

Medication Adherence Among Hypertensive Patients Attending Different Primary Health Centers in Abha, Saudi Arabia: A Cross-Sectional Study

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Background and Objectives: Optimal blood pressure control is achieved by medication adherence. This will reduce the risk of associated morbidities and mortalities. The present study aimed to determine medication adherence and its associated factors among hypertensive patients attending different primary health centers (PHC) in Abha, Saudi Arabia (KSA).

Methods: A cross-sectional study was conducted among ten different PHCs in Abha, KSA. Simple random sampling procedure was utilized to choose 400 participants. A structured anonymous questionnaire was used in the present study. Analysis of the data was done using the SPSS program, version 23. A logistic regression statistical test was applied to identify the independent associated factors of medication adherence. Furthermore, we have applied Spearman's test to find the correlation between overall B-IPQ score and medication adherence score.

Results: A total of 400 hypertensive patients responded in the present survey. More than one-third of the participants (36.3%) were in the high adherence category group, while the remaining participants (63.7%) were either low or medium adherence category. The binary logistic regression analysis revealed that low and medium adherence category is significantly associated with age (adjusted odds ratio [AOR] = 0.96, 95% CI = 0.93–0.99, $p = 0.021$), married participants (AOR = 0.42, 95% CI = 0.33–0.58, $p = 0.001$), residing at village (AOR = 1.49, 95% CI = 1.14–1.73, $p = 0.038$), and participants with monthly family income of 5000 to 7000 SAR (AOR = 3.06, 95% CI = 1.62–5.79, $p = 0.001$). A negligible positive correlation was revealed between illness perception and medication adherence.

Conclusion: The present study revealed that hypertensive patients poorly adhere to their antihypertensive medications. This low adherence is significantly associated with the age, monthly income, people living in rural areas, and married participants. The present study results recommend sustained efforts to implement health education programs and awareness-raising interventions targeted at hypertensive patients.

Keywords: medication adherence, hypertension, illness perception, primary health centers, Saudi Arabia

Introduction

Healthcare adherence is defined by the World Health Organization (WHO) as “The extent to which an individual behavior (in terms of medications intake, adopting healthy diets, or performing lifestyle modifications) concurs with medical or health advice”.¹ Healthcare adherence includes the timely and proper use of medicines, the timely presence in the predetermined treatment programs, follow-up of the disease for any later required referral, and adherence with health behaviors change. In healthcare non-adherence, patients do not comply with therapeutic recommendations intentionally and consciously.^{2,3} Non-adherence may result in disappointment of healthcare providers, undesirable health outcomes,

increased use of health services, increased rate of morbidity and mortality, and wastage of resources in healthcare systems.⁴⁻⁶

Hypertension is one of the serious public health problems globally as it is considered one of the leading preventable causes of morbidities and mortalities. Globally, this is a major cause of premature mortality affecting one in four males and one in five females.⁷⁻⁹ In the kingdom of Saudi Arabia (KSA), hypertension is one of the leading causes of death and morbidity among adults. It has been estimated that about one in four adults have been diagnosed with hypertension.¹⁰⁻¹² Furthermore, poor blood pressure control among Saudi patients is well demonstrated in the literature.^{13,14}

A study conducted in Malaysia to assess medication adherence among hypertensive patients of primary health centers (PHC) showed good adherence in 53.4% of the total population studied. They reported that female patients were more likely to adhere to the medication than male patients. Also, the Chinese patients adhered to hypertensive medications two times more than the Indian patients.¹⁵ A study was carried out to determine the barriers to medication adherence among hypertensive patients in deprived rural areas. It showed that medication adherence was significantly decreased and had a significant positive correlation with gender and economic status, while it was negatively correlated with age. Medication Adherence had a positive correlation with the duration of hypertension, while it negatively correlated with the number of medications used and concurrently with other diseases.¹⁶ In the KSA, Khayyat et al surveyed Saudi hypertensive patients attending primary care clinics and assessed the predictors of medication adherence and blood pressure control. In their survey, 54% of hypertensive patients did not adhere to the medicines prescribed by their physicians. Binary logistic regression tests reported that highly adherent participants were around five times more likely to have a well-controlled blood pressure than low-adherent hypertensive patients. Female gender, Age > 65 years, and being diabetic were found to be independent predictors of medication adherence.¹⁷

Illness perception is an individual feelings and experiences about a particular disease. This concept is particularly important in hypertension management as it is directly associated with in changing behavior, utilization of healthcare services, and adherence to medications prescribed by the physicians.¹⁸⁻²⁰ Some researchers reported that illness perception is one of the important correlates of medication adherence.¹⁹ However, very few studies have attempted to correlate the brief illness perception with medication adherence, especially in the KSA.

