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Compliance with Antihypertensive Medication among a Patient Group in a Teaching Hospital, Sri Lanka

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ABSTRACT

In this cross-sectional study, we evaluated the factors associated with compliance with recommended anti-hypertensive medications among patients with hypertension in a teaching hospital, in Sri Lanka. A sample of 384 patients (178 males & 206 females), aged over 18 years, who attended the cardiology clinic at Colombo South Teaching Hospital (CSTH) over six months, were selected for the study by using a systematic sampling method. Participants were categorized according to their compliance level using the Morisky Green Levine Scale. Data were analyzed for descriptive statistics, and ethical approval was obtained from ethics review committees of the University of Sri Jayewardenepura and CSTH. Of the total number of participants, 47.7% were non-compliant, and 52.3% were compliant with the anti-hypertensive treatment. Demographic factors were not associated with compliance except for the education level ($p=0.023$). Other factors associated with the compliance level Counselling by the prescriber on anti-hypertensives ($p=0.002$), using an electronic device to remember the time of administering medicine ($p=0.014$), "do patients purchase medicine at a community pharmacy, when anti-hypertensives are not available at the hospital pharmacy" ($p=0.009$). Therefore, advising on purchasing the complete medicine list from any pharmacy, and remembering the time of medicine administration by at least using an electronic device has a significant influence on patient compliance as well as being counseled by the prescriber.

1. Introduction

Hypertension is a globally addressed disease at present. World Health Organization (WHO) defines hypertension as the state of high or elevated blood pressure, and it is the condition of persistently raised pressure of blood vessels [1]. An elevated blood pressure (BP) is defined as hypertension; if the systolic blood pressure (SBP) is more than 130 mm Hg or diastolic blood pressure (DBP) is more than 80 mm Hg or both [2]. The prevalence of hypertension is rising globally. Nearly 40% of adults aged 25 and above in the world were diagnosed with hypertension in 2008 [1]. WHO has stated hypertension accounts for 9.4 million deaths per year and hypertension is responsible for at least 45% of deaths due to heart disease and 51% of deaths due to stroke mortality.

There are several factors associated with hypertension. These factors are categorized into social determinants, behavioral factors, and metabolic risk factors. Globalization, urbanization, aging, income, education, and housing are the main social determinants. Unhealthy diet, tobacco use, physical inactivity, and harmful use of alcohol are considered behavioral factors. Meanwhile, obesity, diabetes, and raised blood lipids are considered as some of the metabolic risk factors [1]. In the treatment options for hypertension, lifestyle modifications, and medication are the major arms. There are lifestyle modifications such as intake of a low-salt diet, quitting smoking, and reducing alcohol consumption. The medication prescribed for hypertension could be categorized into five main classes beta-blockers, angiotensin-converting

enzyme inhibitors (ACEI), diuretics, angiotensin receptor blockers (ARB), and calcium channel blockers (CCB). Alpha-blockers, hydralazine, and methyldopa are other uncommonly used drug classes [3]. The word “compliance” has various definitions. Here we consider the degree of willingness of the patient to follow the prescriber’s instructions as compliance.

1.1. Literature Survey.

Factors associated with compliance can be categorized as patient-centered factors, therapy-related factors social and economic factors, disease-related factors, and healthcare system-related factors [4]. Compliance with a patient is essential to improve the quality of life of the patient. Non-compliance with standard treatment guidelines and poor patient compliance with treatment regimens are common causes of irrational use of medicines. It has become a global problem, especially affecting developing countries.

In Southwest Nigeria, a community-based cross-sectional study was done on factors associated with treatment compliance in hypertension [5]. Their findings revealed that control of hypertension among study participants was sub-optimal. The factors associated with high self-reported compliance included: regular clinic attendance, not using non-western prescription medication, and having social support from a family member or any helper.

