 percent of respondents had a high fear of falling.[7] However, this result was not supported by the characteristics of the respondents, which may attributed to their fear of falling level, such as older age, female gender, fall history, and physical activity, which were found to have correlations with FOF.[8] Despite the abovementioned importance, more studies about FOF in any Surabaya healthcare facility besides the nursing home need to be published. Dr Soetomo General Academic Hospital, one of the largest tertiary and referral hospitals in eastern Indonesia, had yet to report information regarding the prevalence of fear of falling. Furthermore, being one of the few institutions with integrated geriatric services, it should be crucial to address the knowledge gap about FOF to reduce fall incidents, a prevalent issue among older people.[9]

Therefore, this research aims to describe the fear of falling among the elderly at the medical rehabilitation outpatient clinic in Dr Soetomo General Academic Hospital by identifying its prevalence and characteristic distribution. In addition, this research attempts to test the hypothesis that FOF correlates with each associated variable, namely age, sex, fall history, and physical activity.

Methods

This study is descriptive cross-sectional research with primary data sources. The research instrument is a questionnaire collected using the interview method. The sample for this research is elderly patients at a medical rehabilitation outpatient clinic in Dr Soetomo General Academic Hospital, Surabaya, from October 2023 to April 2024. A total sampling method with adherence to sample acceptance criteria was utilized. The sample was recruited during their visit between October 2023 and April 2024 based on inclusion criteria of age (>60 years old), cooperation, and willingness to participate in the research by filling out an informed consent form. To maintain accuracy and consistency of responses, the subjects would be excluded if they had psychotic disorders based on the MINI questionnaire or had cognitive impairment (scored less than 7 in Abbreviated Mental Test (AMT)). Elderly patients with significant immobility (i.e., restricted in bed or post-amputation) would not be included in the research to ensure relevance.

Other than fear of falling (FOF), the variables studied include age, sex, history of falling in the last 1 year, and physical activity. Fear of falling was measured using the modified Falls Efficacy Scale-International (FES-I) Indonesian version. The Indonesian version of the modified FES-I has been validated, obtaining good validity and reliability with Cronbach's alpha=0.957.[10] Meanwhile, physical activity was measured using the Indonesian version of the International Physical Activity Questionnaire - Short Form (IPAQ-SF). The translated questionnaire is valid and reliable for measuring physical activity with Cronbach's alpha=0.884.[11]

The data collected from this study was analyzed for correlation tests using IBM SPSS 27. All the data is in this study. Spearman correlation test was used for age, prior fall frequency, and physical activity variables. Concurrently, the Fisher Exact test was used for sex and history of fall (yes/no) variables. Further sensitivity test needs to be performed. All data analysis was done using IBM SPSS software and later would be displayed in contingency tables.

Results

The data was collected and analyzed from a total of 35 participants. All the information required from the questionnaires is complete with all the data, as seen in Figure 1.

