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Intervention to improve patient adherence with Antihypertensive Medications at a tertiary care teaching hospital.

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ABSTRACT: A Cross-sectional descriptive comparative study was carried out in a 400 bedded multispecialty tertiary care teaching hospital. The study subjects (N=43) were post discharge patients from the general medicine department whose prescription contained one or more antihypertensive medications. Medication adherence behaviour of the patients and reason for non-adherence were studied using Morisky self-report scale. The main outcome measures were improvement in antihypertensive medication adherence of patients, and change in systolic and diastolic blood pressure at the end of 6 months. Mean age of the group under study was 59.63 years (range = 30 to 92 years). There were 25(58.14 %) male patients. Approximately 76.74 % had more than one chronic health conditions. All the patients (100%) were non-compliant to therapy at baseline interview. In this study intentional reasons for non-adherence have been reported more frequently than unintentional. The most prevalent causes of non compliance were side effect of drugs (74%), forgetfulness (72%), thinking medication not effective (21%), and medications too expensive (19%). The most commonly reported reason (72%) for unintentional non-adherence was forgetfulness. The number of compliants increased from 0(0%) to 41(95.4%, $p<0.05$) from baseline to final interview. In our study all patients showed improvement in their medication compliance at the end of pharmacist intervention. Only 11(25.6%) patients had blood pressure below 160/100 mmHg at baseline interview while this value improved to 41(95.35%, $p<0.05$) during final interview. The study resulted in improvement of medication adherence and treatment outcomes. This study also had an impact on improvement in reduction of blood pressure.

Key Words: Patient compliance; adherence; antihypertensive; pharmacist intervention

INTRODUCTION

Hypertension (HTN) is one of the major risk factor for coronary heart disease and stroke. The World Health Organization (WHO) has estimated that about 62% of cerebrovascular disease and 49% of ischemic heart disease burden worldwide are attributable to suboptimal blood pressure levels. High blood pressure is estimated to cause 7.1 million deaths annually, accounting for 13% of all deaths globally.[1]

Overall 26.4% (972 million) of the adult world population was estimated to have hypertension in the year 2000, a figure that is projected to increase to 29.2% (1.56 billion) by the year 2025. In India, the prevalence of hypertension is reported to be increasing rapidly in the urban areas, and the same trend is spreading gradually to rural areas. Though the prevalence of hypertension in India has been reported to vary regionally, recent pooled analyses of several epidemiological studies in India suggest that hypertension is present in 25% of adults in the urban areas, and in 10% of individuals in the rural areas. The same study estimated that there were about 66 million hypertensives in India (32 million rural and 34 million urban). This clearly indicates that adherence to antihypertensive medication is not good in our country, which has made hypertension an increasingly important medical and public health issue.[2] According to Berenson GS. et al. (2006) poor adherence to therapy is a major reason that large percentage of patients with hypertension fail to achieve good blood pressure control.[3]

Medication adherence has been defined as "the extent to which a person's behaviour in terms of taking medications coincides with medical advice". Non-adherence can lead to detrimental outcomes, including relapse of the disease being treated, nursing home admission, hospitalization, and increased morbidity (e.g: increase in relative risk of coronary heart disease) and mortality. Conversely, increased adherence has the potential to improve treatment outcomes.

A cross-sectional study on compliance to antihypertensive therapy by Almas.A in the year 2006 found that 43% of patients were non-compliants. In another study conducted in Pakistan, only 49% of patients took more than 80% of their prescribed dosage of antihypertensive drugs in the first year of treatment. Non-compliance to antihypertensive drugs, cost of antihypertensive medication, old age and adverse effects due to the antihypertensive agents are associated with poor blood pressure control.[4]

However, information on the degree of antihypertensive medication compliance in our country is

lacking.[5] The primary purpose of this study was to find out the factors affecting antihypertensive medication adherence and effectiveness of pharmacist intervention in improving medication adherence. The study hypothesis was that there would be significant differences in medication adherence after pharmacist intervention among patients on antihypertensive therapy.

