

The effect of fear of falling towards falls incidence among knee osteoarthritis patients in Malang, Indonesia: a cross-sectional study



Rakhmad Rosadi^{1*}, Sri Sunaringsih Ika Wardojo¹

ABSTRACT

Introduction: One serious effect of knee osteoarthritis (OA) is falling. Some predictors caused its vulnerability, one of which was fear of falling. However, few studies investigated how fear of falling leads to falling among the elderly. This study analyzed the fear of falling towards falls incidence among knee OA patients in Malang, and the results of this study might have a significant recommendation for the geriatric fall prevention system policy in Indonesia.

Methods: This is a cross-sectional study with 53 participants recruited using the purposive sampling technique from *Puskesmas Rampil Celaket* and *Posyandu Lansia Samaan* Malang from March-April 2021. Measurements were the Falls International Efficacy Scale (FES-I) to assess fear of falling, the John Hopkins Grading Scale to measure fall incidence, and the self-reported sociodemographic questionnaire. Data analysis used were the Chi-Square test, Independent T-test, and multivariate logistic regression to analyze significant predictors of falling.

Results: From the bivariate analysis, it was found that the falling group tends to have a higher fear of falling than the non-falling group (34% and 1.9%, respectively). For BMI, the falling group tends to have a higher BMI than the non-falling group (27.2 ± 2.8 and 25.7 ± 3.9 , respectively). While multivariate analysis showed that only fear of falling has a significant effect on falling incidence among the elderly ($p < 0.05$), with participants having the risk 2.32 times ($OR = 2.32$; $95\%CI = 0.96-4.87$) of falling compared to others.

Conclusion: As there was a significant positive correlation between fear of falling and falling incidence among knee OA patients, thus it gives a significant recommendation for the Health Department to design a fall prevention program for the elderly, focusing on managing its predictor.

Keywords: *Fall, Knee osteoarthritis, Elderly.*

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¹Physiotherapy Department, Faculty of Health Science, Universitas Muhammadiyah Malang, Indonesia;

*Corresponding author:

Rakhmad Rosadi;
Physiotherapy Department, Faculty of Health Science, Universitas Muhammadiyah Malang, Indonesia;
rakhmad21@gmail.com

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INTRODUCTION

As humans get old, problems in their body increases. One of the consequences of aging is the emergence of degenerative diseases caused by physiological changes in a person over time. According to the data obtained from National Centers for Health Statistics in 2020, it is estimated that adult patients diagnosed with osteoarthritis (OA) increased to 15.8 million globally, with the majority of people diagnosed with OA aged range 55-75 years old,¹ and most of them were diagnosed with knee OA type.²

One of the serious effects of knee OA is an increasing risk of fall.³ Based on a previous study in 2019, it was found that almost 50% of knee OA patients had experienced falling.⁴ Increasing risk of falls experienced by knee OA patients

might be caused by several predictors such as unstable conditions and serious degeneration of basic functional ability that might increase fall risk.⁵ Besides the functional ability, personal factors might become a trigger on increasing fall risk, and one of them was fear of falling.⁴

Individuals experiencing fear of falling may lose confidence in performing activities normally without falling, and it causes them to limit their social interaction, which would eventually contribute to cognitive diseases.⁶ Also, the feeling of lethargy is closely related to the increased risk of falling.^{7,8} However, there was a lack of attention paid to managing falls prevention among elderly in Indonesia, which might worsen the elder physical health condition.⁵ Thus, this study aims to analyze the fear of falling towards falls incidence among knee OA patients

in Malang. The results of this study might have a significant recommendation for the geriatric fall prevention system policy in Indonesia.

METHODS

Study Design and Participants

This study used a cross-sectional design; all participants were recruited from *Puskesmas Rampil Celaket* and *Posyandu Lansia Samaan*, Malang, from March to April 2021. Sampling was recruited using the purposive sampling technique with inclusion criteria: patients diagnosed with knee OA, aged >50 years old, did not receive any knee surgery, did not have any nervous system problems, did not have any history of periarticular fracture and rheumatoid arthritis.

While, for sample size calculation from

a total population of 250 knee OA patients, we used online sample size calculation (with 95% CI, 10% Margin of error, and 22% population proportion). Finally, there were 53 respondents recruited for this study who met the inclusion criteria. All recruited respondents were informed about the purpose of this study and were asked for their consent before the data collection began.

