

Association between Polypharmacy and Depression, Anxiety and Stress in Elderly: A Cross-Sectional Study

Yaşlılarda Polifarmasi ile Depresyon, Anksiyete ve Stres Arasındaki İlişki: Kesitsel Bir Çalışma

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ABSTRACT

Objective: This study aimed to examine the association between polypharmacy and depression, anxiety and stress in elderly.

Methods: This cross-sectional study was conducted with 396 elderly admitted to two different hospitals in a province in eastern Türkiye. Information Form and Depression Anxiety Stress Scale-21 were used to collect data. The data were obtained between August and September 2023.

Results: Polypharmacy was present in 43.7% of the elderly. In the study, it was determined that income status (OR=0.385; 95% CI=0.163-0.909, $P=.029$), hypertension (OR=3.899; 95% CI=1.606-9.466, $P=.003$), coronary artery disease (OR=6.677; 95% CI=2.620-17.020, $P=.001$), diabetes (OR=3.924; 95% CI=1.543-9.981, $P=.004$), lung disease (OR=8.893; 95% CI=2.909-27.180, $P<.001$), hyperlipidemia (OR=20.023; 95% CI=5.737-69.887, $P<.001$), kidney disease (OR=16.514; 95% CI=5.873-46.431, $P<.001$), thyroid disease (OR=7.213; 95% CI=2.255-23.079, $P<.001$), cancer (OR=24.783; 95% CI=6.755-90.933, $P<.001$) and thinking that they were using too much drug (OR=0.484; 95% CI=0.233-1.005, $P=.052$) were significant risk factors for polypharmacy. It was observed that the presence of depression, anxiety and stress was not a significant risk factor for polypharmacy in the elderly ($P>.05$).

Conclusion: Further study on association between polypharmacy and depression, anxiety and stress in elderly is necessary. In future studies, it is recommended to use more comprehensive measurement tools, to evaluate which group the medicines used by the elderly belong to and to test causality.

Keywords: Polypharmacy, depression, anxiety, stress, elderly.

ÖZ

Amaç: Bu çalışmanın amacı yaşlılarda polifarmasi ile depresyon, anksiyete ve stres arasındaki ilişkiyi incelemektir.

Yöntemler: Bu kesitsel çalışma, Türkiye'nin doğusundaki bir ilde iki farklı hastaneye başvuran 396 yaşlı ile gerçekleştirilmiştir. Veri toplamak için Bilgi Formu ve Depresyon Anksiyete Stres Ölçeği-21 kullanıldı. Veriler Ağustos ve Eylül 2023 tarihleri arasında elde edilmiştir.

Bulgular: Yaşlıların %43,7'sinde polifarmasi mevcuttu. Çalışmada gelir durumu (OR=0,385; %95 GA=0,163-0,909, $P=.029$), hipertansiyon (OR=3,899; %95 GA=1,606-9,466, $P=.003$), koroner arter hastalığı (OR=6,677; %95 CI=2,620-17,020, $P<.001$), diyabet (OR=3,924; %95 CI=1,543-9,981, $P=.004$), akciğer hastalığı (OR=8,893; %95 CI=2,909-27,180, $P<.001$), hiperlipidemi (OR=20,023; %95 CI=5,737-69,887, $P<.001$), böbrek hastalığı (OR=16,514; %95 CI=5,873-46,431, $P<.001$), tiroid hastalığı (OR=7,213; %95 CI=2,255-23,079, $P<.001$), kanser (OR=24,783; %95 GA=6,755-90,933, $P<.001$) ve çok fazla ilaç kullandığını düşünme (OR=0,484; %95 GA=0,233-1,005, $P=.052$) polifarmasi için anlamlı risk faktörleriydi. Yaşlılarda depresyon, anksiyete ve stres varlığının polifarmasi için anlamlı bir risk faktörü olmadığı görülmüştür ($P>.05$).

