



## DRUG UTILIZATION PATTERN AND COST- EFFECTIVE ANALYSIS OF ANTI HYPERTENSIVE DRUGS AMONG HYPERTENSIVE IN-PATIENTS IN A TERTIARY CARE HOSPITAL

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### ARTICLE INFO

### ABSTRACT

#### Key Words

Hypertension, Prevalence, Drug utilization, Essential Drug List (EDL), Rationality.



**Introduction:** Hypertension is also known as high or raised blood pressure in which the blood vessels have persistently raised pressure. Hypertension is the most common disorder affecting the heart and blood vessels. Recent studies from India have shown the prevalence of Hypertension was found to be 25% in urban area and 10% in rural area people. In this 20% of male and 20.9% of a female was suffering from Hypertension. **Methodology:** A Prospective observational and drug utilization study was conducted in the General Medicine department in tertiary care hospital for a period of six months. Total 200 cases data were collected and analyzed. **Results:** Total 200 hypertensive patients were admitted. In these prescriptions, drugs were prescribed in both monotherapy and combination therapy. Of this Male (52%) are more prevalent than female (48%). Beta Blockers are frequently used and hypertension along with cardiovascular disease patients is more. **Conclusion:** According to the Essential Drug List only three drugs are prescribed in the hospital i.e., 50% rationality is followed in the hospital. Based on the results of cost-effectiveness we concluded that local guidelines are recommending all antihypertensive agents as the first line therapy. Prescribing solely Losartan, Amlodipine, Hydrochlorothiazide and Bisoprolol would be more cost-effective.

### INTRODUCTION

Hypertension is thought as high or raised force per unit area, within which the blood vessels have persistently raised pressure it is the foremost common disorder poignant the centre and blood vessels(1). The foremost common symptoms of cardiovascular disease area unit severe headaches, Fatigue, Vision issues, Chest pain, problem in respiration, irregular heartbeat, haematuria and Pounding within the chest, neck, or ears. Several risk factors might contribute to its development, together with age, gender, weight, physical activity,

smoking, case history, blood serum sterol, diabetes, excretory organ dysfunction, peripheral resistance vessel tone, epithelium dysfunction, involuntary tone, hormone resistance, and neurohumoral factors(2). It is a significant risk issue for stroke, infarct, vascular malady, and chronic excretory organ disease(3). The key risk factors area unit strokes and heart attacks. If not treated, high force per unit area will injury the centre and circulation, lungs, brain, and kidneys while not inflicting any of the higher than symptoms. Recent studies from Bharat have shown the prevalence of cardiovascular disease was found to be twenty fifth in

geographic region and 100 percent in country folks. during this 2 hundredth of men and twenty.9% of girls were stricken by cardiovascular disease (4). Drug utilization analysis will increase the understanding of however medicine area unit getting used and to estimate the numbers of patients exposed to such medicine at intervals a given time. Drug utilization analysis determines the pattern of drug use or profile of drug use and therefore the extent to that various medicine area unit getting used to treat conditions and to check the discovered patterns of drug use for the treatment of an exact malady (5). This conjointly provides insight into the potency of drug use and might be accustomed facilitate and set the rational allocation of attention budgets (6). The goal of drug utilization analysis should be to assess whether drug therapies is rational or irrational. Cost-effectiveness analysis (CEA) has been planned as a vital tool during this effort as a result of in several read the institution of priorities among varied health services as avital step toward an answer to the matter of rising health care prices and conjointly helps to spot neglected opportunities by light interventions that area unit comparatively cheap, however have the potential to cut back the malady burden well.as an example, each year over 1,000,000 young kids die from dehydration, once they become unwell with diarrhoea(7,8,9). Oral rehydration medical care does not diminish the incidence of diarrhoea, however dramatically reduces its severity and therefore the associated mortality. The scientific proof that oral rehydration medical care will save lives was a vital step in distinguishing this as a neglected chance for rising health (10).

**AIM:** The aim of this study was to assess the prescribing pattern, dispensing, and patient use pattern of antihypertensive drugs.  
**OBJECTIVES:** To assess the prevalence of hypertensive patients in a tertiary care hospital.

- To evaluate drug utilization pattern of antihypertensive medication.

- To assess the rationality in the usage of antihypertensive by comparing the Essential drug list.

## **METHODOLOGY:**

**Study Design:** A hospital-based prospective and observational study.

**Study Site:** The study was conducted in Department of General Medicine inManipalsuper specialty Hospital, Vijayawada, India.

