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Original Research Article.

Comparative Assessment of The Pattern of Anti-Hypertensive Drugs Prescribed in Medicine and Cardiology Out-Patient Department OPD

Dhodi Dinesh K.[1], Beldar Amit S.[2*]

[1]Associate Professor, [2*]Assistant Professor,
Department of Pharmacology, Grant Govt. Medical College, Mumbai, Maharashtra, India.

ABSTRACT

Background: Hypertension is an important public health challenge to the economically developed as well as developing countries. These hypertensive patients are treated by both general medicine department as well as cardiology department. Present study was planned to compare the prescribing patterns of antihypertensive medications in cardiology and general medicine department.

Methods: An observational, cross sectional study was carried out for a period of 6 months after an approval from institutional ethics committee. Adult patients of either sex, diagnosed with hypertension and taking at least one medication were included. Data was collected in a proforma which included demographic details and details of drug prescribed.

Results: There was unequal distribution of patients among medicine OPD 223 patients and Cardiology OPD 434 patients. Calcium Channel Blockers CCBs [55.1%], followed by Angiotensin Converting Enzyme Inhibitors ACEIs [15.3%] were more commonly prescribed in medicine OPD whereas adrenergic beta receptor blockers BB [42.4%] were most commonly prescribed in Cardiology OPD. Combination of CCB and BB [40.96%] was more preferred in medicine OPD whereas ACEIs and BB combination [53.03%] was preferred in Cardiology OPD.

Conclusions: There was variation in the prescription of antihypertensive drugs among medicine OPD and Cardiology OPD. CCBs were most commonly used in medicine OPD whereas BBs are preferred in cardiology OPD. Single drug was more preferred by medicine OPD whereas combination therapy was preferred by cardiology OPD.

Keywords: Hypertension, Antihypertensive Drugs, Drug Utilization Study, Prescription Audit.

***Correspondence to:**

Dr. Amit Beldar,
Assistant Professor,
Department of Pharmacology,
Grant Govt. Medical College,
Mumbai, Maharashtra, India.

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INTRODUCTION

Hypertension or High blood pressure is one of the strongest modifiable risk factors for cardiovascular and renal diseases and is a condition that afflicts almost 1 billion people worldwide.[1] It is usually asymptomatic until the damaging effects of hypertension such as stroke, myocardial infarction, renal dysfunction, visual problems etc. are observed.[1] It is labeled as 'Silent Killer' because in considerable proportion of cases the disease tends to be asymptomatic for prolonged time.[2] It is also considered as an 'Iceberg' disease because unknown morbidity far exceeds the known morbidity.[3] It ranks fourth in the world by its prevalence.[4]

Hypertension is an important public health challenge in both economically developing and developed countries. WHO health statistics 2012 revealed that, the prevalence of hypertension in India was 23.1% in men and 22.6% in women in equal or more than 25 years age.[5]

According to a recent review on "Global Burden of hypertension", the estimated prevalence of hypertension in aged 20 years and older in India is expected to increase by approximately 60% by 2025.[6]

It is well documented that, in addition to lifestyle modifications, convenient antihypertensive drug therapy substantially reduces the risk of hypertension-related morbidity and mortality.[6] The treatment of hypertension is constantly evolving in response to new evidence published every now and then and a plethora of new drugs are being added at a rapid pace.

Various international committees have published guidelines on the treatment of hypertension. The JNC 7 Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure recommends the use thiazides type diuretics as the first choice when used alone or in combination with drugs from other

classes of anti-hypertensive in uncomplicated essential hypertension.[7] For > 20/10 mm Hg above goal BP, combination of two agents is recommended with one of them is usually being thiazides diuretic.[7] But in recent JNC 8 guidelines it do not consider diuretics as the first choice, rather, considers first-line and later-line treatments to be limited to 4 classes of medications: thiazides-type diuretics, calcium channel blockers CCBs, Angiotensin Converting Enzyme inhibitors ACEI and Angiotensin Receptor Blockers ARBs. followed by second- and third-line alternatives included higher doses or combinations of ACE inhibitors, ARBs, thiazides-type diuretics and CCBs.[8] The National Institute for Health and Clinical Excellence NICE guideline[9] recommend angiotensin-converting enzyme ACE inhibitor or angiotensin-II receptor blocker ARB as first choice antihypertensive drug under 55 years, whereas calcium channel blockers CCBs are preferred first choice over 55 years. A combination therapy has recently been recommended as first-line intervention, particularly in patients with severe hypertension.[7,8] but despite the undisputed importance to treat hypertension aggressively, control rates are still unsatisfactory.

