# Original Research Paper

# Medical Science

## Drug Utilization Study of Antihypertensive Drugs in Type - 2 Diabetic Mellitus with Co-Existing Hypertension in Jln Medical College, Ajmer

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**ABSTRACT**

**Introduction:** Increase in drug consumption has become a matter of concern to health authorities all over the globe. To understand the problem and solve related aspect of the problem, "Drug Utilization research Program" was developed by World Health Organization (WHO). The principle aim of drug utilization research is to facilitate rational drug use in population. The increasing importance of drug utilization studies as a valuable investigation resource in pharmacoepidemiology has been bridging it with other health related areas, such as public health, pharmacovigilance, pharmacoeconomics, eco-pharmacovigilance or pharmacogenetics. This study attempts to analyze the prescription pattern of antihypertensive drugs in type 2 diabetic mellitus (type 2 DM) with co–existing hypertension in tertiary care hospital Jawahar Lal Nehru Medical College & Hospital, Ajmer.

**Aims & Objective:** The purpose of present study was to evaluate the drug utilization pattern of antihypertensive drugs in type 2 DM with co- existing hypertension in medical OPD of Govt. tertiary care teaching hospital.

**Material & Method:** After obtaining the approval & ethical clearance from the institutional ethical committee, this drug utilization study was conducted retrospectively in medicine department of JLN Medical College, Ajmer. A total of 160 carbon copies of the prescription fulfilling the inclusion and exclusion criteria were collected. Each prescription then was analyzed to study the parameters needed to fulfill the objectives of the present study.

**Results:** A total of 160 prescriptions were analysed. In present study male patients was 48.75 % whereas female patients was 51.25 %. Angotensin receptor blocker (ARBs) (37.63 %) was the most common anti-hypertensive class followed by diuretics. An average 4.88 drugs were prescribed per prescription.

**Conclusions:** ARBs were the most frequently prescribed drug group. A number of 4.88 drugs were prescribed per prescription, which was found to be higher than the recommended. It should be brought down. We recommend that periodical prescription audit as well as problem based training course in pharmacotherapy and seminar/ workshop on the rational use of drugs should be followed.

**KEYWORDS** | Drug utilization, Angotensin receptor blockers, hypertension and Polypharmacy

## Introduction

Increase in drug consumption has become a matter of concern to health authorities all over the globe. To understand the problem and solve related aspect of the problem, "Drug Utilization research Program" was developed by World Health Organization (WHO). Drug Utilization has been defined as the "marketing, distribution, prescription and use of drugs in the society with special emphasis on the resulting medical, social and economical consequences". [1]

Drug utilization studies are a pre-requisite for the formulation of drug policies. These studies give valuable information about drug status to the medical profession, public health administration and society. The principle aim of drug utilization research is to facilitate rational drug use in population.

Rational Drug use defined by WHO as "Rational use of drugs requires that patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements for an adequate period of time, at the lowest cost to them and their community".[2]

The increasing importance of drug utilization studies as a valuable investigation resource in pharmacoepidemiology has been bridging it with other health related areas, such as public health, pharmacovigilance, pharmacoeconomics, eco-pharmacovigilance or pharmacogenetics.[3]

Hypertension and diabetes mellitus are interrelated diseases. Alone each condition is a risk factor for cardiovascular disease and together, they strongly predispose to end stage renal disease, coronary artery disease and peripheral vascular and cerebral vascular disease. [4] In diabetics, presence of hypertension increases macro and micro vascular complications and causes a 7.2 fold increase in mortality. [5] The incidence of hypertension in patients with T2DM is approximately two-fold higher than in age-matched subjects without the disease. [6]

This study attempts to analyze the prescription pattern of antihypertensive drugs in type 2 diabetes (type 2 DM) with co–existing hypertension in tertiary care hospital Jawahar Lal Nehru Medical College & Hospital, Ajmer.

## AIMS & OBJECTIVES

The main aim of this study was to analyze the prescription pattern of antihypertensive drugs in type 2 DM with co- existing hypertension.

