

ORIGINAL ARTICLE

Extent of patients Adherence to anti-hypertensive medications in Hail University Medical Polyclinic, Hail Region, Saudi Arabia, 2019

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ABSTRACT

The prevalence of hypertension was about twenty-two percentage worldwide in adults and was responsible for more than nine million deaths. Heart diseases were responsible for about 46% of mortality rate in Saudi Arabia, and twenty-four percentage of this mortality rate was due to poor adherence to anti-hypertensive drugs, none healthy lifestyle, little physical activities, unhealthy diet, that led to uncontrolled blood pressure. Our aim to assess the extent of patient adherence to anti-hypertensive treatment and factors predicting this behavior in Hail, Saudi Arabia. In addition, evaluation of patient's knowledge and perceptions about hypertension, risk factors, and medication side effects. Data were collected by well-trained doctors during August and September 2019 among 231 patients (129 males and 102 females) from Hail University Medical Polyclinic, Hail, KSA. The results showed that cholesterol level was more than 200 mg/dl in males (46.5%) Vs 40.2% in females. About 92% of patients reported regular visits to their physicians for regular checkups but with different frequencies. About 68% of the participants with complete adherence to treatment with anti-hypertensive drugs, 90.3% of them their age >60 years old. High percentages (68.5%) of married patients showed good adherence to treatment, but the level of education had no great effects on drug adherence. Our conclusion was that advises from physicians, pharmacists and with health-care system might solve the poor adherence to treatment. Also, better interventions and good patient knowledge's about disease nature and drugs treatment could be of a great importance.

Keywords: Hypertension, Compliance, Adherence to treatment, Hail, Saudi Arabia.

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INTRODUCTION

High blood pressure (Hypertension) caused huge burden of many diseases such as strokes, cardiovascular disease, renal failure, that leading to early disability and high mortality. Many people were undiagnosed with hypertension due to rare causes symptoms at an early stage [1]. High blood pressure is one of the health problems that cause high prevalence of morbidity and mortality [2,3]. Blood pressure was diagnosed as hypertension when measured on two different days and the systolic blood pressure readings on both days was  $\geq 140$  mmHg and/or the diastolic blood pressure readings on both days was  $\geq 90$  mmHg. More than one billion people worldwide had hypertension, most of them living in low- and middle-income countries. Hypertension was characterized by main symptoms including early morning headache, bleeding from nose, heart rate rhythm was irregular, visual changes and ear buzzing. [4] Uncontrolled blood pressure due to poor adherence to the anti-hypertensive drugs was considered as the major cause of treatment failure [5]. Successful treatment with antihypertensive drugs was very important in reduction of morbidity and mortality, and controlling health care costs associated with this disease [2].

The WHO estimated that chronic diseases were responsible for almost sixty percentage of deaths worldwide [6]. In the Kingdom of Saudi Arabia, chronic diseases were responsible for 67% of all deaths in 2004, and hypertension was responsible for 37% of them [6]. The prevalence of hypertension was about

22% worldwide in adults, and that was responsible for more than nine million deaths (WHO, 2014)[7].The prevalence in 2016 of hypertension in adults’ Saudi patients was 21% [8].Heart diseases were responsible for about 46% of mortality rate in KSA, but 24% of this rate was attributed to hypertension [3,7].Other authors found that46.2% of males were nonadherent to treatment and females were 53.9% [9].Complex drug prescription, unsatisfied treatment and effectiveness of therapy were found to be the most common risk factors for poor adherence to antihypertensive drugs[10,11].Many recent studies proved the relationship between hypertensive patients’ socio-demographic factors and their adherence to drug treatment regimens. Bandi et al. (2017) found that, older patients reported good adherence to antihypertensive drugs and had better knowledge about their condition than younger patients [12].They were also found that males are more adherent than females but were less consistent in receiving medications[13]. Other study in 2009 found that females with poor socio-economic class and low education level were more likely to be with low adherence to antihypertensive treatment. While, males with the same condition had higher adherence to antihypertensive drugs[9]. The interpretation of Braverman and Dedier [9]results(considering male and female patients) showed that less educated females in poor socio-economic status were more liable to devote their time to their families more than themselves. The studies that related to treatment adherence were very limited in Saudi Arabia. The aim of this study aims to assess the extent of patient adherence to antihypertensive treatment and factors predicting this behavior in Hail, Saudi Arabia. In addition, evaluation of patient’s knowledge and perceptions about hypertension, risk factors, and medication side effects.

**SUBJECTS AND METHODS**

This cross-sectional study was conducted through interviews with hypertensive outpatients who are visiting of Hail University medical polyclinics, Hail region, KSA from August to September 2019. The study protocol was reviewed and approved by the Institutional Review Board of Hail University. The study excluded pregnant women, patients with a psychiatric illness or mental impairment, or patients unable to give informed consent. In addition, untreated hypertensive patients. All participants were provided with clear and easy to understand information about the research project in order to allow them to make an informed and voluntary decision about their participation.The data collection tool through a well-structured questionnaire was used to address the study objective such as information about socio-demographic, education, lifestyle, medication, number of their antihypertensive drugs, adherence, extent of patient’s knowledge about hypertension, medication side effects and family history of hypertension was collected for each subject. The questionnaire was prepared after reviewing published literature, it consists of 27 questions, 5 questions socio-demographic, 4 questions related to lifestyle, 18 questions about adherence to medication, with a high reliability and validity, which has been particularly useful in chronic conditions such as hypertension [14]. Statistical analyses were performed using SPSS version 23 (SPSS, Chicago, IL, USA). Frequencies and percentages were calculated for categorical variables.

Table 1: Numbers and percentages of hypertensive patients in Hail University Polyclinic who answering questionnaire about Blood Cholesterol level, commitment with diet, daily activity, have chronic diseases, take drugs for other diseases. (n= 231).