At present, hypertensive patients are treated in medicine as well as the cardiology department. There is no clear guideline which says about the treatment of hypertensive patient should be done in a particular department. The pattern of prescription may vary between the two departments which may affect the compliance of patients and rationality of prescription. Therefore, the present study was planned with the objective to compare the prescribing pattern of antihypertensive drugs in patient attending medicine and cardiology OPD and to analyze the factors affecting the difference in prescribing pattern of antihypertensive in the above mentioned OPD, if any.

METHODS

The present study was an observational, cross sectional study conducted in the department of pharmacology in collaboration with the medicine and the cardiology department of Grant Govt. Medical College and Sir JJ Group of Hospitals for a period of 6 months from January 2014 to June 2014. The study commenced after approval of Institutional Ethics Committee IEC and the concerned department. Confidentiality with respect to identity of participating patients and the data obtained was maintained at all levels. The personal right to withdraw from the study at any moment was ensured.

Patients of either sex or age diagnosed with hypertension by the consulting physicians of our tertiary care hospital after recording blood pressure for frequent time and at frequent intervals, taking at least one anti-hypertensive drug and willing to participate by giving written consent were included in the study while pregnant females, mentally compromised, unconscious patients and patients unable to respond to verbal questions were excluded from the study. Data was collected in a pre-designed proforma which included patient's demographic details and details of the drugs prescribed. Data was compiled in Microsoft Office Excel 2010 Version and a descriptive statistical analysis was carried out. Observations were presented as simple percentages of different variables.

Table 1: Single drug per prescription in medicine and cardiology OPD

Drugs	Medicine OPD		Drugs	Cardiology OPD	
	No of drugs	Total %		No of drugs	Total
CCBs			**CCBs**		
Amlodipine	52	54 55.10	Amlodipine	18	1928.78
Diltiazem	2		Diltiazem	1	
BB			**BB**		
Metoprolol	4	19 19.38	Metoprolol	19	28 42.42
Atenolol	15		Atenolol	9	
α + β Blocker-			**α + β Blocker-**		
Carvedilol	2	22.04	Carvedilol	1	1 1.51
ACEIs			**ACEIs**		
Enalapril	4	1515.30	Enalapril	3	69.09
Ramipril	9		Ramipril	1	
Captopril	2		Captopril	2	
ARBs			**ARBs**		
Telmisartan	3	66.12	Telmisartan	2	913.63
Losartan	3		Losartan	7	
Diuretics			**Diuretics**		
Frusemide	2	22.04	Frusemide	2	23.03
α-Blocker-			**α-Blocker-**		
Prazosin	0	00	Prazosin	1	11.51
TOTAL	**98**	**98100**	**TOTAL**	**66**	**66 100**

Table 2: Two drug per prescription in medicine and cardiology OPD

Medicine OPD		Cardiology OPD	
Drugs	**Total %**	**Drugs**	**Total %**
CCBs, BB	34 40.96	**CCBs, BB**	189.09
CCBs, ACEIs	910.84	**CCBs, ACEIs**	31.51
CCBs, ARBs	80.96	**CCBs, ARBs**	2412.12
CCBs, Diuretic	1315.66	**CCBs, Diuretic**	10.50
BB, Diuretic	22.40	**BB, Diuretic**	31.51
ACEIs, Diuretic	56.02	**ACEIs, Diuretic**	42.02
ACEIs, BB	78.43	**ACEIs, BB**	10553.03
ARBs, Diuretic	44.81	**ARBs, Diuretic**	168.08
CCBs, α - Blocker	11.20	**ACEIs, α+β Blocker**	10.50
TOTAL	83100	**ARBs, BB**	2110.60
		D + D	21.01
		TOTAL	198 100

