MEDICATION ADHERENCE AND ITS PSYCHOLOGICAL AND NON-PSYCHOLOGICAL BARRIERS IN HYPERTENSIVE PATIENTS USING THE "MORISKY MEDICATION ADHERENCE SCALE (MMAS-8)" IN ARAR CITY, SAUDI ARABIA

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Abstract

Objective: To estimate the frequency of adherence to antihypertensive medications in hypertensive patients and determine the Barriers to medication adherence.

Methods: This cross-sectional study was conducted among hypertensive patients in Arar, Saudi Arabia. Eight questions comprise the Arabic version of MMAS-8 that was implemented in the data collection process.

Results: A total of 540 patients were included in this study; most of them (79.3%), with a mean age of 40.76 ± 14.29 years. The data reveals a total mean MMAS-8 score of 6.16 ± 1.6, with 77.8% of participants displaying moderate adherence and 22.2% demonstrating low adherence. Marital status (P=0.012), smoking status, and occupation (P<0.001) were significantly associated with the compliance level. Patients who have longer disease duration (P<0.001), who were frequently admitted to the hospital (P=0.002), with secondary complications (P=0.038), who understand their medication regimen (P<0.001), who do not stop taking medication when they feel better (P<0.001) or worse (P<0.001), who do not suspect the effectiveness of the medication (P<0.001), who do not have medication side effects (P<0.001), and those with no alternative medicine (P=0.001) were significantly more compliant with hypertensive medication.

Conclusion: The study underscores suboptimal medication compliance in managing hypertension in Saudi Arabia. Addressing barriers like poor understanding, side effects, and alternative treatments is essential. Emphasis should be placed on patient education, ongoing follow-up, and personalized support. Future research should involve longitudinal studies to evaluate changes in adherence over time, especially in newly diagnosed patients, to better understand long-term factors influencing adherence.

Keywords: Hypertension; Medication compliance; MMAS-8; Antihypertensive treatment; Barriers to adherence.

Introduction

Despite significant advancements in the diagnosis and management of arterial hypertension, this ailment continues to place a significant financial, social, and medical burden. Even with the most effective drugs, controlling blood pressure, the main goal of antihypertensive therapy, cannot be accomplished without the patient's participation. But the research that is now available indicates that even up to 90% of hypertension patients may not stick to their medications, and that about 50% of them may stop the therapy within a year of the diagnosis [1].

In general, patients with chronic illnesses that show silently or without symptoms have low treatment adherence [2]. Since chronic illnesses need long-term, ongoing therapy, patient adherence to medication might be crucial in treating them. Due to a lack of resources, those with chronic illnesses who are underprivileged are more susceptible to poor drug adherence [3]. 40% of senior individuals who have prescriptions for medicine don't take them as directed [4]. An EU analysis claims that failing to follow treatment regimens results in 194,500 fatalities and costs the EU €125 billion yearly [5]. Adherence drug non-adherence has enormous societal repercussions, many doctors lack the necessary training to identify non-adherence and instead depend primarily on their own empirical judgment [6]. Since medication adherence is a complex, multivariate behaviour, it is crucial to have a reliable, usable method for evaluating medication adherence in everyday medical practice to comprehend patient medication behaviour [7].

Medication adherence can be assessed using either direct or indirect techniques of evaluation. Direct approaches to assess medication compliance include directly observed treatment and measuring drug or drug metabolite concentrations in urine or blood. Patients' questionnaires, pill counts, prescription fill rates, evaluation of the patient's clinical result, electronic medication monitors, and this approach, which will be described in this article, are examples of indirect methods. Each approach has advantages and disadvantages, and one of them could serve as the benchmark for another way [8]. Due to their ease of use and low cost, patient questionnaires are frequently used to assess adherence to medicines in clinical settings, even though findings may be biased by patients [9]. The Morisky Medication Adherence Scale - 8 (MMAS-8) is one of the patient questionnaires that is used the most commonly to gauge medication adherence [7].

A self-reported measure with four items about typical medication-taking habits that result in drug omission was created by Morisky et al. [10] Prior until this, it has been extensively employed, particularly in Randomized Controlled Trials (RCT) of medication adherence intervention among patients with a variety of chronic conditions. To address some of its shortcomings, the 8-item Morisky Medication Adherence Scale (MMAS-8) was later revised with an extra four items that addressed the conditions around adherence behaviour. The MMAS-8 consists of 8 items, the final of which is a 5-point Likert scale evaluation and the first seven of which are yes/no questions [11]. More than 200 investigations have employed the MMAS-8 since its introduction in 2009 up to the present. The MMAS-8 has been increasingly used in RCTs of medical adherence interventions for a variety of chronic conditions during the last years [12].