Questions		n (%)	n (%)	n (%)	
1- Blood Cholesterol level.	Level	>200	=200	>200	
	Male	21 (16.3)	48 (37.2)	60 (46.5)	
	Female	39 (38.2)	22 (21.6)	41 (40.2)	
2- Are you commitment with diet?	Answer	No	Yes	Sometimes	
	Male	62 (48.1)	57 (44.2)	10 (7.7)	
	Female	50 (49.0)	37 (36.3)	15 (14.7)	
3 - Body Weight	Answer	Slim	Fit	Obese	
	Male	30 (23.3)	83 (64.3)	16 (12.4)	
	Female	1 (0.9)	60 (58.8)	41 (40.3)	
4 - Daily activity level.	Answer	Less	Medium	High	Very High
	Male	29 (22.5)	71 (55.0)	26 (20.2)	3 (2.3)
	Female	22 (21.6)	60 (58.8)	14 (13.7)	6 (5.9)
5- Do have chronic diseases?	Answer	Yes		No	
	Male	63 (48.8)		66 (51.2)	
	Female	37 (36.3)		65 (63.7)	
6- Are you take drugs for other diseases?	Answer	Yes		No	
	Male	62 (48.1)		67 (51.9)	
	Female	38 (37.2)		64 (62.8)	

n : Number of patients

(%) : Percentage of patients

Table 2: Numbers and percentages of hypertensive patients in Hail University Polyclinic who answering questionnaire about reused antihypertensive drug without prescription, forget your antihypertensive drug, or changing it with herbal medicine. (n= 231).

Questions		n (%)	n (%)	n (%)
1- Do you leave the antihypertensive drug and reused it without prescription?	Answer	Yes	NO	Sometimes
	Male	39 (30.2)	72 (55.8)	18 (14.0)
	Female	17 (16.7)	82 (80.4)	3 (2.9)
2- When you travel or leave home you forget your antihypertensive drug?	Answer	Yes	NO	Sometimes
	Male	27 (20.9)	78 (60.5)	24 (18.6)
	Female	6 (5.9)	87 (85.3)	9 (8.8)
3- Do you change antihypertensive drug with herbal medicine?	Answer	Yes, once	Yes, Twice	NO
	Male	68 (52.7)	19 (14.7)	42 (32.6)
	Female	6 (5.9)	20 (19.6)	76 (74.5)
4- Do you change antihypertensive drug with another drug?	Answer	Yes	NO	
	Male	106 (82.2)	23 (17.8)	
	Female	38 (37.3)	64 (62.7)	
5- Do you take your antihypertensive drug yesterday?	Answer	Yes	NO	
	Male	71 (55.0)	58 (45.0)	
	Female	90 (88.2)	12 (11.8)	

n : Number of patients (%) : Percentage of patients

Table 3: Numbers and percentages of hypertensive patients in Hail University Polyclinic who answering questionnaire about the commitment in visiting hypertension clinic, in taking antihypertensive drug and their information about antihypertensive drug. (n= 231).

Questions		n (%)			n (%)		n (%)	
How many years you have hypertension?	Level	1-2 Y	2-5 Y	6-10 Y	11-15 Y	16-20 Y	>20 Y	
	Male	21(16.3)	54 (41.9)	37 (28.7)	7 (5.4)	2 (1.6)	8 (16.2)	
	Female	21(20.6)	30 (29.4)	23 (22.6)	12(11.8)	8 (7.8)	8 (7.9)	
How may visits to your physician?	Answer	NO	Yes, once each 2 weeks	Yes, Once each month	Yes, once each 3 months	Yes, once each 6 months		
	Male	5 (3.9)	23 (17.8)	74 (57.4)	24 (18.6)	3 (2.3)		
	Female	12 (11.8)	2 (1.96)	45 (44.12)	40 (39.2)	3 (2.9)		
Are you visiting physician regularly?	Answer	Yes		NO		Sometimes		
	Male	70 (54.3)		46 (35.7)		13 (10.1)		
	Female	89 (87.4)		15 (14.7)		3 (2.9)		
Do you feel hard with commitment with your antihypertensive drug?	Answer	Yes		NO		Sometimes		
	Male	39 (30.2)		84 (65.1)		6 (4.7)		
	Female	19 (18.6)		73 (71.6)		10 (9.8)		
Do you have enough information about how you take your antihypertensive drug?	Answer	Yes		NO		Nearly		
	Male	62 (48.1)		58 (44.9)		9 (7.0)		
	Female	91 (89.2)		10 (9.8)		1 (1.0)		
How many drugs you used for hypertension?	Answer	One		Two		Three		
	Male	58 (45.0)		59 (45.7)		12 (9.3)		
	Female	62 (60.8)		34 (33.3)		6 (5.9)		
Are antihypertensive drugs you used are available?	Answer	Yes		NO		Sometimes		
	Male	60 (46.5)		57 (44.2)		12 (9.3)		
	Female	85 (83.3)		9 (8.8)		8 (7.8)		

n : Number of patients (%) : Percentage of patients

Table 4: Numbers and percentages of hypertensive patients in Hail University Polyclinic who answering questionnaire about the adherence of patients to treatment with antihypertensive drug in relation to age. (n= 231).