**Study Period:** Six months (March 2019 – August 2019)

**Study Population:** 200 cases were collected from general medicine wards.

**Inclusion Criteria:** Patients who are willing to participate. Patients suffering with hypertension and along with other diseases. Patients who are having above 30 years.

**Exclusion Criteria:** Those who are unable or unwilling to participate.

**A collection of data:** Data of patients matching inclusion criteria were recorded. Total 200 cases were collected. The study was carried out for 6 months duration from March 2019 – August 2019. Data like name, age, sex, prescription drugs were recorded in the prepared case record form.

**Statistical Analysis:** Data was analysed on MS Excel and descriptive statistics was used to analysing the result of the study.

**Description of Tables and Figures: Tab/ Fig 1:** The table one shows the percentage of the diseased population age groups of subjects above 30 years of age among the 200 patients in which 51-60 years of age group patients are high in number i.e., 34.50% (n=39). In 51-60 age group patients' females (n=39) are more as compared to the males (n=30). The above 81 years of age group patients are less number when compared to another age group of patients. On whole males 52% (n=104) are more affected than females 48% (n=96).

Table 1: Percentage of Diseased Population Age Group

Age	No. of Patients	Male	Female	Percentage of patient
31-40	12	6	6	6%
41-50	35	22	13	17.50%
51-60	69	30	39	34.50%
61-70	58	30	28	29%
71-80	18	11	7	9%
> 81	8	5	3	4%
Total	200	104	96	100%

Table 2: Percentage of drugs used in Hospital

Category	No. of prescriptions	Percentage
ARBs	67	23.3
CCB	50	17.3
ACE Inhibitor	11	3.9
Potassium channel Activator	31	10.7
Beta-blocker	74	25.7
Loop Diuretics	33	11.4
Alpha Blocker	5	1.7
ARBs + CCB	6	2.1
Selective Beta blocker + CCB	11	3.8

Table 3: Percentage of Comorbidities with diagnosis

Sl.NO	Comorbidity	Male	Female	No of Patients	Percentage of Patients
1	HTN + Endocrine	4	11	15	7.50%
2	HTN + CVS	21	8	29	14.50%
3	HTN + CKD	5	4	9	4.50%
4	HTN+ AKI	6	5	11	5.50%
5	HTN + OA	2	3	5	2.50%
6	HTN + Cancer	6	13	19	9.50%
7	HTN+GIT disorders	7	5	12	6%
8	HTN + COPD	2	4	6	3%
9	Only HTN	6	4	10	5%
10	HTN+DM+AKI	4	3	7	3.50%
11	HTN + DM + COPD	8	1	9	4.50%
12	HTN +DM + CVS	24	11	35	17.50%
13	HTN + DM + CKD	6	2	8	4%
14	HTN + DM +OA	4	2	6	3%
15	HTN +DM+ Cancer	5	7	12	6%
16	HTN+DM+GIT disorders	2	5	7	3.50%

Table 4: Percentage of patients suffering fromHypertension

Sl. No	Year Wise	Male	Female	No. of Patients	Percentage of patients
1	< 1 year	6	9	15	7.5
2	1-5 years	63	52	115	57.5
3	> 5 years	41	29	70	35
	Total	110	90	200	100

Table 5: WHO drug core indicators

Sl. No	Prescribing INDICATORS	Frequency
1	Total no of Prescriptions	200
2	Total number of drugs in 200 prescriptions	1003
3	Total no of antihypertensive drugs	288
4	Average number of drugs per Prescription	5.3
5	Percentage of drugs prescribed by Generic Name	13.7%
6	Percentage of drugs prescribed by Brand name	86.34%
7	Percentage of drugs prescribed by parenteral	28.9%
8	Average number of antihypertensive drugs in each prescription	1.42
9	Percentage of anti-Hypertensive medicines in EDL	50%
10	Number of drugs available in the hospital as per EDL	4

Table 6: The Eight types of drugs according to the Essential Drug List are

S.NO	Essential Drug List	Availability of EDL in hospital
1.	Amlodipine	Amlodipine
2.	Bisoprolol	Bisoprolol
3.	Hydrochlorothiazide	Hydrochlorothiazide
4.	Losartan	Losartan
5.	Hydralazine	
6.	Methyldopa	
7.	Enalapril	
8.	Sodium Nitroprusside	