The main concerns of the healthcare system nowadays are problems associated with patients' non-adherence to medical problems. The desired blood pressure control will not be achieved if the patients do not comply with the therapeutic recommendations of physicians, despite the tremendous efforts of physicians.²¹ The government of Saudi arranges the health system at four levels ranging from primary care centers to apex hospitals. The healthcare services, including hypertension management at PHCs are given free of cost for their country citizens and government expatriate workers. Also, concerned Saudi authorities made health insurance mandatory for all other category populations residing and visiting the KSA. The PHCs play a critical role in creating awareness, screening, diagnosis, and management of hypertension. Hence, it is essential to investigate medication adherence and factors affecting adherence among hypertensive patients receiving care at PHCs. So that necessary measures can be taken within the PHCs to promote patients' adherence to their medications, prevent long-term side effects of non-adherence and decrease the burden on tertiary health care.^{22,23} The present study was conducted to determine medication adherence and its associated factors among hypertensive patients attending different PHCs in Abha, KSA. Also, the authors aimed to identify the correlation between hypertensive patients' medication adherence and brief perception of illness.

Materials and Methods

Study Design and Setting

The present study is a descriptive, cross-sectional carried out to determine medication adherence among hypertensive patients attending different primary health centers in Abha, Saudi Arabia from December 2021 to June 2022.

Sampling Technique

There were 40 PHCs in Abha, KSA, 10 centers were selected by simple random sampling technique. The number of participants included in each PHC were proportional to the number of patients served by this center. The questionnaires

were distributed by the researchers to all patients attending the selected centers except those who refused to participate in the study.

Sample Size

We have estimated the required number of participants using the Epi-Info version 7 StatCalc, which is available from the Centers for Disease Control (CDC) and the WHO. The authors determined the following criteria after reviewing the available literature to calculate the least sample size: infinite population size, expected frequency of 50%, confidence level of 95%, power of study as 80%, design effect of 1 and a margin of error of 5%. The calculated sample size was 384 and rounded to 400.

Inclusion and Exclusion Criteria

Patients over 18 years of age, both male and female, with a confirmed diagnosis of hypertension for at least one year and taking at least one medication to treat hypertension were included in the study. The present study included the patients visiting the primary health centers and excluded the patients receiving care at private clinics. Patients with mental health issues, cancers, or any other terminal illness and unwilling to participate in the study were excluded from the study.

Data Collection Method

The present study's protocol was ethically cleared by the local committee of bioethics (LCBE) of the Jouf University, Saudi Arabia through approval number 20-08-42. We have obtained informed consent from the study participants prior to study commencement. A structured anonymous questionnaire was used in the present study. The authors made the questionnaire based on existing literatures²⁴⁻²⁷ (Please see [Appendix 1](#) for more information). "In the beginning, independent experts from internal medicine, family medicine, and public health departments discussed, and the contents were finalized. The structured data collection instrument was translated to Arabic by the bilingual medical team. Next, it was back translated to English, and we found the details are correct. Next, we pretested the questionnaire on 30 hypertensive patients to check respondents' views for face validity testing. The pilot study of hypertensive patients ensured the data collection tool was precise, and the analysis did not find any missing variables among the completed questionnaires. The Cronbach's coefficient alpha value of the data collection instrument was 0.76 for the medication adherence section and 0.85 for the Brief Illness Perception Questionnaire (B-IPQ). The data collection tool was divided into three parts. The first part inquired about socio-demographic characteristics such as age, sex, residence, educational status, working status, marital status, monthly income. The second part was composed of questions related to medication adherence. It consists of 8 questions. The hypertensive patients responded either "yes" or "no" for questions 1 to 7 and Item 8 had a 5-point Likert answer scale. We have marked answer "no" as 1 and each "yes" answer is marked as 0 apart from item 5, in which each "yes" answer is marked as 1 and each "no" answer is marked as 0. For Item 8, the code (0-4) has to be standardized by dividing the result by 4 to calculate a summated score. Total scores on this part of the questionnaire range from 0 to 8, with scores of 8 reflecting high adherence, 7 or 6 reflecting medium adherence, and <6 reflecting low adherence. This category by the present study authors is similar to other studies categories that assessed medication adherence among hypertensive and diabetes patients.^{28,29} The research team executed necessary validation and reliability tests for this structured questionnaire.

