

Adherence to Medications of Hypertension among Hypertensive Patients of Majmaah City of Saudi Arabia

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Abstract Objectives: To assess engagement in heart-healthy lifestyle practices and adherence to antihypertensive medications with knowledge of hypertension, for more effective blood pressure control. **Methodology:** It was a cross-sectional study involving adults of more than 18 years diagnosed with hypertension as study participants. Total sample size was 381. Assessment of medication adherence, and responses were calculated using Malaysian Medicine Adherence Score 8 (MALMAS 8) scale. The scoring system utilized in the MALMAS questionnaire, aligned with the MMAS-8, aids in categorizing participants based on their medication adherence levels. Data were collected using a pre-tested, self-administered questionnaire. The data were analysed using the statistical software for social sciences (SPSS26). **Results:** The prevalence of hypertension among the selected study participants was found to be 71%. High level of adherence was found in 33% of the participants. The medication adherence of the patient was significantly associated with gender ($p < 0.05$). 27% of the study participants belong to the age group of 25-40 years. Around 63% of the females were having high adherence and this association was found to be statistically significant, (p value < 0.05). There was no statistically significant association between participants' adherence to the age group they belong, marital status, educational level and their occupation. **Conclusion:** In conclusion, this cross-sectional study highlights the difficulty in adhering to treatment plans, with forgetfulness and trouble taking medications ranking as the biggest obstacles. Interestingly, adherence was higher in females than in males. Nevertheless, no statistically significant correlation was observed between medication adherence and other demographic variables, including age, income level, occupation, marital status, education, or occupation.

Key Words compliance, adherence, medication, hypertension, lifestyle changes

1. Introduction

With over a billion people affected worldwide, hypertension is a major modifiable risk factor for cardiovascular disease [1], [2]. Despite improvements in diagnosis and treatment, hypertension—dubbed "the silent killer" because of its undiagnosed and chronic nature—affects about one in three persons in the US [3], [4]. A few decades ago, very few people were aware of the consequences of hypertension; just 25% of adults knew that it was linked to heart disease and stroke [4]. However, new polls show that people are more conscious of their condition; more than 70% of people know they have high blood pressure, and more than half of those who receive treatment achieve ideal blood pressure control [4], [5].

Uncontrolled hypertension is caused by a variety of vari-

ables, including issues related to the patient and the physician [6]. Lack of understanding about hypertension might affect blood pressure control by decreasing compliance with prescription drugs and heart-healthy lifestyle choices [7]–[9]. Clinical research have demonstrated time and time again the beneficial effects of dietary salt reduction on older individuals' blood pressure control [10], [11]. Furthermore, it has been demonstrated that hypertensive people's blood pressure can be lowered by losing weight and increasing their physical activity [12], [13]. Following a doctor's prescription for anti-hypertensive medicine is essential for managing hypertension effectively, which lowers healthcare expenses and the risk of cardiovascular disease [14], [15].

While some research indicates that patients are aware of

the benefits of lowering blood pressure for their health, the majority of studies assessing hypertension knowledge fail to look into the relationship between hypertension knowledge and heart-healthy lifestyle choices and medication compliance [16]. This cross-sectional study will assess hypertension knowledge among adult hypertensive patients and investigate its relationship with heart-healthy lifestyle choices and adherence to antihypertensive drugs for better blood pressure control.

2. Methodology

The proposed research adopts a cross-sectional study design conducted in Majmaah city, focusing on the Saudi population, including both males and females, during the year 2022. The study involves Saudi adults aged 18 and above, diagnosed with hypertension in Majmaah city as study participants and the sample size, determined using Raosoft software, comprises 381 participants, ensuring statistical robustness. The research employs the Malaysian Medicine Adherence Score 8 (MALMAS 8) questionnaire as the study tool, which assesses medication adherence, and responses are scored using the MMAS-8 scale. The total score, ranging from 0 to 8, categorizes medication adherence into three levels: low adherence (total score < 6), medium adherence (6 to < 8), and high adherence (total score = 8). The scoring system utilized in the MALMAS questionnaire, aligned with the MMAS-8, aids in categorizing participants based on their medication adherence levels. This classification, ranging from low to high adherence, provides a comprehensive understanding of adherence patterns among the hypertensive population in Majmaah city.