## MATERIAL & METHOD

After obtaining the approval & ethical clearance from the institutional ethical committee, this drug utilization study was conducted retrospectively in medicine department of JLN Medical College, Ajmer, from September 2014 to October 2015. Sample size was calculated by using Epi info software. Maximum sample size turns out to be 137, taking 10% attri-

tion turned out to be 151. For convention sample taken was 160. A total of 160 prescription of type -2 diabetes mellitus with co-existing hypertension as diagnosed by physician, fulfilling the mentioned inclusion and exclusion criteria were included in the study. Patients with type 2 DM and co-existing hypertension with or without associated chronic complications and age between of 40-70 years were included in our study. Patients who do not fulfill the inclusion criteria, all patients except type 2 DM, patient's age less than 40 yrs and more than 70 yrs and patients with severe acute complication like ketoacidosis and septicemia etc. were excluded from study. Each prescription then was analysed to study the parameters needed to fulfil the objectives of the present study.

## RESULTS

Results of the study are shown in tabulated form. Table 1 shows the gender wise distribution in the study population. Out of 160 patients studied, 48.75 % were male and 51.25 % were female. The mean age of the study population was 55.41 + 9.49 years (Table-2).

Out of the total drugs prescribed, 24.80 % were antihypertensive drugs.(table-3) Among them 89.69 % of the antihypertensive agents were prescribed as single drug formulations and only 10.31% as combination drug formulations (table-4). Among the antihypertensive agents prescribed, angotensin receptor blockers (ARBs) (37.63 %) was the most common anti-hypertensive class followed by Diuretics (23.19 %), Beta blockers (20.62 %), calcium channel blockers (CCBs) (10.31 %), angiotensin converting enzyme (ACE) inhibitors (7.73 %), and Alpha blockers (0.52%) (table-5).

Table-6 shows the individual antihypertensive drugs prescribed in the study population as follows hydroclorthiazide (20.27%), Losartan (18.02 %), Atenolol (13.51 %), Telmisartan (13.51 %), Amlodipine (8.56 %), Ramipril (5.86 %), Metoprolol (4.05 %), Olmesartan (1.35%), Enalapril (0.9 %) and Nifedipine, Nebivolol and Prazosin (0.45 % each). Among ARBs, losartan was most commonly prescribed and among ACE inhibitors, ramipril was the most common drug prescribed. Losartan with Hydrochlorothiazide was most common combination prescribed.

Polypharmacy was seen in 15.62 % of study population (table-7).

## DISCUSSION

In our study, it was found that prevalence of type 2 DM with hypertension is more in female. This finding resemble with a study carried by Sachdev B. [7] Mean age to develop type-2 diabetes mellitus with co-existing hypertension was 55.41 ± 9.49 years. [Table-1]These results closely match with the findings in a study previously done by Rekha MB having mean value of 54.99 ± 6.65. [8]

Non-pharmacological treatment regimens, such as low salt diet, weight loss, exercise and alcohol restriction, have been shown in meta-analyses to lower BP. [9, 10] However, antihypertensive drugs often have to be used to reach the BP target of below 140/90 mmHg (or lower if high-risk patients). [11]

In our study ARBs (37.63 %) was the most common anti-hypertensive class of drugs prescribed followed by Diuretics (23.19 %), Beta blockers (20.62 %), CCBs (10.31 %), ACE inhibitors (7.73 %), and Alpha blockers (0.52%) [table-5]. Among ARBs, losartan was most commonly prescribed and among ACE inhibitors, ramipril was the most common drug prescribed.

ACEIs block the conversion of angiotensin I into angiotensin II by inhibition of ACE. The reduced levels of angiotensin II lead not only to vasodilatation and a fall in BP but also to a reduction of potential harmful effects of angiotensin II on the cardiorenovascular system, such as structural damage to the heart, blood vessels and kidneys. ACEIs also increase

bradykinin levels through inhibition of degradation with potential effects and side effects (cough). The ARBs block angiotensin II -Type I receptors leading to vasodilatation, but owing to their angiotensin II type I receptor selectivity, they lack the effect of potentiation of bradykinin and possibly other vasoactive peptides.[12]

In diabetic patients, combination treatment is commonly needed to effectively lower BP, Large hypertension and heart failure trials have also reported an impact on diabetes development in favour of RAS blockade. So for persons with cardiovascular or kidney disease, including microalbuminuria, or with cardiovascular risk factors in addition to diabetes and hypertension, a ACEIs or ARB should be started.

