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NON-ADHERENCE IN HYPPERTENSIVE PATIENTS OF PESHAWAR, PAKISTAN

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Abstract:
Introduction: *Hypertension is a major risk factor for cardiovascular morbidity and mortality. Adherence to anti-hypertensive treatment plays an important role in controlling hypertension and reducing mortality and morbidity associated with cardiovascular events.*
Objectives: *The objectives of this study were to determine the frequency of adherent patients among a sample of Peshawar's population, awareness of hypertension in non-adherent patients and to demonstrate the factors responsible for non-adherence in hypertensive patients.*
Methodology: *It was a quantitative, descriptive, cross-sectional questionnaires based study carried out from 05-12-2013 to 18-03-2014. A convenient sample of 100 hypertensive patients (60 females & 40 males) was gathered from Hayatabad, Phase-4, Peshawar. To assess adherence, 8 item Morisky medication adherence scale was used, whereas, factors were reported via structured questionnaire. Data was analyzed using SPSS v21 and Microsoft Excel 2013 was used for graphs.*
Results: *In our study, 68% of the patients were non-adherent. The mean MMAS score was 5.33 (SD= ± 2.49). Overall awareness of hypertension in non-adherent patients regarding importance of medication use , skipping a dose affect BP, and about cause of hypertension was 95.6%, 60.3% and 91.2% respectively. Among demographic factors, only socioeconomic status was significantly associated with adherence (p=0.02). The top three medication related factors responsible for non-adherence were forgetfulness, (61.76%), symptomless (58.82%) and fear of addiction (51.47%).*
Conclusion: *Different interventions at the level of families of hypertensive patients regarding reducing forgetfulness should be introduced. People should be educated to use the medicine continuously and about the fear of addiction to anti-hypertensive medication via mass media.*
Keywords: *Non-adherence, hypertension, Morisky medication adherence scale, lifestyle modification.*

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INTRODUCTION:

Hypertension rank third as a cause of disease burden worldwide accounting for 64 million DALY i.e. 4.4% of causes of global burden of disease. Globally, 7.6 milliion premature deaths and 92 million DALYs were estimated to be due to hypertension in 2001. Nearly, one billion of world's adult population had hypertension in 2000 which was projected to increase to 1.56 billion by 2025. According to National Health survey of Pakistan (NHSP) carried out from 1990-94, 18% of the population above 15 years and 33% of the population above 45 years was hypertensive [1]. Hypertension causes a 2-fold increase in the risk of cardiovascular diseases, including coronary heart disease, congestive heart failure, stroke, renal failure, and peripheral arterial disease Worldwide, CVD accounts for approx. 17 million deaths per year which is nearly one third of the total deaths. Hypertension accounts for 9.4 million per year deaths out of deaths due to CVD. In Pakistan, deaths due to cardiovascular diseases accounted for 25% of the total deaths in 2010 [2].

Antihypertensive therapy has shown to reduce the risk of cardiovascular and renal diseases but still, large fragment of the hypertensive population are either untreated or inadequately treated. Antihypertensive therapy is estimated to reduce risk of stroke by 30% and that of coronary artery disease by 20%. In different classes of drugs such as thiazides, calcium antagonists, ACE inhibitors and angiotensin receptor blockers, there was no difference observed in outcome of the disease, efficacy and side effects of the drug, or in quality of life of the patients. Combination therapy with an ACEl and a diuretic after a stroke reduces the rate of recurrent stroke [3]. Non-adherence to antihypertensive therapy is the most important cause of uncontrolled blood pressure. Good adherence is related to good blood pressure control and reduction in hypertensive complications. Treatment of hypertension with antihypertensive medications continues life-long. Hence, the patients should be willing to accept their condition and take medication life-long. Hypertensive patients cannot continue their daily medication due to several reasons. About 16-50% of hypertensive patients discontinue their antihypertensive medication within the first year of treatment [4].

Healthy life-style modifications can be adopted which can have an effect on prevention in pre-hypertensive individuals as well as in the treatment of hypertension in combination with antihypertensive drugs in hypertensive patients[5]. According to WHO, in China, Gambia and Seychelles, adherence in hypertensive patients to antihypertensive medication was only 43%, 27% and 26% respectively whereas in United States only 51% hypertensive patients adhere to their antihypertensive regiment. Adherence in hypertensive patients of Pakistan was estimated in a study done by Agha Khan University of Karachi appeared to be 77% when 80% was used as a cut off value [6]. But there was no data available on estimation of adherence in other provinces or cities of Pakistan. Non-adherence to antihypertensive medication and lifestyle modifications leads to poorly controlled hypertension which is a burden on economy. Enhancing adherence in hypertensive patients can lead to improvement of health and economy [7].

LITERATURE REVIEW:

Hypertension is achronic condition in which arterial BP is elevated. Normal blood pressure is important for the maintenance of heart, brain and kidneys, though lower systolic (105mmHg) and lower diastolic (60mmHg) blood pressure is associated with cardiovascular benefits. Globally, prevalence of hypertension is estimated to be 1 billion whereas about 7.1 million deaths annually result due to hypertension. The number of people with hypertension was projected to increase by 24% in developed countries and 80% in developing countries by 2025. Prevalence of hypertension in Eastern Mediterranean Region is estimated to be about 26% affecting around 125 million individuals. In Pakistan, one in three adults over the age of 45 years suffers from high blood pressure. Among hypertensive population of Pakistan, only 50% is diagnosed and only half of them are ever treated . Hypertension is a major risk factor for cardiovascular diseases. In Pakistan, prevalence of coronary artery disease is estimated to be 26.9% in males and 30% in females whereas 4.8% of the population over 40 years of age had suffered from stroke. Keeping blood pressure levels below 140/90 mmHg is associated with decline in complications due to hypertension. With increase in BP, there is increase in death rate due to ischemic heart disease and stroke. There is 2-fold increase in mortality due to ischemic heart disease and stroke for every 20 mmHg rise in systolic and 10 mmHg rise in diastolic BP [8].

