

ORIGINAL ARTICLE

NON-COMPLIANCE TO ANTI-HYPERTENSIVE MEDICATION AND ITS ASSOCIATED FACTORS AMONG HYPERTENSIVES

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Background: Non-compliance to anti-hypertensive drugs can have negative impact on cardiovascular outcome. Various studies have been conducted on the issue but the factors are not yet explored properly, particularly in Pakistan. This study was conducted to determine the frequency and factors associated with non-compliance to anti-hypertensive medications in Karachi. **Methods:** This descriptive cross sectional study was conducted on 113 indoor hypertensive patients included by purposive sampling, aged 30 years and above diagnosed at least 6 months back in public sector tertiary care institutes of Karachi from March to October 2011. Data was collected through a questionnaire in Urdu. Demographic data, hypertension diagnosis, medical co-morbidity, current number of anti-hypertensive medicines, frequency of missing prescribed antihypertensive therapy and other factors affecting compliance pertaining to medicines, patient, physician and health care centre were included in the questionnaire. **Results:** This study revealed that 68.14% patients were non-compliant. Non-compliance was found to be associated with gender and socioeconomic status. Duration of hypertension, duration between follow up visits to physician, number of drugs, careless attitude, role of physician and limiting access to health care center are found to be important factors in non-compliance. **Conclusions:** Multiple factors including patients, medicine and health care system related, which can be prevented with simple measures, were found responsible for higher prevalence of non-compliance against anti-hypertensive medicines.

Keywords: Non-compliance, antihypertensive drugs, risk factors for non-compliance, tertiary care hospital.

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INTRODUCTION

Hypertension is one of the most prevalent chronic disease.¹ Today, approximately one billion people worldwide have high blood pressure, and this number is expected to increase to 1.56 billion people by the year 2025.² The World Health Organization rates hypertension as one of the most important causes of premature death worldwide and the problem is growing day by day Globally, the overall prevalence of raised blood pressure in adults aged 25 and over was around 40% in 2008.³ In America only, High blood pressure costs the nation \$47.5 billion each year. This total includes the cost of health care services, medications to treat high blood pressure, and missed days of work.⁴ In the Eastern Mediterranean Region, the prevalence of hypertension averages 29% and it affects approximately 125 million individuals. Of greater concern is that cardiovascular complications of high blood pressure are on the increase, including the incidence of stroke, end-stage renal disease and heart failure.⁵ In the United States, about 77.9 million (1 out of every 3) adults have high blood pressure. Projections show that by 2030, prevalence of hypertension will increase 7.2% from 2013 estimates.⁶

Overall, 12 million Pakistanis, 18% of its people aged 15 and above, have high blood pressure.⁷ Research has shown that medication non-compliance is the most important reason for poorly controlled hypertension.¹ Non-compliance is defined as “the extent to which a person’s behaviour does not coincide with medical or health advice”.¹ Studies in hypertension vary markedly in estimates of compliance; levels as different as 20 and 80% are quoted.⁸ The number of people with uncontrolled hypertension has increased to around 1 billion worldwide in the past three decades.⁹ In a study conducted in Karachi, the prevalence of non-compliance was found to be 43%, out of which 53.4% had mild non-compliance, 24.4% had severe non-compliance, while 22% had moderate non-compliance.¹⁰ Results of another study conducted in Civil hospital, Karachi revealed that only 13.5% of patients had controlled blood pressure while rest of the hypertensive had uncontrolled blood pressure¹¹, It was also noticed that less than half (43.8%) of the hypertensives had regular follow up for their blood pressure, and only 54% of patients claimed to have good drug compliance. It is important to know that 22.5% patients were being prescribed sub therapeutic doses of antihypertensive drugs.¹¹ Uncontrolled hypertension is a major risk factor for CVDs and it

has been shown that non-compliance is the most common cause of uncontrolled hypertension. Non-compliance is a complex behavioural process and it is affected by many factors such as patient's individual character, patient-physician relationship, and the health-care system.¹ Study of civil hospital also explored that irregular follow-up, poor drug compliance, non-provision of antihypertensive drugs, faulty prescriptions by the doctors and the lack of health education were the main reasons for poor control of blood pressure¹¹