The third part was about assessment of illness perception. Assessment of illness perception was done using the B-IPQ, a pretested and validated tool that estimates eight different characteristics of illness perception: consequences, timeline, personal control, treatment control, identity, concerns, understanding, and emotional representation.²⁷ The B-IPQ tool assesses all the stated aspects of illness perception using an 11-point Likert scale. A higher score indicates a more threatening view of the illness, while a lower score indicates a benign view.²⁷

Data Analysis

Data was analyzed using SPSS program, version 23. Mean and standard deviation were calculated for quantitative data. Qualitative data was presented as number and percent. A multivariate binary logistic regression model was applied to identify

the independent predictors of medication adherence (High adherence vs low/medium adherence). The basis for the adherence categories is “High medication adherence is associated with the higher odds of better cardiovascular disease outcome”. Furthermore, the basis of the current categories was supported by previous studies by Kim et al, Ho et al, and a medication scale used by Laghous et al^{28,30,31}. In the logistic regression model (enter method), the above-mentioned binary outcome variables were compared with the potential predictor as included in the data collection form. After including all covariates in the analysis, we made the category in each variable as the reference category. We have obtained the odds ratio (OR) and confidence interval (CI) of OR of each variable as the final results from logistic regression after adjusting with other independent variables. An adjusted OR of more than one that did not include a null value (0) in the confidence interval was considered a significant predictor. Furthermore, we have applied Spearman’s test to find the correlation between overall B-IPQ score and medication adherence values. A P value ≤ 0.05 was set as a statistically significant value.

Ethical Considerations

The current survey was done according to the guidelines of the Declaration of Helsinki. The research team ensured the ethical aspects of this survey by, firstly, briefing the objectives of the current study to the selected hypertensive patients before administering the data collection form to them. Secondly, we have taken informed consent from participants willing to participate in the survey. Furthermore, the present survey utilized an anonymous tool to ensure the privacy and confidentiality of participants.

Results

Of the 400 studied population, most of them were males (62.8%), working in government sectors (41.3%), married (78.5%), residing in an urban area (57.8%), and without other chronic diseases (57.5%). The mean age (\pm SD) of the studied participants was 49.92 ± 10.9 (Table 1).

The medication adherence categories of the participated hypertensive patients are presented in Figure 1. Of the sampled participants, more than one-third of the participants (36.3%) were in the high adherence category group, while the remaining participants (63.7%) were either low or medium adherence category.

The research team performed a univariate analysis followed by multivariate analysis. The binary logistic regression analysis revealed that low and medium adherence category is significantly associated with age (adjusted odds ratio [AOR] = 0.96, 95% CI =0.93–0.99, $p = 0.021$), married participants (ref: unmarried: AOR = 0.42, 95% CI =0.33–0.58,

Table 1 Background Details of Hypertensive Patients Attending Different Primary Health Centers (PHC) in Abha, KSA

Variables	Frequency (n)	Proportion (%)
Age (in years): Mean \pm SD	49.92 \pm 10.9	
Gender		
Male	251	62.8
Female	149	37.3
Education level		
University and above	158	39.5
Up to school	143	35.8
No formal education	99	24.8
Occupation		
Government sector	165	41.3
Private/Self employed	82	20.5
Retired	55	13.8
Unemployed	98	24.5

(Continued)

Table 1 (Continued).

Variables	Frequency (n)	Proportion (%)
Marital status		
Married	314	78.5
Single	27	6.8
Divorced/Widow	59	14.8
Residence		
Urban	231	57.8
Village	169	42.2
Monthly income in Saudi Riyals (SAR)*		
> 7000	128	32.0
5000–7000	102	25.5
< 5000	170	42.5
Presence of other chronic disease (s)		
Yes	170	42.5
No	230	57.5

Note: 1 USD = 3.75 SAR.

$p = 0.001$), residing at village (ref: urban: AOR = 1.49, 95% CI = 1.14–1.73, $p = 0.038$), and participants with monthly family income of 5000 to 7000 SAR (ref: > 7000: AOR = 3.06, 95% CI = 1.62–5.79, $p = 0.001$ (Table 2).

Table 3 presents the respondents' B-IPQ descriptive data (median and IQR). Of the 400 participants, the lowest median (IQR) value was noted in the statement "How much does the illness (hypertension) affects your life?" with a median (IQR) score of 2 (4).

The Spearman correlation test revealed a negligible positive correlation between the overall B-IPQ score and the medication adherence score ($r = 0.158$, $p = 0.002$) (Table 4).

