Research Article

Current Prescription Trends among Cardiology Patients

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Abstract

The study aims to understand the specific patterns and trends in the prescription of antihypertensive drugs among Cardiovascular Diseases (CVD) patient. This was a prospective observational study over a period of 24 months on cardiovascular diseases patients attending Cardiology departments. The prescription of these patients was evaluated to understand the prescribing pattern of antihypertensive drugs. Monotherapy accounted for 34.5%, with Beta blockers most commonly prescribed. The majority of prescriptions 41.01% involved dual therapy, with β-blockers+ARB being most commonly prescribed combination. The most commonly prescribed triple therapy combination are β-blockers+2 diuretics. Among quadruple therapies, the most commonly used combination was ARB+β-blockers+2 Diuretics. ARB+CCB+(α+β) blocker+2 Diuretics were the only combination used in penta therapy. The combination therapy being the trend, emphasizing the importance of effective control and prevention of cardiovascular complications. Further research is needed to develop rational therapy based on patient conditions.

Keywords: Monotherapy; Dual therapy; Triple therapy; Quadruple therapy; Penta therapy

Introduction

Cardiovascular diseases, a leading cause of morbidity and death globally, are estimated to rise from 16.7 million to 23.3 million by 2030 [1]. Cardiovascular issues are accountable for mortality among India's non communicable diseases. There is spike in number of patients receiving cardiovascular medicines; due to increase in frequency of CVD [2]. Long-term care of cardiovascular diseases typically involves many medication combinations. A prescription is a written order from a physician that guides a patient's care plan through the chemist. This is a way for a physician to communicate the medication message to the patients [3]. These investigations are becoming increasingly prevalent in healthcare settings worldwide, with significant medical, social and monetary problems. Identifying and assessing prescription patterns are essential for improving drug efficacy and ensuring patient safety. The logical prescribing of medication is crucial for patient safety and quality, ensuring efficient and safe drugs are prescribed based on medical requirements, a suitable duration, at a reasonable cost, and with proper patient counselling to avoid undesirable side effects and therapy failure [4]. Previous studies have shown that developed countries have implemented preventive strategies to reduce the risk of cardiovascular diseases, while studies in developing countries, especially in tertiary care setups, are insufficient and incomplete [5,6]. The study aimed to analyse the trends in the prescription of cardiovascular drugs among the patients with cardiovascular disease.

Materials and Methods

A data collecting form has been prepared with the necessary information for the study. This covers patient demographics, religion, marital status, social habits, profession, education status, and any co-morbid problems they are suffering; it includes treatment chart information, prescribed medications and therapy changes.

Methodology

The purpose of this prospective observational study is to look at the drug prescribing patterns among cardiovascular disease patients in Guntur's cardiology departments. The study conducted from July 2021 to July 2023, collects data from patient's case sheets, lab reports, and does not involve invasive techniques like collection of blood samples. Patients who met the criteria are included in the study.

Inclusion criteria

- Patients of either gender

- Patients diagnosed with CVD like hypertension, coronary heart disease of age above 18 yrs

- Patients with cardiovascular disease who use antihypertensive medication

- Patients who are visiting the hospital on regular basis for checkups

- Patients with all food habits (veg and non-veg)

- Patients with or without any co-morbid conditions like diabetes mellitus

- Patients who have given written informed consent to participate in the study are eligible

- Conscious patients

Exclusion criteria

- Patients below 18 years of age

- Patients with hepatic/renal failure

- Pregnant and breast feeding women

- Unconscious patients (E.g. continuous coma state)

- Patients visited other departments rather than cardiology department

- Patients who are not outpatient ward of Cardiology department and also not visited the hospital on regular basis for check-ups

Data sources

Data sources include:

- Treatment charts

- Outpatient OPD cards

- Interviews with patients or their carers

- Interviewing nurse, cardiologist

- Any other relevant sources

Statistical analysis

All the raw data collected, recorded in data collection form was updated in sheets of Microsoft Office Excel 2007 and statistically analysis was done by using SPSS version 28. Prescription pattern analysis.

Results

Gender distribution

A total of 1158 subjects were finally participated in the study, with 732 males and 426 females. This finding shows that males were approximately 26% more susceptible to cardiovascular events compared to female, represented in Figure 1 and Table 1.

