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## Clinical Study

# Compliance with treatment of patients with hypertension in Almadinah Almunawwarah: A community-based study

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### KEYWORDS

Compliance;  
Diet;  
Exercise;  
Medication;  
Hypertension

**Abstract Objective:** The success of long-term maintenance therapy for hypertension depends largely on the patient's compliance with a therapeutic plan. The objective of this study was to determine the compliance with treatment of hypertensive patients attending primary health care centres in Almadinah Almunawwarah, Kingdom of Saudi Arabia.

**Methods:** A community-based cross-sectional study was adopted, with cluster random sampling. Sociodemographic data and subjective information were collected at interviews and clinical data by reviewing patients' medical records.

**Results:** The total mean percentage score for compliance was 35.1%. The best compliance was with electrocardiography and Doppler scanning, followed by laboratory investigations; the worst compliance was with exercise. In general, patients showed poor compliance with exercise and dietary regimes. The factors that affected patients' compliance were their sex, level of education, work status, smoking habits, self-reported response to medications and their perception of hypertension. A satisfactory patient–physician relationship was reported by only 14.4% of patients with fair-to-good compliance; 83.0% of patients with associated co-morbidity had poor compliance.

**Conclusion:** A healthy lifestyle, patient education, family counselling and social support networks should be strengthened in health promotion programmes in order to enhance compliance of hypertensive patients with the therapeutic regimen and to improve their quality of life.

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## Introduction

Hypertension is a common chronic problem worldwide. It is defined as systolic blood pressure  $\geq 140$  mm Hg and/or diastolic blood pressure  $\geq 90$  mm Hg and/or receiving antihypertensive medication. Its prevalence differs from one country to another. In 2000, nearly 1 billion people or  $\sim 26\%$  of the adult population worldwide had hypertension, and it was common in both developed (333 million) and underdeveloped (639 million) countries.<sup>1</sup> Over 90–95% of adult hypertension is of the essential type.<sup>2</sup>

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In western countries, hypertension affects 28–44% of the population.<sup>3</sup> Epidemiological studies in Arab countries show prevalences ranging from 20.1% in Egypt, 26.3% in Kuwait, 32.1% in Qatar and 33% in Oman.<sup>4–7</sup> A recent study in the Kingdom of Saudi Arabia found that 26% of adults were hypertensive.<sup>8</sup>

Hypertension is a major risk factor for stroke and coronary heart disease.<sup>9,10</sup> A large percentage of the population, however, are unaware that they have hypertension, and those known to be hypertensive are often not adequately controlled.<sup>11–13</sup> The first line of treatment for hypertension is preventive lifestyle changes and medication,<sup>14,15</sup> and poor control is attributed to poor compliance with the treatment regime.<sup>16–18</sup> Sackett and Haynes<sup>19</sup> defined patient compliance as “the extent to which a person’s behaviour in terms of taking medication, following diet, or executing life-style changes coincides with medical or health advice.” Compliance can be viewed as a patient’s behaviour in terms of timeliness in seeking care, attendance at follow-up appointments or observance of the physician’s advice. As compliance improves the outcome of hypertension, understanding its pattern is an important step in evaluating the effect of a hypertension treatment regime.

The objective of this study was to determine the compliance of patients with hypertension with their treatment regime.

## Materials and Methods

A community-based cross-sectional study was performed, with random sampling of 30 clusters in the Medina City administrative divisions and random selection of one primary health care centre from each cluster. At each primary health care centre, 30 hypertensive patients aged  $\geq 20$  years with a diagnosis of hypertension who were being investigated or treated were selected during a 5-month period starting in October 2011. All 900 hypertensive patients gave verbal consent for inclusion in the study. Data were collected by interview with a questionnaire designed to elicit sociodemographic data (basic education including primary and preparatory level, higher education including secondary level and university degree or more), clinical data including concurrent diseases such as diabetes, heart disease and rheumatic disorders, views on health care services, the patient’s beliefs and perceptions concerning hypertension, compliance with the treatment regime and barriers to good compliance.