Sonuç: Yaşlılarda polifarmasi ile depresyon, anksiyete ve stres arasındaki ilişki üzerine daha fazla çalışma yapılması gereklidir. Gelecekteki çalışmalarda daha kapsamlı ölçüm araçlarının kullanılması, yaşlıların kullandıkları ilaçların hangi gruba ait olduğunun değerlendirilmesi ve nedenselliğin test edilmesi önerilmektedir.

Anahtar Kelimeler: Polifarmasi, depresyon, anksiyete, stres, yaşlı

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INTRODUCTION

The proportion of elderly population has increased worldwide.¹ Increasing proportion of elderly population increases the load of chronic diseases and health expenditures.² The fact that elderly tend to suffer from multiple chronic diseases compared to younger people.^{3,4} causes them to require more drugs,⁴ and polypharmacy, which is defined as the use of multiple drugs.⁵

Although no definite consensus has been reached on the concept of polypharmacy,^{2,6} and the threshold amount is accepted as 5 drugs.^{2,7} Polypharmacy is a growing geriatric health problem worldwide.^{6,8} Polypharmacy leads to various problems^{6,9} and these problems may cause worse outcomes in elderly individuals.⁶ Elderly people who use more than one medication have a lower quality of life due to reduced activities of daily living.³ Polypharmacy has been associated with malnutrition, weight loss, treatment non-compliance, adverse drug events, falls, fractures, disability, frailty, depression,⁸ and multiple geriatric syndromes.² Given the serious outcomes and economic burden of polypharmacy,⁵ which has major negative consequences for patients, the healthcare system, and society, there has been a growing effort and interest in understanding its associations with mental health.¹⁰

The aging of the global population has created a great concern for the high prevalence of mental disorders or psychological problems in the elderly.¹¹ Approximately 14% of individuals aged 60 years and over live with a mental disorder¹² and with depression, anxiety and stress being most common in elderly.¹¹ Depression is a condition associated with psychosocial aspects and chronic stress rather than a genetic component in the elderly.¹³ Anxiety occurs in the elderly due to the changes experienced with the aging process.¹¹ Stress is seen in elderly not only due to stress factors in life, but also due to permanent decline in functional abilities and capacities, chronic pain, frailty or impaired mobility, grief, isolation, loneliness,¹⁴ chronic diseases, economic problems, major life changes such as retirement, care responsibilities and losses.¹⁵

Since mental disorders are more prevalent in elderly with both polypharmacy and chronic diseases,⁷ it is essential to carry out studies that address polypharmacy and related conditions in the elderly.⁸ In the literature, there are various studies^{9,10,16-19} in which the association between polypharmacy and depression in the elderly has been explored. In addition, there are a limited number of studies^{7,17,19} in which the association between polypharmacy and anxiety in the elderly has been examined. However, there is no study on the association between polypharmacy and stress.

AIM

This research aimed to examine the association between polypharmacy and depression, anxiety and stress in elderly.

Research questions

In this research, answers to the following questions were sought:

- What is the level of polypharmacy in the elderly?
- What are the factors affecting polypharmacy in the elderly?
- Is there an association between polypharmacy and depression in the elderly?
- Is there an association between polypharmacy and anxiety in the elderly?
- Is there an association between polypharmacy and stress in the elderly?

METHODS

Study Design

This study had a cross-sectional design and was reported based on the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist.

Setting and Sample

This study was carried out with elderly who applied to two different hospitals in a city in eastern Türkiye for any reason. The inclusion criteria were to be literate enough to fill out the forms used in the study, being aged 65 and over, and not having hearing/vision problems that would prevent them from responding to the forms. The sample size was calculated with the formula used for an unknown population ($n = p \cdot q \cdot t^2 / d^2$). In the study by Sofulu and Karadakovan² the rate of polypharmacy in individuals aged 65 and over was found to be 46.3%. Based on this study, the minimum sample size was calculated as 381 at $P = .46$, $q = 0.54$, a confidence interval of 95%, $d = 0.05$, and $t = 1.96$.

