Original paper

Adherence to treatment and quality of life of patients with hypertension during the COVID-19 pandemic

Stosowanie się do zaleceń terapeutycznych i jakość życia pacjentów z nadciśnieniem tętniczym w czasie pandemii COVID-19

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Słowa kluczowe: jakość życia, nadciśnienie tętnicze, pacjent, przestrzeganie zaleceń lekarskich, COVID-19.

Abstract

Introduction: Reduced accessibility to routine follow-up visits in GP surgeries during the COVID-19 pandemic as well as the failure to report to health care facilities for fear of infection may have disrupted doctor-patient cooperation and worsened adherence to therapeutic recommendations.
Aim of the research: To examine the quality of life of patients with arterial hypertension and their assessment adherence to therapeutic recommendations during the COVID-19 pandemic.
Material and methods: A total of 103 hypertensive patients of the Independent Public Healthcare Centre of the Ministry of Interior and Administration in Wroclaw were examined. The World Health Organization Quality of Life Instrument Short Form (WHOQOL-BREF) and the Adherence in Chronic Diseases Scale (ACDS) were used.
Results: The mean score for perception of quality of life was 3.64 ±0.73. Quality of life was rated best in the psychological domain (M = 15.05, SD = 2.42) and worst in the physical domain (M = 13.25, SD = 2.67). 57.28% (59/103) of the respondents had medium adherence, 23.30% (24/103) had low adherence, and 19.42% (20/103) had high adherence. The level of adherence was significantly better among patients keeping a self-monitoring diary compared to those who did not keep such a diary (24.19 ±2.86 vs. 21.86 ±4.56, $p = 0.007$). Patient age ($r = 0.323$, $p = 0.001$) and systolic blood pressure value ($r = –0.193$, $p = 0.05$) significantly correlated with adherence level. The higher the level of adherence, the better the quality of life in the psychological ($r = 0.197$, $p = 0.046$) and social ($r = 0.198$, p = 0.045) domains.
Conclusions: Adherence to the therapeutic plan and good patient-doctor cooperation are extremely important for the level of quality of life of hypertensive patients.

Streszczenie

Wprowadzenie: Ograniczenie dostępności do rutynowych wizyt kontrolnych w gabinetach lekarskich w czasie pandemii COVID-19, jak również niezgłaszanie się pacjentów z nadciśnieniem tętniczym do placówek ochrony zdrowia w obawie przed zakażeniem mogło zaburzyć współpracę lekarza z pacjentem i pogorszyć przestrzeganie zaleceń terapeutycznych.
Cel pracy: Zbadanie jakości życia pacjentów z nadciśnieniem tętniczym oraz ocena przestrzegania przez nich zaleceń terapeutycznych podczas pandemii COVID-19.
Materiał i metody: Zbadano 103 pacjentów SPZOZ MSWiA we Wrocławiu. Zastosowano *Skróconą wersję ankiety oceniającej jakość życia* (WHOQOL-BREF) oraz *Skalę adherence w chorobach przewlekłych* (ACDS).
Wyniki: Średnia ocena percepcji jakości życia wyniosła 3,64 ±0,73. Najlepiej oceniono jakość życia w dziedzinie psychologicznej (M = 15,05, SD = 2,42), a najgorzej w dziedzinie fizycznej (M = 13,25, SD = 2,67). Grupa 57,28% (59/103) badanych miała średni, 23,30% (24/103) – niski, a 19,42% (20/103) – wysoki *adherence*. Poziom *adherence* był istotnie lepszy u pacjentów prowadzących dzienniczek samokontroli w porównaniu z tymi, którzy takiego dzienniczka nie prowadzili (24,19 ±2,86 *vs* 21,86 ±4,56, $p = 0,007$). Wiek pacjenta ($r = 0,323$, $p = 0,001$) i wartość ciśnienia tętniczego skurczowego ($r = –0,193$, $p = 0,05$) istotnie korelowały z poziomem *adherence*. Im wyższy był poziom *adherence*, tym lepsza była jakość życia w dziedzinie psychologicznej ($r = 0,197$, $p = 0,046$) i socjalnej ($r = 0,198$, $p = 0,045$).
Wnioski: Dla odpowiedniego poziomu jakości życia chorych z nadciśnieniem tętniczym niezwykle ważne jest przestrzeganie planu terapeutycznego oraz dobra współpraca lekarza z pacjentem.

