Level of Hypertension Treatment Adherence During COVID-19 Pandemic

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Abstract

Background:

Arterial hypertension is prevalent and remains one of the most significant causes of mortality worldwide. Over 1.7 million Bulgarians (24%) have a blood pressure (BP) value equal to or higher than 140/90 mmHg and therefore are at increased risk of complications. Adherence to antihypertensive medications is the cornerstone for achieving hypertension control.

Methods:

The aim of this study was to assess whether the patients of both sexes with hypertension exhibit equal adherence to medication during the COVID-19 pandemic and to explore how the pandemic has affected the adherence of patients with high BP to prescribed antihypertensive drugs. This multicentre observational study utilized self-completed questionnaires among patients visiting several healthcare centres, including the cardiology outpatient clinic of a university hospital, a private cardiology practice, general practice offices, and a pharmacy between June and November 2020.

Results:

Overall, 442 patients were included in the study. The likelihood of adherence was assessed using the 5-item version of the Medication Adherence Report Scale (MARS-5©Professor Rob Horne). The average MARS score of the sample was 16.81, the median was 4.162, and the most common value was 3 (24.5% of respondents).

Conclusions:

Overall, 18.1% had a high degree of adherence to the prescribed therapy, and almost 1/3 of the respondents (30.7%) had a low degree of adherence to the prescribed therapy. In the present study, approximately one-third of the participants complied with pharmacological treatment. The study suggests that several sociodemographic factors but not the COVID pandemic play a role in treatment adherence.

Background

Arterial hypertension, one of the most common chronic diseases, as defined by the World Health Organization (WHO), is a physical condition in which systolic blood pressure (BP) ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg. According to the 2020 International Society of Hypertension Global Hypertension Practice Guidelines, hypertension should be diagnosed when a person's systolic blood pressure (SBP) in the office or clinic is ≥ 140 mm Hg and/or their diastolic blood pressure (DBP) is ≥ 90 mm Hg following repeated examination [1]. This chronic disease affected approximately 22% of the adult population in 2015 [2].

Hypertension is prevalent and remains one of the most significant causes of mortality worldwide. Every year, it accounts for approximately 7.5 million deaths worldwide and has harmful consequences, especially in countries with poor health policies [3]. Elevated blood pressure (BP) is a major risk factor for coronary artery disease and its complications, including heart failure, stroke, renal insufficiency, and blindness, in diabetic patients. The Global Burden of Disease study estimated that hypertension is now the leading risk factor for disability-adjusted life years worldwide [4]. According to the WHO, over 30% of the world's population suffers from hypertension (high blood pressure). Hypertension is the leading risk factor for myocardial infarction and stroke. Poor blood pressure control is the cause of 62% of all cerebrovascular accidents.

Over 1.7 million (24%) Bulgarians have a blood pressure value equal to or higher than 140/90 mmHg and therefore are at increased risk of complications.

Healthy lifestyle choices can prevent or delay the onset of high BP and can reduce cardiovascular risk [5]. The risk of developing hypertension can be reduced by effective medication therapy management and significant lifestyle modifications. Adherence to antihypertensive medications is the cornerstone for achieving hypertension control.

Adherence is defined as the extent to which a person's behaviours, such as taking a medication, following dietary or lifestyle changes, correspond with agreed recommendations from a healthcare provider [6]. Low adherence is one of the main causes of therapy failure worldwide [7–9]. Non-adherence to antihypertensive treatment affects 10–80% of hypertensive patients and is one of the key drivers of suboptimal BP control [10–12]. Poor adherence to antihypertensive treatment correlates with the magnitude of BP elevation and is an indicator of poor prognosis in hypertensive patients. The aetiology of non-adherence to antihypertensive treatment is multifactorial and includes the healthcare system, the pharmacological therapy, the disease, the patient and their socioeconomic status.

Concerns have been raised about the cost of non-adherence, medication and resource waste and lack of effective strategies for preventing cardiovascular disease [13].

Self-reported scales are the most commonly used instruments to assess medication adherence in research and in clinical practice [14, 15].

The Medication Adherence Report Scale (MARS-5, ©Professor Rob Horne) – a shorter form of MARS-10 – comprises items which describe a range of nonadherent behaviours, with items phrased in a nonthreatening and nonjudgmental way to normalise nonadherence, and a response scale that allows the categorisation of patients in terms of their position along the "adherence dimension" rather than on the basis of a "yes/no" or "high/low" dichotomous response, thus providing more detail and differentiation between individuals. MARS-5 follows the same structure as MARS-10 and asks respondents to rate the frequency with which the five different medication-taking behaviours occur, scoring each item on a five-point scale (5 = never, 4 = rarely, 3 = sometimes, 2 = often, 1 = very often), with higher scores indicating higher reported adherence.[16–17]

Methods

Considering the aforementioned facts, our study sought to test the hypothesis that patients of both sexes with hypertension exhibit equal adherence to medication during the COVID-19 pandemic and to explore how the pandemic has affected the adherence of patients with high BP to prescribed antihypertensive drugs. We believe that the findings of this study will be beneficial for health care providers who deal with patients suffering from hypertension under the current conditions and will help them aid their patients in achieving good BP control.