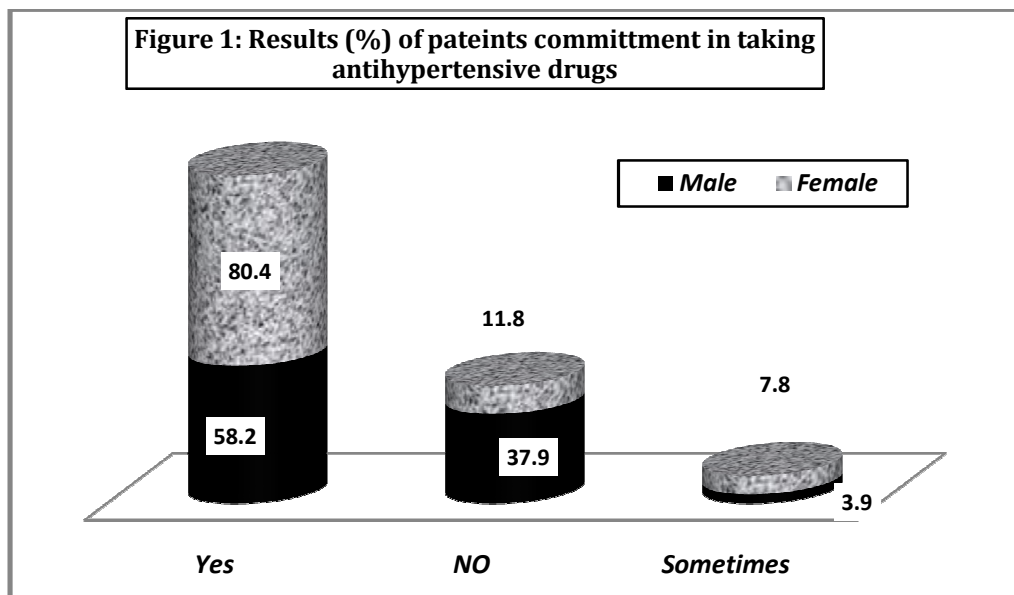
Questions	Answer	Number	%	Number	%	Number	%
Are you committed in taking your antihypertensive drug?		Yes		NO		Sometimes	
	Male	75	58.2	49	37.9	5	3.9
	Female	82	80.4	12	11.8	8	7.8
	Total	157	68.0	61	26.4	13	5.6
Age of patent (20-30 years)	Male	1	25.0	2	50.0	1	25.0
	Female	1	25.0	2	50.0	1	25.0
	Total	2	25.0	4	50.0	2	25.0
Age of patent (31-35 years)	Male	9	40.9	12	54.6	1	4.5
	Female	1	33.4	0 1	0 33.3	1	33.3
	Total	10	41.7	13	54.2	1	4.1
Age of patent (36-40 years)	Male	22	48.9	22	48.9	1	2.2
	Female	3	50.0	2	33.3	1	16.7
	Total	25	49.0	24	47.1	2	3.9
Age of patent (41-45 years)	Male	8	57.1	5	35.7	1	7.1
	Female	8	61.5	2	15.4	3	23.1
	Total	16	59.3	7	25.9	4	14.8
Age of patent (46-50 years)	Male	4	66.6	1	16.7	1	16.7
	Female	19	90.5	1	4.8	1	4.7
	Total	24	85.8	2	7.1	2	7.1
Age of patent (51-60 years)	Male	12	70.6	5	29.4	0	0
	Female	27	90.0	3	10.0	0	0
	Total	39	83.0	8	17.0	0	0
Age of patent (>60 years)	Male	19	90.5	2	9.5	0	0
	Female	23	92.0	1	4.0	1	4.0
	Total	42	91.3	3	6.5	1	2.2

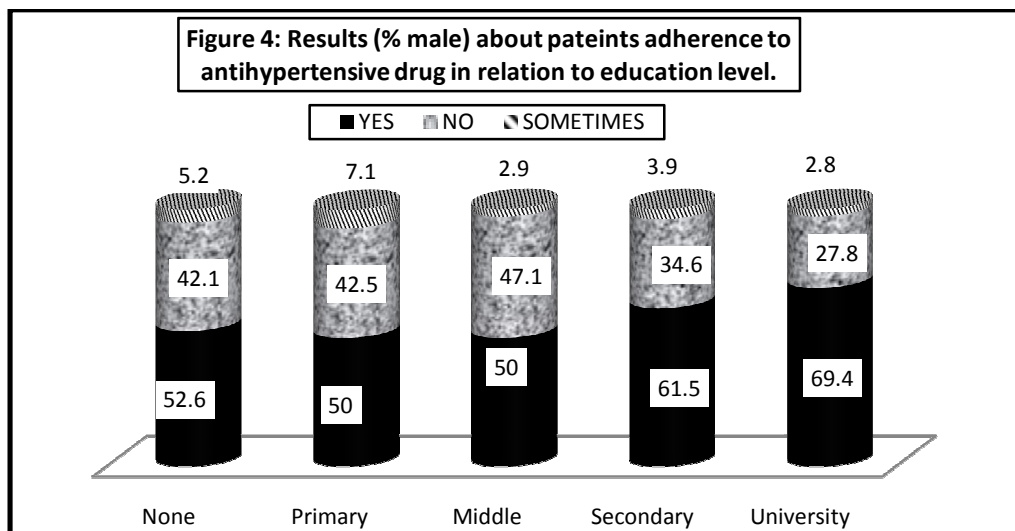
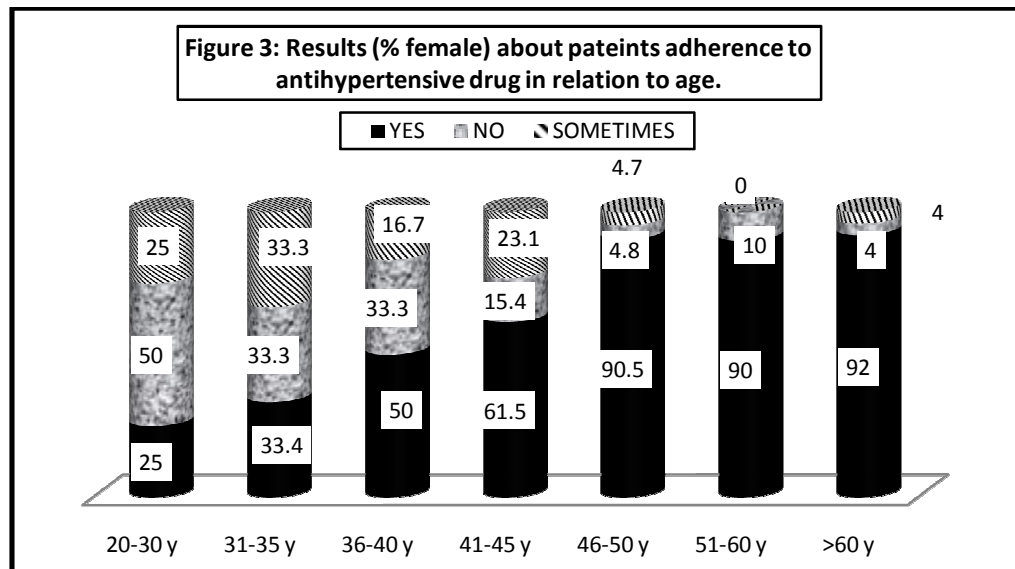
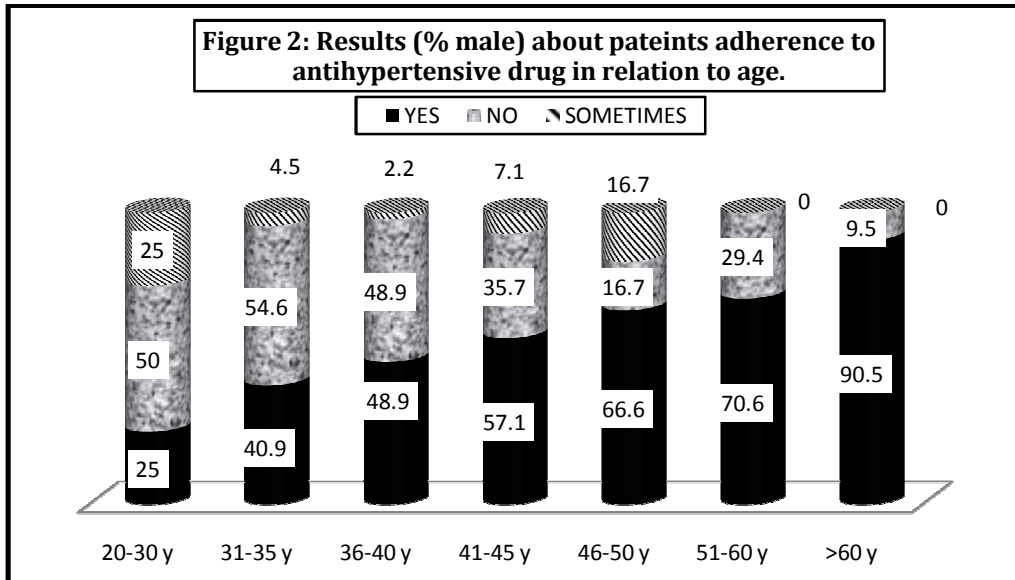
Table 5: Numbers and percentages of hypertensive patients in Hail University Polyclinic showed the relation between adherence of patients to treatment with antihypertensive drug and level of education. (n= 231).

