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A STUDY ON IMPACT OF ANEMIA AND PRESCRIBING PATTERNS OF CARDIOVASCULAR MEDICATIONS IN CONGESTIVE HEART FAILURE IN A TERTIARY CARE HOSPITAL, SVIMS

Sathish Kumar Sure[1], Surendra Pata[2], Meena Kakarla[3], Deepika Reddy Basireddygari[4], Dr. V. Vanajakshamma*[5], MD, DM, Dr. C. Kapil*[6], DM, Dr. K. Prasanna Lakshmi[7], Pharm D. and Dr. V. Jayasankar Reddy[8] M Pharm, PhD,

[1,2,3,4]Pharm.D, Krishna Teja Pharmacy College, Tirupati.

[5]Professor, Department of Cardiology, SVIMS, Tirupati.

[6]Assistant Professor, Department of Cardiology, SVIMS, Tirupati.

[7]Assistant Professor, KTPC, Tirupati.

[8]HOD, Department of Pharmacology, KTPC, Tirupati.

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***Corresponding Author**
Dr. V. Vanajakshamma, MD, DM and
Dr. C. Kapil, DM
Professor, Department of Cardiology, SVIMS, Tirupati.
Assistant Professor, Department of Cardiology, SVIMS, Tirupati.

ABSTRACT

Heart Failure (HF) is a common cardiovascular condition with increasing incidence and prevalence and can result from any disorder that reduces ventricular filling (diastolic dysfunction) and myocardial contractility (systolic dysfunction). Anemia is prevalent in patients with HF but the exact rates vary widely. The main aim was to study the impact of anemia and prescribing patterns of drugs in patients with HF. Objectives are to study the prevalence of anemia in patients with HF, to compare baseline clinical characteristics and outcomes of HF patients with and without anemia and to study the trends in prescribing patterns of cardiovascular medications in HF. It is prospective study and data recorded in patient data collection proforma from the patients of HF during the period of 5 months. The data was analyzed by using Two-sample t-test, Chi-square and One way ANOVA. Our study reveals about 1270 cardiovascular drugs prescribed for 200 patients who are included in the study. Most common class of drugs Prescribed in the treatment were Diuretics (27.56%), Antiplatelets (21.50%), Hypolipidemics (12.05%), Beta Blockers (11.89%), ARBs & ACEIs (9.92%), Cardiac glycosides such as Digoxin (7.17%). The average Hospital stay of severe anemic patients was higher than moderate and mild which

was found to be statistically significant. we conclude that polytherapy is better than monotherapy in patients with CHF. Prescription of generic drugs reduces the economic burden of the patients such that making them more affordable and also the chance of survival for long time depends on absence or presence of co-morbidities.

KEYWORDS: Heart failure, ventricular filling, Anemia, polytheapy, monotherapy.

INTRODUCTION

Heart failure (HF) is a progressive clinical syndrome that can result from any disorder that impairs the ability of the ventricle to fill with or eject blood, thus rendering the heart unable to pump blood at a rate sufficient to meet the metabolic demands of the body.[1] Heart failure is the final common pathway for numerous cardiac disorders including those affecting the pericardium, heart valves, and myocardium. Diseases that adversely affect ventricular diastole (filling), ventricular systole (contraction), or both can lead to heart failure.

Heart failure can result from any disorder that affects the ability of the heart to contract (systolic function) and/or relax (diastolic dysfunction). Heart failure with impaired systolic function (i.e., reduced LVEF) is the classic, more familiar form of the disorder, but current estimates suggest up to 50% of patients with heart failure have preserved left ventricular systolic function with presumed diastolic dysfunction.[2]

In contrast to systolic heart failure that is usually caused by previous myocardial infarction (MI), patients with preserved LVEF typically are elderly, female, obese, and have hypertension, atrial fibrillation, or diabetes.[2] Frequently, systolic and diastolic dysfunction coexists. The common cardiovascular diseases, such as MI and hypertension, can cause both systolic and diastolic dysfunction; thus many patients have heart failure as a result of reduced myocardial contractility and abnormal ventricular filling.