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Introduction

Hypertension is one of the most important risk factors for cardiovascular disease, including coronary artery disease, heart failure, cerebral stroke, and renal failure [1]. Hypertension contributes to lowering the quality of life (QOL) and premature death worldwide [2, 3]. The World Health Organization (WHO) reports that approximately 1.28 billion adults aged between 30 and 79 years have BP, and two-thirds of sufferers are from low- and middle-income countries (LMICs). In addition, it is estimated that 46% of adults with BP are unaware that they have the disease, and less than half are diagnosed and treated [4]. The prevalence of hypertension increases with age, rising sharply after the age of 50 years.

The primary goal of hypertension treatment is to reduce cardiovascular incidents and mortality. To achieve this, pharmacological treatment based on hypotensive drugs and lifestyle modification are often necessary [5]. The implementation of a therapeutic plan by patients is a prerequisite for effective BP treatment [6]. However, it should be emphasized that about 50% of patients with chronic diseases do not have good adherence to their medication treatment plan [7].

The preferred term for the implementation of treatment recommendations is adherence (sticking to the therapeutic plan). Adherence is a term used to describe "the extent to which an individual's behaviour coincides with health-related instructions or recommendations given by a health care provider in the context of a specific disease or disorder" [8]. The term refers to the joint creation (by the physician and the patient) of therapeutic plans and their implementation. The premise of adherence is that the patient understands the desirability of therapeutic interventions, a partnership between the patient and the doctor, and that the patient is consciously in control of his or her health [6, 9]. Studies show that among those who adhere to therapeutic recommendations, there is a lower risk of premature death than among non-adherents, and as adherence decreases, the likelihood of a patient's death increases [10, 11]. One of the financial consequences of non-adherence is the waste of resources through non-adherence to prescribed medications, which are subsidised by the public health system. In addition, deterioration in the health status of a patient who has not followed medical recommendations is associated with the need to re-visit a specialist, additional examinations, and sometimes hospitalization. In Poland, the cost of non-adherence to therapeutic recommendations to the public health care system is estimated at about 6 billion zlotys per year [10, 11].

The study found that the following factors can affect patients' adherence levels: occurrence of side effects of drugs, lack of follow-up visits, lack of clear information regarding the therapeutic plan, insufficient support from the medical staff, lack of acceptance of the disease by the patient, the quality of medical advice and the doctor's involvement in the therapeutic process, the doctor's ability to establish contact with the patient, sociodemographic factors (material situation, gender, and education of the patient – women are less likely to skip medication doses, and people with higher education are least likely to reduce the numbers of medication doses), and duration of illness, number of pills taken (the lower the number of prescribed medication doses, the better the adherence) [12–14]. The patient's personality, emotional state, level of knowledge about the disease, and acceptance of its chronic nature are also important factors affecting adherence [14]. In contrast, typical problems among the elderly that hinder adherence to long-term therapy are often cognitive impairment, depression, visual impairment, and mobility impairment [13]. Misconceptions about health, psychiatric disorders, hearing problems that interfere with understanding medical instructions, the form of used treatment, availability of the drug, a difficult dosing regimen, and technical difficulty in handling the drug (secure packaging) can also be important predictors of treatment adherence [15].

A relatively new factor affecting adherence may also be the period of the COVID-19 pandemic. Following the announcement of the pandemic outbreak, governments in many countries introduced restrictions ranging from constraints on movement and increased social distancing to the implementation of voluntary or forced isolation and quarantine. One consequence of the introduced restrictions is a decrease in physical activity. The closure of swimming pools or gyms and the introduction of legislation restricting access to outdoor spaces (e.g. parks, forests) and free movement (e.g. in gyms, fitness clubs) have greatly reduced opportunities for exercise. This has a particular impact on hypertensive patients, who should engage in regular physical activity to lower their blood pressure [16].

Another consequence of restrictions may be access to fresh food. In order to reduce the frequency of going to the store, people have begun to buy long-life and processed foods. This situation has led to unfavourable changes in the diet of people with hypertension, who are primarily advised to consume large amounts of fresh fruits and vegetables [16]. In addition, due to stress and staying at home for longer periods of time, people have begun to overeat unnecessarily, which negatively affects the maintenance of normal body weight, which plays an important role in the non-pharmacological treatment of hypertension [17].

Another effect of the pandemic outbreak is a reduction in routine follow-up visits. Access to outpatient care and medical advice are essential for chronic diseases. Some patients with hypertension, fearing infection, did not report to health care facilities. This resulted in the disease not being adequately controlled,

and cooperation between the patient and the doctor was disrupted [16, 17]. The COVID-19 pandemic also affected adherence to pharmacotherapy recommendations by patients with hypertension. Although research on the treatment of people infected with SARS-CoV-2 is ongoing, the media is informing the public about premature findings. Thus, in March 2020, there were reports of potentially adverse effects of angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin receptor blockers (ARBs) on the risk of infection and severity of infection. Such information may have caused patients, due to fear for their health, to make their own decisions about taking hypotensive drugs, disregarding their doctor's recommendations [16].