Questions	Answer	Yes		NO		Sometimes					
		Number	%	Number	Number	%	Number				
Are you committed in taking your antihypertensive drug?	Male	75	58.2	49	37.9	5	3.9				
	Female	82	80.4	12	11.8	8	7.8				
	Total	157	68.0	61	26.4	13	5.6				
Level of Education	Answer	None		Primary		Middle		Secondary		University	
		No.	%	No.	%	No.	%	No.	%	No.	%
	Male	19	14.7	14	10.9	34	26.4	26	20.2	36	27.9
	Female	45	44.1	11	10.8	3	2.9	10	9.8	33	32.4
	Total	64	27.8	25	10.8	37	16.0	36	15.6	69	29.9
1-None Educated	Answer	Yes		NO		Sometimes					
		Number	%	Number	%	Number	%				
	Male	10	52.6	8	42.1	1	5.2				
	Female	31	81.6	5	13.2	2	5.3				
Total	49	75.4	13	20.0	3	4.6					
2- Primary Educated	Male	7	50.0	6	42.9	1	7.1				
	Female	8	72.7	3	27.3	0	0				
	Total	15	60.0	9	36.0	1	4.0				
3- Middle Educated	Male	17	50.0	16	47.1	1	2.9				
	Female	2	66.7	1	33.3	0	0				
	Total	18	50.0	17	47.2	1	2.8				
4- Secondary Educated	Male	16	61.5	9	34.6	1	3.9				
	Female	12	70.6	1	5.9	4	23.5				
	Total	21	58.3	10	27.8	5	13.9				
5- University Educated	Male	25	69.4	10	27.8	1	2.8				
	Female	29	87.8	2	6.1	2	6.1				
	Total	54	78.4	12	33.3	3	8.3				

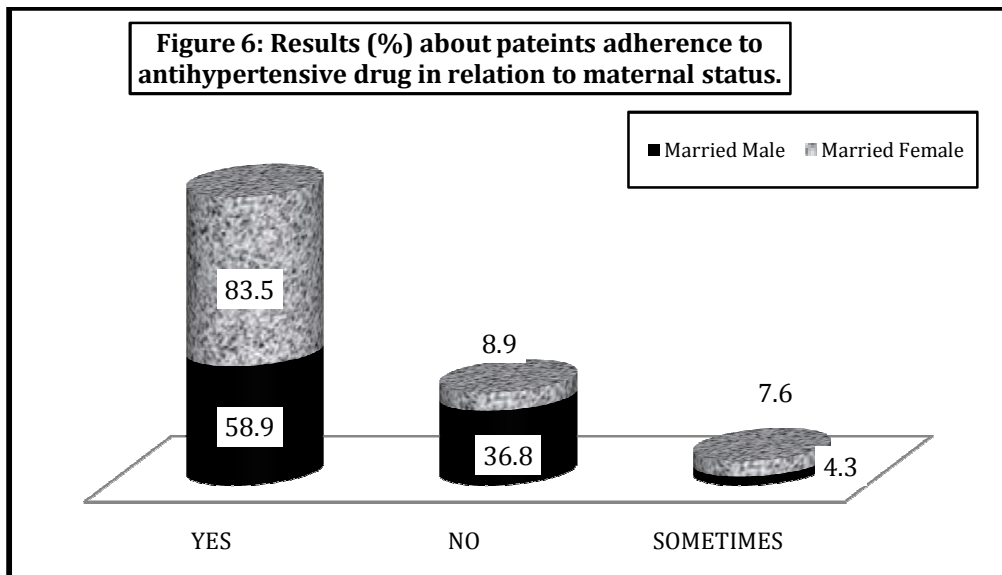
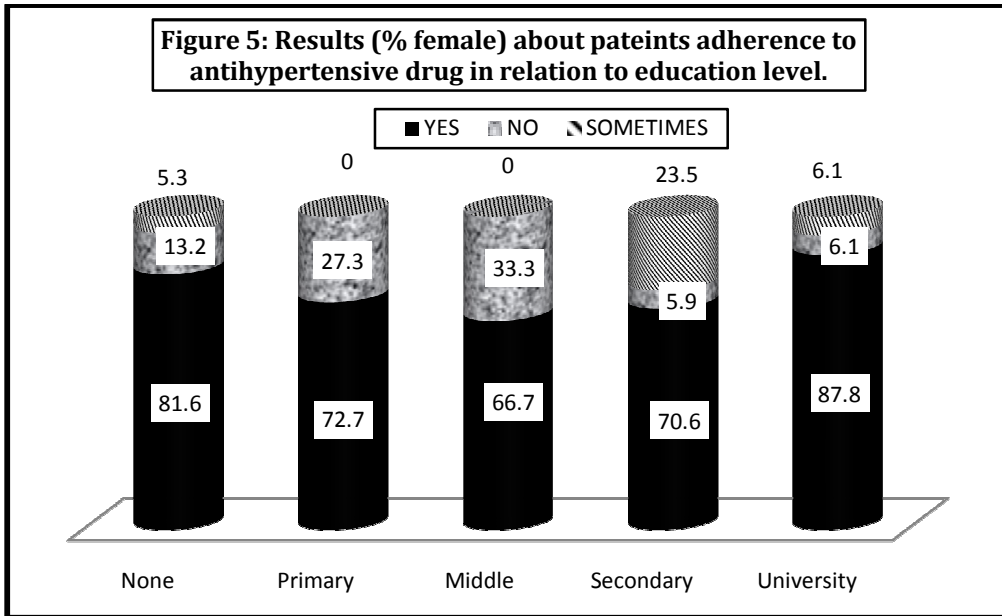
Table 6: Numbers and percentages of hypertensive patients in Hail University Polyclinic showed the relation between the adherence of patients to treatment with antihypertensive drug and marital status. (n= 231).