Data Collection

An Information Form and Depression Anxiety Stress Scale-21 were used to collect data. The data were obtained between August and September 2023. Initially, 400 elderly participated in the study. However, due to missing data from 4 individuals, the study was completed with 396 elderly. The flow chart is summarized in Figure 1.

Information Form: The form was created by the researchers by reviewing the literature^{2,4,6,17} and consisted of 12 questions.

Depression Anxiety Stress Scale-21 (DASS-21): The scale was developed by Lovibond & Lovibond by shortening DASS-42. The Turkish validity of the scale was tested by Saricam.²⁰ The four-point Likert-type scale includes three subscales, depression, stress, and anxiety, each including 7

questions. A score of 5 or above on the depression subscale, 4 or above on anxiety, and 8 or above on stress indicates that the individual has the relevant problem. In the validity study of the scale, the Cronbach alpha was found to be $\alpha=0.87$ for depression, $\alpha=0.85$ for anxiety, and $\alpha=0.81$ for stress.²⁰ In our study, Cronbach's alpha was 0.80 for the total scale, 0.58 for depression, 0.58 for anxiety and 0.55 for stress.

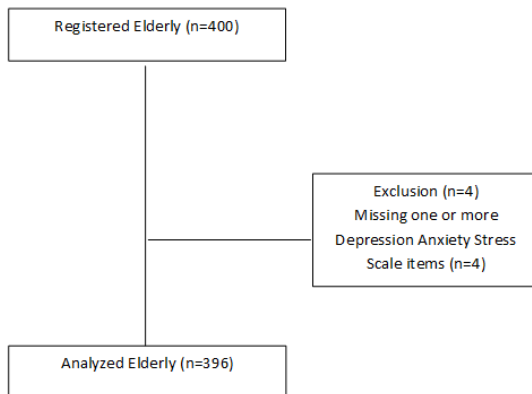


Figure 1. Flowchart of the study group

Data Analysis

The data obtained in the study were analyzed in the SPSS 25.0 (IBM SPSS Corp., Armonk, NY, USA) program. Descriptive statistical methods (number, percentage, minimum-maximum, and mean and standard deviation) were used in data analysis. The fitness of the data to normal distribution was checked with the Kolmogorov-Smirnov test. The Mann Whitney U test was used to compare quantitative data between two independent groups for non-normally distributed data. Chi-square analysis was performed to test the relationship between categorical variables. For statistically significant variables, the enter model was used in logistic regression. When interpreting the results, $P<.05$ was accepted for the significance level of statistical tests.

Ethical Considerations

Ethics approval for the research was obtained from Kafkas University Faculty of Health Sciences Noninvasive Research Ethics Committee (Dated 02/02/2023, Document ID: 81829502.903/30). Institutional permissions were obtained in writing from the state hospital and health, research and application center before data collection. Permission was obtained from the author of the scale used as a data collection tool in the study via e-mail. The study was conducted in line with the Declaration of Helsinki. In addition, the purpose of the study was explained to the elderly and their informed consent was obtained.

RESULTS

The mean age of the elderly who participated in the study was 76.38 ± 7.58 . Of the elderly, 53.0% were male; 57.3% were married; 33.1% were primary school graduates; 34.6% lived in the county; 48.2% lived with partners; 47.0% had moderate income; 76.0% had social insurance; 41.1% perceived their health status as moderate; 56.3% used 0-4 drugs; 56.8% thought they use too much drug (Table 1).

In the study, there was a statistically significant difference in the presence of polypharmacy according to health status perception, income status, having hypertension, coronary artery disease, diabetes, lung disease, hyperlipidemia, kidney disease, thyroid disease, cancer, and thinking that they use too much drug (Table 2) ($P<.05$).