Table 1: Gender distribution

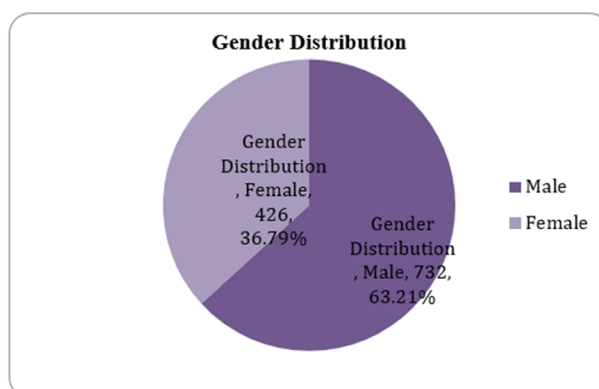| Gender	Subjects	Percentage
Male	732	63.21
Female	426	36.79

Figure 1: Gender distribution

Age distribution

Majority of the patients belonged to 61 years-70 years of age, later occupies 51 years-60 years of age. As the percentages do not differ much, we conclude that 51 years to 70 years old has a high incidence of cardiovascular events. Very few patients are under the age of 40 years old (Figure 2) (Table 2).

Table 2: Patients age distribution

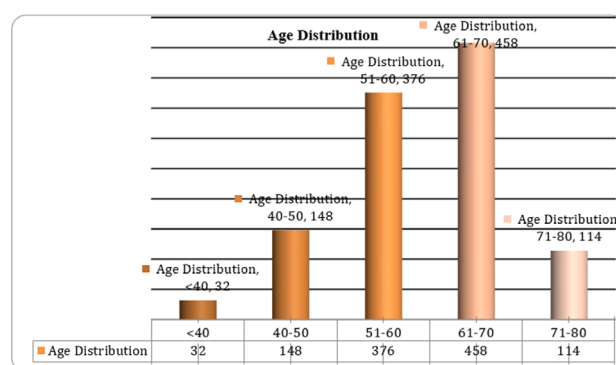| Patients age group	No. of patients	Percentage (%)
Less than 40	32	2.8
40-50	148	12.8
51-60	376	32.5
61-70	458	39.6
71-80	114	12.4

Figure 2: Age distribution

Religion

Among 1158 patients, 69.3%Hindus having the highest incidence of CVD, 16.8% Muslims having CVD, 13.9% Christians having CVD and others with no CVD (Figure 3) (Table 3).

Table 3: Religion distribution

Religion	No. of patients	Percentage
Hindu	803	69.3
Muslim	194	16.8

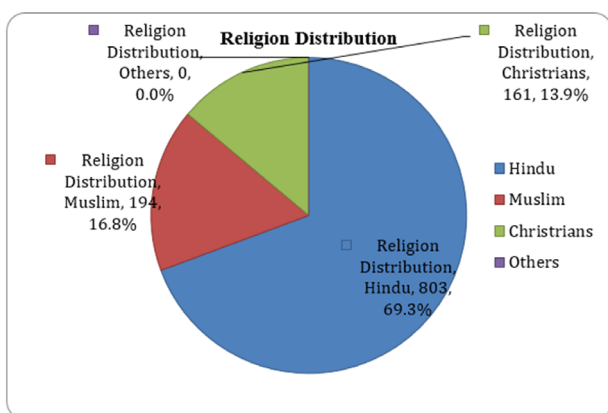|		
Christians	161	13.9
Others	0	0.0

Figure 3: Religion distribution

Marital status

Highest incidences of CVD are observed in married patients with 88.3%, 11.4% in single/widow and 0.3% unmarried with least CVD (Figure 4) (Table 4).

Table 4: Marital status

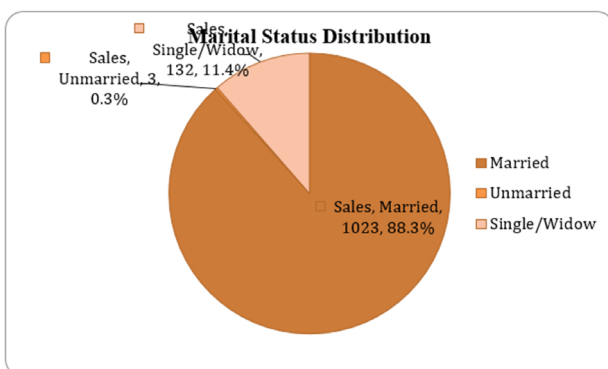| Marital status	No. of patients	Percentage
Married	1023	88.3
Unmarried	03	0.3
Single/Widow	132	11.4

Figure 4: Marital status distribution

Education

53.5% were considered literate because 27.2% had qualified for SSC (10th class), 10.6% had discontinued education after Inter, 9.6% had completed their degree and the remaining 5.8% had postgraduate or higher education.46.4% were illiterate (Figure 5) (Table 5).