Taking this into account, we decided to study the level of adherence of hypertensive patients and the factors determining it, as well as to determine the impact of adherence on the quality of life of these patients.

Aim of the research

The aim of the study was to analyse the quality of life and adherence to treatment recommendations of hypertensive patients during the COVID-19 pandemic.

Material and methods

Study design and setting

The observational study was conducted at the Independent Public Hospital of the Ministry of Interior and Administration in Wroclaw in the Internal Medicine Department within the Endocrinology Subdivision from 15 June 2021 to 31 March 2022. Written approval for the study was obtained from the director of the institution and from the Ethics Committee functioning at the University of Opole (KB number – 30/2021). The STROBE guidelines (Strengthening the Reporting of Observational Studies in Epidemiology) were followed.

Participants

According to the available data from the National Health Fund 877,000 people were hospitalized in Poland in 2018 due to hypertension [18]. In turn, in 2020, the number of hospitalized patients with arterial hypertension as the main or coexisting diagnosis decreased compared to that period (in Poland it amounted to 528,649, and in the Dolnośląskie Voivodship, where the research was conducted – 28,644) [19]. With a confidence level of 95%, a margin of error of 5%, and $p = 50\%$, the minimum study sample was set at 384 patients. The study group consisted of patients of the Independent Public Hospital of the Ministry of Interior and Administration in Wroclaw, who were randomly selected. Invitations to the study were initially referred to the required number of patients, but only 175 of the 384 invited agreed to participate in the study. Finally, a group of 139 patients returned completed questionnaires (response rate of 79.42%); however, some of them (questionnaires from 36 patients) were filled in incorrectly or incompletely. Therefore, the questionnaires from 103 patients were analysed. Patients filled in self-administered questionnaires. Prior to the project, each participant was informed of the purpose of the study and instructed regarding the method of responding. In case of any ambiguity during the consultation, the participant was given additional information.

All participants gave written informed consent after an explanation of the procedures involved. Inclusion criteria were as follows: patient's age above the legal age of consent, diagnosis of hypertension, remaining in logical contact, giving informed consent for the study, and using Polish as the first language. Exclusion criteria were as follows: patient being underage, no hypertension, cognitive impairment, difficulties preventing participation in the study (e.g. severe general condition of the patient), and not speaking Polish as their first language.

The median age of the respondents was 63 years (Q1-Q3; 52–69). Most respondents were women (58; 56.31%), patients with secondary education (40; 38.83%), vocational education (32; 31.07%), married (65; 63.11%), rather satisfied with their material status (80; 77.67%), and living in cities with more than 100,000 residents (82; 79.61%). The largest number of people (27; 26.21%) said that difficulties in accessing a family doctor during the COVID-19 pandemic were rare or difficult to assess. Another significant group of respondents (24; 23.30%) denied any difficulty in accessing a family doctor during the pandemic. A group of 44.66% (46/103) never struggled with lack of knowledge about doctor's recommendations and had no difficulty adhering to their therapeutic plan during the COVID-19 pandemic, while 29.13% of patients (30/103) admitted that it was difficult for them to assess (Table 1).

Data sources/measurement

The method used was a diagnostic survey technique. A questionnaire of our own authorship and 2 types of standardized survey questionnaires were used: the WHOQOL-BREF – Abbreviated Version of the Quality of Life Assessment Questionnaire and the ACDS – Chronic Disease Adherence Scale.

The World Health Organization Quality of Life Instrument Short Form (WHOQOLBREF) is used to assess the quality of life of both healthy and sick people in clinical practice. It consists of 26 questions related to various aspects of life such as physical, psychological, social relationships, and environment. The examinees grade each aspect on a 5-grade scale (very bad, bad, neutral, good, very good). The scale includes some

Table 1. Sociodemographic data of respondents and difficulties in accessing doctors during the COVID-19 pandemic

