Factors related to treatment adherence among hypertensive patients: A cross-sectional study in primary healthcare centers in Taif city

Mohammed A. Alsofyani, Adel O. Aloufi[1], Nada S. Al-Qhtani[2], Sarah O. Bamansour[2], Raghad S. Almathkori[2]

Abstract:

BACKGROUND: Antihypertensive medications must be taken as prescribed since noncompliance can result in the lack of hypertension (HTN) control. The aim of this study was to determine the factors that influence adherence to treatment by HTN patients in Taif city.

MATERIALS AND METHODS: A cross-sectional study was undertaken in basic healthcare centers in Taif city, Saudi Arabia. A simple random sampling method was used to select participants from primary healthcare centers. Data was obtained on patients' demographic characteristics, smoking habits, anti-HTN drugs and treatment characteristics, barriers to medication compliance, systolic and diastolic blood pressure (BP), anthropometric measurements, and family history of HTN and diabetes mellitus (DM). We used the 4-item Morisky Medication Adherence Scale (MMAS-4™) as a valid questionnaire to assess medication adherence. Data were analyzed using SPSS. Qualitative data was presented as numbers and percentages, and Chi-squared test was applied to test the relationship between qualitative variables. For quantitative data, mean and standard deviation was calculated. Multiple logistic regression analysis were performed to determine correlates of treatment adherence, and results were presented as Odds Ratio (OR) and 95% confidence interval (CI) for OR.

RESULTS: Of the 549 patients included, 36.8% did not have a regular check of their BP at home and the majority had a family history of HTN and diabetes. About 86% patients showed a high level of adherence. Income $\geq$5000 SAR, age $\geq$60 years, female gender, who were being married, having $\leq$10 family members, being unemployed, and never having smoked were associated with high adherence level. The most important factor that affected MMAS scores was the regular BP checks at home.

CONCLUSION: When patients attend routine follow-up clinics, it is critical to strengthen reminder mechanisms and provide regular counseling.

Keywords:

Adherence, hypertensive, patients, Taif

Departments of Public Health and [1]Post Graduated Department, Public Health, Ministry of Health, [2]College of Pharmacy, Taif University, Taif, Saudi Arabia

Address for correspondence:
Dr. Mohammed A. Alsofyani, Department of Public Health, Ministry of Health, Taif 22944, Saudi Arabia.
E-mail: mohammed alsofyani@hotmail.com

Introduction

Hypertension (HTN) is known to affect people worldwide, all with a steady upward prevalence.[1]

According to Fryar *et al.*, the prevalence of HTN in people aged 60 and above increased with age, peaking at 29.0% in 2015–2016. They also discovered that 48.3% of their participants had HTN that was successfully treated. This increased in males but not in women as they grew older.[2]

Furthermore, the prevalence of HTN in Saudi Arabia was 15.2%, being 17.8% in males and 12.5% in women.[3]

Because of the subtle nature of the signs and symptoms, adherence to pharmacological treatment of HTN is poor in many countries, and the consequences of uncontrolled high blood pressure (BP) may explain the rising number of people who suffer from stroke, heart disease, and chronic kidney disease, all of which are known complications of high BP.[1,4,5]

The benefits that patients derive from HTN medications diminish with poor adherence. Nonadherence can be accidental (for example, forgetfulness) or deliberate (for example, patients opting out of therapy based on their own personal beliefs about their illness and treatment). Patients' beliefs and health conditions influence their compliance to orders and information. Studies on a variety of patients have confirmed an important line of research regarding variables related to distinguishing between signals and verbal reports about them, as well as their role in health and disease.[6] However, failure to start medication therapy, take medicine as indicated, and maintain long-term treatment are all established factors in poor BP management in hypertensive individuals.[7]

It is critical to understand the elements that influence patient adherence to a treatment regimen if it is to be improved.[8]

Despite years of research, there are still questions concerning why patients refuse to take their medication and what could be done to change their behavior. HTN is inadequately controlled in the United Kingdom, and poor compliance is one possible reason for this. The conformity principle, which emphasizes the importance of patients' opinions, has recently changed how clinicians and patients discuss drugs.[9]

Despite decades of attention, noncompliance with HTN therapy is still a key cause in poor BP control. Current approaches for improving compliance include patient profiles, treatment features, clinical cases, wellness preferences, and the quantity of patient–provider engagement. Clinical researchers are only getting started with a unique concept of enforcement that is described as a progressive adjustment in behavior. Clinicians can improve patient compliance by analyzing their patients' behavior to see how far it has changed, and change their treatments accordingly.[10]

