The Flat feet Increased The Postural Instability on The Elderly in Nursing Home

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ABSTRACT

Introduction: Flat feet or flatfeet are the postures that have a low medial longitudinal arch. The prevalence of Flat feet was 10-25% of adults population. The lower feet arch might have an impact on body sway have during standing posture. Furthermore, increasing of the postural sway could have the higher risk of fall in elderly, that has a prevalence of 30-50%. The aim study to find the correlation between the Flat feet posture with postural stability, to prevent the risk of fall in the elderly.

Method: This design was observational cross-sectional study. The study conducted in the elderly nursing home. The posture was examined by ink feet print on white paper. The Tinetti Balance Assessment assessed the postural stability.

Result: The subjects were 84 elderly, mostly were 60-74 years old, and 46 (54,8%) were female. The most prevalence of the postural stability was the low risk of fall (59,5%). The frequency of Flat feet was 26 (31%). There was a relationship between Flat feet with postural stability in elderly (p = 0,020).

Conclusion: There was a correlation between the Flat feet and the postural stability on elderly in the nursing home.

Keywords: Flat feet, postural stability, elderly

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BACKGROUND

The feet is the most distal segment of the lower extremity and a relatively small for the support base to maintain the body balance.[1] The bones of the feet arranged in two arches, longitudinal and transverse that are held by ligaments and tendons. The arches enable the feet to support the weight of the body, provide an ideal distribution of body weight and as the leverage while walking.[2] The role of the feet arches is to support body weight, maintain the dynamic postural control, and provide body balance around the gravity axis.[3] Therefore, lowering the feet arch may reduce the balanced. The posture with lowering the longitudinal arches called by the *Flat feet*. [4] The prevalence was 10-25%.[5] There were several etiologies as the caused, such as excessive body weight, abnormalities of body posture, weakened of the connective tissues, and genetic predisposition.[2] The *Flat feet* deformity affects the biomechanics of the feet, alignment of the ankle, and alignment of the hip-knee joints,[4] and as a result is an abnormality of biomechanic chain on the feet-knee-hip joint, that may decrease the stability of posture.[5] The Recent study shows that there is a relation between deformation of the feet arch and the body sway while standing in a static posture.[6] Increasing of the postural sway in elderly may higher the risk of falling in elderly. The earlier studies have found that there was a correlation between feet arch structure with postural stability on elderly,[7] and there was also a correlation between feet type and posture on elderly [8]. Elderly who has *Flat feet* was increasing the center of pressure (CoP) sway, that was mean the arch structure of the feet has an essential role in postural control.[7] There was another factor that affected the posture stability and the risk of fall, such as the physical activity.[9] The relationship between low arch feet with postural stability and balance have detected since adult age[10] and the childhood. [11] Identification of the feet problem expected has an impact on improved the posture stability. There was a well-known method to correct the low arch feet by feet orthoses that have proven to improved the lower extremity function [12] and might be improved the postural stability as well.

Approximately 28% to 35% of people aged 65 and over fall each year. The following injuries of falls are considered a significant public health problem. Falls account for more than half of injury-related hospitalizations among old people.[13] Fall is a severe and significant issue problem facing the elderly. The prevention of falls that contribute to preventing disability, mainly in older adults .[14]

Based on described above, the Flat feet posture was one of the risks of fall in the elderly. The presence of flat feet diminishes the quality of life and feet function. [15] In clinical practice flat feet may be diagnosed through different procedures, such as clinical diagnosis, radiological study [16] and footprint analysis[17]. The suitable for diagnosing flatfeet in adults, especially Clarke's angle, which is highly accurate for flatfeet diagnosis [18].The flat feet has associated with family history, the use of footwear in infancy, obesity and public residence[19], and it has also associated with age [20].

The of study aimed to found the relationship between flat feet posture with the postural stability (postural sway) in the elderly who lived in the nursing home. The information from this study can be used to prevent fall on the elderly.