Few Epidemiological studies show that, based on disease-specific estimates of prevalence and incidence rates of Heart Failure, the prevalence of HF in India was 1.3 to 4.6 million. Anemia is prevalent in patients with HF but the exact rates vary widely. A recent Meta-Analysis shows that the prevalence of anemia in patients with HF is 37.2%. Prevalence estimates of HF in India as follows (see table 1):

Table 1: Prevalence Estimates of HF in India. (Huffman and Prabhakar).[3]

CONDITION (a)	PREVALENCE AS IN 2000	INCIDENCE OF HF /YEAR	Prevalence of HF Attributed to Condition (a) After 5 Years
CHD	3%	0.4-2.3%	0.3-1.75 million
Hypertension	118 million	0.1-0.6%*	0.3-1.8 million
Diabetes	32 million	2.3/1000 person years	0.18 million
Obesity (>30 Kg/m2)	5%	0.3-0.5	0.45-0.75 million

CHD- coronary heart disease, HF-heart failure.

**with a systolic blood pressure (SBP) of 144-154 mmHg HOT and [UKPDS trials].*

[Source:Heart failure in south Asia, Current Cardiology Reviews, 2013, 9, 102-111]'

Causes of Heart Failure.[4]

❖ **SYSTOLIC DYSFUNCTION**

- Reduction in muscle mass (e.g., myocardial infarction).
- Dilated cardiomyopathies.

❖ **DIASTOLIC DYSFUNCTION**

- Increased ventricular stiffness.
- Ventricular hypertrophy (e.g., hypertrophic cardiomyopathy).
- Infiltrative myocardial diseases (e.g., amyloidosis, sarcoidosis, end myocardial fibrosis).
- Pressure overload (e.g., systemic or pulmonary hypertension, aortic or pulmonic valve stenosis).
- Myocardial ischemia and infarction.

Types of Heart Failure[5]

❖ HF are classified in several ways:

1. Left, Right and Biventricular Heart Failure.
2. Forward and Backward Heart Failure.
3. High – Output and Low Output Heart Failure.
4. Acute and Chronic Heart Failure.

Left side Heart Failure

❖ Left side heart failure may occur due to improper functioning of left ventricle. Due to this, the left ventricle output gets reduced and the left atrial pressure or pulmonary venous pressure increases.

- Pulmonary edema may takes place by increased left atrial pressure due to failing of ventricles to Completely contract.

Right side Heart Failure

- This condition is seen, when the right ventricle output of the heart is reduced. The right atrial pressure gets increased due to failing of complete right ventricular contraction. It is mainly caused by chronic lung disease and pulmonary valve stenosis.
- The blood that is retained in the right ventricle gets accumulated and prevents the filling of blood from peripheral organs. Hence in Right sided Heart failure, shows peripheral edema and Jugular venous distension as signs and symptoms.

Biventricular Heart Failure

Biventricular Heart Failure is a condition of failure of both right heart and left heart. Dilated cardiomyopathy and Ischemic heart disease affect both ventricles.

Forward and Backward Heart Failure

In some patients, Heart Failure may be caused predominantly due to inadequate cardiac output. It is referred to as forward Failure. While, some patients show normal or near – normal Cardiac Output (CO) with marked salt and water retention causing pulmonary and systemic venous congestion. It is referred as Backward Failure.

Low Output and High Output Heart Failure

Heart Failure may involve right ventricle, left ventricle or both. Low output Heart Failure is common where, the metabolic demands of the body are within normal limits; but the heart is unable to pump them.

High Output Heart Failure occurs with some coexisting conditions such as Anemia, Hyperthyroidism and Arteriovenous shunt. Where, the metabolic demands of the body are excessive that even increased Cardiac Output (CO) is insufficient to meet them. It can be treated by correcting the underlying cause.

Acute and Chronic Heart Failure

In Acute HF, onset of symptoms is sudden, as in Myocardial Infarction. Acute HF occurs either Denovo or as an acute decompensated episode on a background of Chronic Heart Failure. i.e., Acute on Chronic HF.

Chronic HF develops gradually as in progressive valvular heart disease. If there is a gradual impairment of cardiac function, then, a variety of compensatory mechanisms get activated. In Compensated HF patients, the adaptive changes have prevented the development of overt Heart Failure.

Diastolic and Systolic Dysfunction

Heart Failure may develop as a result of systolic dysfunction or diastolic dysfunction. The inadequate contraction of the ventricle that leads to decrease of cardiac output is known as Systolic dysfunction.

Unlike Systolic dysfunction, the abnormal ventricular relaxation that leads to inadequate ventricular filling can be seen in Diastolic dysfunction. In this condition, ventricles remain in contracted state leading to improper filling of ventricles.

