European Journal of Therapeutics
DOI:10.5152/EurJTher.2022.21040
Original Article

# Polypharmacy and Depression Among Older Individuals

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**ABSTRACT**
**Objective:** The aim of the present study is to determine the frequency of polypharmacy and depression and the relationship between them in older adults.
**Methods:** We reviewed the files and electronic records of 863 patients aged 65 years and older admitted to our geriatric outpatient clinic. The presence of polypharmacy and depression was evaluated.
**Results:** The mean age of the participants was 73.3 ± 6.5 years. The proportion of female patients was 66.8%. While the frequency of polypharmacy was 47.1% in general, it was 80.5% in depressive patients. The proportion of patients diagnosed with depression was 15.9%. The presence of depression was found to be associated with a 3.3-fold increase in the risk of polypharmacy.
**Conclusions:** The frequency of polypharmacy was found to be high especially among depressed patients in our study. Early diagnosis of depressed elderly people seems to be an approach to prevent the occurrence of polypharmacy.
**Keywords:** Depression, older adults, polypharmacy

## INTRODUCTION

Geriatric syndromes are common clinical conditions in older adults, including falls, frailty, cognitive impairment, delirium, urinary incontinence, depression, and polypharmacy.[1]

Polypharmacy is a global problem that particularly affects older adults, and its prevalence is higher in older adults.[2,3] Polypharmacy is most commonly defined as the use of 5 or more medications daily by an individual. Hyperpolypharmacy has been defined as using 10 or more medications. It is stated that approximately 30% of adults aged 65 and over take 5 or more drugs in developed countries.[4,5]

Polypharmacy is a complex geriatric syndrome that needs careful evaluation of its benefits and potential harms, especially in elderly patients. Complexity arises from conditions such as multimorbidity, sensory and cognitive impairment, drug-drug and drug-disease interactions, which are common in old age.[6] Prior studies have shown older adults to have multiple comorbidities associated with increased drug use.[7,8]

A very large cross-sectional study found that patients with depression are more likely to have multimorbidity.[9] In addition, the risk of having comorbidities increases by 40% in depressive disorders.[10] Little is known about the relationship between polypharmacy and depression in older adults. There is some evidence that increasing numbers of medications are associated with more depressive symptoms, but this area is less well understood.

This study aimed to determine the frequency of polypharmacy and depression and the relationship between them in older adults.

## METHODS

### Study Design and Patients

The subjects of this study were geriatric patients admitted to our outpatient clinic between November 1, 2020, and March 1, 2021. The files and hospital electronic record system data of 863 patients were reviewed. The patients' socio-demographic characteristics, chronic diseases, medications used, newly prescribed and discontinued drugs were examined. One hundred twenty-four patients with insufficient file data were excluded from the study. The study was completed with 739 patients. Polypharmacy, as defined most frequently, was accepted as using 5 or more drugs at the same time. The diagnosis of depression was made by an experienced psychiatrist or geriatrician.

### Statistical Analysis

The normality of the distribution of continuous variables was tested by the Shapiro-Wilk test. Two independent groups

**Cite this article as:** Çiğiloğlu A, Efendioğlu EM, Öztürk ZA. Polypharmacy and depression among older individuals. *Eur J Ther.* 2022;28(3):226–229.
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**Received:** April 4, 2021 **Accepted:** June 10, 2022