CLASSIFICATION OF HYPERTENSION

Classification of blood pressure given by Seventh Report of the Joint National Committee on Hypertension [13] is presented in the following table:

BP Classification for Adults		
BP Classification	SBP mmHg	DBP mmHg
Normal	<120	and <80
Prehyperrtension	120-139	or 80-89
Stage 1 hypertension	140-159	or 90-99
Stage 2 hypertension	≥160	or ≥100

In this era, very efficient antihypertensive medication is available but still, in many countries, less than 25% of the patients attain optimum BP. Poor adherence is the major reason for inadequate blood pressure control and is responsible for uncontrolled hypertension in about two-thirds of hypertensive population [9].

DIAGNOSIS OF HYPERTENSION:

In adults, when the mean of two or more diastolic blood pressure measurements on at least two consecutive visits is more than or equal to 90 mmHg, or when the mean of multiple systolic blood pressure measurements on at least two consecutive visits is more than or equal to 140 mmHg, they are diagnosed as hypertensive [10].

LIFESTYLE MODIFICATIONS:

More than half of the patients do not adhere to recommended life style modifications. According to EMRO, smoking prevalence ranges from 16-35% and overweight/ obesity from 40-70%. To prevent hypertension and control hypertension in hypertensive patients, it is of utmost importance to adopt a healthy lifestyle. Healthy lifestyle modifications are important in hypertension because they are effective in lowering blood pressure, improving efficacy of antihypertensive medications and decreasing the risk of cardiovascular diseases [11]. Lifestyle modification which needs to be addressed in hypertensive patients are cessation of smoking, weight reduction, exercise, reduction in salt intake, and adaptation of DASH- type diet plan.

Cessation of smoking doesn't lower blood pressure but it decreases the risk for developing cardiovascular diseases and also prevents non-cardiovascular diseases. Smoking may antagonize effect of some beta adrenergic blockers. Weight reduction reduces blood pressure in overweight individuals. Blood pressure is lowered by 1.6/1.1 mmHg for every kilogram of weight loss. Regular aerobic exercises may lower blood pressure but isometric exercises should be avoided. Adaptation of DASH-type dietary plan i.e. Diet rich in fruits, vegetables, and low fat dairy products with reduced content of saturated and total fat, reduction in salt intake, increased potassium intake, moderation of alcohol consumption, and an overall healthy dietary pattern effectively lowers blood pressure. Reduction of dietary sodium intake to no more than 100 mEq/L (2.4g sodium or 6g sodium chloride) reduces the blood pressure by an average of 4-6 mmHg [12].

NON ADHERENCE:

Non-adherence to medical regimen and practitioner's advice is not a novel identity but is conceded for many centuries. Around 2,000 years ago, Hippocrates warned physicians to: "Keep watch also on the faults of the patients which often make them lie about the taking of things prescribed"[5]. Non-adherence is an important cause of global mortality and morbidity worldwide. WHO defines adherence as: "The extent to which a person's behavior – taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider". Hypertension is regarded as an iceberg disease i.e. the diagnosed patients represent only the tip of the iceberg. In developed countries, the situation in 1970 revealed that around half of the hypertensive patients in the population were aware of their condition, among those, only half were taking a treatment and among the ones taking the treatment, only half were adequately treated. Hence in developing countries, the condition can be predicted as far more intimidating[13].

Non-adherence is a major reason for inadequate treatment. The most prevalent causes of treatment failure in hypertension is non-adherence to drug therapy. Poor adherence to antihypertensive therapy is a major obstacle in attaining ideal blood pressure. It is estimated that about 75% of the patients do not attain optimal blood pressure [14]. Improving adherence to medical and non-medical therapy can reduce the risk of coronary artery disease, stroke and

Mi. Antihypertensive therapy has shown to reduce the risk of stroke by approx. 30% and that of coronary heart disease by 20%. Poor adherence to medicines in cardiovascular conditions has projected an increased risk of hospitalization (10-40%) and mortality (50-80%)[26].

GENERAL SETTING AND DUARATION OF THE STUDY:
This was a community based quantitative descriptive cross-sectional study carried on 100 patients (40 males & 60 females) from 5-12-2013 to 18-03-2014 in an urban area, Hayatabad phase-4 Peshawar.

REFERENCE AND STUDY POPULATION
Under this study, population of Peshawar is taken as reference population whereas a sample of hypertensive patients was drawn from residents of Hayatabad phase-4.
Peshawar is the provincial capital of Khyber Pakhtun Khwa and is also the largest city in province. According to 1998 census, the total population of Peshawar was 2.019 million, (Male=1,061,000, Females=958,000) i.e. 11.38% of the population of the province resides in Peshawar. Hayatabad is contemporary suburb on the south western border of Peshawar. Hayatabad is primarily used as residential area and is divided into7 phases. Each phase is further divided into sectors. Residents of Hayatabad belong to different ethnic groups such as Pashtuns, Persians, Hindko speakers and Afghan refugees. Our sample was drawn from sector P-1, P-2 and N-1 of Hayatabad Phase-4.

SAMPLING METHOD:
Hypertensive patients were selected via convenient sampling during visits to Hayatabad phase-4. Hypertensive residents who were fit according to inclusion criteria were chosen and questionnaire were administered to them only. Those who were illiterate or understood other language (i.e. Pashto) were asked the questions directly by the investigators.

INCLUSION CRITERIA:
The inclusion criteria included:
1: Hypertension patients of age ≥ 18 years
2: Known Hypertensive patients who were using antihypertensive medication.
3: Hypertensive patients who were willing to participate.

EXCLUSION CRITERIA:
The exclusion criteria included:
1: Hypertensive patients who refused to participate.
2: Hypertensive patients who were recently diagnosed (<1 year) with hypertension to exclude the non- adherence due to failure of being accustomed to anti-hypertensive therapy.
3: Hypertensive patients who were the guests of the residents.

INSTRUMENTS AND VARIABLES:
A questionnaire was developed which included Morisky Medication Adherence Scale and questions regarding factors responsible for non-adherence. The questionnaire was translated into Urdu for the ease of comprehension by the subjects. Questionnaires were administered in houses of hypertensive patients and required 15-20 minutes to be filled.

