





Research Article

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EVALUATION OF THE RELATIONSHIP BETWEEN FRAILTY, POLYPHARMACY, AND DEPRESSION IN PEOPLE 65 YEARS OF AGE AND OLDER

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Abstract

Objectives: This study aims to determine the level of frailty in patients aged 65 and over who apply to the family medicine clinic to evaluate the relationship between polypharmacy, depression, and socio-demographic characteristics with frailty.

Materials and Methods: This is a single-center, cross-sectional, descriptive survey. One hundred forty-four participants aged 65 and over who applied to the family medicine clinic at Training and Research Hospital in Izmir were included. The Yesavage Geriatric Depression Scale (GDS)-Short Form was used to measure participants' depression levels, and the Edmonton Frail Scale (EFS) was used to determine the level of frailty. The data obtained were analyzed using IBM SPSS 21.0, and a statistical significance value of $p < 0.05$ was accepted.

Results: The group with the highest percentage of participants was under 75 years old, constituting 65.32% of the total group. According to the GDS score average, a significant relationship was found between depression and gender, education level, monthly income, and falls. According to the EFS-TR score average, a significant relationship was found between frailty and age, gender, education level, marital status, monthly income, lifestyle, number of medications used, number of emergency hospital admissions, and falls. A moderate positive correlation was found between GDS and EFS.

Conclusion: The study found that many socio-demographic characteristics affect depression and frailty. It was observed that frailty increases as depression and polypharmacy increase, but there was no significant relationship between polypharmacy and depression. These results are important for better support and protection of elderly individuals in health and social care.

Keywords: Frailty, depression, polypharmacy.

Introduction

With the decrease in the birth rate and the improvement in living standards around the world, the extension of human life is provided, and the elderly population is gradually increasing.¹ The ongoing expansion in the elderly population over time emphasizes the importance of health among elderly individuals. The elderly population accounted for 9% of the world's population in 2019, and it is estimated to increase up to 16%; in other words, one out of every six people will be elderly in 2050.²

Aging is a universal process in all living organisms and manifests as progressive functional loss and impairment, resulting in a reduction in all functions.³ The World Health Organization (WHO) defines old age as a "decrease in the ability of adaptation to environmental factors." Normal aging is a process characterized by social and psychological changes as well as anatomic alterations without disease by advancing age over time. Pathological aging involves all pathological events that interact with the normal aging process.⁴ Although the aging process can show individual variations, it should not be assessed according to age alone. An elderly individual can be termed as healthy, frail or terminal based on functional capacity.

Frailty is defined as "reduction in physiological reserves together with weakness due to many factors including physiological changes by advancing age, genetic predisposition, nutritional status and comorbid disease".⁵ The frailty is important since recovery from diseases is prolonged, and it is more likely to recover with a sequel following disease in frail individuals. If frailty is recognized early, the likelihood of sequels and deaths can be decreased.⁶

Aging comes with many chronic diseases, resulting in a number of drugs used in the elderly individual. Multiple drug use is also termed polypharmacy. Although there is no clear definition of polypharmacy, it can be defined as "simultaneous use of many drugs generally for multiple indications".⁷ Polypharmacy is also defined as "concurrent use of 2 or more drugs for at least 240 days", "concurrent use of 4 or more drugs" according to National Service Framework (NSF) or "concurrent use of 5 or more drugs".⁸⁻¹⁰ Polypharmacy can lead inappropriate drug use, drug-drug interaction, drug-patient interaction, adverse effects, higher costs, fall, weight loss, impaired cognitive functions, hospitalization, increased dwelling in the nursing home and death which are highly important for health of elder individuals.¹¹ Physiological changes, such as forgetfulness or challenges in perception, may appear by aging; psychological alterations can also develop. The strength and prestige, relationship with relatives, social life, reputation and expectations of elderly individuals are decreased, and the individual becomes helpless. During old age, individuals experience depression for several reasons, including loss of relatives and decreased ability to adapt to technology and social life. Depression is a significant factor regarding quality of life and can lead to impairment in general health status and premature death if left untreated.¹²

The frailty of the elderly in terms of health is affected by many factors. Comprehensive geriatric assessment should be performed for early diagnosis and treatment of frailty, and depression and polypharmacy should be questioned during the elderly examination. Our study aimed to determine measures of frailty and assess the link between frailty and polypharmacy, depression and socio-demographic characteristics in patients aged \geq 65 years who presented to our outpatient clinic of family medicine.