METHODS

The design study was cross-sectional observational analytic to find the relationship between the Flat feet posture with the postural stability. The samples were elderly who lived in nursing home Panti Social Tresna Werdha Budi Mulia 2 Cengkareng, selected by random sampling. The inclusion criteria in this study were aged over 60 years, can be invited to communicate well, and able to walk. Assessment of the posture to found the Flat feet was by ink feet print on the white paper. Evaluation of the posture stability was Tinetti Balance Assessment. Data analysis uses SPSS version 20.0 for Windows

RESULTS

The subjects were 84 elderly with the characteristics in Table 1

Table 1 study subjects characteristics

Variable	Frequency	
	Total (n=84)	**Percent (%)**
Gender		
Male	46	54,8
Female	38	45,2
Age		
60-74-year-old	70	83,3
75-90-year-old	12	14,3
≥ 90-year-old	2	2,4
Postural Stability (Tinetti score)		
Low Risk of Fall (≥ 24)	50	59,5
Moderate Risk of Fall (19-23)	19	22,6
High Risk of Fall (≤ 18)	17	17,9
Mean of the Tinetti score	23,39	
Feet Shape		
Normal	58	69,0
Flat feet	26	31,0

In univariate analysis, the results of the study showed that out of 84 respondents, the study sample was dominated by male respondents as many as 46 (54.8%). The highest the age group was 60-74 years on 70 (83.3%) subjects.

The Tinetti Balance Assessment Tool was used to determine the postural stability. The result was the most subjects had a low risk of falls (score ≥ 24), and the mean of Tinetti test score was 23,39.

The examination of posture has revealed that most of subjects 39 (46%) had normal posture.

The relationship between Flat feet and postural stability

Table 3 The correlation between the Flat feet and the Tinetti test Score

Variable	Postural Stability			Total	p
	Low Risk of Fall ≥ 24	Moderate Risk of Fall 19-23	High Risk of Fall ≤ 18		
Normal	39	13	6	58	
Flat feet	11	6	9	26	
Total	50	19	15	84	0.020*

*chi-square

The data in Table 2 has shown that 39 of the elderly who had standard feet shape have a low risk of fall, in contrast on the high risk of fall group has more of the Flat feet subjects (p = 0.020)

DISCUSSION

The study conducted on 84 elderly subjects who lived in Government nursing home. All of the subjects were able to walk independently, and do not have any injury or inflammation on the lower extremities. The feet posture was assessed by ink feet print, and calculated by Clarke's angle method. The postural sway has examined by Tinetti balance score.

The study has shown that 31% of the subjects have Flat feet, that was slightly higher than the earlier studies have found was 10-25% of the population.[5,6,16-19]

A study by Kyunggock Yi and Namhee have found the normal feet prevalence was then the Flat feet posture in the elderly subjects.[9]

Postural sway has evaluated by Tinetti Balance Assessment Tool has the results was the low risk of fall that has Tinetti score ≥ 24 has the highest frequency (59,5%), followed by the moderate and high risk of fall were 22,6% and 17,9% respectively. The results of this study have supported the study in Jaten Klaten, that were 45% of the 75 subjects had a low risk of fall.[8]

Although most of the subjects have a low risk of fall, interestingly there was the correlation between the feet posture and the postural sway, that has tested by the Chi-square (p= 0.020). The distribution of data has shown that there was the highest number of the standard feet in the low risk of fall group, in contrast in the high risk of fall has the higher number of subjects with the Flat feet posture. This result study has agreed with the previous studies that found a relationship between Flat feet and postural stability in the elderly.[8,9] The correlation between Flat feet and postural stability has found on the adolescence population that revealed from the study by Fayiz et al .[10], and on the children from the study by Kadek AA et al. [11].

CONCLUSION

This study has revealed that 31% of the subjects have flat feet posture, while 59,5% of the subjects have a low risk of fall. There was the correlation between the flat feet with the postural sway by Tinetti balance score. From this study may be concluded that the elderly subject who has flat feet posture has a higher risk of fall.

It is necessary to recommend the correction of flat feet in the elderly to prevent the fall.

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