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Research Article

EVALUATION OF PATIENTS COMPLIANCE AND BLOOD PRESSURE CONTROL AMONG HYPERTENSIVE PATIENTS ATTENDING PRIMARY HEALTH CARE CENTERS, MINISTRY OF HEALTH, JEDDAH, SAUDI ARABIA, 2018**Dr. Mawada Mohammed Afif,**
MBBS, Family Medicine Resident**Article Received:** September 2019 **Accepted:** October 2019 **Published:** November 2019**Abstract:**

Background: The World Health Organization defines adherence to medication as the degree to which the person's behaviour corresponds with the agreed recommendations from a healthcare provider. The WHO describes poor adherence as the most critical cause of uncontrolled blood pressure and estimates that 50–70% of people do not take their antihypertensive medication as prescribed. **Aim:** To determine the level of adherence to antihypertensive medications and blood pressure control among patients attending primary health care centres. **Methodology:** The study was a cross-sectional and carried for three weeks on 5 PHCC in Jeddah targeting hypertensive patients over the age of 18 and excluded younger than 18 and pregnancy associated hypertension. By using a special designed questionnaire, the Hill- Bone Compliance to High Blood Pressure Therapy Scale in Arabic language. **Results:** This study included 432 participants; male constitutes 31.2% while females were found to be 68.8%. Age group between 55-60 years were found to be most prevalent in our study (37.6 %). More than 95% of participants were Saudi citizens. Patients with hypertension less than 1 year were 16.24%, between 1-5 years were about 30%. More than 61% of study participants were adherent to their medications while 38.46% were not adherent to medications of hypertension. **Conclusion:** Non-adherence to the therapeutic regimen remains a major limiting factor of hypertension management in Saudi Arabia. Overall the medication adherence was poor in hypertensive patients. Poor adherence to therapy is largely unrecognized in clinical practice. Our study suggests that, improving medication adherence in hypertensive patients can help to achieve optimal blood pressure goals and prevent further hypertension related complications. Adherence to therapeutic regimens is an important factor for optimal clinical benefits; therefore, efforts should be made by the physicians to identify the reasons for non-adherence and initiate steps to improve it.

Keywords: hypertension, drug adherence, compliance.**Corresponding author:****Dr. Mawada Mohammed Afif,**
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INTRODUCTION:

Hypertension is regarded as common disease that targets large scale of population worldwide. It started asymptomatic and stay insidious till accidental medical visit after the first or second complication. (1) Therefore, it is used to called “silent killer”. The definition of hypertension is a condition of elevated blood pressure beyond normal limits of age, gender and race. The prevalence of hypertension is different according to age and race. For example, Africans are more prone to have hypertension (46%) than Albino (35%). (2) In our kingdom, hypertension in Saudi Arabia varied among age groups, in those between 15-24 years; hypertension was found to be 3.2%. In those between 55-69 years old; hypertension was prevalent in 51% of them. Seventy percent of those above 65 years are hypertensive. Complications of hypertension are highly fatal, morbid and irreversible except in certain situations. Myocardial infarction, ischemic and hemorrhagic stroke, heart failure, chronic kidney disease, cognitive decline and premature death are main complications. (3,4) Half percent of cardiac diseases and stroke end to death are due to hypertension.

The diagnosis of hypertension according to NICE guidelines 2011

- Stage I hypertension Clinic blood pressure is 140/90 mmHg or higher
- Stage II hypertension Clinic blood pressure is 160/100 mmHg or higher
- Severe hypertension Clinic systolic blood pressure is 180 mmHg, or higher or clinic diastolic blood pressure is 110 mmHg or higher.

To control hypertension should integration between lifestyle management and adherence to antihypertensive medication.

The World Health Organization defines adherence to medication as the degree to which the person's behavior corresponds with the agreed recommendations from a healthcare provider. The WHO describes poor adherence as the most critical cause of uncontrolled blood pressure and estimates that 50–70% of people do not take their antihypertensive medication as prescribed. (5)

There are several useful options to assess adherence in the routine clinical setting. As asking the patients if they miss any doses of medication. Use a simple questionnaire as The Hill- Bone Compliance to High Blood Pressure Therapy Scale. (6)

Ask the patient to bring antihypertensive medicines to the clinic and calculate the medication possession ratio (MPR), which serves as a proxy for adherence. More sophisticated techniques for assessing adherence include measurements of medications in urine or blood samples, electronic medication monitors. (7)

Numerous factors influence treatment adherence, including demographic characteristics, psychosocial factors, socioeconomic status and disease severity, class of drug prescribed, patient understanding of disease and importance of treatment, co-morbid medical conditions, patient– healthcare provider relationship, drug cost and presence of psychological problems.

Integrated non communicable disease programs implemented through a primary health care approach are an affordable and sustainable way for countries to tackle hypertension.

Literature review:

SARAH M. KHAYYAT et al. Cross-Sectional Study conducted in 2016 in 204 hypertensive patients in Makkah. The study discussed Predictors of Medication Adherence and Blood Pressure Control among Saudi Hypertensive Patients Attending Primary Care Clinics. The mean number of medications used by patients was 4.4 (SD 1.89). More than half 54% of the patients were non-adherent to their medications. Profoundly adherent patients were about five times more likely to have controlled blood pressure compared to low adherent patients. (9)

Shafi Ahamed Shaik et al. Cross-sectional study was conducted during October 2013 to March 2014 in King Khalid University Hospital, Riyadh about patients Medications adherence level and its associated factors among 282 hypertensive patients. The result showed the Prevalence of poor adherence to medications was 55%. Age, educational status, monthly income, time of diagnosis, self-perception of health status, regular checkup at clinics, & routine blood pressure checkup were significantly associated with level of adherence to medications. (10)

Khalil, S A et al. Prospective study conducted on 1997 on Tabouk. The study discussed Drug compliance among hypertensive patients in Tabouk. The compliance rate was 53.0%. It was associated positively with the male, and negatively with older age, symptoms of illness and drug side effects.

The degree of blood pressure control was worse among noncompliant subjects. Reasons for noncompliance included the asymptomatic nature of hypertension, a shortage of drugs, side effects, forgetfulness and lack of health education. (11)

Abdulla Shehab et al. A systematic review and meta-analysis Nonadherence to antihypertensive drugs. A total of 28 studies from 15 countries were identified, in total comprising of 13,688 hypertensive patients. Of 25 studies included in the meta-analysis involving 12,603 subjects, a significant number 45.2% of the hypertensive patients and 31.2% of the hypertensive patients with comorbidities were nonadherent to medications. However, an 83.7% of medication nonadherence found in uncontrolled blood pressure patients.

Although a higher percentage 54% of nonadherence to antihypertensive was noticed in females (the risk of nonadherence was 1.3 times higher in males, with a relative risk of 0.883. Overall, nearly two-thirds (62.5%) of the medication nonadherence found in Africans and Asians (43.5%). (12) Yassine Mohammad et al. Cross-sectional study conducted in Beirut in 2015 among 210 hypertensives. The study discussed Evaluation of medication adherence in Lebanese hypertensive patients. Conclusion: 50.5% showed high adherence, 27.1% medium adherence, and 22.4% low adherence to medication. (13)

Al-Ramahi et al. A cross-sectional descriptive study conducted in Palestine in 2011 among 450 hypertensive patients the study discussed the Adherence to medications and associated factors. Low adherence to drugs was present in 54.2% of the patients. Reasons for low-adherence to drugs recorded as 61.1% forgetfulness, 16.0% cost, lack of access to medication 14.7%, traveling 11.8%, dissatisfaction with treatment 10.0%, adverse effect 10.0%, fear of getting used to medication 7.3%.