Younger age, monotherapy, poor awareness, and symptomatic treatment were the most influential factors adversely affecting adherence to anti-hypertensive medication amongst Pakistani patients with hypertension (9). They emphasized the need for education campaigns to increase awareness about the risk factors, natural history, complications, and treatment of hypertension.

Another research has been done based on a particular patient group to determine patient-reported medication adherence barriers among patients with cardiovascular risk factors. Evaluated medication adherence using a validated, 4-item, self-reported measure developed by Morisky et al. (2008) The most commonly reported medication barrier was having too much medication to take (31%), followed by forgetting whether or not medication had been taken at a particular time (24%) and not having anyone to help keep track of when to take medications. Despite access to low-cost or free medications, barriers to medication adherence were common in this sample [6].

A study conducted in Sri Lanka with 277 patients who attended the cardiology clinic of National Hospital Sri Lanka, revealed that blood pressure control rates are sub-optimal in 41.1% of the local hypertensive population [7]. Among other chronic diseases, the highest number of cases reported is

on high blood pressure (39.0%) [8]. Furthermore, the prevalence of high blood pressure for those aged 15 years and above population is 11.9% in the Colombo district, and it is the highest in Sri Lanka. The prevalence rates of high blood pressure are very low in the below 15 years age group in Sri Lanka.

A descriptive cross-sectional study was conducted on knowledge awareness and medication adherence in patients with hypertension from a tertiary care center in northern Sri Lanka. Three hundred three patients from all four outpatient general medical clinics of the teaching hospital in Jaffna had been recruited. All patients were provided with a questionnaire to understand their reason for non-adherence to the treatment for hypertension. Almost all patients (99%) thought that taking medicine plays a crucial role in controlling blood pressure. However, most patients (84.5%) had had poor drug compliance. The most common reasons for non-adherence were identified as forgetfulness (23.1%) and interruptions of daily routine (17.5%) [9].

Another cross-sectional population-based national survey was conducted in seven of the nine provinces in Sri Lanka to determine the prevalence, predictors, and associations of hypertension between August 2005 and September 2006 [10]. The sample size was 4485. Their findings were one-third of the Sri Lankan population was hypertensive with a large proportion of non-diagnosed hypertension. They suggested that it is essential to introduce health education measures that will promote prevention and elderly detection of hypertension. The reasons for non-diagnosis must be investigated to enable the implementation of appropriate measures to improve early detection and reduce the risk of developing complications and should encourage healthier lifestyles with an emphasis on preventing obesity and increasing physical activity [10].

Poor compliance causes readmissions and severe complications in patients. Households have to spend a larger share of their income on hospitalization and care following complications of hypertension, including heart attack, stroke, and kidney failure [11]. Therefore, assessing compliance factors related to recommended antihypertensive medication is essential to their compliance. There is a paucity of data on factors associated with compliance with recommended anti-hypertensive medications among patients with hypertension in Sri Lanka. The present study aimed to find factors associated with compliance with recommended anti-hypertensive medications. The findings of our study would be beneficial to improve compliance with recommended anti-hypertensive medications among patients with hypertension.

2. Material and Methods

2.1 Study aim

To determine the prevalence and factors associated with compliance to recommended anti-hypertensive medications among patients with hypertension in a teaching hospital in Sri Lanka.

2.2 Study design

A descriptive cross-sectional study design

2.3 Study population

The study population was both male and female patients aged over eighteen years who were on recommended anti-hypertensive medication, for over six months at the cardiology clinic at Colombo South Teaching Hospital. Six months of having the disease was considered because patients need some time to adhere to their medication.

- Inclusion Criteria

Both male and female patients are diagnosed with hypertension, as mentioned in their medical records or clinic cards.

Hypertensive patients who were aged over 18 years.

The patient was on anti-hypertensive medication for over six months.

- Exclusion criteria

Cognitively impaired patients with hypertension.