Discussion

The world hypertension day is celebrated every year on 17th of May with the aim to control, prevent and treat the hypertension. Adhering to the prescribed medication is one of the key elements to achieve it.³² Patients' adherence to

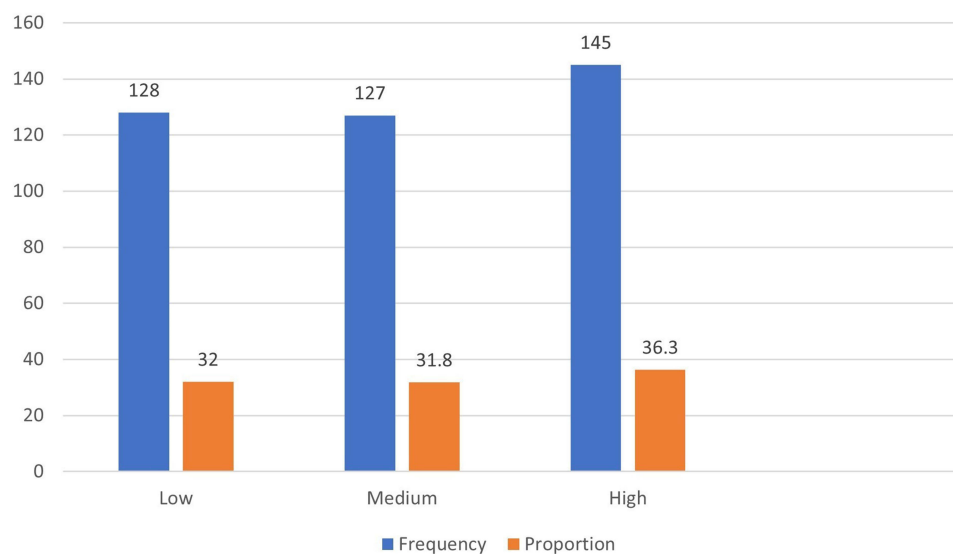


Figure 1 Medication adherence status of hypertensive patients attending different PHCs in Abha, KSA.

Table 2 Correlates of the Low /Medium Medication Adherence Among Hypertensive Patients Attending Different PHCs in Abha, KSA

Variables	Low and Medium Medication Adherence		Crude Odds Ratio (95% Confidence Interval)	p value	Adjusted Odds Ratio [AOR] (95% Confidence Interval)	p value
	No**	Yes				
Age (in years): Mean \pm SD	49.92 \pm 10.9		0.89 (0.67–0.94)	0.003*	0.96 (0.93–0.99)	0.021*
Gender						
Male	102	149	Ref		Ref	
Female	43	106	0.59 (0.51–0.91)	0.018*	0.637 (0.38–1.06)	0.084
Education level						
University and above	54	104	Ref		Ref	
Up to school	47	96	0.94 (0.52–1.52)	0.901	0.69 (0.38–1.24)	0.211
No formal education	44	55	1.88 (1.11–2.65)	0.021*	1.86 (0.83–3.31)	
Occupation						
Government sector	63	102	Ref		Ref	
Private	27	55	0.79 (0.46–1.39)	0.541	1.17 (0.48–2.83)	0.726
Retired	26	29	1.45 (0.78–2.69)	0.267	0.82 (0.44–1.23)	0.548
Unemployed	29	69	0.68 (0.39–1.16)	0.181	1.99 (0.92–3.37)	0.083
Marital status						
Married	125	189	Ref		Ref	
Unmarried	20	66	0.45 (0.26–0.79)	0.005*	0.42 (0.33–0.58)	0.001*
Residence						
Urban	76	155	Ref		Ref	
Village	69	100	1.41 (0.93–2.12)	0.114	1.49 (1.14–1.73)	0.038*
Monthly income (RS)						
> 7000	42	86	Ref		Ref	
5000–7000	55	47	2.39 (1.40–4.10)	0.001	3.06 (1.62–5.79)	0.001*
< 5000	48	122	0.81 (0.49–1.32)	0.445	0.96 (0.50–1.84)	0.908
Presence of other chronic disease (s)						
No	80	150	Ref		Ref	
Yes	65	105	1.61 (0.77–1.75)	0.538	1.17 (0.70–1.93)	0.551

Notes: Variable(s) entered on step 1: Age in years, gender, level of education, occupation, marital status, residence, monthly income, and presence of chronic diseases. *Significant value **High medication adherence.

Table 3 Descriptive Data (Median and IQR) of the Brief Illness Perception Questionnaire

Item	Median	Interquartile Range (IQR)
How much the illness (hypertension) affects your life?	2	4
What do you consider how long your hypertension will last?	2	5
What is the level of control you perceive over your illness?	4	4
What is your perception of the recommended treatment that can assist your illness?	3	6
How much do you struggle with the symptoms of your illness?	4	4
How much are you anxious about your illness?	2	4

(Continued)

Table 3 (Continued).