The quality of life (QOL) of patients with HF depends on the Physician's adherence to the prescribing guidelines of medications. Hence, we observed the rationality and prescribing patterns of drugs in patients with HF which was the main intent of the study.

As Anemia is one of the major cause of disease morbidity and poor QOL, we observed the prevalence of Anemia in patients with HF. The QOL of patients with HF not only relies on rationality and prescribing guidelines, but also on the medication adherence of the patients for which, patient counselling is necessary. Hence we counselled the patients about the disease, need of taking medication, consequences of medication, Non-adherence and diet to be followed.

METHODOLOGY

Aim: To Study the Impact of Anemia and Prescribing Patterns of Cardiovascular Medications In Congestive Heart Failure (CHF) patients in a Tertiary Care Hospital.

Objectives

- To study the prevalence of Anemia in patients with Heart Failure or CHF.
- To study the trends in prescribing patterns of drugs in Congestive Heart Failure.
- To assess the rationality of drug use.
- To determine the extent of adherence to prescribing guidelines for Congestive Heart Failure patients.

- To compare the Baseline Clinical characteristics and Outcomes of Heart Failure patients with and without anemia.
- To provide patient counseling to patients regarding lifestyle modifications and drugs for improving medication adherence.

METHODOLOGY

Study Design: Prospective Cross-Sectional study.

Study Site: Department of Cardiology, SVIMS, Tirupati.

Study Duration: The study was conducted over a period of 6 months at SVIMS, Tirupati.

Inclusion Criteria

- All the patients of either gender with confirmed diagnosis of CHF.
- Patients attending cardiology department.
- Patients of age 18 years and above.

Exclusion Criteria

- Patients who had infection in addition to HF on Admission.
- Pregnant women.
- Patients of age below 18 years.
- Patients diagnosed with cardiovascular disorders other than CHF.
- Patients with other co morbidities like renal failure and malignancies.
- Patients with isolated diastolic heart failure.

Sample Size: 200 patients who was diagnosed with Heart Failure attending Cardiology Department, SVIMS, Tirupati.

Study Materials

- Patient data collection proforma.
- Patient Informed Consent Form.
- Patient Counselling Form.

Data Collection

Baseline clinical and demographic characteristics obtained from all the patients Medical Case Sheets and prescriptions. Data was collected by using a patient data collection proforma and patient Interviewbased on the inclusion and exclusion criteria. The relevant data on drug

prescription of each patient was collected. The prescribing patterns, relevant details of every patient with CHF were recorded in suitably designed proforma. Data was analyzed, processed, formated and submitted.

Method of Study

Patients who visited and admitted in Cardiology Department with a diagnosis of HF in the Period from Oct 2017 – Jan 2018 assessed prospectively using their Medical Case sheets and prescriptions. The following data was collected and recorded in the data collection form- demographic details (name, age, sex), Drugs (name of the drug, dosage form, dose, route of administration, frequency), Baseline characteristics of Heart Failure patients with and without anemia (Heart rate, Systolic and Diastolic B.P), Laboratory and Echocardiography data, Principle diagnosis. To study the drug prescribing patterns in congestive heart failure, all the patients included in the study will be categorized into anemic and non-anemic with CHF considered for analysis. Utilization evaluation and comparison of outcomes in CHF between anemic and non – anemic patients of different classes of drugs as well as individual drugs were analyzed and presented as percentage. The average number of drugs per prescription and the percentage of drugs prescribed by generic name were determined.

Ethical Clearance

The ethics committee clearance was obtained from Sri Venkateswara Institute of Medical Sciences ethics committee for conducting the study. **(IEC NO: 675).**

Statistical Analysis

Mean and standard deviation was calculated for all continuous variables. Percentages were calculated for all categorical variables. Data entered into MS - excel spread sheets and SPSS version 20 (Statistical software) utilized for data analysis. Patients were categorized based on their anemia status and further analysis of baseline clinical characteristics means of anemic and non-anemic patients were compared by using two sample t-test. Chi-square test was applied for discrete variables to assess causes and comorbidities among the study groups. One way ANOVA was performed for comparing the left ventricular dysfunction and laboratory test such as serum sodium, potassium, urea and creatinine. P- Value of ≤ 0.005 was considered as significant.

RESULTS

Age Distribution of patients

A total of 200 patients were reviewed, of that, 59 patients were admitted in the Hospital. The mean age of patients was 59 ± 14.14 years. Most of the patients diagnosed with cardiovascular diseases were of the age group of 51-60 years (34.5%) followed by 61-70 years (24.5%) (Fig.1).