With a specific emphasis on medication adherence, the study aims to elucidate patterns of adherence among Saudi adults diagnosed with hypertension in Majmaah city. The utilization of the MALMAS 8 questionnaire facilitates a nuanced assessment of adherence behaviors. The total scores obtained from both MALMAS and MMAS-8 contribute to categorizing participants into distinct adherence levels, allowing for a detailed analysis of medication adherence patterns within the Saudi hypertensive population. The delineation of adherence levels, encompassing low, medium, and high adherence categories, provides a comprehensive framework for understanding and interpreting the medication adherence behaviors exhibited by the participants. This study's findings hold implications for hypertension management strategies, shedding light on adherence patterns that can inform targeted interventions to improve medication adherence among the hypertensive population in Majmaah city. A pre-tested and self-administered questionnaire was used for data collection. Data was analyzed by using statistical package for social sciences (SPSS26).

3. Results

The prevalence of Hypertension among selected group was 71% as in Figure 1.

Previous history of Hypertension (N=423)

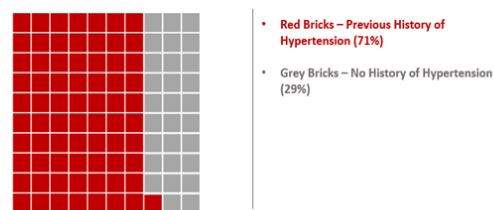


Figure 1: Previous history of Hypertension (N=423)

Variable	Value	Frequency	Percent
Age groups in years	18-24	44	14.7
	25-40	82	27.3
	41-50	79	26.3
	51-60	60	20.0
	More than 60	35	11.7
Gender	Male	150	50.0
	Female	150	50.0
Marital status	Single	55	18.3
	Married	190	63.3
	Divorced	37	12.3
	Widowed	18	6.0
Educational level	Less than secondary school	57	19.0
	Secondary school	120	40.0
	University degree	123	41.0
Occupation	Employee	83	27.7
	Unemployment	90	30.0
	Retired	72	24.0
	Student	20	6.7
	Homemaker	35	11.7
Income level in SRs.	Less than 5000	92	30.7
	5000 – 10000	126	42.0
	10000 - 20000	57	19.0
	More than 20000	25	8.3

Table 1: Demographic characteristics of the participants (N=300)

Age-wise, 27% of people fall into the 25–40 year age group, 26% into the 41–50 year age group, and 20% into the 51–60 year age group. 14 percent of people in the 18–24 age range and 12 percent of people over 60. Males made up 50% of the participants, while females made up 50%. Sixty-six percent of the participants were widowed, divorced, or single, while the remaining thirty-three percent were single Table 1.

Regarding education, the majority of participants held a secondary school certificate (40%) or a university degree (40%), with only 20% having less education than that. In terms of occupation, 30% of people were unemployed, 28% were working, 24% were retired, and just 8% were students. As for the participants' income levels in monthly SRs, the majority (42%) were in the range of (5000 – 10000), (31%), (less than 5000), (19) (10000 – 20000), and just 8% were in the range of (more than 20000).

Almost half of the participants (49%) had been diagnosed with hypertension for 1 to 5 years, while 23% had been diagnosed for less than a year, 18% for 6 to 10 years, and 10%

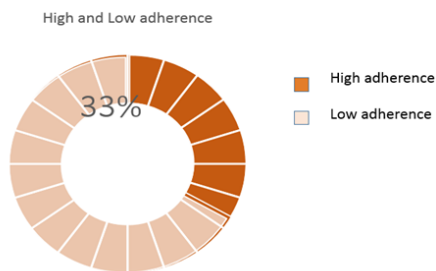


Figure 2: Participants adherence to the medications (N = 300)