Morisky Medication adherence scale (MMAS) was used to assess adherence. The MMAS used was current 8-item scale with reported sensitivity of 93% and 53% specificity [2]. This scale contained eight questions. Out of eight, seven questions had to be answered with dichotomous answers (yes/no) whereas the last question had to be answered on as five point scale (never, almost never, sometimes, often and always). Each item was scored 1 point for each 'no' and 0 for each 'yes' & 'never' (in question 'did you take all your medicines yesterday? 1 was scored for 'yes' and 0 for 'no') [8]. Those who scored 8 points were considered adherent whereas those scoring less than 8 were considered non-adherent. Further, to determine level of adherence, a score of 8 was considered high adherence, 6 to <8 was moderate adherence whereas score < 6 was considered low adherence.

A structured questionnaire was developed after an extensive literature review to determine factors responsible for non-adherence. The questionnaire included categories of factors which assessed individual variables .Adherence was treated as dependent variable whereas the categories and corresponding independent variables were:
DEMOGRAPHICS: These included six items i.e. Gender, District/Village, age, marital status, education, and economic status.
ILLNESS RELATED FACTORS: These factors included five items namely duration of hypertension, number of drugs used for hypertension, complications due to hypertension, co-morbidities, presence of memory loss.
AWARENESS AND ATTITUDE TOWARDS HYPERTENSION: These included six items i.e. importance of drug use, regular BP checkup, cause of hypertension, effect of hypertension on other organs, irritation due to being hypertensive and family support.

MEDICATION RELATED FACTORS: These comprised of eight items namely forgetfulness, symptomless, use of other remedies, adverse effects, ineffective medication, fear of addiction, frequent medication change, and expensive medication.

PHYSICIAN RELATD FACTORS: These consisted of five items i.e. trust in doctor, respected by doctor, doctor explained BP control, listened by doctor, and doctor explained the condition.

LIFESTYLE MODIFICATION RELATED FACTORS: These comprised of five items including reduced salt intake, reduced meat intake, started exercise, decreased body weight, and quit smoking.

OPERATIONAL DEFINITIONS

NORMAL BLOOD PRESSURE

WHO defines normal adult blood pressure as "a systolic blood pressure of 120 mm Hg and a diastolic blood pressure of 80 mm Hg{4].

HYPERTENSION

WHO defines hypertension as "a systolic blood pressure equal to or above 140 mm Hg and/or diastolic blood pressure equal to or above 90 mm Hg [4].

HYPERTENSIVE PATIENT

In this study, a person is considered hypertensive if he/she has hypertension and is already on antihypertensive medications for the past 1 year.

PERSISTENCE

Persistence is defined as the consistent continuation of treatment over a period of time including both taking medication as prescribed and refilling prescriptions when appropriate[5].

COMPLIANCE

The term compliance is defined as " the degree or extent to which a patient follows or completes a prescribed diagnostic, treatment, or preventive procedure"[5].

PILOT STUDY:

The pilot study was carried out on 10 hypertensive patients of out-patient department of medicine in Kuwait Teaching Hospital and Mercy Teaching Hospital. The questionnaire was administered to the selected hypertensive patients and alterations and modifications were made in questionnaire according to the response of patients.

ETHICAL CONSIDERATIONS:

Patients were explained about the nature of the study and an informed consent was obtained after approval of the patients to participate in the study. Identity and information about patient was kept confidential and was not referred to anywhere in the study.

ANALYSIS PLAN

ResuIts were entered and analyzed in SPSS version 21 for windows. Microsoft Excel was used for graphs. Mean, mode, median and ± one standard deviation were calculated for continuous variables. Score was the only variable treated as continuous whereas rest were categorical. Frequencies and percentages were generated for categorical variables. Categorical variables were compared using chi-square test. Fisher- Exact test was applied where appropriate. A p-value of <0.05 was considered significant.

OVERALL ADHERENCE IN HYPERTENSIVE PATIENTS:

The mean MMAS score was 5.33 (SD=±2.49). In this study, 32% of the sample was adherent whereas 68% were non-adherent {Figure-1}. Furthermore, when defining the cases on level of adherence, 32% were highly adherent, 18% showed moderate adherent and 50% with low adherence {Figure-2}.