Table 1. The General Characteristics of Elderly (n=396)

Variables	n	%
Age	76.38±7.58* (min: 65–max: 97)	
Gender	Female	186 47.0
	Male	210 53.0
Marital status	Single	32 8.1
	Married	227 57.3
	Divorced/ widowed	137 34.6
Education	Literate	110 27.8
	Primary school	131 33.1
	Middle school	95 24.0
	University	60 15.1
Living place	Village	127 32.1
	County	137 34.6
	City	132 33.3
Lives at home with	Alone	94 23.8
	Partner	191 48.2
	Children	98 24.7
	Nursing home	13 3.3
Income status	Poor	111 28.0
	Moderate	186 47.0
	Good	99 25.0
Social insurance	Yes	301 76.0
	No	95 24.0
Health status perception	Very poor	9 2.3
	Poor	80 20.2
	Moderate	163 41.1
	Good	118 29.8
	Very good	26 6.6
Number of drugs used	0-4	223 56.3
	5+	173 43.7
Perception of too much drug use	Yes	225 56.8
	No	171 43.2

*Mean, SD; Standard Deviation, min; Minimum, max; Maximum

Table 2. Comparison of elderly general characteristics and polypharmacy states

Variables		Polypharmacy is absent (0–4 medications)		Polypharmacy is present (≥5 medications)		X ²	P
		n	%	n	%		
Gender	Female	99	44.4	87	50.3	1.359	.244
	Male	124	55.6	86	49.7		
Marital status	Single	18	8.1	14	8.1	0.221	.895
	Married	130	58.3	97	56.1		
	Divorced/widowed	75	33.6	62	35.8		
Education	Literate	62	27.8	48	27.7	4.628	.201
	Primary school	71	31.8	60	34.7		
	Middle school	49	22.0	46	26.6		
Living place	University	41	18.4	19	11.0	0.651	.722
	Village	68	30.5	59	34.1		
	County	80	35.9	57	32.9		
Lives at home with	City	75	33.6	57	32.9	6.204	.102
	Alone	58	26.0	36	20.8		
	Partner	113	50.7	78	45.1		
Income status	Children	47	21.1	51	29.5	11.017	.004*
	Nursing home	5	2.2	8	4.6		
	Poor	48	21.5	63	36.4		
Social insurance	Moderate	112	50.2	74	42.8	5.154	.272
	Good	63	28.3	36	20.8		
	Yes	171	76.7	130	75.1		
Health status perception	No	52	23.3	43	24.9	44.507	<.001*
	Very poor	2	0.9	7	4.1		
	Poor	27	12.1	53	30.6		
Hypertension	Moderate	87	39.0	76	43.9	41.234	<.001*
	Good	83	37.2	35	20.2		
	Very good	24	10.8	2	1.2		
Coronary artery disease	Yes	59	26.5	101	58.4	12.677	<.001*
Diabetes	Yes	39	17.5	57	32.9	20.704	<.001*
Lung disease	Yes	49	22.0	75	43.4	18.511	<.001*
Hyperlipidemia	Yes	28	12.6	52	30.1	17.798	<.001*
Kidney disease	Yes	13	5.8	34	19.7	26.652	<.001*
Thyroid disease	Yes	26	11.7	57	32.9	19.158	<.001*
Cancer	Yes	22	9.9	46	26.6	23.858	<.001*
Perception of too much drug use	Yes	13	5.8	39	22.5	69.317	<.001*
	No	86	38.6	139	80.3		
		137	61.4	34	19.7		

Bold values denote statistical significance at the $P<.05$ level, X²: Chi-square test, * $P<.05$

Table 3. Comparison of depression, anxiety and stress states of elderly according to their groups

