



A Study to Assess and Evaluate Prescribing Patterns of Antihypertensive Drugs in Medicine Ward of a Tertiary Care Teaching Hospital at Vijayanagara Institute of Medical Sciences, Ballari, Karnataka

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Authors' contributions

This work was carried out in collaboration between all authors. Author NGK designed the study, guided and corrected all documents. Author RB performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors BLVKS and PRT managed the analyses of the study. Author EJ managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

A prospective observational study was carried out for the period of six months in inpatient department of General Medicine ward of a tertiary care teaching hospital at Vijayanagara Institute of Medical Sciences, Ballari, Karnataka.

Objective: To assess and evaluate Prescribing Patterns of Antihypertensive Drugs.

Results: A total of 200 subjects were covered during the study period. Out of 200 subjects, 88 were males (44%) and 112 were females (56%). Prevalence of hypertension was more in the age group of 60-79 years [(n=90), 45%]. The patients were categorized depending on the stages of

hypertension that they met. 45 patients (22.50%) belonged to the pre-hypertension stage, 56 patients (28%) belonged to stage – 1, hypertension, and 99 patients (49.50%) belonged to stage – 2 hypertension. The results revealed that the maximum number of patients 92 underwent dual therapy, followed by 79 monotherapy, 27 triple therapy and 2 of the patients were treated with more than three drugs. The study showed that 39.5% were prescribed with a single antihypertensive agent, 46% with two, 13.5% with three and 1% with more than three agents.

Conclusion: Most of the prescriptions were rational, but further improvement is needed. Further studies focused on the rationale for the choice of drug based on demographic data, economic status, associated conditions and complications would give additional insights into prescribing patterns in hypertension in India.

Keywords: Rational prescribing; evaluation; prescription pattern; anti-hypertensive drugs.

1. INTRODUCTION

Hypertension is a common worldwide disease affecting humans. Because of the associated morbidity and mortality and the cost to society, Hypertension is important public health challenge. Hypertension is having complex etiology, affecting 972 million people worldwide [1]. According to WHO health statistics 2012, the prevalence of hypertension in India was 23.1% in men and 22.6% in women in equal or more than 25 years age [2].

The various reasons for hypertension are socioeconomic, behavioural, sedentary lifestyle, nutritional and poor health maintenance. The poor controlling of hypertension leads to further progression of cardiovascular complications like ischemic heart disease, heart failure, stroke and chronic renal insufficiency. Current clinical criteria for defining hypertension generally are based on the average of two or more seated blood pressure readings during each of two or more outpatients visit and it is divided as given in Table 1 [2].

Hypertension is also called as silent killer. The strong reason behind this name given to hypertension as silent killer is that the patient externally looks like fit and fine and in most cases physician could not find any signs and patient also don't have any symptoms until disease gets established. Hypertension internally affects various target organs. If it affects brain

then it is called neuropathy. Whenever hypertension affects kidneys it is called nephropathy. When hypertension affects eyes it is called retinopathy [1]. Retinopathy rates in diabetics were doubled when the systolic blood pressure exceeded 145mm Hg. Nephropathy progresses with increasing levels of arterial pressure. The risk of nephropathy increases threefold in diabetics when there is a family history of hypertension [3]. According to the joint National committee (JNC VII) report, hypertension is a major risk factor for stroke, heart failure, coronary heart disease, and end-stage renal disease. Hypertension is also commonly associated with diabetes and chronic renal failure generally [4].

Various international committees have published guidelines on the treatment of hypertension and also continuously update them keeping in view on the results of such treatment. The JNC7 (joint national committee on prevention, detection, evaluation, and treatment of high blood pressure) recommends the use Thiazide type diuretics as the first choice when used alone or in combination with drugs from other classes of anti-hypertensive in uncomplicated essential hypertension. JNC 8 guidelines it do not consider diuretics as the first choice rather consider first – line and later-line treatments to be limited to 4 classes of medications: Thiazide type diuretics, calcium channel blockers, ACE inhibitors, and ARBs followed by second- and third- line

Table 1. Table showing blood pressure classification

Blood pressure classification	Systolic BP, IN mm of Hg	Diastolic BP, IN mm of Hg
Normal	<120 mm Hg	< 80 mm Hg
Pre-hypertension	(120-139) mm Hg	80-89 mm Hg
Stage 1 hypertension	(140-159) mm Hg	90-99 mm Hg
Stage 2 hypertension	≥ 160 mm Hg	≥ 100 mm Hg

alternatives included higher doses or combinations of ACE inhibitors, ARBs, Thiazide – type diuretics and CCBs. The NICE guidelines 2011 also specify age as a selection of initiating drug therapy; with age <55 years to be initiated with ACE inhibitors and in >55 years to be initiated with CCB [2].