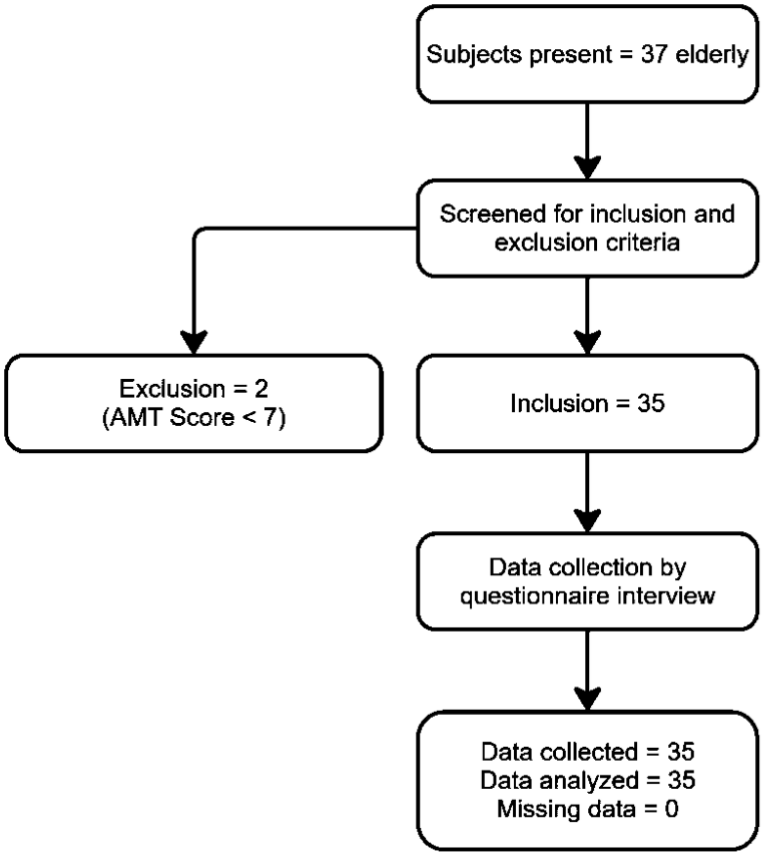

Figure 1. Research subject recruitment process

The FOF was assessed using the FES-I Indonesian version and divided into three categories based on the score. As seen in Table 1, the highest prevalence of FOF is at a moderate level (51.4%). The average score from 35 respondents is 25.6, with a median of 24, also in the mild category. The minimum score is 17, while the highest FOF score is 49. The standard deviation is 6.895 with more than one mode in this dataset, which are 22 and 24.

Table 1. Prevalence of Fear of Falling

Fear of Falling Category	Frequency	Prevalence
Low (16 – 19)	6	17.1%
Moderate (20 – 27)	18	51.4%
High (28 – 64)	11	31.4%
Total	35	100%

This research also analyzes each item of the FES-I questionnaire. Out of 16 items, the activity that caused the highest FOF among respondents was walking on slippery surfaces (item 11), followed by walking on uneven surfaces (item 14), reaching something above the head or on the ground (item 9), and walking up or down a slope (item 15). Meanwhile, activities with the lowest FOF level are walking around in the neighborhood (item 8), cleaning the house (item 1), and getting dressed or undressed (item 2).

Furthermore, the distribution of variables is presented in the contingency Table 2. In the age variable, the highest prevalence for the oldest group (> 80 years old) belongs to high FOF, while for the other groups, it belongs to moderate FOF. There is an increase in high FOF prevalence along with the increase in age groups. Distribution based on sex is quite similar to the overall number of respondents. However, the FOF prevalence is slightly higher in females than males.

Based on fall history, both groups have a similar distribution of respondents. When divided based on previous falls frequency, there is still not much difference either, except that the respondent with more than two falls in the past year (multiple falls) has high FOF.

Ultimately, each group's physical activity level measured by the IPAQ-SF score has a different prevalence distribution. For low physical activity levels, the highest prevalence is high FOF (50%). For moderate physical activity levels, the highest prevalence is moderate FOF (58.8%). Meanwhile, the highest prevalence for high physical activity levels belongs to low/moderate FOF (50%).

Table 2. Prevalence Distribution Based on Age, Sex, Fall History, and Physical Activity

Variable	Fear of Falling Category (N (%))			Total
	Low	Moderate	High	
Age (years)				
60 – 69	4 (18.2%)	12 (54.5%)	6 (27.3%)	22 (100%)
70 – 79	2 (20%)	5 (50%)	3 (30%)	10 (100%)
> 80	0 (0.0%)	1 (33.3%)	2 (66.7%)	3 (100%)
Sex				
Male	2 (15.4%)	7 (53.8%)	4 (30.8%)	13 (100%)
Female	4 (18.2%)	11 (50%)	7 (31.8%)	22 (100%)
Fall History				
Yes	1 (11.1%)	7 (77.8%)	1 (11.1%)	9 (100%)
No	5 (19.2%)	11 (42.3%)	10 (38.5%)	26 (100%)
Fall Frequency				
Never	5 (18.5%)	11 (42.3%)	10 (37%)	26 (100%)
Once	0 (0.0%)	6 (100%)	0 (0.0%)	6 (100%)
Twice	1 (50%)	1 (50%)	0 (0.0%)	2 (100%)
More than twice	0 (0.0%)	0 (0.0%)	1 (100%)	1 (100%)
Physical Activity				
Low	1 (6.3%)	7 (43.8%)	8 (50%)	16 (100%)
Moderate	4 (23.5%)	10 (58.8%)	3 (17.6%)	17 (100%)
High	1 (50%)	1 (50%)	0 (0.0%)	2 (100%)

The variables that were previously reported to be significantly correlated to FOF level then proceeded to correlation test. Among the variables, only one variable has a significant correlation ($p < 0.05$) to the level of FOF in older people, which is physical activity with p-value = 0.012. Otherwise, the other variables, such as age, sex, history, and frequency of falls in the past year, do not have a significant correlation with $p > 0.05$, as stated in Table 3. However, this study has not yet controlled several confounding factors, such as comorbidity, depression, and other physical conditions, such as visual and balance disturbances.