Questions	Answer	Yes		NO		Sometimes			
		Number	%	Number	%	Number	%		
Are you committed in taking your antihypertensive drug?	Male	75	58.2	49	37.9	5	3.9		
	Female	82	80.4	12	11.8	8	7.8		
	Total	157	68.0	61	26.4	13	5.6		
Marital Status		Single		Married		Divorced		Widow	
	Answer	No.	%	No.	%	No.	%	No.	%
	Male	8	6.1	117	90.7	2	1.6	2	1.6
	Female	6	5.9	79	77.5	2	1.9	15	14.7
Single	Answer	Yes		NO		Sometimes			
		Number	%	Number	%	Number	%		
	Male	5	62.5	3	37.5	0	0		
	Female	1	16.7	3	50.0	2	33.3		
	Total	6	42.9	6	42.9	2	14.2		
Married	Male	69	58.9	43	36.8	5	4.3		
	Female	66	83.5	7	8.9	6	7.6		
	Total	134	68.4	53	27.0	11	5.6		
Divorced	Male	1	50.0	1	50.0	0	0		
	Female	1	50.0	1	50.0	0	0		
	Total	3	75.0	1	25.0	0	0		
Widow	Male	1	50.0	1	50.0	0	0		
	Female	13	86.7	2	13.3	0	0		
	Total	14	82.4	3	17.6	0	0		









**RESULTS AND DISCUSSION**

Medication adherence associated with several other parameters is an important factor in achieving blood pressure control. Due to the asymptomatic nature of the disease, patients' adherence to their prescribed medications is often a problem. The rate of medication adherence in hypertension treatment could differ from study to study based on the study methods employed, the population under study, and the definition of adherence itself [2]. In this study the total number of participants was 231 patients (129 males and 102 females). Most of male patients that participate in this study their ages ranged from 36-40 years (45 men), then 31-35 years (22 men), followed by > 60 years (21 men) followed by 51-60 years (16 men), 41-45 years (13 men). While female patients, their ages ranged from 51-60 years (33 women), and > 60 years (25 women) followed by 46-50 years (21 women), 41-45 years (11 women). The number of Saudi patients (males 80, 60.0% VS females 80, 78.4%), followed by Egyptian patients (males 32, 24.80% VS females 7, 6.86%), while few numbers from other nationality such as from Sudan, Jordan, Philippine, and Bangladesh.

Table 1 showed that blood cholesterol level was >200 mg/dl in males more than females and vice versa, blood cholesterol level was <200 mg/dl in males less than females. High level of cholesterol was a significant factor in increasing blood pressure, this result was similar to the study occur in PSMC Riyadh [15] who said that there is significant factoring between high level of lipid (> 200) and prevalence of hypertension and adherence to medication in chronic diseases in PSMC Riyadh. The less commitment of

diet in patient in this study (about 50% of participants either males or females) result in highly prevalence of hypertension while previous study in national survey of hypertension University of Washington with good commitment of diet include fruit and vegetables was the best way to achieve normal blood pressure[3] The importance and effectiveness of lifestyle modifications in lowering blood pressure should be emphasized. Also factor of BMI have no great effects in this study, but other study found that, obese patients have high significant for prevalence of hypertension in primary health clinics[2].The less daily activity considered as a factor for prevalence hypertension in our study, also in previous study of [3] said that high level of patient activity showed poor prevalence of hypertension. In the current study (about 49% of males and 36% of females) who have hypertension have other chronic diseases. Also, the same percentages of patients take drugs for other diseases. Previous study[15] showed good patient adherence to treatment of other drugs, but the study of Khayyat *et al.* [5]showed poor patient adherence.

Table 2 showed that for patients with high blood pressure, adherence to medication is a significant factor in preventing damaging complications to body systems. Many studies identified different factors that contribute to poor adherence to antihypertensive medication in hypertensive patients such as patient forget or travel or multiple drug take used and change drug with herbal medicine. In this study, 52.7% of patients changed their antihypertensive drugs by with herbal medicine one time, and 14.7% (twice) from male patients, but females only 6% (once) and 19.6% (twice). Our results showed that many of hypertensive males changed antihypertensive drugs with another drugs (82.2%), while in females only 37.3% which means that females more adherent to treatment more than males. In the study of Abbas *et al.* [16]demonstrated that 41% of participants had changed their antihypertensive medications during the last year because of medication non-tolerated side effects. Physicians should tell the patients about the adverse effects of the prescribed drugs and the risk of rebound effect related to antihypertensive drugs' abrupt discontinuation. On other hand, this study showed perfect adherence to treatment when they travel or leave home (60.5% males Vs 85.3% females). These results were similar to the results of the previous study in Palestine[17], while study in Malaysia of primary health clinics they were poor adherence when travel or leave home [2].In this study, male patients (55.8%) Vs female patients (80.4%) did not leave the antihypertensive drug and reused it without prescription. This results in agree with the results done in Umm Alqura, KSA[18].In this study, 18.2% for patients who are diagnosed with hypertension in the last 1-2 years and (36.4%) for those who diagnosed in the last 2-5 years,(25.9 %) in the last 6-10 years. In study done in KSA 2015 show that the patients who were diagnosed with hypertension since >6m - <1 year were (7.2 %) while who diagnosed since 1-3 years were (27.9%) and those who diagnosed since more than 3 years were (64.9 %)[18].Another study done in Malaysia show that the ratio of the patients who have a hypertension for less than 5 years were (26.1%) and who have the disease since 6-10 years (26.2%) and from 11-20 years were (25.9%) and for more than 20 years were (26.1%)[2]Study done in Sudan and show (44.9%) were have the hypertension for less than 5 years and (55.1%) of them when have the hypertension for more than 5 years[19].All the three studies seem to be aligned with our study that's the vast majority were diagnosed since more than 3 years and then between 2-5 years the minority were diagnosed for less than 2 years.