Patient compliance was assessed from their attendance, according to the WHO guidelines.<sup>16</sup> Fair-to-good compliance was recorded when the patient attended the clinic for periodic medical check-ups and blood pressure measurement on more than two occasions during 6 months and annual check-ups for eye and renal screening. Poor compliance was recorded

**Table 1: Socio-demographic and disease characteristics of hypertensive patients by compliance level.**

Characteristic	Level of compliance				Total N = 900	P value	
	Poor		Fair to good				
	N = 760	%	N = 140	%			
Age in years: mean (SD)	47.4 (12.51)		46.9 (12.18)		47.3 (12.46)	NS	
<i>Sex</i>							
Male	370	80.3	91	19.7	461	100.0	< 0.05 <sup>a</sup>
Female	390	88.8	49	11.2	439	100.0	
<i>Education</i>							
No formal education	24	72.7	9	27.3	33	100.0	< 0.05 <sup>a</sup>
Basic	117	86.0	19	14.0	136	100.0	
High	619	84.7	112	15.3	731	100.0	
<i>Work status</i>							
Not working	239	78.4	66	21.6	305	100.0	< 0.05 <sup>a</sup>
Working	521	87.6	74	12.4	595	100.0	
<i>Marital status</i>							
Single	168	85.3	29	14.7	197	100.0	NS
Married	314	86.5	49	13.5	363	100.0	
Widow	157	84.0	30	16.0	187	100.0	
Divorced	121	79.1	32	20.9	153	100.0	
<i>Smoking</i>							
Non-smoker	121	90.3	13	9.7	134	100.0	< 0.05 <sup>a</sup>
Active smoker	382	88.2	51	11.8	433	100.0	
Passive smoker	257	77.2	76	22.8	333	100.0	
<i>Self-reported response to medication</i>							
Not responding	214	79.0	57	21.0	271	100.0	< 0.05 <sup>a</sup>
Responding	546	86.8	83	13.2	629	100.0	
<i>Co-morbid conditions</i>							
Absent	267	87.3	39	12.7	306	100.0	NS
Present	493	83.0	101	17.0	594	100.0	
Duration of hypertension (years): mean (SD)	4.6 (3.14)		4.4 (2.69)		4.6 (3.07)		NS

<sup>a</sup> Pearson’s chi-square test,  $p < 0.05$ ; P value of Student’s t test.

when the patient had not attended the clinic during the previous 6 months.

To assess outcome of care, the patients' medical records were reviewed during their interview to obtain the most recent blood pressure measurements and any complications. Body mass index, pulse and blood pressure were estimated.

A compliance score was calculated for each patient and converted to a total percentage score, categorized as poor (<62.5%), fair (62.5–80.0%) or good (>80.0%). The mean score was estimated for each item, and the total mean percentage score was calculated for each category. In order to study the relations between degree of compliance and the study variables, two levels were used: poor compliance (<62.5%) and good and fair compliance (>62.5%).

### Statistical analysis

SPSS version 13 was used. Frequencies, percentages and arithmetic mean were calculated. Chi-square test and Student's *t* test were used appropriately. A *P* value <0.05 was considered significant.

### Results

The mean age of the studied population was 47.3 (12.46) years. The mean duration of hypertension was 4.6 (3.07) years.

Most of the women (88.8%) showed poor compliance ( $p = 0.000$ ); 86.0% of these had received only basic education,

but 84.7% of those with higher education were also poorly compliant ( $p = 0.000$ ) (Table 1). Only 12.4% of the working population and 13.5% of married participants showed good compliance (both  $p = 0.000$ ). Only 9.7% of non-smokers had fair-to-good compliance, and 83.0% of people with comorbid conditions had poor compliance (Table 1).

The total mean percentage score for compliance was 35.1 (14.48), with a significant difference between poor and fair-to-good compliance ( $p = 0.000$ ) (Table 2). The best compliance was with periodic electrocardiography and Doppler, followed by periodic laboratory investigations. The worst compliance was with exercise (Table 2).

More than two fifths (85.2%) of those who stated that they could not access the prescribed medications and 80.5% of those who found that the delay before obtaining an appointment was too long also had poor compliance ( $p = 0.001$ ). Poor compliance was also seen for 80.0% of patients who complained that their examination was too short ( $p = 0.000$ ). Fair-to-good compliance was found for 14.4% of people who had a satisfactory patient–physician relationship ( $p = 0.015$ ). Most patients who received supplementary health education materials (87.8%) had poor compliance ( $p = 0.009$ ) (Table 3).

The outcomes of care (systolic and diastolic blood pressure, pulse rate per minute and complications) were significantly poorer for patients with fair-to-good compliance than those with poor compliance (Table 3). Yes this is result, but not every point expressed in the result section discussed in discussion but the reverse is true.