Treatment adherence is influenced by a variety of factors, including demographic characteristics (gender, age, education, and so on), psychosocial factors (quality of life), socioeconomic status and disease severity, class of drug prescribed, patient understanding of disease and importance of treatment, co-morbid medical conditions, patient-healthcare provider relationship, drug cost, forgetfulness, and the presence of psychological problems, specifically depression. The WHO emphasized in 2003 that "improving the efficacy of adherence interventions may have a far greater impact on the health of the population than any improvement in particular medical treatments." An obstacle to a higher quality of life is poor treatment compliance. The majority of health promotion initiatives aim to alter health-related information, attitudes, obstacles, and facilitators in order to modify behaviour [13].

In this situation, evaluating adherence to an antihypertensive treatment regimen might be made relatively simple by using the 8-item Morisky Medication Adherence Scale (MMAS-8). Furthermore, because the scale items depict adherence behaviours that happen most commonly in practice, this questionnaire might aid in igniting physician-patient discussion about antihypertensive medication [12]. As a result, Medication adherence and blood pressure control have a substantial relationship, according to several research done abroad.

A cross-sectional study was undertaken on patients admitted to Aga Khan University Hospital, Karachi, Pakistan found that 64% of the cohort were adherent to their medications while (36%) were non-adherent. The highest level of adherence was seen in the 61 to 75 years age group (34.9%) and in those with university-level education (30.6%). Moreover, in the hypertensive crisis group, 40.7% of the patients were adherent to their antihypertensive medications while 54.8% were found to be non-adherent, with the p-value reaching statistical significance [7].

The aim of our study is thus to estimate the frequency of adherence to antihypertensive medications in hypertensive patients and determine the Barriers to medication adherence in these patients.

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Methods

Study design & setting

A cross-sectional study design was adopted. The study was carried out at primary healthcare centres belonging to the Ministry of Health (MOH) in Arar City, which is in the northern region of Saudi Arabia.

Study period

The data were collected from October 1st to December 31st, 2023.

Study population

All adult hypertensive patients attending five randomly selected primary healthcare centres in Arar City throughout the study period were eligible for inclusion, provided they fulfilled the inclusion criteria.

Inclusion criteria:

Males or females who were hypertensive, aged between 18 and 65 years, and able to read and write independently.

Exclusion criteria

Non-hypertensive people, those older than 65 or younger than 18, or those who are illiterate or not consenting or willing to participate.

Sample size

The minimum sample size for this study was determined according to the Swinscow formula as 540 patients.

The sampling technique

A two-stage sampling technique was adopted to select the sample size as follows:

In stage 1, Arar City was stratified into four directional sectors (North, South, East, and West), and one primary healthcare centre was randomly selected from each sector using a simple random technique. In stage 2, the sample size was equally distributed between the chosen four primary healthcare centres. Thus, approximately 96 attendants were chosen randomly from each centre. Systematic random techniques were adopted in each centre to select 20 attendants daily from each centre. Thus, five working days in each centre were sufficient to select the required sample size. The sampling interval depended on the number of attendants every day.

Data collection tool

Data were collected using a self-administered questionnaire (Appendix 1). The questionnaire was composed of two main sections. Section 1 included the socio-demographic characteristics of the participants (age, gender, marital status, educational level, occupation, residence, and history of chronic diseases). The second section assessed medication adherence among hypertensive patients using the Morisky 8-Item Medication Adherence Scale (8 items).

Eight questions comprise the Arabic version of MMAS-8; seven were yes/no, while the last was a five-point scale. Items 1 through 7 had "yes" or "no" response options; question 8 had a five-point Likert response option. The majority of "no" and "yes" responses received ratings of "1" and "0," respectively. One exception is item 5, where a "yes" response received a rating of "1" and a "no" response received a rating of "0." and item 8, where response "4" (always) received a score of "0," and response "0" (never) received a score of "1." The MMAS-8 rating system was used to grade the following levels of adherence: low (score: <6), moderate (score: 6 to <8), and high (score: 8). Individuals who exhibited low to moderate levels of drug adherence were classified as non-adherent [14].

Data collection technique

The researchers distributed the questionnaire to all selected patients in the chosen primary healthcare centres and explained to them the nature of the research and the confidentiality of the information that would be given. Then, verbal consent was obtained.

