Original Research Article

Drug Utilization Pattern of Antihypertensive Drugs at Tertiary Care Teaching Hospital

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Abstract

Background*:** Drug utilization studies conducted at regular intervals help to guide the physician in prescribing drugs rationally. ***Methods: This is prospective, observational study was conducted in the outpatient of department of general medicine of Indian Institute of Medical Science & Research a tertiary care teaching hospital. Data was collected from patients who have been diagnosed with hypertension as per JNC-8 guidelines and patients receiving or prescribed with antihypertensive medications were included. Frequency and proportions of utilization of antihypertensive medications in were figured. ***Results:*** A total of 170 prescriptions were analysed during the 6 month study period. The patients 93 (46.5%) were on Mono therapy significantly higher than dual therapy, triple therapy and poly therapy, 64 (32 %), 27 (13.5%), 16 (8 %) respectively. Calcium channel blocker was the frequently used class of drug for monotherapy (19.5 %). In dual drug therapies were CCB+ARB accounting for 18.5 %, and 5.8% of patients were on triple drug therapy with CCB+ARB+Diuretic. 30.2% patients were on ACE inhibitors. 25.5 % patients receiving Calcium channel blocker reported side effect. ***Conclusion*:** This type of studies gives the base line idea of prescription pattern and ADRs of antihypertensive drugs. These helps to design policy for rational use of drugs and motivation of physician for rational use of drugs. The study emphasizes that need for effective continuing medical education and also preventive measures in hypertensive individuals.
Keywords: Drug utilization, Antihypertensive, Adverse drug reaction.

INTRODUCTION

The World Health Organization (WHO) defines drug utilization research as "*the marketing, distribution, prescription and use of drugs in a society, with special emphasis on the resulting medical, social, and economic consequences* [1]". Thus, inherent in the definition, such studies provide logical background for determining the rationality of drug use as well as providing evidence based guidance for making policy decisions at various levels of healthcare [2]. Drug utilization research studies conducted in the inpatient settings are effective tools that help in evaluating the drug prescribing trends, efficiency, and cost-effectiveness of hospital formularies. There is always a variation in drug utilization among different countries and even among health institutions within a country and sometimes within the same institute at different point of time probably because of changing disease trends over a period of time [3].

Conducting periodic studies of pattern of drug use in various hospital settings or patient populations is therefore essential to critically analyse the current hospital drug policies and to make recommendations based on various guidelines to improve upon the current drug usage pattern in the future, if needed. This is more importantly required in resource poor countries like ours so as to ensure that the scarce resources are utilized in the best possible manner. Though there have been various drug utilization studies conducted on specific populations and in varied settings in India [4], only a few have been conducted in outpatient department [5, 6]. Previous studies conducted by the authors in our hospital outpatient department were primarily safety utilization studies [7, 8].

The outpatient department represents an important platform for conducting drug utilization studies as patients present with a wide range of diseases in acute form and the drug use is quite extensive. Therefore, evaluating the drug prescribing behaviour

and usage patterns in the outpatient department of Medicine has the potential of determining the rationality of drug therapy being given in the particular region to a broader extent. Keeping this in view, we conducted a drug utilization study in our tertiary care hospital with the objective of studying pattern of drug use and cost of drug treatment and determining the rationality of prescriptions so as to identify priority areas that need to be targeted for further improvement in patient care

MATERIALS AND METHODS

This is a prospective cross-sectional drug utilization study, conducted between February 2019 to July 2019 at outpatient Department of General Medicine, Indian Institute of Medical Science & Research, Warudi, Badnapur, Jalna. Prescriptions of 170 patients of either sex or age >18 years who have been diagnosed with hypertension as per JNC-8 guidelines and patients receiving or prescribed with antihypertensive medications were included. Patients in emergency, life threatening medical or surgical conditions, pregnant and lactating women and patients with incomplete data were excluded. The patient's sociodemographic profile, receiving or current prescribing patterns of antihypertensive medications were recorded in a predesigned data collection record form. Those receiving or with prescription of a one active principle medication was considered as monotherapy and those receiving or prescription of a more than one active principle medications were defined as a polytherapy.