Table 3 showed that 68.8% of hypertensive patients visited the clinic regularly and this of good impression of Hail people about their careful of their health, this percentages were more than the study done in Lebanon [16] who said that 52.6% of participants reported visiting their physicians for regular blood pressure checkups, and also, more than the results of the study done in Al-Kobar, Saudi Arabia, about only 37.8%[20].Patients who didn't have a difficulty to adhere to their medications have a difficulty were (67.96%) and for those who faced difficulty (25.1%) while (6.9%) who sometimes faced difficulty. One study was done in Al-Kobar 1998 showed (33.8%) of patients who didn't face difficulty to adhere to their medications, about similar percentage of patients faced difficulty (36.1%)[20]. In this study that the vast majority of patients didn't faced any difficulties. Nearly 66% of patients had high knowledge about how to use the antihypertensive medications, while 29.4% of the patient have a low knowledge. Our results were similar to the study in KSA, 2015 that show that (74.4%) of patients had high knowledge while (25.6%) of the them with low knowledge[18]. where another study done also in KSA 2012 showed that hypertensive patients have insufficient knowledge about hypertension and its management, and low hypertension control[21].Also, table 3 showed that51.9% of the patients used one antihypertensive drug, while 40.3% used two drugs, and the rest of the patients (7.8%) used three or more drugs. In previous study 2017 in KSA that show the majority of the patients those who are on one medication were 4.9% and those who use two medications (12.3%) and those who are on three or more medications (82.8%)[5].In other study done in Egypt, the patients who used one medication were 75% and who used two medications (44.3%) and very low percentage who used three or more medications (1.6%) [22]. Another



study in Palestine 2014, the percentage of patients who used one medication were 49.1% and who used two medications (36.2%) and who used three or more medications were 14.6%[17]. On the other hand, study in Malaysia showed about 26 % of patients who used one or two antihypertensive drugs and (51.3%) who used three or more drugs [2]. Also, there in the study which done in Sudan the ratio of patients who used one medication were 80% and those who used two or more medications were 19.2% [19]. In this study and the other studies in Egypt, Palestine and Sudan, all showed the vast majority of the patients were on one antihypertensive drug followed by patients who used two drugs and the least who used three or more drugs. On the other hands, the other two study that done in KSA[5] showed the majority of the patients used three or more antihypertensive medications (82.8%), similar to patients in Malaysia (51.27%)[2]. Increasing the number of antihypertensive medications may lead to increased risk of adverse effects and possible drug interactions. Medication adverse effects negatively impact patients' adherence and uncertainty on the part of the physician as to whether or not to intensify treatment[23]. In this study 62.8% of patients said that antihypertensive drugs were available and 28.6% said not available. Relation between medication adherence and age

Table 4 showed that adherence to medication is a key component of treatment for patients with hypertension. they found that male and female patients have adherence to treatment (58.2% males Vs 80.4% females). These results indicated that adherence in male patients needs to be improved(Figure 1). This result is close to study in Pakistan (64.7%) [24], and other study in Cameroon (66.7%)[25] but more than study in Ajman Emirate (54.4%) [26], Taiwan (47.5%) [27], Saudi Arabia (47.0%) [28]. On the other hand, the result was higher than studies from the United States (9.0%) [14], Egypt (25.9%)[29]and Ethiopia (35.4%)[30]. However, the lack of standard measurements prevents comparisons being made between studies and across populations. But other result done in Lebanon showed higher adherence (89.2%) more than our results[16].

In the current study, old age patients (>60 years old) showed high percentage of adherence to treatment with antihypertensive drugs either in males or females (90.5% males Vs 92% females) (Figure 2&3). This results in agreement with the study done by[31], who said that the highest mean adherence rate was observed in the age group 70–80 years. Female patients with age of 51-60 years showed high percentages of adherence more than males (90.0% females Vs 70.6% males). This results in agreement with the study done in United Kingdom, patients over the age of 50 were found to be more adherent than those in the younger age groups[22]. Also, female patients with age of 46-50 years showed high percentages of adherence more than males (90.5% females Vs 66.6% males). In this study, authors suggested that medication adherence from old people may be due to different reasons. Old people (>60 and sometimes >50) became more careful about their medications because their fear from disease complications. Most of them because of ageing have other diseases in addition to hypertension for example arthritis, diabetes, osteoporosis that need different medication. Also, most of those very old patients were supervised from their families. In this study, younger patients (<30 years), medication adherence was (25% either males of females) increased somewhat in patients <35 years to be (40.9% males Vs 33.4%fe<45 years. The authors suggest that, in case of young patient, poor adherence may be due to many duties and responsibility towards themselves and their families, travelling, so they forget to take their medications. This should be considered during patient counseling; complications of hypertension in addition to risks of poor adherence to medications should be explained well to patients in the younger age groups, living in a village or cities. Other study done on Palestinians showed that Living in a village compared with a city was a reason for poor adherence also; this may be related to lower levels of education or income in addition to difficulties in reaching doctors and health-care facilities[17]. Effect of age is consistent with some other studies; for example, in a study from the United Kingdom, patients over the age of 50 were found to be more adherent than those in the younger age groups [28], and in Pakistan, subjects who were less than 40 years old were less adherent than those older than 70. The highest mean adherence rate was observed in the age group 70–80 years [31]. Evaluating health status as very good, good or poor compared with excellent was significantly associated with poor adherence. In some studies, lower medication adherence was associated with poor health-related quality of life[11]. Poor health may cause the patient to be depressed and less satisfied with his medications. Forgetting to take medication was the main reason for low-adherence is similar to the study of [17,31,33]. Poor adherence to medications may be due to fear of the adverse effects of [28,29]. Effective interventions can be behavioral approaches that use techniques such as reminders, memory aids, and synchronizing therapeutic activities with routine life events for example, taking pills before your shower or after your prayers [34]. It should be remembered that the application of multiple interventions of different types is more effective than any single intervention [35]. Also, controlled patient's blood pressure creates a strong motivation toward the treatment, while uncontrolled blood pressure could make the patient hopeless with low satisfaction that

may lead them to stop their treatment [30].males). By increasing the age, the adherence was increased gradually. So, the data revealed that patient <40 years showed adherence about 50% either in male or female patients, followed by 60% adherence for patients