**Table 2: Compliance of hypertensive patients with treatment regimen.**

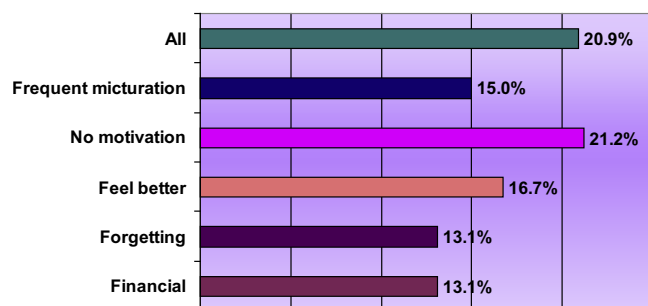
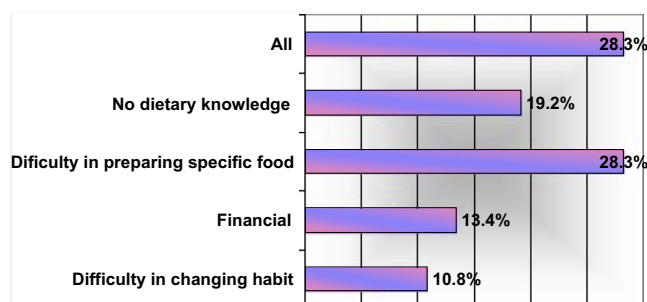
Item	Level of compliance				Mean score
	Poor		Fair to good		
	<i>N</i> = 760	%	<i>N</i> = 140	%	
<i>Periodic medical check-up</i>					
Not compliant	554	72.9	37	26.4	0.34 (0.48)
Compliant	206	27.1	103	73.6	
<i>Periodic electrocardiography and Doppler scan</i>					
Not compliant	18	2.4	6	4.3	1.0 (0.16)
Compliant	742	97.6	134	95.7	
<i>Periodic laboratory investigations</i>					
Not compliant	371	48.8	22	15.7	0.56 (0.49)
Compliant	389	51.2	118	84.3	
<i>Self-measurement of blood pressure</i>					
Not compliant	732	96.3	118	84.3	0.15 (0.22)
Compliant	28	3.7	22	15.7	
<i>Medications</i>					
Not compliant	642	84.5	57	40.7	0.22 (0.42)
Compliant	118	15.5	83	59.3	
<i>Dietary regimen</i>					
Not compliant	665	87.5	72	51.4	0.18 (0.39)
Compliant	95	12.5	68	48.6	
<i>Exercise</i>					
Not compliant	719	94.6	77	55.0	0.12 (0.32)
Compliant	41	5.4	63	45.0	
Total mean score (SD)	30.4 (10.11)		60.3 (6.19)		35.1 (14.48)
<i>P</i> value	<0.05 <sup>a</sup>				

<sup>a</sup> *P* value of Student's *t* test significant at <0.05.

**Table 3: Patients' satisfaction with quality of care and compliance level.**

	Level of compliance				Total N = 900	P value
	Poor N = 760		Fair to good N = 140			
		%		%		
<i>Medications</i>						
Not available	306	85.2	53	14.8	359	100.0
Available	454	83.9	87	16.1	541	100.0
<i>Waiting time</i>						
Long	350	80.5	85	19.5	435	100.0
Reasonable	410	88.2	55	11.8	465	100.0
<i>Examination time</i>						
Insufficient	360	80.0	90	20.0	450	100.0
Sufficient	400	88.9	50	11.1	450	100.0
<i>Patient-physician relationship</i>						
Unsatisfactory	241	82.0	53	18.0	294	100.0
Satisfactory	519	85.6	87	14.4	606	100.0
<i>Health education about: Type of treatment</i>						
No	441	82.7	92	17.3	533	100.0
Yes	319	86.9	48	13.1	367	100.0
<i>Proper use of medications</i>						
No	449	82.8	93	17.2	542	100.0
Yes	311	86.9	47	13.1	358	100.0
<i>Complications of hypertension</i>						
No	457	84.0	87	16.0	544	100.0
Yes	303	85.1	53	14.9	356	100.0
<i>Follow-up schedule</i>						
No	351	80.3	86	19.7	437	100.0
Yes	409	88.3	54	11.7	463	100.0
<i>Supplementary health education material</i>						
No	387	81.5	88	18.5	475	100.0
Yes	373	87.8	52	12.2	425	100.0
<i>Outcome of care</i>						
Systolic blood pressure Mean (SD)	120.1 (10.59)		115.4 (9.67)		116.2 (8.73)	
Diastolic blood pressure Mean (SD)	81.5 (12.34)		80.1 (10.81)		80.5 (9.64)	
Pulse rate/minute Mean (SD)	78.5 (5.8)		75.9 (7.61)		77.3 (5.21)	
<i>Complications</i>						
Absent	301	74.9	101	25.1	402	100.0
Present	459	92.2	39	7.8	498	100.0

<sup>a</sup> Pearson's chi-square test,  $p < 0.05$ ;  $P$  value of Student's  $t$  test.

