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Adherence problems in elderly patients with hypertension

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ABSTRACT

Introduction: Adherence to treatment recommendations for chronically ill patients is still a complex problem, especially among the older population. Chronic diseases, including hypertension, negatively affect patients' quality of life (QOL). A satisfactory level of the patients' QOL and good adherence to medication regimens can prevent complications and deterioration of daily functioning.

Objectives: This cross-sectional study aimed to analyse selected sociodemographic and clinical factors affecting adherence to antihypertensive treatment in elderly patients.

Material and methods: A total of 100 patients (61 females, 39 males) with hypertension who were treated in a university hospital participated in the study. Medical records were analysed to include required sociodemographic and clinical factors. Data were collected from standardized instruments: World Health Organization Quality of Life-Age (WHOQOL-AGE), the Geriatric Depression Scale (GDS), and the Adherence in Chronic Diseases Scale (ACDS).

Results: The median duration of illness was 10 years (Q1 = 4.75, Q3 = 14.0). The median total QOL score was 61.06 points (Q1 = 50, Q3 = 69.23). Symptoms of depressive disorder were found in 32% of patients. There was a high level of adherence in 63% of respondents, 34% presented a moderate level, and 3% of patients adhered to a low level. Significant differences (p < 0.05) were found in the adherence levels in groups varying in depressive symptoms (rs = –0.289) and QOL results (rs = 0.33). Adherence was also significantly higher in patients with a college/university education and a good financial situation (p < 0.05).

Conclusions: Education and financial standing affect adherence to antihypertensive treatment in elderly patients and should be considered in everyday clinical practice. Also, the level of QOL and depressive symptoms are significant.

Key words: hypertension, antihypertensive agents, medication adherence, quality of life, depression, frail elderly

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Introduction

Globally, hypertension is the leading cause of premature mortality [1]. According to epidemiological estimates, 7.5 million people die annually because of complications from hypertension, which accounts for approximately 13% of all deaths worldwide [2]. As with many chronic diseases, the prevalence of hypertension increases with age, from 27% in those under 60 to 74% in those over 80 [3].

Irrespective of age, antihypertensive treatment is based on two main pillars: lifestyle changes and pharmaceutical treatment [4, 5]. Non-pharmaceutical treatment mainly involves: a diet to normalize body weight, reduction of sodium chloride intake, increased physical activity, and cessation of smoking [6]. As regards pharmaceutical treatment, it involves taking appropriate doses of medication following the prescribed protocol at all stages of treatment [7].

The American Medical Association indicates that patients are considered adherent if they take 80% of their prescribed medications [8]. It should be noted that recently, partial or complete non-adherence has been recognized as a serious problem in the long-term treatment of hypertension regardless of the patient's age category. At the same time, the fact remains that non-adherence in hypertensive patients older than 65 years is still a matter of debate [9].

Kardas et al. [10] performed an extensive and well-conducted review of 51 systematic reviews covering 19 different disease categories and analysing individual factors affecting medication adherence. This review provides explicit evidence that poor medication adherence is affected by various factors from several different domains. Poor access to health care, poor supply of medications, unclear information about medication administration, a poor continuation of treatment, and inadequate physician-patient communication and interaction may contribute to unsatisfactory medical adherence.

The rate of medication adherence in chronically ill patients is approximately 50–75% in developed countries, but it is lower in less developed ones [11]. Medication non-adherence is recognized as a global public health problem with substantial implications for chronic disease management, particularly in older adults due to the presence of numerous comorbidities and concomitant polypharmacy [12]. Factors contributing to non-adherence are multidimensional and related to patients, physicians, and healthcare systems [13].

In a study by Leporini et al. [14], 10% of elderly patients who were hospitalized, 25% of those admitted to care homes, and 20% of those treated on an outpatient basis experienced adverse effects of medication. Besides the adverse effects of medication, several factors exist that may potentially increase the risk of poor patient cooperation. There are multiple additional causes leading to poor adherence associated with a specific disease or old age, decreased quality of life (QOL), low mood and presence of depressive symptoms, and clinical and sociodemographic factors (education, socioeconomic status, comorbidities).