Pilot study

A pilot study was conducted on 40 attendants from one PHC centre and was not included in the study to evaluate the data collection tool and methodology of the study and estimate the duration of questionnaire completion. Results were excluded from the main study.

Data analysis:

All data was entered and analyzed using SPSS 23 using appropriate statistical methods for description and analysis. For the categorical variables, descriptive statistics were shown as frequencies and percentages, and for the numerical parameters as mean ± standard deviation. The proportions were compared using chi-square. A P-value less than 0.05 was considered for statistical significance.

Ethical considerations

The research proposal was approved by the Regional Research and Ethics Committee in Arar by decision number 101/23/H on 26/10/2023. Permission was obtained from the directors of the involved PHC centres.

Results

A total of 540 patients were included in this study, most of them (79.3%), with a mean age of 40.76 ± 14.29 years. Nearly (64.4%) are married and 25.9% are single. Most participants (75.6%) had university education or higher and only 5% were illiterate. The majority (93.3%) lives in urban areas and (64.4%) were governmental employees. The majority (94.1%) were non-smokers and none were alcoholic. Less than half of the patients had other comorbidities (31.9%), and DM was the most common comorbidity (25.9%). More than half of them (53.3%) do home blood pressure monitoring (Table 1).

Most patients (60.7%) were diagnosed with hypertension less than two years ago. More than half of them (57%) delayed medication administration after their diagnosis, and 57% had anti-hypertensive medications. Most patients (67.4%) were never admitted to the hospital due to hypertension, and only 17% had complications. Only 51.1% received health education related to their condition, and only 27.4% received two or more sessions within the last six months. Most participants (65.9%) were seen by healthcare practitioners less than 3 months ago. Nearly 40.7% stopped taking medication when they felt

Table 1. Sociodemographic characteristics of the included participants (n=540).

Parameter		Frequency	%
Mean age, y	40.76 ± 14.29 (11-100)		
Gender	**Female**	428	79.3
	Male	112	20.7
Marital status	**Married**	348	64.4
	Single	140	25.9
	Divorced	16	3.0
	Widowed	36	6.7
Educational status	**Primary education**	12	2.2
	Moderate education	16	3
	Secondary education	76	14.1
	University or higher	408	75.6
	Illiterate	28	5
Region	**Urban**	504	93.3
	Rural	36	6.7
Occupation	**Student**	100	18.5
	Government employee	348	64.4
	Non-government employee	16	3.0
	Self-employee	4	.7
	Unemployed	72	13.3
Smoking	**Yes**	32	5.9
	No	508	94.1
Alcohol	**No**	540	100
Do you have any health problems other than hypertension?	**Yes**	172	31.9
	No	368	68.1
If yes, then what health problem do you have? (n=172)	**DM**	140	25.9
	Heart disease	12	2.2
	Visual problems	16	3.0
	Kidney problems	4	.7
Number of medicine are you taking for hypertension	**No medications**	160	29.6
	One medication	260	48.1
	Two medication	100	18.5
	Three medications	20	3.7
Do you do home blood pressure monitoring?	**Yes**	288	53.3
	No	252	46.7
Body weight (kg)	71.46 ± 13.84 (38-105)		
Length (cm)	161.71 ± 9.6 (125-185)		

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better, 21.53% stopped taking medication when they felt worse, and 30.4% stopped taking medication because they believed it was ineffective. Only 15.6% reported suffering side effects, and 43.7% used alternative medication (Table 2).

The data revealed a mean MMAS-8 score of (6.16 ± 1.6). The majority of participants, 420 individuals (77.8%), demonstrated a moderate level of adherence. In contrast, a smaller group, comprising 120 individuals (22.2%), exhibited low adherence (Table 3 & Figure 1).

Marital status (P=0.012), smoking status (P=0.032), and occupation (P<0.001) were significantly associated with the adherence level. Widowed individuals show moderate levels of adherence, followed by married participants, whereas single individuals have comparatively low adherence. Non-government employees, self-employees, and non-smokers showed moderate levels of adherence (Table 4).

Patients who have a longer duration of hypertension, 2-10 years (81.8%) and more than 11 years (95%), were significantly more compliant (P<0.001). Patients frequently admitted to the hospital and those with complications secondary to hypertension were significantly more compliant (P=0.002) and (P=0.038), respectively. Patients who understand their medication regimen (P<0.001), who do not stop taking medication when they feel better (P<0.001) or worse (P<0.001), who do not suspect the effectiveness of the medication (P<0.001), who do not have side effects due to medication (P<0.001), and those with no alternative medicine (P=0.001) were significantly more compliant (Table 5).