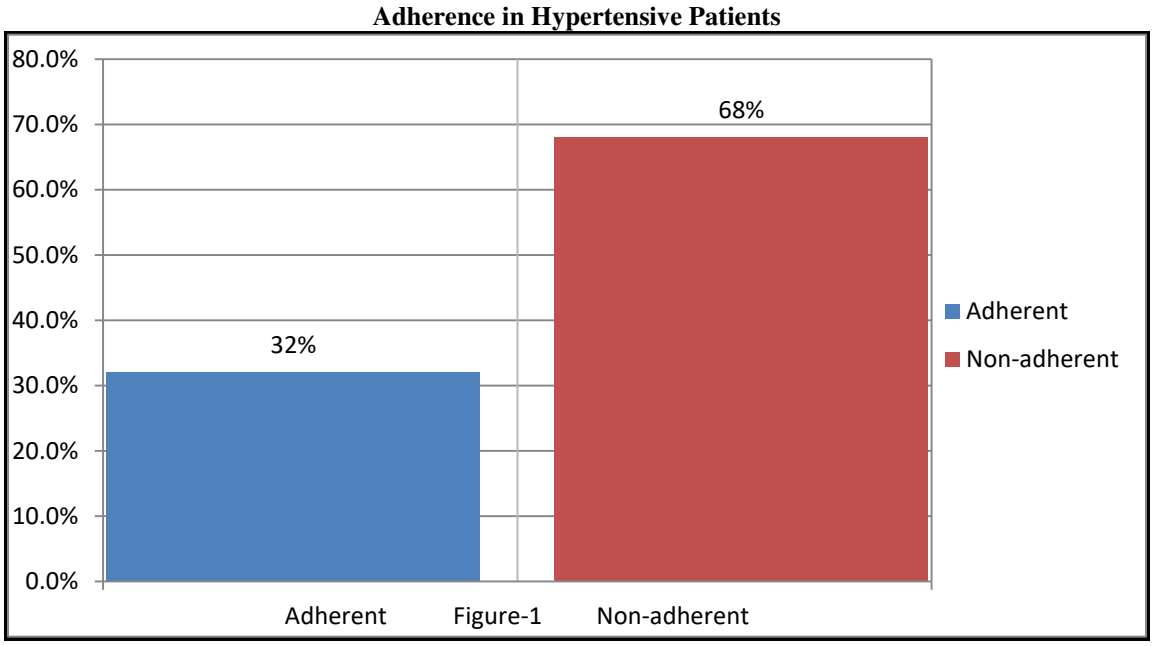
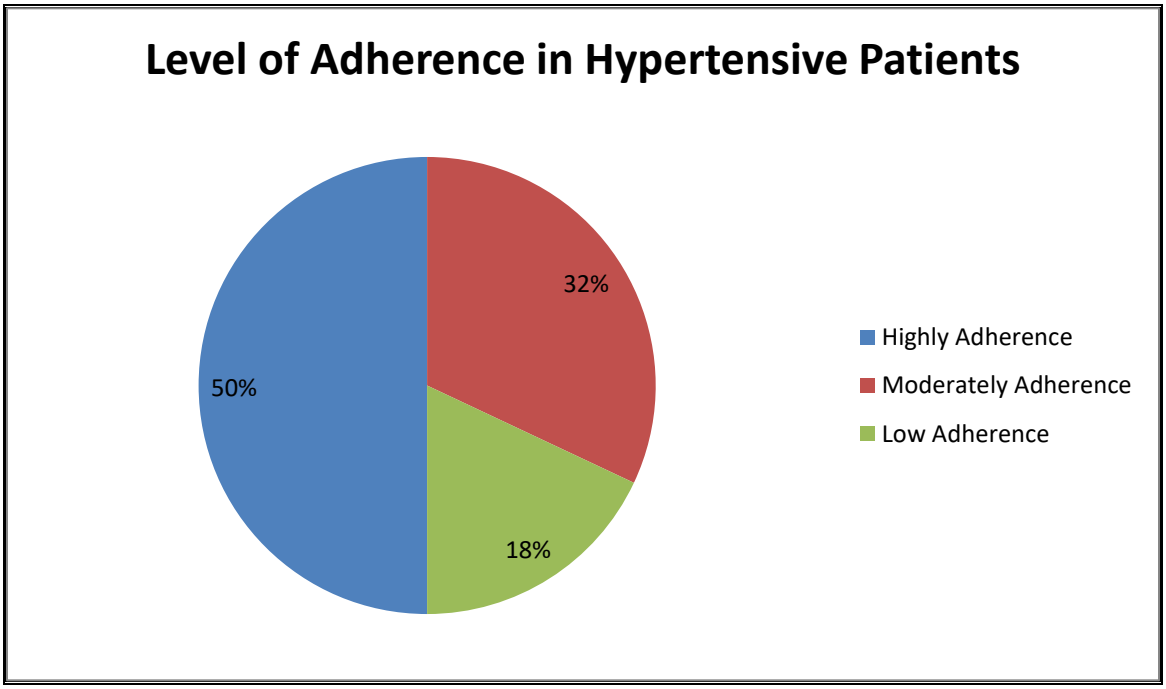


Figure-1



AWARENESS ABOUT HYPERTENSION:

Awareness about hypertension and anti-hypertensive treatment was calculated in non-adherent subjects only (n=68). Overall level of awareness in non-adherent hypertensive patients was very high. Table-2 shows that more than half of the patients responded positively when asked about the importance of medication use, regular BP checkup regardless of regular use of medication, stress, obesity and smoking as a cause of hypertension and hypertension being harmful to the functions of other organ as well. Awareness was low about the fact that skipping a dose affects hypertension (41%).

Table-2 : Awareness about Hypertension in non-adherent patients				
Knowledge about Hypertension	Yes n (%)	No n (%)	Don't know n (%)	Total
Medication use is important	65 (95.6)	3 (4.4)	0 (0.0)	68
Regular BP checkup is important	60 (88.2)	8 (11.8)	0 (0.0)	68
Skipping a dose affect BP	41 (60.3)	23 (33.8)	4 (5.9)	68
Knows cause of hypertension	62 (91.2)	5 (7.4)	1 (1.5)	68
Hypertension affects other organs	57 (83.8)	9 (13.2)	2 (2.9)	68

FACTORS RESPONSIBLE FOR NON-ADHERENCE IN HYPERTENSIVE PATIENTS:

Factors responsible for non-adherence in hypertensive patients were divided into 6 categories i.e. patients related factors, illness related factors, social factors, medication related factors, physician related factors, and lifestyle modification related factors. Patients related factors and illness related factors were described in both adherent and non-adherent patients, whereas other factors were only described for non-adherent hypertensive patients.

DEMOGRAPHICS

In Table-3, it is shown that females are slightly more non-adherent as compared to males. Adherence was more in age-group 36-50 years. Younger age groups i.e. 18-35 years were more non-adherent as compared to other groups. Married hypertensive patients were more adherent as compared to singles. Singles included people who were never married, divorced and widowed. Patients who had degree level or more showed more adherence as compared to others. Interestingly, patients who were illiterate also showed more adherence whereas patients who had primary to secondary qualification, showed least adherence. Though, all these associations were not significant. Adherence increased as the socioeconomic status increased with more adherences in patients with better socioeconomic status. This association was significant (p-value < 0.05).