Table 3. Bivariate Analysis

Variable	FOF Category (p value)	Conclusion
Age	0.413[a]	Not significant
Sex	1.000[b]	Not significant
Falls History (Yes/No)	0.198[b]	Not significant
Falls Frequency	0.502[a]	Not significant
Physical Activity	0.012[a]	Significant

[a]: analyzed using Spearman correlation
[b]: analyzed using the Fisher Exact Test

Discussion

As shown from the research result, the order from highest to lowest prevalence of fear of falling among older people is moderate FOF (51.4%), high FOF (31.4%), and low FOF (17.1%). This differs slightly from prior study results in Surabaya nursing home, which reported the prevalence as 22.7% low FOF, 22,6% moderate FOF, and 49.7% high FOF.[7] The difference might be caused by the older average age of the respondents, 78 years old in the prior study compared to 69 years old in this one.

Nevertheless, another study showed moderate FOF as the highest prevalence, covering 47.9% of 242 participants.[12] In that paper, the subject criteria are community-dwelling elderly who do not use any walking aid. Because of that, the participants are considered to have independent mobility. Hence, the FOF level is moderate-low. Similarly, since this research data is taken from a medical rehabilitation outpatient clinic, most respondents can also move and go out without other people's help.

Furthermore, the classification of FOF level could be simplified into two categories: low FOF and high FOF (includes moderate and high based on FES-I score), making the prevalence of this research 17.1% low FOF and 82.8% high FOF. These numbers are consistent with previous studies. At least two papers from Brazil and Vietnam reported that more than half of the respondents have high FOF, with a prevalence of 66.5% and 91.5%, respectively.[13,14]

When looking at the mean of the FES-I score, it is categorized as moderate FOF, which is concordant with the mean of several previous studies in other countries.[12,15,16] It is, however, a bit lower than prior research done in Surabaya, which found the mean to be 29 or high FOF.[7] This might be due to differences in subject characteristics, which, in this research, older people are mostly relatively active and do not suffer from immobility. The sample size might also impact the result as in a tertiary hospital, which is the data collection location, the number of elderly patients at the outpatient clinic is relatively smaller than those in primary/secondary hospitals or nursing homes.

According to previous research, activities that contribute to the highest FOF are walking on slippery or uneven surfaces, reaching something above the head or on the ground, and walking up or down a slope.[14] Thus, it is highly suggested that patients, caregivers, and healthcare providers pay more attention to alternatives to these activities for the elderly. The concern of falling might be caused by older adults with vision impairment, who tend to be less able to evaluate how slippery a floor is, notably on slippery or sandy floors.[17] Conversely, walking down or up an inclination and reaching for a higher or lower object deteriorates physical ability in older adults.

It is generally acknowledged that many factors affect fear of falling, with relative strength in each variable. Those variables can be categorized as sociodemographic (age, sex, education level), physical ability, health (comorbidity, falls history, quality of life, sensory disorders), psychology (mood, cognitive), and social environment.[18] Regardless, this research only looked into a fraction of the multifactorial causes of FOF: age, sex, fall history and frequency, and physical activity.

This research found A significant correlation between FOF levels and physical activity ($p=0.012$). Participants with low physical activity tend to have higher FOF levels and vice versa. This relationship might be explained by reduced physical activity, which causes a decrease in muscle strength and balance, subsequently causing difficulties in maintaining gait and resulting in the development of FOF.[19] This result also matches with prior studies that mentioned the prevalence of FOF is higher in older people who do not exercise.[20] It is also higher for elderly with ADL restriction compared to those with normal ADL.[21]