Table 3: Three drugs per prescription in medicine and cardiology OPD

Medicine OPD		Cardiology OPD	
Antihypertensive Drugs	**Total %**	**Antihypertensive Drugs**	**Total %**
CCBs, ARBs+ Diuretic	1134.37	**CCBs, ARBs+ Diuretic**	43.03
CCBs, ARBs, BB	825	**CCBs + BB, ARBs**	2720.45
CCBs + ARBs, Diuretic	39.37	**CCBs + ARBs+ Diuretic**	21.51
α+β Blocker, Diuretic, ACEIs	39.37	**α +β Blocker, Diuretic, ACEIs**	1410.60
CCBs, Diuretic, α-Blocker	26.25	**CCBs, Diuretic, α-Blocker**	21.51
ARBs + Diuretic, BB	26.25	**ARBs, Diuretic, BB**	11 8.33
BB, ACEIs, ARBs	13.12	**BB, ACEIs, ARBs**	64.54
α+β Blocker, Diuretic, ARBs	13.12	**α+β Blocker, Diuretic, ARBs**	21.51
α+β Blocker, ARBs + Diuretic	13.12	**α+β Blocker, ARBs + Diuretic**	10.75
α+β Blocker, Diuretic, K^+ channel openers	0	**α+β Blocker, Diuretic, K^+ channel openers**	32.27
BB, Diuretic, K^+ channel openers	0	**BB, Diuretic, K^+ channel openers**	21.51
ARBs, Diuretic + Diuretic	0	**ARBs, Diuretic + Diuretic**	10.75
CCBs, Diuretic + Diuretic	0	**CCBs, Diuretic + Diuretic**	10.75
α+β Blocker, Diuretic, Diuretic	0	**α+β Blocker, Diuretic, Diuretic**	43.03
CCBs, ACEIs, BB	0	**CCBs, ACEIs, BB**	1712.87
CCBs, ACEIs, Diuretic	0	**CCBs, ACEIs, Diuretic**	43.03
CCBs + BB, ACEIs	0	**CCBs + BB, ACEIs**	53.78
Diuretic, ACEIs, BB	0	**Diuretic, ACEIs, BB**	6246.96
BB + ACEIs, K^+ channel openers	0	**BB + ACEIs, K^+ channel openers**	32.27
BB, BB, ACEIs	0	**BB, BB, ACEIs**	10.75
CCBs, ACEIs, ACEIs	0	**CCBs, ACEIs, ACEIs**	10.75
TOTAL	**32**	**TOTAL**	**129**

Table 4: Four drugs per prescription in medicine and cardiology OPD

Medicine OPD		Cardiology OPD	
Antihypertensive Drugs	**Total %**	**Antihypertensive Drugs**	**Total %**
CCBs, α+β Blocker, Diuretic, α-Blocker	3 30	**CCBs + ARBs, Diuretic, α Blocker**	512.19
CCBs, BB, ARBs + Diuretic	220	**CCBs, BB, ARBs, Diuretic**	1434.14
CCBs, BB, Diuretic, BB	440	**CCBs + BB, ARBs + BB**	24.87
CCBs, ARBs, Diuretic + Diuretic	110	**CCBs, BB, Diuretic, Diuretic**	614.63
		BB, D, ARBs + Diuretic	37.31
		CCBs + ARBs, BB + ACEIs	12.43
		CCBs + ARBs, BB, K^+ channel openers	24.87
		CCBs + ARBs, Diuretic, Central Sympatholytic	12.43
		CCBs + ARBs, Diuretics, CCBs	24.87
		α+β Blocker, D, ACEIs, K^+ channel openers	12.43
		ACEIs, BB, ARBs + Diuretic	24.87
TOTAL	**10**	**TOTAL**	**39**

