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"ASSESSMENT OF ADHERENCE TO CARDIOVASCULAR MEDICINES IN RURAL POPULATION ATTENDING A TERTIARY CARE TEACHING HOSPITAL"

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ABSTRACT

Introduction: Nonadherence to cardiovascular medication is a great public health concern, increasing the morbidity and mortality of patients. This study was conducted to evaluate the adherence to cardiovascular medications in rural Indian setting. **Methods:** This study was conducted over a period of 12 months, jointly by the department of medicine and pharmacology. The patients diagnosed with essential hypertension (HTN), congestive cardiac failure (CCF), and ischemic heart disease (IHD) attending the out-patient clinics of medicine as well as the inpatients from medicine ward were included in the study. In the first visit, the patients were prescribed cardiovascular medicines by the concerned physician and adherence to these medicines was assessed in the subsequent visits. The Four Items Morisky's Medication Adherence Scale (MMAS-4) was used for assessing adherence to medication. **Results:** The results of our study reflect that the adherence to cardiovascular medication was 20.83%, 28.37% and 32% in HTN, CCF and IHD patients, respectively. Nonadherence was found highest among the patients of HTN. Forgetfulness at 45.66% was the most common and carelessness at 7.16% was the least common cause of nonadherence in all the three categories of patients. 68% of HTN patients were on single antihypertensive drugs whereas, 32% of HTN patients were on combination antihypertensive drugs. **Conclusion:** Nonadherence to cardiovascular medications is a major public health concern amongst the patients of rural India. Policy makers should develop strategies for detecting the level of adherence to

cardiovascular medicines, evaluating the barriers of adherence and designing subsequent interventions to overcome it.

KEYWORDS: Adherence, cardiovascular medicines, congestive cardiac failure, essential hypertension, ischemic heart disease, rural population.

INTRODUCTION

Cardiovascular diseases comprising of essential hypertension (HTN), congestive cardiac failure (CCF), and ischemic heart disease (IHD) are common in the Indian population. The knowledge regarding the management of cardiovascular diseases is increasing exponentially; however, the nonadherence to the medications greatly reduces the benefits derived from these advances. A significant share of cardiovascular disease events (~9% in Europe) are caused by poor adherence to prescribed medication. Optimal adherence to cardiovascular medication confers a significant inverse relation to the adverse outcomes.[1] Very scares data on medication adherence patterns of rural India is available, whereas, adherence patterns of cardiovascular diseases are reported from many urban areas of other countries.[2,4] This study was conducted to evaluate the level of adherence to cardiovascular medicines and evaluate the barriers of adherence in patients from the rural Indian setting. The study would prove instrumental in providing data for designing subsequent interventions to overcome non-adherence which would greatly reduce morbidity and mortality due to cardiovascular disorders.

MATERIAL AND METHODS

This is a prospective observational study, carried out over a period of 12 months, jointly by the department of medicine and pharmacology at a tertiary care hospital after approval from the institutional ethics committee. Patients attending the outpatient clinics of medicine, as well as inpatients from medicine ward were included in the study only after obtaining an informed written consent. The study included both males and females, aged ≥ 25 years and diagnosed with essential HTN, CCF or IHD by the attending physician. Only patients from rural areas were included in the study. Patients with co-morbid conditions such as chronic obstructive pulmonary diseases, collagen vascular diseases, type II diabetes mellitus, chronic kidney or chronic liver diseases were excluded. Patients diagnosed as cases of secondary HTN were also excluded from the study. Only adherence to cardiovascular medications was assessed and adherence to lifestyle modification and dietary restrictions was not assessed. While diagnosing essential HTN, secondary causes like pheochromocytoma, kidney

disorders, liver disorders, renal artery stenosis, Cushings syndrome were excluded. CCF was diagnosed on the basis of history, physical examination and findings on echocardiography. Patients who developed CCF due to acute myocardial infarction (AMI) were excluded from the study. A history of past AMI and angina, electrocardiogram (ECG), echocardiography, angiography and treadmill test were used to diagnose patients with IHD. IHD patients who preferred medical therapy and refused surgical intervention like coronary artery bypass grafting and angioplasty were also included in the study.

In the first visit, the patients were prescribed the appropriate cardiovascular medications by the concerned physician. In the subsequent visit adherence to the prescription was assessed at 4 weeks, 8 weeks and 12 weeks' time. Initially, after eligibility screening 185, 129, and 82 patients of HTN, IHD, CCF respectively were included in the study, however, only 120, 100, 60 patients were assessed for adherence to medications for HTN, IHD, and CCF respectively due to loss at the follow-up visits.

