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Prevalence of frailty syndrome and related factors in older adults living in a nursing home

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Abstract

In this study, it was aimed to determine prevalence of frailty syndrome in older adults living in a nursing home in Kayseri and to assess relationship of frailty with sociodemographic characteristics and health-related conditions. This cross-sectional study was conducted on older adults living in a nursing home in Kayseri in 2016. Data were collected by using a sociodemographic questionnaire, Katz Index of Independence of Daily Living Activities, Instrumental Activities of Daily Living Scale, Geriatric Depression Scale and Study of Osteoporotic Fracture Index. It was aimed to include 128 older adults living in the nursing home. A total of 105 people were included. Chi-square test was used for statistical analysis. Of subjects, 56.2% were men; 5.7% were married and 45.7% were literate, 92.4% had health insurance, and 70.5% had regular income. Mean age was 77.5 ± 8.7 years. Prevalence rate of frailty syndrome was 31.4%. Prevalence rate was found to be higher in women and in those aged ≥ 85 years. It was found that walking difficulty and walking stick use were more prevalent, while general health perception and sleep quality were poorer in older adults with frailty syndrome. Frailty syndrome was detected in approximately one-third of the study group. Prevalence rate of frailty syndrome was found to be higher among women and it was found to be increased by advancing age. The frailty has negative influence on health perception, sleep quality and walking difficulty. It is important to assess older adults for frailty and risk factors and to raise awareness the caregivers on frailty syndrome..

Keywords: Older adult, nursing home, frailty syndrome, daily living activities

Introduction

Frailty Syndrome (FS) has various definitions. The most commonly used definition is “increased vulnerability to external stress as a result of loss of physiological reserves and function in neuromuscular, metabolic and immune systems due to aging” [1]. In addition, there are definitions emphasizing altered mobility, decreased strength and presence of nutritional impairments [2,3]. The older adults with FS generally have chronic diseases and functional dependency [1,2]. Losses in muscle strength, sarcopenia, slowing in walk, decreased grip strength and undesired weight loss may be encountered in older adults with FS [4,5]. FS is a clinical condition which isn't only associated to difficulty in performing daily living activities but also can result in hospitalization and death [6].

It is important to assess frailty in older adults. It is essential to distinguish normal aging process from FS symptoms by monitoring

age-related physiological changes [6,7]. Several indices based on screening frailty symptoms such as weight loss, slowed walk, decreased physical activity level, incontinence and exhaustion [2,8,9]. The Cardiovascular Health Study (CHS) index and Study of Osteoporotic Fractures (SOF) index are widely used methods to diagnose FS [8,9].

It is essential to better understand preceding process in order to prevent frailty. It is believed that frailty can be prevented by timely intervention to acute disorders, trauma or stress in this latent period [9,10]. It has been shown that strength exercises, nutritional supplements, weight control, reviewing medications used, early recognition of medical issues, arrangements at home and environment, and assessment of social issues are effective in restoration aging body and maintaining functionality in both latent and apparent processes of frailty [6,10].

In this study, it was aimed to determine FS prevalence in older adults living in a nursing home and to assess the relationship of FS with sociodemographic characteristics and health-related parameters.

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Material and Methods

This cross-sectional study was conducted on older adults living in Hacı Rukiye Gazioğlu Nursing Home between 21.03.2016 and 29.05.2016. The data related to daily living activities and depressive symptoms in the same group will be published elsewhere [11].

The study was approved by Kayseri Metropolitan Municipality and Ethics Committee on Clinical Research of Erciyes University. We also obtained oral informed consent from the participants.

At time of investigation, it was found that 128 of 154 individuals living in the nursing home were ≥ 65 years old. No sampling was performed as it was aimed to obtain data from all older adults aged ≥ 65 years living in nursing home. The data were collected by face-to-face interviews. Overall, 23 individuals were excluded from study including eighteen individuals with severe cognitive disorder (Alzheimer's disease, dementia, psychosis) and communication disability, 2 individuals with incomplete data and 3 individuals lacking at nursing home at time of study were excluded. Final analysis included data from 105 subjects.

Data Collection Tools

Data were collected by using sociodemographic questionnaire, Geriatric Depression Scale (GDS) [12], Katz Index of Independence of Daily Living Activities (ADL) [13], Instrumental Activities of Daily Living Scale (IADL) [14], and Study of Osteoporotic Fracture Index (SOF) [8].

Sociodemographic Questionnaire

The sociodemographic questionnaire was developed by researchers and included 20 items addressing age, gender, education status, occupation, and marital status, number of children, health insurance, economical status and general health status. In addition, height and weight measures were taken by researchers.