Parameter		Total (*N* = 103)
Age [years]	M ± SD	61.03 ±12.66
	Median	63
	Q1–Q3	52–69
Gender	Women	58 (56.31%)
	Men	45 (43.69%)
Education	Primary	11 (10.68%)
	Occupational	32 (31.07%)
	Secondary	40 (38.83%)
	High	20 (19.42%)
Self-assessment of material status	Very dissatisfied	2 (1.94%)
	Rather dissatisfied	16 (15.53%)
	Rather satisfied	80 (77.67%)
	Very satisfied	5 (4.85%)
Place of residence	City of more than 100 thousand inhabitants	82 (79.61%)
	City of 20–100 thousand inhabitants	4 (3.88%)
	City of under 20 thousand inhabitants	5 (4.85%)
	Village	12 (11.65%)
Marital status	Single	10 (9.71%)
	Married	65 (63.11%)
	Divorced	7 (6.80%)
	Widow/widower	21 (20.39%)
Difficulties in access to family doctor during COVID-19 pandemic	Never	24 (23.30%)
	Rarely	27 (26.21%)
	Neither satisfied nor dissatisfied	27 (26.21%)
	Often	19 (18.45%)
	Very often	6 (5.83%)
Difficulties in access to specialist doctors during COVID-19 pandemic	Never	25 (24.27%)
	Rarely	22 (21.36%)
	Neither satisfied nor dissatisfied	28 (27.18%)
	Often	20 (19.42%)
	Very often	8 (7.77%)
Struggling with the lack of knowledge of medical recommendations and difficulties in implementing the plan during the COVID-19 pandemic	Never	46 (44.66%)
	Rarely	11 (10.68%)
	Neither satisfied nor dissatisfied	30 (29.13%)
	Often	14 (13.59%)
	Very often	2 (1.94%)

M – mean, SD – standard deviation, Q1 – first quartile, Q3 – third quartile.

questions that are separately analysed: question 1 applies to general individual perception of one's QOL, and question 2 concerns general individual perception of one's health condition. The domain scoring reflects individual perceptions of the QOL domains and has a positive direction – the higher the score, the higher the QOL. The overall scoring for each domain is calculated by counting the average of all the positions included in each domain. The reliability of the Polish version of the WHOQOL-BREF questionnaire, measured using Cronbach's α coefficient, proved acceptable for the parts that evaluate each domain (with coefficients ranging from 0.81 to 0.69) and for the questionnaire as a whole (with a coefficient of 0.90) [20].

The Adherence in Chronic Diseases Scale (ACDS) is a therapeutic plan adherence assessment tool designed to survey adults being treated for chronic diseases. The tool is intended both to reflect actual adherence to pharmacotherapy and to indicate the mechanisms affecting patients' implementation of the therapeutic plan. The results of testing with this scale can contribute to improving the regularity of taking prescribed medications in clinical practice. The ACDS scale contains 7 questions with suggested sets of 5 responses to each question. The questions relate to behaviours that directly determine adherence (questions 1–5) and to situations and views that may indirectly affect adherence (questions 6 and 7). The scoring of the ACDS scale is as follows: if the patient marks answer A, he/she receives 4 points, if B – 3 points, C – 2 points, D – 1 point, and E – 0 points. The respondent can receive a maximum of 28 points, and a minimum of 0. A score < 21 points corresponds to low adherence, between 21 and 26 points – a medium level, and a score > 26 points suggests a high level of adherence to the therapeutic plan [9].

The self-authored questionnaire contained a total of 24 closed-ended questions regarding sociodemographic data (age, gender, education, self-assessment of material status, place of residence, and marital status), clinical status (e.g. weight, height, systolic blood pressure and diastolic blood pressure on the day the questionnaire was filled out, duration of illness, presence and number of other chronic diseases, number of medications taken on a daily basis, number of hospitalizations in the last 3 years, smoking, alcohol consumption, physical activity, etc.), self-care (self-measurement of blood pressure and keeping a self-monitoring diary), and questions relating to health care during the COVID-19 pandemic (difficulties in accessing a family doctor and seeing a specialist, ignorance of medical recommendations, difficulties in implementing a therapeutic plan).

Statistical analysis

Comparison of the values of quantitative variables in 2 groups was performed using the Mann-Whitney test. Comparison of the values of quantitative variables in 3 or more groups was performed using the Kruskal-Wallis test. After detecting statistically significant differences, post-hoc analysis was performed using Dunn's test to indicate statistically significantly different groups. Correlations between quantitative variables were analysed using Spearman's correlation coefficient. In the analysis, the significance level was 0.05. The analysis was performed in R software, version 4.1.2.

Results

Analysis of clinical and lifestyle status of hypertensive patients during the pandemic

The median duration of hypertension was 10 years (Q1–Q3; 10–15 years). The mean systolic blood pressure was 135.69 ±12.72 mm Hg, while the mean diastolic blood pressure was 82.66 ± 8.4 mm Hg. Analysing body mass index (BMI), it can be seen that the largest group was overweight (41; 39.81%), followed by those with grade I obesity (30; 29.13%). It was revealed that 41.75% (43/103) had no chronic diseases other than hypertension. Among the respondents, 33.01%, (34/103) admitted that they measured their blood pressure once a day, while 17.47% (18/103) measured their blood pressure twice a day, and 16.50% (17/103) did not measure their blood pressure at all. Keeping a self-monitoring diary and noting the measurement results was confirmed by 52.43% (54/103) of the study participants (Table 2).

