

# Factors Influencing Adherence to Anti-hypertensive Medications: A Cross-sectional Study Among the Najran Population, Saudi Arabia

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## Abstract

**Background:** Anti-hypertensive drugs are crucial for managing hypertension, a significant cause of morbidity and mortality globally. However, adherence to anti-hypertensive medications is often suboptimal, leading to poor blood pressure control and an increased risk of cardiovascular events.

**Objectives:** This study aims to determine the elements affecting the Najran population's adherence to anti-hypertensive medication.

**Methods:** A cross-sectional study was conducted in Najran, Saudi Arabia, with 208 hypertensive patients recruited from primary care clinics. Medication adherence was assessed using the 8-item Morisky Medication Adherence Scale (MMAS-8). Descriptive statistics, bivariate analysis, and multivariate logistic regression were performed to identify factors associated with non-adherence. A P-value < 0.05 was considered statistically significant.

**Results:** The mean MMAS-8 score was  $4.66 \pm 2.53$ , indicating moderate non-adherence. Non-adherence was significantly associated with female sex ( $P = 0.001$ ), single marital status ( $P = 0.001$ ), lower education level ( $P < 0.001$ ), private employment ( $P = 0.005$ ), and rural residency ( $P = 0.002$ ). Multivariate analysis showed that female sex [odds ratio (OR) = 2.56,  $P = 0.001$ ], single status (OR = 3.29,  $P = 0.001$ ), primary education (OR = 2.89,  $P = 0.005$ ), and rural residency (OR = 3.12,  $P = 0.012$ ) were independent predictors of non-adherence.

**Conclusions:** Several factors are associated with non-adherence to anti-hypertensive medications among the Najran population in Saudi Arabia. Female sex, single marital status, primary education, private sector employment, and rural residency were independent predictors of non-adherence. These findings suggest that interventions to improve adherence to anti-hypertensive medications should consider these factors and be tailored to the specific needs and challenges faced by individuals in the studied subgroups.

**Keywords:** Adherence; Medication; Antihypertensive; Non-adherence

## 1. Background

The process of continuously taking prescribed drugs as instructed by a healthcare professional represents anti-hypertensive medication adherence. It is a crucial aspect of managing hypertension, also known as high blood pressure, as it can significantly impact an individual's blood pressure control and overall health outcomes (1). Cardiovascular disease is the primary cause of morbidity and death globally, and hypertension is a key risk factor for it (2). It is described as having blood pressure readings that are persistently higher than 140/90 mmHg. It can be brought on by several factors, including poor lifestyle choices, genetics, and certain medical disorders (3)2cC.

In addition to pharmacological treatment with anti-hypertensive drugs, effective management of hypertension requires lifestyle changes, including stress management,

frequent physical exercise, and a nutritious diet (2). These medications work by lowering blood pressure and reducing the risk of cardiovascular events such as stroke, heart attack, and heart failure (2).

However, adherence to anti-hypertensive medications can be challenging for a variety of reasons. According to a comprehensive review and meta-analysis of research from Ethiopia, the average percentage of anti-hypertensive drug adherence was 65.1% (4). The hassle of taking many drugs, the side effects, the price, and a lack of knowledge of the medication's usefulness are some factors that might cause non-adherence.

Poor adherence to anti-hypertensive medications can have serious consequences. A study conducted in Finland found that non-adherence to anti-hypertensive medicines



was associated with an odds ratio of 7.4 for developing stroke among those non-adherent to statin and anti-hypertensive medications (5).

## 2. Objectives

This study aims to identify the factors influencing adherence to anti-hypertensive medications among the Najran population in Saudi Arabia.

Method

## 3. Methods

### 3.1. Study Design and Setting

The population of Najran, Saudi Arabia, was the subject of this cross-sectional survey. The research was carried out between January and June 2020.

### 3.2. Study Population

Individuals with a diagnosis of hypertension and those who were presently using anti-hypertensive drugs were included in the study population if they were 18 years of age or older. Participants were recruited from primary care clinics in Najran. Based on a prior study that revealed a 50% prevalence of anti-hypertensive drug non-adherence, the sample size was estimated (reference). A sample size of 384 participants was calculated with a 95% confidence interval and a 5% margin of error.

### 3.3. Data Collection

A self-administered data collection tool was used to gather sociodemographic and adherence-related information from participants. The tool included questions on age, gender, education level, employment status, marital status, and the number of medications being taken. The Morisky Medication Adherence Scale (MMAS-8) was also included in the data collection tool to assess adherence to anti-hypertensive medications. The MMAS-8 is a validated tool that consists of eight questions that determine the likelihood of medication non-adherence based on four domains: Forgetfulness, difficulties in taking medications, a perceived need for drugs, and side effects (refer-

ence). The MMAS-8 has a score range of 0 - 8, with higher scores indicating a higher likelihood of non-adherence.