For the assessment of adherence to medication, four items Morisky's Medication Adherence Scale (MMAS-4) was used.[5] The MMAS-4 addressed the four major reasons for nonadherence to medications, namely, forgetting, stopping the medication when feeling worse, carelessness, or starting the medication when feeling worse. Patients providing a negative response to all four questions of the MMAS-4 were considered as "adherent".

Statistical analysis

The data will be collected in Microsoft Excel 2014 datasheet and analyzed in the Statistical Package for Scientific Solutions (SPSS) version 17.0. For data analysis, simple statistical methods such as mean values, standard deviations, and percentages were used.

RESULTS

A total of 365 rural patients participated in the study. 80% of the patients were males, 94% from lower socioeconomic status and 46% were illiterate [Table 1]. Mean age of the patients suffering from HTN, CCF and IHD was 45.32 ± 8.76 years, 55.45 ± 7.98 years, and 52.28 ± 8.43 years respectively. The number of male patients dominated the female patients, education up to primary level and low socio economic status was prevalent in majority of the patients; of all three groups.

Table 1: Demographic profile of study populations consuming cardiovascular medicines.

Demographic characteristics	Distribution of subjects n(%)		
	HTN (n=205)	CCF (n=50)	IHD (n=110)
Age (mean±SD)	45.32±8.76 years	55.45±7.98 years	52.28±8.43 years
Gender			
Male:Female	114:91	31:19	67:43
Education status			
Illiterate	69 (33.65)	21 (42)	31 (28.18)
Primary	82 (40)	19 (38)	48 (43.63)
Higher secondary	43 (20.97)	8 (16)	25 (22.72)
Graduate & above	11 (5.36)	2 (4)	6 (5.45)
Socioeconomic status			
High:Low income	63:142	15:35	39:71

HTN=Hypertension, CCF=Congestive cardiac failure, IHD=Ischemic heart disease, SD=Standard deviation, INR=Indian Rupee.

Morisky's scale revealed that overall rates of adherence to medication were 18.04%, 38%, and 36.36% in HTN, CCF, and IHD patients, respectively [Table 2]; with non-adherence highest among the hypertensive patients followed by patients with IHD. Among the four reasons for nonadherence assessed by MMAS‑4; forgetfulness 45.66% (121) was the most common and carelessness 7.16% (19) was the least common cause of nonadherence in all the three groups of patients, i.e. HTN, CCF, and IHD [Table 2].

Table 2: Assessment of cardiovascular medication adherence in HTN, CCF and IHD patients by Morisky's instrument.

Morisky's Instrument (MMAS‑4) Questionnaire	Distribution of subjects with negative response n (%)		
	HTN (n=205)	CCF (n=50)	IHD (n=110)
1. Do you ever forget to take your medication?	73 (35.60)	24 (48)	47 (42.72)
2. Are you careless at times about taking your medication?	125 (60.97)	38 (76)	83 (75.45)
3. When you feel better, do you sometimes stop taking your medication?	94 (45.85)	32 (64)	65 (59.09)
4. Sometimes, if you feel worse when take your medicine do you stop taking it?	100 (48.78)	29 (58)	62 (56.36)
Number of patients who said "no" to all four questions = considered adherent to medications.	37 (18.04)	19 (38)	40 (36.36)

MMAS‑4=Four items Morisky's Medication Adherence Scale, HTN=Hypertension, CCF=Congestive cardiac failure, IHD=Ischemic heart disease.

68% of HTN patients were on single antihypertensive drug with amlodipine at highest of 40.97% followed by angiotensin converting enzyme inhibitors [ACEI]/angiotensin receptor blockers [ARBs] at 13.17%. Whereas, 32% of HTN patients were on combination antihypertensive drugs with the combination of ACEI/ ARBs + diuretics at the top (11.21%) followed by amlodipine + ACEI/ARBs at 10.24%. Adherence was seen in 18.04% (37) patients of HTN (30 patients on single antihypertensive and 7 patients with combination therapy). The CCF and IHD patients were on multiple medications. 100% of the CCF patients were on loop diuretics, 90% on ACEI/ARBs, 60% on beta‑blockers, 28% on spironolactone and 22% on digoxin; in various combinations. Adherence to CCF medications was seen in 28% (19) of CCF patients. IHD patients were on statin (90.90%), ACEI/ARBs (83.63%), aspirin (82.72%), beta‑blockers (50%) and nitrates (34.54%) in different combinations. 36.36% (40) patients were adherent to IHD medications.