MATERIALS AND METHODS

Study design: A Cross-sectional descriptive comparative method.
Study site: General medicine department of a 400 bedded multi-speciality tertiary care teaching hospital.
Study period: The study was conducted for a period of 8 months from May 2006 to December 2006.
Outcome measures: Improvement in medication adherence and its associated effect on blood pressure control in the subjects before and after pharmacist intervention.
Inclusion / exclusion criteria: All post discharge patients from the general medicine department with antihypertensive medications in the prescription, diagnosed to have hypertension for more than 6 months with a systolic blood pressure (SBP) of ≥140 mmHg and / or diastolic blood pressure (DBP) of ≥80 mmHg and who were willing to participate in the study were included, whereas children below 12 years were excluded.

METHOD

The ethics committee of the institution approved the study. Forty-three post discharge patients who accepted to participate were included in a pre and post intervention study. After obtaining patient consent, the subjects were interviewed to gather clinical and demographic details. Their medication adherence behavior and the reasons for non-adherence were studied using Morisky self-report measure of medication adherence. Morisky scale consists of a 5-point response version (never / rarely / sometimes / often / always) and a set of open-ended questions regarding reasons for non-adherence. Scores for the scale range from 0-4 and 0-16 for the 5-point response version and open-ended questions respectively. Higher the scores are indicative of worse adherence. All the subjects answered 'YES' for at least one question and they were considered as non-adherent. They were given counseling on drugs and life-style modifications. The subjects were also provided with medication schedule reminder in order to improve their medication taking behaviour. Frequent telephone reminder from the pharmacist also helped them to reduce medication non-adherence. The subjects were followed up and regular interview was conducted by the pharmacist once in every 2 months and the reports were noted down.

Data Analysis:

The collected data were analyzed and results are expressed as mean ± standard deviation. A 'p' value of <0.05 was considered statistically significant.

RESULTS

Forty three patients were included in the pre and post intervention study. The mean age of the group under study was 59.63 years (SD= 11.65; range = 30 to 92 years). Fifty-eight percentage of the patients were male and the mean duration of hypertension was 7.5 ± 1.5 years (table 1). Almost 53.5% of the patients had diabetes mellitus along with hypertension; other concurrent diseases were viral pyrexia (13.9%) and rheumatoid arthritis (9.3%).

Subjects were prescribed a total of 239 drugs (mean number of drugs per subject = 5.56; SD = 1.58; median = 5; range = 4 to 10). The total number of antihypertensive medications prescribed was 64 (27%). The average number of antihypertensive medication prescribed per patient was found to be 1.5 drugs (SD:0.3, median:1, range:1-3). The prescribed antihypertensive medication consisted of Calcium-Channel Blockers (CCB=46.51%), Beta- Blockers (32.55%), Diuretics (27.9%) and Angiotensin Converting Enzyme Inhibitors (ACEI=25.58%). Amlodipine (41.86%) was the most commonly prescribed drug followed by atenolol (23.26%), ramipril (20.6%), losartan potassium (13.95%) and frusemide (13.95%). Antihypertensive medications prescribed are shown in table 2.

The number of subjects reported to be non-adherent at baseline interview was 43(100%, $p<0.001$); second interview 22 (51.2%, $p<0.001$) and final interview 2(4.6%, $p<0.001$). Table 3 and 4 shows the score distribution of Morisky Medication Adherence Scale at various level of intervention and the various reasons for non-adherence reported by the study participants.

The mean blood pressure at baseline interview was 163/100 mmHg; at second interview 148/92 mmHg ($p<0.0001$) and at final interview 141/90 mmHg ($p<0.0001$). At baseline intervention, 12 patients (27.9%) had severe hypertension, 20 of them (46.5%) had moderate and 11 (25.6 %) had mild hypertension. During final interview the number of patients with severe, moderate and mild hypertension were 3 (7.0%), 15(34.9%) and 25(58.1%) respectively.

Table 5 gives the details of improvement in number of compliants with respect to number of drugs prescribed. Improvement in medication adherence with respect to dose frequency is presented in table 6.