### 3.4. Data Analysis

The Statistical Package for the Social Sciences (SPSS) version 25.0 was used to evaluate the acquired data once it was entered into a computer. The research population's sociodemographic parameters were described using descriptive statistics. The mean and standard deviation were used to examine the MMAS-8 results. To determine the relationship between sociodemographic characteristics and anti-hypertensive medication adherence, bivariate analysis was used. To discover independent determinants of adherence to anti-hypertensive medication, multiple logistic regression analysis was used. A P-value of 0.05 or less was regarded as statistically significant.

### 3.5. Ethical Considerations

The Najran University Institutional Review Board examined and approved the study procedure. After being fully informed, all participants provided their consent in writing. The privacy of the participants was protected throughout the study, and the confidentiality of the data acquired was guaranteed.

## 4. Results

The social and demographic characteristics of the study's 208 participants are shown in Table 1. The average age of the participants was  $53 \pm 12$  years, with the bulk of them being between the ages of 30 and 50 (38.5%) and 51 and 90 (56.3%). The majority of the participants were married (57.2%), and the sample had a slight masculine bias (58.2%). The educational level of the participants was diverse, with a significant proportion having secondary education (34.6%) or university education or higher (18.3%). The majority of the participants were employed in the public sector (36.1%), and the majority were residents of urban areas (95.2%). The majority of the participants learned about their hypertension from family and friends (46.6%), and the majority had been taking anti-hypertensive medications for 1 - 4 years (91.8%).

**Table 1.** Sociodemographic Characteristics of the Participants (N = 208) <sup>a</sup>

Parameters	Values
<b>Age group (y)</b>	
18 - 29	11 (5.3)
30 - 50	80 (38.5)
51 - 90	117 (56.3)
<b>Age (y)</b>	$53 \pm 12$
<b>Sex</b>	
Female	87 (41.8)
Male	121 (58.2)

<b>Marital status</b>	
Single	14 (6.7)
Married	119 (57.2)
Widowed	48 (23.1)
Divorced	27 (13)
<b>Educational level</b>	
Primary education	12 (5.8)
Secondary education	72 (34.6)
University and more	38 (18.3)
Intermediate	68 (32.7)
Illiterate	18 (8.7)
<b>Employment status</b>	
Public sector	75 (36.1)
Private sector	16 (7.7)
Military sector	32 (15.4)
Unemployed	73 (35.1)
Other	12 (5.8)
<b>Residency</b>	
Rural area	10 (4.8)
Urban area	198 (95.2)
<b>Source of knowledge</b>	
Family and friends	97 (46.6)
Newspapers	36 (17.3)
No specific source	48 (23.1)
Social media	27 (13)
<b>Duration of anti-HTN medications (y)</b>	
1 to 4	191 (91.8)
5 or more	17 (8.2)

<sup>a</sup> Values are expressed as No. (%) or mean  $\pm$  SD.

Table 2 shows the results of the MMAS-8 for the study participants (n = 208). Eight questions constitute the MMAS-8, which evaluates the possibility of non-adherence to medication based on four domains: Orgetfulness,

difficulties in taking medications, the perceived need for drugs, and side effects. The score range for the MMAS-8 is 0 - 8, with higher scores indicating a higher likelihood of non-adherence.

**Table 2.** Morisky Medication Adherence Scale Items and Average Score (N = 208) <sup>a</sup>

Parameters	Values
<b>Do you sometimes forget to take your anti-hypertensive drugs?</b>	
No	89 (42.8)
Yes	119 (57.2)
<b>People sometimes miss taking their anti-hypertensive medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your anti-hypertensive drugs?</b>	
No	110 (52.9)
Yes	98 (47.1)
<b>Have you ever cut back or stopped taking the medication without telling your doctor because you felt worse when you took it?</b>	
No	135 (64.9)
Yes	73 (35.1)

**When you travel or leave home, do you sometimes forget to bring along your anti-hypertensive medications?**

No	101 (48.6)
Yes	107 (51.4)

**Did you take your anti-hypertensive drugs yesterday?**

No	43 (20.7)
Yes	165 (79.3)

**When you feel like your hypertension is under control, do you sometimes stop taking your medicine?**

No	130 (62.5)
Yes	78 (37.5)

**Taking anti-hypertensive drugs every day is a genuine inconvenience for some people. Do you ever feel hassled about sticking to your blood pressure treatment plan?**

No	110 (52.9)
Yes	98 (47.1)

**How often do you have difficulty remembering to take your anti-hypertensive drugs?**

Never	66 (31.7)
Sometimes	42 (20.2)
Rarely	56 (26.9)
Always	7 (3.4)
Mostly	37 (17.8)

**MMAS-8 score** 4.66 ± 2.53

<sup>z</sup> Abbreviation: MMAS-8, Morisky Medication Adherence Scale.