Patients' quality of life

The mean rating of the respondents' perception of their quality of life was 3.64 points (SD = 0.73), meaning that they rated their quality of life between good and average (neither good nor bad). Whereas the average rating of their own health was 3.01 points (SD = 0.89), meaning that they rated their health as average (neither satisfactory nor unsatisfactory). They rated their quality of life best in the psychological domain (M = 15.05, SD = 2.42), slightly worse in the social domain (M = 14.94, SD = 3.02) and in the environmental domain (M = 14.21, SD = 2.35), and rated their quality of life worst in the physical domain (M = 13.25, SD = 2.67) (Table 3).

Factors determining adherence

The study revealed that 59 of the 103 survey participants (57.28%) had medium adherence, 24 respondents (23.30%) had low adherence, and 20 respondents (19.42%) had high adherence (Table 4).

Patient age correlated significantly positively with the level of adherence (r = 0.323, p = 0.001). In contrast, systolic blood pressure correlated significantly negatively with the level of adherence (r = –0.193, p = 0.05). The level of adherence was significantly

Table 2. Health status and lifestyle of patients with hypertension

Parameter		Total (*N* = 103)
Systolic blood pressure [mm Hg]	M ± SD	135.69 ±12.72
	Median	134
	Q1–Q3	128–141
Diastolic blood pressure [mm Hg]	M ± SD	82.66 ±8.4
	Median	83
	Q1–Q3	78–89
Duration of hypertension [years]	M ± SD	10.69 ±8.58
	Median	10
	Q1–Q3	4–15
Number of all daily medications	M ± SD	3.55 ±2.78
	Median	3
	Q1–Q3	2–5
Number of hospitalizations in the past 3 years	M ± SD	1.87 ±1.34
	Median	1
	Q1–Q3	1–2
Body mass index (BMI)	Underweight	1 (0.97%)
	Normal body weight	23 (22.33%)
	Overweight	41 (39.81%)
	1st degree obesity	30 (29.13%)
	2nd degree obesity	5 (4.85%)
	3rd degree obesity	3 (2.91%)
Other chronic diseases	Lack of other chronic diseases	43 (41.75%)
	1 other chronic disease	38 (36.89%)
	2 others chronic diseases	14 (13.59%)
	3 others chronic diseases	5 (4.85%)
	4 others chronic diseases	3 (2.91%)
Frequency of self-measurement of blood pressure	Never	17 (16.50%)
	Occasionally	9 (8.74%)
	Once a month	1 (0.97%)
	Once a week	10 (9.71%)
	2 times a week	5 (4.85%)
	3 times a week	3 (2.91%)
	4 times a week	3 (2.91%)
	Once a day	34 (33.01%)
	2 times a day	18 (17.47%)
	3 times a day	3 (2.91%)

Table 2. Cont.

Parameter		Total (*N* = 103)
Maintaining a self-monitoring diary	Yes	54 (52.43%)
	No	49 (47.57%)
Smoking	Yes	27 (26.21%)
	No	76 (73.79%)
Regular consumption of alcohol	Yes	11 (10.68%)
	No	92 (89.32%)
Regular use of physical activity	Yes	27 (26.21%)
	No	76 (73.79%)
Limiting fatty foods	Yes	76 (73.79%)
	No	27 (26.21%)
Increased amount of unsaturated fatty acids in the diet	Yes	51 (49.51%)
	No	52 (50.49%)
Limiting sodium intake	Yes	66 (64.08%)
	No	37 (35.92%)

M – mean, SD – standard deviation, Q1 – first quartile, Q3 – third quartile.

Table 3. Quality of life in specific domains

WHOQoL BREF	M	SD	Median	Min.	Max.	Q1	Q3
Physical domain	13.25	2.67	13	6	19	11.5	15
Psychological domain	15.05	2.42	15	6	20	13	17
Social domain	14.94	3.02	16	4	20	13	16
Environmental domain	14.21	2.35	14	6	18	13	16

M – mean, SD – standard deviation, Q1 – first quartile, Q3 – third quartile, min. – minimum, max. – maximum.

Table 4. Adherence of patients with hypertension during the COVID-19 pandemic

ACDS [points]	Interpretation	*n*	%
0–20	Low adherence	24	23.30
21–26	Medium adherence	59	57.28
27–28	High adherence	20	19.42

better in patients who kept a self-monitoring diary compared to those who did not keep such a diary (24.19 ±2.86 vs. 21.86 ±4.56, $p = 0.007$). However, factors such as gender ($p = 0.545$), education ($p = 0.86$), number of chronic diseases ($p = 0.278$), BMI value ($p = 0.929$), duration of hypertension ($p = 0.511$), number of medications taken on a daily basis ($p = 0.062$), and diastolic blood pressure value ($p = 0.135$) did not affect adherence to therapeutic recommendations of hypertensive patients during the COVID-19 pandemic (Table 5).