Table 5: Education profile

Education	No. of patients	Percentage
No schooling	538	46.4
10th class	316	27.2
Inter	123	10.6
Degree	114	9.8

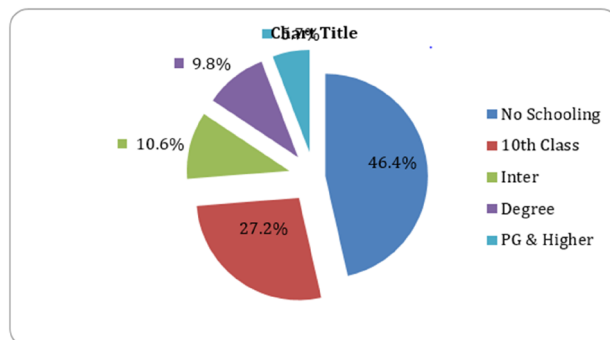|		
PG and higher	67	5.7

Figure 5: Education profile

Occupation

The majority of the patients 33.2% were daily wages, we included farmers in this category as well. Next, 23.6% of patients were house wives (females). 19.1% owned their own businesses in a variety of fields. 8.2% of members worked in either the private or public sectors. 15.9% were retired employees, some of them are pensioners and others who are not (Figure 6) (Table 6).

Table 6: Occupation

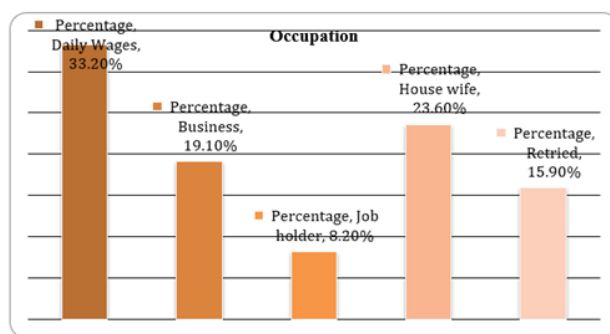| Occupation	No. of patients	Percentage
Daily wages	385	33.2
Business	221	19.1
Job holder	95	8.2
House wife	273	23.6
Retried	184	15.9

Figure 6: Occupation

Social habits

Social habits significantly impact disease risk. 36.4% of people use tobacco, 29.5% do not, and 9.4% are alcoholics. 24.7% of the population is both an alcoholic and a smoker. Most daily consumers consume alcohol on weekends and special occasions (Figure 7) (Table 7).

Table 7: Social habits

Social habits	No. of patients	Percentage
Smoker/Tobacco	421	36.4
Alcoholic	109	9.4

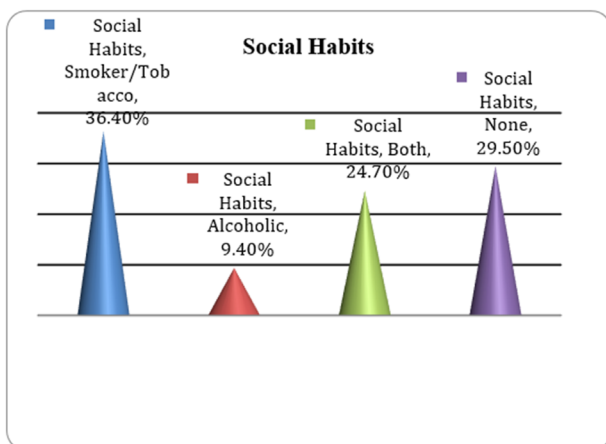| Both | 286 | 24.7 |
| None | 342 | 29.5 |

Figure 7: Social habits

Co-morbidities

The majority of the patients had both hypertension and diabetes mellitus, with 35.6% having the highest incidence. 31.8% had coronary artery disease. 13.5% had hypertension (which includes arrhythmia, heart failure and left ventricular disease among other things). 12.4% had dilated cardiomyopathy, 6.7% had myocardial infarction, the least common cardiovascular event (Figure 8) (Table 8).