The primary objective of the present study was to analyze the effect of selected sociodemographic (age, sex, education, residence, marital status, financial standing, living situation) and clinical (duration of illness, systolic and diastolic blood pressure, and comorbidities) factors on adherence to antihypertensive treatment in older adults. The secondary outcome was to evaluate patients' quality of life and depressive symptom severity, including their relationship with adherence.

Materials and methods

Study design and setting

The research was a prospective cross-sectional study conducted between January 2017 and June 2017 in an outpatient setting at the Hypertension Clinic of the University Clinical Hospital in Wroclaw, Poland. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) was used to ensure a proper study protocol and paper preparation.

Eligibility criteria

The study included a sample of 182 patients. Finally, the data from 100 patients were subjected to statistical analysis (Fig. 1). The inclusion criteria com-
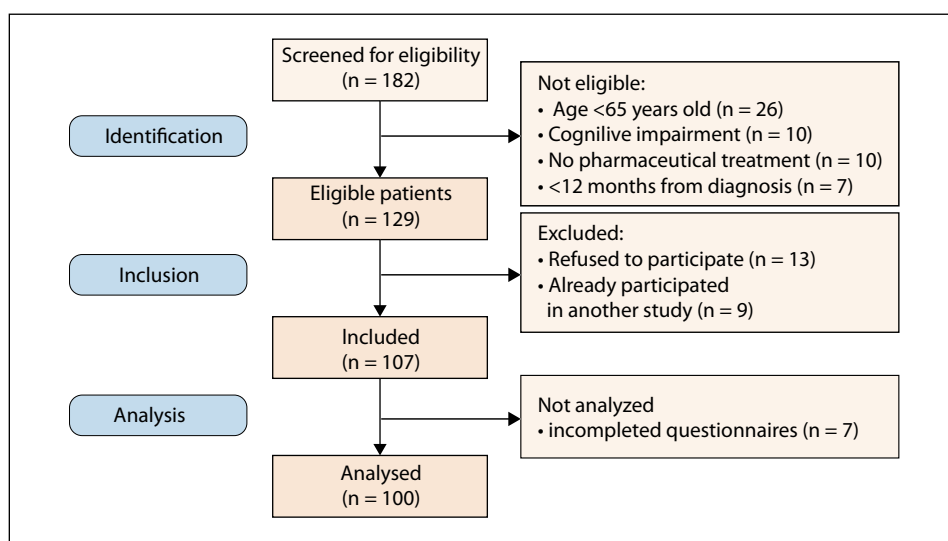

Figure 1. STROBE flow chart of study participants

prised: (1) hypertension diagnosed following the European Society of Hypertension guidelines, (2) at least 12 months from diagnosis, (3) ongoing pharmaceutical treatment, (4) age > 65 years, (5) informed consent to participate in the study, and (6) no cognitive impairment.

Study participants

A group of 100 patients (61 females, 39 males) with hypertension, aged between 68 and 73 years (M = 70.36) was finally analysed in this study. Duration of illness ranged between 4.75 and 14 years (M = 10.86). The most taken group of drugs used by 61% of studied patients were angiotensin-converting enzyme inhibitors. Another 35% of patients took thiazide diuretics, 32% calcium channel blockers, 28% β-blockers, 12.6% angiotensin receptor blockers, 2.3% α-adrenolytic, and 1.5% loop diuretics. In addition, 57.4% of respondents administered medications as a polytherapy and 42.6% as a monotherapy. Figure 1 presents a flow chart of study participants.

Research tools

Medical records were analysed to obtain the required sociodemographic and clinical data. In addition, the following standardized research instruments were used: (1) the World Health Organization Quality of Life-Age (WHOQOL-AGE) questionnaire, (2) the Geriatric Depression Scale (GDS), and (3) the Adherence in Chronic Diseases Scale (CDS).

World Health Organization Quality of Life-Age (WHOQOL-AGE)

WHOQOL-AGE is dedicated to patients older than 65. It evaluates QOL in two subscales, as well as overall QOL. In all these three dimensions, QOL is scored between 0 and 100. Higher WHOQOL-AGE scores indicate better patients' QOL. There are no cut-off values for good and poor QOL in the WHOQOL-AGE. However, as all dimensions are scored on the same scale, QOL results can be compared between the dimensions [15]. The WHOQOL-AGE has shown good psychometric properties in Poland with Cronbach's alpha coefficient of 0.89 for factor 1, and 0.84 for factor 2 [16].