And other reasons such as the unavailability of these medicines at the Ministry of Health healthcare centers 8.9%. (14)

Candy D. Kang et al. Cross-sectional study on Hong Kong among 2445 patients, on 2014. The study discussed Determinants of medication adherence and blood pressure control among hypertensive patients. Conclusion: 55.1% and 52.5% had optimal medication adherence and BP control. Evidence-based, adherence-enhancing interventions should be a target for younger subjects; employed patients; and those with poor self-perceived health status. Patients who are single and those with comorbidities should

be carefully monitored for their BP control. (15)

Yang Heui Ahn et al. A cross-sectional study was conducted in Korea in 2011 with a convenient sample of 289 patients. The study discussed the Factors Associated with Medication Adherence among Medical-Aid Beneficiaries with Hypertension. The study found that 25.6% to 34.6% had low knowledge regarding medication adherence. Those with higher health literacy and higher self-efficacy scores were more likely to have higher medication adherence, whereas those who perceived more cons of chronic disease management were more likely to have lower medication adherence than their counterparts. (16)

Xin Tong MPH et al. Nonadherence in Antihypertensive Medication Among Hypertensive Adults in the United States 2010. The study among 4198 adults aged 18 years and older. The study found overall nonadherence was 30.5% and was more prevalent among younger adults and patients with lower income. Affordability was the top reason reported for nonadherence. (17)

Karen L. Tang et al. cohort study the study discussed Measuring medication adherence in patients with incident hypertension of patients aged ≥ 65 years from Manitoba, Canada diagnosed in 2004 and followed in 2009. Conclusion: Among 2199 patients, 24.1% to 90.5% and 71.2% to 92.7% were considered adherent when using fixed interval and prescription-based interval medication possession ratios, depending on how concurrent medications. (18)

Rationale:

Researcher has the interest, during my practice on primary health care I dealt with many patients not compliance to antihypertensive medications. Importance of hypertension as common non-communicable diseases in our community. Many of hypertensive patients are attending primary health care centers for chronic diseases clinic. And the primary health care centers are easy to access and place of education.

Aim of the study:

To determine the level of adherence to antihypertensive medications and blood pressure control among patients attending primary health care centers.

Objectives:

- To assess the level of compliance to antihypertensive medications among hypertensive patients attending primary health care centers, Jeddah, 2018.

- To determine the level of adherence to diet and follow up appointments among hypertensive patients attending primary health care centers in Jeddah, 2018.
- To assess the control of blood pressure among hypertensive patients attending primary health care centers, Jeddah, 2018.

METHODOLOGY (MATERIALS AND METHODS):

Study Design:

Cross-sectional study.

Study Area:

The study was carried out in the city of Jeddah. Jeddah is a Saudi Arabian port city on the Red sea and gateway for pilgrimages to the Islamic holy cities Makkah Al-Mukarramah and Medina. The total population are 3976368.

Study Population:

Hypertensive Patients are attending the primary health care centers at Jeddah city in Prince Abdul Majeed, AlFaisaliah, Al Rehab, AlSheraa and AlBalad primary health care centers.

Inclusion Criteria:

Hypertensive Patients are attending the selected PHCC

- Male and female.
- Age 18 year and above

Exclusion Criteria

- Pregnant hypertensive patients.
- Patients less than 18 years.

Sample Size:

The study was carried for three weeks on 5 PHCC in Jeddah. The estimated total number of hypertensive patients attending PHCC 40 patients per week for each center. Estimated total number of hypertensive patients attending selected PHC Centers for three weeks are 600 patients. According to the previous study, the prevalence of nonadherence to antihypertension medications among hypertensive patient is 54%. By using the Raosoft calculator program with confidence interval 95% and error 5 % the sample size, it will be in 234 patients.

Sampling Technique:

The total number of PHCC under MOH in Jeddah are 48 centers under 5 hospitals administration. The first step, the researcher was using cluster sampling technique to choose one PHCC from each sector. Every center under each hospital administration given a random number and by using random number

generator the result was Prince Abdul Majeed, AlFaisaliah, Al Rehab, AlSheraa and AlBalad primary health care centers. The second step was choosing the participants on these study by using non randomized sample technique (convenience sampling) for every hypertensive patient attending the PHCC.

Data collection tool (instrument):

Self-administered questionnaire. The questionnaire has two parts. The first part information regarding patient's sociodemographic characteristics, lifestyle characteristics, and patient disease status. Patients were asked about duration of hypertension, other chronic diseases, their prescribed medication regimen, including the number of their antihypertensive drugs, frequency per day and reasons for not taking their medications. The second part about patient medication adherence by using the Hill- Bone Compliance to High Blood Pressure Therapy Scale in Arabic language. HB-HBP has been widely used for assessing patients' adherence to their medications. The scale assesses patient behaviours for three important domains of high blood pressure treatment: 1) diet (reduced sodium intake); 2) appointment keeping; and 3) medication taking. This scale is comprised of 14 items in three subscales, 9 items for medications adherence, 3 items for appointment keeping and 2 items for diet. Each question/item was answered with a four-point Likert scale ranging from 1 to 4 (1= none of time, 2 = some of the time, 3 = most of time, and 4 = all the time). Total HILL-BONE score ranged from 14 (good adherence) to 56 (non-adherence) with higher scores denoting overall poorer adherence. Trained nurses to measured blood pressure by electronic sphygmomanometers to all patients participated in this study.

Validity of Questionnaire:

The questionnaire has been validated by three consultants, two Family medicine consultant and one internal Medicine consultant. The questionnaire was tested during the pilot study.

Translation:

Translation of an English questionnaire to the Arabic Language was translated back to English with a consistency and similarity of >80% between the two English versions.

Reliability:

The reliability was tested by 10% of the population size in the pilot study.

Data Collection Technique:

The study was conducted in January 2018 for three weeks among hypertensive patients attending the selected PHCC in Jeddah. The PHCC that participated in this study are Prince Abdul Majeed, Alfaisaliah, Al Rehab, AlBalad and AlSheraa. They will be 47 patients from each center, 78 patients per week.

After taking approval from MOH and PHCC managers, data was collected using a structured questionnaire distributed to patients after taken written consent. The survey was distributed to patients in the morning from 8 am to 2 pm before they enter the clinic. The questionnaire was distributed and collected by researcher's hand to hand. Trained nurses measured blood pressure by using electronic sphygmomanometers in all patients after they were resting for 10 minutes and in a seated position with the right arm placed at the level of the heart. The nurse wrote the measurement on the same paper of questioner for each patient.

Aim for a target clinic blood pressure below 140/90 mmHg considered as control blood pressure in people aged under 80 years with treated hypertension. In people aged 80 years and older target clinic blood pressure below 150/90 mmHg according to NICE guidelines.

Study variables:

Dependent variable:

- Level of adherence to antihypertension medications (good adherence and poor adherence).
- Blood pressure control (controlled, uncontrolled).

Independent variable:

Sociodemographic characteristics as age, gender, and level of education.

Data entry and analysis:

The Statistical Package for Social Sciences (SPSS) program version 24 was used for data entry and analysis. The P value less than 0.05 will be considered significant. Confidence of interval 95% and Error 5%. And we use Student t-test, One-way ANOVA test and logistic regression test.