Over past 25 years, hundreds of articles have been published on issue of medication non-compliance, approaching the issue from various angles, resulting in confused correlations. The World Health Organization (WHO) describes poor adherence as the most important cause of uncontrolled blood pressure and estimates that 50–70% of people do not take their antihypertensive medication as prescribed.¹² Various factors are associated with it, which varies from study to study. They generally include choice of medication, some demographics and health service related factors. However most of the studies focusing on this issue have looked at determinants of non-persistence (not non-compliance) and mostly were secondary analysis of administrative databases. In these databases, important patient information e.g. occupation, income, perception of health and beliefs about disease and its treatment is seldom available.¹³ Understanding the reasons for patient's non-compliance with anti-hypertensive medications is essential if blood pressure is to be more effectively managed.¹⁴ An optimal approach that ensure high compliance levels are yet to be discovered despite many years of research. However it is crucial to know because adverse outcomes e.g., hospitalization, complication, disease progression and death are increasing day by day.

Data on the factors associated with non-compliance from developing countries, especially Pakistan, is scarce. Previous studies have been carried out to recognize those factors which contribute to non-compliance of patients to anti-hypertensive therapy but we have observed a high number of perceived problems in everyday life related to non-compliance with antihypertensive therapy which are yet to be explored.

With above issues in mind, this study was conducted to determine the frequency of non-compliance and to associate the factors with non-compliance to anti-hypertensive medications among known hypertensive patients of Karachi. This information would help in designing effective interventions and therapeutic techniques for enhancing compliance among hypertensive patients.

Better compliance will certainly translate in improved treatment efficacy, better intervention outcome and reduction of cost burden on health care system.

MATERIAL AND METHODS

A descriptive cross-sectional study was conducted on the patients admitted in the wards through emergency at Abbasi Shaheed hospital and National Institute of Cardiovascular Diseases from March to October 2011. All the hypertensive patients aged 30 years and above, diagnosed at least 6 months back were enrolled by using purposive sampling. Patients who were using medicines other than anti-hypertensives and with co morbid conditions were also included. Patients who were not willing to take part in the study and who were unstable and unable to give answers were excluded from the study.

A sample of 113 hypertensive patients was selected for study as estimated by specified relative precision equation of WHO sample size software, based on 46% non-compliance rate as shown in a study of Karachi¹¹ with 95% confidence level (1- α) and 20% relative precision. An interviewer assisted standardized questionnaire was designed and translated into Urdu for uniformity and easy understanding of the participants. Standardized pattern of enquiry was devised in order to minimize interviewer bias by administration of the questionnaire by researcher herself and the medical students specially trained for the purpose. Pilot study was conducted on small sample of 15 patients and necessary amendments had been made in questionnaire to overcome the identified problems.

The questionnaire inquired about demographic variables, hypertension diagnosis, medical co-morbidities, number of medications on daily basis and schedule. Prescribed numbers of pills per month were calculated by the interviewer and respondents were then asked about estimated number of pills taking during one month period. The questionnaire also inquired reasons for non-compliance based upon the proposed triadic model, including factors pertaining to physicians, patients and medications.

A written informed consent was taken from each patient participating in the study before the administration of questionnaire. The participants were explained about the objectives and benefits of participating in the study and were assured that they could stop the interview at any time when they wish to do so.

Data was entered and analysed in computer in SPSS-16.0. Number of medicine used per month was divided by the number of medicine actually prescribed for a month, percentages were calculated

and those who were taking <80% of prescribed medicine were labelled as non-compliant. All the variables were categorical; frequency and percentages were calculated. Non-compliance was compared with various factors by using chi square test and *p*-value ≤0.05 was considered as significant.