Geriatric Depression Scale (GDS)

GDS is a self-reported instrument screening for depression in elderly patients. The total GDS score may range between 0 and 15 points, and higher GDS scores indicate more severe symptoms of depression. Therefore, scores of six and above are interpreted as

indicative of a depressive disorder [17]. The GDS has good psychometric properties and high reliability with Cronbach's alpha coefficient of 0.94 [18].

Adherence in Chronic Diseases Scale (ACDS)

ACDS enables the evaluation of adherence to treatment in chronically ill patients. The questionnaire comprises seven items with a set of possible responses. ACDS items from one to five concern behaviours that directly determine adherence, while items from six to seven concern beliefs and circumstances which indirectly affect adherence. The total ACDS score may range between 0 and 28 points, and higher scores indicate better adherence [19]. The ACDS has been confirmed as a reliable tool with Cronbach's alpha coefficient of 0.739 [20].

Ethical considerations

The local and independent Bioethics Committee at the Wroclaw Medical University in Poland approved the study protocol before patients' enrolments (permission number 388/2017/permission date: 08/06/2017). All patients gave their written informed consent to participate in this study which has been conducted under consideration of the Declaration of Helsinki tenets and Good Clinical Practice guidelines.

Sample size

Statistical power analysis was performed using STATISTICA v. 13.3 software (TIBCO, Software Inc., Palo Alto, CA, USA). For analyses for two comparison groups for quantitative variables by the t-test or the Mann-Whitney tests, as well as for qualitative variables by the ANOVA or the Kruskal-Wallis tests, a sample size of at least N = 97 participants was needed to detect a sufficiently large effect size (Cohen's f = 0.5) with a statistical power of 80% and α = 0.05. Therefore, the sample size of 100 participants used in the study was considered sufficient.

Statistical analysis

Statistical analysis was performed using STATISTICA v. 13.3 (TIBCO). All analyses were conducted using quantitative (M, SD, Me, Min and Max, Q1 and Q3) and qualitative (N and %) variables. The t-test or the Mann-Whitney test were used for comparisons of quantitative variables between two groups. The ANOVA test or the Kruskal-Wallis test were used for comparisons of quantitative variables in three or more groups. The Fisher's LSD test or the Dunn test were used for post-hoc intergroup comparisons. Pearson's

correlation coefficient or Spearman's correlation coefficient was used for correlations between quantitative variables. The standard interpretation for the strengths of correlations was used: $|r| \geq 0.9$ — very strong, $0.7 \leq |r| < 0.9$ — strong, $0.5 \leq |r| < 0.7$ — moderately strong, $0.3 \leq |r| < 0.5$ — weak, and $|r| < 0.3$ — very weak correlation. The Shapiro-Wilk test was used to check the normality distribution of variables. The multivariate analysis of the independent influence of outcomes (GDS, WHOQOL-AGE), as well as demographic (education, financial standing) and clinical variables (diabetes mellitus, hypercholesterolemia, rheumatic disorders), was performed using the logistic regression method. The results are presented in the form of values of the regression coefficient parameters with a 95% confidence interval (CI). All analyses used a significance threshold of 0.05.

Results

Sociodemographic and clinical characteristics

The study included 100 patients (61 females, 39 males) with hypertension, aged between 68 and 73 years (M = 70.36). Mean systolic blood pressure (SBP) was 147.49 mmHg (SD = 14.93) and mean diastolic blood pressure (DBP) was 87.29 mmHg (SD = 9.57). The mean duration of illness was 10.86 years (SD = 7.63). Nearly half of the respondents (47%) had vocational education. Of the 100 patients, 54 respondents lived in urban areas and 46 in rural areas; 75% were married. Most patients reported good financial standing (73%). Regarding BMI, 46% of the patients were overweight, 32% had a normal body weight, 18% had class 1 obesity, 3% were diagnosed with class 2 obesity, and 1% had class 3 obesity. In addition, 42% of patients had diabetes. Other comorbidities included: hypercholesterolemia in 35%, ischaemic heart disease in 30%, rheumatic disorders in 25%, and chronic kidney disease in 10%. All sociodemographic and clinical data are presented in Table 1.