Pilot study:

A pilot study was conducted on 10% of the population size in AlRawabi PHCC to test validity and reliability of the questionnaire. Full methodology and analysis were as the main study.

Ethical considerations:

The researcher started data collection after fulfillment of all official approvals

- Approval from Research committee.
- Approval from program director joint program of family medicine in Makkah Al Mokrammah.
- Permission were obtained from the director of health affairs in Jeddah to research the selected PHCC.
- Approval were obtained from each PHCC.
- Written consents from all patients who were participated on research.
- Acknowledgments of all supervisors, advisors, facilitators, participants. and family members indicating their role in the research process.
- Confidentiality of the data was completely confirmed.

Relevance and expectations:

The researcher expects from the study to find that there is a low adherence to antihypertension medication and identify the factors of non-adherence.

Limitations:

Time limitation.

Budget:

This study was entirely self-funded by researcher.

RESULTS:

Demographics:

This study included 432 participants, male constitutes 31.2% while females were found to be 68.8%. Age group between 55-60 years were found to be most prevalent in our study (37.6 %). More than 95% of participants were Saudi citizens. About 75% of participants were married. Bachelor degree holders were found to be 39% of participants while elementary school certificate holders were next to bachelor holders (27%). Diabetes mellitus was most prevalent in our study (109) patient as shown in Table 1 and Figure 1.

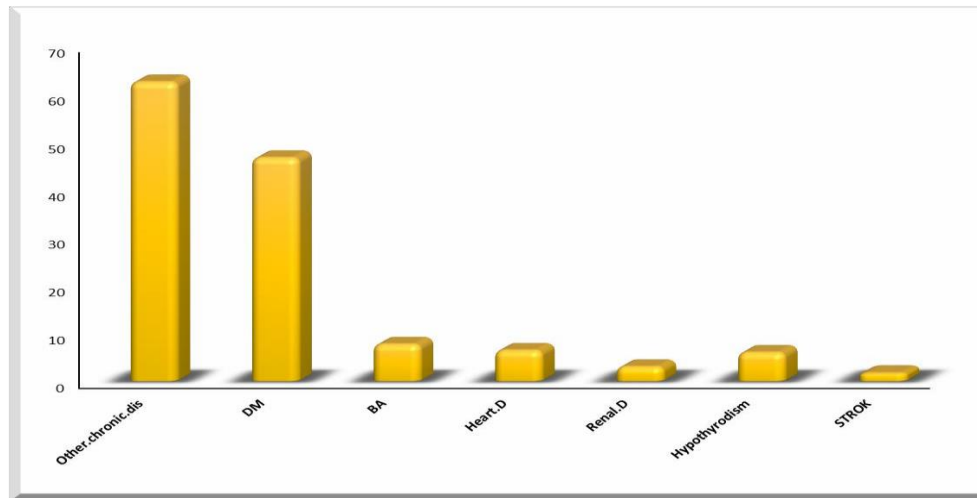


Figure 1: Frequency of comorbidities in our study.

Table 1: Demographic distribution and statistical frequency of study participants

	N	%
Gender		
Male	73	31.20
Female	161	68.80
Age		
30-18	5	2.14
40-31	25	10.68
50-41	61	26.07
60-51	88	37.61
More than 60	55	23.50
Nationality		
Saudi	223	95.30
Non Saudi	11	4.70
Marital Stat		
Single	15	6.41
Married	175	74.79
Divorced	17	7.26
Widow	27	11.54
Level of educational		
Elementary	64	27.35
Intermediate	23	9.83
Secondary	41	17.52
Diploma	14	5.98
Bachelor	92	39.32
Comorbidity		
Other.chronic.dis	146	62.39
DM	109	46.58
BA	18	7.69
Heart.D	15	6.41
Renal.D	7	2.99
Hypothyroidism	14	5.98
STROK	4	1.71

Patients with hypertension less than 1 year were 16.24%, between 1-5 years were about 30%.

Table 2 and Figure 2 illustrate the frequency of disease prevalence.

Table 2: Frequency of disease prevalence		
Duration of HTN		
	N	%
less than 1 year	38	16.24
y 5-1	69	29.49
y 10-6	61	26.07
more than 10 y	66	28.21
Total	234	100.00

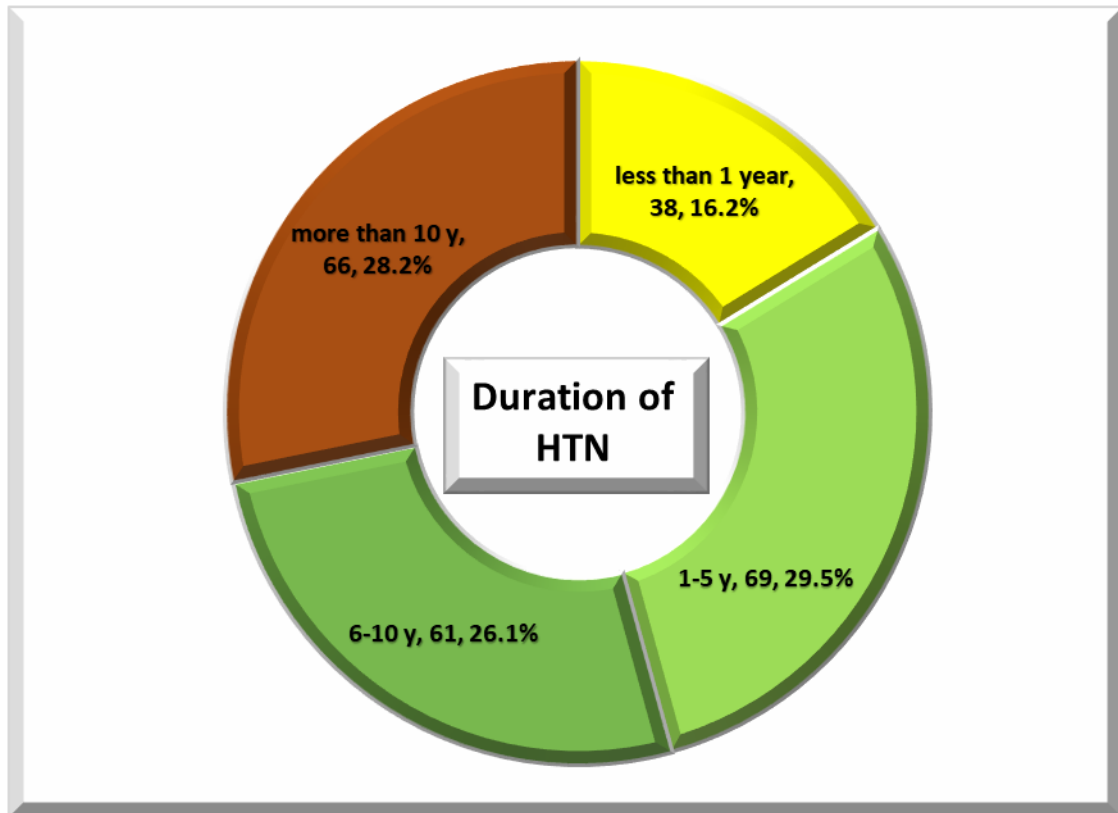


Figure 2: Duration of disease among our study.

Over 60% of our study participant took only one drug. Two-drugs were found in 30% of our study participants. Table 3 and Figure 3 illustrate the frequency distribution of drugs in our study.