In 2018, Choi *et al.,* showed a link between adherence to antihypertensive treatment and age 65, exercise, two types of antihypertensive medications, co-diabetes medication, and a family history of high BP or cardiovascular disease.[11] Nonadherence was statistically related to age, domicile, educational level, annual family income, and outpatient medical reimbursement, according to Zhang *et al.,* 2018, and more than half of the patients were able to reach normal BP.[12] In a study conducted by Abdelhalim *et al.*, 2019, in Dammam, Saudi Arabia, the proportion of participants who were compliant to therapy was 39.6%.[13] Another study conducted in the Al-Ahsa district in 2019 discovered that most respondents had poor medication adherence.[14]

Many patients in our family medicine clinic show non-compliance to medication leading to microvascular and renal disorders. No previous study assessed factors influencing treatment adherence in a primary health care (PHC) setting in Taif City.

The aim of this study was to assess the factors affecting adherence to treatment in the primary healthcare centers (PHCCs) of the Ministry of Health (MOH) in patients with HTN in Taif city, Saudi Arabia.

Materials and Methods

A cross-sectional study was carried out at the PHCCs within the city of Taif (*n* = 19, in the Taif region, Saudi Arabia, from February to March 2021). Ethical Approval was obtained from the Institutional Review Board (IRB) vide letter No. 473 dated 12/01/2021 and written informed consent was taken from all participants.

The inclusion criteria were all essential hypertensive Saudi patients, aged ≥18 of both genders. Those under 18 years of age, who could not respond to interviews, or who refused to participate in the research and non-Saudi nationals were excluded. The number of hypertensive patients who visited MOH PHCCs in Taif city was 10342 patients. The prevalence was 50%, with absolute precision of 5% at a 95% confidence level. The sample size was calculated using the Raosoft website. The minimum sample size was 384 patients. The 19 PHCCs located within Taif city were divided into four sectors according to geographical distribution and stratified sampling technique used to select one PHC from each sector. Participants in these PHCCs were selected using the simple random method. The response rate was 87.3%.

Data collected by interviewing the patients comprised seven parts, the first of which was their demographics (e.g., age, gender, etc.), family history hypertension of (HTN) and comorbidities, number of persons in a family, smoking status, and obtaining of anti-HTN medications. The second part consisted of details of systolic and diastolic BP, height, weight, and and body mass index (BMI). The third part asked about treatment characteristics (time of diagnosis, regular BP check at home, number of medications in a day, regular clinical check, and patient opinion about his/her condition). The fourth part consisted

of obstacles to taking medications, medication availability, taking medication factors (more than one medicine), psychological factors (lack of confidence in medication for the control of the disease), financial factors (if medications have to be purchased by the patient himself), healthcare providers, and medical system factors (difficulties in seeing appropriate clinician). The fifth part included questions about physical activities, education on HTN, doctor's specialty, and the last visit to the clinic (months). The sixth part comprised validated Arabic version of Morisky Medication Adherence Scale (MMAS-4™). The (MMAS-4™) sensitivity was estimated to be 93% and the specificity was 53%.[15] The (MMAS-4™) has been shown to have strong concurrent and predictive validity, suggesting that it could be used as a screening tool in outpatient settings with a variety of patient populations.[15] MMAS had been validated in a Saudi population.[16,17] MMAS scores were rated as follows: high adherence (MMAS-4 = 4), moderate adherence (MMAS-4 = 2–3), and poor adherence (MMAS-4 = 0–1). This scale assesses adherence through multiple questions including Do you ever forget to take your HTN medicine?; Do you ever have problems remembering to take your HTN medication?; When you feel better, do you sometimes stop taking your HTN medicine?; and Sometimes if you feel worse when you take your HTN medicine, do you stop taking it?.[15] The final section consisted of some questions about patient opinion on the appointment system in PHCC, the current means of getting advice from your doctor, and the results of the laboratory.

The researcher carried out a pilot study on 20, and based on the feedback and responses to the questionnaire, changes to the data collection tools were made as indicated. The statistical program for social sciences (SPSS) version 24 was used to code and analyze the data. Qualitative data were expressed as numbers and percentages, and Chi-squared test (χ^2) was applied to test the relationship between variables. For quantitative data, the standard deviation and means were used. Multivariate regression analysis was done and the Odds Ratio (OR) was determined at a Confidence Interval (CI) of 95%). $P < 0.05$ was considered statistically significant.