Table 8: Co-morbidities

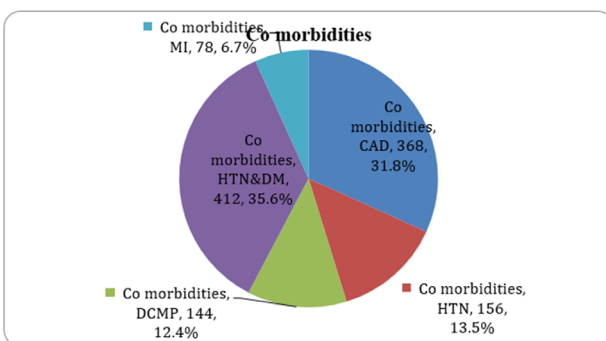| Co morbidities	No. of patients	Percentage
CAD	368	31.8
HTN	156	13.5
DCMP	144	12.4
HTN and DM	412	35.6
MI	78	6.7

Figure 8: Co-morbidities

Drug prescribing patterns

The study includes 1158 patients, with physicians either following the same prescription or making minor changes. Some patients were switched from lower to higher drug combinations, and some were maintained on same drug combination to meet the treatment goals. As, a result we considered each visit to be a new prescription. Therefore, 1158 × 4 visits=4632 total number of prescriptions.

Dual therapy was highly prescribed (41.01%) among the 4632 prescriptions because its effectiveness and treatment outcome are superior to single drug therapy, which was provided in 34.5% of prescriptions. Dual therapy is generally preferred in patients who have not been able to reduce their high blood pressure to therapeutic levels. Triple therapy was prescribed in 19.2% of prescriptions. 4.3% of prescriptions were of quadruple therapy, while only 0.86% was for penta therapy. Patients with severe illnesses were given quadruple and penta therapy. The type of therapy varies depending on the severity and the combination preferred depends on the patient's condition (Figure 9) (Table 9).

Table 9: Types of therapy prescribed

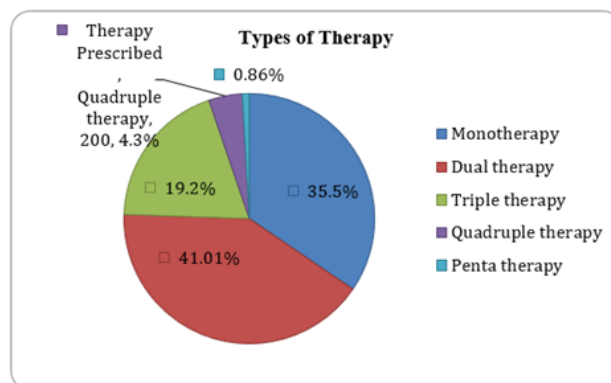| Types of therapy	Total no. of prescriptions	Percentage
Monotherapy	1600	34.5
Dual therapy	1900	41.01
Triple therapy	892	19.2
Quadruple therapy	200	4.3
Penta therapy	40	0.86

Figure 9: Types of therapy prescribed

Monotherapy

1600 (34.5%) of the 4632 prescriptions were of the monotherapy. 56.25% Beta-blockers were strongly recommended in the Monotherapy, where Metoprolol and Atenolol were highly liked in them. Angiotensin Receptor Blockers (ARB's) come in second with the 19.3%, where Telemisartan was a popular medicine among them. Calcium Channel Blockers (CCB's) with 12.5%, Nifidepine and Clinidepine were widely used 5.68% were Diuretics, 3.3% Angiotensin Converting Enzyme Inhibitors (ACEI) and 2.8% α+β blockers are present in the medication (Figure 10) (Table 10).

Table 10: Monotherapy prescription pattern

Monotherapy	Total no. of prescriptions	Percentage
β blockers	900	56.25
ARB's	310	19.3

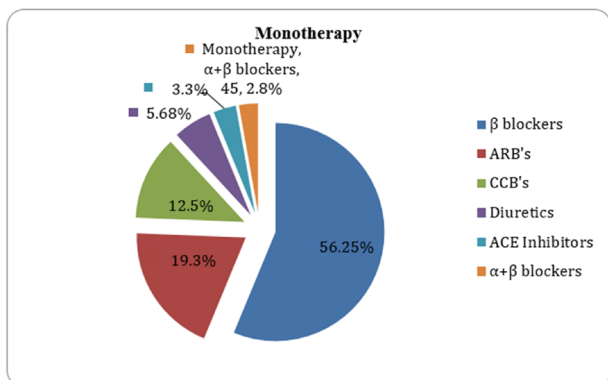|		
CCB's	200	12.5
Diuretics	91	5.68
ACE Inhibitors	54	3.3
α+β blockers	45	2.8