Table 3: Frequency of number of medications		
Number of medication		
	N	%
One	142	60.68
Two	70	29.91
Three	13	5.56
Four	7	2.99
Five	2	0.85
Total	234	100.00

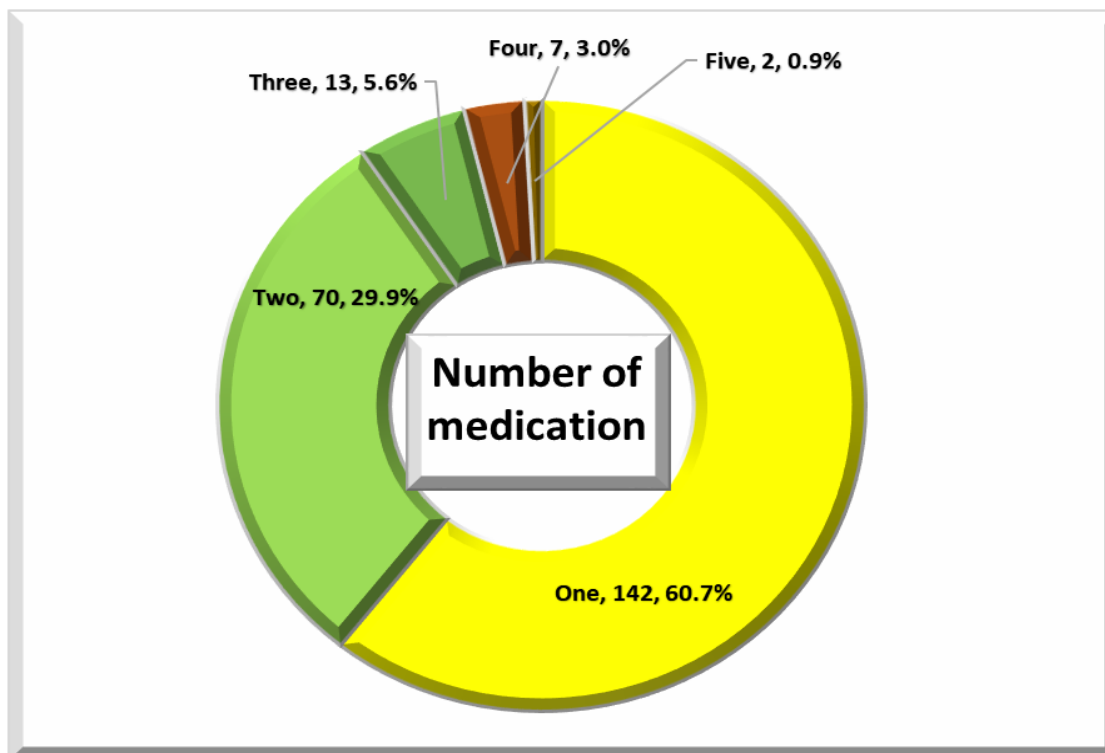


Figure 3: Frequency of number of medications.

Adherent study participants were found to be 144(61.54%) while 38.5 % were not adherent to medications of hypertension as shown in Table 4 and Figure 4 and 5. The adherence scale ranges from 9-31 with mean and SD 13.3(4.1)

Diet adherence was found to be closely between non-

adherent and adherent. Fifty-four percent of participants were adherent to diet modification as shown in Table 4 and Figure 4. Adherence to doctor appointment was much lower than non-adherence, 74 (31.6%) were adherent to doctor appointment. Table 4 and Figure 4 illustrate divergence of frequency.

Table 4: Custom tabulation of adherence between groups.

	Adherence to medications		Adherence to diet		Adherence to appointment		Total Adherence	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Non- adherence	90	38.46	106	45.3	160	68.4	85	36.3
Adherence	144	61.54	128	54.7	74	31.6	149	63.6
Range	.31-9		.12-3		.7-2		45-14	
Mean±SD	4.188±13.372		1.598±5.573		1.278±4.167		5.3±23.111	

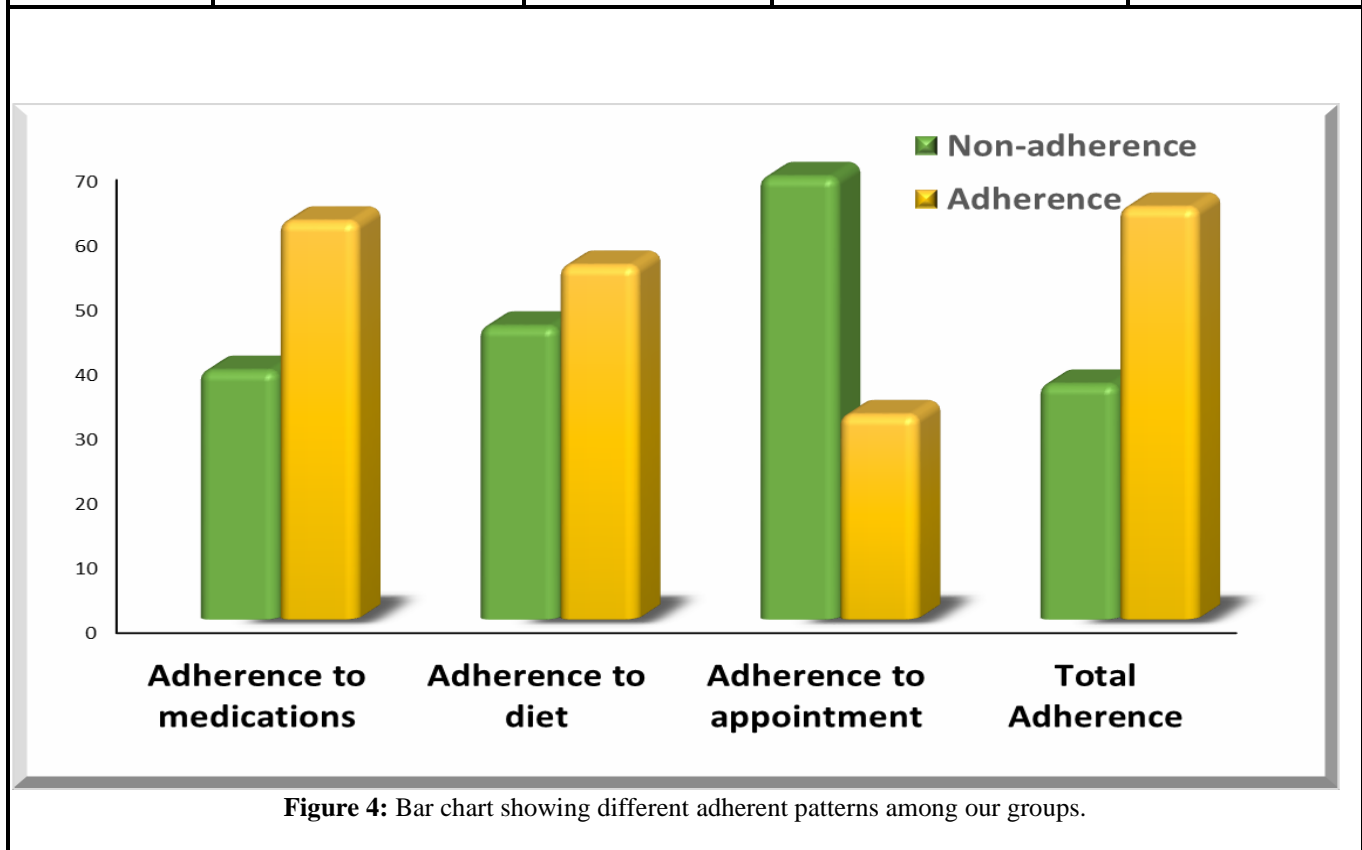


Figure 4: Bar chart showing different adherent patterns among our groups.