Results

The study was conducted on 549 hypertensive patients. Data in Table 1 show that 67% had an income level of <5000, 58.1% were younger than 60 years old, 59.4% were females, and 78% were married. Of them, 52.1% were illiterate, 44.9% had more than 10 family members, 78.9% were unemployed, and 86.7% were nonsmokers.

Table 1: Sociodemographic characteristics of hypertensive patients at PHC centers in Taif city, 2021 (*n*=549)

Characteristics	*N* (%)
Level of monthly income	
Lowest or equal 5000	368 (67)
Over 5000	181 (33)
Age	
Lower than 60	319 (58.1)
≥ 60	230 (41.9)
Gender	
Male	223 (40.6)
Female	326 (59.4)
Marital status	
Single	26 (4.7)
Married	428 (78.0)
Divorced	17 (3.1)
Widow	78 (14.2)
Level of education	
Illiterate	286 (52.1)
High school and below	173 (31.5)
College and postgraduate	90 (16.4)
Number of persons in a family	
<5	81 (14.8)
6-10	221 (40.3)
Over 10	247 (44.9)
Occupation	
Government	85 (15.5)
Nongovernmental	25 (4.6)
Business person	6 (1.1)
Unemployed	433 (78.9)
Smoking history	
Never	476 (86.7)
Yes, but quit	35 (6.4)
Continue	38 (6.9)

Table 2 shows that 56.3% of the patients had a family history of HTN and 52.6% had a family history of diabetes mellitus (DM), 96.4% got free anti-HTN, and 35.3% had no comorbidity. About 57% had a systolic BP of <150 and those with a diastolic BP from 50 to 100 were 92.0%. About 66% (66.7%) of the patients had a height between 150 and 170 cm, 51.7% weighed 70–90 kg, and 33.3% had a BMI ranging from 25.0 to 29.9 kg/m².

Data in Table 3 show that 49.5% of the patients had exceeded 5 years since diagnosis, 33.7% did not check their BP regularly at home, 63.9% had only one medication per day, 22% had regular clinical checks, and 69.9% believed that they were controlled. Of them, 62.7% engaged in physical activity, 21.9% had received some education on HTN, 31.7% saw a specific doctor for follow-up, and for 58.8%, the doctor's specialty was general practitioner and, for 64.7%, the last visit to the clinic (Months) was below 1.

Table 2: Distribution of hypertensive patients at PHC centers in Taif city according to family history of hypertension and diabetes mellitus, comorbidities, and anthropometric measurements (*n*=549)

Characteristics	N (%)
Family history of HTN	
Yes	309 (56.3)
No	240 (43.7)
Family history of diabetes	
Yes	289 (52.6)
No	260 (47.4)
Obtaining of anti-HTN medications	
Paid	20 (3.6)
Free	529 (96.4)
Comorbidity	
No	194 (35.3)
Stroke	3 (0.5)
CVA	9 (1.6)
CKD	4 (0.7)
DM	248 (45.2)
Dyslipidemia	10 (1.8)
A lot of one	81 (14.8)
Systolic	
Lowest 150	318 (57.9)
150-200	212 (38.6)
Over 200	19 (3.5)
Diastolic	
Lowest 50	3 (0.5)
50-100	505 (92.0)
Over 100	41 (7.5)
Height	
Lowest 150	92 (16.8)
150-170	366 (66.7)
Over 170	91 (16.6)
Weight	
Lowest 70	168 (30.6)
70-90	284 (51.7)
Over 90	97 (17.7)
BMI	
Below 18.5	1 (0.2)
18.5-24.9	75 (13.7)
25.0-29.9	183 (33.3)
30.0-34.9	164 (29.9)
35.0-39.9	78 (14.2)
Above 40	48 (8.7)

HTN=Hypertension, CKD=Chronic kidney disease, BMI=Body mass index, DM=Diabetes mellitus, CVA=Cerebral vascular accident

Table 3: Distribution of the participants according to treatment characteristics (*n*=549)

Treatment characteristics	N (%)
Time of diagnosis (years)	
1-5	66 (12.0)
2-5	209 (38.1)
Above 5	274 (49.9)
Regular blood pressure checks at home	
No	185 (33.7)
No device at home	202 (36.8)
Yes	162 (29.5)
Number of medications in a day	
1	351 (63.9)
2	159 (29.0)
Above or equal 3	39 (7.1)
Regular clinical check	
No	121 (22.0)
Yes	428 (78.0)
What would you say your condition?	
Controlled	384 (69.9)
Not controlled	165 (30.1)
Physical activities	
No	205 (37.3)
Yes	344 (62.7)
Have you received any education on HTN	
No	429 (78.1)
Yes	120 (21.9)
Do you follow up with a specific doctor?	
No	375 (68.3)
Yes	174 (31.7)
If (yes), what is the doctor's specialty?	
GP	323 (58.8)
FM	215 (39.2)
IM	11 (2.0)
Last visit to the clinic (months)	
Below 1	355 (64.7)
Below 3	124 (22.6)
Below 6	70 (12.8)