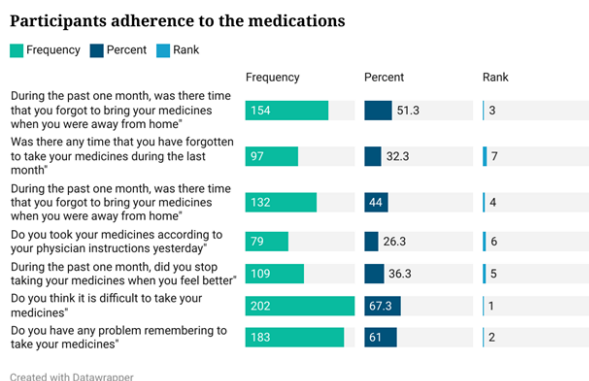


Figure 3: Participants adherence to the medications

for more than 10 years. Of the participants with hypertension, approximately 44% took one medicine daily, 37% took two medications daily, 16% took three medications before bed, and 2% used more than three medications daily.

About 45% of people take their medications once a day, 41% take them twice a day, and 13% take them three times a day. Regarding comorbidities, about 44% had none at all, 40% had diabetes, 12% had heart disease, 8% had kidney disease, and 3% had stroke. About 43% of participants said it's quite easy, 37% said it's easy, 16% said it's fairly difficult, and only 3% said it's difficult to get to pharmacies and medical facilities. Regarding social support, the majority of participants (56%) reported receiving assistance from friends and family, 26% from acquaintances, and only 18% reported receiving no social support at all (Table 2).

About one-third of participants (33%) were highly adherence to the medications, while about two-third of participants (67%) were low adherence to the medications, also there was statistically significant association high adherence and low adherence, p value < 0.05 (Figure 2).

As mentioned in Figure 3, The Participants adherence to the medications was low (67%) where "I think it is difficult to take your medicines" got 1st rank, followed by "have any problem remembering to take your medicines" followed by "During the past one month, was there time that you forgot to bring your medicines when you were away from home".

Although the low adherence was more (32%) among the

25-40 years age group but there was no statistically significant association between participants' adherence to the medications and age group , p value > 0.05 (Table 3).

Around 63% of the females were having high adherence and this association was found to be statistically significant, (p value < 0.05.) (Table 4).

There was no statistically significant association between participants' adherence to the medications and marital status, p value > 0.05 (Table 5).

There was no statistically significant association between participants' adherence to the medications and educational level, p value < 0.05 (Table 6).

There was no statistically significant difference between participants' adherence to the medications and occupation, p value > 0.05 (Table 7).

There was no statistically significant association between participants' adherence to the medications and Income level in SRs, p value > 0.05 (Table 8).

4. Discussion

The highest proportion of participants (27.3%) were between the ages of 25 and 40, followed by 41 and 50. Out of the 300 participants, 50% were men and 50% were women. The subjects in a study conducted by Shuvankar Mukherjee et al. in Kolkata had an average age of 42.64 (SD 15.70) years. Of them, 33.6% (158/470) were women and 66.4% (312/470) were men. The discrepancy in the population of men and women could be caused by various cities that supply hospitals [17].

In a different study conducted in Warangal, Andhra Pradesh, Medi et al. discovered that there were more females (n = 79, 56.57%) than males (n = 61, 43.57%), which is greater than the current study; this could be because the respective populations' sex ratios differ [18]. The mean age of the subjects in a study by Ayub A was found to be 39.42 ± 5.21 years (Mean ± SD). 207 (49.75%) of the 416 participants were men, and 209 (50.24%) were women [19], [20] which is comparable to our study (Maximum participants from age group of 25-40 years).

In the current study, most half of the participants (49%) had been diagnosed with hypertension for 1 to 5 years, while 23% had been diagnosed for less than a year, 18% for 6 to 10 years, and 10% for more than 10 years. Of the participants with hypertension, approximately 44% took one medicine daily, 37% took two medications daily, 16% took three medications before bed, and 2% used more than three medications daily. About 45% of people take their medications once a day, 41% take them twice a day, and 13% take them three times a day. About one-third of participants (33%) were highly adherence to the medications, while about two-third of participants (67%) were low adherence to the medications, also there was statistically significant association high adherence and low adherence, p value < 0.05. According to a study by Kiranmayi Venkata Kakumani et al., the most frequent cause of non-compliance is a lack of desire for treatment adherence. Many participants (61.4% of diabetics and 55.8%