Measurements

Fear of falling

The fear of falling was measured by a questionnaire so-called Fall Efficacy Scale-International (FES-I).^{8,9} FES-I comprises 16 question instruments, with each instrument scoring from 1 to 4. Score 1 means not afraid, score 2 means slightly afraid, score 3 means quite afraid and score 4 means highly afraid. The reliability and validity of this FES-I in measuring the fear of falling have been recognized by ProFaNe.¹⁰ In this study, the final score was grouped into 2 categories: low category (18-22) and moderate category (23-64).

Falls

While the occurrence of falling among participants was examined based on their history of falling within the last 1 year using the John Hopkins Grading Scale measurement. This measurement categorized participants into two groups: 1= respondents who reported falling and 0= respondents who did not report falling.

Sociodemographic characteristics

Participants were also asked for their sociodemographic information by self-reported questionnaire. These questionnaires asked information about their age; sex (male/female); Body Mass Index(BMI); Marital status (unmarried/married); Education level (uneducated/elementary school/junior high school/senior high school/university), and knee OA problems (right knee/left knee/ both knees).

Data analysis

In this study, participants' characteristics were presented with numbers and percentages (categorical variables) and mean and standard deviation (continuous variables). Comparisons between falling

and non-falling groups were analyzed using a t-test (continuous) and χ^2 test (categorical). Multivariate logistic regression was used to analyze the effect of predictors of falling among the elderly. The level of significance for all tests was $p<0.05$. All data analysis was conducted using IBM SPSS for windows version 25.0 (IBM Corporation, Armonk, NY, USA.).

Ethical approval

During this study, the researcher obtained ethics approval (Institutional Review Board /IRB) from the Health Research Ethics Committee of Muhammadiyah University Malang No. E.5.a/160.KEPK-UMM/VII/2020. Also, prior to data collection, all of the recruited participants have signed the consent form.

RESULTS

As explained in Table 1, there was a total of 53 participants recruited for this study. Of those participants, 37 (69.8%) experienced falling during the last year. In comparison,

16 (30.1%) participants did not experience any falling history. Most respondents were female (96.2%), married (75.4%), and had an average age of 62.5 ± 3.2 . However, when we differentiate between the falling and non-falling groups, there were no significant differences in characteristics between those two groups, unless fear of falling and Body Mass Index ($p<0.05$). For fear of falling categories, the falling group tends to have a higher fear of falling than the non-falling group, with 34% and 1.9%, respectively. While, for BMI, the falling group tends to have higher BMI compared to the non-falling group with 27.2 ± 2.8 and 25.7 ± 3.9 , respectively.

While based on Table 2, the results from multivariate logistic regression were reported to determine which predictors significantly affect falling among knee OA participants. As a result, it showed that only fear of falling has a significant effect on falling incidence among the elderly ($p<0.05$), with participants having the higher category having 2.32 times

Table 1. Characteristics of the Study Respondents (n=53).

Variables	Falling Group (n=37)	Non-Falling Group (n=16)	p-value
	n(%)	n(%)	
<i>Sociodemographics Characteristics</i>			
<i>Sex</i>			
Female	28 (52.8)	23(43.4)	0.48
Male	0(0)	2(3.8)	
<i>Marital Status</i>			
Unmarried	7(13.2)	6(11.3)	0.39
Married	22(41.5)	18(34)	
<i>Education Level</i>			
Uneducated	0(0)	1(1.9)	0.54
Elementary School	13(24.5)	9(17)	
Junior High School	6(11.3)	5(9.4)	
Senior High School	6(11.3)	5(9.4)	
University	4(7.5)	4(7.5)	
<i>OA Problem</i>			
Right Knee	12(22.6)	9(17)	0.23
Left Knee	7(13.2)	6(11.3)	
Both Knees	17(32.1)	2(3.8)	
<i>Fear of Falling</i>			
Low Category (18-22)	10(18.9)	24(45.3)	0.03*
High Category (23-64)	18(34)	1(1.9)	
	M±SD	M±SD	p-value
Age, (years)	62.8±3.2	62.2 ±8.5	0.36
Body Mass Index (BMI), (kg/m2)	27.2±2.8	25.7±3.9	0.02*

* $p<0.05$; M: Mean; SD: Standard Deviation

(OR=2.32; 95%CI= 0.96-4.87) risk of falling compared to others.