RESULTS

A total of one hundred and thirteen hypertensive patients participated and answered the questionnaires; 48 (42%) participants belonged to the age group between 46–60 years and approximately equally 46 (41%) were above 60 years of age. All of the participants were married with 22 (19.5%) were living separately (either divorced or widowed), about 72 (64%) of our study population was female, 59 (52%) were illiterate while only 28 (25%) were employed.

Out of all participants, 77 (68.14%) were found to be non-compliant as were in habit of taking <80% of the prescribed dose of anti-hypertensive medicine per month. Relationship of non-compliance with various demographic variables has been shown in table-1. Non-compliance was found to be significantly associated with gender, occupation and monthly income. The frequency was getting higher with increasing age but the difference found to be statistically insignificant.

Table-1: Relationship of non-compliance with demographic variables

Variables	Compliance n (%)	Non-compliance n (%)	<i>p</i> -value*
Age			
30–45 years	9 (25)	10 (12.98)	0.175
46–60 years	16 (44.44)	32 (41.55)	
>60 years	11 (36.56)	35 (45.45)	
Gender			
Male	7 (19.44)	35 (45.45)	0.008
Female	29 (80.55)	42 (54.54)	
Occupation			
Unemployed	2 (5.55)	19 (24.67)	0.002
Employed	5 (13.89)	23 (29.87)	
House wives	29 (80.56)	35 (45.45)	
Marital status			
Married	29 (80.55)	62 (80.51)	0.996
Divorced/widow	7 (19.44)	15 (19.48)	
Monthly income			
<10,000 Rs.	13 (36.11)	47 (61.03)	0.046
10000–25000	18 (50.00)	23 (29.87)	
>25,000	5 (13.88)	07 (9.09)	
Education			
None	22 (61.11)	37 (48.05)	0.102
Primary	8 (22.22)	12 (15.58)	
Secondary or above	6 (16.66)	28 (36.36)	

**p*-value calculated by applying chi square test

Regarding patient related factors, there is no specific association of non-compliance with

family history of hypertension. When evaluated for co morbidities, it was noticed that 43 (38%) had no other disease while 70 (62%) were having other diseases as well. Diabetes was found to be as commonest co morbid condition as it was found in 40 (35%), while asthma and renal disease were coexist with hypertension among 30 (27%). When co morbidities were stratified further into compliance and non-compliance group, we came to know that diabetics were comparatively less non-compliant i.e., 21/40 (52.5%) than other illnesses 25/30 (83%) and non-compliance was highest, i.e., 31/43 (72.09%) among the group having no other condition than hypertension.

We could not ask about the fact that which of the disease has developed first either hypertension or others. When inquired about the duration of the diagnosis of hypertension, it was observed that 30 (27%) were diagnosed six months back, while 42 (37%) and 41 (36%) were diagnosed between six months to five year and more than five years respectively. For analysis we merge the two groups and had recently diagnosed (included those who were diagnosed in last five years) and those who were diagnosed more than five years back. Proportion of non-compliance was found to be high among recently diagnosed patients 54/72 (75%) than those who had diagnosed more than five years back 23/41 (56.09%). Non-compliance was found high in patients who visited the doctors after a longer time period. The patients who visited the doctors one year back or more were 38/38 (100%) non-compliant while those who visited six months back or three months back were 29/46 (63%) and 10/29 (34.48%) respectively.

About 55/77 (71.43%) of non-complaints reported that they had developed complications of hypertension. The carelessness in 25/113 (22.12%) and un-affordability in 23/113 (20.35%), were the two main causes of non-compliance as enquired during the research. We also asked the patients about the circumstances of taking medicine through which we came to know that 51/113 (45.13%) were taking medicines for symptomatic reasons. Among the patients who thought that by taking the drugs their B.P. got controlled, 55/85 (64.71%) were non-compliant while in vice versa case, 22/28 (78.57%) were non-compliant.

In this research we did not find any significant association of non-compliance with physician related factors as shown in table-2.