2.4 Sampling method

Two cardiology clinic days a week were randomly selected. Monday and Thursday were selected in the first month. Wednesday and Friday were selected for next month. This selection pattern was to avoid selecting the same patient more than once. On each clinic day, every fifth patient in the queue was selected for the study. Patients who fulfilled the inclusion and exclusion criteria were recruited for the study.

2.5 Ethical considerations

Ethical approval was obtained from the Ethics Review Committee of the Faculty of Medical Sciences, University of Sri Jayewardenepura, and the Ethics Review Committee of the Colombo South Teaching Hospital. Further permission was obtained from the consultants of the cardiology unit and nurses in charge of the clinic Csth.

The nature of the study was explained to each participant. Informed written consent was obtained from all study participants before recruitment to the

study. All participants were informed that they had the right to refuse participation in the study.

The information obtained using the questionnaire was stored under lock and key with high confidentiality. The collected information at the beginning for identification purposes was disposed of immediately after the study. Serial subject numbers were given instead of personal details to ensure the anonymity of participants. The access to the personal data of the participants was given only to the investigators and supervisors.

2.6 Data collection

An interviewer-administered questionnaire was used to assess the factors affecting medication compliance with prescribed anti-hypertensive medication in hypertensive patients.

This questionnaire had three parts, including a socio-demographic and clinical data form, a medication compliance form, and the Morisky Green Levine Scale (MGLS). MGLS is a validated scale in Sri Lanka [12].

In the overall study population, participants who had a Morisky score of 4 (i.e., should not have answered 'YES' to any of the four questions in MGLS) were classified as compliant, and all other scores were considered as non-compliant (Table 1).

Table 1 Scoring system for MGLS.

Adherence level	MGLS Score
High adherence	4
Medium adherence	1-3
Low adherence	0

The questionnaire was pre-tested among ten patients with hypertension who did not participate in this study to determine acceptability, feasibility, comprehensibility, and appropriateness. No change was made to the questionnaire predesigned.

2.7 Data analysis

Data analysis was performed using SPSS. Descriptive statistics (mean, mode, standard deviation) Pearson Chi-square, and odds ratio were used to measure the association between compliance level and factors.

3. Results and Discussion

3.1 Results

Age group, gender, marital status, education level, employment, and family income are demographic factors that have been considered in our study. As shown in Table 2, among 384 patients 178 (46.4%) of the study sample were males, and 206 (53%) were females with a 100% response rate.

Almost all the participants were married (92.7%). income level (45.6%).
Most of the participants were in the Rs 25000-30000

Table 2 Socio-demographic profile (N = 384)

Socio-demographic characteristics		N (%)
Age group	65>	339 (88.3)
	65<	45 (11.7)
Gender	Male	178 (46.4)
	Female	206 (53.6)
Marital status	Single	27 (7.0)
	Married	356 (92.7)
	Other	1 (0.3)
Education level	primary education only	113 (29.4)
	secondary / higher education	271 (70.6)
Employment	Student	0 (0.0)
	Employed	101 (26.3)
	Retired	94 (24.5)
	Unemployed	189 (49.2)
Family income (monthly)	25000 >	138 (35.9)
	25000-35000	175 (45.6)
	35000-45000	60 (15.6)
	45000-55000	9 (2.3)
	55000 <	2 (0.5)

A total of 384 diagnosed patients with hypertension participated in this study. Among them, 183 (47.7%) patients were non-compliant with the treatment, while 201 (52.3%) were compliant.

According to Table 3, most of the participants (n=229, 59.6%) were prescribed with two drug class combinations, and the least amount (n=3,

0.8%) were prescribed with four drug class combinations. 197 participants have controlled blood pressure levels as their mean systolic and diastolic blood pressure levels were 127.68mmHg and 79.78mmHg, respectively. The mean number of medications on the last prescription was 8.04 (i.e.; around 8 medicines have been prescribed per patient), and the average number of tablets per day was 11.5.