Figure 10: Monotherapy prescription pattern

Dual therapy

1900 (58.84%) of the 4632 prescriptions received dual therapy. Most of the combinations utilized here are fixed dosage combinations in single tablet. β-blockers+ARB are the most often utilized combination, accounting for approximately 20.7% of all combinations. Though this combination is not without risk, studies have proven that it is beneficial, when compared to Monotherapy, 18.8% were β-blockers+CCB, which is more successful in reducing high blood pressure. 18.7% were ARB combined with Diuretics, which was an excellent and desirable combination. 17.6% were 2 Diuretics in combination with subclass variation. ARB with CCB accounted for 13.1% of the total. β-blockers were combined with α-blockers in 4.1% of cases. Beta blockers and diuretics were used in 3.1% of cases. 3% were ACE treated with diuretics. The remaining 2.05% and 1.3% were ARB with α+β blockers and CCB with alpha blockers, respectively (Figure 11) (Table 11).

Table 11: Dual therapy prescription pattern

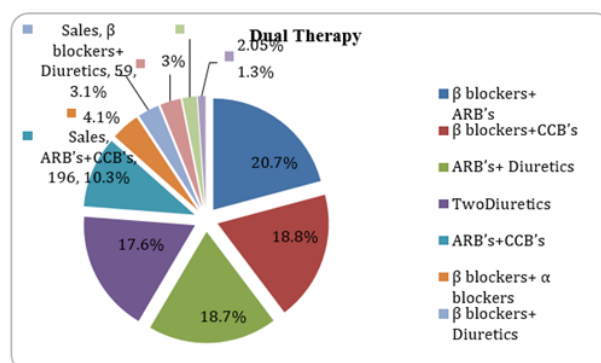| Dual therapy	Total no. of prescriptions	Percentage
β blockers+ARB's	395	20.7
β blockers+CCB's	358	18.8
ARB's+Diuretics	356	18.7
Two Diuretics	336	17.6
ARB's+CCB's	196	10.3
β blockers+α blockers	79	4.1
β blockers+Diuretics	59	3.1
ACE's+Diuretics	57	3
ARB's+α+β blockers	39	2.05
CCB's+α blockers	25	1.3

Figure 11: Dual therapy prescription pattern triple therapy

Triple therapy

Triple therapy was prescribed in 19.2% (892) of the 4632 prescriptions. The combinations used here are mostly fixed dose combinations in a single pill, with only a few exceptions involving two pills. According to our observations, the most commonly used combination is a β-blockers with 2 diuretics, which accounts for 28.9% of triple therapy prescription. ARB with Beta Blocker (BB) and CCB account for 25.5% of prescriptions, 11.9% of prescriptions are ARB's+β-blockers+Diuretics, 10.8% of prescriptions are CCB+ARB+Diuretics, 9.7% of prescriptions are β blockers+CCB+Diuretics. The remaining 5.8% of prescriptions are for ARB+2CCB's, 4.7% of prescriptions for ACE+CCB+Diuretics, 2.3% were a combination of ARB and 2 Diuretics (Figure 12) (Table 12).

Table 12: Triple therapy prescription pattern

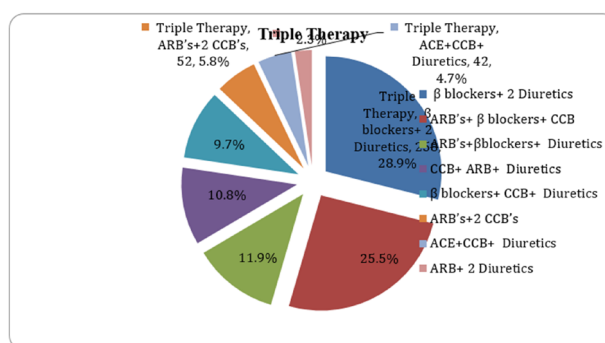| Triple therapy	Total no. of prescriptions	Percentage
β blockers+2 Diuretics	258	28.9
ARB's+β blockers+CCB	228	25.5
ARB's+βblockers+Diuretics	107	11.9
CCB+ARB+Diuretics	97	10.8
β blockers+CCB+Diuretics	87	9.7
ARB's+2 CCB's	52	5.8
ACE+CCB+Diuretics	42	4.7
ARB+2 Diuretics	21	2.3