Geriatric Depression Scale (GDS)

Geriatric Depression Scale (GDS) developed by Yesavage et al. [12] and Ertan et al. [15], conducted the validity and reliability study of the Turkish version. It is a scale based on self-report and consists of 30 items and it is requested to answer questions in a yes / no form.

Katz Index of Independence of Daily Living Activities (ADL)

Katz ADL includes 6 items rating bathing, dressing, toileting, transferring, continence, and feeding. These items are rated as follows: 3 points, able to perform without assistance; 2 points, able to perform with assistance; and 1 point, unable to perform. Total score is between 0 and 18 points. The individual is assessed as 'dependent' if total score is 0-6 points, 'semi-dependent' if total score is 7-12 points and 'independent' if total score is 13-18 points [13].

Instrumental Activities of Daily Living Scale (IADL)

The IADL was developed by Lawton and Brody [14]. It includes 8 items rating ability to telephone use, food preparation, shopping, housekeeping, laundry, mode of transportation, responsibility for own medication and ability to handle finances. These items are rated as follows: 3 points, able to perform without assistance; 2

points, able to perform with assistance; and 1 point, unable to perform. Total score is between 0 and 24 points. The individual is assessed as 'dependent' if total score is 0-8 points, 'semi-dependent' if total score is 9-16 points and 'independent' if total score is 17-24 points.

Study of Osteoporotic Fracture Index (SOF)

In elder individual, it assess frailty depending on weight loss $\geq 5\%$, inability to do 5 chair stands, and no for question "do you feel yourself full of energy". The elder individual with at least two of above-mentioned findings are considered as frail [8].

Data Analysis

Data obtained from GDS, Katz ADL, IADL and SOF index were analyzed based on their own instructions. The body mass index (BMI) was classified as underweight (<18.50 kg/m²), normal ($18.50-24.99$), overweight ($25.0-29.99$) and obese (≥ 30) [16]. The BMI values were classified in 2 groups as <25 and ≥ 25 , in statistical analysis.

Data obtained from this study were analyzed with the SPSS 15.0 package program. Pearson's chi-square test and Fisher's exact test were used to assess relationship of frailty with sociodemographic characteristics and health-related parameters. A p value <0.05 was considered as statistically significant in all analyses.

Results

Of subjects, 56.2% were men; 5.7% were married and 45.7% were literate. Mean age was 77.5 ± 8.7 years. Of subjects, 92.4% had insurance, 70.5% had regular income, 56.2% retired and the proportion of those with 5 or fewer children was 88.6%.

As shown in Table 2, 23.8% of subjects reported their general health status as poor. Of subjects included, 22.9% were smokers while 32.4% were ex-smokers. Mean BMI was 21.1 ± 3.4 kg/m². The BMI was <18.5 kg/m² in 3.8% and ≥ 25 kg/m² in 53.3%. Of subjects included, 61.9% reported difficulty in walking while 39.0% reported stick use and 30.5% reported fall within prior year. At least one chronic disease was reported by 69.5% of subjects included.

Table 3 shows effects of sociodemographic factors evaluated and health-related parameters on FS prevalence. The FS prevalence rate was 31.4% in study population. The FS prevalence was found to be significantly higher in age groups of ≥ 85 years when compared to other age groups ($p < 0.05$). It was also significantly higher among women when compared to men. No significant effect was found for remaining sociodemographic characteristics and health-related parameters.

Table 4 presents comparison prevalence of several health issues between older adults with or without FS. The percentages of poor health perception, poor sleep quality, walking difficulty and stick use were 36.4%, 42.4%, 84.8% and 66.7% in older adults with FS, respectively, which were found to be significantly higher than those in older adults without FS ($p < 0.05$). However, it was found that history of fall had no significant influence on dependency as rated by Katz ADL and IADL.

Table1. Sociodemographic characteristics of study population

Characteristics	Groups	Number	%
Age Groups (year)	65-74	40	38.1
	75-84	40	38.1
	≥85	25	23.8
Age (year) (mean ± SD)			
Gender	Male	59	56.2
	Female	46	43.8
Job	Retired	59	56.2
	Housewife	46	43.8
	Illiterate	48	45.7
Education level	Literate but no formal education	15	14.3
	Primary school	35	33.3
	College or higher	7	6.7
Marital status	Married	6	5.7
	Non-married	7	6.7
	Widow	92	87.6
Number of children	≤5	93	88.6
	>5	12	11.4
Insurance	Yes	97	92.4
	No	8	7.6
Personal income	Yes	74	70.5
	No	31	29.5
Income assessment	Good	23	21.9
	Moderate	33	31.4
	Poor	49	46.7