Table-3 : Association between patient's demographic characteristics and Adherence			
	Adherence n (%)	Non-adherence n (%)	p-value
Gender			0.93
Male	13 (32.5)	27 (67.5)	
Female	19 (31.2)	41 (68.8)	
Age			0.77
18-35 years	1 (16.7)	5 (83.3)	
36-50 years	16 (35.6)	29 (64.4)	
51-70 years	13 (33.3)	26 (66.7)	
More than 70 years	2 (20)	8 (80)	
Marital Staus			0.49
Single	2 (20)	8 (80)	
Married	30 (33.3)	60 (66.7)	
Education			0.61
Illiterate	16 (34.8)	30 (65.2)	
Primary – Secondary	3 (18.8)	13 (81.3)	
Higher secondary	2 (25)	6 (75)	
Degree Level or more	11 (36.7)	19 (63.3)	
Socioeconomic Status			0.02
Poor	1 (33.3)	2 (66.7)	
Moderate	1 (5.6)	17 (94.4)	
Good	17 (34)	33 (66)	
Better	13 (44.8)	16 (55.2)	

ILLNESS RELATED FACTORS:

Table-4 shows that adherence increased as the duration of hypertension increased. Hypertensive patients with duration of hypertension 1-3 years were least adherent. Adherence decreased as the number of drug decreased but patients using more than 3 drugs were most adherent of all. Surprisingly, patients who developed complications due to hypertension were more inclined towards non-adherence as compared to the patients who did not develop any complications due to hypertension. Patients with other co-morbidities were more no-adherent as compared to the patients who had no other co-morbidities.

Table-4 : Association between patient's illness related factors and adherence			
	Adherent n (%)	Non-adherent n (%)	p-value
Duration of Hypertension			0.99
1-3 years	7 (30.4)	16 (69.6)	
4-6 years	9 (31.0)	20 (69.0)	
7-10 years	6 (33.3)	12 (66.7)	
More than 10 years	10 (33.3)	20 (66.7)	
Number of Drugs			0.93
1	20 (32.8)	41 (67.2)	
2	7 (31.8)	15 (68.2)	
3	2 (22.2)	7 (77.8)	
More than 3	3 (37.5)	5 (62.5)	
Complications due to Hypertension			0.32
Present	6 (24.0)	19 (76.0)	
Absent	26 (34.7)	49 (65.3)	
Comorbidities			0.33
Present	20 (29.0)	49 (71.0)	
Absent	12 (38.7)	19 (61.3)	

3.3 SOCIAL FACTORS

Figure-3 shows that in most of non-adherent patients, their family members reminded them to take their medicine. Only 26.5 of non-adherent patients were irritated by their condition and left taking medications due to it.

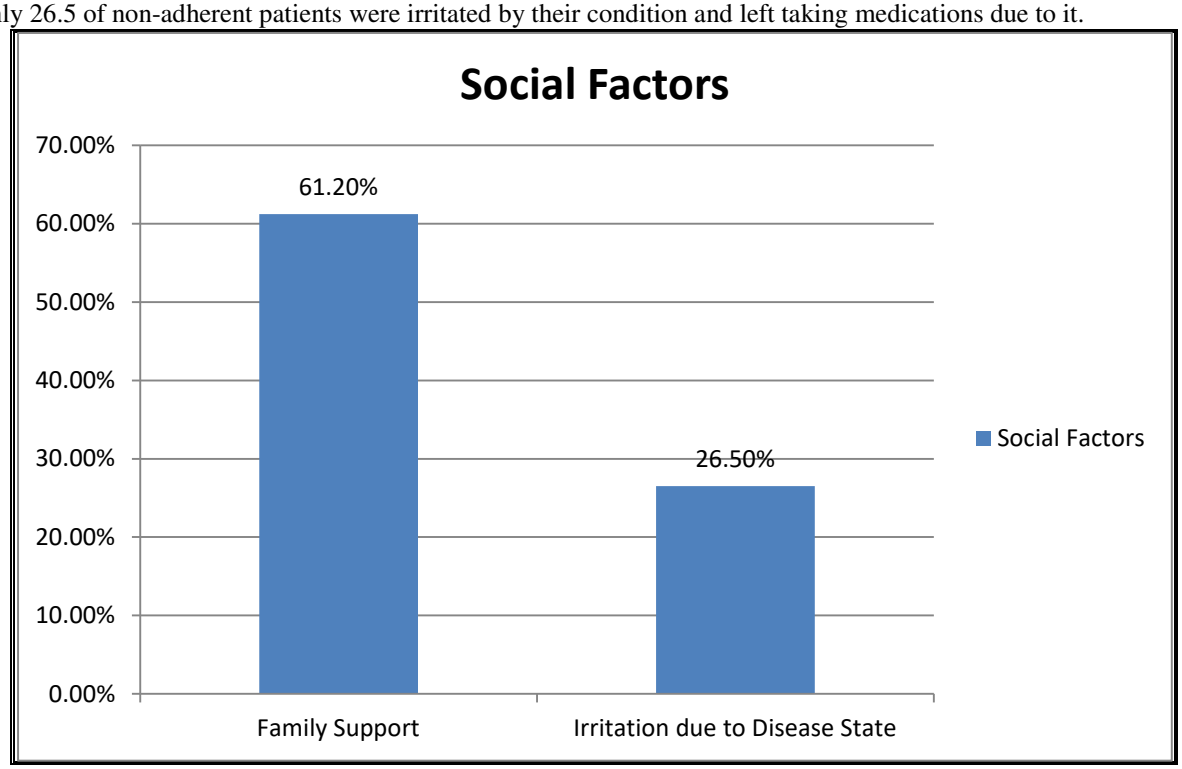


Figure 3

3.4 MEDICATION RELATED FACTORS:

Figure-4 shows medication related factors in non-adherent hypertensive patients. Forgetfulness, symptomless and fear of addiction to anti-hypertensive medications were most frequent medication related factors among non-adherent hypertensive patients.