#### **Relation between medication adherence and level of education**

Table 5 showed the effect of education as high percentages of patient who are adherent to antihypertensive drugs are more in females than males (87.8% females Vs 69.4% males) with University education followed by secondary education (70.6% females Vs 61.5% males). On the other hand, none educated female have high level of adherence to treatment (81.6% females Vs 52.6% males); also, female with primary education were (72.7% females Vs 50% males)(Figure 4&5). These results were similar to the results of Braverman & Dedier [36] who said that male's results with a similarly low level of education and had higher antihypertensive treatment adherence. But had some differences in saying females from poor socio-economic status and with low educational level were more likely to have low antihypertensive treatment adherence. It can be noticed that a low level of adherence was not influenced by sex or by the level of education. This might reflect an important cultural behavior that could influence the proposed strategies to improve adherence. They should cover both males and females from different educational levels.

#### **Relation between medication adherence and marital status**

Previous studies showed great association between hypertensive patients' socio-demographic factors and their adherence to treatment. Table 6 showed that most of patients that have hypertension are married (males 90.7% VS females 77.5%), while the number of single patients was nearly equal (males 6.2%VS females 5.9% (Figure 6). Similar result was showed in the study done on hypertensive patients in Saudi Arabia at Umm Alqura University [18] and at Al-Ahsaa (83%)[37]. They found that married males and females had high prevalence of hypertension. In our study, the percentages of married female are more adherent to treatment with antihypertensive drugs than married males (83.5% females Vs 58.9% males). Level of education in the current study had no significance difference between them while previous study about prevalence of hypertension in Taibah University showed high educational level was lowest [38]. In the absence of new antihypertensive drugs, it is important that healthcare providers focus their attention on how to do better with the drugs they have. This is the reason why recent guidelines have emphasized the important need to address drug adherence as a major issue in hypertension management. [39]. Recent study showed that using Smartphone app slightly increased patient engagement and improved medication adherence and blood pressure control in[40]. However, no single management strategy has been shown to be effective in improving adherence in apparent treatment-resistant hypertension [39].

#### **CONCLUSION**

Active communication with physicians, pharmacists, and with health-care might solve poor adherence to medications. Also, effective interventions could be behavioral approaches by using some techniques such as reminders through memory aids or synchronize time of medications with routine life events which can enhance adherence to medications. Better education about the nature of the disease and treatment with drugs can be of a great importance to improve adherence to medications.

#### **REFERENCES**

1. World Health Organization.(2013).A global brief on Hypertension World Health Day 2013. Geneva: WHO; 2013.
2. Ramli, A., Ahmad, N.S., Paraidathathu, T.(2012).Medication adherence among hypertensive patients of primary health clinics in Malaysia. *Patient Prefer Adherence*. 6:613–22.
3. El Bcheraoui, C., Memish, Z.A., Tuffaha, M., Daoud, F., Robinson, M., Jaber, S., et al.(2014). Hypertension and its associated risk factors in the Kingdom of Saudi Arabia, 2013: a national survey. *Int J Hypertens*. 2014;1–8.
4. World Health Organization (2019).<https://www.who.int/news-room/fact-sheets/detail/hypertension> 13 September 2019.
5. Khayyat, S.M.,Khayyat, S.M.S., Hyat,Alhazmi, R.S., Mohamed, M.M.A., Abdul Hadi, M.(2017).Predictors of Medication Adherence and Blood Pressure Control among Saudi Hypertensive Patients Attending Primary Care Clinics: A Cross-Sectional Study. *PLOS ONE* page 2-12.
6. World Health Organization.(2016).Adherence to long-term therapies: evidence for action. Geneva: World Health Organization; 2003. [http://www.who.int/chp/knowledge/publications/adherence\\_](http://www.who.int/chp/knowledge/publications/adherence_) Accessed December 10, 2016.
7. World Health Organization.(2014). Global status report on non communicable diseases 2014. Geneva: WHO; 2014.
8. Saeed, A.A., Al-Hamdan, N.A. (2016).Isolated diastolic hypertension among adults in Saudi Arabia: prevalence, risk factors, predictors and treatment. Results of a national survey. *Balkan Med J*.33:52–7.
9. Braverman, J. and Dedier, J.(2009).Predictors of medication adherence for African American patients diagnosed with hypertension. *Journal of Ethnicity and Disease*.19(4): 396-400.