1.1 Aim and Objectives

The main aim of this present prospective study was carried out to assess the current trends in prescribing patterns of Antihypertensive drugs in the treatment of hypertension. The objectives includes distribution of patients according to age & gender of the patients, different stages of hypertension, commonly used antihypertensive drugs in hypertensive patients and classes of antihypertensive drugs prescribed as monotherapy and combinational therapy.

2. METHODOLOGY

2.1 Study Site

The study was conducted at General Medicine Department of VIMS Ballari District, Karnataka.

2.2 Study Design

A Prospective, Observational Study.

2.3 Study Duration

The Study was conducted for a period of six months from October 2016 to March 2017.

2.4 Study Criteria

The subjects were enrolled for the study by following inclusion and exclusion criteria.

Inclusion criteria:

- Patients aged ≥ 18 years of both genders.
- Hypertensive patients with or without comorbid conditions.
- Patients those had a history of hypertension or recently diagnosed.

Exclusion criteria:

- Patients who are less than 18 years old.
- A hypertensive patient who is admitted to intensive care unit.
- Patients with gestational hypertension, psychiatric, cancer.

- Patients who are not willing to participate in the study.

2.5 Source of Data

The data was collected by interviewing subjects and by direct access to the patient treatment chart. Timely monitoring of blood pressure which was recorded by mercury sphygmomanometer was taken from patient treatment chart.

3. PLAN OF WORK

3.1 Development of Forms Required for the Study

Forms

1. Data collection form

3.2 Data Collection Form

A suitably designed data collection form was developed and it consisted of three sections A, B and C.

Section A – Demographic details of subjects involved in the study.

Section B – Diagnosis.

Section C – Medication data such as Drug class, Dosage, Frequency, route of administration.

3.3 Study Procedure

After identifying the subjects on the basis of inclusion and exclusion criteria, investigators performed direct interview with the subject followed by direct access to the patient treatment chart after which the information was entered in section A, B and C in the data collection form.

Data collected from the enrolled subjects were assessed and analyzed on the basis of data collection form parameters with the help of Microsoft Excel. The results were tabulated and counted in numbers and percentage, followed by representing the data with the aid of bar and pie diagrams.

4. RESULTS

A prospective observational study was conducted from October 2016 to march 2017 among the inpatients in Vijayanagara Institute of medical Sciences, Ballari, Karnataka. A total of 200 subjects were covered during the study period.