Variables		Polypharmacy is absent (0–4 medications)		Polypharmacy is present (≥5 medications)		Total		X ²	P
		n	%	n	%	n	%		
Depression	Yes	152	68.2	145	83.8	297	75.0	12.732	<.001*
	No	71	31.8	28	16.2	99	25.0		
Anxiety	Yes	201	90.1	161	93.1	362	91.4	1.065	.302
	No	22	9.9	12	6.9	34	8.6		
Stress	Yes	106	47.5	109	63.0	215	54.3	9.398	.002*
	No	117	52.5	64	37.0	181	45.7		

* $P<.05$, Bold values denote statistical significance at the $P<.05$ level, X²: Chi-square test,

In the study, among the elderly, 68.2% of those without polypharmacy and 83.8% of those with polypharmacy had depression. There was a statistically significant association between the elderly groups and the status of having depression (Table 3) ($P<.05$).

In the study, among the elderly, 90.1% of those without polypharmacy and 93.1% of those with polypharmacy had anxiety. There was no statistically significant association between the elderly groups and the status of having anxiety (Table 3) ($P>.05$).

In the study, among the elderly, 47.5% of those without polypharmacy and 63% of those with polypharmacy had stress. There was a statistically significant association between the elderly groups and the status of having stress (Table 3) ($P<.05$).

Based on the Enter model logistic regression analysis performed including the variables that were significant in the model established according to the presence of polypharmacy, the perception health status and the presence of depression and stress were not significant risk factors for polypharmacy ($P>.05$). Income status, presence of chronic diseases, and thinking that they use too much drug were significant risk factors for polypharmacy ($P<.05$). Elderly with an income less than their expenses were 0.39 times more likely to have polypharmacy than those with an

income equal to their expenses ($P=.029$, $OR=0.385$; 95% $CI=0.163-0.909$). Elderly with hypertension had a 3.9 times higher risk of polypharmacy than those without hypertension ($P=.003$, $OR=3.899$; 95% $CI=1.606-9.466$). Elderly with coronary artery disease had a 6.7 times higher risk of polypharmacy than those without coronary artery disease ($P<.001$, $OR=6.677$; 95% $CI=2.620-17.020$). Elderly with diabetes had a 3.9 times higher risk of polypharmacy than those without diabetes ($P=.004$, $OR=3.924$; 95% $CI=1.543-9.981$). Elderly with lung disease had an 8.9 times higher risk of polypharmacy than those without lung disease ($P<.001$, $OR=8.893$; 95% $CI=2.909-27.180$). Elderly with hyperlipidemia had a 20 times higher risk of polypharmacy than those without hyperlipidemia ($P<.001$, $OR=20.023$; 95% $CI=5.737-69.887$). Elderly with kidney disease had a 16.5 times higher risk of polypharmacy than those without kidney disease ($P<.001$, $OR=16.514$; 95% $CI=5.873-46.431$). Elderly with thyroid disease had a 7.2 times higher risk of polypharmacy than those without thyroid disease ($P<.001$, $OR=7.213$; 95% $CI=2.255-23.079$). Elderly with a cancer diagnosis had a 24.7 times higher risk of polypharmacy than those without a cancer diagnosis ($P<.001$, $OR=24.783$; 95% $CI=6.755-90.933$). Elderly who thought they use too much drug had a 0.5 times higher risk of polypharmacy than those who did not ($P=.052$, $OR=0.484$; 95% $CI=0.233-1.005$) (Table 4).

