Original Research Article

Prescription to practice in hypertension: a community experience in central Kerala

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ABSTRACT

Background: Control of blood pressure is a global challenge and non-adherence to hypertension medications is a public health concern. Patient, medication and system related factors can contribute to non-adherence. The study was to determine adherence to hypertension medications and to understand the barriers to adherence in an adult group in Pathanamthitta District of Central Kerala.

Methods: A cross sectional study was conducted in a community setting in 2016, among 139 adults aged 30 years and above on treatment for hypertension for at least six months. Those with gestational hypertension, those having serious comorbid conditions and those unwilling to participate were excluded. The data sheet included basic demographic information and history related to hypertension. A content validated eight item questionnaire was used to assess reported adherence and scores classified level of adherence as good (8), moderate (6-<8) and poor (<6). The data was analyzed using SPSS. Chi square test of significance and multivariate regression analysis were done. P<0.05 was considered statistically significant.

Results: The participants were in the age group 34-91 years, 50.4% belonging to 50-69 years, and 75.5% were females. Adherence to hypertension medications was good in 49.6%, moderate in 31.7% and poor in 18.7%. The most common factors reported to contribute to non-adherence were forgetfulness (70.5%), high cost of medications (51.8%), and symptom-free state (27.3%).

Conclusions: Adherence was good in less than half the study participants and poor in almost one-fifth. Forgetfulness and high medication costs were the most commonly reported barriers. These findings highlight the importance of individuals, families and health service, joining hands to tackle the public health problem of non-adherence to hypertension medications.

Keywords: Adherence, Barriers to adherence, Hypertension

INTRODUCTION

Non-communicable diseases are on the rise in epidemic proportions globally, imposing major threat to developing nations.[1] Hypertension is one among these, accounting for an overall prevalence of around 40% among adults aged 25 years and above in the year 2008 and attributing to 12.8% of total of all the deaths.[2] If this dilemma continues, by 2025, there will be an expected 80% rise in number of hypertensive individuals.[3] As per 2011 census, state of Kerala, India had a prevalence of 42%.[4]

Hypertension affects close to one billion individuals worldwide. Uncontrolled blood pressure leads to increased risk of morbidity and mortality due to cardiovascular, cerebrovascular, and renal diseases. The

World Health Organization (WHO) reports that about 62% of cerebrovascular diseases and 49% of ischemic heart diseases occur as a result of suboptimal blood pressure control (>115 mm Hg systolic blood pressure). Unfortunately, in patients with chronic conditions such as hypertension, control is poor.[5] A considerable drop in medication adherence has been noticed among patients within 6 months of initiation of drug therapy and sometimes within 1 month.[6]

Adherence can be defined as "the extent to which a person's behaviour corresponds with agreed upon recommendations from healthcare provider".[7] The degree of non-adherence for chronic conditions is said to be 25-50%.[8] The barriers for adherence could be patient-related factors such as age, sex, education, and forgetfulness; therapy-related factors such as treatment complexity and side effects; health care system factors such as drug availability and accessibility to healthcare; and socio-economic factors such as cost of therapy, income and social support.[7]

A study done at Bangalore in 2011 with 608 hypertensive individuals, 49.67% were not adherent to anti-hypertensive medications. Access barrier and recall barrier were reported by 82.57% and 62.17%, respectively and 78.62% of patients reported cost of medication as an obstacle.[9] Another hospital based study in Chitradurga, Karnataka in 2014 among 516 patients, a much lower proportion (25.58%) were non-adherent. Marital status (single), lower level of education and poor socioeconomic status were significantly associated with non-adherence to hypertension medication; postgraduate level of education showed absolute adherence. Those in younger age group and of male sex showed a higher degree of non-adherence.[10]

The seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7) recommends screening persons with blood pressure of <120/80 mm Hg every 2 years and those with a systolic blood pressure of 120–139 mm Hg or diastolic blood pressure of 80–89 mm Hg, every year. When detected to have hypertension, treatment has to be initiated; monthly follow-up and adjustment of medications are recommended until the blood pressure goal is reached.[11] It is a fact that in spite of awareness and availability of medication for this 'silent disease', over half of all hypertensive individuals are non-compliant with antihypertensive medications, half of these non-compliant group not taking any treatment at all. Thus, poor adherence may be one of the causes of uncontrolled blood pressure.[12]

Poor adherence to treatment recommended by health care providers result in failure to attain positive clinical outcomes. This in turn increases the frequency of complications and thereby hospitalizations increasing the cost of medical care.[13] Hence successful treatment of hypertension is important in reducing morbidity and

mortality, as well as controlling health care costs associated with complications.[5] Moreover, WHO in 2003 emphasized that, "increasing the effectiveness of adherence interventions may have a far greater impact on the health of the population than any improvement in specific medical treatments".[13]

In the context of the above findings and recommendations, and lack of information from the region, this study assessed the level of adherence to hypertension medication of adults with hypertension in Pathanamthitta district of Central Kerala listing the barriers for adherence.

METHODS

A community based cross sectional study was conducted in parts of Pathanamthitta district, from August 2016 to February 2017, among adults with hypertension aged 30 years and above, from both genders. Known hypertensives on treatment for at least a period of six months and willing to respond to the interview were included whereas individuals with serious comorbid conditions requiring hospitalization and those with gestational hypertension were excluded from the study. Minimum sample size required was calculated as 135 based on previous prevalence studies on adherence to hypertension medications.[8] The formula used was N= $(Z_{1-\alpha/2})$ pq/d^2 where p=43.5%, q=56.5% and d=20%*p and value of normal deviate at considered level of confidence was taken as 5% (α=5%). Adults satisfying the inclusion criteria were identified from previous baseline survey record. Applying the exclusion criteria, 139 participants were recruited for the study by non-randomized sampling method.

Instrument for data collection was a pre- structured pre-designed questionnaire prepared after extensive review of literature, discussion with clinicians and experts, and considering the local practices and conditions.[6,14,15] It included details on socio economic variables and clinical history regarding hypertension, assessment of adherence to hypertension medications, and barriers for adherence. The eight-item questionnaire to assess adherence was content validated by experts in the field of Community Medicine and Field Research. Seven items had dichotomous responses "yes or no" (scored as 0 and 1) and one question for frequency of adherence, on a Likert-type scale with four responses scoring 0-3. Cut offs were decided after referring to standard questionnaires. A score of 8 was considered good adherence, 6-less than 8 moderate adherences and less than 6 poor adherence.[16] In addition, the participants were asked to list the possible barriers for adherence. The tool was prepared in English and translated into local language.

Prior to the conduct of study, approval was obtained from the institutional research and ethics committees and permission from the local authorities. The recruited participants were approached in their homes. Those who

gave written consent for being part of study were interviewed in the local language by the principal investigator or trained co investigators using the questionnaire. Data was entered in MS EXCEL 2010©, double checked and analyzed using a statistical package. While calculating the adherence score, the one question with four scores was re-scored as 0 for 0-1 and 1 for 2-3, thereby making a total score of 8. Descriptive analysis was performed for all variables, expressing level of adherence and its barriers as frequency and percentage. Chi square test of significance and ordinal regression analysis were performed to assess the relationship between adherence, and socio-demographic and hypertension related variables, p value<0.05 was considered as significant.

RESULTS

The above community study was performed interviewing 139 hypertensive individuals for assessing the level of medication adherence and barriers to adherence. Three-fourth of the participants (105; 75.5%) were females.

The mean age of the study group was 62.91years, with a range of 34 to 91 years, half of them (50.4%) belonging to 50 to 69-year age group, followed by above 70 years group (33.1%). More than half (77; 55.4%) possessed primary to secondary education and 64.5% (90) resided in rural area. In terms of adherence to hypertensive medications, good adherence was observed in 49.6% (69), moderate in 31.7% (44) and poor in 18.7% (26).