Discussion

Hypertension stands out among all other non-communicable diseases due to its significant role in the development of cardiovascular mortality [15]. Therefore, patient adherence to treatment is crucial for preventing deadly cardiovascular illnesses, and non-adherence is linked to unfavourable outcomes and resource waste [16]. To avoid issues connected to hypertension, patients' compliance with their antihypertensive medications is essential. The current study evaluated the parameters related to medication adherence in hypertensive individuals.

None of the patients included in this study recorded high compliance; 77.8%

Table 2. Hypertension treatment factors (n=540).

Parameter		Frequency	%
Disease duration	Less than two years	328	60.7
	2-10 years	132	24.4
	More than 11 years	80	14.8
Have you delayed medication administration after diagnosis?	Yes	308	57
	No	232	43
Medication type	Anti-hypertensive	308	57
	Diuretics	32	5.9
	I do not know	200	37
Number of hospital admissions related to hypertension	0	364	67.4
	1	88	16.3
	2	60	11.1
	3	16	3.0
	4	4	.7
	5	8	1.5
Complications of hypertension	Yes	92	17
	No	448	83
Ever had health education	Yes	276	51.1
	No	264	48.9
Health education in the last 6 months	None or one	392	72.6
	Two or more	148	27.4
Last seen by healthcare worker	3 months or less	356	65.9
	More than 3 months	184	34.1
Understanding drug regimen	Yes	352	65.2
	No	52	9.6
	A little	136	25.2
Do you stop taking your medicine when you feel better?	Yes	220	40.7
	No	320	59.3
Do you stop taking your medicine when you feel worse?	Yes	116	21.5
	No	424	78.5
Do you stop taking your medication because you believe that they are ineffective?	Yes	164	30.4
	No	376	69.6
Do you suffer from any side effects of medication?	Yes	84	15.6
	No	456	84.4
Do you use alternative meication?	Yes	236	43.7
	No	304	56.3
Affordability of prescribed drugs?	All drugs	192	35.6
	Some	232	43.0
	None	116	21.5

Table 3. Results of Morisky Medication Adherence Scale (MMAS-8).

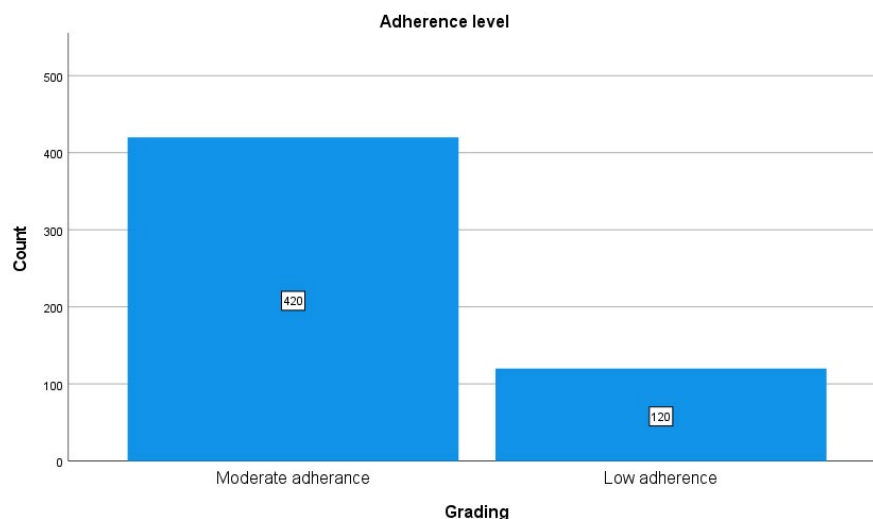| Parameter		Frequency (%
Total mean MMAS-8 score		6.16 ± 1.6
Adherence level	Moderate	420 (77.8%)
	Low	120 (22.2%)

Figure 1. Bar chart of the adherence level.

Table 4. The association between adherence level and sociodemographic characteristics.