Table 3: Distribution of cardiovascular medications consumed by the study population.

Medication Class Consumed	**n (%)**
Hypertension (n=205)	
Single Therapy	**139 (68)**
Amlodipine 68	84 (40.97)
ACEI/ ARBs	27 (13.17)
beta blocker	14 (6.82)
Diuretics	14 (6.82)
Combination Therapy	**66 (32)**
ACEI/ ARBs + diuretics	23 (11.21)
Amlodipine + ACEI/ ARBs 32	21 (10.24)
Amlodipine + beta blocker	8 (3.90)
ACEI/ARBs + beta blocker	8 (3.90)
Amlodipine + diuretics	6 (2.92)
Congestive Cardiac Failure (combination/ multiple therapy) (n=50)	
Loop diuretics	50 (100)
ACEI/ ARBs	45 (90)
Beta blockers	30 (60)
Spironolactone	14 (28)
Digoxin	11 (22)
Ischemic Heart Disease (combination/ multiple therapy) (n=110)	
Aspirin	91 (82.72)
beta blockers	55 (50)
ACEI/ ARBs	92 (83.63)
Statins	100 (90.90)
Nitrates	38 (34.54)

DISCUSSION

The effectiveness of pharmacological therapy is invariably tied to medication adherence, i.e. the extent to which the patient follows the prescribed medication therapy. Morbidity as well as mortality is increased due to nonadherence. Measurement of adherence is carried out at two domains, the objective and the subjective domain. Objective measurement includes evaluation of pharmacy refill records and pill counts. A microprocessor attached to the medicine bottle lid can be used to record the frequency and time of each opening; in the medication event monitoring system. Subjective measurement, though more practical and commonly used are less reliable. They comprise of questionnaires, interviews or diaries.

In our study the patients were interviewed with questionnaires of Morisky's instruments which have been validated and used in several adherence studies. The results of our study reflect poor overall adherence to cardiovascular medications (36.22%) among the HTN, IHD and CCF patients. Although there are few rural Indian studies on antihypertensive medication adherence, there are only a handful on medication adherence in IHD or CCF patients.[6,11,16] There are varying levels of adherence to antihypertensive medication seen in different studies. In a study carried out in Kolkata on antihypertensive medication adherence in slum dwellers, the prevalence over a recall period of 1 week was seen to be 73%. Hypertensive patients undergoing therapy for long duration (≥5 years), patients getting free medications, patients with small family size (≤4 members) and high income were observed to have a relatively high medication adherence. Furthermore, adherence to medication was seen in patients who were satisfied with the current treatment and perceived current blood pressure to be under control.[6] In a survey from Bangalore, 49.67% of the patients were non adherent to antihypertensive medication. Various barriers to medication adherence such as belief, access and recall were reported by 39.14%, 82.57% and 62.17% patients respectively. 78.62% of the patients experienced difficulty paying for the medication and 54.93% of them had difficulty getting a refill on time.[7] In a study from Coimbatore, a high prevalence of non compliance was found to be attributed to forgetfulness (72%), perceiving medication as ineffective (21%), side effects of drugs (74%) and medication being too expensive (19%). Interventions such as patient education, repeated counselling and reminders by pharmacist, for a period of 6 months revealed the significant rise in compliance from 0% to 95.4%.[8] In a Mangalore based study on anti-hypertensive medication, 45.8% of the participants had low level of adherence; while on the other hand, provision of free medication, absence of side effects and regular check-ups were associated with better compliance.[9] A rural Indian study on

compliance to antihypertensive medication conducted at Loni, Ghaziabad showed results pointing towards better compliance with combination therapy as compared to monotherapy along with an economic approach.[10] Another rural Indian study from Mysore, Karnataka showed a high prevalence of recall and belief as barrier to antihypertensive medication adherence and the intervention of a reminder by the pharmacist was seen to be effective in reducing these barriers.[11] Factors associated with increase in the adherence to antihypertensive medication include significantly lower healthcare cost, rate of hospitalizations and emergency department visits.[12] Our study recorded higher nonadherence prevalence than other Indian studies. This reflects the poor medication adherence in rural region reinforcing that place of residence is a contributing factor to medication adherence as, in plain contrast, urban studies tend to show a relatively higher medication adherence among patients.[7,9]