Table 1: Association between adherence and socio-economic variables (n=139).

Variables	Poor adherence	Moderate adherence	Good adherence	Total	P value
	N (%)	N (%)	N (%)	N (%)	
Age group (years)					
30-49	8 (34.8)	5 (21.7)	10 (43.5)	23 (100)	
50-69	13(18.6)	21 (30.0)	36 (51.4)	70 (100)	0.165
>70	5 (10.9)	18 (39.1)	23 (50.0)	46 (100)	
Gender					
Females	22(21.0)	33 (31.4)	50 (47.6)	105 (100)	
Males	4 (11.8)	11 (32.4)	19 (55.9)	34 (100)	0.468
Education					
Illiterate	5 (41.7)	3 (25)	4 (33.3)	12 (100)	
Primary-secondary	13 (16.9)	26 (33.8)	38 (49.4)	77 (100)	
X, +1, +2, diploma	8 (18.6)	15 (34.9)	20 (46.5)	43 (100)	0.067
Graduate	-	-	7 (100)	7 (100)	
Occupation					
Not working	14 (15.6)	28 (31.1)	48 (53.3)	90 (100)	
Working	12 (24.5)	16 (32.7)	21 (42.9)	49 (100)	0.354
Income (per month in rupees)					
8010 and above	4 (8.3)	13 (27.1)	31 (64.6)	48 (100)	
4810-8009	7 (18.9)	9 (24.3)	21 (56.8)	37 (100)	0.009*
Less than 4809	15 (27.8)	22 (40.7)	17 (31.5)	54 (100)	
Residence					
Rural	22 (24.4)	27 (30.0)	41(47.6)	90 (100)	
Urban	4 (8.2)	17 (34.7)	28 (57.1)	49 (100)	0.062
Marital status					
Single	16 (16.7)	31 (32.3)	49 (51.0)	96 (100)	
Married	10 (23.3)	13 (30.2)	20 (46.5)	43 (100)	0.653

*significant by chi-square test at p<0.05

Association between adherence and socioeconomic variables: In this study, adherence to hypertension medications was seen to be better among the 50 to 69-year age group (51.4%) followed by those 70 years and above (50.0%) and poor adherence higher among younger individuals (34.8%). Poor adherence was observed more in females (21.0%) than in males (11.8%). Both were not statistically significant. The higher the level of education, the more the adherence to hypertension medications, and this was marginally

significant (p=0.067). A statistically significant association was observed between adherence and income level (p=0.009), better adherence seen with increasing income level (35.7% to 64.6%). Those residing in urban area were more adherent to hypertension medications, only 8.2% were poorly adherent whereas in rural area it was 24.4% (p=0.062) (Table 1).

Association between adherence and hypertension related variables: More than three-fourth (77.3%) of those who

perceived their health status as "good" are having good adherence when compared to 39.5% of those who perceived their health as "poor", which was found to be statistically significant (p=0.036). Poor adherence was observed more among those using public health facility than those using private facility. Out of 80 respondents utilizing public health facility, 21 (26.2%) were found to have poor adherence whereas only 5 (8.5%) out of 59 respondents accessing private facility were poorly adherent to hypertension medications which is statistically significant (p=0.027) (Table 2).

Table 2: Association between adherence and hypertension related variables (N=139).