GP=General practitioner, FM=Family medicine, HTN=Hypertension, IM=Internal Medicine

patients with other levels of education. Of the patients with ≤10 family members, 43.3% had a high adherence, and 78% of the unemployed and 86.5% of the never smokers had a high adherence.

Data in Table 5 show that the obstacles to taking medications were as follows: unavailability of medicines (15.8%), taking medication factor (58.1%), no confidence that the medication could control the disease (13.3%), and financial factors (22.2%).

Table 6 shows that the multivariate logistic regression was performed with adjustment for age and sex. Adjusted for relevant baseline factors, participants over 60 (OR: 1.506, 95% CI: 1.070–2.120) and the number of persons in a family exceeding 10 (OR: 2.672, 95%

Figure 1 shows that 86.1% of the patients had a high adherence level, while 10.9% and 3% had medium and low levels, respectively.

Table 4 shows that of the patients with an income ≥5000 and aged ≥60 years, 66.4% and 58.4% had a high adherence. About 58% (58.1%) of the females had a high adherence compared to 41.9% of the males. Of the married patients, 78.9% had a high adherence, and the illiterates had a 51% high adherence compared to

Table 4: Relationship between adherence to treatment and various characteristics among hypertensive patients at PHC centers in Taif city, 2021*

Obstacles to taking medications	High adherence N (%)	Medium adherence N (%)	Low adherence N (%)	χ^2	*P-value*
Level of monthly income					
≥5000	314 (66.4)	43 (71.7)	11 (68.8)	0.69	0.706
<5000	159 (33.6)	17 (28.3)	5 (31.3)		
Age					
≥60	276 (58.4)	30 (50.0)	13 (81.3)	5.15	0.076
<60	197 (41.6)	30 (50.0)	3 (18.8)		
Gender					
Male	198 (41.9)	18 (30.0)	7 (43.8)	3.17	0.204
Female	275 (58.1)	42 (70.0)	9 (56.3)		
Marital status					
Single	22 (4.7)	2 (3.3)	2 (12.5)	8.85	0.182
Married	373 (78.9)	43 (71.7)	12 (75.0)		
Divorced	17 (3.6)				
Widow	61 (12.9)	15 (25.0)	2 (12.5)		
Level of education					
Illiterate	241 (51.0)	37 (61.7)	8 (50.0)	3.95	0.412
High school and below	152 (32.1)	17 (28.3)	4 (25.0)		
College and postgraduate	80 (16.9)	6 (10.0)	4 (25.0)		
Number of persons in a family					
<5	71 (15.0)	8 (13.3)	2 (12.5)	4.17	0.382
6-10	197 (41.6)	18 (30.0)	6 (37.5)		
Over 10	205 (43.3)	34 (55.7)	8 (51.1)		
Occupation					
Government	74 (15.6)	7 (11.7)	4 (25.0)	5.45	0.486
Nongovernmental	24 (5.1)	1 (1.7)	0		
Business person	6 (1.3)	0	0		
Unemployed	369 (78.0)	52 (86.7)	12 (75.0)		
Smoking history					
Never	409 (86.5)	53 (88.3)	14 (87.5)	0.92	0.921
Continue	32 (6.8)	4 (6.7)	2 (12.5)		
Yes, but quit	32 (6.8)	3 (5.0)	0		

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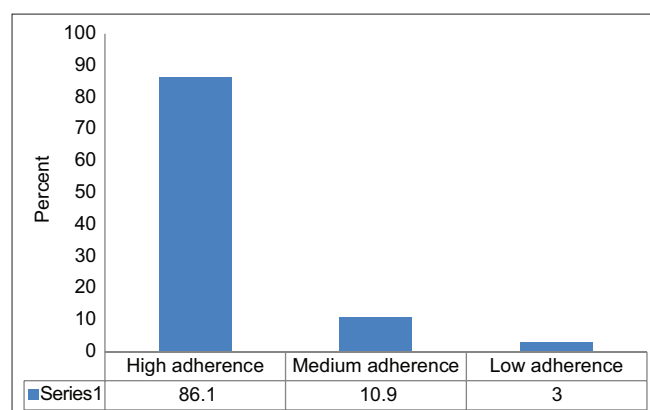

Figure 1: Percentage distribution of the studied patients according to their level of adherence

CI: 1.032–6.914) were risk factors for adherence to medications, but the remaining factors did not affect treatment characteristics.