Figure 12: Triple therapy prescription pattern

Quadruple therapy

Quadruple therapy was prescribed in 4.31% (200) of the 4632 prescriptions. Combinations of ARB, BB with two diuretics and 2 ARB with 2 BB are commonly used and account for 44.5% and 46%. Two diuretics are combined with ARB and CCB in the final 9.5% of combinations. Fixed dose combinations with two pills are used here, as are non-fixed dose combinations with multiple pills. There is no single pill combination in quadruple therapy (Figure 13) (Table 13).

Table 13: Quadruple therapy prescription pattern

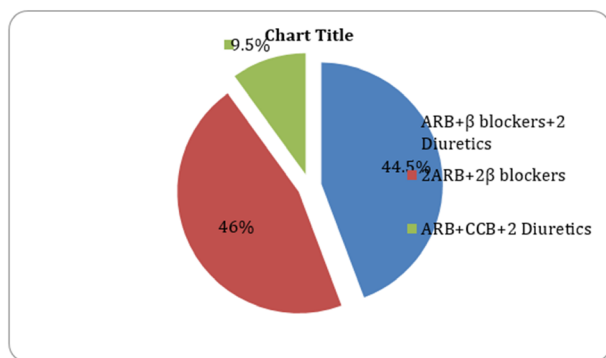| Quadruple therapy	Total no.of prescriptions	Percentage
ARB+β blockers+2 Diuretics	89	44.5
2ARB+2β blockers	92	46
ARB+CCB+2 Diuretics	19	9.5

Figure 13: Quadruple therapy prescription pattern

Penta therapy

Penta therapy combinations are non-fixed dose combinations with multiple pills. It accounts for 0.86% of total prescriptions, indicating that it is less commonly used. It is commonly used in critically ill patients. ARB+CCB+α+β blockers+2 Diuretics are used in this combination (Table 14).

Table 14: Penta therapy prescription pattern

Penta therapy	Total no. of prescriptions	Percentage
ARB+CCB+2 Diuretics+(α+β) blockers	40	0.86

Discussion

The study investigated medication prescription patterns in Guntur, Cardiology Departments. In this study, 63.21% were men and 36.79% were females. Zafar et al. (2015) and Parvathy R.L. Leninrajendran (2023) also reported the patients of male experienced a great prevalence of cardiovascular events than patients of female [3,7]. Our study found that majority of patients attending the cardiology unit were between 51 years to 70 years old.

According to Datta et al. (2010), the most often were 42.3% Angiotensin converting enzyme inhibitors, 73% CCB, 37.2% BB [8]. Muntwyler et al. (2003) found that

BB, ACEI or ARB are prescribed at 58% and 50% [9]. The study carried out by Sainath et al. (2020) were as follows Calcium channel blockers 17.82%, Angiotensin receptor blockers 20.79%, α+β blockers 09.90%, Angiotensin converting enzyme inhibitors 21.78% and β-blockers 8.1% [10]. The present study found that the most often used antihypertensive medications were Diuretics 33.7%, Calcium channel blockers 14.8%, ARB 13.5%, ACEI 11.4%, BB 8.1% and α+β blockers 4.72%. In contrast to previous study, Diuretics were shown to be the more commonly given antihypertensive medication. Antihypertensive medications are primarily utilized in the treatment of different cardiovascular disorders like Coronary Artery Disease (CAD), Angina (drugs used for CAD and angina are Beta blockers, ACEI, CCB, DI) Acute coronary syndromes (drugs used are Beta blockers, ACEI, ARB, CCB, Aldosterone antagonists and diuretics) and Ischemic heart failure (drugs used are diuretics, ACEI and ARB, Beta blockers and Aldosterone antagonists).

The Prescription rate of diuretics was 33.7% with Furosemide 21.6%, Torsemide 12.1%, Hydrochlorothiazide 9.45%, Chlorothiazide 1.35% and spironolactone 2.70%.

Monotherapy

According to Faizan et al. (2020) the most commonly prescribed medication in monotherapy was BB 61.91%, ARB 13.76%, CCB 12.69%, DI 5.69%, ACEI 3.1% and α+β blockers 2.8%, are in accordance to the present study [11]. Our results were equivalent to the study conducted by Haq et al. (2019) [12]. In contrast to our results kumar et al. (2020) observed ARB 44.73% was highly used in Monotherapy, 21.05% CCB.14.6% ACEI, 10.52% each for DI and BB. ACEI 19.07% and alpha antagonists 2.91%.