Quality of Life Evaluation (WHOQOL-AGE)

The median total QOL score was 61.06 points (Q1 = 50, Q3 = 69.23). The median QOL results on subscale 1 were 62.5 points (Q1 = 50, Q3 = 68.75) and 61.06 points (Q1 = 47.84, Q3 = 67.73) on subscale 2. Detailed data are shown in Table 2.

Depressive Symptom Severity Evaluation (GDS)

An analysis of GDS scores demonstrated that 32 out of 100 respondents (32%) had symptoms of depressive disorder. Detailed data are shown in Table 3.

Table 1. Sociodemographic and clinical characteristics of the study group

Characteristic		Values
Age [years]	M ± SD	70.36 ± 3.02
	Me	71
	Q1–Q3	68-73
Sex	Female	61 (61%)
	Male	39 (39%)
Education	Primary	14 (14%)
	Vocational	47 (47%)
	High school	27 (27%)
	College/University	12 (12%)
Residence	Rural	46 (46%)
	Urban	54 (54%)
Marital status	Married	75 (75%)
	In a relationship	9 (9%)
	Single	16 (16%)
Financial standing	Very good	9 (9%)
	Good	73 (73%)
	Poor	18 (18%)
Living situation	Living alone	19 (19%)
	Living with a spouse	54 (54%)
	Living with family	27 (27%)
BMI [kg/m²]	Normal weight	32 (32%)
	Overweight	46 (46%)
	Obesity	18 (18%)
	Class 2 obesity	3 (3%)
	Class 3 obesity	1 (1%)
Duration of illness [years]	M ± SD	10.86 ± 7.63
	Me	10
	Q1–Q3	4.75–14
SBP [mmHg]	M ± SD	147.49 ± 14.93
	Me	141.5
	Q1–Q3	140–151.5
DBP [mmHg]	M ± SD	87.29 ± 9.57
	Me	90
	Q1–Q3	80–95
Comorbidities*	Diabetes mellitus	42 (42%)
	Hypercholesterolemia	35 (35%)
	Ischemic heart disease	30 (30%)
	Renal insufficiency	10 (10%)
	Rheumatic disorders	25 (25%)

*The total exceeds 100%, as the item allowed for multiple choice
BMI — body mass index; DBP — diastolic blood pressure;
M — mean; Me — median; Q1 — quartile 1st; Q3 — quartile 3rd;
SBP — systolic blood pressure; SD — standard deviation

Table 2. WHOQOL-AGE scores

WHOQOL-AGE	N	M	SD	Me	Min	Max	Q1	Q3
Subscale 1	100	59.96	12.81	61.54	26.92	82.69	50	69.23
Subscale 2	100	59.66	12.85	62.5	31.25	96.88	50	68.75
Overall QOL	100	59.73	11.74	61.06	38.46	89.78	47.84	67.73

M — mean; Max — maximum value; Me — median; Min — minimum value; N — number of patients; QOL — quality of life; Q1 — quartile 1st; Q3 — quartile 3rd; SD — standard deviation; WHOQOL-AGE — World Health Organization Quality of Life-Age questionnaire

Table 3. GDS scores

GDS score	Interpretation	N	%
0–5	No symptoms of depression	68	68%
6–15	Symptoms of depression	32	32%

GDS — Geriatric Depression Scale; N — number of patients

Table 4. ACDS scores

ACDS score	Interpretation	N	%
0–10	Low adherence level	3	3%
11–21	Moderate adherence level	34	34%
22–28	High adherence level	63	63%

ACDS — Adherence in Chronic Diseases Scale; N — number of patients

Table 5. Correlations of quantitative demographic and clinical factors with the ACDS

Variable	Correlation coefficient *	p	Correlation direction	Correlation strength
Age [years]	–0.038	0.706	–	–
SBP [mmHg]	0.009	0.925	–	–
DBP [mmHg]	–0.02	0.846	–	–
Duration of illness [years]	–0.058	0.568	–	–
GDS [points]	–0.289	0.004	negative	very weak
QOL [points]	0.33	0.001	positive	weak