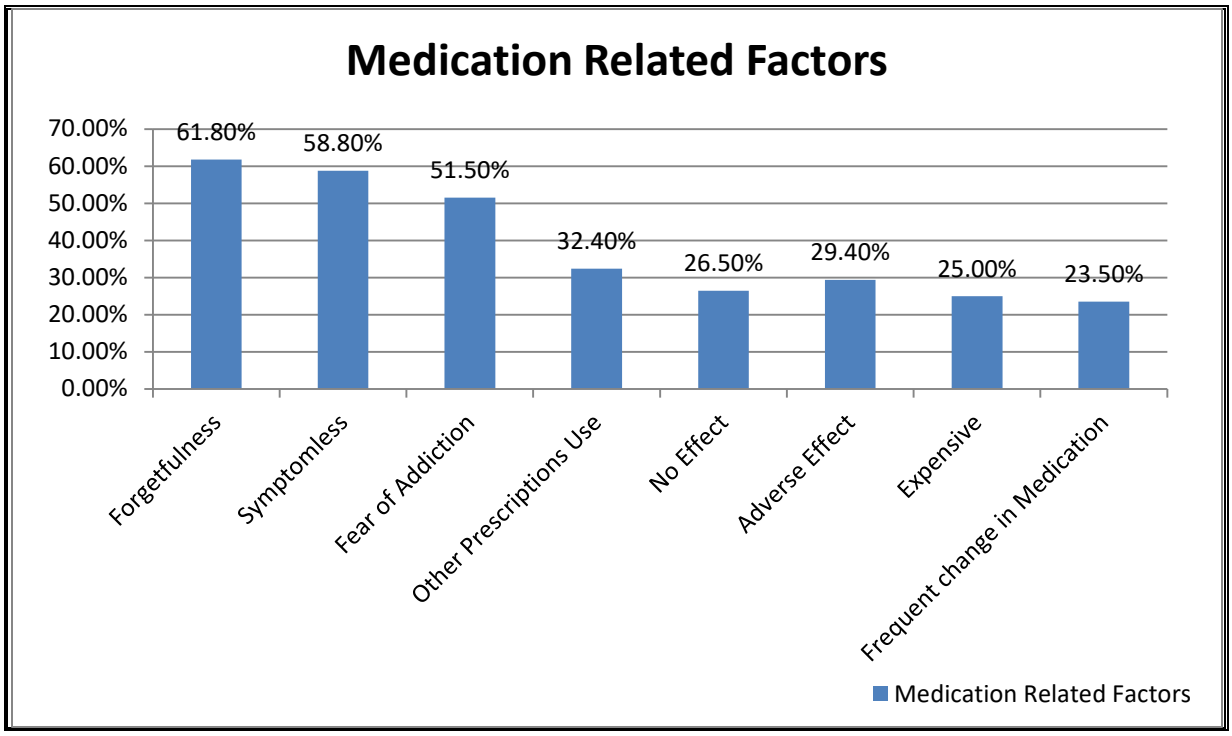


Figure 4

3.5 PHYSICIAN RELATED FACTORS:

Figure-5 shows physician related factors in non-adherent hypertensive patients. Most of the non-adherent patients were satisfied with their physician/doctors in being respected by their physician, trusting their physician, being listened to by their physician and informed by the physician about BP control and their condition.

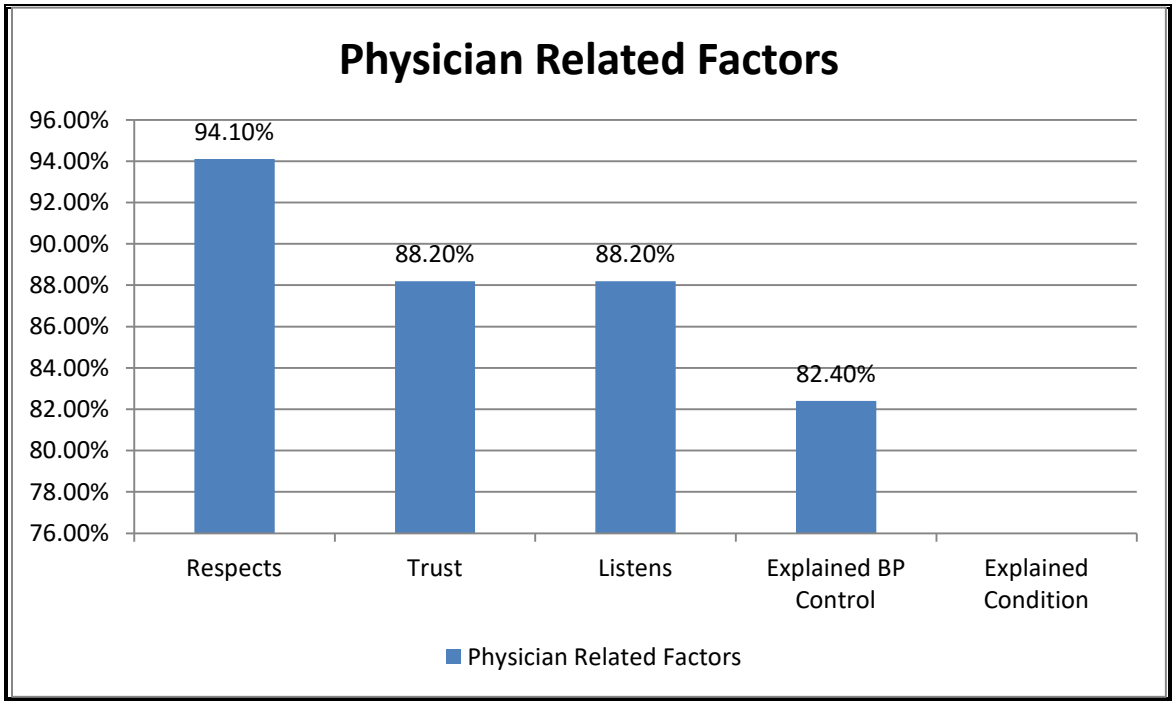


Figure 5

3.6 LIFE STYLE MODIFICATION RELATED FACTORS:

Figure-6 shows the modification of lifestyle in non-adherent hypertensive patients. Most of non-adherent patients decreased salt intake after they were diagnosed as hypertensive whereas decrease in meat intake, exercise and weight loss was followed to a lesser extent by non-adherent patients. Among 68 non-adherent hypertensive patients, 57 (83.8%) were non smokers. Among smokers, only 27.3% (n=3) non-adherent patients had quit smoking after they were diagnosed as hypertensive.