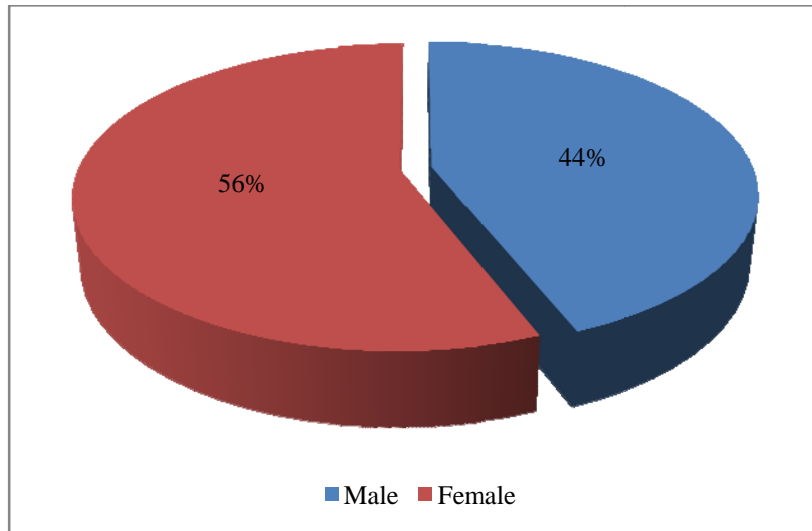


Fig. 1. Distribution of patient according to gender

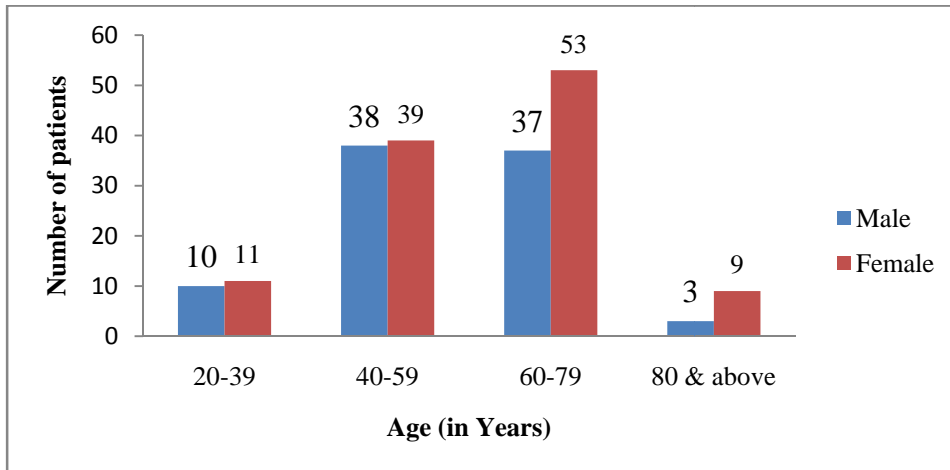


Fig. 2. Age and gender distribution

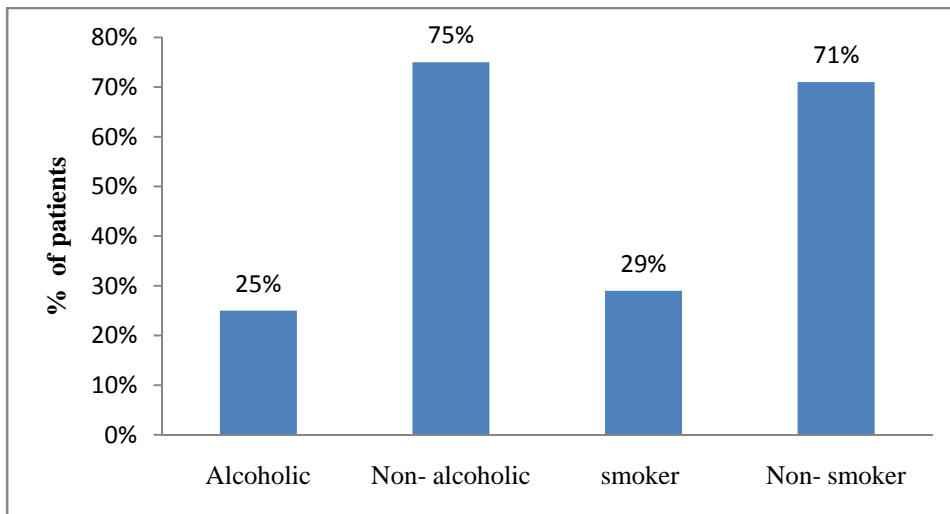


Fig. 3. Social habits among the enrolled patients

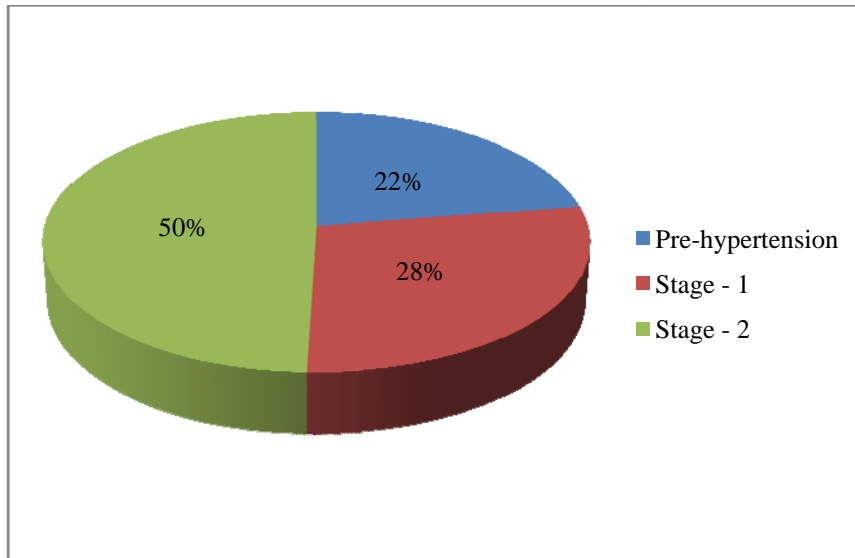


Fig. 4. Distribution of patients in different stages of hypertension

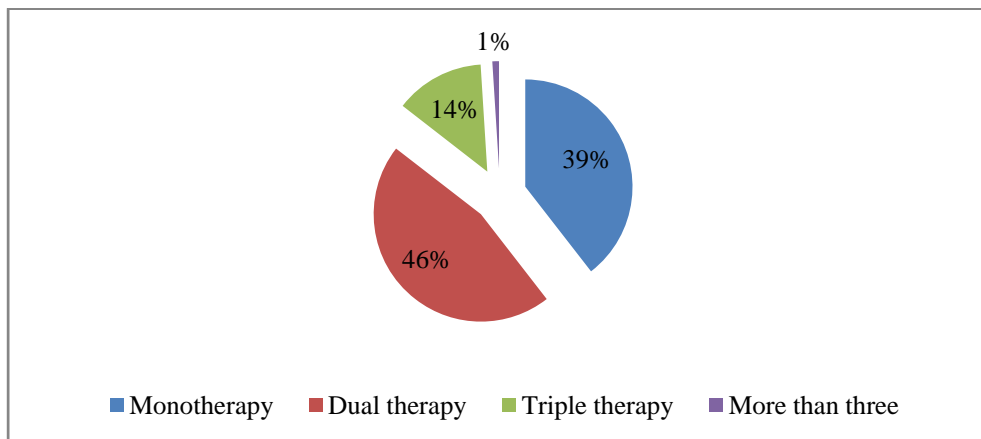


Fig. 5. Type of antihypertensive treatment

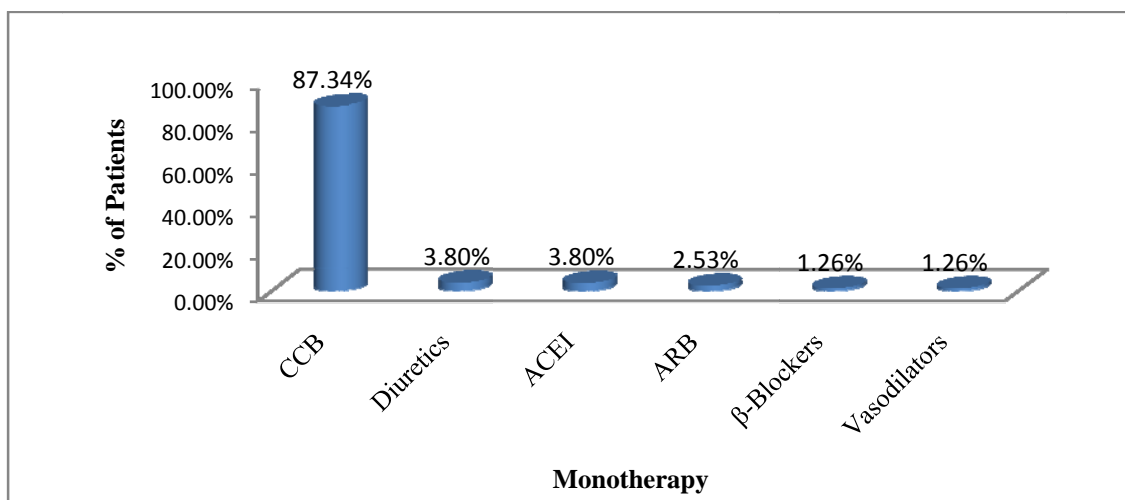


Fig. 6. Percentage distribution of monotherapy agents used for treatment

Table 2. Percentage of individual drugs prescribed as monotherapy

Class of antihypertensive drugs	Individual drug prescribed	Number of drugs (n=79)	Percentage
CCBs	AMLODIPINE	66	83.5%
	CLINIDIPINE	1	1.26%
	NIFEDIPINE	1	1.26%
DIURETICS	FUROSEMIDE	3	3.79%
	ACEI	ENALAPRIL	2
ARB	RAMIPRIL	1	1.26%
	TELMISARTAN	2	2.53%
VASODILATORS	ISOSORBIDE DINITRATE	1	1.26%
β - BLOCKERS	ATENOLOL	1	1.26%
	CARVEDILOL	1	1.26%