*Non-normal distribution was for at least one variable; Spearman's correlation coefficient was used
ACDS — Adherence in Chronic Diseases Scale; DBP — diastolic blood pressure; GDS — Geriatric Depression Scale; p — level of statistical significance; QOL — quality of life; SBP — systolic blood pressure

Adherence Level Evaluation (ACDS)

Based on ACDS scores, 63 out of 100 respondents (63%) were found to have a high level of adherence, 34 respondents (34%) presented a moderate level, and three respondents (3%) showed a low level of adherence. Detailed data are shown in Table 4.

Correlations of Quantitative Demographic and Clinical Factors with the Adherence (ACDS)

An analysis of quantitative variable correlations demonstrated significant differences in adherence between the groups categorized by depressive symptoms and QOL scores. The correlation with GDS was significant (p < 0.05) and negative, indicating that more severe depressive symptoms were associated with poorer adherence. Conversely, the correlation with WHOQOL-AGE was significant (p < 0.05) and positive, showing that better QOL was associated with better adherence. Detailed data are shown in Table 5.

Correlations of Qualitative Demographic and Clinical Factors with the Adherence (ACDS)

An analysis of qualitative variable correlations demonstrated (at p < 0.05) that patients with college/university education presented a significantly higher adherence than those with vocational or primary education, and patients with high school education

Table 6. Correlations of qualitative demographic and clinical factors with the ACDS

	Variable	M ± SD	Me	Q1–Q3	p*
Sex	Female (n = 61)	21.84 ± 4.67	23	20–25	0.35
	Male (n = 39)	22.64 ± 4.28	24	21–25	
Education	Primary (n = 14) — A	20.71 ± 3.89	20	19.25–24.75	0.021
	Vocational (n = 47) — B	21.28 ± 5.2	22	18–25	
	High school (n = 27) — C	23.41 ± 3.39	24	22–25.5	D > B, A C > A
	College/university (n = 12) — D	24.42 ± 3.2	25.5	24–26.25	
Residence	Rural (n = 46)	21.83 ± 4.1	23	20–25	0.224
	Urban (n = 54)	22.43 ± 4.87	24	21–26	
Relationship status	Married (n = 75)	22.37 ± 4.84	24	20–26	0.195
	In a relationship (n = 9)	20.89 ± 3.72	22	20–23	
	Single (n = 16)	21.81 ± 3.23	21	20–25	
Financial standing	Very good (n = 9) — A	23.11 ± 4.62	25	24–25	0.038
	Good (n = 73) — B	22.48 ± 4.57	24	21–26	
	Poor (n = 18) — C	20.33 ± 3.97	20.5	18–24	A,B > C
Living situation	Living alone (n = 19)	20.53 ± 4.45	21	18–24.5	0.109
	Living with a spouse (n = 54)	22.54 ± 4.94	24	22–25	
	Living with family (n = 27)	22.52 ± 3.46	23	20–25.5	
BMI [kg/m^2]	Normal weight (n = 32)	21.94 ± 3.29	22	20–24.25	0.125
	Overweight (n = 46)	22.41 ± 5.55	25	21–26	
	Obesity (n = 22)	21.91 ± 3.73	23.5	20–24.75	
Diabetes mellitus	Yes (n = 42)	21.31 ± 4.92	22.5	20–24.75	0.07
	No (n = 58)	22.76 ± 4.14	24	21–26	
Hypercholesterolemia	Yes (n = 35)	23.23 ± 3.75	25	22–26	0.059
	No (n = 65)	21.57 ± 4.81	22	20–25	
Ischemic heart disease	Yes (n = 30)	21.87 ± 3.83	21.5	20.25–25	0.343
	No (n = 70)	22.27 ± 4.8	24	20–25.75	
Renal insufficiency	Yes (n = 10)	22.3 ± 5.42	24.5	20.5–26.5	0.572
	No (n = 90)	22.13 ± 4.44	23.5	20–25	
Rheumatic disorders	Yes (n = 25)	20.88 ± 4.59	21	18–24	0.06
	No (n = 75)	22.57 ± 4.44	24	21–25	

*Non-normal distribution in groups; the Mann-Whitney test was used for sex, residence, and comorbidities; the Kruskal-Wallis test together with the post-hoc Dunn test was used for the remaining variables
BMI — body mass index; M — mean; Me — median; p — level of statistical significance; Q1 — quartile 1st; Q3 — quartile 3rd; SD — standard

adhered significantly better than those with primary education. Moreover, patients with a good or very good financial standing had a significantly higher level of adherence than those with a poorer financial situation. All correlations are shown in Table 6.