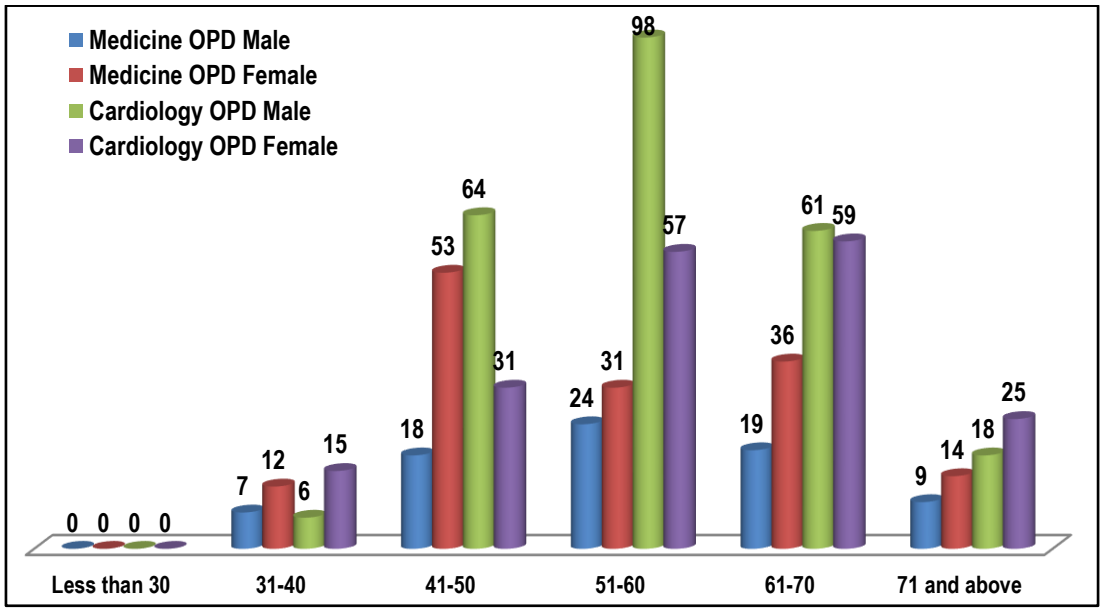

Figure 1: Age and Sex Distribution of patients n = 657.