	Poor adherence	Moderate adherence	Good adherence	Total	P value
	N (%)	N (%) N (%) N (%)			
Duration of HTN (years)					
Up to 5	15 (22.4)	18 (26.9)	34 (50.7)	67 (100)	
6-10	7 (14.0)	18 (36.0)	25 (50.0)	50 (100)	
11-15	2 (18.2)	5 (45.5)	4 (36.4)	11 (100)	0.802
16+	2 (18.2)	3 (27.3)	6 (54.5)	11 (100)	
No. of HTN medications					
Single	18 (15.8)	37 (32.5)	59 (51.8)	114 (100)	
Multiple	8 (32.0)	7 (28.0)	10 (40.0)	25 (100)	0.167
Frequency: medications					
Once	24 (21.2)	33 (29.2)	56 (49.6)	113 (100)	
More than once	2 (7.7)	11 (42.3)	13 (50.0)	26 (100)	0.200
Frequency of monitoring BP					
Up to 1 month	17 (16.8)	31 (30.7)	53 (52.5)	101 (100)	
More than 1 month	9 (23.7)	13 (36.8)	16 (39.5)	38 (100)	0.497
Perceived health status					
Good	-	5 (22.7)	17 (77.3)	22 (100)	
Fair	16 (21.6)	23 (31.1)	35 (47.3)	74 (100)	0.036*
Poor	10 (23.3)	16 (37.2)	17 (39.5)	43 (100)	
Side effects					
Yes	23 (17.7)	43 (33.1)	64 (49.2)	130 (100)	
No	3 (33.3)	1 (11.1)	5 (55.6)	9 (100)	0.294
Family history HTN					
Yes	12 (19.4)	21 (33.9)	29 (46.8)	62 (100)	
No	14 (18.1)	23 (29.9)	40 (51.9)	77 (100)	0.825
Comorbidities					
Yes	12 (14.0)	29 (33.7)	45 (52.3)	86 (100)	
No	14 (26.4)	15 (28.3)	24 (45.3)	53 (100)	0.187
Type of medical facility					
Government	21 (26.2)	24 (30.0)	35 (43.8)	80 (100)	
Private	5 (8.5)	20 (33.9)	34 (57.6)	59 (100)	0.027*
Distance to nearest Medical facility					
<5km	21 (19.3)	31 (28.4)	57 (52.3)	109 (100)	
>5km	5 (16.7)	13 (43.3)	12 (40.0)	30 (100)	0.294
Care giver					
Self	16 (22.5)	23 (32.4)	32 (45.1)	71 (100)	
Family	10 (14.7)	21 (30.9)	37 (54.6)	68 (100)	0.412

*significant by chi-square test at p<0.05

For multivariate regression, we considered all the variables which were found to be statistically significant (self-perception of health, income, type of medical facility) and marginally significant (education, residence) by chi square. Considering the continuous variable age as a significant covariate, other non-modifiable factors such as educational status, monthly income and self-perception regarding health showed an independent association with adherence to hypertension medications (Table 3). Perceptions related to barriers responsible for poor adherence were evaluated under socio-economic, patient related, medication related and health system related

factors.[17] The common factors responsible for poor adherence by respondents were forgetfulness (70.5%) followed by cost of medications (51.2%), lack of symptoms (27.3%), and transportation (25.2%) etc.

Table 3: Factors showing independent association with adherence by ordinal regression, considering age as covariate and '−' indicating the components considered as the base categories.

Variables	95% Confidence Interval			
	Estimate	Significance	Lower limit	Upper limit
Age	0.035	0.047	0.001	0.070
Perception of health				
Good	-	-	-	-
Fair	-1.800	0.004	-3.017	-0.58
Poor	-1.827	0.006	-3.118	-0.537
Income				
8010 and above	1.392	0.003	0.484	2.300
4810-8009	0.828	0.067	-0.057	1.712
Less than 4809	-	-	-	-
Education				
Illiterate	-18.596	0.001	-19.959	-17.234
Primary	-17.360	0.001	-18.232	-16.487
Secondary	-18.016	-	-18.016	-18.016
X and above	-	-	-	-
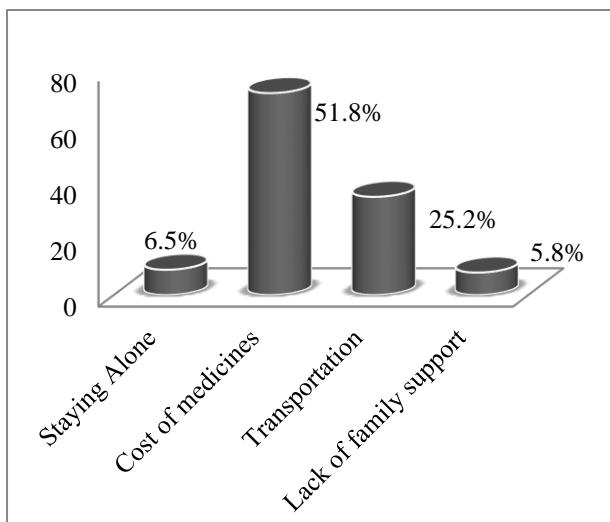
Figure 1: Socio- economic factors for non-adherence.