**Figure 1: Causes of poor compliance with medication.****Figure 2: Causes of poor compliance with dietary regimen.**

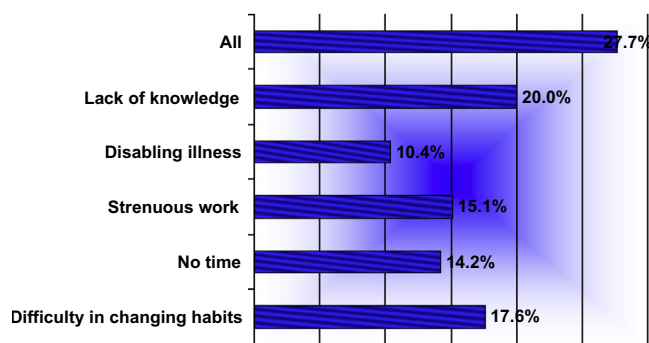


Figure 3: Causes of poor compliance with exercise regimen.

Lack of motivation was the most frequent cause of poor compliance (21.2%) (Fig. 1). Difficulty in preparing a specific diet (28.3%) was the most frequent cause of poor compliance to the dietary regimen (Fig. 2), and 20.0% stated that lack of

knowledge was the chief cause of non-compliance with the exercise regime (Fig. 3).

The mean percentage score for patient perceptions concerning hypertension was 65.4 (10.52) ( $p = 0.002$ ), with the highest values for benefits of compliance (81.6%) and the role of family support (70.0%) (Table 4).

Compliance with a treatment regimen was positively correlated with duration of hypertension ( $r = 0.066$ ,  $p = 0.043$ ) (Fig. 4).

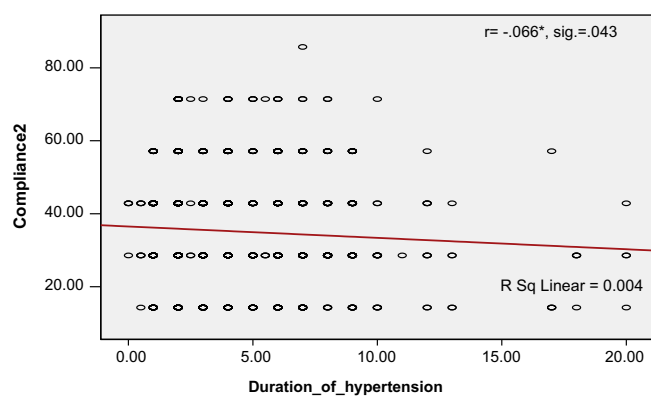
## Discussion

This study shows that the worst compliance is with exercise and dietary regimens and the best with laboratory investigations, even when hypertension was severe enough to justify immediate medication. This result concurs with those of similar studies<sup>17,18</sup>, even though the achievement and maintenance of a more optimal standardized weight with a healthful dietary plan, recommended levels of regular physical activity and

Table 4: Patients' perceptions of hypertension and compliance level.