**Table 1.** Participants' Socio-demographic Characteristics (n = 739)

| Variables | Non-depressive (n = 621) | Depressive (n = 118) | *P* | Total (n = 739) |
|---|---|---|---|---|
| **Gender** | | | | |
| Female | 406 (65.4%) | 88 (74.6%) | .055 | 494 (66.8%) |
| Male | 215 (34.6%) | 30 (25.4%) | | 245 (33.2%) |
| **Age**† | 73.2 ± 6.5 | 73.7 ± 6.7 | .486 | 73.3 ± 6.5 |
| **Age group** | | | | |
| 65–74 years | 399 (64.3%) | 70 (59.3%) | .502 | 469 (63.5%) |
| 75–84 years | 179 (28.8%) | 37 (31.4%) | | 216 (29.2%) |
| ≥85 years | 43 (6.9%) | 11 (9.3%) | | 54 (7.3%) |
| **Number of comorbidities**† | 2.5 ± 1.1 | 3.4 ± 1.0 | .000* | 2.7 ± 1.1 |
| **Comorbidities** | | | | |
| Hypertension | 425 (68.4%) | 87 (73.7%) | .277 | 512 (69.3%) |
| Diabetes mellitus | 328 (52.8%) | 74 (62.7%) | .055 | 402 (54.4%) |
| Coronary artery disease | 127 (20.5%) | 29 (24.6%) | .187 | 156 (21.1%) |
| Neurodegenerative diseases | 37 (6.0%) | 11 (9.3%) | .218 | 48 (6.5%) |
| **Polypharmacy** | 253 (40.7%) | 95 (80.5%) | .000* | 348 (47.1%) |
| **Number of medications used**† | 4.3 ± 2.4 | 5.8 ± 2.5 | .000* | 4.5 ± 2.5 |
| **Patients with increased medication** | 105 (16.9%) | 29 (24.6%) | .047* | 134 (18.1%) |
| **Patients with decreased medication** | 71 (11.4%) | 8 (6.8%) | .134 | 79 (10.7%) |

*$P < .05$; †mean ± SD.

with a non-normal distribution were compared with Mann-Whitney *U* test. The relationship between categorical variables was assessed with the $\chi^2$ test, and numerical variables with Spearman's rank correlation coefficient. Multicollinearity was checked, and multivariate binary logistic regression analysis was performed for independent predictors of polypharmacy. Statistical analysis was performed with Statistical Package for the Social Sciences for Windows version 22.0 (IBM SPSS Statistics Corp., Armonk, NY, USA). A *P* value less than .05 was accepted as statistically significant.

**Compliance with Ethical Standards**

Ethics approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Approval for the study was granted by Gaziantep University Medical Faculty Ethics Committee (Date: May 27, 2020, Decision no: 2020/115). The authors confirm independence from the sponsors, and the content of the article has not been influenced by the sponsors.

**Main Points**

- Almost half of the geriatric patients had polypharmacy.
- The frequency of polypharmacy was higher in depressive patients.
- The presence of depression increased the risk of polypharmacy.

## RESULTS

The mean age of the 739 patients was 73.3 ± 6.5 years. The proportion of female patients was 66.8%. Almost half of the participants had polypharmacy. The proportion of patients who were previously or newly diagnosed with depression was 15.9%. The frequency of polypharmacy in depressive individuals was more than 80%, and also the rate of those with an increase in the number of medications was found to be higher in depressed patients. In addition, while 66 (19%) of 348 patients with polypharmacy had a decrease in the number of drugs, most of these patients were non-depressive patients. Other socio-demographic characteristics of the patients are shown in Table 1.

A statistically significant positive correlation between the number of medications used and comorbidities and also the number of medications used and medications discontinued are presented in Table 2.

Variance inflation factor was calculated, and the presence of hypertension and diabetes mellitus was excluded from models due to the collinearity problem. In multivariate binary logistic regression analysis, age, depression, and the number of comorbidities were found as independent variables for polypharmacy (Table 3).

## DISCUSSION

The results of our study showed that polypharmacy is associated with depression and is more common in older adults with depression than in non-depressive adults.

**Table 2.** Correlation Analysis Results Between the Variables

| | | Age | Number of Comorbidities | Number of Medications | Number of Medications Newly Prescribed | Number of Medications Discontinued |
|---|---|---|---|---|---|---|
| Age | r | 1.000 | 0.011 | 0.095 | −0.060 | −0.102 |
| | *P* | | .756 | .010* | .485 | .346 |
| Number of comorbidities | r | 0.011 | 1.000 | 0.730 | 0.104 | 0.271 |
| | *P* | .756 | | .000* | .222 | .011* |
| Number of medications | r | 0.095 | 0.730 | 1.000 | −0.045 | 0.479 |
| | *P* | .010* | .000* | | .597 | .000* |
| Number of medications newly prescribed | r | −0.060 | 0.104 | −0.045 | 1.000 | 0.661 |
| | *P* | .485 | .222 | .597 | 1.000 | .052 |
| Number of medications discontinued | r | −0.102 | 0.271 | 0.479 | 0.661 | 1.000 |
| | *P* | .346 | .011* | .000* | .052 | |

r, Spearman rank correlation coefficient.
*Significant at .01 level.