This multicentre observational study utilized self-completed questionnaires to assess medication adherence among patients visiting several healthcare centres, including the cardiology outpatient clinic of a university hospital, a private cardiology practice, general practice offices, and a pharmacy between June and November 2020. Patients from the cities Varna and Plovdiv were recruited. Overall, 442 patients were included in the study. The inclusion criteria were patients aged greater than 18 years with hypertension who were undergoing treatment. The Ethics Committee of the Medical University of Sofia approved the study protocol. All participants provided written informed consent before entering the study, and the answers to all questionnaires were anonymized before evaluation. Primary data was collected through standard interviews, which included 13 questions about demographic data of the respondent, characteristics of the disease, comorbidities, risk factors, and blood pressure values. The likelihood of adherence was assessed using the Medication Adherence Report Scale (MARS-5, ©Professor Rob Horne) – a shorter form of MARS-10 with higher scores indicating higher reported adherence which was created and validated by Horne et al. [16]. The Medication Adherence Report Scale was translated into Bulgarian and standardized by forward translation, backward translation, and a pretest.

Face-to-face interviews with the patients were completed by the research team members.

The data were coded and statistically analysed using the IBM SPSS ver.21.0 software package. Statistical analyses included one-dimensional and two-dimensional frequency distributions; summarization of statistical quantities; the Kolmogorov-Smirnov test, which was used to check the normality of the distribution of measured traits; parametric tests to test hypotheses with respect to mean values (t-test for independent samples and analysis of variance (ANOVA)); nonparametric hypothesis testing, chi-square test for analysis of two-dimensional distributions and association measures (contingency factor). The critical significance level used was $\alpha < 0.05$.

Results

In total, 442 respondents took part in the survey, 57% (252) of whom were from Plovdiv and 43% (190) of whom were from Varna. The sex distribution of the whole sample was 51.1% male and 48.9% female. Two-dimensional distribution by sex and place of residence showed the following:

- In Varna, 54.2% of the individuals who participated in the survey were men, and 45.8% were women.

- In the city of Plovdiv, men accounted for 48.8% of the individuals who participated in the survey, and women accounted for 51.2% of these individuals.

The sample included respondents aged 19 to 91 years. The mean age of the respondents was 62.65, and the most common age was 60. The mean age of men was higher than that of women (63.96 vs. 61.27) (t = 2,069, p = 0.039). (Table 1)

Table 1
Distribution of respondents by age (n = 442).

Age group	Relative share (%)	Cumulative share (%)
18–19	0.2	0.2
20–29	1.6	1.8
30–39	4.1	5.9
40–49	10.2	16.1
50–59	21.9	38.0
60–69	31.4	69.5
70–79	17.4	86.9
above 79	13.1	100.0

The one-dimensional frequency distribution of the grouped age data showed that the respondents from 60 to 69 years of age comprised the largest relative share of the sample, representing almost 1/3 of the entire sample.

One in five (20.8%) respondents indicated that they were in the first stage of hypertension, but the majority (62.9%) of respondents did not know the stage of their disease.

More of the patients who knew the stage of their disease were women than men (Pearson chi-square = 4,572, p = 0.033). For example, 32.3% of the surveyed men indicated the stage, while this percentage was 42.1% for women.

Among men who knew the stage of their disease, the percentage of those in the first stage (46.6%) was the highest. The percentage of patients in the first stage was also the highest among women who knew the stage of their disease, but this percentage was higher at 63.7%.

The average duration of the disease was 10.15 years, and the most common disease duration was 2 years (12.6% of respondents). The sample included respondents who ranged from being relatively recently diagnosed (1 month) to having the disease for more than 20 years (representing 10% of the sample). Men had a longer duration of the disease (mean 11.35 years) than women, with a mean of 8.91 years (t = 3.119, p = 0.002).

A moderately strong positive correlation was found between the age of the respondent and the duration of the disease (r = 0.567, p = 0.000).

The average duration of the disease varied depending on the stage of disease (chi-square = 59.228, p = 0.000); in the first stage, the median duration was 3 years, whereas it was 15 years in the third stage (Table 2)

Table 2
Duration of the disease and stage - summarized characteristics.