Multivariate analysis

Multivariate analysis of the effect of GDS and WHO-QOL-AGE scores and selected sociodemographic and clinical variables on adherence to medical recommen-

dations using the ACDS questionnaire assessment was performed. The obtained linear regression model showed that none of the analysed variables was an independent predictor of ACDS scores, and thus did not affect adherence to treatment recommendations (p > 0.05). Detailed results are presented in Table 7. The R^2 coefficient for the model was 16.67%, indicating that variables included in the model accounted for 16.67% of the variance in ACDS scores. The remaining variance was 83.33% arising from random factors or variables not included in the model.

deviation

Table 7. Multivariate analysis

Variable		Regression coefficient	95% CI		p
GDS [points]		0.06	−0.433	0.552	0.811
WHOQOL-AGE [points]		0.003	−0.103	0.109	0.952
Education	Primary	Reference item			
	Vocational	−0.283	−3.027	2.461	0.838
	High school	1.873	−1.289	5.034	0.242
	College/University	2.235	−1.648	6.119	0.256
Financial standing	Very good	Reference item			
	Good	0.489	−3.089	4.067	0.787
	Poor	−1.6	−5.815	2.615	0.453
Diabetes mellitus	No	Reference item			
	Yes	−1.334	−3.212	0.544	0.162
Hypercholesterolemia	No	Reference item			
	Yes	1.366	−0.585	3.316	0.168
Rheumatic disorders	No	Reference item			
	Yes	−1.547	−3.713	0.619	0.159

CI — confidence interval; GDS — Geriatric Depression Scale; p — level of statistical significance; WHOQOL-AGE — World Health Organization Quality of Life-Age questionnaire

Discussion

The present analysis included 100 patients aged ≥ 65 years who had had hypertension for 10.86 years on average. Regarding cardiovascular disease risk factors and comorbidities, 42% of patients had diabetes, 35% had hypercholesterolemia, 30% were diagnosed with ischaemic heart disease, 25% with rheumatic disorders, and 10% had renal insufficiency. The present study demonstrated that hypertensive older adults scored their QOL score 61.06 points, indicating the average level. It was shown that 32% of patients had depressive symptoms. According to the adherence behaviours, 63% of patients had a high level of adherence, 34% moderate, and only 3% showed a low level of adherence. The authors observed a significant negative correlation indicating that more severe depressive symptoms were associated with poorer adherence. Also, there was a significant and positive showing that a higher level of QOL was associated with better adherence. Moreover, a significantly higher level of adherence was noted in patients with college/university and high school education and those with good or very good financial standing. However, none of the analysed variables was an independent predictor of adherence to treatment recommendations.

Evaluation of factors affecting adherence to antihypertensive treatment is important for elderly patients. Identifying causes of non-adherence allows for introducing significant interventions that may improve medication-taking behaviours and increase the treatment success rate. Evaluation of QOL and early identification of initial depressive symptoms could significantly contribute to these desired results. The literature on the subject demonstrates that age is associated with more comorbidities and cardiovascular risk factors and, therefore, with poorer treatment adherence. This also entails taking more medication, and thus an increased risk of skipping doses [21, 22].

Chronic illness, including hypertension, adversely affects a population's QOL. In the present study, the respondents rated their QOL at 59.73 out of 100. Bardage et al. [23] and Banegas et al. [24] emphasize the negative impact of hypertension on QOL compared to healthy individuals. Effective antihypertensive treatment requires an appropriate level of adherence. In the present study, most patients (63%) showed a high level of adherence; a moderate level was found in 34% and a low level in 3% of respondents. Notably, the number of adherent patients was relatively high. However, recent data are not optimistic, demonstrating that only one in two patients continues to refill their prescription for antihypertensive medication after just six months of treatment [25]. Hence, the importance of the patient's relationship with the entire multidisciplinary therapeutic team in raising awareness and improving medication-taking. In the present study, age, duration of illness, or blood pressure values did not seem to affect adherence.