Table 4. Logistic regression model for polypharmacy

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Income status									
	Poor ^a			4.805	2	.091			
	Moderate	-0.956	0.439	4.74	1	.029	0.385	0.163	0.909
	Good	-0.857	0.536	2.562	1	.109	0.424	0.149	1.212
Health status perception									
	Poor ^a			1.934	3	.586			
	Moderate	-0.578	0.443	1.7	1	.192	0.561	0.235	1.338
	Good	-0.409	0.495	0.682	1	.409	0.664	0.252	1.754
	Very good	-0.997	1.214	0.674	1	.412	0.369	0.034	3.985
Chronic disease									
	Hypertension ^b	1.361	0.453	9.041	1	.003	3.899	1.606	9.466
	Coronary artery disease ^b	1.899	0.477	15.817	1	<.001	6.677	2.620	17.020
	Diabetes ^b	1.367	0.476	8.236	1	.004	3.924	1.543	9.981
	Lung disease ^b	2.185	0.57	14.696	1	<.001	8.893	2.909	27.180
	Hyperlipidemia ^b	2.997	0.638	22.081	1	<.001	20.023	5.737	69.887
	Kidney disease ^b	2.804	0.527	28.267	1	<.001	16.514	5.873	46.431
	Thyroid disease ^b	1.976	0.593	11.089	1	<.001	7.213	2.255	23.079
	Cancer ^b	3.21	0.663	23.426	1	<.001	24.783	6.755	90.933
Perception of too much drug use^c									
Scales									
	Depression ^b	-0.35	0.433	0.654	1	.419	0.705	0.302	1.646
	Stress ^b	0.009	0.358	0.001	1	.981	1.009	0.5	2.035
	Constant	-3.489	2.239	2.429	1	.119	0.031		

^aReference category, B; Unstandardized Beta, b: Yes, c: Yes, CI: Confidence Interval, Exp(B): Estimated relative risk (Odds ratio), SE; Standard Error,

DISCUSSION

Since mental disorders are more prevalent in elderly with both polypharmacy and chronic diseases,⁷ it is essential to carry out studies that address polypharmacy and related conditions in the elderly.⁸ This research aimed to examine the association between polypharmacy and depression, anxiety and stress in elderly. In our study, polypharmacy was present in 43.7% of the elderly. The frequency of polypharmacy in the elderly was found to vary between 2.1% and 72%.^{2,6,8,16,17,21} The prevalence of polypharmacy in the elderly varies.⁸ This may result from differences in sociodemographic characteristics, health systems,²¹ clinical practice guidelines, and definitions of polypharmacy.⁸ The high prevalence of polypharmacy in our study compared to some other studies may be due to factors such as the presence of chronic diseases in the elderly, the increase in the frequency of applying to the health system in our country in recent years, and differences in sociodemographic structures.

In the study, the risk of polypharmacy was found to be 0.39 times higher in the elderly whose income was less than their expenses compared to those whose income was equal to their expenses. In some studies,^{4,6,8} no significant relationship was found between income status and polypharmacy. In addition, Iqbal et al.²² found that lower socioeconomic status was associated with higher polypharmacy. Elderly individuals with poor socioeconomic status are more likely to have chronic diseases.²³ In the elderly, the increase in chronic diseases has been found to be associated with an increase in polypharmacy.^{4,6,21} Kizmaz et al.⁶ found that the prevalence of polypharmacy in those with at least one chronic disease (53.64%) was significantly higher than in those without chronic disease (5.48%). In our study, the slightly higher risk of polypharmacy in elderly individuals with an income less than expenses may be explained by the fact that chronic diseases and drug use were higher in elderly individuals with a low income compared to those with an income equal to expenses. However, it should be noted that elderly individuals with high socioeconomic status may also have more than one chronic disease, and their current socioeconomic sources and high level of access to health services may affect their drug use.²²

In the research, the risk of polypharmacy was 3.9 times higher in the elderly with hypertension, 6.7 times higher in those with coronary artery disease, 3.9 times higher in those with diabetes, 8.9 times higher in those with lung disease, 20 times higher in those with hyperlipidemia, 16.5 times higher in those with kidney disease, 7.2 times higher in those with thyroid disease, and 24.7 times higher in

those with cancer. In the literature, it was determined that polypharmacy was associated with chronic diseases.^{6,8}