Variable	Value	Frequency	Percent
Duration of hypertension diagnosis	Less than 1 year	68	22.7
	1-5 years	148	49.3
	6-10 years	54	18.0
	More than 10 years	30	10.0
Number of medications taken for hypertension	One	133	44.3
	Two	111	37.0
	Three	49	16.3
	More than Three	7	2.3
Frequency of medication(s) taken	Once a day	134	44.7
	Twice a day	124	41.3
	Three times a day	38	12.7
	Four times a day	4	1.3
Health conditions or comorbidities	No other comorbidity	133	44.2
	Diabetes	119	39.5
	Heart diseases	37	12.3
	Kidney diseases	23	7.6
	Stroke	8	2.7
	other	10	3.0
Accessibility to medical facilities and pharmacies	Easy	112	37.3
	Fairly easy	128	42.7
	Fairly difficult	47	15.7
	Difficult	13	4.3
Social support	Family members	169	56.3
	Friends	77	25.7
	Nothing	54	18.0

Table 2: Medical history and medications use of the participants (N = 300)

Adherence level		Age group in years					Total	P Value
		18-24	25-40	41-50	51-60	More than 60		
Low adherence	Count	31	64	48	37	20	200	0.07
	% within group	15.5%	32.0%	24.0%	18.5%	10.0%	100.0%	
	% within q2	70.5%	78.0%	60.8%	61.7%	57.1%	66.7%	
	% of Total	10.3%	21.3%	16.0%	12.3%	6.7%	66.7%	
High adherence	Count	13	18	31	23	15	100	
	% within group	13.0%	18.0%	31.0%	23.0%	15.0%	100.0%	
	% within q2	29.5%	22.0%	39.2%	38.3%	42.9%	33.3%	
	% of Total	4.3%	6.0%	10.3%	7.7%	5.0%	33.3%	
Total	Count	44	82	79	60	35	300	
	% within group	14.7%	27.3%	26.3%	20.0%	11.7%	100.0%	
	% within q2	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
	% of Total	14.7%	27.3%	26.3%	20.0%	11.7%	100.0%	

Table 3: Chi square test to compare between Participants adherence to the medications and age group (N = 300)

Adherence level		Gender		Total	P Value
		Male	Female		
Low adherence	Count	113	87	200	.001
	% within group	56.5%	43.5%	100.0%	
	% within q3	75.3%	58.0%	66.7%	
	% of Total	37.7%	29.0%	66.7%	
High adherence	Count	37	63	100	
	% within group	37.0%	63.0%	100.0%	
	% within q3	24.7%	42.0%	33.3%	
	% of Total	12.3%	21.0%	33.3%	
Total	Count	150	150	300	
	% within group	50.0%	50.0%	100.0%	
	% within q3	100.0%	100.0%	100.0%	
	% of Total	50.0%	50.0%	100.0%	

Table 4: Chi square test to compare between Participants adherence to the medications and gender (N = 300)

Adherence level		Marital status				Total	P Value
		Single	Married	Divorced	Widowed		
Low adherence	Count	44	125	21	10	200	.06
	% within group	22.0%	62.5%	10.5%	5.0%	100.0%	
	% within q4	80.0%	65.8%	56.8%	55.6%	66.7%	
	% of Total	14.7%	41.7%	7.0%	3.3%	66.7%	
High adherence	Count	11	65	16	8	100	
	% within group	11.0%	65.0%	16.0%	8.0%	100.0%	
	% within q4	20.0%	34.2%	43.2%	44.4%	33.3%	
	% of Total	3.7%	21.7%	5.3%	2.7%	33.3%	
Total	Count	55	190	37	18	300	
	% within group	18.3%	63.3%	12.3%	6.0%	100.0%	
	% within q4	100.0%	100.0%	100.0%	100.0%	100.0%	
	% of Total	18.3%	63.3%	12.3%	6.0%	100.0%	

Table 5: Chi square test to compare between Participants adherence to the medications and Marital status (N = 300)