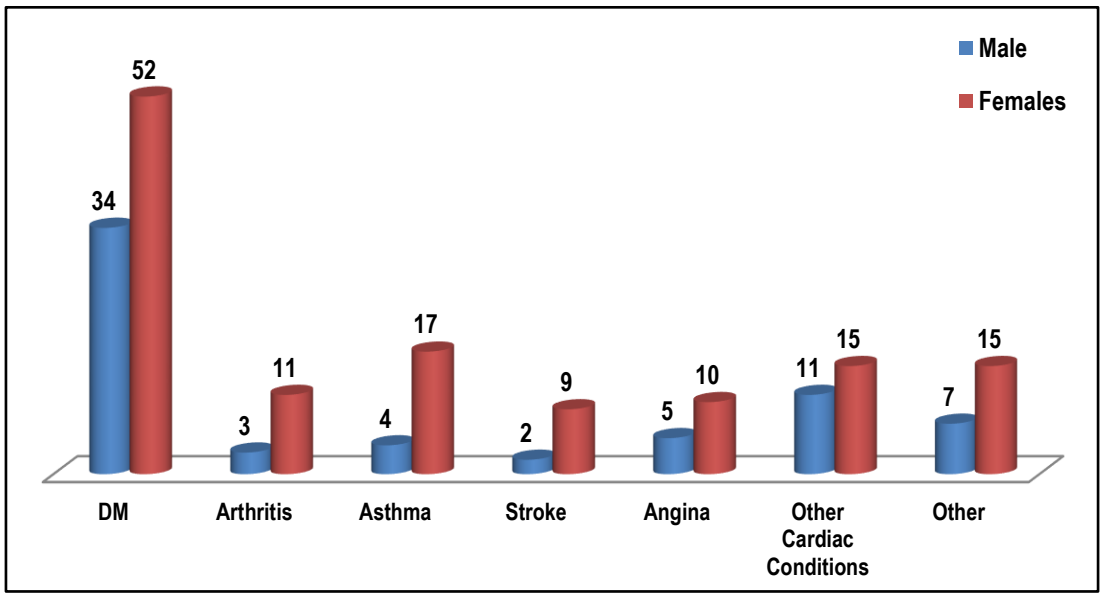

Figure 2: Co-morbid conditions in Medicine OPD

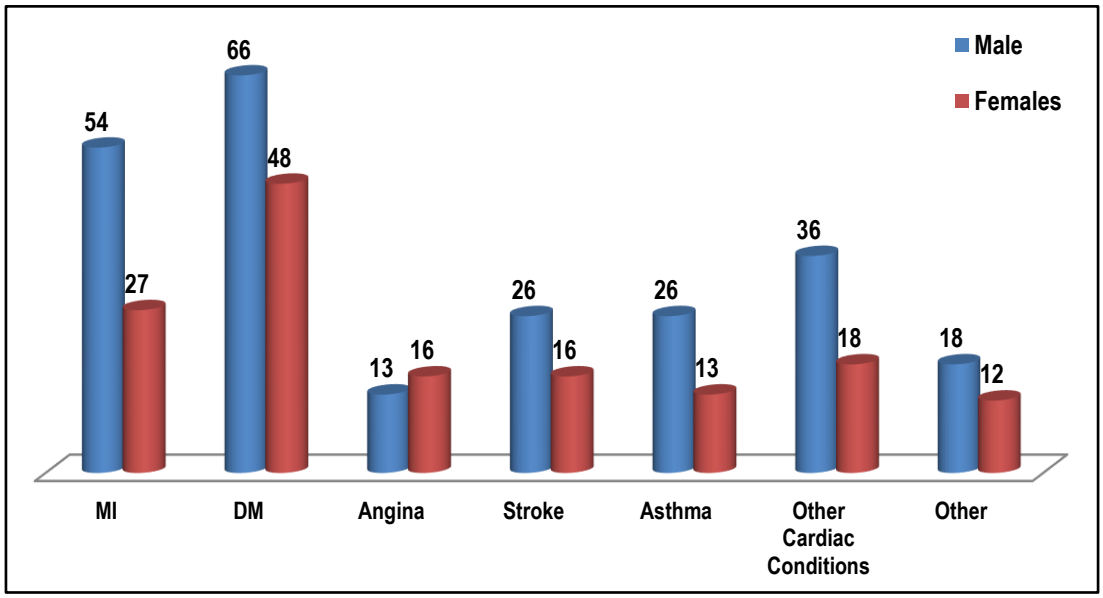

Figure 3: Co-morbid conditions in Cardiology OPD

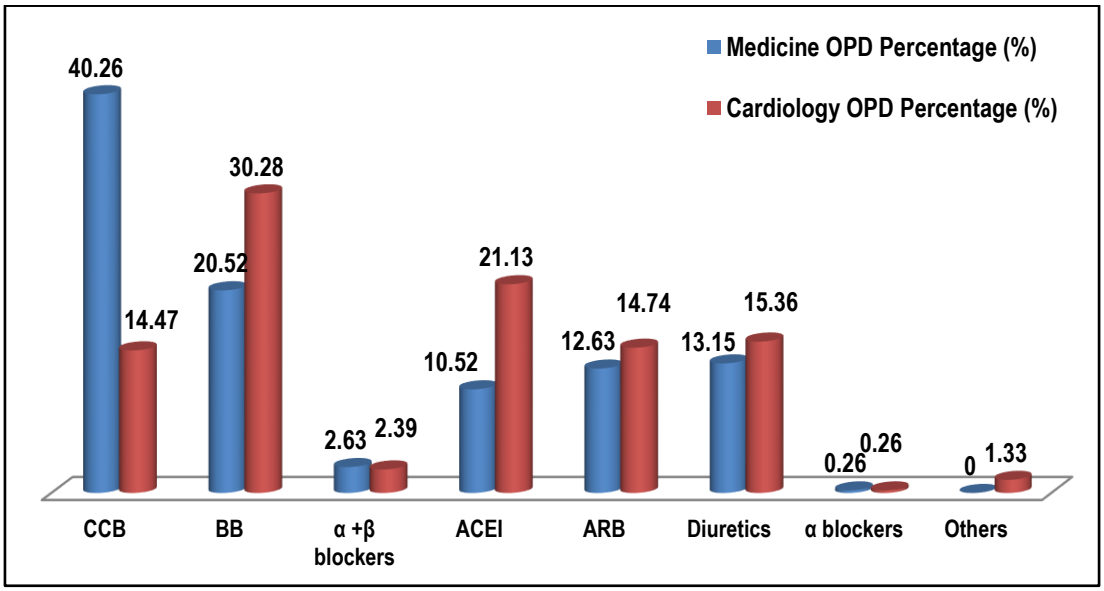

Figure 4: Drugs Prescribed in Medicine and Cardiology OPD

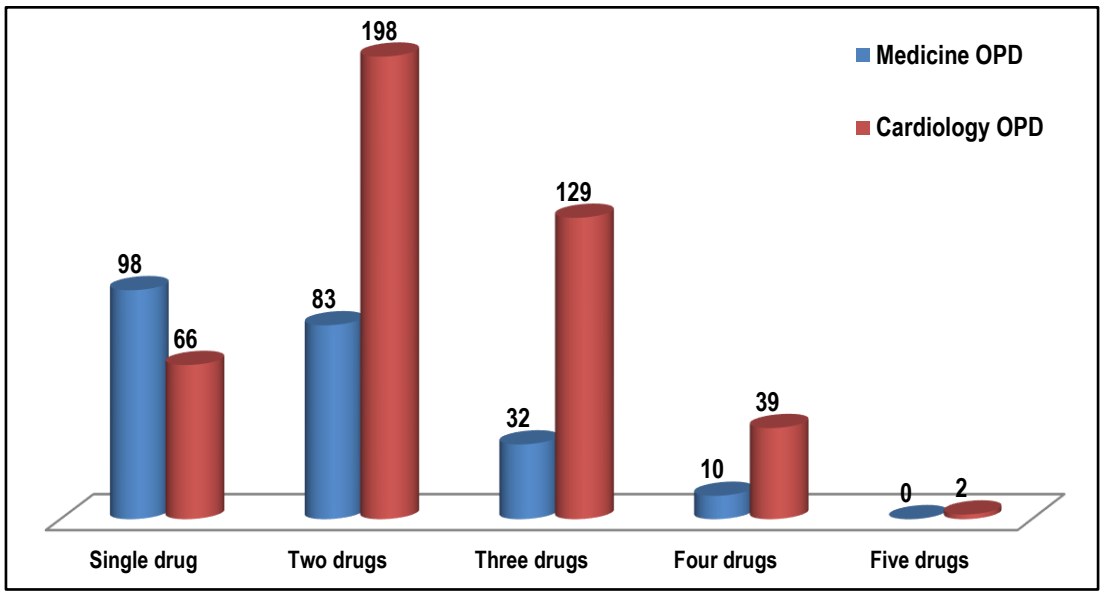

Figure 5: Anti-hypertensive drugs per prescription

RESULTS

The present study which was conducted for a period of 6 months in the medicine and cardiology OPD showed unequal distribution of the patients in the medicine and cardiology OPD, with 223 patients attended medicine OPD while 434 patients attended cardiology OPD. Demographic characteristic of the patients showed females were more compared to males in medicine OPD whereas male was more in the cardiology OPD. Age wise distribution Figure 1 showed majority of the patients belong to 41-50 years in medicine OPD whereas 51-60 year old patients were in majority in cardiology OPD.

As in Figure - 1, amongst the patients attending medicine OPD, majority of the patients 61.88% were stage 1 hypertensive >140/90mmHg according to JNC VII classification [7] whereas majority 69.38% of those attending cardiology OPD were stage II hypertensive >160/100.

As shown in Figure 2, and Figure 3, diabetes mellitus was the most common co-morbid condition associated with hypertension in both the OPDs. Also, in medicine OPD, asthma was next most common co-morbid condition Figure 2. In cardiac OPD, myocardial infarction was second most common co-morbid condition Figure 3. Analysis of the anti-hypertensive drugs prescribed showed, calcium channel blockers CCB were the most commonly prescribed drug in medicine OPD followed by angiotensin converting enzyme inhibitors ACEI whereas beta blockers BB were most commonly prescribed in cardiology OPD followed by ACEI, Figure 4. Single drug prescription was the most preferred in medicine OPD followed by combination of two drugs whereas combination of two drugs was preferred in cardiology OPD followed by combination of three drugs, Figure 5.

Anti-hypertensive drugs in the form of fixed drug combinations FDC were prescribed more in cardiology OPD 18.93% in comparison to medicine OPD 7.72%. As shown in Table -1, amongst the single drug prescription CCBs were most commonly prescribed in medicine OPD followed by BB whereas BBs were the most commonly prescribed in cardiology OPD followed by CCBs.