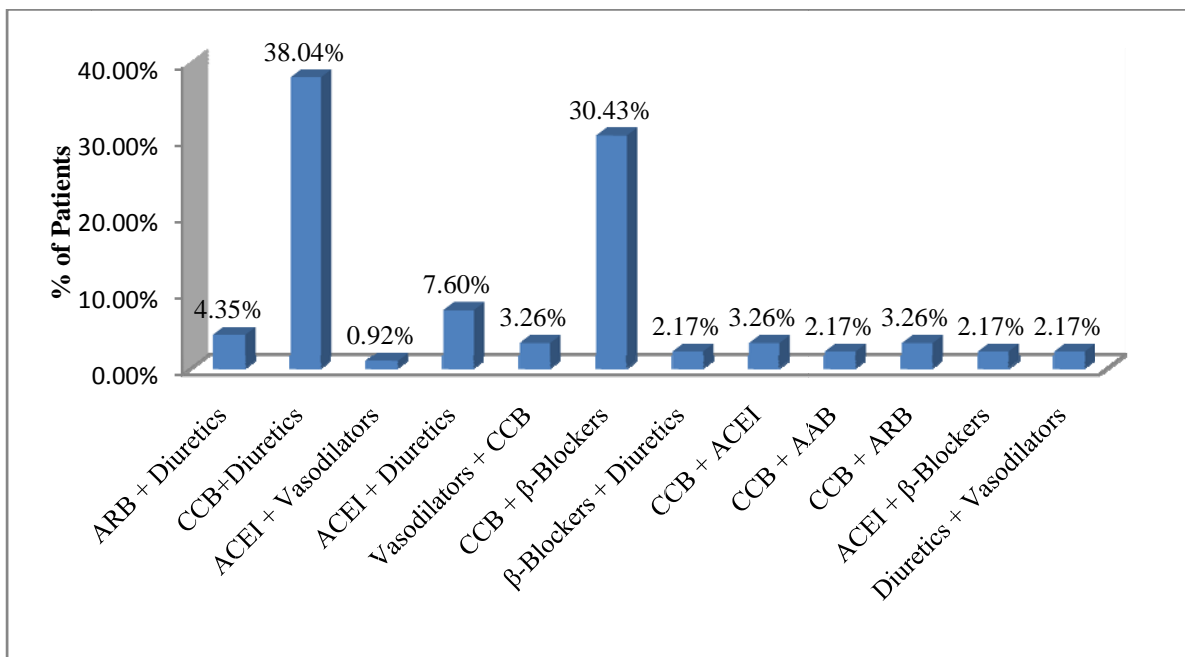


Fig. 7. Classes of antihypertensive drugs prescribed as dual therapy

Table 3. Classes of antihypertensive drugs prescribed as triple therapy

Class	Frequency of prescribing (n=27)	Percentage
β-Blockers+ARB+Diuretics	1	3.70%
Diuretics+CCB+β-Blockers	10	37%
Vasodilators+CCB+β-Blockers	1	3.70%
CCB+Diuretics+Vasodilators	3	11.11%
CCB+ARB+Diuretics	2	7.40%
CCB+β-Blockers+ARB	6	22.22%
CCB+ACEI+Diuretics	1	3.70%
ACEI+β-Blocker+Diuretics	1	3.70%
CCB+AAB+Diuretics	2	7.40%

Table 4. Classes of antihypertensive drugs prescribed as more than three

Class	Frequency of prescribing (n=2)	Percentage
CCB+ARB+β-Blockers+Diuretics	2	100 %

5. DISCUSSION

A total of 200 prescriptions were collected in which all basic demographic data of the patient like blood pressure, past medication history, social and family history was gathered. A higher number of 645 prescriptions were analyzed in the study conducted by Beg Atif M, et al. [5]. In contrast a total number of 100 prescriptions were analyzed in the study conducted by Dr. V Raj Amruth, et al. [6]. The present prospective study observed that hypertension was more prevalent in females (56%) than in males (44%). The above result gives an indication that gender is not only risk factor for hypertension. Instead, the above trend can be attributed to the sedentary life style, unhealthy eating habits and increased stress at work. In correlation, a study conducted by Khurshid Fowad, et al showed that prevalence in female (54.6%) patients is more than their male (45.4%) counterparts [7]. In contrast, male patients were predominant than females in the study conducted by Joel J. Juno, et al. [8].