Table 2. Some characteristics related to health status in the study population

Characteristics	Groups	Number	%
Smoking status	Non-smoker	47	44.8
	Ex-smoker	34	32.4
	Active smoker	24	22.9
Perceived general health status	Good	34	32.4
	Moderate	46	43.8
	Poor	25	23.8
Walking difficulty	Yes	64	61.9
	No	41	39.0
Stick use	Yes	41	39.0
	No	64	61.0
History of fall within prior year	Yes	32	30.5
	No	73	69.5
Chronic disease	Yes	73	69.5
	No	32	30.5
Frailty	Yes	33	31.4
	No	72	68.6
BMI	Lean	4	3.8
	Normal	45	42.9
	Overweight	37	35.2
BMI (Mean ± SD)	Obese	19	18.1
		21.1 ± 3.4	

Table 3. Effects of sociodemographic characteristics and health status on frequency of FS

Variables	Groups	N	FS		X2	p
			Number	%		
Age Groups	65-74	40	6	15.0	14.517	0.001
	75-84	40	12	30.0		
	≥85	25	15	60.0		
Gender	Male	59	13	22.0	5.515	0.019
	Female	46	20	43.5		
Marital status	Married	6	1	16.7	Fisher's exact test	0.662
	Single	99	32	32.3		
Education level	No primary school degree	63	24	38.4	3.248	0.072
	Primary school or higher	42	9	21.4		
Income	Good	23	8	34.8	0.155	0.926
	Moderate	33	10	30.3		
	Poor	49	15	30.6		
Smoking	Non-smoker	47	17	36.2	1.754	0.416
	Ex-smoker	34	11	32.4		
	Active smoker	24	5	20.8		
Chronic disease	No	32	10	31.3	0.001	0.979
	Yes	73	23	31.5		
BMI	<25	49	16	32.7	0.064	0.800
		56	17	30.4		
Total		105	33	31.4		

Table 4. Effect of FS on health status in elder individuals

	FS				X ²	p
	Yes (n=33)		No (n=72)			
	Number	%*	Number	%*		
Perceived poor health	12	36.4	13	18.0	4.181	0.041
Poor sleep quality	14	42.4	15	20.8	5.277	0.022
Walking difficulty	28	84.8	36	50.0	11.546	<0.001
Stick use	22	66.7	19	26.4	15.424	<0.001
History of fall within prior year	11	33.3	21	29.2	0.041	0.840
IADL dependent	22	66.7	35	48.6	2.973	0.085
ADL semi-dependent	2	6.1	2	2.8	0.666	0.373

*: Column percent

Discussion

In this study, the FS prevalence rate was found to be 31.4% in elder individuals (Table 3). In a study, FS prevalence rate has been reported to be 7%-32% among community-dwelling older adults [17]. In Cardiovascular Health Study, it was found that; 7% of study group was frail, whereas 47% was in pre-frail stage [18]. In a study from Taiwan, the FS prevalence rate was reported as 11-14.9% in community settings [19]. The FS prevalence rate was found as 30.1% in a study on older adults living in nursing home from Turkey [20]. The FS prevalence rate found in our study was compatible with the literature.

In our study, the FS prevalence rate was 15.0% in subjects aged 65-74 years, while 60% in those aged ≥85 years, indicating increased

prevalence rate by advancing age (Table 3). In many study, it was reported that the FS prevalence is increased by advancing age [1,6,21]. By advancing age, reduction in physiological reserves, slowness, weakness, decreased physical activity, exhaustion and decreased BMI become more frequent, resulting in an increase in the FS prevalence [4,6,7].

Gender is one of the factors implied in frailty. Female gender is reported as a risk factor for frailty [6,21]. It was reported that frailty is more commonly seen among women in Women Health and Aging study [2] and Cardiovascular Health Study [9]. In our study, the FS prevalence rate was 43.5% among women, indicating a significant difference from men (Table 3). This might be due to higher muscle mass and strength in men than women.

In our study, FS was detected in 38.4% of subjects without formal primary school education whereas 21.4% of those having formal education at varying levels. However, no significant difference was found in FS prevalence according to educational status (Table 3). In a study from Brazil, the factors associated to FS were investigated and authors reported that lower educational level was associated to FS [22]. Again, in a study on subjects aged ≥ 65 years, Chen et al. suggested a relationship between lower educational status and FS [23]. However, no relationship was found between education level and frailty in the study by Ayg r et al. [10]. Higher FS prevalence rate in older adults with lower educational level might be due to greater age and higher prevalence of chronic diseases in this group.