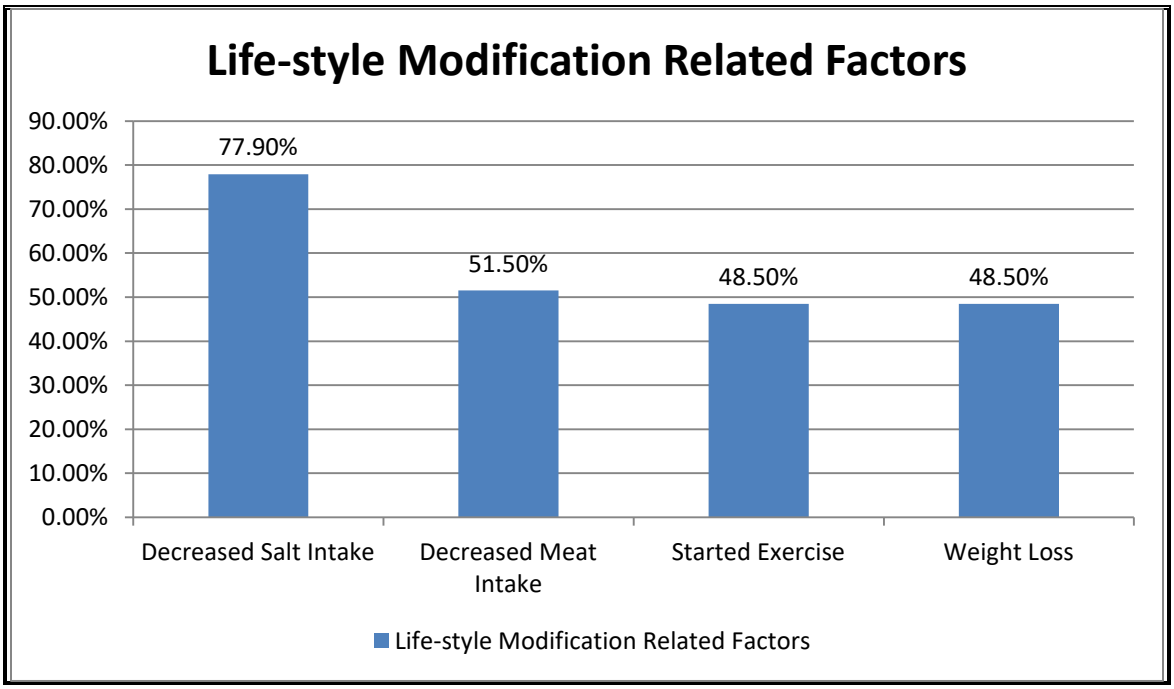


Figure 6

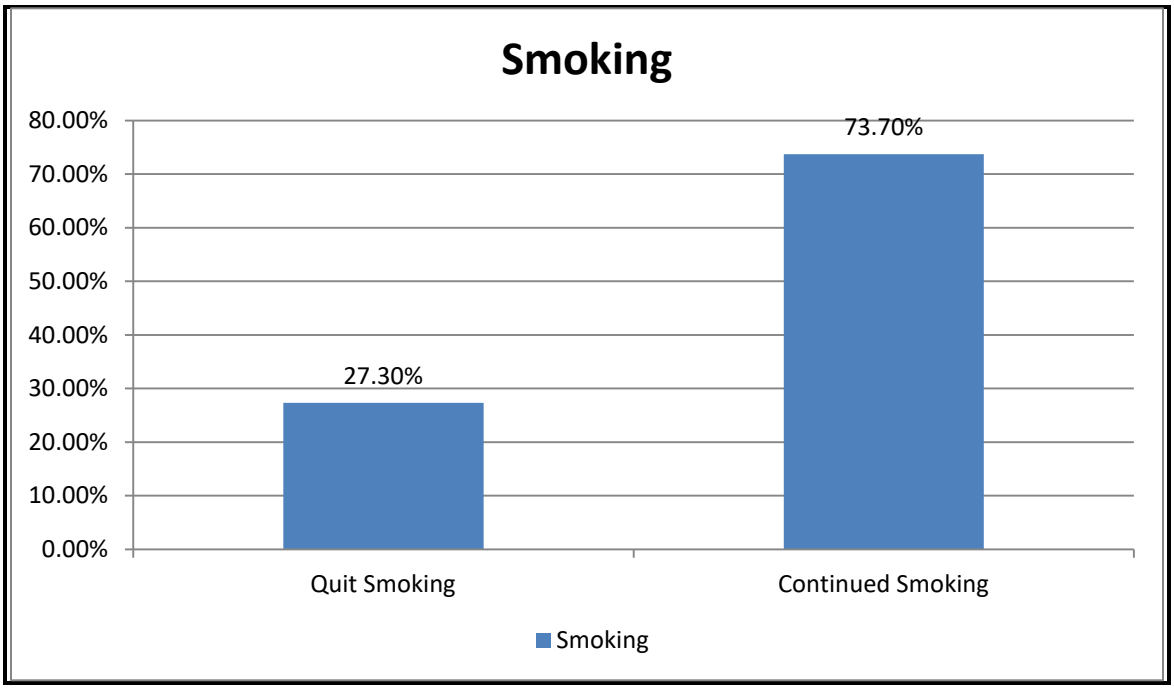


Figure 7

DISCUSSION:

The adherence rate in hypertensive patients of Peshawar was 32% when defined by the cut-off value of 100%. Our study reports a lower 32% adherence then what has been reported previously in the Pakistani population in a local study done in Agha Khan University, Pakistan (77%) [9]. This could be due to a majority of reasons but mainly the variation in the population subset and higher cut-off value used in our study can be one of the reasons. Among the studies conducted on various populations of the world we are not able to find one which used a similar cut-off point of 100%. The studies conducted in the world in different areas majority used the cut-off value of ≥80% including one done in Pakistan (77%) [9], and also similarly for Ethiopia (74%).

Many studies have demonstrated association between adherence and lack of awareness about hypertension and its treatment and its treatment. Whereas our study shows a different picture. Most of non-adherent patients in our study showed excellent knowledge about hypertension. Non-adherence in these patients can be due to their careless attitude towards their condition. In our study, females were slightly most non-adherent as compared to males which is in line with another study which also demonstrated females to be more adherent[15]. Regarding age, younger age group i.e. 18-35 years was more non-adherent as compared to other groups. This is in agreement with the studies done in china which also reports younger age to be a factor responsible for non-adherence. This could be due to the fact that younger patients are not willing to accept their diseased condition and are not used to the routine of taking medication. A study done on adherence, observing relationship with the marital status showed that married people were more adherent as compared to singles [16]. This is same as the result of our study in which married people were more adherent in comparison with singles. The positive influence of compliance with medication is due to the help and support from the spouse and the more conscious behavior towards one's own health for the sake of their family, which could be possible reason of married patients being more compliant.