The study included the subjects who are aged more than 18 years and majority of the patients were in the age group of 40 – 59 in males and 60 – 79 in females. This was strongly in liaison with the study conducted by Bathula G, et al. where the majority of the patients were in age group of 50 – 59 in males and 60 - 69 in females [9].

Age probably represents and accumulation of environment influences and the effect of genetically programmed senescence in body systems.

As per the social habits of the patients concerned, out of 200 subjects there were 50 alcoholic patients, 58 with smoking habit. The result was similar to that found by Khan GM, et al. [5]. The alcohol taking habit of the subjects showed that majority of the subjects were non-alcoholic. Although alcohol consumption increases chances of hypertension, surprisingly the result was opposite in our study. It was also found that majority of subjects were non-smokers. Smoking habit is not directly linked to develop hypertension and result obtained supported this fact [5].

The patients were categorized as per the JNC-VII classification criteria for hypertension and were observed that majority of the hypertension patient fall under stage -2. Others are classified under stage – 1 and the least number of patients in pre-hypertensive category of JNC-VII. In

contrast, patients belong to stage – 1 are more then followed by stage -2 then pre-hypertension. This was observed in the study conducted by Pavani V. et al. [10].

Among the 200 patients only 79 patients receive monotherapy and 121 patients received combination therapy. The high prescription rate of combination therapy may be due to high prevalence of patients with severe and moderate hypertension, and the presence of co-morbid diseases. The similar result is also observed in the study conducted by Etuk E, et al. [11]. In patients receiving monotherapy the rate of prescription of antihypertensive was followed in the order of frequency by CCB (87.34%), Diuretics (3.80%), ACEI (3.80%), ARB (2.53%), β -Blocker (1.26%), Vasodilator (1.26%).

Calcium channel blocker constitutes the most frequently prescribed antihypertensive drug class. This was analogous to the study conducted by Bathula G, et al. [9]. The choice of diuretics as the first line antihypertensive drug is consistent in compliance with JNC – VII guidelines. However, contrary to the traditional recommendations in most guidelines including the report of antihypertensive and lipid-lowering treatment to prevent heart attack trial (ALLHAT), calcium channel blocker was found to lower blood pressure more than diuretics when both are used as monotherapy. Among all CCB, Amlodipine was the most commonly prescribed drug among monotherapy [11]. In diuretics, Furosemide was the most commonly prescribed drug and in ACE Inhibitors class Enalapril was mostly prescribed drugs. The least commonly prescribed class of drugs includes β -Blocker and vasodilators. The results are similar to a study conducted by Bathula G, et al. [9].

Among the dual drug combination therapy CCB+Diuretics (38.04%) is most commonly prescribed. The results are in conformity with the study conducted by Konwar Mahanjit, et al. [2]. This was followed by CCB+ β -Blocker (30.43%). The fixed dose combination of β -Blocker and calcium channel blocker provides efficiency and tolerability in the treatment of arterial hypertension [5]. Followed by ACEI+Diuretics (7.60%), ARB+Diuretics (4.35%), Vasodilators+CCB (3.26%), CCB+ACEI (3.26%), CCB+ARB (3.26%), β -Blocker+Diuretics (2.17%), CCB+AAB (2.17%), ACEI+ β -Blocker (2.17%), Diuretics+Vasodilators (2.17%) and least followed dual drug combination is ACEI+Vasodilators (0.92%).

The results in our study reveal that triple therapy was given among 27 patients with Diuretic+CCB+ β -Blockers (37%) being the most prescribed combination followed by CCB+ β -Blocker+ARB (22.22%), CCB+Diuretics+Vasodilators (11.11%), CCB+AAB+Diuretics (7.40%), CCB+ARB+Diuretics (7.40%) and the least was β -Blocker+ARB+Diuretics (3.70%), Vasodilators+CCB+ β -Blocker (3.70%), CCB+ACEI+Diuretics (3.70%), ACEI+ β -Blocker+Diuretics (3.70%).