Figure 2: Patient related factors for non-adherence.

Among socio-economic factors, most of the respondents had reported cost of medications followed by transportation as barriers and among patient related factors, forgetfulness was the commonest barrier.

Side effects (8.4%) and lack of availability of medicines (7.9%) at the health centers were the dominating barriers among medication related and health system related factors (Figures 1, 2, 3, 4).
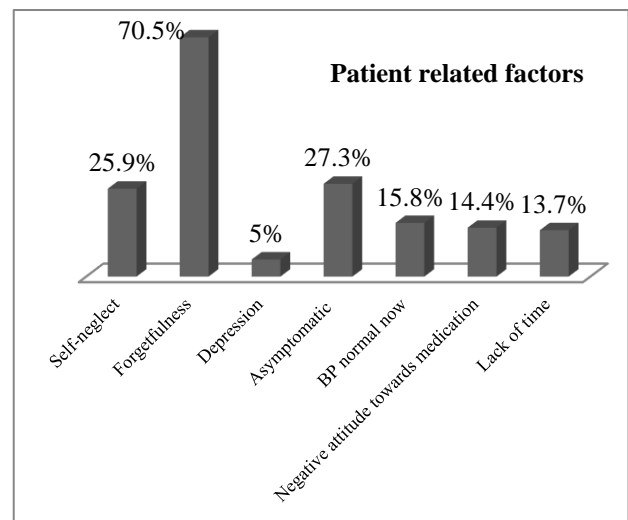
DISCUSSION

Non-adherence to hypertension medications has been found to be a major factor responsible for uncontrolled blood pressure. The present study on 139 adults with hypertension assessed the level of medication adherence and barriers to adherence. Nearly half of them (69; 49.6%) showed good adherence to hypertension medications.
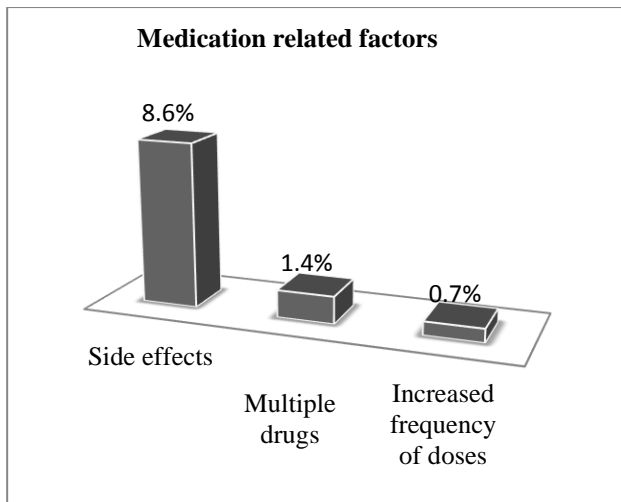
Medication related factors