Table 3 Medication-related data

Medication-related clinic data		Frequency (n)
Time of diagnosis of hypertension	0.5- 1 year	53 (13.8)
	1-3 years	93 (24.2)
	3-5 years	94 (24.5)
	5 years <	144 (37.5)
Prescribed drug classes	Single	91 (23.7)
	Two drug classes	229 (59.6)
	Three drug classes	61 (15.9)
	Four drug classes	3 (0.8)
	Five drug classes	0 (0.0)

Table 4 – Significant associations with different factors and compliance level

Factors	Compliance level		p-value
	Non-compliance Number (%)	Compliance Number (%)	
Education level			
Primary education only	64 (56.6)	49 (43.4)	0.023
Secondary/ higher education only	119 (43.9)	152 (56.1)	
Counseling by the prescriber on antihypertensives			
Yes	131 (43.5)	170 (56.5)	0.002
No	52 (62.7)	31 (37.3)	

Using electronic devices to remember the time of administering medicine			
Yes	6 (24.0)	19 (76.0)	0.014
No	177 (49.3)	182 (50.7)	
Do patients purchase medicine at a community pharmacy when antihypertensives are not available at the hospital pharmacy?			
Yes	173 (46.4)	200 (53.6)	0.009*
No	4 (100.0)	0 (0.0)	
Sometimes	6 (85.7)	1 (14.3)	

*Values extracted from the fisher's exact

3.2 Discussion

This study is an attempt to find out the prevalence and factors associated with compliance with recommended anti-hypertensives among patients with hypertension at Colombo South Teaching Hospital.

- Prevalence of compliance / non-compliance to recommended anti-hypertensives.

In this study, the compliance level was assessed using the Morisky Green Levine Scale. According to the results of this study, the majority of patients were compliant with the treatment (n=201,52.3%), and 183 (47.7%) patients were non-compliant with the treatment. Similar results were shown in a study conducted in Austria using the same Morisky scale. Both studies have revealed that a higher proportion of patients are compliant. The Austrian study has shown that out of a total of 323 patients, only 109 (33.7%) had met the criteria for non-adherence and 66.3% adhered to the regimen [13].

An instrument for evaluating attitudes regarding taking medication (IAAFTR) is the medication compliance scale which has been used in a study conducted in Brazil. Compliance with drug treatment had been considered sufficient in those patients who reached scores of 8 or more points, which represented 44.93% of the study sample [14]. These results show the opposite results of our study results.

Among 149 municipal workers who had participated in a study conducted in the Southeastern U.S. more than one-third of the participants (34.9%) had been classified in the low medication adherence category, the same number (34.9%) were in the medium medication adherence category, and 30.2% had been classified in high medication adherence category [15]. That categorization is different when compared to our study.

- Factors associated with compliance to recommended antihypertensives.

Results obtained from Pearson chi-square showed that education level has a significant association (p=0.023) with the compliance level.

Being compliant was associated with having a secondary/higher education level. According to Osamor et al., 2011, education level was not a demographic factor associated with compliance level. There was no clear-cut trend with high self-reported compliance when compared with respondents with other categories of educational levels [5]. However, a study conducted in Seychelles, which used data obtained from urine samples to assess compliance proved literacy is associated significantly (p=0.024) with patient compliance. A study on hypertension control and its correlates among adults attending a hypertension clinic in Tanzania stated there was no association between socio-demographic factors including education level and blood pressure control also education level was not significantly associated with patient compliance [6,13].

Interfering factors in the process of drug treatment compliance were those that can act positively (facilitating factor) or negatively (complicating factor) on the correct treatment follow-up [14]. Doctor-patient relationship/communication had been stated as a facilitating factor by Ana et al., 2013. Being counseled by the prescriber on antihypertensives was significantly associated (p=0.002) with being compliance with the treatment in our study population. Results from a qualitative study conducted in Spain had shown a few explanations given by the physician and low physician-patient interaction had influenced non-compliance [16].