This study revealed that more than three drug therapy was given among 2 patients with CCB+ARB+ β -Blocker+Diuretics was prescribed.

6. CONCLUSION

This study concludes that hypertension is more prevalent in females than in males, with its prevalence increases with age. In our study, it was found that patient between the age group of 60 – 79 years have a high incidence of hypertension and among hypertensive patients, females are higher than males. The results showed that prescription varies by age, gender. Our study showed that it's better to prescribe combination therapy because a lot of clinical trials support the combination therapy for cardiovascular disease. So this could be the subject of study for physicians and pharmacist for determining the safety and efficacy of drugs.

The present study revealed that calcium channel blocker (Amlodipine) was the drug of choice for hypertensive patients as a single drug therapy. And in combination therapy, CCB+Diuretics are the most commonly prescribed drugs then followed by CCB+ β -Blockers.

But in combination therapy diuretics are being utilized in combination with Angiotensin receptor blocker, ACE Inhibitor, calcium channel blocker and the pattern supports JNC-VII guidelines as diuretic play a very important role in adequate reduction of BP by reducing blood volume and vascular resistance.

To conclude, most of the prescriptions were rational, but further improvement is needed. Further studies focused on the rationale for the choice of drug based on demographic data, economic status, associated conditions and complications would give additional insights into prescribing patterns in hypertension in India.

CONSENT AND ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Hamid AIMS, Karnik DN. Evaluation of prescribing pattern of hypertensive patients admitted in general medicine ward of KEM hospital Mumbai. *International Journal of Advances in Pharmacy Medicine and Bio-allied Sciences*. 2016;4(1):1-6
2. Konwar M, Paul KP, Das S. Prescribing pattern of antihypertensive drugs in essential hypertension in medicine out patients department in a tertiary care hospital. *Asian Journal of Pharmaceutical and Clinical Research*. 2014;7(2):142-144.
3. Johan JP, Manimekalai K, Velvizhy R. Pattern of antihypertensive drug utilization in a tertiary care hospital. *International Journal of Pharma and Bio Sciences*. 2015;6(4):759-764.
4. Pyarelal. A study of prescription pattern of antihypertensive drugs in a tertiary care teaching hospital. *Indian Journal of Basic & Medical Research*. 2015;4(3):584-588.
5. Beg AM, Dutta S, Varma A, Kant R, Bawa S, Anjoom M, Sindhu S, Kumar S. A study on prescribing pattern in hypertensive patients in a tertiary care teaching hospital at Dehradun, Uttarakhand. *International*

- Journal of Medical Science and Public Health. 2014;3(8):922-926
6. Amruth VR, Gautam A, Ghimire S, Shashidhar G, Mahesh MN, Gyawali S. Prescribing pattern of antihypertensive drugs and cost analysis in a tertiary care teaching hospital. World Journal of Pharmacy and Pharmaceutical Sciences. 2015;4(5):958-976.
 7. Kuchake GV, Maheshwari OD, Surana JS, Patil HP, Dighore NP. Prescription pattern of antihypertensive drugs in uncomplicated hypertensive patients at teaching hospital. Indian Journal of Pharmacy Practice. 2009;2(2):74-80.
 8. Joel JJ, Daniel N, Sharma R, Shastry CS. Drug utilization pattern of anti-hypertensives in a tertiary care hospital in South India. World Journal of Pharmacy and Pharmaceutical Sciences. 2014;3(10): 1094-1099.
 9. Bathula G, Tippaluru S, Palagiri RK. A prospective study on prescribing pattern and utilization of anti- hypertensive drugs in a tertiary care hospital. International Journal of Pharma Research & Review. 2015;4(12):1-5.
 10. Pavani V, Cidda M, Krishna RT, Parmar YM, Nalini M. Study of prescribing of antihypertensive drugs. International Journal of Pharmacy & Biological Sciences. 2012;2(2):317-327.
 11. Murti K, Khan AM, Dey A, Sethi KM, Das P, Pandey K. Prescription pattern of antihypertensive drugs in adherence to JNC-7 guidelines. American Journal of Pharmacology and Toxicology. 2015;10(1): 27-31.

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