In the study, the risk of polypharmacy was 0.5 times higher in the elderly who thought that they use too much drug. In the literature, there is no study in which the perception of drug use and polypharmacy in the elderly have been compared. In a study, the elderly were asked about their perception of polypharmacy and the elderly were divided into two categories: those who thought that 5 to 9 drugs were too many and those who thought that 10 drugs or more were too many. In the analysis conducted in the study, it was determined that those who thought that 10 drugs or more were too many used more drugs than those who thought that 5 to 9 drugs were too many.²⁴ One's thoughts and beliefs about medication and treatment have a significant impact on medication use.^{25,26} The elderly with polypharmacy may perceive taking a large number of drugs as a burden.²⁵ Nurses should be aware that the beliefs and perceptions of patients about medication will affect their medication use and should evaluate their beliefs and perceptions about medication.²⁶

In the first analysis performed in our study, the elderly with polypharmacy were found to have statistically significantly a higher level of depression compared to those without polypharmacy. However, in the regression analysis, it was found that the presence of depression was not a significant risk factor for polypharmacy. In the literature, there is conflicting evidence regarding the association between polypharmacy and depression. In some studies, conducted with the elderly,^{9,10,16-19} polypharmacy and depression were found to be significantly correlated. In a systematic review and meta-analysis study, it was found that an increase in the number of drugs used and polypharmacy were associated with an increased risk of depression.²⁷ Similar to our result, Van Wilder et al.²⁸ found that polypharmacy and depression were not associated in a study of 544 persons with chronic diseases. Little is known about the association between polypharmacy and depression in the elderly.¹⁸ This association has been attempted to be explained by the fact that depression accompanies chronic diseases that require the use of multiple drugs and that depression is more common in cases of multiple chronic diseases.¹⁷ However, there is conflicting evidence on this issue. Bazargan et al.¹⁶ reported that the presence of multiple diseases in the elderly completely mediated the association between polypharmacy and depression. On the contrary, in another study conducted with the elderly, no significant association was reported between the type and duration of chronic disease or drug use and depression levels.¹ In the elderly, depression may develop mostly in association with chronic distress, anxiety, marital status, grief, illness,

economic conditions, and various psychosocial factors.¹³ Furthermore, elderly are more likely to observe tangible physical deterioration and not express or ignore stressful situations, which may lead to the development of depression.²⁹ In the elderly with depression, the main symptoms of depression, such as low mood and lack of enjoyment of life, may not be as common as in younger adults.^{1,30} Since nervousness, anxiety,³⁰ and somatic symptoms are more common in the elderly compared to these symptoms,^{1,29,30} the diagnosis of depression may be overlooked.^{1,13} Another important point in this regard is the possibility that depression may occur due to the side effects of certain medications (some antihypertensive, antilipidemic, non-steroidal anti-inflammatory, antiviral, corticosteroids, etc.). Pharmacokinetic and pharmacodynamic changes that occur with age, the mechanisms of action of drugs and the doses of drugs used may trigger depression in the elderly. Especially in the elderly with polypharmacy, it is necessary to determine whether one of the drugs or medications used is the cause of depression.³¹

In the study, the presence of anxiety was not identified as a significant risk factor for polypharmacy. In the literature, there is conflicting evidence regarding the association between polypharmacy and anxiety. In some studies, conducted with the elderly,^{5,7} polypharmacy and anxiety were reported to be significantly associated. Similar to our finding, in some studies conducted with the elderly,^{17,19} polypharmacy and anxiety were found to be non-associated. The relationship between anxiety and polypharmacy has been one of the current research topics⁷ and the association between polypharmacy and anxiety have not yet been explained.¹⁷ The frequency of anxiety disorder due to medical illnesses is also increasing in the elderly.¹ The diagnosis of anxiety and related disorders in the elderly is difficult due to the tendency of the elderly to minimize anxiety symptoms and attribute them to physical illnesses, comorbidities that occur with aging, and cognitive decline.^{1,32} Moreover, symptoms of mental disorders in the elderly due to chronic diseases are considered normal symptoms of old age and anxiety is often seen together with depression, therefore the diagnosis may be overlooked.¹