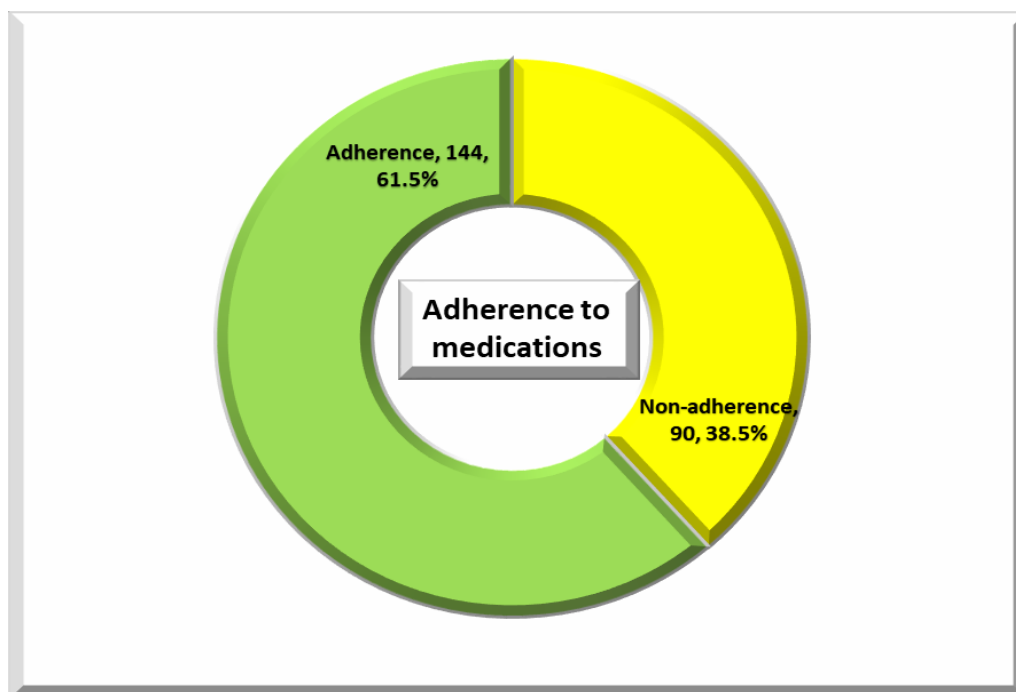


Figure 5: Adherence to medication.

In general, non-adherence events were recorded 85 times and constituting 36.32%. Adherence was recorded in 149 participants and as constituting with 63.68% as shown in Table 5 and Figure 6.

Table 5: frequency of Total Adherence		
	N	%
Non- adherence	85	36.32
Adherence	149	63.68
Total	234	100.0
Range	45-14	
Mean±SD	5.344±23.111	

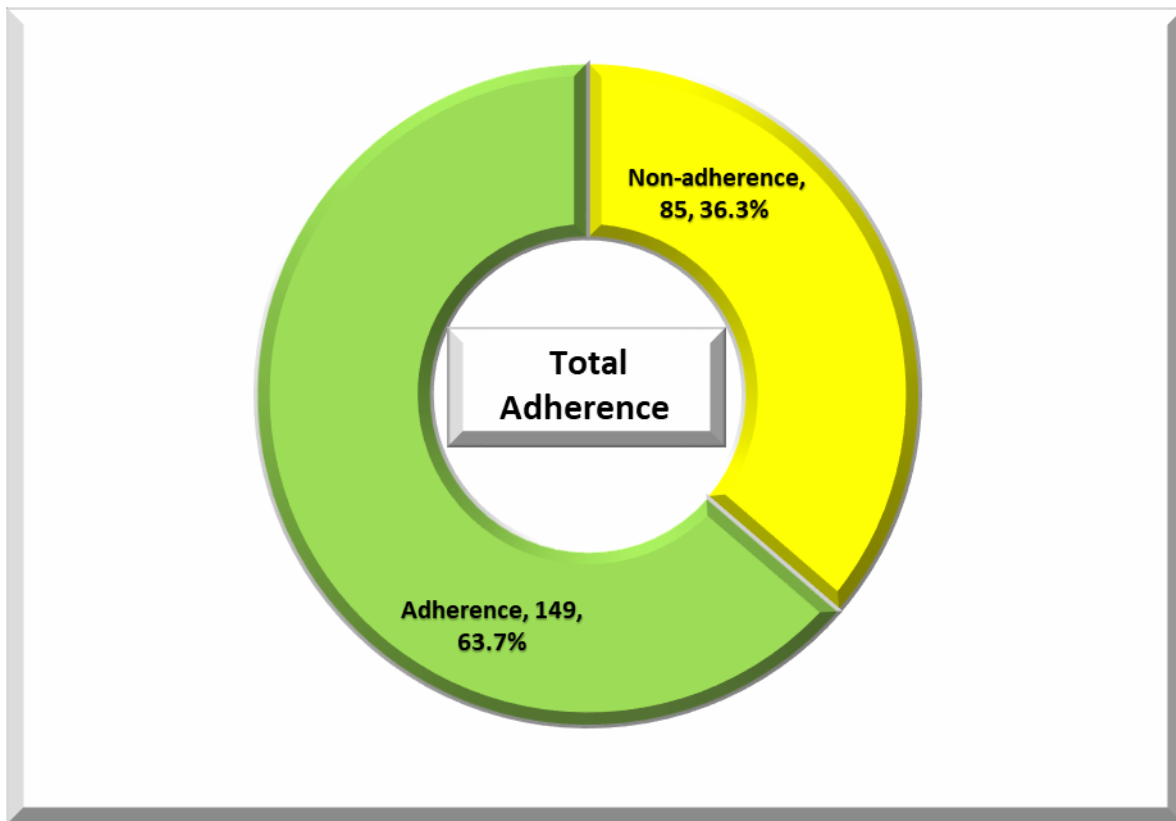


Figure 6: Pie chart of total adherence.

In Tables 6-9; marital status and BP reading were found to be statistically significant regarding adherence to medications, in other words; Married and divorced participants were more adherent to medications than single. Uncontrolled BP reading was also associated with more adherence to medications (see Table 6). Adherence to diet was significantly associated with age, level of education and presence of uncontrolled status of BP. Adherence to appointment was markedly and statistically associated with gender and level of education. In general, total adherence is statistically associated with marital status and BP readings (0.037, <0.001) respectively.

Table 6: Measuring adherence to medications versus demographic variables.