DISCUSSION

This study examined the effect of fear of falling and falling incidence among knee OA patients in Malang City, East Java. From the study conducted in 53 recruited participants, it was found out that fear of falling becomes a positively significant predictor of falling among knee osteoarthritis patients ($p < 0.05$), with OR=2.32; 95%CI= 0.96-4.87. It also defines that patients with high fear of falling had a 2.32 times risk of falling compared to others. These results were consistent with the previous study. In the Fear Avoidance Model (FAM) theory, an individual describes the pain experienced and problems in his/herself as a form of fear and fight triggers loss of confidence.^{11,12} In this theory, it has also pointed out that loss of confidence, such as fear of falling, may result in excessive activity limitation and eventually cause muscle atrophy, loss of balance, gait disorder as well as changes in physical condition, leading up to the increased risk of falling in an individual.^{7,13} Another theory mentions that pain felt by an individual would stimulate avoidance and cause the emergence of the fear to move and also functional ability problems.¹⁴

The effect of fear of falling might create movement rigidity and gait change, and this theory is in line with the study conducted by,^{14,15} that limitations toward activities, as well as changes in body biomechanical caused by fear of falling, may increase the risk of falling in an individual due to fatigue. An individual experiencing fear of falling tends to use a stiffening strategy where he/she would reduce movement of a range of motion from the center of mass by triggering contraction in M. tibialis anterior, soleus, and gastrocnemius, resulting in a high frequency and low amplitude postural sway.¹²

Eventually, fear of falling would also induce dysfunction in the nervous system being involved in motor imagery ability, which is a cognitive process where a subject visualizes that they would be moving without muscle activation, and this fear of falling would contribute to the

Table 2. Results of Multivariate Logistic Regression.

Variables	OR	95%CI	p value
<i>Sociodemographics Characteristics</i>			
<i>Sex</i>			
Female	1.00		
Male	1.01	0.56-3.52	0.23
<i>Marital Status</i>			
Unmarried	1.00		
Married	1.21	0.60-1.48	0.18
<i>Education Level</i>			
Uneducated	1.00		
Elementary School	1.34	0.65-1.52	0.32
Junior High School	1.42	0.54-1.88	0.37
Senior High School	1.38	0.76-1.85	0.28
University	1.58	0.87-2.33	1.22
<i>OA Problem</i>			
Right Knee	1.00		
Left Knee	1.22	0.74-1.54	0.08
Both Knees	2.18	0.96-4.32	0.06
<i>Fear of Falling</i>			
Low Category (18-22)	1.00		
High Category (23-64)	2.32	0.96-4.87	0.02*
Age, (years)	1.21	0.99-1.42	0.18
Body Mass Index (BMI), (kg/m ²)	1.39	0.89-2.14	0.32

* $p < 0.05$

decrement in motor imagery performance and, in the end, increment in the risk of falling.⁸ In another theory, it is also mentioned that the cause of falling may be influenced by fractures, tissue injuries, and the fear of falling.¹⁶

Based on the research conducted by us, it was found that 93.75% of the fallen individuals belonged to the 'highly afraid to fall' category. However, this percentage was lower in individuals with no falling experience in the past year. This result is in line with the research conducted by pointing out that the fear of falling is experienced by 65% of elderly who have never experienced such a falling.¹⁶ Such percentage is even bigger in the elderly who have ever experienced falling, which 92% of whom had such fear of falling.

Some limitations in this study would need to be taken into consideration by future studies. First of all, this study used a cross-sectional study design, which might limit further discoveries regarding the cause and effect of fear of falling in patients with knee OA who might be prone to falling. Secondly, the number of

samples in this study was small. So, future researchers would need more samples to obtain a more accurate result.

CONCLUSION

The fear of falling becomes a significant predictor of falling among knee osteoarthritis patients, and patients with high fear of falling had a 2.32 times risk of falling compared to others. This study result might also recommend the Health Department control falling among the elderly; it becomes significant and minimalizes its predictor (fear of falling) through strategic policy for Indonesia's geriatric fall prevention system.

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AUTHOR CONTRIBUTION

RR and SSIW contributed equally in conducting the research and preparing the manuscript.

CONFLICT OF INTEREST

The author reports no conflicts of interest in this work.

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