Adherence level		Educational level			Total	P Value
		Less than high school	High school	Graduate degree		
Low adherence	Count	38	80	82	200	1.00
	% within group	19.0%	40.0%	41.0%	100.0%	
	% within q6	66.7%	66.7%	66.7%	66.7%	
	% of Total	12.7%	26.7%	27.3%	66.7%	
High adherence	Count	19	40	41	100	
	% within group	19.0%	40.0%	41.0%	100.0%	
	% within q6	33.3%	33.3%	33.3%	33.3%	
	% of Total	6.3%	13.3%	13.7%	33.3%	
Total	Count	57	120	123	300	
	% within group	19.0%	40.0%	41.0%	100.0%	
	% within q6	100.0%	100.0%	100.0%	100.0%	
	% of Total	19.0%	40.0%	41.0%	100.0%	

Table 6: Chi square test to compare between Participants adherence to the medications and Educational level (N = 300)

Adherence level		Occupation					Total	P Value
		Employee	Unemployment	Retired	Student	Homemaker		
Low adherence	Count	60	61	46	14	19	200	.40
	% within group	30.0%	30.5%	23.0%	7.0%	9.5%	100.0%	
	% within q7	72.3%	67.8%	63.9%	70.0%	54.3%	66.7%	
	% of Total	20.0%	20.3%	15.3%	4.7%	6.3%	66.7%	
High adherence	Count	23	29	26	6	16	100	
	% within group	23.0%	29.0%	26.0%	6.0%	16.0%	100.0%	
	% within q7	27.7%	32.2%	36.1%	30.0%	45.7%	33.3%	
	% of Total	7.7%	9.7%	8.7%	2.0%	5.3%	33.3%	
Total	Count	83	90	72	20	35	300	
	% within group	27.7%	30.0%	24.0%	6.7%	11.7%	100.0%	
	% within q7	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
	% of Total	27.7%	30.0%	24.0%	6.7%	11.7%	100.0%	

Table 7: Chi square test to compare between Participants adherence to the medications and Occupation (N = 300)

Adherence level		Income level in SRs.				Total	P-Value
		Less than 5000	5000 – 10000	10000 - 20000	More than 20000		
Low adherence	Count	66	84	37	13	200	.31
	% within group	33.0%	42.0%	18.5%	6.5%	100.0%	
	% within q8	71.7%	66.7%	64.9%	52.0%	66.7%	
	% of Total	22.0%	28.0%	12.3%	4.3%	66.7%	
High adherence	Count	26	42	20	12	100	
	% within group	26.0%	42.0%	20.0%	12.0%	100.0%	
	% within q8	28.3%	33.3%	35.1%	48.0%	33.3%	
	% of Total	8.7%	14.0%	6.7%	4.0%	33.3%	
Total	Count	92	126	57	25	300	
	% within group	30.7%	42.0%	19.0%	8.3%	100.0%	
	% within q8	100.0%	100.0%	100.0%	100.0%	100.0%	
	% of Total	30.7%	42.0%	19.0%	8.3%	100.0%	

Table 8: Chi square test to compare between Participants adherence to the medications and Income level in SRs. (N = 300)

of hypertensives) reported having trouble remembering to take their daily medications because of work or forgetfulness. The following are living far from a doctor in a city (43% of diabetics and 46% of hypertensives) and not having enough money (50% of diabetics and 55.8% of hypertensives) [21].

The Participants adherence to the medications was low (67%) where “I think it is difficult to take your medicines” got 1st rank, followed by “have any problem remembering to take your medicines” followed by “During the past one month, was there time that you forgot to bring your medicines when you were away from home”, whereas according to research by Bali H et al., of the 104 participants in the study, 47.1% were compliant with routine follow-up, 53.8% with medication, 66.3% with dietary guidance from doctors, and 62.5% with exercise recommendations. When comparing urban and rural individuals, the percentage of urban participants who comply with regular follow-up and medication is higher. Over 41 is linked to higher adherence to dietary recommendations. Individuals who take medicines for their hypertension and diabetes show improved adherence to other prescriptions. A positive patient-physician rapport, a sense of satisfaction following each visit, and accurate health-related information are linked to good adherence to routine follow-up appointments and dietary and exercise recommendations from the doctor. For almost fifty percent of the participants, non-compliance was due to forgetfulness [22].