<sup>a</sup> Values are expressed as No. (%) or mean ± SD.

According to the MMAS-8 results, a sizable percentage of participants admitted to occasionally forgetting to take their anti-hypertensive medications (57.2%), missing doses for reasons other than forgetting (47.1%), and feeling stressed about following their treatment regimen (47.1%). A sizeable proportion (31.7% never, 20.2% sometimes, 26.9% rarely, 3.4% consistently, and 17.8% mostly) also stated that they had difficulty knowing when to take their medications.

Table 3 shows the association between sociodemographic characteristics and the MMAS-8 scores for the study participants (n = 208). The MMAS-8 is a validated tool that consists of eight questions that assess the likelihood of medication non-adherence based on four domains: Forgetfulness, difficulties in taking medications, the perceived need for drugs, and side effects. The score range for the MMAS-8 is 0 - 8, with higher scores indicating a higher likelihood of non-adherence.

**Table 3.** Morisky Medication Adherence Scale Scores in Association with Sociodemographic Characters (N = 208) <sup>a</sup>

Parameters	MMAS Score	P-Value
<b>Age group (y)</b>		0.612 b
18 - 29	5.09 ± 0.34	
30 - 50	4.78 ± 2.63	
51 - 90	4.54 ± 2.58	
<b>Sex</b>		0.001 c
Female	5.36 ± 2.24	
Male	4.15 ± 2.62	
<b>Marital status</b>		0.001 b
Single	6.64 ± 1.75	
Married	4.84 ± 2.52	
Widowed	4.23 ± 2.16	
Divorced	3.6 ± 2.92	
<b>Educational level</b>		0.000 b
Primary education	5.17 ± 2.14	

Secondary education	5.53 ± 2.89	
University and more	5.42 ± 1.64	
Intermediate	3.78 ± 2.1	
Illiterate	2.54 ± 2.17	
<b>Employment status</b>		0.005 b
Public sector	4.51 ± 2.09	
Private sector	6 ± 1.4	
Military sector	4.94 ± 2.62	
Unemployed	4.62 ± 2.91	
Other	3.25 ± 2.98	
<b>Residency</b>		0.002 c
Rural area	1.93 ± 2.02	
Urban area	4.8 ± 2.48	
<b>Source of knowledge</b>		0.000 b
Family and friends	4.63 ± 2.68	
Newspapers	5.06 ± 2.31	
No specific source	5.73 ± 1.71	
Social media	2.32 ± 2.03	
<b>Duration of anti-HTN medications (y)</b>		0.000 c
1 to 4	4.88 ± 2.48	
5 or more	2.1 ± 1.56	

<sup>a</sup> Values are expressed as mean ± SD.

<sup>b</sup> The Kruskal-Wallis test was used.

<sup>c</sup> The Mann-Whitney test was used.

The results of the bivariate analysis showed a significant association between MMAS-8 scores and the following sociodemographic characteristics: Sex, marital status, educational level, employment status, residency, source of knowledge, and duration of anti-hypertensive medications. Notably, female participants' MMAS-8 scores were considerably higher than those of male participants ( $P = 0.001$ ). Single individuals scored significantly higher on the MMAS-8 than participants who were married, widowed, or divorced ( $P = 0.001$ ). Compared to individuals with a university education or higher, secondary education, intermediate education, and illiteracy, participants with elementary education had substantially better MMAS-8 scores ( $P = 0.000$ ). The MMAS-8 scores of participants in the commercial sector were considerably higher than those in the public sector ( $P = 0.005$ ). In comparison to participants from urban regions, people from rural areas scored considerably better on the MMAS-8 ( $P = 0.002$ ). In contrast to individuals who learned about their hypertension via family and friends, those who knew about their hypertension from newspapers had substantially higher MMAS-8 scores ( $P = 0.000$ ). In comparison to individuals who had been on anti-hypertensive drugs for 1 - 4 years, participants who had been taking anti-hypertensive medications for 5 years or more had substantially lower MMAS-8 scores ( $P = 0.000$ ).

## 5. Discussion

The degree to which patients take their prescriptions as directed is known as medication adherence. It is crucial for the effective management of chronic illnesses like hypertension (high blood pressure). Poor anti-hypertensive drug adherence can result in insufficient blood pressure management, which increases the risk of significant health issues such as renal disease, heart attack, and stroke. With a frequency of about 40% among adults, hypertension is a prevalent ailment in Saudi Arabia. Anti-hypertensive drug adherence is a complex condition that can be affected by patient views, access to treatment, attitudes, and the structure of the healthcare system. The findings of this study emphasize the significance of determining the factors that affect anti-hypertensive drug adherence, as non-adherence to these medications is a significant problem that can adversely affect blood pressure control and raise the risk of cardiovascular events. The results of the MMAS-8 showed that the average score for the study participants was  $4.66 \pm 2.53$ , indicating a moderate level of non-adherence to anti-hypertensive medications.