Items		N	Adherence to medications		F or T	ANOVA or T-test	
			Mean	±SD		Test value	P-value
Age	30-18	5	12.000	±3.000	F	1.702	0.150
	40-31	25	12.680	±3.945			
	50-41	61	14.459	±4.787			
	60-51	88	13.307	±4.260			
	than 60	55	12.709	±3.348			
Gender	Male	73	12.904	±3.614	T	1.151-	0.251
	Female	161	13.584	±4.418			
Nationality	Saudi	223	13.296	±4.124	T	1.249-	0.213
	Non Saudi	11	14.909	±5.319			
Marital Stat	Single	15	12.533	±3.335	F	2.985	*0.032
	Married	175	13.103	±3.917			
	Divorced	17	16.059	±6.675			
	Widow	27	13.889	±3.896			
Level of educational	Elementary	64	13.891	±3.843	F	2.380	*0.05
	Intermediate	23	12.348	±3.298			
	Secondary	41	13.780	±4.281			
	Diploma	14	15.714	±5.398			
	Bachelor	92	12.728	±4.248			

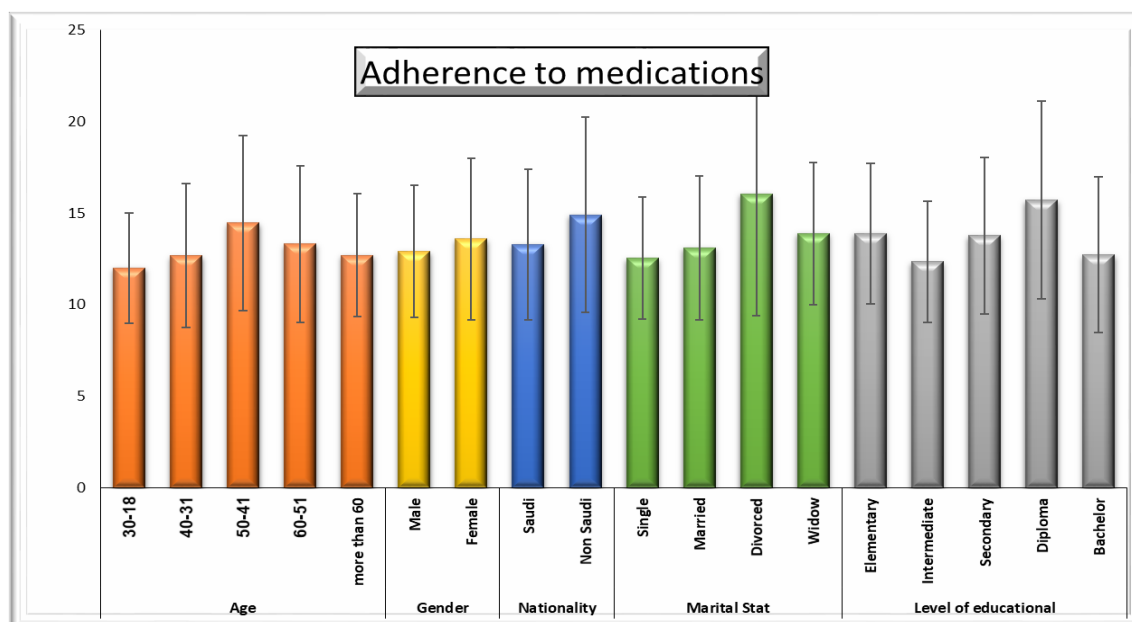
**Figure 7: Bar chart showing adherence to medications versus demographic variables.**

Table 7: Measuring adherence to diet versus demographic variables.

Items	N	Adherence to diet		F or T	ANOVA or T-test		
		Mean	±SD		Test value	P-value	
Age	30-18	5	6.400	±1.517	F	3.701	*0.006
	40-31	25	6.000	±1.528			
	50-41	61	5.967	±1.825			
	60-51	88	5.489	±1.516			
	than 60	55	5.000	±1.319			
Gender	Male	73	5.616	±1.533	T	0.282	0.778
	Female	161	5.553	±1.631			
Nationality	Saudi	223	5.570	±1.603	T	0.135-	0.893
	Non Saudi	11	5.636	±1.567			
Marital Stat	Single	15	6.067	±1.438	F	2.157	0.094
	Married	175	5.531	±1.564			
	Divorced	17	6.235	±1.715			
	Widow	27	5.148	±1.725			
Level of educational	Elementary	64	5.266	±1.514	F	2.484	*0.044
	Intermediate	23	6.000	±2.045			
	Secondary	41	6.024	±1.475			
	Diploma	14	6.071	±2.369			
	Bachelor	92	5.402	±1.383			

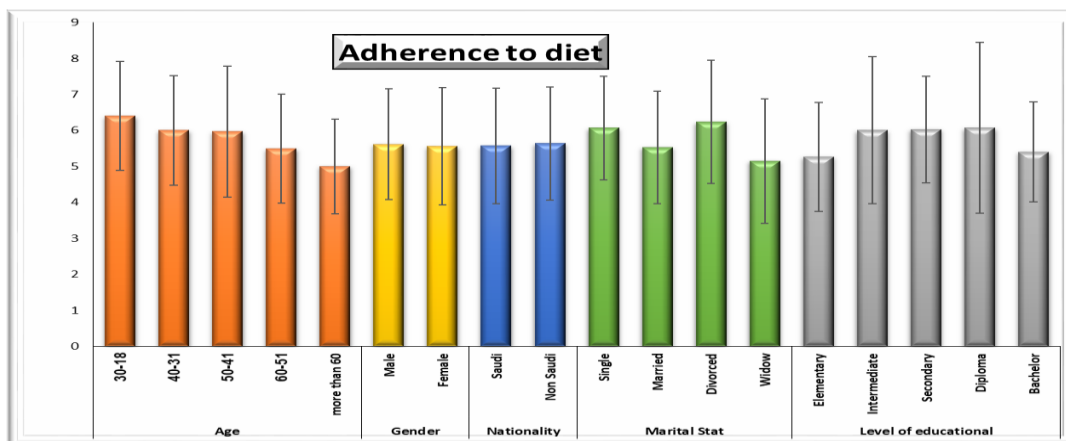


Figure 8: Bar chart showing adherence to diet versus demographic

Table 8: Measuring adherence to appointment versus demographic variables.

Items		N	Adherence to appointment		F or T	ANOVA or T-test	
			Mean \pm	SD		Test value	P-value
Age	30-18	5	4.200 \pm	1.304	F	0.115	0.977
	40-31	25	4.320 \pm	1.376			
	50-41	61	4.115 \pm	1.367			
	60-51	88	4.159 \pm	1.268			
	more than 60	55	4.164 \pm	1.183			
Gender	Male	73	4.493 \pm	1.156	T	2.666	*0.008
	Female	161	4.019 \pm	1.306			
Nationality	Saudi	223	4.170 \pm	1.276	T	0.201	0.841
	Non Saudi	11	4.091 \pm	1.375			
Marital Stat	Single	15	4.000 \pm	1.309	F	0.475	0.700
	Married	175	4.131 \pm	1.291			
	Divorced	17	4.353 \pm	1.320			
	Widow	27	4.370 \pm	1.182			
Level of educational	Elementary	64	4.469 \pm	1.054	F	5.591	*0.001<
	Intermediate	23	4.870 \pm	1.100			
	Secondary	41	4.268 \pm	1.225			
	Diploma	14	3.500 \pm	1.401			
	Bachelor	92	3.837 \pm	1.345			

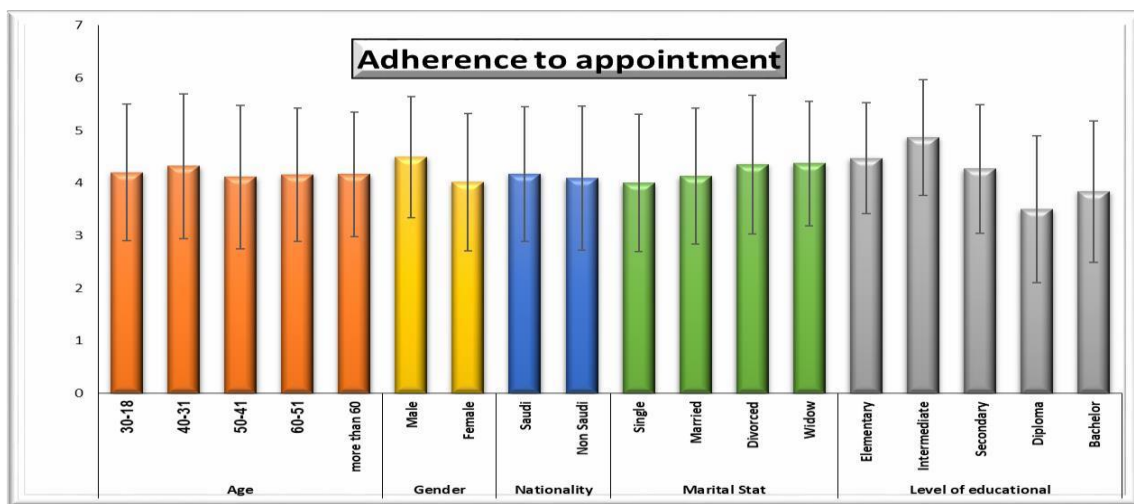
**Figure 9:** Bar chart showing adherence to appointment versus demographic variables.