Materials and Methods

This study was designed as a single-center, cross-sectional, descriptive survey. In determining the study sample, the frailty rate was determined as 10% in studies conducted in Turkey, using the sample calculation for an unknown population with a confidence level of 95 % and a margin of error of 0.05; at least 136 individuals were calculated. Between May 2020 and July 2020, face-to-face interviews were conducted with 144 participants who were 65 years and older and met the inclusion criteria of the study and who applied to the family medicine clinic. After providing information about the study to the participants reached during the research process, those who were capable of answering the questions and willing to participate were included. The Socio-demographic data form, Yesavage Geriatric Depression Scale (GDS)-Short Form, and Edmonton Frailty Scale (EFS) were used to be filled out by individuals who applied to the clinic. Patients who use five or more medications are defined as having polypharmacy. The Turkish validity and reliability of the Edmonton Frailty Scale were conducted by Aygor et al. in 2018.¹ The GDS short form consists of 15 questions, and the Turkish validity and reliability of the scale were conducted by Ertan et al. in 1996.¹³

Descriptive statistics are summarized as frequency, percent, mean and standard deviation. The statistical analyses were performed using IBM SPSS version 21.0 (Statistical Package for the Social Sciences). Mann Whitney U test was used for comparisons between two groups, while the Kruskal-Wallis test was used for comparisons among three or more groups. Pearson's Chi-square test was used to analyze differences in qualitative variables between groups when appropriate. Spearman rho correlation test was used to define the strength and direction of linear correlations between quantitative variables. A p-value $>$ 0.05 was considered statistically significant in all analyses.

Results

As shown in Table 1, individuals aged $<$ 75 years comprised 94 (65.32%) of the study population as being the largest group among participants. Of the study population, 87 (60.41%) were women; 101 (70.11%) were married; 24 (16.72%) were illiterate; and almost one-half had primary school graduation. Of the participants, income was greater than expense; 44 (30.61%) and 26 (18.13%) lived alone. There was a comorbid disease in 135 (93.82%) of participants, including hypertension in 95 (70.38%), cardiovascular disease in 56 (41.5%),

hyperlipidemia in 22 (16.29%), and cerebrovascular disease. 137 (95.12%) of participants were using drugs. Of these, 117 (81.31%) were using regularly, and 56 (38.93%) were using five or more drugs.

Table 1. Distribution of participants according to socio-demographic characteristics (n=144)

Demographic characteristics		n	%
Gender	Female	87	60.41
	Male	57	39.59
Age	<75	94	65.32
	75- 84	39	27.11
	≥85	11	7.57
Marital status	Married	101	70.11
	Single	4	2.74
	Divorced	3	2.11
	Widow	36	25.04
Education level	Illiterate	24	16.72
	Primary school	68	47.23
	Secondary school	13	9.01
	High school	13	9.02
	University	26	18.02
Income	Income less than expenses	44	30.61
	Income equal to expenses	78	54.23
	Income more than expenses	22	15.26
Residence	Alone	26	18.13
	With partner	94	65.32
	With relatives	24	16.65
Comorbid disease	Yes	135	93.82
	No	9	6.18
Hypertension	No	40	29.62
	Yes	95	70.38
Hyperlipidemia	No	113	83.71
	Yes	22	16.29
Chronic lung disease	No	120	88.86
	Yes	15	11.14
CVD*	No	79	58.51
	Yes	56	41.49
CVD**	No	122	90.41
	Yes	13	9.59
Thyroid disorder	No	120	88.87
	Yes	15	11.13
Osteoporosis	No	120	88.88
	Yes	15	11.12
Depression	No	122	90.44
	Yes	13	9.56
Total			100.0

*CVD: Cardiovascular Disease, **CVD: Cerebrovascular Disease

The socio-demographic characteristics were compared by the Yesavage Geriatric Depression Scale. A significant correlation was detected between age, education level, monthly income and fall (Table 2 and Table 3). The female patients, those who were illiterate, those having income less than the expense and those with a history of 2 or fewer falls were found to be more depressive.

There was no significant difference in mean Yesavage GDS Score according to age group, marital status, lifestyle, number of drugs used and number of emergency department visits.