The main aim of study was evaluating the different classes of antihypertensive medications with respect to diagnosis and to carry out the drug utilization review in hypertension with its different combinations. Patient's demographics, type of antihypertensive drug prescribed, lab reports, detailed medical history, concomitant medications for co morbid diseases were recorded. Frequency of drug prescription among different age groups, frequency of administration of individual drugs, frequency of prescribing combination drugs, frequency of prescribing fixed drug combinations, number of prescriptions per drug, number of drugs prescribed per total number of prescription, percentage of patients in the treatment of hypertension with comorbidities, percentage of economic difference, percentage of expenditure cost, and average drug acquisition cost (ADAC) were calculated.

Adverse drug reactions

In the present study, causality assessment between the drug and suspected reaction was determined by using WHO-UMC Scale, Naranjo Scale and Hartwig and Siegel scale. According to Naranjo Criteria, the ADRs are analysed on the basis of a questionnaire comprising 10 questions in which each

question is given a score of +2, +1, 0 or -1 depending on the analysis. When total if the score is >9 – labelled as definite ADR, if 5-8 – probable ADR, if 1-4 – possible ADR, if 0 – doubtful ADR.

STATISTICAL ANALYSIS

Data was analysed using the software, Statistical Package for Social Sciences (SPSS for windows. Version 24 software. Percentage describes categorical data mean±standard deviation (SD) describes continuous data Subjects were recruited in the study. All drug related adverse events were evaluated according to the "WHO causality Assessment Scale" was used to describes causality of adverse drug event into adverse drug reaction.

RESULTS

Age distribution of patient: In table 1, the highest age group patients were between 41-60 years accountable 52.9 % and least age group patients were between 18-40 years 11.1 %.

Table-1: Distribution of age group

Age group in years	No. of patients (n=170)	Percent
18-40	19	11.1
41-60	90	52.9
61-80	61	35.8

Table-2: Distribution of gender

Gender	No. of patients	Percent
Male	92	54.1
Female	78	45.8

Gender distribution of patient

In table 2, the gender ratio of the patients' male: female was found to be 1.2:1. Out of the 200 patients, 54.1 % (92) of patients were male and 45.8 % (78) of patients were female. Test of proportion showed that the male patients were slightly more than the female patients.

Table-3: Duration of hypertension

Duration in years	No. of patients	Percent
< 3 years	92	54.1
4-6 years	61	21.1
> 7 years	17	10

Duration of hypertension

In table 3 shows that 92 (541%) patients were between < 3 years, 61 (21.1%) patients were between 4-6 years and 17 (10%) were having history of >7 years.

Table-4: Distribution of Systolic blood pressure

Systolic blood pressure (mmHg)	No. of patients	Percent
120-139 (Pre HTN)	27	15.8
140-159 (Stage 1 HTN)	56	32.9
160-179 (Stage 2 HTN)	78	45.8
>180 (HTN emergency)	9	5.2

Systolic blood pressure distribution in patients

In table 4 depicts most of the patients 78 (45.8%) were significantly higher systolic blood pressure ranging between 160-179 mmHg (Stage 2 HTN) and least patients were emergency hypertensive were 5.2 %.

Table-5: Distribution of Diastolic blood pressure

Diastolic blood pressure (mmHg)	No. of patients	Percent
80-89 (Pre HTN)	29	17.0
90-99 (Stage 1 HTN)	57	33.5
100-119 (Stage 2 HTN)	73	42.9
>120 (HTN emergency)	11	6.4

Diastolic blood pressure distribution of patients

In table 5, test of proportion showed most of the patients 73 (42.9 %) were significantly higher diastolic blood pressure ranging between 100-119 mmHg and least patients were emergency hypertensive were 6.4 %.

Table-6: Distribution of drug therapy

Drug Therapy	No. of patients	Percent
Monotherapy	83	48.8
Dual therapy	57	33.5
Triple therapy	19	11.1
Poly therapy	11	6.4

Drug therapy distribution among patients

In table 6 shows most of the patients 93 (46.5%) were on Mono therapy significantly higher than dual therapy, triple therapy and poly therapy, 64 (32 %), 27 (13.5%), 16 (8 %) respectively.