Difficulties in accessing a family doctor ($p = 0.138$) and difficulties in accessing specialists ($p = 0.384$) during the COVID-19 pandemic had no significant impact on patient adherence (Table 6).

Influence of adherence to treatment recommendations on quality of life in patients with hypertension

ACDS correlated significantly positively with quality of life in the psychological ($r = 0.197$, $p = 0.046$), and social ($r = 0.198$, $p = 0.045$) domains, so the higher the adherence, the better the quality of life in these domains (Table 7).

Discussion

Key results

The purpose of our study was to analyse the quality of life and adherence to treatment recommendations of hypertensive patients during the COVID-19 pandemic. We showed that both the average rating of the perception of quality of life and the average rating of the subjects' own health were at average lev-

Table 5. Determinants of adherence among patients with hypertension during the COVID-19 pandemic

ACDS [points]	Gender				*P*-value*
	Women (*N* = 58)		Men (*N* = 45)		
M ± SD	23.4 ±3.44		22.67 ±4.47		0.545
Median	24		24		
Q1–Q3	22–26		20–26		
ACDS [points]	**Education**				***P*-value****
	Vocational (*N* = 11)	**Occupational (*N* = 32)**	**Secondary (*N* = 40)**	**High (*N* = 20)**	
M ± SD	23.36 ±3.38	22.88 ±4.5	23.32 ±3.83	22.75 ±3.63	0.86
Median	24	24	24	23	
Q1–Q3	22–25.5	20–26	21–26	20.75– 24.5	
ACDS [points]	**Number of chronic diseases**				***P*-value****
	Lack of others chronic diseases (*N* = 43)	**1 other chronic disease (*N* = 38)**	**2 others chronic diseases (*N* = 14)**	**3–4 others chronic diseases (*N* = 8)**	
M ± SD	23.09 ±3.69	23 ±4.07	24.64 ±1.91	20.62 ±6.02	0.278
Median	24	24	24	21	
Q1–Q3	21–25.5	20.25–26	24–25.75	19–24	
ACDS [points]	**Body mass index**				***P*-value****
	Underweight, normal body weight (*N* = 24)		**Overweight (*N* = 41)**	**Obesity (*N* = 38)**	
M ± SD	23 ±4.67		22.93 ±4.04	23.29 ±3.34	0.929
Median	24		24	23.5	
Q1–Q3	20–26.25		21–25	21.25–25.75	
ACDS [points]	**Maintaining a self-monitoring diary**				***P*-value***
	Yes (*N* = 54)		**No (*N* = 49)**		
M ± SD	24.19 ±2.86		21.86 ±4.56		0.007
Median	25		23		
Q1–Q3	23–26		20–25		
Features			**Spearman correlation coefficient**		***P*-value**
Duration of hypertension and ACDS			0.066		0.511
Number of medications taken daily and ACDS			0.184		0.062
Systolic blood pressure and ACDS			–0.193		0.05
Diastolic blood pressure and ACDS			–0.148		0.135
Patient's age and ACDS			0.323		0.001

ACDS - Adherence in Chronic Diseases Scale, M – mean, SD – standard deviation, Q1 – first quartile, Q3 – third quartile, p – Mann-Whitney test. p** – Kruskal-Wallis test, SBP – systolic blood pressure, DBP – diastolic blood pressure, BMI – body mass index, r – Spearman's correlation coefficient.*

Table 6. Difficulties in accessing physicians during the COVID-19 pandemic and patient adherence

ACDS [points]	Difficulties in accessing a family physician during the COVID-19 pandemic					*P*-value
	Never (*N* = 24)	Rarely (*N* = 27)	Neither satisfied nor dissatisfied (*N* = 27)	Often (*N* = 19)	Very often (*N* = 6)	
M ± SD	24.38 ±2.84	23.26 ±4.51	22.44 ±3.92	23.21 ±2.76	19.5 ±6.16	0.138
Median	25	24	23	24	20.5	
Q1–Q3	22–26.5	21.5–26.5	20–25.5	21.5–25	19.25–22.5	
ACDS [points]	**Difficulties in access to specialist physicians during the COVID-19 pandemic**					***P*-value**
	Never (*N* = 25)	**Rarely (*N* = 22)**	**Neither satisfied nor dissatisfied (*N* = 28)**	**Often (*N* = 20)**	**Very often (*N* = 8)**	
M ± SD	24.04 ±3.67	23.91 ±3.1	22.29 ±4.17	22.7 ±3.56	21.5 ±6.05	0.384
Median	24	25	23	24	23	
Q1–Q3	22–28	20–26	20–26	21.5–24.25	20.5–25.25	

ACDS – Adherence in Chronic Diseases Scale, M – mean, SD – standard deviation, Q1 – first quartile, Q3 – third quartile, p – Kruskal-Wallis test.