However, some recent reports confirm a considerable role of age in adherence to treatment. For instance, the Medicaid study emphasizes the negative impact

of age on adherence in patients older than 65. In this study, only 20% of patients had a satisfactory level of adherence [26]. In the present study, significant factors included: patients' education and financial standing, depressive symptoms, and the QOL score. Patients with a college/university education were found to have a significantly higher adherence level than those with primary or vocational education. A similar significant difference was found between patients with high school education and those with primary education. One may presume that better-educated patients are more knowledgeable about their illness and more aware of the need to undergo treatment thus they cooperate better with the treatment team and tend to adhere to their therapy well. Okuno et al. [27] studied 220 patients aged 60 and over and found a similar association between adherence and education. Another factor that affected adherence in the present study was financial standing. Patients reporting a good or very good financial standing were found to be more adherent. Undoubtedly, insufficient financial means adversely affect multiple aspects of life, and these likely include health care.

A patient's overall psychological state is also significant for treatment effectiveness. The present study included an evaluation of depressive symptom severity in patients over 65 years of age. Symptoms of a depressive disorder were found in almost a third of respondents (32%). Such depressive disorder symptoms were negatively correlated with adherence. The literature data indicate that depression or related problems affect approximately 15–20% of the population above 65 years of age, and this only includes patients who report to a physician. Therefore, one may presume that a large portion of the depressive population remains unidentified and undiagnosed [28]. Somewhat different results were reported in a study by Hashmi et al. [29] on factors associated with non-adherence to antihypertensive treatment, which was performed in a group of 460 patients. The authors demonstrated no association between depression and adherence. However, there is some evidence that depression may cause non-cooperation [30].

The present study showed that QOL scores were positively correlated with adherence. Better QOL is therefore associated with better adherence. De Souza et al. [31] found that adherence to pharmaceutical treatment may improve all aspects of QOL evaluation: psychological, physical, social, and overall HRQOL. A cross-sectional study from 2015 by Mollaoglu et al. [32] focused on associations between medication adherence and HRQOL in 120 hypertensive patients. A statistically significant positive association was found between adherence and QOL. The authors also reported that regular and consistent education for patients undergoing antihypertensive treatment improved their QOL and as a consequence, their adherence levels.

Study limitations

Although this study was prepared with the greatest effort, it has potential methodological limitations and shortcomings. The main limitation was the relatively small group of patients who were recruited from a single hypertension clinic and outpatient setting. Consequently, the results of this study provide only general information and insights into the study area. The present research should be continued as a multicentre and international study. Furthermore, the results could be verified with more relevant clinical and pharmacological variables, such as physiological markers, pharmacy data, or drug concentrations. Another limitation is that adherence in this study was measured by a self-report questionnaire, and the study had a cross-sectional design. Moreover, it would have been valuable to include a control group of patients with different chronic conditions to compare medication adherence levels or to include patients who participated in self-care training or educational interventions on medication adherence. Moreover, adverse events as a potential factor affecting medical adherence to antihypertensive treatment should be considered in future studies to optimize the pharmacological treatment strategy in this group of patients. Future studies should also consider evaluating educational interventions to improve patients' knowledge about adherence to antihypertensive medications based on the knowledge-belief-action theory, which would provide valuable insights into the motivations, behaviours, and attitudes of hypertensive patients.

Conclusions

Sociodemographic factors affecting adherence to antihypertensive treatment recommendations in older adult patients include education and financial situation. Better adherence to treatment recommendations was found in patients with higher or secondary education and patients with good or very good financial situations. The level of QoL and severity of depressive symptoms were also significant. Higher self-rated QoL scores and lack of depressive symptoms were associated with better adherence. Furthermore, it was shown that one-third of older hypertensive patients had depressive symptoms and were characterized by moderate levels of medication adherence.

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