Though this is somewhat in line with our study, but our study concluded an interesting result showing that those who were highly educated (degree level) were more adherent but similarly those who were illiterate were adherent as well. People with primary or secondary level of education were non adherent. This could be justified as higher education leads to higher conceptual understanding of risk factors related to hypertension, while low education level leads to lack of knowledge about disease. Also low education level is related to poverty and poverty leads to poor structured national programs on hypertension, thus indirectly related to education. But more adherence in illiterate could be explained as these people were may be trying to increase their level of adherence to impress their physicians. From these results, it seems that educational level may not be a good predictor of treatment adherence. Contrary to our result, study done in Nizhniy, Russia has concluded that patients who were illiterate and were educated by medical staff were more adherent. Study done on Nigeria showed that level of education did not affect adherence [17].

Lower socioeconomic status showed a significant association with non-adherence in our study. Our result was consistent with another study done in Pakistan, which showed that higher the socioeconomic status, higher is the level of adherence [9]. As post of the patience belonging to higher socioeconomic status are usually more educated and have knowledge about their disease, they tend to be more adherent. Secondly socioeconomic status is also related to easy purchase and availability of treatment thus leading to more adherents as compared to those of low socioeconomic status. In contrary to our result, higher socioeconomic status was negatively associated with adherence in a study conducted in Taiwan. Our study that which longer duration of hypertension, patients became more adherent. It is in contrast to a study done is Taiwan and Greenwich which showed that longer the duration of hypertension, more is the level of non-adherence toward the antihypertensive drug. This could be explained as with longer duration of hypertension, the patient accepts his condition and illness and taking medication regularly becomes a part of his/ her routine.

Number of drugs could have effect on non-adherence to antihypertensive drugs, this factor is also discussed in our study. According to the result, people taking one or two drugs were more non-adherent as compare to those taking three or more drugs. Thus adherence increased with increase in number of drugs this is consistent with other studies showing that multiple drug therapy is positively related to adherence. This result goes against different international studies 53, 56, 37 which explained that single tablet taking patients were more adherent than those taking more than one. This could be argued that as increasing number of drugs refers to increased risk for complication of hypertension or sense of more illness, patient becomes more conscious about taking medicine regularly. On the other hand the opposite result can be explained by making its association

with easy intake of one drug while difficult intake and irritability due to multiple drugs. Co-morbidity can affect adherence to antihypertensive drugs. Our study concluded that patients having co-morbidity were more non-adherent as compare to those in whom co-morbidity was absent, this is in line with the study done in Ethiopia [18]. Our result can be justified as patient having multiple comorbidities have to take multiple drugs and this complex treatment regimens lead to their non-adherent behavior.

Forgetfulness and symptomatic condition has been reported as a major factor for non-adherence all over the world which Is in line with our study. These two factors were the most frequently reported factors among non-adherent patient. The next common medication related factor recorded among non-adherent patient was fear of addiction to antihypertensive medication which is in agreement with another qualitative study. The reason for this fear could be the ignorance of the patients that hypertension is a life-long disease and its treatment needs to be carried out for the rest of the life. Other prescription use for hypertension, adverse effects of anti-hypertensive medication and unaffordable anti-hypertensive medication has also been reported as factors for non-adherence in many studies but in our study, these factors were less frequent among non-adherent patients. Adverse effect was reported to be only 29.4% whereas unaffordable drugs were reported by 25% of the patients. Expenses of drugs could be a less common factor among non-adherent patients because the sample was recruited from a posh area of Peshawar who belonged to a better socioeconomic status.

Dis-satisfaction with the physician attitude in non-adherent patients did not appeared to be a factor frequent in non-adherent patients. While other studies reported patient-physician relationship to be an important factor to modify adherence. Similarly, concern of non-adherent patients about attitude of physician was also an issue demonstrated in some studies. Our study reported satisfaction of non-adherent patients with their physicians, which may be due to patients filling a socially acceptable answer or due to respect towards their physician. In our study, non-adherent patients were fairly adherent to life-style modification. The only factor which showed least adherence in hypertensive patients was smoking, out of the patients who smoked, most of the patients continued smoking after diagnosed with hypertension (73.7%). In contrast to this, a study done by Uzun S et al showed that 83% of the patients demonstrated smoking related adherence. Non-adherence regarding smoking can be due to careless behavior of the patients towards hypertension and lack of awareness about hypertension and its risk factors

CONCLUSION:

Increase in morbidity and mortality due to complications of hypertension is somehow related to the non-adherence of hypertensive drugs. This descriptive cross-sectional study was focused on measuring non adherence in hypertensive patients. In this study, there was high level of non-adherence among hypertensive patients. Forgetfulness, asymptomatic condition and socioeconomic status were the most important factors found to be affecting adherence in our study. Forgetfulness was reported to be the main barrier to adherence in our society. To address that, we recommend that the physician should involve the patient's family so that they will remind the patients to take drugs in time. The patient should set reminder for taking drugs and in follow-up therapy, physician must ask the patient that he/she is taking drugs regularly or not. Physicians should pay special attention to education and counseling of non-adherent patients. A female plays a major role in community and family. Unluckily females of our society showed non-adherence more than males. SO females should be targeted for education and awareness about hypertension. As females have a major share in the family and home, they can educate their family and elderly members about hypertension only if they are aware of it themselves. The need of the hour is to create public awareness about hypertension, its risk factors, its treatment and its complications. It is especially important in younger age group to prevent them from hypertension and also in those who are already hypertensive to prevent complications. Queries of the patients regarding use of anti-hypertensive medication should e addressed. Patients should be educated via mass media about fear of addiction to anti-hypertensive medication, importance of anti-hypertensive therapy, and more importantly modification required in lifestyle in hypertensive patients as well as in those who are at risk of developing hypertension.

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