Table-3 shows medicine related factors, it was found that Non-compliance was higher among those who were taking medicine for less than five years (*p*=0.03), on mono therapy and di therapy comparing to patients using 3 or >3 drugs (*p*=0.02).

Non-compliant patients were not taking medicines on regular basis and on prescribed time and dose ($p=0.000$). Non-compliance is reported greatest, i.e., 65(86%) among patients who paid themselves for their medicines ($p=0.06$) than those whose medicine paid by family or others. Side effects of drugs also contribute to some extent in causing non-compliance in 10 (9%). Common side effects which were reported by patients were dizziness 13 (17%), polyuria 9 (12%), and sedation 7 (9%).

Table-2: Relationship of non-compliance with physician related factors

Variables	Compliance n (%)	Non-compliance n (%)	p-value*
Complex regimen			
yes	11 (30.5)	20 (25.97)	0.558
No	21 (58.3)	52 (67.53)	
Don't know	4 (11.11)	5 (6.49)	
Counselling about medicine			
Yes	16 (44.44)	40 (51.94)	0.457
No	20 (55.55)	37 (48.05)	
Counselling about life style			
Yes	22 (61.11)	40 (51.94)	0.362
No	14 (38.88)	37 (48.05)	

*p-value calculated by applying chi square test

Table-3: Relationship of non-compliance with medicine related factors

Variables	Compliance n (%)	Non-compliance n (%)	p-value*
Duration of treatment			
<5 years	9 (25)	38 (49.35)	0.03
>5 years	25 (69.44)	34 (44.15)	
Don't know	2 (5.55)	5 (6.49)	
Number of drugs			
Monotherapy	23 (63.88)	52 (67.53)	0.02
DitheraPy	4 (11.11)	17 (22.07)	
3 or more than 3 drugs	9 (25)	5 (6.49)	
Don't know	0	3 (3.89)	
Financial support for drugs			
Themselves	4 (11.11)	24 (22.42)	0.06
Family	27 (75)	43 (40.18)	
Government	2 (5.55)	2 (1.86)	
Charity	3 (8.33)	35 (32.71)	
Employer	0	3 (2.80)	
Take medicine regularly			
Yes	35 (97.22)	48 (62.33)	0.00
No	1 (2.77)	29 (37.66)	
Adverse effects of medicines			
Sedation	3 (8.3)	7 (9.09)	0.07
Dizziness	10 (27.77)	9 (11.69)	
GI complications	0	8 (10.39)	
Increase urination	4 (11.11)	10 (12.99)	
Others	4 (11.11)	3 (3.90)	
None	15 (41.66)	40 (51.95)	

*p-value calculated by applying chi square test

Regarding factors related to health service centre, most of the patients were used to visit area clinic 55 (48.7%), and government hospital 32 (28.31%) as compared to private hospitals 26 (23%).

Non-compliance to antihypertensive medicines was found to be 36/55 (65.45%), 18/26 (69.23%) and 23/32 (71.88%) among those who visited local clinic, private & public hospitals respectively. It was found that 55/113 (48.67%) of the participants had nearest medical facility within the range of 1–7 Km. Patients with health care centre within 1–7 km distance from their residency were a little less non-compliant, i.e., 36/55 (65.45%) as compared to 25/34 (73.53%) and 16/24 (66.67%) with distance 8–15 km and more respectively.

DISCUSSION

Hypertension is one of the most prevalent disease renders the patients exposed to many serious complications and these complications can be reduced by taking simple measures. As non-compliance is one of the major known causes of uncontrolled hypertension, estimation and identification of the subgroup of population prone to be non-complaint to medication would help in developing and implementing simple cost effective measures and thus ultimately would cause a decline in complications.