Table 7. The impact of adherence on the quality of life of patients with hypertension

WHOQoL BREF	ACDS
	Spearman correlation coefficient
Perceptions of quality of life	$r = 0.072$, $p = 0.467$
Perception of one's own health	$r = 0.065$, $p = 0.516$
Physical domain	$r = 0.055$, $p = 0.582$
Psychological domain	$r = 0.197$, $p = 0.046$ *
Social domain	$r = 0.198$, $p = 0.045$ *
Environmental domain	$r = 0.165$, $p = 0.095$

*R – Spearman's correlation coefficient, *statistically significant relationship (p < 0.05).*

els. The lowest ratings were given to quality of life in the physical domain. Only one-fifth of hypertensive patients had high adherence, which means that about 80% had adherence at an average or low level. Factors such as the patient's age, systolic blood pressure, and keeping a self-monitoring diary were found to be essential to the level of adherence. Adherence to treatment recommendations significantly improved quality of life in the psychological and social domains. In addition, we found that only about a quarter of patients reported frequent or very frequent difficulties in accessing family physicians or specialists and about a fifth struggled with lack of knowledge of medical recommendations and difficulties in implementing the plan during the COVID-19 pandemic. However, the aforementioned difficulties did not have a significant impact on patient adherence.

Interpretation

As mentioned above, the average quality of life and self-assessment of the health of the patients in the study were at an average level. In a study by Klarkowska and Antczak, people with hypertension rated their quality of life as good or very good [21]. The difference between the obtained data may be because the group of respondents of the above-mentioned study consisted of primary care patients who did not require hospital treatment at the time, and probably because of this, the perception of quality of life was better in them than in patients hospitalised during the conducted study. A study by Snarska *et al*. completed 3 months before the first SARS-CoV-2 virus-infected patients in Poland also showed that the quality of life of the surveyed patients was mainly rated as average or good [22].

Based on the information collected in the self-study, patients rated quality of life best in the psychological domain, and worst in the physical domain. Different results were obtained by researchers in the southern part of Vietnam; respondents there rated quality of life in the physical and environmental domains as moderate, rated social relationships positively, while they perceived their mental health negatively [23]. Also, in Cyprus most patients rated their mobility, self-care, and performance of activities of daily living well, but complained of accompanying anxiety and depression [24].

Recent reports confirm that psychological factors, in addition to influencing the occurrence of hypertension, also affect the cardiovascular prognosis of patients and affect their quality of life. Some authors claim that the outbreak of the COVID-19 pandemic, which generated tremendous stress and resulted in numerous restrictions and the so-called "new social and work order", may have contributed to the exacerbation of emotionally driven hypertension symptoms [25]. Nevertheless, our own study did not show that the average level of perception of quality of life and health of the interviewed patients was much lower

than the level observed before the COVID-19 pandemic in the studies cited above.

In almost 80% of the patients studied, the level of adherence to treatment recommendations was at a low or medium level. A study conducted in Latvia showed that the frequency of nonadherence was at a high level, as high as 46.20%. Despite this unfavourable result, the majority (61.4%) of respondents did not express any concerns about taking medication. The remaining respondents were not sure whether the medications were necessary, safe, effective, or whether the disease was serious enough to necessitate taking them. The authors of the present study speculated that anxiety and doubt were factors that influenced medication-taking habits and may have caused patients to not always answer their doctor's questions honestly [26]. In the study of Świątoniowska-Lonc *et al.*, patients with hypertension had a low level of adherence to pharmaceutical treatment. The authors showed that greater patient satisfaction with communication with their physician was associated with lower ARMS (Adherence to Refills and Medication Scale) score, indicating better adherence [27].

Our own study showed that adherence increased with age. This fact may be because young people are the most active in the workforce and have many life roles that consume a lot of time and make it difficult to regularly take prescribed medications. In addition, a study conducted in India showed that young people did not perceive hypertension as a serious condition, and some of them ignored hypertension as a serious disease [28]. It is worth noting that elderly people with chronic diseases usually take several different types of medications, e.g in our study about 59% of the subjects had additional chronic diseases in addition to hypertension (multimorbidity phenomenon), and the average number of daily medications taken by a patient was 3.55 ±2.78. Correlation analysis did not show a significant relationship between the number of medications taken by patients and the level of adherence ($p = 0.062$), although other studies show that polypharmacy may worsen the adherence of elderly people with chronic diseases [29, 30] and may contribute to adverse events such as falls [31].