As shown in Table - 2, combination of CCB and BB were more preferred in medicine OPD followed by combination of CCBs and Diuretics D whereas combination of ACEIs and BB were preferred in cardiology OPD followed by combination of CCBs and Angiotensin receptor blockers ARBs.

As shown in Table - 3, when three anti-hypertensive drugs were prescribed, combination of CCB, ARB and D were most common in medicine OPD whereas combination of D, ACEIs and BBs were preferred in cardiology OPD.

As shown Table - 4, combination of 2 BB, CCB and D was preferred in medicine OPD when 4 drugs were needed for prescription, whereas combination of CCBs, BB, ARBs and D was preferred in cardiology OPD.

Combination of 5 drugs was never prescribed in medicine OPD whereas it was prescribed to 2 patients in cardiology OPD, ACEIs, ACEIs, D, CCBs and BB. FDCs of ARBs and Diuretics were most commonly prescribed in medicine OPD followed by CCB and BB whereas FDC of ARB and CCB was most commonly prescribed in cardiology OPD followed by that of BB and ACEIs. Majority of the drugs were prescribed by their brand names in both the OPDs.

DISCUSSION

Hypertension is one of the leading causes of mortality and morbidity around the world. The prevalence of this disorder is expected to increase to 1.15 billion by 2025 in developing countries alone including India. Irrespective of the fact that many medicines are present at present to prevent the mortality and morbidity associated with hypertension the incidence is still on rise. Hypertensive patients can be treated in medicine and cardiology OPD. So, the prescription pattern may vary between the departments.

So, the present study was planned for 6 months to compare the prescription pattern of the two departments. Our study showed unequal distribution of the patients among the two departments with majority of the patients 43466.05% opting for cardiology department and the remaining 22333.94% for medicine OPD. Overall result showed males 333 50.68% and females 324 49.31% were in almost equal proportion, but females were in majority in the medicine OPD while males were in majority in cardiology OPD. The results of our study were in accordance with the study conducted by Jhaj and Goel[10] where male and females were in almost equal proportion, but majority of the studies conducted in India[11,12] and abroad, Hong Kong[13], Germany.[14] On the contrary males were in majority in a study conducted by Malhotra in North India.[15] Age wise distribution of the patients showed patients belongs to 51-60 years of age presented more with complaints of hypertension, but, majority of the patients belongs to 41-50 years in the medicine OPD and to 51-60 years in cardiology OPD. The above result did prove that as the age increases the risk of hypertension also increase especially after 40 years. Results of our study were comparable to studies done in past[16,17] where the maximum prevalence of hypertension was in the age group of 51-60years. But a study conducted by Khurshid F[11], reported the prevalence to be more among 31-40 years. The above results prove that apart from advancing age, a multi factorial inheritance of the disorder.

Diabetes mellitus was the most common co-morbid condition associated with hypertension in both medicine and cardiology OPD. Similar pattern of co-morbidity was seen in the study conducted by Sharminder Kaur[18] and Mirza Beg.[19] The other co-morbidity present in our study was angina, asthma, arthritis, stroke, myocardial infarction. The presence of co-morbidity decides mainly the pattern of drugs prescribes to patients, as, some drugs are contraindicated in particular condition and some drugs are favoured in other. The average number of antihypertensive drugs prescribed in medicine OPD was 1.79 ±0.85 with maximum single drug prescribed to 43.94% patients and the average antihypertensive drug prescribed in cardiology OPD was 2.33±0.85 with maximum 2 drugs per prescription prescribed to 45.62% patients. The above results can be compared to study conducted by Khurshid[11] and Malhotra[15] where the average anti-hypertensive drugs were 1.8 and 1.9 respectively.