Dual therapy

In the present study, among overall two dual therapy BB+ARB 20.7% were highly prescribed in dual combination, followed BB+CCB 18.8%, ARB+DI 18.7%, DI+DI 17.6%, ARB+CCB 10.3% and other less prescribed medication are β+α blockers 4.1%, β blocker +DI 3.1%, ACEIs+DI 3%, ARB+ β+α blockers 2.05%, CCB+α blockers 1.3%. Faizan et al. (2020), showed comparable outcomes with our study [11]. kumar et al. (2020), reported among dual therapy ARB+DI 33.6 as most commonly prescribed, ARB+BB and ARB+CCB both account for 17.2%, ACEI+DI 9.8% was contradicted to our findings [13]. However, Haq et al. (2019) reported ARB+BB accounted for 17% of dual therapy, 12% ACEI+BB, 5% ARB+CCB, 5% ARB+DI, 4% BB+CCB, 2% CCB+DI, both ACEI+DI and BB+DI account for 1% each.

Triple therapy

The most often recommended triple treatment combination was BB+DI+DI 28.9%, next was ARB+BB+CCB 25.5%, ARB+BB+DI 11.9%, CCB+ARB+DI 10.8%, β blocker+CCB+DI 9.7%, ARB+2 CCBs 5.8%, ACEI+CCB+DI 4.7% and ARB+2 DI 2.3%. Faizan et al. (2020), reported similar to this study, except ARB+β blocker+DI, CCB+ARB+DI, β blocker+CCB+DI (13.3%

each), which varies from our study11. According to Kumar et al. (2020) findings the most prescribed combinations were 18.91% DI+ARB+CCB; ARB+BB+CCB 18.91% followed by DI+ARB+CCB 16.21% and DI+ARB+β blocker 10.8% [13]. ARB+β blocker+CCB 25.5% was higher second most common drug combination in our findings is higher than the kumar et al. (2020) findings. Haq et al. (2019), observed the most often recommended combination as ARB+BB+DI 14%, ARB+BB+CCB 11%, ARB+CC+DI 3%, 1% each with ACEI+BB+CCB; BB+CCB+DI [12]. ARB+β blocker+DI 14% was similar with our study.

Quadruple therapy

Among quadruple therapy, 2ARB+2β blocker 46% was maximally prescribed combination followed by ARB+β blocker +2 DI 44.5% and ARB+CCB+2DI 9.5%. These study findings were slightly higher when compared with the findings of Faizan et al. (2020) [11]. Kumar et al. (2020), reported ACEI+DI+β-blocker+CCB 16.21% often utilized combination, ARB+β blocker+DI+CCB 8.10% and ARB+DI+α-blocker+CCB 5.4% [13]. Haq et al. (2019), ACEI+ARB+β-blocker and DI just 1% patient [12]. Study conducted by Cidda et al. (2014) found that ARB+DI+DI+BB 20%, ARB+DI+DI+DI 20%, ACEI+Alpha-blocker+BB+DI 20% are mostly reported [14]. The combinations ACEI+DI+β-blocker+CCB, ACEI+ARB+β-blocker+DI and ARB+DI+α-blocker+CCB were not used in this study.

Penta therapy

Among penta therapy, ARB+CCB+2DI+(α+β) blocker 0.86% was less used. Similar findings were observed with Faizan et al. (2020), ARB+CCB+2DI+(α+β) blocker 1.13% [11]. Singla et al. (2018) reported penta therapy combination ARB+DI+DI+β blocker+CCB [15]. In all these three studies ARB+CCB+2 DI was commonly combined with another drug.

Conclusion

The study provides insights into the prescription pattern of antihypertensive among cardiology patients. Prescription pattern studies reflect the present state of drug usage in medical fields. The study found that beta blockers were preferred over diuretics as Monotherapy, and regular monitoring of prescription patterns is important for treatment outcomes. The combination therapy being the trend, emphasizing the importance of effective control and prevention of cardiovascular complications. Further research is needed to develop rational therapy based on patient conditions.

Acknowledgement

None.

Conflict of Interest

Authors have no conflict of interest to declare.

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