In type 2 DM with hypertension treatment with a strategy based on an ARB (losartan) significantly reduced cardiovascular morbidity and mortality compared with treatment with a β-blocker (atenolol) with a relative risk reduction of 24% (2–42%), despite almost similar BP reduction. [13]

Current guidelines for type 2 DM with hypertension by JNC-8 and American Diabetes Association (ADA) which recommend the use of either ACE inhibitor or ARB which effectively control blood pressure and also have renoprotective action with few metabolic adverse effects and having beneficial effects reducing kidney disease, congestive heart failure cardiovascular and CAD.

In this study, we also observed the incidence of polypharmacy. Average number of drugs per encounter was 4.88 which were found to be higher than the recommended. [14] this could be because diabetes mellitus and hypertension are chronic diseases usually associated with other co-morbidities like dyslipidemia, depression and coagulopathies, each of which may require one or more drugs for adequate control. As the population ages, the incidence of chronic conditions increases. With the availability of multiple medications and the variety of expert guidelines for the treatment of these conditions, additional drug therapy is often indicated. Debate has emerged about how many conditions need to be treated.[15,16] therefore treatment decisions should consider age and life expectancy, co-morbid conditions, cognitive status, living arrangements, and severity of vascular conditions. [17]

## Conclusion

It was found that most common antihypertensive class of drug prescribed was angotensin receptor blockers (ARBs) (37.63 %). Among ARBs, losartan was most commonly prescribed. Polypharmacy (5 or more than 5 drugs) was seen in 15.62 % of study population. Average number of drugs per encounter was 4.88 which were found to be higher than the recommended. It should be brought down. We recommend that periodical prescription audit as well as problem based training course in pharmacotherapy and seminar/ workshop on the rational use of drugs should be followed.

**Table - 1:  Sex wise distribution of patients**

| Sex | Number of patients | Percentage |
|---|---|---|
| Male | 78 | 48.75 |
| Female | 82 | 51.25 |
| Total | 160 | 100 |

**Table-2: Age wise distribution of patients**

| Age in years | Number of patients | Percentage |
|---|---|---|
| 40-45 | 10 | 6.25 |
| 46-50 | 34 | 21.25 |
| 51-55 | 26 | 16.25 |
| 56-60 | 43 | 26.86 |
| 61-65 | 33 | 20.63 |
| 66-70 | 14 | 8.76 |
| Total | 160 | 100 |

**Table-3: Different classes of drugs prescribed**

| Classes of drugs | Number of drugs | Percentage |
|---|---|---|
| Anti diabetics | 329 | 42.08 |
| Anti hypertensive | 194 | 24.80 |
| For other comorbidity | 259 | 33.12 |
| Total | 782 | 100 |

**Table-4: Anti-hypertensive drugs prescribed as single or combination therapy**

| Drug prescribed as | Number | Percentage |
|---|---|---|
| Total number of antihypertensive drugs prescribed | 194 | 100 |
| Number of antihypertensive prescribed as single drug formulation | 174 | 89.69 |
| Number of antihypertensive drugs prescribed as combination drug formulation | 20 | 10.31 |

**Table-5: shows the various antihypertensive drug classes prescribed**

| Antihypertensive class of drugs | Number of drugs | Percentage |
|---|---|---|
| Alpha blocker | 1 | 0.52 |
| Beta blocker | 40 | 20.62 |
| ACE inhibitors | 15 | 7.73 |
| ARBs | 73 | 37.63 |
| Calcium channel blockers | 20 | 10.31 |
| Diuretics | 45 | 23.19 |
| Total | 194 | 100 |

**Table-6: Individual antihypertensive drugs prescribed**

| Antihypertensive drugs | Number of drugs | Percentage |
|---|---|---|
| Prazosin | 1 | 0.45 |
| Atenolol | 30 | 13.51 |
| Metoprolol | 9 | 4.05 |
| Nebivolol | 1 | 0.45 |
| Enalapril | 2 | 0.9 |
| Ramipril | 13 | 5.86 |
| Losartan | 40 | 18.02 |
| Telmisartan | 30 | 13.51 |
| Olmesartan | 3 | 1.35 |
| Nifedipine | 1 | 0.45 |
| Amlodipine | 19 | 8.56 |
| Hydrochlorothiazide | 45 | 20.27 |
| Total | 194 | 100 |

**Table-7: Number of drugs prescribed/ patient/encounter**

| Number of drugs prescribed per encounter | Number of patients | Percentage |
|---|---|---|
| Two drugs | 12 | 7.5 |
| Three drugs | 68 | 42.5 |
| Four drugs | 55 | 34.38 |
| 5 or more drugs | 25 | 15.62 |

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