According to a research by Yasir S. Alsaqabi et al., 38.8% of patients had poor adherence. None of the four WHOQOL-BREF domains—the physical, psychological, social connection, and environmental—showed a statistically significant correlation with medication adherence. However, low medication adherence was linked to low perceived health adjusted $\beta = -0.013$ (95% CI: -0.025 to -0.002; $p < 0.018$) and overall QOL adjusted $\beta = -0.012$ (95% confidence interval [CI]: -0.021 to -0.002; $p = 0.018$) [23].

In the present study, regarding comorbidities, about 44% had none at all, 40% had diabetes, 12% had heart disease, 8% had kidney disease, and 3% had stroke. About 43% of participants said it's quite easy, 37% said it's easy, 16% said it's fairly difficult, and only 3% said it's difficult to get to pharmacies and medical facilities. According to another study by Abuabker Ibrahim Elbur, the corresponding rates of adherence to medication, a healthy diet, and exercise were 20.1%, 11.8%, and 34.7%. A healthy diet and regular exercise were found to be substantially correlated with monthly income (* $P = 0.046$ and * $P = 0.004$, respectively). It was discovered that the presence of additional co-morbidity significantly influenced adherence to prescription drugs (* $P = 0.002$), regular exercise (* $P = 0.028$), and a nutritious diet (* $P = 0.012$). Patients under 65 years of age were observed to follow a healthy diet more closely than those over 65 (* $P = 0.007$). It was discovered that just 6 (4.2%) of the patients adhered to every domain under study. With increasing educational level, adherence to all domains rose significantly (* $P = 0.002$) [24].

According to a study by Aynalem G A et al., 53.6% of

hypertension patients did not follow the suggested lifestyle changes. Compared to female patients, male hypertension patients were more consistent in their lifestyle modifications (adjusted OR (AOR) = 0.60, 95% CI: 0.39–0.92). Patients with a diagnosis of hypertension during the last five years had a 1.86-fold greater rate of poor adherence than those with a diagnosis of hypertension within the last five years (AOR = 1.86, 95% CI: 1.19–2.89). Compared to patients who did not take their medicine, patients who adhered to their medication had poorer adherence to lifestyle change 2.13 times more frequently (AOR = 2.13, 95% CI: 1.38–3.27) [25]. According to Alzahrani, Samer, et al., patients did not follow treatment programs because they did not grasp the benefits of continuing to take their drugs and because their general knowledge ratings were low. Enlightening patients on the advantages of taking hypertensive medicine and dispelling any doubts they may have about its use should lead to improved hypertension therapy and management [26].

5. Limitations of Study

Limitations of the study include its reliance on a cross-sectional design, which limits the ability to establish causality between variables and may overlook longitudinal trends. Additionally, the self-reporting nature of data collection introduces potential biases, such as recall bias and social desirability bias, which may affect the accuracy of reported adherence levels. The study's focus on a single city and relatively small sample size may restrict the generalizability of findings to broader populations. Finally, the absence of longitudinal follow-up and consideration of language and cultural factors may hinder a comprehensive understanding of adherence behaviors and lifestyle practices among hypertensive individuals.

6. Conclusion

In conclusion, this cross-sectional study highlights the difficulty in adhering to treatment plans, with forgetfulness and trouble taking medications ranking as the biggest obstacles. Interestingly, adherence was higher in females than in males. Nevertheless, no statistically significant correlation was observed between medication adherence and other demographic variables, including age, income level, occupation, marital status, education, or occupation. The study's findings provide important light on the challenges associated with managing hypertension and highlight the necessity of focused interventions to increase medication adherence and encourage heart-healthy lifestyle choices among Majmaah City's hypertensive population. The findings offer implications for healthcare professionals and policymakers in refining strategies for effective hypertension control and prevention of cardiovascular diseases in the region. They also add to the growing body of knowledge on hypertension awareness, medication adherence, and lifestyle practices.

Conflict of interest

The authors declare no conflict of interests. All authors read and approved final version of the paper.

Authors Contribution

All authors contributed equally in this paper.

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