In this study, the prevalence of non-compliance were found to be 77 (68.14%), which was higher than the study conducted in Aga Khan university (AKU) may be because of the fact that AKU is a private institute and its participants belong to economically stable group.¹⁰

Due to difference in criteria for non-compliance, the proportion of non-compliance was found to be higher even when compared to almost similar socioeconomic group in a study conducted by Nazir Ahmed.¹⁵

The finding in the study of Tanzania¹⁶ is replicated as non-compliance was found to be significantly associated with gender ($p=0.008$); being more prevalent among male but the proportion of non-compliance among both the gender is higher in our setting might be due to low literacy rate. Our study revealed that increase in age reduces the compliance might be due to increasing age lead to increase dependency on others although the difference was found to be statistically insignificant as in the study of Abbottabad and Tanzania.^{15,16}

We found that non-compliance was equally distributed among married and those who had no partners in contrast to the finding of study conducted by Angelina¹⁶ where the non-compliance was higher

among Widowed, the joint family system in our setting might be the reason for better compliance even among widows, although the difference was found to be insignificant among both the studies.

Though insignificant statistically, Non-compliance was found to be higher among those with more years of education comparable to the research conducted in Aga Khan hospital and Tanzania in which literacy was seen more in non-compliant group^{10,16} while sufficient knowledge about hypertension in patients has been associated with greater medication adherence and better blood pressure control in previous studies.^{20,21} This necessitates the inclusion of health education components in the curriculum of routine education.

The prevalence of non-compliance to antihypertensive medication was found to be higher among unemployed persons ($p=0.002$) and low socioeconomic status ($p=0.046$) might be due to cost of and lack of access to medication as Pakistan government spends little on health as compared to other middle & low income countries. It has been estimated that in Pakistan 82.5% of total health expenditure was private in 2005.²³

Regarding medicine related factors, non-compliance was higher among those who were taking medicine for less than five years ($p=0.03$) comparable to the study conducted in Shiraz¹, on mono therapy and di therapy comparing to patients using 3 or >3 drugs ($p=0.02$). Recent diagnosis & less number of drugs prescribed may be associated with mild hypertension, less significant symptoms and complications might result in non-serious attitudes of the participants.

Non-compliance is reported greatest, i.e., 86% among patients who paid themselves for their medicines ($p=0.06$) than those whose medicine paid by family or others same as research done by A.G Elzubier in Kassala.²² In physician related factors around 50% were non-compliant due to lack of counselling by physician not only for medication but also for life style, this was reported 4.6% by Almas *et al*, difference in setting of two studies, i.e., government and private sectors might be the possible cause of it. Counselling was recommended by many studies in order to improve compliance among hypertensive.^{15,17}

In contrast to many studies¹⁷⁻¹⁹, we did not find adverse drug effects as a primary reason for poor compliance to anti-hypertensive medications indicating lack of knowledge or non-serious attitude of the participants.

Our study replicates the result of research conducted in Iran¹ in which non-compliance was found to be high in patients who visited the doctors after a prolong period of time.

CONCLUSION

We explored multiple factors, i.e., patients, medicine and health care system related prevailing in our society while physician related factors though prevalent but not found statistically significant in this study. These all factors are leading towards higher prevalence of non-compliance against anti-hypertensive medicines and ultimately predispose the hypertensive persons to various complications include the fatal one also. Non-compliance can be prevented with simple measures like proper counselling, comprehensive prescription and an efficient health care delivery system.