In this study, using an electronic device such as a mobile and alarm, to remember the time of administering medicine was significantly associated (p=0.014) with being compliant from the results of the Pearson chi-square test. Among patients who have used an electronic device to remember the time of administering medicine, 76% complied with the treatment. Reminding the respondent about taking medication was associated with high self-reported compliance according to a study conducted among hypertensive patients in Southwest Nigeria [5]. Not having someone to help with tasks if needed was significantly associated (p<0.001) with a higher medication adherence barrier score (6).

Those who were non-adherent had a higher barrier score than those who were adherent (n=420, $P<0.01$). Therefore, having someone/something to remember the time of medication administration is essential to patient compliance.

According to the results obtained from Fisher's exact test in this study, purchasing medicine from community pharmacies when they are unavailable at the hospital had shown a significant positive association ($P=0.009$, 53.6%) with patient compliance.

- Factors that have no significant association with compliance level in our study

Older age (50 years or older) had been associated ($p=0.02$) with compliance [13,17] and female gender ($p<0.001$) [18] in some cases while younger age (40 years old or younger) had shown non-compliance ($p=0.022$) [13]. However, in most of the literature findings, age and gender had shown no significant association with compliance level [5,19,20] as same as in our study results.

Marital status and employment also showed no association in some of the studies [19] as same as in the present study, while some of the studies had stated unmarried and unemployment ($p<0.002$) lead to non-compliance to the treatment process.

Hashmi et al. concluded that monthly income has a significant association with compliance ($p=0.001$) [17]. However, family income had no association in our study. This may be due to free healthcare services in Sri Lanka.

Having long-term medication showed no association in our study, and Wong et al. also showed the same results. Because the proportion of participants who believe long-term medication is good and long-term medication is not good were almost the same. Around 47.65% of participants believe that long-term medication is good, while 43.48% believe long-term medication is not good.

Our study results have shown disease period/treatment duration has no association with compliance level as in most cases [20,21]. However, Carolina et al. stated that the time of treatment is a complicating factor for patient compliance [14].

Some studies have shown that adherence increases with an increased number of anti-hypertensive drugs ($P<0.05$) [17], ($p=0.028$)- In our study, the number of medications in the prescription/number of anti-hypertensive drug

class combination did not show an association with patient compliance as same as Maginga et al. Although Lötsch et al. indicated that a higher number of tablets per day leads to high compliance of patients, according to Hungerbühler et al., the number of tablets per day had no significant association with compliance. The results were the same as in our research study. In the present study, counseling by the prescriber plays a significant role in patient compliance. Therefore, the number of tablets in the prescription may not have a significant influence on compliance.

3.3 Limitations

There are a few limitations in this study; only one hospital was selected to collect data. Therefore, findings cannot be generalized. The respondent business was present. We had to rely on patients' responses to the questions asked.

4. Conclusion

This study was conducted in CSH using 384 samples to determine the prevalence and factors associated with compliance to recommended anti-hypertensive medications among patients with hypertension, in a teaching hospital in Sri Lanka.

Most of the participants were in the 55-75 years age group. Nearly equal proportions of male and female participants were there. Blood pressure levels are within the normal range.

According to 4 items, MGLS compliance with anti-hypertensive medicines was higher (52.3%) than non-compliance (47.7%).

Having a secondary/higher education level, being counseled by the prescriber on antihypertensives, using an electronic device to remember the time of administering medicine, and purchasing medicine from a community pharmacy when they are unavailable at the hospital were significantly associated with patient compliance. Therefore, advising on the importance of purchasing the complete medicine list from any pharmacy has a significant influence on patient compliance.

- Recommendations

Healthcare professionals should focus on the necessity and the requirement of effective health education interventions to enhance further medication compliance among patients with hypertension. Further studies are warranted to profile the counseling practices of the prescribers, in making the patients compliant with medication and the necessity of profiling the compliance among patients as a national need.

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