Item	Median	Interquartile Range (IQR)
How much do you perceive that you understand your illness?	4	5
How much does your illness affect you mentally?	4	5

Table 4 Correlation Analysis Between Illness Perception and Medication Adherence Scores Among Hypertensive Patients Attending Different PHCs in Abha, KSA

	Illness Perception	
	r value	p-value*
Medication adherence	0.158	0.002

Note: *Significant value at 0.01 level (two-tailed).

their antihypertensive drugs is of crucial importance in preventing hypertension related complications. The present study assessed the medication adherence among hypertensive patients and its associated factors.

The present study revealed that only 36.3% of hypertensive patients had high adherence practice towards antihypertensive medications. Poor adherence to antihypertensive drugs is not only correlated with poor blood pressure control but also associated with development of morbidities and mortalities.³³ A survey conducted by Algabbani et al in the Riyadh region of the KSA found a slightly higher proportion (42%) of the participants aged 18 years and above had high adherence with the prescribed antihypertensive medications.³⁴ However, the finding of the present study was lower than that of other studies conducted among Swedish adults (87.3%),³⁵ and Africa Americans (64.0%).³⁶ The possible reasons for the differences in the percentage of adherence rate could be variation in the methods applied to determine medication adherence among various populations. Other reasons could be due to variation in the educational level of the participants, complexity of drug regimens, participants' knowledge, and health conditions. In the present survey, a significant association was revealed between residence and medication adherence. The participants who lived in rural regions were nearly 2 times as possible to have low and medium medication adherence as compared to those who lived in urban areas. This is consistent with a study conducted in northwest Ethiopia.³⁷ This may be because rural residents are farmers busy with their agricultural land and they may forget taking their hypertensive medications on time. In addition, differences in educational levels and access to different health services may be other probable factors contributed for the variations, as urban residents have more access to different health services and more likely to be more educated than rural residents. Antihypertensive drugs are long term medications that requires continued replenishing. The cost of antihypertensive medications is one of the barriers that hinders the continuity of treatment for patients with low monthly income.³⁸ Hypertensive patients with low monthly income are fighting to adhere to antihypertensive medications because of their cost.³⁸ The present study revealed that monthly income is a significant predictor for adherence to antihypertensive medications. Participants with low income in this study were more liable to low or medium medication adherence. This is consistent with other study findings.^{39,40} The results of the present study showed that marital status was negatively associated with medication adherence as married participants were more liable to low or medium medication adherence. This finding is contrary to the results of the earlier surveys which showed that married respondents had adherence levels more than divorced, widowed, or not married.^{40,41} The above difference in the attitude may be attributed to the fact that married participants in the present study are busy in their life and do not care on taking the medicine on time. This is in addition to the medicine may be costly for them. The present explored that age is one of the significant predictors of medication adherence (AOR = 0.96, 95% CI =0.93–0.99, p = 0.021). The present study's findings related to age were consistent with the previous studies by Hyre et al in New Orleans and Lee et al in China.^{42,43} This may be due to possible comorbidities associated with aged patients. Hence, they perceive themselves as sicker and follow a better medication adherence practice to the antihypertensive regime prescribed by the physicians. The current

study revealed a significant correlation between medication adherence and illness perception which is similar with the findings of previous surveys indicating high perception of illness will lead to high level of medication adherence.^{44–46} However, a study conducted by Saarti et al revealed that medication adherence by hypertensive patients were associated with treatment satisfaction rather than illness perception.²⁰ The dissimilarities in the findings may be because of using different questionnaire to estimate illness perception and medication adherence.

Limitations

The research team executed this study with a standard methodology. However, certain constraints need to be considered while reading the results of this survey. Firstly, the present cross-sectional study assessed only association, not the causation. This study used a self-reported survey questionnaire. Hence, bias related to self-reported surveys like recall, exaggerated response, and selection bias can occur.

Conclusion

The present study revealed that low medication adherence practice among hypertensive patients. This low adherence is significantly associated with the age, monthly income, people in village area, and married participants. Hence, it is recommended to raise awareness among the hypertensive patients on the importance of adhering to the medications prescribed by the treating physicians. Moreover, the concerned authorities need to develop structured intervention and health education programs to target low and medium-adherence groups. A multidisciplinary team approach with greater participation of patients in managing the hypertensive status should be encouraged to promote better medication adherence. Finally, future studies are warranted in other healthcare facilities, including private clinics in other KSA regions.

Acknowledgments

The authors wish to thank all the participants for their willingness to participate in the study. Also, we wish to extend our sincere thanks to ministry of health, Asir region, Saudi Arabia for their help for this survey.

Disclosure

The authors report no conflicts of interest in this work.

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