Table-7: Utilization pattern of different antihypertensive drugs

Treatment	No. of patients use antihypertensive drug	Percent
Monotherapy		
Calcium channel blocker	29	17.0
ARB	17	10.
ACE Inhibitor	13	7.6
Beta Blocker	16	9.4
Alpha Blocker	3	1.7
Diuretics	5	2.9
Dual therapy		
CCB+ARB	26	18.5
CCB+Beta Blocker	19	15.5
CCB+ Diuretic	7	5.5
ARB+ Diuretic	5	4.5
Triple therapy		
CCB+ARB+Diuretic	12	7.0
CCB+B Blocker+Diuretic	7	4.1

Utilization pattern of different antihypertensive drugs

Calcium channel blocker was the frequently used class of drug for monotherapy (19.5 %). In dual drug therapies were CCB+ARB accounting for 18.5 %, and 5.8% of patients were on triple drug therapy with CCB+ARB+Diuretic.

Table-8: WHO causality assessment of ADRs

Type of reaction	No. of patients reported ADR (43)	Percent
Certain	7	16.2
Probable/likely	29	67.4
Possible	6	13.9
Unlikely	1	2.3
Conditional/unclassified	-	-
Unassessable/ unclassifiable	-	-

Among 200 patients only 43 patients experienced ADRs. Causality assessment of ADRs was done using WHO-UMC scale which categorizes ADRs as "certain", "probable", "possible" and "unlikely".

Table 8 shows that type of reactions and their percentage are as certain (16.2 %), Probable/ Likely (67.4%), Possible (13.9 %) and Unlikely (2.3 %).

Table-9: Severity of reported ADRs by modified Hartwig and Siegel scale

Type of reaction	No. of patients reported ADR (43)	Percent
Lethal	-	-
Severe	3	6.9
Moderate	9	20.9
Mild	31	72.0

In table 9, it was found that from all ADRs, reported (72 %) were mild, (20.9 %) moderate and only (6.9 %) was classified as severe.

Table 10: Common ADR Reported

Class of drugs	Adverse events experienced	No of patients (43)	%
CCB	Pedal edema, giddiness, headache, abdominal pain, bradycardia	11	25.5
ARB	Anxiety, Nausea and Vomiting, Headache, Abdominal pain, Restlessness, Itching and inflammatory swelling	9	20.9
ACE Inhibitor	Dry cough, dizziness, headache, drowsiness, diarrhea, hypotension, weakness, cough, rash, metallic or salty taste.	13	30.2
Beta Blocker	Constipation, nausea and vomiting, headache, hypoglycemia, postural hypotension	5	11.6
Diuretics	Hypotension, muscle cramps, headache vertigo, pain in legs, dysuria	2	4.6
Other	Skin reaction	3	6.9

Total 43 patients were reported ADR. 30.2% patients were on ACE inhibitors. 25.5 % patients receiving Calcium channel blocker reported side effect.

DISCUSSION

The WHO defines drug utilization studies as "the marketing, distribution, prescription and the use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences." Prescription pattern surveys are an important methodological instrument of drug utilization studies, which help provide an in-depth insight into the disease profile of patients and prescribing behaviour of clinicians. Hypertension is a serious public health problem worldwide [9]. It is the leading cause of death in the world and is the most common cause for outpatient visits to physicians [10].

In this study, the maximum number of patients, were from the age group of 41-60 (52.9%) years followed by 61-80 (35.8%) and least number in 18-40 (11.1%) years of age of patients are from this age group Whereas, total 170 patients were there, including 92 (54.1) males and 78 (45.8) females (Table 2) and showing a predominance of male population. The hypothetical cause of higher number of male patients is elevated levels of androgen such as testosterone as they play a role in elevation of blood pressure [11]. A similar study was also conducted by Chobanian AV *et al*. which is supporting this study [12].

Furthermore, maximum number of patients was seen in less than 3 years duration of hypertension followed by 4-6 years of duration and minimum number of patients was seen in more than 7 years of duration. In addition, systolic blood pressure, maximum number of patients in stage 2, followed by stage 1 and hypertensive emergency and lowest number in pre-stage hypertension.