Figure 3: Medication related factors for non-adherence.
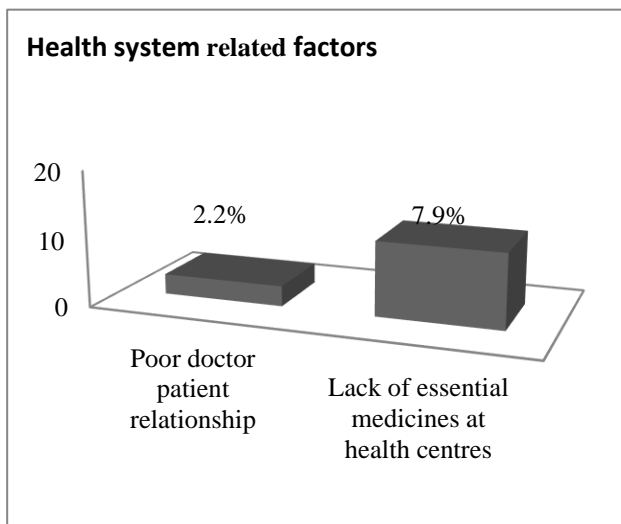
Health system related factors

Figure 4: Health system related factors for non-adherence.

This was much higher than 24.1% adherence reported from a community based study on 473 hypertensive individuals in a rural area in Tamil Nadu.[13] Three other studies at Sunder lands, Ethiopia and Pakistan showed better adherence rates of 79% ,64.6% and 77% respectively.[18-20]

Another study in South India with 516 patients, prevalence of poor adherence to hypertension medications was 25.58% which was higher when compared to present study (18.7%).[10] Those were conducted at hospital settings unlike our study which was in a community setting.

The wide variations in adherence rates in different regions may also be due to differences in socio-economic profile, and availability and accessibility to health care services. The current study shows that adherence is better among individuals in the 50 to 69-year age group (51.4%)

with a male predominance (53.9%) where as another study in South India showed good adherence rate among younger age group, 30 to 39 years (27%) and those above 60 years (27.1%) with female predominance (25.5%).[13] According to Hashmi et al, younger age group had poorer adherence to medications as in the present study.[20] Age was found to be independently associated with medication adherence in our study as in above said study.[20]

Present study showed an independent association between level of education and adherence, (p= 0.034), similar to the findings of a study from Karnataka.[10] Where higher level of education showed absolute adherence to anti- hypertension drugs (p=0.045). Those accessing private facilities are more adherent to hypertension medications than those utilizing public health facility. The prevalence of poor adherence among those utilizing private facilities is observed to be 8.5% when compared to 26.2% among those utilizing public health facilities. On the contrary, the community study from South India showed better adherence among those utilizing public facilities (Odds Ratio of 1.32).[13]

These differences may be due to differences in regional health facilities. In the present study adherence is better with monotherapy though the relationship is not statistically significant, unlike significantly less adherence with mono-therapy observed in the study by Hashmi et al.[20]

Main barriers to hypertension medication adherence reported in this study were forgetfulness (70.5%), cost of medications (51.8%) followed by symptom-free state and transportation. The most commonly reported barrier in a study on a large sample of non-adherent hypertensive individuals was also forgetfulness.[21] According to Tong et al, cost of medications contributed as a major cause for non-adherence to hypertension medications.[22]

Limitations: Medication adherence was measured using self- reported questionnaire in a cross-sectional design. There can be chances of respondent bias and recall bias leading to underestimation of non-adherence to hypertension medications. It was equally important to relate adherence to control of blood pressure which did not form a part of our objective.

CONCLUSION

In the present community study, less than half the participants reported full adherence and almost one-fifth reported poor adherence. The main reported barriers are forgetfulness and cost of medications followed by symptom-free state, transportation, non-availability of essential medicines, and use of multiple drugs. Higher age, educational status, income and perceived health status showed independent association with good adherence.

Recommendations

Adequate knowledge related to the disease and therapy, and use of medication charts for each individual may be helpful to an extent to improve adherence to medications. Routine medication reminder systems like smart phone applications can overcome forgetfulness. Adoption of a simple regimen and provision of all essential medications at an affordable cost through the health systems can improve the availability. Treatment support groups found to be successful in Tuberculosis control may be established for hypertension as well. A larger multi-centric nation-wide study would provide more generalizable results.

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