Stage of hypertension	Duration (years)			
	Mean	Median	Mode	SD
First	4.6	3.00	2.00	3.9
Second	12.9	12.50	5.00	7.4
Third	15.5	15.00	20.00	5.1
Cannot determine/does not know	11.1	10.00	10.00	8.7

The average number of drugs taken by the respondents was 2.23 (median and fashion of 2). A total of 21.6% of the respondents accepted 1 drug, 44.7% accepted two, and 25.2% accepted three. Overall, 8.3% accepted more than 3 drugs. In the age groups up to 59 years, the number of drugs the participants admitted to using was lower than the average for the sample, while in those over 70 years, it was higher (F = 7.135, p = 0.000).

A difference in the average number of drugs taken was also found between respondents in different stages of hypertension; the average number of drug products taken those in the first stage was 1.89 drugs; that taken by patients in the second stage was 2.66, and that taken by patients in the third stage was 3.92 (22,717, p = 0.000).

Respondents with comorbidities received a higher average number of medications than those who noted no comorbidities (2.48 versus 2.05) (t = -4.746, p = 0.000).

Correlation analysis showed a medium-strong positive relationship between the duration of the disease and the number of drugs taken (r = 0.352, p = 0.000).

When asked if they happened to forget to take medication for hypertension, 21.4% of respondents indicated that this happens very often, and 55% indicated that it happens sometimes. Those who noted that they never fail to take medication accounted for 23.6% of the sample. Demographic factors (sex and age) did not influence forgetting to or not taking medication for hypertension.

Less than half (47.5%) of respondents stopped medication for hypertension when they felt unwell. This behaviour was more typical for men (52.2% of male respondents stopped taking drugs) than for women (42.6%) (contingency coefficient = 0.096, p = 0.043). Discontinuation of intake was also observed for

respondents who were older (over 70 years of age), among whom the percentage of respondents who discontinued intake was significantly higher than the average value; for example, in 70-79-year-olds, this percentage was 51.9%, and for those over 79, it reached 72.4% (contingency coefficient = 0.234, p = 0.001). The stage of hypertension was unrelated to the respondents' tendency to stop the intake of medication when they felt badly (contingency coefficient = 0.169, p = 0.091).

Less than 1/3 (28.3%) of the respondents stopped taking medication for hypertension when they felt better. As for the previous question, discontinuation of medication was more common for men than for women (35.4% of men versus 20.8% of women) (contingency coefficient = 0.160, p = 0.001). Among adult respondents (over 79 years of age), 51.7% stopped taking medication when they felt better (contingency coefficient = 0.211, p = 0.004) The stage of hypertension was unrelated to the respondents' tendency to stop taking medication when they felt better (contingency coefficient = 0.168, p = 0.092).

A variant of MARS-5 was used in the study. Participants were asked to rate the frequency with which they engaged in each of the adherence-related behaviours on a five-point scale, where 5 = never, 4 = rarely, 3 = sometimes, 2 = often and 1 = always. Scores for each item were summed to give a total score, with higher scores indicating higher levels of reported adherence. As a result, the responses ranged from 5 to 25 as follows:

- values of 5 to 10 meant a high degree of nonadherence to treatment;

- values from 10 to 20 indicated average degree of adherence;

- values from 20 to 25 indicated a high degree of adherence.

The average MARS score of the sample was 16.81, the median was 4.162, and the most common value was 3 (24.5% of respondents).

Overall, 18.1% had a high degree of adherence to the prescribed therapy, and almost 1/3 of the respondents (32.13%) had a low degree of adherence to the prescribed therapy. Table 3 presents the descriptive characteristics of the patients included.

Table 3: MARS degree - descriptive characteristics (n = 442).

	Relative share (%)
High degree	18.1
Average degree	49.77
Low degree	32.13

Table 4 presents two-dimensional frequency distributions of MARS scores and the demographic characteristics of the respondents:

- women were more likely to adhere to the prescribed treatment than men (15.2% of men versus 21.8% of women);
- increasing age was associated with a decreased tendency to adhere to treatment (the highest share of low-degree MARS scores was observed in respondents over 60 years of age)

Table 4
MARS degrees and demographic characteristics of the respondents.

Demographic characteristic	MARS degree					
	High		Average		Low	
	n	%	n	%	n	%
*Sex**						
Male	33	7.47	109	24.66	84	19.0
Female	47	10.63	111	25.11	58	13.13
*Age***						
18–19	0	0.0	1	0.23	0	0.0
20–29	1	0.23	5	1.13	1	0.23
30–39	6	1.36	9	2.03	3	0.68
40–49	9	2.03	26	5.88	10	2.26
50–59	17	3.85	49	11.09	31	7.02
60–69	29	6.56	71	16.06	39	8.82
70–79	10	2.26	43	9.73	24	5.43
above 79	8	1.81	16	3.62	34	7.69
* Pearson's chi-Square = 7.006, p = 0.003						
** Pearson's chi-Square = 30.196, p = 0.007						

Analysis of the degree of MARS, hypertension (stage), the number of drugs taken and the presence of concomitant diseases did not reveal any significant differences. The only difference was found in respondents with renal insufficiency (among these respondents, 56.6% had low adherence compared to 30.7% for the whole sample) (Table 5).