Parameter		Adherence level		P-value
		Moderate	**Low**	
Gender	**Female**	336 (78.5%)	92 (21.5%)	0.427
	Male	84 (75%)	25 (25%)	
Marital status	**Married**	280 (80.5%)	68 (19.5%)	**0.012**
	Single	96 (68.6%)	44 (31.4%)	
	Divorced	12 (75%)	4 (25%)	
	Widowed	32 (88.9%)	4 (11.1%)	
Educational status	**Primary education**	12 (100%)	0	0.35
	Moderate education	16 (100%)	0	
	Secondary education	60 (78.9%)	16 (21.1%)	
	University or higher	308 (75.5%)	100 (24.5%)	
	Illiterate	24 (85.7%)	4 (14.3%)	
Occupation	**Student**	60 (60%)	40 (40%)	**<0.001**
	Government employee	280 (80.5%)	68 (19.5%)	
	Non-government employee	16 (100%)	0	
	Self-employee	4 (100%)	0	
	Unemployed	60 (83.3%)	12 (16.7%)	
Smoking	**Yes**	20 (62.5%)	12 (37.5%)	**0.032**
	No	400 (78.7%)	108 (21.3%)	
Types of medicine are you taking for hypertension	**No medications**	128 (80%)	32 (20%)	0.224
	One medication	204 (78.5%)	56 (21.5%)	
	Two medication	76 (76%)	24 (24%)	
	Three medications	12 (60%)	8 (40%)	
Do you do home blood pressure monitoring?	**Yes**	220 (76.4%)	68 (23.6%)	0.407
	No	200 (79.4%)	52 (20.6%)	

demonstrated a moderate level of adherence, and 22.2% exhibited low adherence. Many hypertensive patients in Saudi Arabia may have limited knowledge about the importance of adhering to prescribed treatments. Some patients may not fully understand the long-term consequences of untreated or poorly managed hypertension, leading to lower adherence rates. In our study, only 51.1% received health education related to their condition, and only 27.4% received two or more sessions within the last 6 months.

In line with our results, Khalil & Elzubier reported a low adherence rate to antihypertensive medication, and in patients who did not comply, there was insufficient blood pressure control [16]. Alotayfi *et al*. also found that Saudi Arabian patients, especially those young males, have a low level of compliance with antihypertensive medication [17]. Another study also found that there was a high rate of non-compliance among hypertension patients who visit the Al-Qabel PHC Centre in Abha [18]. In contrast, Mansour *et al*. reported proof of a high rate of hypertension medication compliance [19].

Widowed individuals show moderate levels of adherence, followed by married

participants, whereas single individuals have a comparatively low adherence (P=0.012). Non-government employees, self-employees (P<0.001), and non-smokers (P=0.032) showed moderate levels of adherence. Age and patient education had a positive and substantial correlation with non-compliance. According to Al-Sowielem & Elzubier [20], individuals with hypertension who were illiterate had substantially higher compliance rates than those who were educated. Al-Sowielem & Elzubier [20] and Al-Mustafa & Abulrahi [21] in the Kingdom of Saudi Arabia also observed reduced compliance among smokers and those with relatives who had a history of hypertension.

This is due to the fact that formal education encourages patients to become aware of and comprehend hypertension recommendations [22]. On the other hand, a study conducted in Kenya revealed that patients with greater education had higher noncompliance [23]. The primary issues related to patients include inadequate understanding of the hypertension condition, limited awareness, and the absence of symptoms linked with hypertension [24].

In this study, patients with a longer duration of hypertension (2-10 years at

Table 5. The association between adherence level and hypertension treatment factors (n=540).

Parameter		Adherence level		P-value
		Moderate	Moderate	
Disease duration	Less than two years	236 (72%)	92 (28%)	**<0.001**
	2-10 years	108 (81.8%)	24 (18.2%)	
	More than 11 years	76 (95%)	4 (5%)	
Have you delayed medication administration after diagnosis	Yes	232 (75.3%)	76 (24.7%)	0.114
	No	188 (81%)	44 (19%)	
Number of hospital admissions related to hypertension	0	284 (78%)	80 (22%)	**0.002**
	1	76 (86.4%)	12 (13.6%)	
	2	40 (66.7%)	20 (33.3%)	
	3	8 (50%)	8 (50%)	
	4	4 (100%)	0	
	5	8 (100%)	0	
Complications of hypertension	Yes	64 (69.6%)	28 (30.4%)	**0.038**
	No	356 (79.5%)	92 (20.5%)	
Ever had health education	Yes	216 (78.3%)	60 (21.7%)	0.782
	No	204 (77.3%)	60 (22.7%)	
Health education in the last 6 months	None or one	300 (76.5%)	92 (23.5%)	0.257
	Two or more	120 (81.1%)	28 (18.9%)	
Last seen by healthcare worker	3 months or less	284 (79.8%)	72 (20.2%)	0.120
	More than 3 months	136 (73.9%)	48 (26.1%)	
Understanding drug regimen	Yes	292 (83%)	60 (17%)	**<0.001**
	No	32 (61.5%)	20 (38.5%)	
	A little	96 (70.6%)	40 (29.4%)	
Do you stop taking your medicine when you feel better?	Yes	152 (69.1%)	68 (30.9%)	**<0.001**
	No	268 (83.8%)	52 (16.3%)	
Do you stop taking your medicine when you feel worse?	Yes	68 (58.6%)	48 (41.4%)	**<0.001**
	No	352 (83%)	72 (17%)	
Do you stop taking your medication because you believe that they are ineffective?	Yes	100 (61%)	64 (39%)	**<0.001**
	No	320 (85.1%)	56 (14.9%)	
Do you suffer from any side effects of medication?	Yes	48 (57.1%)	36 (42.9%)	**<0.001**
	No	372 (81.6%)	84 (18.4%)	
Do you use alternative medicine?	Yes	168 (71.2%)	68 (28.8%)	**0.001**
	No	252 (82.9%)	52 (17.1%)	
Affordability of prescribed drugs?	All drugs	148 (77.1%)	44 (22.9%)	0.182
	Some	188 (81%)	44 (19%)	
	None	84 (72.4%)	32 (27.6%)	