Table 7: Cost of various brands of antihypertensive drugs used in the hospital

Generic Name	Brand Name of Drugs	Each Drug Cost (Rupees)	Percentage of Drugs (%)	Cost of drug per day (Rupees)	Cost of drug per month (Rupees)	Cost of drug per year (Rupees)
Metoprolol	Met XL	4.25	15.57	4.25	127.5	1551.25
	Starpress XL	6.04	22.13	6.04	181.2	2204.6
	Supermet XL	5	18.32	5	150	1825
	Promolet XL	6	21.98	6	180	2190
	Metolar XL	6	21.98	6	180	2190
Torsemide	Dytor plus	5.3	100	5.3	159	1934.5
Telmisartan	Cresor	6.7	17.34	6.7	201	2445.5
	Tellzy, Telma	6.93	17.93	6.93	207.9	2529.45
	Telesta D	11	28.47	11	330	3960
	Telma H, Telma CH	14	36.24	14	420	5040
Atenolol	Aten	2.15	100	2.15	64.5	774
Cilnidipine	Cilidin	6	100	6	180	2190
Carvedilol	Cardivas	7.5	100	7.5	225	2700
Furosemide	Lasix	1	100	2	60	720
Ramipril	Ramipress	8.24	50	8.24	247.2	2966.4
	Ramistar	8.24	50	8.24	247.2	2966.4
Olmesartan	Olmezest	15.8	65.69	15.8	474	5688
	Olzex	8.25	34.30	8.25	247.5	2970
Amlodipine	Stamlo	2.73	100	2.73	81.9	982.8
Losartan	Losar	6	35.29	6	180	2160
	Losar H	11	64.70	11	330	3960
Amlodipine + Atenolol	Amlong AT	7	36.06	7	210	2520
	Amlodac AT	10	51.51	10	300	3600
	Betacard AM	2.41	12.41	2.41	72.3	867.6

Spironolactone	Aldactone	2	100	2	60	720
Nicorandil	Nicos	13	81.25	26	780	9360
	Nicardia	3	18.75	6	180	2160
Prazosin	Minipress XL	14.27	100	14.27	428	5137
Telmisartan + Amlodipine	Telmikind AM	4.74	20.51	4.74	142.2	1706.4
	Cresor AM	6	25.96	6	180	2160
	Telma A	12.37	53.52	12.37	371	4453
Lasilacton	Lasilacton	4	100	4	120	1440
Amlodipine + Olmesartan	Amlo O	1.5	100	1.5	45	540
Nimodipine	Nimodipine	5	100	20	600	7200
Concor	Bisoprolol	6	100	6	180	2160