Table 4 and Table 5 compare socio-demographic characteristics with the Edmonton Frail scale. It was found that there was a significant relationship between age, gender, marital status, education level, monthly income, lifestyle, number of drugs used, number of emergency department visits and falls. Based on these results, female patients, those aged ≥ 85 years, those who were illiterate, widows, those having monthly income less than the expense, those living with relatives, those using five or more drugs, those with a history of more than two falls and those presented to the emergency department more than twice were found to be more frail.

Table 6 shows a moderate, positive correlation between the Yesavage Geriatric Depression Scale and Edmonton Frail Scale according to Spearman's rho correlation test.

Table 2. Results of Yesavage Geriatric Depression Scale according to socio-demographic characteristics

Yesavage Geriatric Depression Scale		n	Median	t	df	p
Age	<75	94	5.00	1.891	2	0.388
	75- 84	39	6.00			
	≥ 85	11	4.00			
Education	Illiterate	24	9.00	30.375	4	<0.001*
	Primary school	68	6.00			
	Secondary school	13	7.00			
	High school	13	3.00			
	University	26	3.00			
Marital status	Married	101	5.00	5.976	3	0.113
	Single	4	3.00			
	Divorced	3	8.00			
	Widow	36	7.50			
Income	Income less than expenses	44	8.50	24.502	2	<0.001*
	Income equal to expenses	78	6.00			
	Income more than expenses	22	2.00			
Residence	Alone	26	6.50	3.301	2	0.192
	With partner	94	4.50			
	With relatives	24	7.00			
Number of emergency visits	No	86	4.00	4.284	2	0.117
	≤ 2	39	6.00			
	> 2	19	8.00			
Number of falls	No	72	4.00	6.100	2	0.047*
	≤ 2	44	8.00			
	> 2	28	6.00			

* $p < 0.05$ was considered as statistically significant (Kruskall Wallis test)

Table 3. Results of Yesavage Geriatric Depression Scale according to socio-demographic characteristics

Yesavage Geriatric Depression Scale		N	Median	Z	p
Gender	Female	87	7.00	2.92	0.003*
	Male	57	4.00		
Number of medication	<5	88	5.50	0.86	0.391
	≥5	56	6.00		

* p<0.05 was considered as statistically significant (Mann Whitney U test)

Table 4. Results of Edmonton Frail Scale according to socio-demographic characteristics

Edmonton Frail Scale		N	Median	Z	p
Gender	Female	87	7.00	3.11	0.002*
	Male	57	4.00		
Number of medication	<5	88	5.00	2.76	0.006*
	≥5	56	7.00		

* p<0.05 was considered as statistically significant (Mann Whitney U test)

Table 5. Results of Edmonton Frail Scale according to socio-demographic characteristics

Edmonton Frail Scale		N	Median	t	Df	p
Age	<75	94	5.00	20.610	2	<0.001*
	75- 84	39	8.00			
	≥85	11	8.00			
Education	Illiterate	24	10.00	44.469	4	<0.001*
	Primary school	68	7.00			
	Secondary school	13	4.00			
	High school	13	6.00			
	University	26	3.50			
Marital status	Married	101	6.00	12.316	3	<0.006*
	Single	4	2.50			
	Divorced	3	6.00			
	Widow	36	8.50			
Income	Income less than expenses	44	8.00	22.924	2	<0.001*
	Income equal to expenses	78	5.50			
	Income more than expenses	22	2.50			
Residence	Alone	26	5.00	8.549	2	0.014*
	With partner	94	6.00			
	With relatives	24	8.50			
Number of emergency visits	No	86	5.00	23.678	2	<0.001*
	≤2	39	8.00			
	>2	19	10.00			
Number of falls	No	72	5.00	16.007	2	<0.001*
	≤2	44	7.00			
	>2	28	8.00			

* p<0.05 was considered as statistically significant (Kruskall Wallis test)

Table 6. Correlation test for Yesavage Geriatric Depression Scale and Edmonton Frail Scale

			Yesavage Geriatric Depression Scale	Edmonton Frail Scale
Spearman's Rho	Yesavage Geriatric Depression Scale	Correlation Coefficient Sig. (2-tailed) n	1.000 144	0.677** 0.001 144
	Edmonton Frail Scale	Correlation Coefficient Sig. (2-tailed) n	0.677** 0.001 144	1.000 144

* p<0.05 was considered as statistically significant

**Spearman's rho correlation test

Discussion

The birth rate is decreasing worldwide, and the elderly population is consistently expanding with a decrease in the younger population. Although the community's aging showed variation regarding time and process, it is observed in almost all countries, and it is thought that this issue will become an important problem in emerging countries.¹⁴ If social and health-related problems accompanying aging are recognized early, they can be prevented or delayed. Thus, problems in this age group should be addressed using a public health approach. In this study, we evaluated the effects of socio-demographic characteristics, depression and polypharmacy on frailty in elderly individuals.