81.8%, and more than 11 years at 95%) showed significantly higher compliance (P<0.001). Additionally, patients who were frequently hospitalized or had hypertension-related complications were also more compliant (P=0.002 and P=0.038, respectively). Almonawar *et al.* also found a higher rate of non-compliance among newly diagnosed patients [18]. The comparison with Almonawar *et al.*'s findings, which indicate higher rates of non-compliance among newly diagnosed patients, supports the idea that individuals who have not yet experienced the long-term effects or complications of hypertension might underestimate the importance of strict adherence to treatment. These patients might need more targeted education and support to improve compliance early after diagnosis. Together, these findings highlight the importance of patient education and experience in promoting adherence to hypertension treatment.

We also found that those who understood their medication regimen, did not stop taking medication when feeling better or worse, did not doubt the medication's effectiveness, experienced no side effects, and did not use alternative medicine were significantly more compliant, with all P-values less than 0.001 except for alternative medicine (P=0.001). Patients with hypertension should receive information on the condition, medication, nutrition, exercise, and follow-up appointments. Patients must be counselled to set up self-reminders so they do not forget to take their medications and follow up with doctors. Patients with hypertension should be counseled against smoking. PHC doctors should give their hypertension patients adequate time to discuss their concerns, meet their expectations for a consultation, and refrain from overprescribing several anti-hypertensive drugs [18].

Strengths and limitations

The study's robust sample size (540 participants) enhances the generalizability of the findings to the broader hypertensive population in Saudi Arabia. The Morisky Medication Adherence Scale (MMAS-8), a widely validated tool, ensures a reliable assessment of adherence behaviours. Additionally, including multiple demographic and clinical variables allows for a comprehensive analysis of factors influencing medication adherence.

The cross-sectional design limits the ability to establish causality between the identified factors and medication adherence. Self-reported data on adherence and other variables may introduce recall bias or social desirability bias, potentially overestimating adherence rates. Furthermore, the study was conducted in a single city, which may restrict the generalizability of the findings to other regions with different healthcare dynamics.

Conclusion

The study highlights a significant issue in the management of hypertension: suboptimal medication adherence in Saudi Arabia. Addressing barriers such as poor understanding of the medication regimen, side effects, and the use of alternative treatments is crucial. Healthcare professionals should focus on patient education, continuous follow-up, and personalized support to optimize treatment outcomes and reduce the burden of hypertension-related complications. Future research should explore longitudinal studies to assess how medication adherence evolves, especially in newly diagnosed hypertensive patients. This approach would help establish causality and determine the long-term effects of various factors on adherence.

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(Appendix-I)

The Morisky 8-Item Medication Adherence Scale (8 items)

1. Do you sometimes forget to take your high blood pressure pills?

2. Over the past two weeks, were there any days when you did not take your high blood pressure medicine?

3. Have you ever cut back or stopped taking your medication without telling your doctor, because you felt worse when you took it?

4. When you travel or leave home, do you sometimes forget to bring along your medications?

5. Did you take your high blood pressure medicine yesterday?

6. When you feel like your blood pressure is under control, do you sometimes stop taking your medicine?

7. Taking medication every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your blood pressure treatment plan?

8. How often do you have difficulty remembering to take all your blood pressure medication?