Different observational studies present a varied range of results for medication adherence in CCF patients. A Yemen based study showed an overall 54.2% nonadherence to CCF medication while the adherence for beta blockers, digoxin and diuretics was 8%, 29% and 46% respectively.[13] In a study from Olmsted County, Minnesota, the CCF patients had poor adherence of 19%, 19% and 13% for beta blockers, ACEI/ARB and statins respectively. It was found that patients with poor adherence experienced mainly cost related issues.[14] In a Brazilian study from a university hospital in Rio Grande de Sul, a higher level of adherence to pharmacological treatment (47%) was observed as compared to non-pharmacological treatment (18%).[15] Unfortunately data pertaining to adherence to CCF medication in Indian patients is available only from one study which is a low of %.[16] Our study revealed that nonadherence to CCF medication in rural India was significantly higher than that seen in other non-Indian studies, as only 28.37% of our patients were adherent. The results of our study reflect that forgetfulness 45.66% (121) was the most common and carelessness 7.16% (19) was the least common cause of nonadherence in all the three groups of patients. In our study 27.92% (191) of patients in general stopped medication when they started feeling better or worse.

Non adherence to medication is more prevalent among coronary artery disease (CAD) patients. An observational study from London published that in patients of post-acute coronary syndrome, medication non adherence was seen to be 20%, 54% and 53% at 2 weeks, 6 months and 12 months respectively. The non-adherence was reported as mainly

unintentional.[17] A study from US showed that the primary reason for discontinuation of statins in CAD patients was muscle pain (60%), followed by cost (16%) and finally a perceived lack of efficacy (13%).[18] A multicentre study that involved post ACS patients treated with Aspirin revealed that greater than 9% of them discounted therapy early. The common reasons for discontinuation being patient refusal, bleeding, other side effects and physician's preference.[19] Another study from the Ontario province of Canada observed a poor 2 year adherence rate of 40% to statin therapy in post ACS patients.[20] A multicentre analysis from the USA showed that out of 17,000 patients with health insurance and prescription drug coverage, the highest decrease of adherence occurred between 30 to 90 days with only 45% being adherent to beta blockers by the end of 1 year.[21] Another study based in the USA showed a rise in medication adherence in the first year after ACS hospital discharge. This was attributed to a multifaceted intervention comprising of pharmacist-led medication reconciliation and tailoring, patient education, collaborative care between pharmacist and clinician and voice messaging. However, the patients were better adherent to ACEI/ARBs, statins and clopidogrel but not to beta blockers.[22] Among the 3 categories of cardiovascular diseases, our study showed that CCF patients had the highest medication adherence (38%) followed by IHD patients (36.36%). Relative to HTN patients, IHD and CCF patients are more symptomatic (angina, breathlessness and edema) which could explain the higher medication adherence in these patients. Being more symptomatic these patients are easily motivated and consequently symptom relief increases the faith in medication.

One of the major limitations of our study is that it is not a community based study and thus the original status of the community is not reflected in the results. For detection of adherence, only MMAS-4 was used which detects only the patient's factors (such as forgetfulness, carelessness, patient's perception/belief of the disease and its requirement of treatment) while other contributors to non-adherence were not assessed. When it comes to measurement of medication adherence, not a single valid tool is yet developed which can evaluate all the factors associated with of non-adherence as defined by World Health Organization's (socioeconomic, health care system, therapy, patient and condition-related factors). Hence, the only valid methods for detection of the barriers of adherence are individual detection and thorough evaluation followed by the appropriate interventions best tailored to fit the population. A major player in such cases are the health care professionals who may improve medication adherence of patients and, in turn, the community, with behavioural as well as informational interventions and by collaboration between the patients and providers.[23]

CONCLUSION

Adherence to cardiovascular medication is very poor in rural India population which needs to be highlighted and dealt with on priority. Indian regulatory authorities should develop strategies for detecting the level of adherence to cardiovascular medicines, evaluating the barriers of adherence and designing subsequent interventions to overcome it. This would greatly reduce morbidity and mortality due to cardiovascular disorders. We hope the findings of our study will serve as an eye opener for the Indian policy makers and sensitise them to take prompt action in this regard.

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