Discussion

The study conducted on 549 hypertensive patients aimed at assessing factors affecting adherence to treatment for patients with HTN in the PHCCs of the MOH in Taif city, Saudi Arabia.

The study found that of the patients with an income ≥5000 and those aged ≥60 years, 66.4% and 58.4% had a high adherence. About 58% (58.1%) of the females had a high adherence compared to 41.9% of the males. Of the married patients, 78.9% had a high adherence, and 51% of the illiterates had a high adherence compared to those of other educational levels. Of patients with ≤10 family members, 43.3% had a high adherence, and 78% of the unemployed and 86.5% of the never smokers had a high adherence level.

These findings are like those of Alkhamis *et al.*, who found that the average age of the participants was

54.09 years, that about 59% of the women were compliant with the treatment regimen, that 33.5% of the married participants were compliant, and that 16.7% of the unmarried participants were compliant.[14] In addition,

Table 5: Obstacles to treatment adherence among hypertensive patients at PHC centers in Taif city, 2021

Obstacles to taking medications	N (%)
Medications are not available	
No	462 (84.2)
Yes	87 (15.8)
Taking medication factor	
No	230 (41.9)
Yes	319 (58.1)
Confidence in medication for controlling the disease	
No	73 (13.3)
Yes	476 (86.7)
Financial factors	
No	427 (77.8)
Yes	122 (22.2)

unemployed patients (72.3%) were more compliant than participants who had employment.[11]

However, 86.1 percent of patients in our study showed a high level of adherence, whereas 10.9 percent and 3% had medium and low levels, respectively. The proportion of patients in the Alkhamis *et al.*, research who were therapy compatible was 39.6%.[14]

In a study done by Patel and Taylor, it was reported that the adherence rate in China was 51.7% and in the United States was 67.6%.[18] In contrast, Alkhamis *et al.*, discovered that most of the respondents in Al-Ahsa had poor medication adherence.[14]

Choi *et al.*, discovered that good adherence to hypertension medication was connected with age 65, activity, the presence of two antihypertensive medication classes and co-diabetes treatment, and a family history of high blood pressure or cardiovascular disease.[11] Males were found to be more adherent to therapy than

Table 6: Multiple logistic regression analysis: Factors related to treatment adherence among hypertensive patients at PHC centers in Taif city

Variable	Univariate regression analysis		Multivariate regression analysis	
	OR (95% CI)	*P-value*	AOR (95% CI)	*P-value*
Level of monthly income				
≥5000	1 (reference)		1 (reference)	
<5000	1.035 (0.725-1.478)	0.850	0.672 (0.449-1.006)	0.054
Age				
≥60	1 (reference)		1 (reference)	
<60	1.506 (1.070-2.120)	0.019	1.026 (0.708-1.486)	0.893
Gender				
Male	1 (reference)		1 (reference)	
Female	1.087 (0.773-1.529)	0.631	1.124 (0.773-1.635)	0.542
Marital status				
Single	1 (reference)		1 (reference)	
Married	1.356 (0.519-3.547)	0.534	0.536 (0.193-1.490)	0.232
Divorced	1.282 (0.762-2.157)	0.349	0.745 (0.449-1.237)	0.255
Widow	0.708 (0.232-2.163)	0.545	0.383 (0.101-1.447)	0.157
Level of education				
Illiterate	1 (reference)		1 (reference)	
High school and below	0.709 (0.395-1.272)	0.249	1.611 (0.940-2.763)	0.083
College and postgraduate	0.785 (0.443-1.394)	0.409	1.022 (0.566-1.847)	0.942
Number of persons in a family				
≥5	1 (reference)		1 (reference)	
6-10	2.672 (1.032-6.914)	0.043	0.690 (0.259-1.835)	0.457
>10	1.841 (0.779-4.355)	0.164	0.839 (0.346-2.030)	0.696
Occupation				
Government	1 (reference)		1 (reference)	
Nongovernmental	1.056 (0.602-1.853)	0.848	0.930 (0.559-1.547)	0.779
Business person	0.677 (0.287-1.598)	0.373	0.304 (0.090-1.034)	0.057
Unemployed	1.923 (0.327-11.298)	0.469	0.446 (0.052-3.857)	0.463
Smoking history				
Never	1 (reference)		1 (reference)	
Yes, but quit	0.868 (0.422-1.785)	0.700	0.882 (0.420-1.849)	0.739
Continue	0.544 (0.208-1.424)	0.215	1.423 (0.542-3.737)	0.474