Table 9: Measuring total adherence versus demographic variables.

Items	N	Total Adherence		F or T	ANOVA or T-test		
		Mean	±SD		Test value	P-value	
Age	30-18	5	22.600	±4.336	F	1.892	0.113
	40-31	25	23.000	±5.362			
	50-41	61	24.541	±6.284			
	60-51	88	22.955	±5.302			
	More than 60	55	21.873	±3.991			
Gender	Male	73	23.014	±4.593	T	0.187-	0.852
	Female	161	23.155	±5.664			
Nationality	Saudi	223	23.036	±5.225	T	0.970-	0.333
	Non Saudi	11	24.636	±7.514			
Marital Stat	Single	15	22.600	±5.152	F	2.866	*0.037
	Married	175	22.766	±4.969			
	Divorced	17	26.647	±8.463			
	Widow	27	23.407	±4.806			
Level of educational	Elementary	64	23.625	±4.709	F	2.158	0.075
	Intermediate	23	23.217	±4.889			
	Secondary	41	24.073	±5.751			
	Diploma	14	25.286	±7.342			
	Bachelor	92	21.967	±5.205			

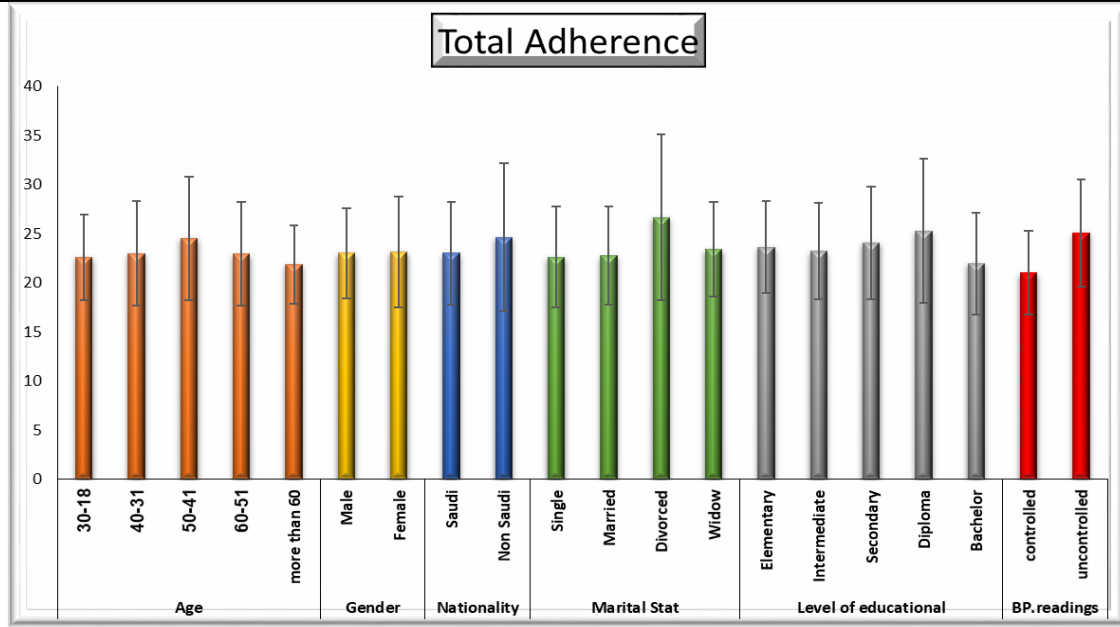


Figure 10: Bar chart of total adherence among our study.

Blood pressure reading is found to be statistically significant with medication and diet adherence (0.000, 0.012) as shown in Table 10 and Figure 11

Table 10: Impact of BP reading versus all subcategories of adherence.

	BP.reading					T-test	
	Controlled			Uncontrolled		t	P-value
	Mean	±	SD	Mean	±SD		
Adherence to medications	11.487	±	2.940	15.132	±4.418	7.377-	0.000
Adherence to diet	5.301	±	1.529	5.826	±1.626	2.543-	0.012
Adherence to appointment	4.221	±	1.341	4.116	±1.219	0.630	0.529
Total Adherence	21.009	±	4.296	25.074	±5.493	6.277-	0.000

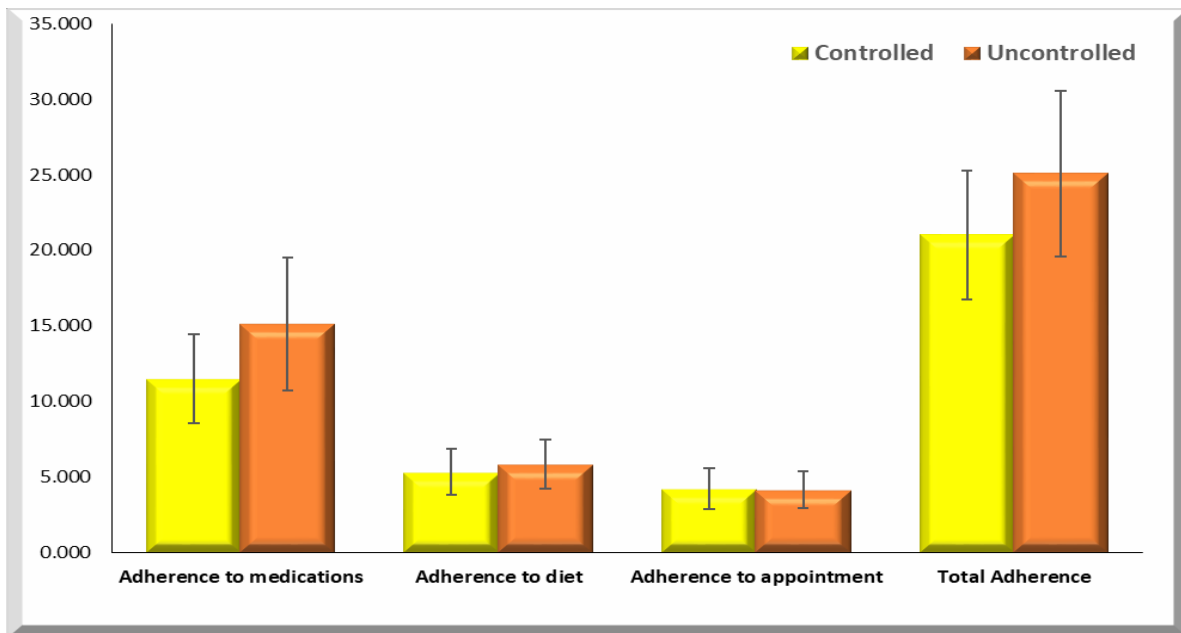


Figure 11: Bar chart of BP reading among our study.