Previous studies have shown that polypharmacy is very common in the elderly population and has a prevalence between 27% and 59% in primary care patients. In a recent study conducted with 34,232 elderly participants from 17 European countries, the prevalence of polypharmacy was found to be 32.1%.[11]

Depression is the most common psychological disorder in older adults that compromises health status, so individuals suffering from depression are more prone to polypharmacy.[12] Studies have shown that depression increases mortality alone or in combination with other diseases. Studies conducted in Turkey have reported that 10.2%-68.9% of the older individuals living in institutions and 29% of community dwellers had depressive symptoms.

There is a vicious circle between polypharmacy and depression. While depression can increase the number of drugs used, polypharmacy can also lead to depressive symptoms in individuals.

To date, few studies have investigated the relationship between depression and polypharmacy, and one of them claimed that depression is a better predictor of polypharmacy than other comorbid diseases.[13–15]

In some studies investigating the consequences of polypharmacy, depression has been addressed, but it has not been discussed sufficiently.[16,17] Vetrano et al[18] have shown that depressive symptoms were associated with polypharmacy. Furthermore, other studies have shown that depressive patients have higher odds for polypharmacy, and there was a positive association between polypharmacy and depressive symptoms in older women.[19,20]

**Table 3.** Multivariate Logistic Regression Analysis Results of the Independent Variables for Polypharmacy

| | Polypharmacy | |
|---|---|---|
| **Variable** | **OR [95% CI]** | ***P*** |
| Age | 1.04[1.01–1.07] | .016* |
| Gender (female vs. male) | 1.01[0.67–1.51] | .970 |
| Depression | 3.30[1.88–5.78] | .000* |
| Number of comorbidities | 5.49[4.25–7.10] | .000* |

OR, odds ratio.
*$P < .05$ according to multivariate binary logistic regression analysis.

In the present study, the prevalence of polypharmacy has been found as 47.1% in older individuals. The high prevalence of polypharmacy in older adults can be explained by the exponential increase in the prevalence of chronic diseases and conditions associated with advancing age.[21] The fact that the frequency of polypharmacy in depressive individuals is more than 80% indicates the importance of evaluating the elderly in terms of the presence of depression. Also, the presence of depression was found to be associated with a 3.3-fold increase in the risk of polypharmacy.

Our findings showed that, compared to non-depressive older adults, depressive patients had a significantly higher number of comorbidities. Consistent with other studies, the number of comorbidities and depressive disorders were associated with the usage of more medications.[22,23] More importantly, the number of medications used for chronic diseases has increased in approximately a quarter of depressive patients who applied to our geriatric outpatient clinic. In addition, most of the patients with polypharmacy with a decreased number of drugs were non-depressive patients. This also forces geriatricians to fight against polypharmacy.

There are some limitations in our study. First is the retrospective design of the study. Second, the fact that the study was conducted in a tertiary healthcare institution increases the likelihood of depressive patients having more comorbidities. Third, the number of depressive patients was relatively low. Despite these limitations, our study has some strengths. There are few studies investigating the relationship between depression and polypharmacy. There was no heterogeneity among the study groups, so the relationship between depression and polypharmacy has been emphasized more clearly.

## CONCLUSION

This study showed that polypharmacy is quite common in the elderly population, and defining variables, such as depression associated with polypharmacy, is important in monitoring the older individuals most vulnerable to this problem. Early diagnosis of depressed elderly people seems to be an approach to prevent the occurrence of polypharmacy. It is necessary to carry out further large-scale, multi-center, prospective studies to analyze this association better in older individuals.

**Ethics Committee Approval:** Ethical committee approval was received from the Ethics Committee of Gaziantep University Medical Faculty University (Date: May 27, 2020, Decision no: 2020/115).

**Informed Consent:** Written informed consent was obtained from all participants who participated in this study.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Concept – A.C; Design – A.C., Z.A.O; Supervision – Z.A.O; Funding – None; Materials – A.C; E.M.E; Data collection and/or Processing – A.C; E.M.E; Analysis and/or Interpretation – A.C; Literature Review – E.M.E; Writing – A.C; E.M.E; Critical Review – Z.A.O

**Declaration of Interests:** The authors declare that they have no competing interest.

**Funding:** The authors declared that this study has received no financial support.

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