A combination of two or more drugs was prescribed to 56.05% patients in medicine OPD whereas it was prescribed to 84.79% patients in cardiology OPD. The above results can be compared to several other studies[20,21] which demonstrated that combination therapy was needed in atleast 70 % of patients to attain optimal blood pressure control. But many other studies have demonstrated the preference of single drug therapy by the physician.[12,22,23] Overall assessment of the anti-hypertensive drugs prescribed showed, CCBs 40.26% were the most common drug prescribed in the medicine OPD followed by BBs 20.52%, whereas BBs 30.28% were the most preferred drug in cardiology OPD followed by ACEIs 21.13%. The pattern of anti-hypertensive drugs prescribed differs from study to study, may be because of the different demographic characteristic and the associated co morbid condition. ARBs and ACEIs were the most commonly prescribed drugs in the study conducted by Mirza Beg[19], Elliot WJ.[25] A common observation in all the above-mentioned studies, including ours, was the underutilization of diuretics, in spite of the JNC 7 report recommendation that in the absence of any specific indications, a diuretic should be selected as the initial therapy for hypertension.[7]

Amongst the single drug prescription, Amlodipine, a calcium channel blocker, 5253.06% was the most commonly prescribed single drug in medicine OPD followed by Atenolol, a beta blocker, 1515.30%. Whereas, Metoprolol, a beta blocker, 1928.78%, was preferred as a single drug in cardiology OPD followed by Amlodipine, 1827.27%. This result can be compared to study done in India[26] where CCBs was the most commonly used drug as single drug therapy followed by ACEIs, ARBs, Diuretics and β blockers. Other Indian studies showed ARBs to be the first-choice monotherapy.[26,27] Nigerian study showed diuretics were prescribed more commonly.[28]

In the combination drug therapy, dual drug therapy was most preferred. Combination of CCBs and BBs were most commonly prescribed in medicine OPD, whereas combination of ACEI and BBs was preferred in cardiology OPD. Similar to our study, CCBs and BBs was most common combination used in a study conducted in other part of India[11,12,19], whereas, combination of ACEI with BBs was most commonly prescribed in a study conducted by Solanki[29], ARB with Diuretic was the most frequently prescribed in a study conducted by Pai[30], Sivakumar[26] and Pavani.[27] Etuk[28] reported combination of ACEI and diuretic to be the most common two drug combination used. CCB with Diuretics 2430% were most commonly prescribed in a study conducted by Konwar.[25]

When combination of three drugs were analysed, combination of CCB, ARB and diuretics was most commonly prescribed in medicine OPD whereas that of ACEI, BB and Diuretics were preferred in cardiology OPD.

Various other study has reported the use of various other combination agent in the treatment of hypertension such as, combination of ARB, BB and Diuretics were preferred in a study conducted by Pavani[27]; ARB, CCB and Diuretics was most commonly prescribed in a study conducted by Sivakumar[26]; α-Methyl dopa, ACEI and Diuretics was preferred in Nigerian study[28]; ACEI, BB and Diuretics were preferred in study conducted by Konwar[25]; ACEI, CCB and Diuretics was most commonly prescribed in study by Solanki[29] Whereas, ACEI, BB and CCB was most commonly prescribed in study conducted by Khurshid.[11] Thus, all the four major drugs are used in combination in various studies and it was also seen that diuretic was involved in almost all combination. Combination of CCBs, α+β Blocker, D and α-Blocker was preferred as four drug combination therapy in medicine OPD, whereas combination of CCBs, BB, ARBs and D was preferred in cardiology OPD.

Fixed drug combination FDC of ARB and diuretic was preferred in medicine OPD while that of ARB and CCB was preferred in cardiology OPD followed by that of BB and ACEI. FDCs were prescribed more by cardiologist in comparison to the physicians. Majority of the drugs were prescribed according to their brand name in both medicine and cardiology OPD. Thus, there is a wide variation in the prescription of anti-hypertensive drugs among various physicians and it was also seen that variation does exist between the medicine and cardiology OPD. This difference might be due to physician's choice with relation to the characteristics of patients, their concurrent illness, as well as the availability of medicines in the hospital. There are very limited data available where, comparison of prescription of a particular disorder in two department of a tertiary care hospital is available. Such studies will definitely help policy makers in generating policies for the disorder.

CONCLUSION

The study concludes that there is a wide variation in the prescription of the anti-hypertensive drugs among medicine and cardiology OPD. CCBs were most commonly used in medicine OPD whereas beta blockers were preferred in cardiology OPD. Monotherapy was preferred in medicine OPD, whereas combination therapy was preferred by cardiologist. Double and triple drug combination therapies were used more in comparison to monotherapy.

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