Comorbidities were tested in patients with hypertension as shown in Table 11.

		BA		P-value	Heart.D		P-value	Renal.D		P-value	Hypothyroidism		P-value	STROK		P-value
		YES	NO		YES	NO		YES	NO		YES	NO		YES	NO	
Adherence to medications	Mean	15.72	13.18	*0.01	12.87	13.41	0.63	11.29	13.44	0.18	13.71	13.35	0.75	11.75	13.4	0.44
	SD	4.82	4.08		2.72	4.27		1.6	4.23		4.75	4.16		3.59	4.2	
Adherence to diet	Mean	5.56	5.57	0.96	5.13	5.6	0.27	5.71	5.57	0.81	5.79	5.56	0.61	5.25	5.58	0.68
	SD	1.62	1.6		0.99	1.63		1.6	1.6		2.04	1.57		2.22	1.59	
Adherence to appointment	Mean	4.56	4.13	0.18	4.13	4.17	0.92	4.43	4.16	0.58	4.07	4.17	0.77	4	4.17	0.79
	SD	1.42	1.26		1.3	1.28		1.27	1.28		1.54	1.26		1.41	1.28	
Total Adherence	Mean	25.83	22.88	*0.02	22.13	23.18	0.47	21.43	23.16	0.4	23.57	23.08	0.74	21	23.15	0.43
	SD	6.49	5.19		2.64	5.48		3.05	5.39		5.92	5.32		5.72	5.34	

By doing logistic regression analysis, it has been found that middle age periods (40-61y) and BP reading were statistically associated with non-adherence

Table 12: Logistic analysis for identification of variables controlling the total adherence.

	B	.S.E	Wald	df	.Sig	Odd ratio	C.I.for Odd %95	
							Lower	Upper
Gender	0.442-	0.473	0.870	1	0.351	0.643	0.254	1.626
Age			8.163	4	0.086			
(Age)1	2.203-	1.695	1.689	1	0.194	0.110	0.004	3.063
(Age)2	2.243-	0.918	5.966	1	*0.015	0.106	0.018	0.642
(Age)3	1.513-	0.655	5.340	1	*0.021	0.220	0.061	0.795
(Age)4	0.999-	0.658	2.307	1	0.129	0.368	0.102	1.336
Nationality	0.267	0.897	0.088	1	0.766	1.306	0.225	7.572
marital.stat			1.750	3	0.626			
(marital.stat)1	0.301	1.066	0.080	1	0.778	1.351	0.167	10.925
(marital.stat)2	0.598	0.669	0.798	1	0.372	1.818	0.490	6.754
(marital.stat)3	0.066-	0.891	0.005	1	0.941	0.936	0.163	5.371
educational.level			3.009	4	0.556			
(educational.level)1	0.618-	0.540	1.314	1	0.252	0.539	0.187	1.551
(educational.level)2	0.654-	0.722	0.821	1	0.365	0.520	0.126	2.139
(educational.level)3	0.944-	0.598	2.496	1	0.114	0.389	0.121	1.255
(educational.level)4	0.592-	0.830	0.508	1	0.476	0.553	0.109	2.818
BP.reading	2.830-	0.597	22.500	1	*0.000	0.059	0.018	0.190
Constant	7.966	1.876	18.032	1	0.000	2881.177		

DISCUSSION:

The findings of the present study refer to poor adherence in valuable percentage of patients diseased with hypertension. (14) Variable sectors of non-adherence are reported in previous studies. Different scales were used to detect so, but in our study, we used Hill- Bone Compliance to High Blood Pressure Therapy Scale. (12) The test is validated, reliable and hypertension specific tool. This test provides certain points to understand the term of compliance like diet and doctor visit commitment. (20)

In our score, higher values indicate poor adherence. Hypertensive patients were poorly adherent to medications, visit and diet. In this study, we found that hypertensive patient may miss their pills time due to carelessness or comorbid condition other than mental problem. (13-15, 20)

In comparison to Song et al., hypertensive Korean patients were found to be poorly adherent to medications. (21) Mafutha et al., documented that medication compliance was good in general but errors were happened in drug compliance like missing pills especially in elderly people. (22) Ramli et al., documented higher proportion of non-compliance in hypertensive patients. Non-compliance was attributed to missing and running out of pills. (23)

Indian audits recorded similar problem. Venkatachalam et al showed that rural areas harbored the lowest scores of adherences. 51.6% forget to take medicines regularly, 59.8% were careless about taking their medications, 53.6% stop medication on feeling better, and 55.2% stop medication on feeling worse. (24) Santra et al recorded different values of adherence to hypertension medications in CHF, hypertension and IHD between 20-30%. Whatever the co-existing diagnosis, non-adherence was the same. And again, missing, forgetting and running out of pills were the cause of non-adherence. (25, 26)

In our study, most patients were taking single drug followed by two drugs. A meta-analysis was conducting on antihypertensive medications compliance showed that significant compliance to medications between single and add-on therapy. (27) Another factor is that newly diagnosed patients were less compliant than chronic ones. Indeed, co-existing pathology or development of complications related to hypertension were found to be positively effective in drug adherence. (28) In those who have controlled blood pressure, compliance and adherence were much lower than uncontrolled ones, as well as diet adherence. Various studies concluded similar finding. (29)

Non adherence to diet and salt is a real problem in hypertension clinic. Low-salt diet is not palatable for large proportion of patients. In addition, lifestyle modification to stop smoking, alcohol and consuming low fat diet is extremely difficult to be done as a single shot once they are diagnosed. Patients subjectively described missing commitments in smoking, diet and salt intake. (30)

Hypertensive patients are advised to check their condition and medication success in fixed time intervals. Absenteeism from outpatient appointments is common which reduces clinic productivity and may impact patient outcomes because of missed opportunities for diagnosis and treatment. (26, 28)

Technology aided advancements like telephonic reminders; short text messages (SMS) may significantly reduce the failure rate and be cost efficient as seen in chronic respiratory disorders.

These results triggered a question: What make the hypertensive patient non-adherent? The answer is; multifactorial. Complex factors are gathering to form answer. These factors are physician related, patient related, and health system related. Modest success was the result of increasing drug adherence at least. Multimodality treatment from multiple specialties is needed to refine medical service provided to hypertension patients.

Education and counseling are needed to raise alertness about diet adherence, enough drug available and fixed periodic checking at family clinic. (30, 31)

CONCLUSION:

Non-adherence to the therapeutic regimen remains a major limiting factor of hypertension management in Saudi Arabia. Overall the medication adherence was poor in hypertensive patients. Poor adherence to therapy is largely unrecognized in clinical practice. Our study suggests that, improving medication adherence in hypertensive patients can help to achieve optimal blood pressure goals and prevent further hypertension related complications. Adherence to therapeutic regimens is an important factor for optimal clinical benefits; therefore, efforts should be made by the physicians to identify the reasons for non-adherence and initiate steps to improve it.

RECOMMENDATIONS:

1. Large multicentric study to assess further causes and types of drug adherence
2. Forming specialized educational programs for non-adherent patients and their families

3. Designing a special clinic for hypertension and focusing on ill-adherent patients
4. Strict on periodic clinic visits by Telephone calling prior to date, mail arrangement
5. Explaining to patients through using revolutionary new methods the poor outcome of diet non-adherence.

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