CI=Confidence interval, OR=Odds ratio, AOR=Adjusted odds ratio

females in India in 2019, according to Shankar *et al.*, (37%). Forgetfulness was the most common reason for non-adherence, followed by running out of medication. The patients had a strong understanding of the blood pressure target and a high rate of adherence, indicating the importance of education in achieving a beneficial outcome.[19] A good adherence of males to treatment was also noted.[20] In contrast, the results obtained in our study showed that higher proportion of high adherence was found among females.

In this study, 58.1% of the patients were under 60 years old, 86.7% were nonsmokers, 56.3% had a family history of HTN, 52.6% had a family history of DM, 96.4% received free anti-HTN, and 33.3% had a BMI of 25.0–29.9 kg/m^2, indicating overweight. The current findings are close to those found by Petrie *et al.*, 2018, who claimed that the causes of HTN are not always clear, but that several factors, such as old age, weight gain, and smoking, may raise the risk of HTN.[20]

The multivariate logistic regression analysis revealed that participants over 65 and those with a family size of more than 10 were more likely to have high medication adherence. In 2018, Tilea *et al.*, discovered a link between low adherence and male gender, as well as a strong link between overall cardiovascular risk and level of adherence. They discovered that 54.7% of the patients who adhered very closely to instructions had satisfactory BP management, and that increased adherence was positively associated with antihypertensive regimens supplied as fixed-dose combos.[21]

In a study conducted by Zhang *et al.*, 2018, age, domicile, educational level, annual family income, and outpatient medical reimbursement were statistically associated with nonadherence. Furthermore, more than half of the patients achieved normal BP.[12]

In 2017, Xu *et al.*, discovered that higher adherence to a healthy heart was linked to a decreased risk of both ischemic and deadly strokes, while increased adherence to clinical measures was linked to a lower risk of both nonfatal and fatal strokes. Furthermore, enhanced adherence had a greater protective impact against stroke in patients 65 years and older than in those 65 years and younger.[22]

According to Nashilongo *et al.*, 2017, most patients reported obtaining enough information on how to take their medicine from their healthcare providers; however, more than half of the patients were unaware of the effects of HTN and nonadherence to medication. There was no link between patients' sociodemographic variables including gender, employment status, or educational level and antihypertensive medication adherence, nor was there any link between adherence and any chronic comorbidity.[23]

Age (<50 years), monthly income (5000 SAR), self-perception of health status (uncontrolled), and periodic evaluation in clinics were all independent characteristics related to poor adherence, according to Shaik *et al.*, 2016.[24] The patient's age and condition were linked to education and monthly income, which were found to be significantly linked to poor adherence in patients under 50 years old compared to those over 50. Patients with a monthly income of <5000 SAR had a higher risk of poor medication adherence than those with a monthly income of more than 30000 SAR.[24]

One limitation of the present study is the use of a self-reporting questionnaire that may have a recall bias. Our sample size was still too small to extrapolate our findings to the Taif population, even though we exceeded the projected sample size for the study. Another limitation was that BMI and blood pressure were self-reported. Other factors that may affect patient adherence, such as depression, anxiety, and difficulties obtaining PHC, were not included in this study.

Conclusion

There was a high level of adherence to anti-HTN medications by the studied patients. Of the patients with an income ≥5000 and those aged ≥60 years, 66.4% and 58.4% had a high adherence. About 58% (58.1%) of the females had a high adherence compared to 41.9% of the males. Of the married patients, 78.9% had a high adherence, and the illiterates had a 51% high adherence compared to patients with other levels of education. Of the patients with ≤10 family members, 43.3% had a high adherence, and 78% of the unemployed and 86.5% of the never smokers had a high adherence. The obstacles to taking medications were taking medication factors (58.1%), financial factors (22.2%), unavailability (15.8%), and no confidence in the medications as control for the disease (13.3%). Aged over 65 and the number of persons in the family were risk factors for adherence to medications. It is recommended that healthcare professionals assess hypertensive patients' adherence to medication and determine causes of non-adherence to overcome. Regular counseling and health education should be provided to hypertensive patients during their routine follow-ups.

Acknowledgment

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