DISCUSSION

All subjects (n=43) in this study were non-compliant to therapy at baseline interview. Intentional reasons for non-adherence were found to be more

common than unintentional non-adherence. The majority (n=13) of the subjects (30.23%) reported four reasons, 23.26% reported 3 reasons, and 16.28% reported 5.
reasons for non-adherence. The most prevalent causes of non-compliance were side effects of drugs (74%), forgetfulness (72%), thinking medication not effective (21%), and medications too expensive (19%). The most commonly reported reason for unintentional non-adherence was forgetfulness (72%). This typically results in under dosing as a result of random or systematic missed doses. In people aged 60 years and above, non-compliance with medication regimen was found to be 82.6%.

Amlodipine (40%) was widely prescribed to treat hypertension. This was followed by atenolol (29%), ramipril (20.8%) and losartan potassium (18%). Hydrochlorthiazide (15%) and frusemide (12%) were also prescribed. Most common single drug is amlodepine (18 Patients), atenolol (10 Patients) and ramipril (9 Patients). Most common combination drug is amlodipine + atenolol followed by losartan potassium + hydrochlorthiazide.

Patients taking atenolol, losartan potassium, and hydrochlorthiazide group of drugs were identified to be poor complaints at baseline interview. Patients on calcium channel blocker and beta-blocker showed better improvement in compliance than patients on diuretics and ACE inhibitors. Patients with once a day regimen showed better compliance than doses taken twice a day or more often. The study could find some difference in compliance depending on the timing of dosage. Patients with once a day regimen with a morning dose (n=41, 95.4%) showed better improvement in medication adherence. Patients with single therapy showed better improvement in medication adherence. Seven(16.3%) patients received multiple dosage and only 3(7%) of them showed change in adherence. Patients with fewer medications showed better compliance at the end of the study. The result indicates that the number of patients classified as compliants was higher for calcium channel blocker than beta-blocker. Among these, patients on ramipril showed significant improvement in adherence at the end of the study. Patients prescribed with frusemide were found to be poor adherents. This may be due to increased frequency of urination.

Among the 64 antihypertensive drugs, 36 patients (83.7%) had OD dosing, 7 patients (16.3%) for BID dosing, none of them for TID dosing and for multiple daily dosing (MDD). At final interview the number of compliance for OD dosing (79.17%) was significantly higher ($p<0.0001$) than for BID. This number was also significantly higher than for BID dosing. Therefore the study indicates that OD dosing regimens are associated with greater adherence to antihypertensive pharmacotherapy than for BID regimens.The current study showed extremely statistically significant improvement in the medication compliance of all study participants at the end of pharmacist intervention. After 6 months of intervention the percentage of patients classified as compliants increased significantly from 0% at baseline to 95.4% at final interview with associated modest reduction in mean blood pressure.

This study has several strengths; the intervention was multi-layered and included a strong educational component with baseline individual counseling and repeat face to face counseling / telephone counseling by the pharmacist. The study also adds to the current understanding of the reasons for poor rate of medication adherence in hypertensive patients. Medication schedule reminder and telephone calls from the pharmacist served to remind patients to take their medications.

This study used self-report assessment of patient medication adherence instead of more expensive and cumbersome approaches such as collateral and physiological measures. Self-report drug therapy adherence has repeatedly been shown to be comparable to other measures of adherence, such as pill-count, appointment keeping, pharmacy dispensing records, and other physiological measures.[5,6,7] As such, the present study measured adherence to taking the medication recommended for the antihypertensive medication regimen with the four-item Morisky Medication Adherence Scale.[8] The MMA was first designed as a 5-item scale measuring medication taking behavior in outpatients being treated for high blood pressure[10] but was later revised to the 4-item measure used in the present study[8,9] The MMA uses strategic wording, through a focus on common ways that patients experience drug omissions, to help elicit accurate disclosures of non-adherence. The four questions used in the scale are: “Do you ever forget to take your medicine?”; “Are you careless at times about taking your medicine?”; “When you feel better do you sometimes stop taking your medicine?”; “Sometimes if you feel worse when you take the medicine, do you stop taking it?”. Scores range from 0 to 4, where affirmative answers get no score, with a higher score representing a low level of adherence. The scale has been found to have an internal consistency. Subsequent work with the self-report compliance measure on a larger population suggested that it is easily implemented, maintains reliability, and demonstrates concurrent and predictive validity with regard to blood pressure control.[8]

CONCLUSION

The current study identified intentional reasons for non-adherence to be more common than unintentional non-adherence. The most prevalent causes of medication non-adherence were side effects of drugs (74%), forgetfulness (72%), thinking medication not effective (39%) and medications too expensive (19%). It is also evident from the study that pharmacist intervention is effective in improving medication adherence and its associated effect on blood pressure in patients receiving antihypertensive therapy.