In contrast to other papers that found significant correlations between age and sex with FOF level,[22] this research finds quite the opposite. Despite that, the distribution of the prevalence itself shows information from existing papers. For instance, the prevalence of high FOF (31.8%) in the female group is slightly higher than in the male group (30.8%). It is linked to physiological changes in older females, specifically estrogen hormone deficiency, which affects muscle function and diseases such as osteoporosis and osteoarthritis.[23] Additionally, this is consistent with previous studies that stated FOF prevalence is commonly higher in females than males.[5,18,21]

The age variable shows that high FOF prevalence is increasing along with the rise of the subject's age groups. This increasing prevalence was also found in prior studies.[5,21] While aging, older people can lose their self-efficacy to avoid falls in daily activities, even if it is low-risk. Many elderly think their body is no longer strong enough to sustain their activity without a high risk of falling. The consequences of falling are also concerning for them, which is realistic considering the empirical data regarding fall incidents among older people.[14]

Besides that, there are no significant findings in the fall history variable either from bivariate analysis or prevalence distribution. This contradicts the existing papers, which found a substantial correlation between previous falls within a year and FOF levels.[5,24] Other studies also mentioned the history of falls as one of the most significant risk factors of FOF,[18] and the prevalence is higher in elderly with falls history compared to those without.[25]

Several theories explain this distinction. First, a study stated that falls are not merely a causing factor of FOF but also a consequence of the subject's FOF.[26] Second, there is a possibility that there are unreported non-injurious falls or almost-falling experiences not recorded in the research instrument, despite those factors can also trigger fear of falling in older people.[4,6]

Otherwise, the etiologic pattern of the onset of FOF can be found in other anxiety disorders, in the sense that not all people with phobias have bad experiences related to the object of their phobia, and not all bad experiences will lead to a phobia.[27] Fear can arise when the subject associates a neutral thing or event with negative consequences. This association can occur due to experiencing directly or indirectly from seeing or hearing the dire consequences of the event. For example, the elderly may feel afraid or worried about walking on slippery surfaces because they have seen others fall or heard that another older person has been injured by falling in the bathroom. Therefore, it is still highly possible for older people to develop FOF without any history of falling before.

Regarding the findings, medical practitioners should educate the elderly and caregivers about the fear of falling, especially by identifying factors like older age, female gender, and low physical activity. The awareness and precaution

in fear of falling from the patients and their caregivers is essential to prevent fall incidents. Early management might also be offered if required. Physical activity may serve as a target intervention to manage the high prevalence of fear of falling. Additionally, interventions are likely necessary in patients with high FOF to prevent a decline in the elderly's body function.

Several potential limitations and biases must be considered when interpreting the results of this research. The sample size is relatively small (35 elderly). Thus, the results of this study are hardly applicable for generalization to broader subject groups, such as other elderly populations outside the outpatient clinic in tertiary hospitals. In addition, this research was done only in one specific location, making the characteristics of those who opted to participate differ from those of older people in the general population.

Response bias might be present in the interview method, which could limit the accuracy and precision of data obtained through the questionnaires. For instance, The FOF, measured by FES-I items, is highly impacted by the subject's perception of fear and truthfulness. Assessment of fall history and physical activity also rely on self-reporting, which may be affected by the subject's memory recollection.

Since this study still has many limitations, further research is recommended with consideration of a bigger sample size to conduct multivariate analysis. Cross-sectional research methodologies are unable to investigate causality. Consequently, a future study using a longitudinal design is required. Furthermore, there are still many factors that might affect the result, which need to be explored, for example, depression, polypharmacy, and other physical conditions like chronic pain and balance disturbances.[8]

Conclusion

From the results, it can be determined that the prevalence of fear of falling among the elderly at the medical rehabilitation outpatient clinic in Dr Soetomo General Academic Hospital, Surabaya, is 17.1% for low FOF, 51.4% for moderate FOF, and 31.4% for high FOF. Physical activity was found to have a significant correlation with FOF level (p= 0.012), while FOF could develop even if there is no history of falls.

Acknowledgment and Other Information

This study received ethical clearance from the Ethics Committee for Health Research, Dr Soetomo General Academic Hospital, Surabaya (Ref. No. 1439/LOE/301.4.2/ IX/2023) on 7 September 2023. This study did not receive any funding, and the authors declared no conflict of interest. The authors also would like to thank all of the respondents, staff, and residents at the medical rehabilitation outpatient clinic, Dr Soetomo General Academic Hospital, for their assistance in collecting data for this study.

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