10. Tomaszewski, M., White, C., Patel, P., Masca, N., Damani, R., Hepworth, J., et al.(2014).High rates of non-adherence to antihypertensive treatment revealed by high-performance liquid chromatography-tandem mass spectrometry (HP LC-MS/MS) urine analysis. *Heart*, 100: 855–61.
11. Sweileh, W.M., Ihbeshah, M.S., Jarar, I.S., Taha, A.S., Sawalha, A.F., Zyoud, S.H., et al.(2011).Self-reported medication adherence and treatment satisfaction in patients with epilepsy. *Epilepsy Behav*, 21;301–5.
12. Bandi, P., Goldmann, E., Parikh, N.S., Farsi, P., Boden-Albala, B.(2017).Age-related differences in antihypertensive medication adherence in Hispanics: a cross-sectional community-based survey in New York City, 2011-2012. *Prev Chronic Dis*,14; E57.
13. Klootwyk, J.M. and C.A. Sanoski.(2008).Medication Adherence and Persistence in Hypertension Management. *Journal of Clinical Outcomes Management*, 18(8): 351-358.
14. Krousel-Wood, M., Islam, T., Webber, L.S., Re, R.N., Morisky, D.E., Muntner, P. (2009).New medication adherence scale versus pharmacy fill rates in hypertensive seniors. *Am J ManagCare*; 15:59–66.
15. Tourkmani,A.M.,Bakbiet, A.H., kbasban, Him,I., Albabtain, M.A.,Alzharni, T.J.(2012). Medication adherence among patients in a chronic clinic of prince sultan military medical city Saudi med journal, 33(12):1278-1284
16. Abbas, H., Kurdi, M., Watfa, M., Karam, R. (2017).Adherence to treatment and evaluation of disease and therapy knowledge in Lebanese hypertensive patients. *Patient Preference and Adherence* 2017:11 Pages 1949—1956.
17. Alramahi R.(2015).Factually of medicine and health sciences Al Najah national university to asses adherence of Palestine hypertensive patients to therapy and associated factors in Palestine region publish in journal of epidemiology and global health, 5,125-132.
18. Alsolami, F., Correa-Velez,L, Hou, X.(2015).Factors Affecting Antihypertensive Medications Adherence among Hypertensive Patients in Saudi Arabia *American Journal of Medicine and Medical Sciences*, 5(4): 181-189
19. Elzubier, G.A., Husain, A.A., Suleiman, I.A., Hamid, Z.A. (2000).Drug compliance among hypertensive patients in Kassala, eastern Sudan. *Eastern Mediterranean Health J*,6(1):100-5.
20. Al-Sowielem, L.S., Elzubier, A.G.(1998).Compliance and knowledge of hypertensive patients attending PHC centers in Al-Khobar, Saudi Arabia. *East Mediterr Health J* ;4:301–7.
21. Alsolami, F., Xiang-Yu Hou, Correa-Velez, I(2012). Factors Affecting Antihypertensive Treatment Adherence: A Saudi Arabian Perspective. *Clinical Medicine and Diagnostics*, p-ISSN: 2163-1433 e-ISSN: 2163-1441, 2(4): 27-32.
22. Youssef, R.M., Moubarak, I.(2002 a).Patterns and determinants of treatment compliance among hypertensive patients. *Eastern Mediterranean Health J*,8(4-5):579-92.
23. Hameed, M.A.& Dasgupta, I.(2019).Medication adherence and treatment-resistant hypertension: a review. *Drugs in Context*, 8: 212560. DOI: 10.7573/dic.212560 4 of 11 ISSN: 1740-4398
24. Saleem, F., Hassali, M.A., Shafie, A.A., Awad, G.A., Atif, M., Haq, N.U., et al.(2012).Does treatment adherence correlate with health-related quality of life? Findings from a cross sectional study. *BMC Pub Health*, 12:318.
25. Adidja, N.M., Agbor, V.N., Aminde, J.A., Ngwasiri, C.A., Ngu, K.B. and Aminde, L.N.(2018).Non-adherence to antihypertensive pharmacotherapy in Buea, Cameroon: a cross-sectional community-based study. *BMC Cardiovascular Disorders*, 18:150 <https://doi.org/10.1186/s12872-018-0888-z>
26. Bader,R.J.K.,Koprulu,F., Hassan, N.A.G.M.,Ali A.A.A. and ElnourA.A. (2015).Predictors of adherence to antihypertensive medication in northern United Arab Emirates. *Eastern Mediterranean Health Journal*, EMHJ. 21(5).
27. Li, W.W., Kuo, C.T., Hwang, S.L., Hsu, H.T.(2012).Factors related to medication non-adherence for patients with hypertension in Taiwan. *J Clin Nurs* 21:1816–24.
28. Khalil, S.A., Elzubier, A.G.(1997).Drug compliance among hypertensive patients in Tabuk, Saudi Arabia. *J Hypertens*. 15(5):561–5.
29. Youssef, R.M. and Moubarak, I. (2002 b).II. Patterns and determinants of treatment compliance among hypertensive patients. *East Mediterr Health J* 2002 b; 8:579–92.
30. Dessie A, Asres, G., Meseret, S., Birhanu, Z.(2012).Adherence to antihypertensive treatment and associated factors among patients on follow up at University of Gondar Hospital, Northwest Ethiopia. *BMC Pub Health*, 12:282.
31. Hashmi, S.K., Afridi, M.B., Abbas, K., Sajwani, R.A., Saleheen, D., Frossard, P.M., et al. (2007).Factors associated with adherence to anti-hypertensive treatment in Pakistan. *PLoS One*.2(3): e280. PMID:17356691
32. Maguire, L.K., Hughes, C.M., McElnay, J.C.(2008).Exploring the impact of depressive symptoms and medication beliefs on medication adherence in hypertension—a primary care study. *Patient Educ Couns*; 73:371–6.
33. Gadkari, A.S., McHorney, C.A.(2012).Unintentional non-adherence to chronic prescription medications: how unintentional is it really? *BMC Health Serv Res*. 12:98.
34. Fenerty, S.D., West, C., Davis, S.A., Kaplan, S.G., Feldman, S.R. (2012).The effect of reminder systems on patients\_ adherence to treatment. *Patient Prefer Adherence*, 6:127–35.
35. Tiv, M., Viel, J.F., Mauny, F., Eschwege, E., Weill, A., Fournier, C., et al.(2012).Medication adherence in type 2 diabetes: the ENTRED study 2007, a French population-based study. *PLoSOne* 7:e32412.
36. Braverman, J. and J. Dedier, (2009).Predictors of medication adherence for African American patients diagnosed with hypertension. *Journal of Ethnicity and Disease*. 19(4): p. 396-400.
37. Alkhamis, A.M., Alsalman, A.J., Al Khamis, M., Alkhamis, A., Alotaibi, N.M.(2019).Prevalence of Nonadherence to Antihypertensive Medications among Adults Attending Primary Healthcare Clinics in Al-Hasa Region: A Cross-Sectional Study. *Dr. Sulaiman Al Habib Medical Journal*. 1(1-2).

38. Alnozha, M.M.,Almobeireek, A.,Abdullah, M., Arafab, M.R.,Khalil, M.Z., Khan, N.B.,Almazroua, Y.Y., Almaatoug, M.A.,Almarazouk, I.K.,Alkadra, A., Noub, M.S.,Alhartbi, S.S. and Alshabid, M.S. (2007). Prevalence of hypertension in SA inTaibah university. *Saudi med journal*. 28(1)77-84.
39. Burnier, M. and Egan, B.M.(2019).Adherence in Hypertension, A Review of Prevalence, Risk Factors, Impact, and Management. *Circ Res.*; 124:1124-1140.
40. Morawski, K., Ghazinouri, R., Krumme, A., et al.(2018).Association of a smartphone application with medication adherence and blood pressure control: the MediSAFE-BP randomized clinical trial. *JAMA Intern Med*.178(6):802-809

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