The present study observed that single-drug therapy (17.0 %) as a CCBs was more commonly employed than multiple-drug therapy. These results support the work of Sindhu et al. which showed blood pressure could be adequately controlled with the help of single-drug therapy [13]. This might be attributed to patient's compliance, good response, and less incidence of adverse effects. In a study by Anand *et al*. CCBs were found to be the most frequently used group of drugs which is parallel to findings of our study [14]. In our study, BBs were prescribed most frequently next to CCBs the findings of which are similar to the study performed in a tertiary care hospital of India by Rachana *et al*. [15].

In this present study, it was observed that there was a significant change in antihypertensive prescribing pattern with a considerable increase in the frequency of intake of CCBs, ARBs, ACEIs and BBs. These observations line with other study [16]. CCBs and ARBs constitute the most frequently prescribed antihypertensive drug class. Increased prescription of

ARBs and CCBs probably suggest that clinicians are more aware of the long term cardiovascular and renovascular benefits. The prescriptions were also in accordance with the evidence and the guidelines, as these medications will reduce the chance of occurrence of diabetic nephropathy, retinopathy and other related complications in diabetes patients. When calcium channel blockers were concerned the most commonly prescribed drugs were the dihydropyridine type of calcium channel blockers (ie., Amlodipine, Felodipine), whereas the prescription of non-dihydropyridine type of calcium channel blockers was very less.

Observations on combination therapy reflect that the most commonly prescribed drugs in combination were diuretics (i.e., Thiazide and potassium sparing diuretic groups). The joint national committee on prevention, detection, evaluation and treatment of High blood pressure (JNC-8) report notes that volume overload due to inadequate diuretic therapy is one of the commonest reason for resistance observed in HTN treatments [17]. So, there is a paradigm shift towards increased prescribing of combination therapy. The present observational study depicts that the patients with co-morbidity were prescribed one or two antihypertensive along with other medications to treat their associated diseases such as diabetes mellitus, IHD, CVA and Bronchial asthma. In a study by Mohd AH *et al*. the most commonly prescribed antihypertensive among elderly patients was Amlodipine [18]. This is also in consonance with the recommendations of the JNC on Prevention, Detection, Evaluation, and Treatment of high blood pressure guidelines which state that low dose of different classes of antihypertensive drugs is more beneficial than a high dose of one [19].

According to WHO-UMC Scale maximum number of ADRs in probable class followed by possible, unlikely and certain class. Moreover, as per the modified Hartwig and Siegel's scale maximum number of ADRs was mild category and lowest in sever type of reaction was observed in this study. No ADRs were found in lethal type of reaction. These findings were consistent with the literature reported by Kabir Z *et al.* and Singh *et al*. Total 37 patients were reported ADR [20]. 30.2 % patients were on ACE inhibitors. 25.5 % patients receiving Calcium channel blocker reported side effect.

Finally, the strength of this study lies firstly in the unparalleled period of consideration (8 months). Earlier studies have been characterized by a relatively short period of consideration (usually not exceeding 3 months) with a tangible majority of them having comparatively smaller sample sizes [21-26]. It is noteworthy also that there is no prior study of this kind in a secondary healthcare setting. Furthermore, the result of this study represents a much more recent (and arguably more reliable) assessment of the subject matter and, as such, is hoped to not only merit publication but also attract attention as a renewed, data-driven basis for further research in the management and control of hypertension, ultimately.

CONCLUSION

In conclusion, our study analysed the drug utilization of antihypertensive medication and found that the prescribing pattern was totally consistent with the JNC 8 (the Eighth Report of the JNC on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure) guidelines for the treatment of hypertension. Monotherapy was consistently more recommended in the early stages of hypertension to achieve target goal of blood pressure, and CCBs were the drugs of choice for hypertensive patients.

The knowledge and prescription of drug was concluding to be the base line idea of ADRs of antihypertensive drugs in hypertensive patients visiting OPD of tertiary teaching care hospital in India. In this study, we can say that all of the prescriptions found were rational; furthermore, more changes are needed to be done in prescription of antihypertensive drugs are needed in drug prescribing practices in hypertensive patients. Patients are needed to provide information and proper counselling regarding the ADRs of drugs; this would refine the quality of life [23-26].

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