Some research has been undertaken in Saudi Arabia to evaluate the adherence patterns of hypertension patients. This research sought to assess patients' hypertension compliance and awareness (6), treatment practices (7), and hypertension management (8). The

main conclusions were that patients' knowledge of hypertension was lacking (6), there was little awareness of hypertension, blood pressure was poorly controlled, and patients' hypertension practices needed to change by improving their diet and lifestyle (7), and that its treatment was not being used (8). Despite this, the primary benefit of these studies is that they use large sample sizes for their research. The data-gathering techniques used in these investigations are their main drawback. For example, utilizing the WHO stepwise method of monitoring (STEPS) of non-communicable disease risk factors, the research examined the practices of hypertension patients (7). Rather than concentrating on specific patients' behaviors, the contents of this survey were designed to be utilized to gather nationwide data regarding chronic illness risk factors (9). Therefore, more studies in this area are necessary, using a test design, especially for exploring the adherence behaviors of Saudi hypertensive patients.

The results of bivariate and multivariate analyses showed that several sociodemographic factors were associated with non-adherence to anti-hypertensive medications. Female sex, single marital status, primary education, private sector employment, and rural residency were independent predictors of non-adherence. These findings are consistent with previous studies conducted in Saudi Arabia (10), Lebanon (11), the United States (12), and China (13). This low rate may be due to a higher cut-off level for adherence in this study (a score of 8 on the MMAS Scale) compared to other studies (a score of 6 out of 8). Cultural factors may also have contributed to the difference in adherence rates between this study and others.

The finding that single marital status was a predictor of non-adherence in this study is intriguing and warrants further investigation. Single individuals may face unique challenges that affect their ability to adhere to their medication regimens, such as a lack of social support or someone to remind them to take their medications. It is also possible that single individuals may have different attitudes towards their health and medication-taking compared to married individuals. Future research is necessary to comprehend the underlying causes of this association and to establish methods to address these issues and improve adherence among single individuals.

The finding that private-sector employment was a predictor of non-adherence in this study is also interesting and warrants further investigation. Individuals employed in the private sector may face different challenges and barriers to adherence compared to those employed in the public sector. For example, they may have more irregular work schedules or may be more prone to work-related stress, which could interfere with their ability to take their medications as prescribed. To address these issues and enhance adherence among workers in the private sector, further research is required to understand the underlying causes and to design solutions.

Patient education programs might be used to improve

adherence to antihypertensive medications. These programs may assist in increasing adherence by giving patients the information and abilities to evaluate their illness and course of treatment.

### 5.1. Conclusions

In conclusion, this study's findings suggest that female gender, single marital status, elementary education, private sector work, and rural domicile are independent predictors of antihypertensive medication non-adherence among the Najran population in Saudi Arabia. Interventions to increase antihypertensive medication adherence should take these characteristics into account and be adapted to the unique requirements and obstacles that individuals in these subgroups encounter. Additional study is required to determine the underlying causes of these correlations and to create effective strategies to enhance adherence and minimize the burden of hypertension.

### 5.2. Limitations

Some limitations to this study should be considered when interpreting the results. First, the cross-sectional design of the study does not allow for the determination of cause-and-effect relationships between the variables. Second, the study relied on self-reported data, which may be subject to recall and social desirability biases. Third, the sample size was relatively small and may not be representative of the entire Najran population. Fourth, the study did not assess other potential predictors of adherence, such as access to healthcare, patient-doctor communication, and patient-pharmacist communication, which may have influenced the results.

### 5.3. Future Research

Despite these limitations, the findings of this study offer valuable insights into the factors influencing antihypertensive treatment outcomes among the Najran community in Saudi Arabia. Identifying these factors is crucial for developing interventions to improve adherence and ultimately reduce the burden of hypertension. Future research should consider the use of more objective measures of adherence, such as electronic pill bottles or electronic monitoring devices. It should assess a broader range of potential predictors of adherence, such as access to healthcare, patient-doctor communication, and patient-pharmacist communication. Research is also required to understand the temporal correlations between these characteristics and adherence to anti-hypertensive medication.

**Authors' Contribution:** A. I. A. the only author of the article and the study was solely carried out by the author.

**Conflict of Interests:** The author declares no conflict of interest.

**Data Reproducibility:** The dataset presented in the study is available on request from the corresponding au-

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**Ethical Approval:** The Najran University Institutional Review Board examined and approved the study procedure.

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