REFERENCES

- Hadi N, Rostami-Gooran GN. Determinant factors of medication compliance in hypertensive patients of Shiraz, Iran. Arch Iranian Med 2004;7(4):292-6.
- Health Stats International, hypertension statistics, worldwide. [Online]; [cited on April 19, 2011] Available from :<http://www.healthstats.com/en/hypertension-statistics.html>
- WHO. Global Health Observatory, non communicable disease, risk factors, blood pressure prevalence. [online]. 2014; [cited 2014 July 22]. Available from: http://www.who.int/gho/ncd/risk_factors/blood_pressure_prevalence_text/en/
- Centres for disease control and prevention. High blood pressure facts; high blood pressure in the United States. [Online]. 2014; [cited 2014 July 22] Available from: <http://www.cdc.gov/bloodpressure/facts.htm>
- WHO. Non communicable diseases, hypertension.[Internet]. [cited 2011 April 12]; Available from: <http://www.emro.who.int/ncd/hypertension.html>
- American heart association. Available from: https://www.heart.org/idc/groups/heart-public/.../ucm_319587.pdf
- Ahmad k. Facing up to Pakistan's cardiovascular challenge. Lancet 2002;259(9309):859.
- Ross S, Walker A, MacLeod MJ. Patient compliance in hypertension: role of illness perceptions and treatment beliefs. J Hum Hypertens 2004;18(19):607-13.
- Ikeda N, Sapienza D, Guerrero R, Aekplakorn W, Naghavi M, Mokdad AH, *et al*. Control of hypertension with medication: a comparative analysis of national surveys in 20 countries. Bull World Health Organ 2014;92(1):10-19.
- Almas A, Hameed A, Ahmed B, Islam M. Compliance to antihypertensive therapy. J Coll Physicians Surg Pak 2006;16(1):23-6.
- Niaz SA. Blood Pressure Control, follow-up and Drug Compliance among Hypertensive patients at Civil Hospital, Karachi. Med Channel 1999;5(1):5-10.
- Mant J, McManus RJ. Does it matter whether patients take their antihypertensive medication as prescribed? The complex relationship between adherence and blood pressure control. J Hum Hypertens 2006;20(8):551-3.
- Gregoire J, Moisan J, Guibert R, Ciampi A, Milot A. Predictors of self-reported noncompliance with anti-hypertensive drug treatment:prospective cohort study. Can J Cardiol 2006;22(4):323-9.
- Thrall G, Lip GY, Lane D. Compliance with pharmacological therapy in hypertension: can we do better and how?, J Hum Hypertens 2004;18(9):595-7.
- Ahmed N, Abdul Khaliq M, Shah SH, Anwar W. Compliance to anti-hypertensive drugs, salt restriction, exercise and control of systemic hypertension in hypertensive

- patients at Abbottabad. J Ayub Med Coll Abbottabad 2008;20(2):66-9.
16. Joho AA. Factors Affecting Treatment Compliance Among Hypertension Patients in three District Hospitals - Dar es Salaam. Masters thesis, Muhimbili University of Health and Allied Sciences. [Online]. 2012 [cited on 2014 July 22]; Available from: <http://ir.muhas.ac.tz:8080/jspui/bitstream/123456789/590/1/Angelina%20Joho%20Final%20dissertation.pdf>
 17. Cohen JS. Adverse drug effects, compliance and initial doses of antihypertensive drugs recommended by the joint national committee Vs the physician's desk reference. Arch Intern Med 2001;161(6):880-5.
 18. Mac Connachle AM, Maclean D. Low dose combination anti-hypertensive therapy: additional efficacy without additional adverse effects? Drug safety 1995;12(2):85-90.
 19. Flack JM, Yunis C, Preisser J, Holmes CB, Mensah G, McLean B, *et al.* The rapidity of drug dose escalation influences blood pressure response and adverse effects and burden in patients with hypertension: the Quinapril Titration Interval Management Evaluation (ATIME) Study. Arch Intern Med 2000;160:1842-7.
 20. Almas A, Godil SS, Lalani S, Samani ZA, Khan AH. Good knowledge about hypertension is linked to better control of hypertension; A multicentre cross sectional study in Karachi, Pakistan. BMC Res Notes 2012;5:579.
 21. Sanson-Fisher RW, Clover K. Compliance in the treatment of hypertension: a need for action. Am J Hypertens. 1995;8(10 Pt 2):82S-88S.
 22. Elzubier AG, Husain AA., Suleiman IA., Hamid ZA. Drug compliance among hypertensive patients in Kassala, eastern Sudan. East Mediterr Health J 2000;6(1):100-5.
 23. Christian L. Out-of-pocket household health expenditures and their use in National Health Accounts: Evidence from Pakistan. [cited on March 13, 2014]. Available from: <http://www.academia.edu/5929712>

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