	Level of compliance				Total		P value
	Poor		Fair to good				
	N = 760	%	N = 140	%	N = 900	%	
<i>Severity of hypertension</i>							
No	595	78.3/83.6	117	83.6/16.4	712	79.1/100.0	< 0.05 <sup>a</sup>
Yes	165	21.7/87.8	23	16.4/12.2	188	20.9/100.0	
<i>Susceptibility to complications</i>							
No	343	45.1/87.7	48	34.3/12.3	391	43.4/100.0	< 0.05 <sup>a</sup>
Yes	417	54.9/81.9	92	65.7/18.1	509	56.6/100.0	
<i>Impact on social life</i>							
No	448	58.9/83.0	92	65.7/17.0	540	60.0/100.0	NS
Yes	312	41.1/86.7	48	34.3/13.3	360	40.0/100.0	
<i>Benefits of compliance</i>							
No	156	20.5/94.0	10	7.1/6.0	166	18.4/100.0	< 0.05 <sup>a</sup>
Yes	604	79.5/82.3	130	92.9/17.7	734	81.6/100.0	
<i>Barriers to treatment</i>							
No	312	41.1/80.8	74	52.9/19.2	386	42.9/100.0	< 0.05 <sup>a</sup>
Yes	448	58.9/87.2	66	47.1/12.8	514	57.1/100.0	
<i>Barriers to diet</i>							
No	302	39.7/84.4	56	40.0/15.6	358	39.8/100.0	NS
Yes	458	60.3/84.5	84	60.0/15.5	542	60.2/100.0	
<i>Barriers to exercise</i>							
No	322	42.4/85.4	55	39.3/14.6	377	41.9/100.0	< 0.05 <sup>a</sup>
Yes	438	57.6/83.7	85	60.7/16.3	523	58.1/100.0	
<i>Internal cues to compliance: control of severe hypertension</i>							
No	242	31.8/79.9	61	43.6/20.1	303	33.7/100.0	< 0.05 <sup>a</sup>
Yes	518	68.2/86.8	79	56.4/13.2	597	66.3/100.0	
<i>External cues to compliance: family support</i>							
No	249	32.8/92.2	21	15.0/7.8	270	30.0/100.0	< 0.05 <sup>a</sup>
Yes	511	67.2/81.1	119	85.0/18.9	630	70.0/100.0	
<i>Educational support</i>							
No	387	50.9/81.5	88	62.9/18.5	475	52.8/100.0	< 0.05 <sup>a</sup>
Yes	373	49.1/87.8	52	37.1/12.2	425	47.2/100.0	
Score: mean (SD)	50.4 (14.18)		75.9 (15.23)		65.4 (10.52)		< 0.05 <sup>a</sup>

<sup>a</sup> Pearson's chi-square test,  $p < 0.05$ ; P value of Student's *t* test.



**Figure 4:** Relation between duration of hypertension and compliance.

other behavioural approaches are associated with a significant reduction in blood pressure.

One limitation of this study is that we did not exclude patients with psychiatric problems or those with severe complications with permanent disabling sequelae, such as stroke. This should be avoided in future studies.

The level of compliance varies from patient to patient. We found that sex, educational level, work status, smoking habits and self-reported response to medications affected compliance, as did patients' perceptions of hypertension. Other factors that affect compliance include the recommended behavioural change, the complexity of the regimen and the ease with which the patient could incorporate the recommendations into his or her daily routine. Compliance also varies according to incentive, therapeutic intent or goal and the ability to pay for care. It is difficult to predict which patients will comply and to what extent they will comply with a given behaviour at any time. It has been known for decades that compliance with lifestyle behaviour change and drug regimens has been overestimated by both patients and providers.<sup>18</sup>

Health education is considered the cornerstone of management, particularly for hypertensive patients. The rationale for enhancing compliance is based on the premise that the patient will get well or stay well if the physician, other health care providers and health care organizations make appropriate recommendations, provided that the patient has the requisite knowledge, motivation, skills and resources to follow the recommendations.<sup>16,17</sup> The literature on compliance is dominated by reports of patient noncompliance with prevention and treatment recommendations, and there are fewer reports on how the behaviour of health care professionals and the delivery of medical care contribute to patient compliance. We also studied patient satisfaction and found that only 14.4% of patients with fair-to-good compliance reported a satisfactory patient-physician relationship. Effective communication between physician and patient depends in part on the physician's confidence in his or her ability to teach and enhance patient skills as well as the time available for providing preventive services.<sup>14</sup>

The aim of treatment should be reduce blood pressure to < 140/90 mm Hg for most individuals and lower for those with diabetes or kidney disease.<sup>19,20,21</sup> This aim was achieved for patients in this study, whose mean systolic pressure was 116.2 (8.73) and diastolic pressure was 80.5 (9.64). We found

that 83.0% of patients with co-morbid conditions had poor compliance. Such conditions may determine the target blood pressure, with lower targets for patients with end-organ damage or proteinuria.<sup>12,19-22</sup> The results of this study lead us to suggest that the most appropriate therapeutic attitude in treating patients with hypertension should be to avoid therapeutic withdrawal and lack of medical control. In the United States, only about one third of all people with hypertension are controlled, and programmes to improve hypertension control rates and prevent hypertension are urgently needed.<sup>23</sup>

## Conclusion

Patients with hypertension were poorly compliant with exercise and dietary regimens. Sex, educational level, work status, smoking habits and self-reported response to medications affected compliance, as did patients' perceptions of hypertension. A minority of patients with fair-to-good compliance had a satisfactory patient-physician relationship. Most patients with co-morbid conditions were poorly compliant.

Health promotion programmes should emphasize a healthy lifestyle, patient education, family counselling and social support networks in order to enhance compliance with therapeutic regimens for hypertension and to improve patients' quality of life.

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