In our study, frailty increased with increasing age. In a study using EFS, Fabricio-Wehbe found that frailty levels varied across age groups, with increased frailty with advancing age.¹⁵ In a study using EFS, Ching Chang et al. found that there was no statistical correlation between age groups and frailty total score.¹⁶ This may be due to the difference in age distribution between studies. In a study of 1013 participants aged ≥ 74 years, Masel et al. found a correlation between frailty and economic challenges¹⁷. On the other hand, no significant correlation was found between education level and frailty.¹ It may be due to the higher education level among the study population in a study by Aygor et al.

Although many factors are involved in the etiology of falls, frailty also leads to falls. In a study by Morley, it was found that fall incidence was increased by increasing frailty.¹⁸ In our study, it was found that the patients with a history of more than two falls were frailer.

In the geriatric age group, the number of comorbid diseases increases with age, which in turn increases the number of medications used. In our study, it was observed that individuals using five or more medications were more fragile. In the literature, it has been shown in several studies that there is a statistically significant relationship between polypharmacy and frailty.^{16,19-22} The FRAILTURK study (2015) found that women are frailer than men.²³ In a study by Fabricio-Wehbe et al., it was found that there was a significant correlation between female gender and frailty.¹⁵ Our study also found that women were frailer than men, in agreement with the literature. Although it has been observed that women are frailer than men in most studies, the underlying cause hasn't been fully elucidated. This may be due to the role of women in society as well as biological and social causes.

In addition to physiological alteration induced by aging, social and psychological changes also affect the individual's social life, communication and prestige. The individual becomes helpless. The loss of relatives and the challenges of adapting to technology lead to isolation, psychological distress and depression.¹² Feeling unhappy within the prior two weeks is a condition that warrants further evaluations for depression.²⁴ In a study on subjects aged ≥ 65 years, Yalinkilic et al. observed that the mean frailty score as rated by EFS was higher in subjects feeling unhappy within the prior two weeks.²⁵ In our study, a moderate, positive correlation was detected between Yesavage GDS and Edmonton Frail Scale in Spearman's rho correlation test, indicating increased frailty by increasing severity of depression. Our results are in agreement with the literature.

Among socio-demographic characteristics, education level and income are highly effective on the quality of life of an individual. In our study, the participants with lower income and those who were illiterate were found to be more depressive. In a study on elderly individuals in nursing homes by Gümüş et al. (2007), it was observed that low-income level led to increased hopelessness level²⁶ while in the study by Balci et al., it was found that low-income increased depression.²⁷ The household problems as well as social and environmental factors resulting from low income, lead to being more depressive. In a study using the Yesavage Geriatric Depression Scale by Discigil et al., it was found that female gender and the presence of 2 or more chronic diseases were risk factors for depression, while age, education status and social security status did not affect risk for depression.²⁸ Although many studies showed that depression is more commonly seen among women when compared to men, the social role, coping abilities and biological causes may have caused such findings. In our study, those who were illiterate were found to be more depressive; this may be due to higher rates of investigation and reading, ability to cope with stress and more willingness to cope with depression among elderly individuals with higher education levels.

In our study, no significant relationship was found between polypharmacy and depression.^{29,30} However, in some other studies, it has been determined that individuals using multiple medications and having a higher

number of chronic illnesses are at risk for depression. It is believed that the different categorizations of multiple medication use and the scales used in these may account for these divergent results.

This study has some limitations. The study randomly assigned 144 patients aged ≥ 65 years who presented to the family medicine outpatient clinic of Bozyaka Training and Research Hospital; thus, the study population may not be representative of the geriatric population in Turkey. Secondly, the study's cross-sectional design resulted in a heterogeneous study population regarding socio-demographic characteristics; thus, results cannot be generalized.

In conclusion, it has been found that women, older adults, and individuals who are economically challenged are more fragile. Additionally, a statistically significant relationship exists between polypharmacy, depression, and frailty. These findings emphasize the importance of a preventive healthcare approach for the elderly.

Ethical Considerations: Ethical approval was obtained from the Clinical Research Ethics Committee of Education and Research Hospital in İzmir (decision no:17) on May 12, 2020.

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