Table: 1 Patient demographics (n=120)

Patient characteristics	Parameters
Age (range: 30 to 92 yrs)	62yrs
Male	77 (64.2%)
Female	43 (35.8%)
Number of years with hypertension	7.9 ±1.5 years
BMI	24
Blood pressure	157 / 96 mmHg
Educational status Primary Secondary Graduates and above	54% 35% 11%
Social habits Smoker Smoker and alcoholic None	5% 44% 51%

Table 2: Antihypertensive drugs prescribed (n=43)

Sl.No.	Name of the drug	Number of patients (%)
1	Amlodipine	18(41.86)
2	Atenolol	10(23.26)
3	Ramipril	9(20.63)
4	Losartan potassium	6(13.95)
5	Frusemide	6(13.95)
6	Hydrochlorthiazide	4(9.30)
7	Propranolol	3(6.98)
8	Spiranolactone	2(4.65)
9	Nifedipine	2(4.65)
10	Enalapril	2(4.65)
11	Metoprolol	1(2.33)
12	Clonidine	1(2.33)
13	Prazosin	1(2.33)
14	Carvedilol	1(2.33)
15	Acetazolamide	1(2.33)

Table 3: Distribution of MMA Scale Scores at Various Level of Intervention (n=43)

Distribution of Scores	Total Sample (%)		
	Baseline Intervention (%)	First Intervention (%)	Second Intervention (%)
0	0(0)	21(48.8)	41(95.4)
1	12 (27.9)	6(14.0)	1(2.3)
2	10 (23.3)	7(16.3)	1(2.3)
3	9 (20.8)	2(4.7)	0 (0)
4	5 (11.6)	3(6.9)	0 (0)
5	0 (0)	2(4.7)	0 (0)
6	1 (2.3)	1(2.3)	0 (0)
7	0 (0)	0 (0)	0 (0)
8	2 (4.7)	0 (0)	0 (0)
9	2 (4.7)	1(2.3)	0 (0)
10	2 (4.7)	0 (0)	0 (0)
Total	43 (100)	43(100)	43(100)

MMA- Morisky Medication Adherence

Table 4: Reasons for Non-Adherence Reported by 43 Subjects in Response to an Open Ended Question.

Sl No.	Reason	Number (Percent)
	Intentional Non-Adherence	
1.	**Side effects**	**32(74.42)**
2.	**Alter regimen as see fit**	**9(20.93)**
3.	**Think medications not effective**	**17(39.53)**
4.	**Don't care to take medications**	**4(9.30)**
5.	**Modify diuretics due to increased urination**	**0(0**
6.	**Omit medications if feeling ill**	**7(16.28)**
7.	**Alter dosing schedule for convenience**	**7(16.28)**
8.	**Stop to see if still needed**	**7(16.28)**
9.	**Fasting once/ month**	**17(39.53)**
	Total intentional	**100(232.55)**
	Unintentional Non-Adherence	
1.	**Forget**	**31(72.09)**
2.	**Confusion / hiding pills**	**7(16.28)**
3.	**Too expensive**	**8(18.60)**
4.	**Trouble swallowing pills**	**4(9.30)**
5.	**Trouble operating dispensers (inhalers)**	**0(0)**
6.	**Trouble reading labels**	**2(4.65)**
7.	**If run out (eg. Pharmacy delivers late or makes error).**	**0(0)**
	Total unintentional	**52(120.92)**
	Total Reported Reasons for Non-Adherence	**152(353.47)**

Table 5: Improvement in Adherence With Respect to Number of Drugs Prescribed (n=43)

Number of drugs prescribed	Number of patients	Number of compliants at baseline intervention	Number of compliants at final intervention
4	2	0	2
5	5	1	5
6	11	3	10
7	10	1	8
8	6	1	4
9	3	0	2
10	6	0	3
Total	43	6	34

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