In our study, the FS prevalence rate was comparable in subjects with or without chronic diseases (Table 3). In the literature, it has been suggested that chronic diseases is one of the factors associated to FS. In a study by Zaslavsky et al., it was suggested that chronic diseases had influence of likelihood of FS [24]. In addition, it was reported that using 5 or more drugs was associated to FS in a Brazilian study [22]. In our study, the lack of association between presence of a chronic disease and frailty may be due to use of self-reported data regarding chronic diseases and unawareness of older adults about their chronic diseases.

In a study on older adults living in a nursing home, it was shown that frailty parameters were less frequent and frailty scores were lower in obese individuals [20]. On contrary, there are studies indicating that FS may be present in obese individuals. It is suggested that this results from loss in lean mass [25-27]. In our study, FS prevalence rate was compared between subjects with BMI<25 and ≥ 25 due to smaller number of obese individuals. No significant difference was found in FS prevalence between groups (Table 3).

Older adults experience challenges to maintain daily living activities independently as a consequence of many negative influences including physical and cognitive as well as economical losses resulting from aging [28-29]. Together with environmental factors, such negative influences cause weakness, decreased mobility and impair balance, resulting increased frailty in elder individual. Thus, the FS affects daily living activities and functional independency of elder individuals and also increases risk for fall [30]. In Women Health and Aging Study and Cardiovascular Health Study, it was found that women with FS experienced more difficulty in performing daily living activities and that they had higher risk for mortality and need for care in a facility [4,9].

It was found that percentage of walking difficulty and stick use were higher in subjects with FS (Table 4). In the literature, it has been reported a relationship between walking difficulty and FS [6, 21]. In older adults with FS, it is anticipated to increase in walking difficulty, falls and stick use due to impaired balance.

In our study, the FS was detected in 34.8% of subjects with high income and 30.6% of subjects with poor income; however, no significant association was found between FS and income level (Table 4). Likewise, it was also found that marital status had no significant influence on FS prevalence (Table 4). In the literature, it has been reported that socioeconomic status and living alone are factors affecting likelihood of FS. In a study by J rschik et al, it was found that FS was more frequent in individuals living alone [31].

In a study from Brazil, it was reported that living alone and low socioeconomic status were associated to FS [22]. In community-dwelling older adults, economic status and marital status may affect FS prevalence by influencing on factors related to general health status such as nutrition, care and using healthcare services. However, factors such as nutrition and care are independent from economic or marital status in older adults living in the nursing homes. Thus, it isn't surprising to find that economic and marital status had smaller influence on FS prevalence among older adults living in nursing home.

In our study, percentages of subjects reporting poor general health status and poor sleep quality were found significantly higher among those with FS when compared to those without (Table 4). There are studies indicating that the FS is associated to general health perception [10,32]. As most of older adults are unaware of their chronic diseases, subjective health perception may be a better indicator for general health status. The relationship found between FS and general health perception indicates that the FS can be used as an objective indicator for assessment of general health status in older adults.

To best of our knowledge, there is no study investigating association between sleep quality and FS. However, it is known that functional losses and psychosocial problems affecting general health status can have influence on likelihood of FS [10,22,25]. It is anticipated that sleep quality may be impaired in elder individuals with FS since above-mentioned factors also lead similar impairment in sleep quality.

The FS has negative influences on activities of daily living and functional independency of elder individuals. It was found that prevention of FS improved quality of life in older adults and prolonged the period where older adults live independently [6]. In our study population, it was found that there was history of fall within prior year in 33.3% of subjects with FS whereas 66.7% were dependent in IADL and 6.1% was semi-dependent in Katz ADL. These values were lower in subjects without FS but the differences were not significant (Table 4). This might be due to small numbers of the subjects who are dependent in IADL and semi-dependent in Katz ADL.

This study has some limitations. First, it was conducted in a nursing home; thus, sample size was restricted to residents of the nursing home. Secondly, chronic disease and history of fall which may be related to FS, were assessed based on self-reports of the participants.

Conclusion

Frailty syndrome was detected in approximately one-third of older adults included to the study. Prevalence rate of FS is higher among women and increase by age. FS has negative influence on health perception, sleep quality and walking difficulty. The symptoms of FS should be assessed periodically in older adults and individualized nutritional support and resistance exercises should be provided to maintain functionality and prevent muscle loss.

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Competing interests

The authors declare that they have no competing interest

Financial Disclosure

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Ethical approval

The study was approved by Kayseri Metropolitan Municipality and Ethics Committee on Clinical Research of Erciyes University.

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