After analysing the collected data in our study, we found that higher levels of adherence were positively influenced by lower values of systolic blood pressure and keeping a self-monitoring diary. The observed phenomenon may be because higher BP values discouraged patients from sticking to the therapeutic plan, while normal SBP values motivated patients to adhere even better and record measurements in the self-monitoring diary, which they could present to the doctor during follow-up visits.

Studies on adherence of patients with hypertension have shown that adherence was positively influenced by disease acceptance, a good doctor-patient therapeutic relationship [27], longer duration of medication [26], awareness of hypertension and the consequences of not treating it, taking one pill a day, motivation for treatment, and regular visits to a cardiologist [32]. Dalal *et al.*, indicated also other factors that determine the adherence among hypertensive patients such as health literacy, lower socioeconomic status, cost of medications, and forgetfulness as much as the asymptomatic nature of disease [33].

Based on the information collected in our study, we found that only 24% of respondents had frequent or very frequent problems accessing their family doctor, and only 27% of respondents encountered difficulties accessing specialist doctors. One of the few studies that analysed the level of adherence among hypertensive patients during the COVID-19 pandemic was a survey conducted in public health facilities in Ethiopia. Nearly 60% of respondents reported that the COVID-19 pandemic had a negative impact on their follow-up visits, availability of medications, and affordability. Interestingly, the above study showed that patients from extreme poverty had better adherence. Poor adherence was influenced by the presence of comorbidities and the use of stimulants [17].

The correlation between adherence and quality of life was also analysed in our study. The results showed that reliable adherence to medical recommendations had a positive impact on quality of life in both psychological and social domains. A study conducted in a rural community in the southern part of Vietnam among 275 subjects also showed that good adherence had a positive effect on the quality of life of hypertensive patients [21].

According to data from the literature, the COVID-19 pandemic negatively affected human life and health, hindered access to medical care, and exacerbated existing conditions both physically and mentally. The SARS-CoV-2 virus accounted for a huge number of premature deaths and the emergence of new medical problems. Nevertheless, in our study, we did not observe that the quality of life of hypertensive patients and their level of adherence in the era of the COVID-19 pandemic were significantly different from those analysed before the outbreak of the pandemic.

Limitations of the study

The study was limited by the fact that all patients were recruited from a single hospital. Moreover, the study was limited by the small sample size. However, it should be noted that the study was conducted during the difficult period of the COVID-19 pandemic. At the beginning of November 2021, the Internal Medicine Department, which is the largest ward in the hospital, was converted into a "covid" ward, which made it difficult to conduct the study. The problem encountered during the survey in the Internal Medicine Department was the large number of patients with whom full logical contact was difficult. In some

cases, the questions proved to be too difficult and exceeded the perceptual capabilities of some patients. This situation was due, among other things, to the patients' severe medical condition or old age and associated dementia. Some patients refused to take part in the study because of the large number of questions included in the questionnaires and the fear that they would not be able to cope with filling in the questionnaires. On the other hand, the fact that the study was conducted precisely during the COVID-19 pandemic is a novel element, and the use of 2 standardised tools certainly contributes to objectifying the results obtained. These aspects are the strengths of our survey.

Conclusions

Both the average assessment of the perception of quality of life and the average self-assessment the health of hypertensive patients during the COVID-19 pandemic were at average levels. Quality of life was rated worst in the physical domain; this could have been related to the regulations introduced during the pandemic restricting freedom of movement (e.g. difficult access to swimming pools, closure of fitness clubs, prohibition of access to forests, etc.), which greatly hindered opportunities for physical exercise. Therefore, it is important that hypertension patients now take special care to engage in regular physical activity.

Most hypertensive patients at the time of the COVID-19 pandemic had adherence at an intermediate or low level. Patient age, systolic blood pressure, and keeping a self-monitoring diary significantly affected adherence.

As the level of adherence increased among hypertensive patients, their quality of life in the psychological and social domains increased. This result shows the importance of adherence to the therapeutic plan and good doctor-patient cooperation.

Nearly a quarter of patients reported frequent or very frequent difficulties in accessing family physicians or specialists, and about a fifth struggled with lack of knowledge of medical recommendations and difficulties in implementing the plan during the COVID-19 pandemic. However, these difficulties did not have a significant impact on patient adherence.

Conflict of interest

The authors declare no conflict of interest.

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