Table 5
MARS degree and characteristics of the disease.

Characteristic		MARS degree					
		High		Average		Low	
		n	%	n	%	n	%
*Stage of hypertension**							
	First	17	3.85	55	12.44	20	4.52
	Second	12	2.71	25	5.66	19	4.30
	Third	2	0.45	11	2.49	3	0.68
	Does not know	49	11.09	129	29.18	100	22.63
*Number of medications***							
	0	0	0.0	1	0.23	0	0.0
	1	19	4.3	48	10.86	28	6.33
	2	35	7.92	86	19.46	74	16.74
	3	15	3.93	62	14.03	33	7.47
	4	10	2.26	10	2.26	6	1.36
	5	1	0.23	6	1.36	0	0.0
	6	0	0.0	1	0.23	1	0.23
	7	0	0.0	1	0.23	0	0.0
*Comorbidities ****							
	With	62	14.03	120	27.15	73	16.52
	Without	18	4.07	100	22.62	69	15.61
Type of comorbidity							
	Stroke ****	3	0.68	6	1.36	7	1.58
	Heart attack*****	2	0.45	7	1.58	4	0.90
	Kidney failure******	5	1.13	18	4.07	30	6.79
*Blood pressure*******							
	Lower than 140/90	50	11.31	137	31	76	17.19
	Higher than 140/90	30	6.79	83	18.79	66	14.93

* Pearson's Chi-Square=9.919, p=0.128

** Pearson’s Chi-Square=20.097, p=0.127

**** Pearson’s Chi-Square=1.204, p=0.548

***** Pearson’s Chi-Square=0.107, p=0.948

****** Pearson’s Chi-Square=16,754, p=0.000

*******BP values in the last week, Pearson’s chi-square=3.107, p=0.211

Discussion

In the present study, in which adherence to pharmacological and nonpharmacological treatment was studied, approximately 70% of the participants complied with pharmacological treatment. Rates of adherence to pharmacological treatment ranged between 52% and 87% in studies conducted in Turkey and between 48% and 84% in studies conducted in other countries in Africa, America, Asia. [18–27]. The WHO has reported that rates of adherence to pharmacological treatment by hypertension patients vary between 20% and 80% [28]. Thus, it can be concluded that the rate of adherence to pharmacological treatment in the present study, which was conducted in two of the largest Bulgarian cities, coincides with the rates reported in the literature. In the present study, there was no association between adherence to pharmacological treatment and comorbidities in the sample. While adherence to treatment was shown to increase as the number of diseases increased in some studies, it was shown to decrease in other studies [19, 29, 30]. In the study, an increase or decrease in the rate of adherence to treatment may have been due to the presence of comorbid chronic diseases, perceived health status, or differences in giving or receiving health care. COVID pandemic was not assessed as an important factor, influencing the level of adherence, although the patients stated that they know that the disease can worsen their health status. While sex was not shown to be a determinant of the rate of adherence to pharmacological treatment in some studies, the adherence rate was shown to be higher in women in other studies [19, 22]. In the present study, although not significant, the rate of adherence was higher in women, as previously shown in the literature [29]. This can be explained by the fact that men are busier with outdoor activities and forget to look after their health during the workday if they experience no symptoms.

Conclusions

In the present study, approximately one-third of the participants complied with pharmacological treatment. The study suggests that several sociodemographic factors but not the COVID pandemic play a role in treatment adherence. The results suggest that good motivation from health care providers can increase adherence among hypertensive patients. Further studies must regularly follow patients and assess their level of adherence to identify the causes of non-adherence and solve this problem.

Declarations

Ethics approval and consent to participate

The Ethics Committee of the Medical University of Sofia approved the study protocol (May, 2020).

Consent for publication

Not applicable

Availability of data and materials

The data used to support the findings of this study are included within the article.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

V.P. was involved in the data analysis, interpretation and study write up. E.H. was involved in the study design, data collection, interpretation and write up review. M.D. was involved in the study design, data analysis, interpretation and write up review. K.A. was involved in the data analysis, interpretation, write-up and final review. D.G. was involved in the study design, data collection, interpretation and write up review. A.T. participated in the design of the study. A.Ts. performed the document analysis. All authors read and approved the final manuscript.

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Not applicable

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