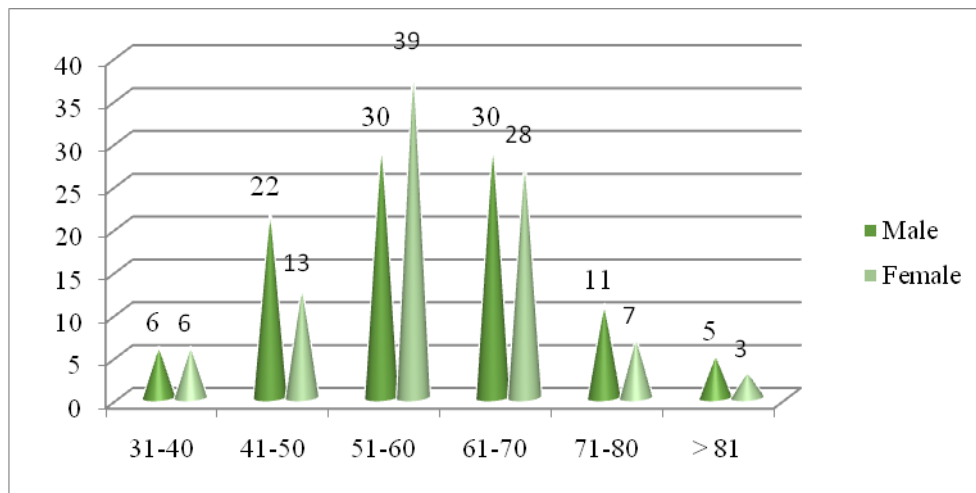


Figure 1: Percentage of Diseased Population Age groups

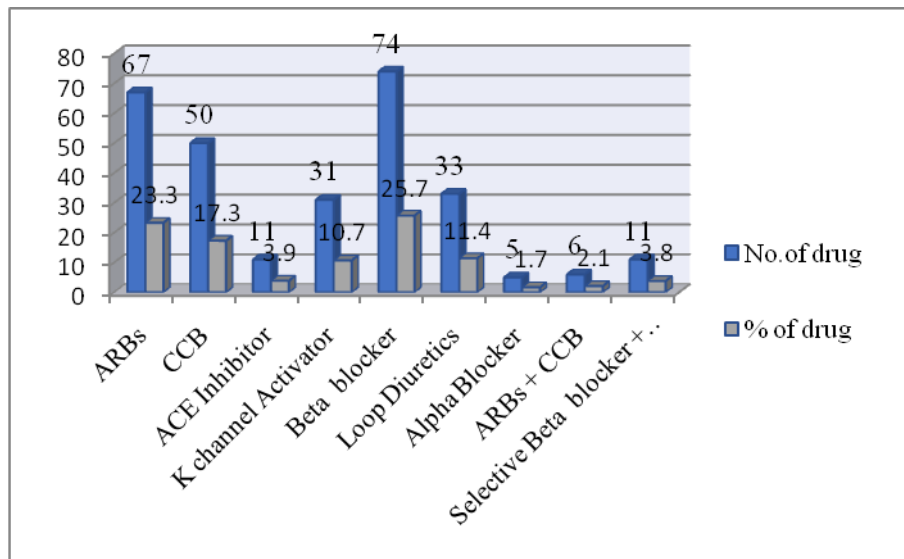
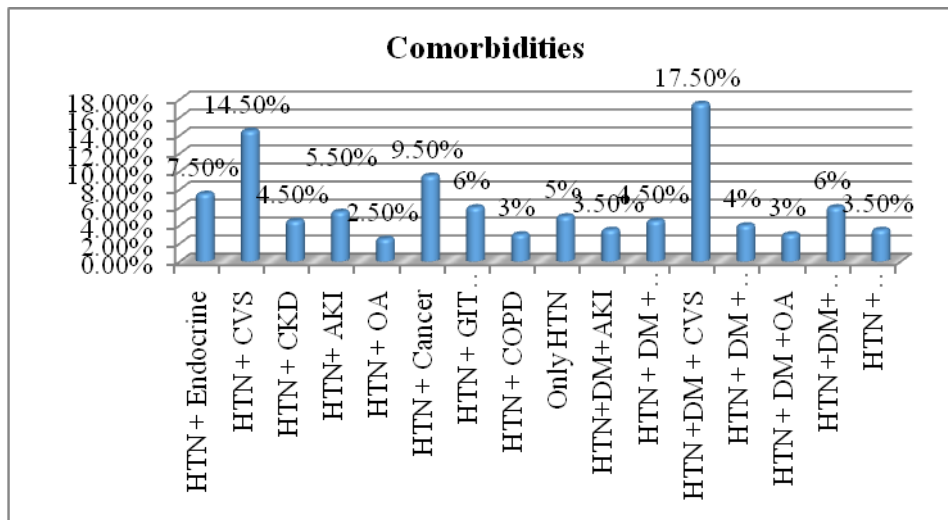


Figure 2: Percentage of Drugs Used in Hospital



**Figure 3: Percentage of comorbidities with diagnosis**

**Tab/ Fig 2:** The table two and graph explains about the percentage of drugs used in the hospital in which the most commonly used drugs are Beta blockers 25.7% followed by ARB's of 23.3% and the rarely used combination of drugs are Alpha blockers 1.7% respectively.

**Tab/Fig 3:** It explains the percentage of the comorbidities with diagnosis in which the patients with Cardiovascular diseases along with Hypertension are more affected by 14.50% (n=29). The other comorbid condition of Diabetes along with Cardiovascular diseases and HTN are mostly found in the study at 17.50% (n=35). The least percentage of comorbid condition along with HTN is Osteoarthritis of 2.50% (n=5) respectively.

**Table 4:** Table four shows the percentage of patients suffering from diagnosis in which 57.5% (n=115) of patients are suffering from hypertension from past five years. The 7.5% (n=15) of patients were suffering from past one year and 35% (n=70) of patients were suffering from more than five years period.

**Table 5:** Table five gives the data related to the WHO guidelines and its core indicators in which it explains the average number of drugs per prescription is 5.3. The percentage of drugs prescribed by generic name was 13.7%, and prescribed by injections were 28.9%. The average number of antihypertensive drugs per prescription was found to be 1.42. The percentage of antihypertensive drugs as per to the Essential Drug List (EDL) used in the hospital was 50%. According to the EDL, there are 8 types of drugs which show 100% benefit by the usage of these drugs but the availability

of drugs in the hospital was only which shows only 50% effectiveness in hypertensive patients.