In the first analysis performed in our study, it was determined that the elderly with polypharmacy had statistically significantly higher stress than those without polypharmacy. However, according to the regression analysis, the presence of stress was not found to be a significant risk factor for polypharmacy. In the literature, there is no study in which polypharmacy and stress in the elderly have been compared. The elderly, like people of all

ages, encounter not only life stressors but also stressors such as decreased functional ability and capacity.¹⁴ Especially gradual physical and psychological decline in old age can result in stress in the elderly.³³ One of the important causes of stress in the elderly is chronic diseases that significantly affect daily life.³³ Chronic diseases are long-term, usually slowly progressing diseases causing high rates of disability and death.³⁴ Elderly individuals tend to suffer from more than one chronic disease compared to younger people.^{3,4} The long-term³⁴ and increased need for more medication⁴ in the elderly with chronic diseases can cause an economic burden as well as various psychological problems, including stress term.³⁴ In the elderly, chronic diseases were found to be a significant risk factor for psychological distress, including stress.³⁴

Factors such as the individual characteristics of the study group, the measurement tool used, and the fact that the majority of the elderly (77.5%) perceived their health status as moderate/good/very good may have been effective in the lack of a significant association between polypharmacy and depression, anxiety, and stress in our study. In the elderly, it was reported that the frequency of chronic diseases and mental health symptoms was higher in those who perceived their health as poor compared to those who perceived their health as good.³⁵ Another factor that may be effective in the lack of significant association between stress and depression and polypharmacy in our research may be that the majority of the elderly who participated in this study were married (57.3%) and lived with their partners (48.2%). These rates suggest that social support may have a protective role. Huang et al.³⁶ found that loneliness was positively associated with perceived stress and depressive symptoms and that loneliness may affect depressive symptoms through perceived stress. In another study conducted by Son et al.³⁷ it was found that loneliness was associated with depression in elderly individuals and that spousal support could be effective in alleviating depression. In addition, the same study proved that social support has a protective effect on the association between loneliness and depression.³⁷

Strengths and Limitations

One of the strengths of our research is that to our knowledge, it is the first study in which the association between polypharmacy and stress in the elderly was examined. In addition, this study is among the limited number of studies in which the association between polypharmacy and depression and anxiety in the elderly has been examined. Our study has several limitations. Firstly, since our study was conducted in a single province, the results may not represent the general elderly population in Türkiye. In the study, data were collected

based on self-reports of the elderly, which may lead to a bias. Furthermore, since a cross-sectional design was used, it was not possible to establish a causal relationship. Finally, another limitation of this study is that the types of drugs used were not evaluated.

Polypharmacy was present in 43.7% of the elderly. It was observed that the presence of depression, stress and anxiety was not a significant risk factor for polypharmacy in the elderly. Although the conclusions of our study show that the presence of depression, anxiety and stress is not an important risk factor for polypharmacy in the elderly, considering the fact that the diagnosis of depression, stress and anxiety in the elderly is missed and these conditions are expressed/mixed with physical diseases, we recommend that elderly people with polypharmacy should be mental evaluated by nurses. In addition further study on association between polypharmacy and depression, anxiety and stress in elderly is necessary. In future studies, it is recommended to use more comprehensive measurement tools, to evaluate which group the medicines used by the elderly belong to and to test causality.

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Bilgilendirilmiş Onam: Yaşlı katılımcılara çalışmanın amacı açıklanmış ve bilgilendirilmiş onamları alınmıştır.

Hakem Değerlendirmesi: Dış bağımsız.

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Informed Consent: The purpose of the study was explained to the elderly participants and their informed consent was obtained.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept- BA; Design- BA, AS; Supervision- BA; Resources- AS; Materials- AS; Data Collection and/or Processing- AS; Analysis and/or Interpretation- BA, AS; Literature Search- BA; Writing Manuscript- BA, AS; Critical Review- BA, AS.

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