**DISCUSSION:**

A prescription-based survey is one of the most effective methods to evaluate the prescribing pattern of the physicians as well as dispensing practice of pharmacists. The present study observed that the incidence of hypertension was higher in males that were comparable to the previous studies on hypertensive patients. The patients suffering from hypertension from the past five years were males are more when compared to females. In the present study most commonly, prescribed antihypertensive agents were Beta blockers and Angiotensin Receptor Blockers among the drugs for 200 patients in the present study, which was comparable with angiotensin-converting enzyme inhibitors and other class of Anti HTN drugs in a previous study<sup>5</sup>. The coexisting diseases were diabetes, cardiovascular disease, carcinoma, kidney diseases, osteoarthritis, GI disorders, COPD, and hypothyroidism along with other diseases. Co-prescribed drugs were antidiabetics, statins, anticancer drugs, diuretics, antibiotics, nebulizers, and thyroid hormones. The prescription of beta blockers and ARBs seems justified as these drugs have a protective role in diabetic patients. These two drugs are known to decrease the onset and progress of microvascular complications in hypertension and diabetes mellitus as described in previous studies. In the present study, diuretics were not used primarily. Comorbidities with CVS+DM+HTN are more prone as per to the study as compared to the other comorbid

conditions. Underutilisation of diuretics and ACE inhibitors has been reported from time to time to decrease the HTN in accordance with Beta blockers and ARB's. The study supported and described the decrease in prescribing trend of diuretics and ACE inhibitors. The present study represents the current prescribing pattern of antihypertensive agents. It implies that Beta Blockers and Angiotensin receptor blockers (ARBs) and ACE inhibitors were the leading groups of antihypertensive agents as compared with other groups of the anti-hypertensive class of drugs.<sup>5</sup> In the hospital various brands of antihypertensive drugs were used, we found total 20 different brands. Out of those 17 brands are single and remaining three brands are two drug composition. According to the study in mono therapy telmisartan occupies the highest percentage of cost. Various brands of Telmisartan were used in the hospital, from those Telma H was used in higher percentage as compared to the other brands and the least percentage of drugs used in the hospital was found to be Nicorandil. In two drug composition, Telmisartan + Amlodipine used in higher percentage in these combination different brands are available; out of those Telma AM was commonly used. According to cost parameter, Telmisartan places the highest cost as compared to the other drugs and conquers about a total average cost of INR.3493/- per annum to the individual patient. Metoprolol was placed in the second highest, the total average cost of INR.1992/- per annum. So, in cost-effective analysis, we concluded that the cost of ARB's occupied the highest place as compared to the other class of antihypertensive drugs, and followed by Beta blockers occupy the second highest place in the cost analysis. In EDL list total eight antihypertensive drugs are present, but in the hospital, only four the drugs were used to treat hypertension. The remaining four drugs were not available in hospital, because these drugs may cause severe adverse drug reactions when compared to remaining four antihypertensives. Sodium Nitroprusside, Enalapril, Hydralazine and Methyldopa were not used in hospital, because these drugs may cause severe adverse effects like Cardiac dysrhythmia, haemorrhage, decreased platelet aggregation; Blurred vision, confusion, faintness, or light-headedness; Stomach upset, dizziness, headache, leukopenia count and peeling skin; Irregular heartbeat or pulse,

shortness of breath, sweating, arm, back, or jaw pain & chest pain respectively.

The remaining four drugs were used in the hospital are Amlodipine, Bisoprolol, Hydrochlorothiazide and Losartan. These four drugs may cause less adverse effects than remaining drugs present in EDL. The higher incidents of adverse effects are edema, fatigue; Fatigue, hypoglycemia, anaemia; Electrolyte imbalance; Dyspnoea, dizziness, and antinuclear antibody (ANA) conversions.<sup>17,18</sup> Finally, compared to all the drugs present in Essential Drug List, the Bisoprolol, Losartan, Amlodipine, and Hydrochlorothiazide have less adverse effects and these are available with low cost when compared to remaining four drugs in EDL. Sum of the cost of four drugs used in the hospital-per annum was found to be INR.7360/- and the remaining four drugs present in EDL are two drugs were available in tablet form and the two drugs were available in parenteral form. The total cost of two tablets per annum was found to be INR.1628/- and remaining two drugs are sodium nitroprusside injection and the injection Hydralazine, the cost of 1 vial was INR.144/- and INR.400/- respectively.

#### **CONCLUSION:**

In this study we concluded that, most prevalence rate were shown between 51-60 years of age group 34.50%(n=69). On the assessment of those prescriptions prescribing pattern, showed that monotherapy (Angiotensin II receptor blockers) was most commonly prescribed than combinational therapy (Selective Beta blockers along with Calcium channel blocker). In EDL contains total eight drugs, out of these four drugs were available in the hospital as low cost and were as remaining four drugs were available with high cost. In cost-effective strategy to start antihypertensive treatment in monotherapy.

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