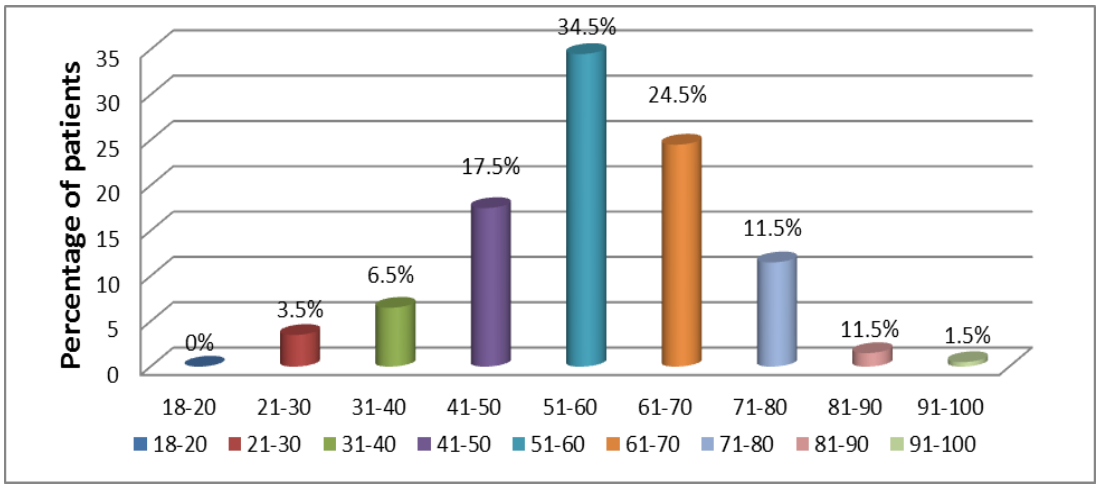

Figure 1: Age wise distribution of patients.

Gender distribution of patients

In this study, most of the patients with HF were males (75%) followed by females (25%) (Fig. 2).

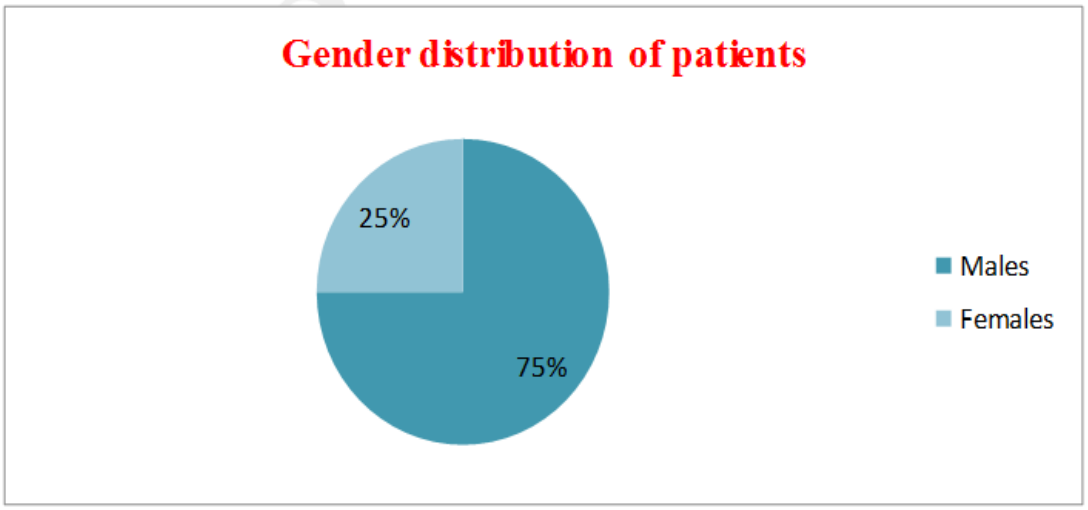

Figure 2: Gender distribution of patients.

Risk factors in heart failure

The major risk factors of heart failure were observed (fig. 3) to be Hypertension (HTN), Diabetes Mellitus (DM), smoking and alcohol consumption. Out of 200 patients 53% of patients were observed to be Hypertensive, 37% of patients were observed to be Diabetic and 35% of patients were smokers, followed by 17.5% of patients were alcoholics. 25% of patients were observed to be both Hypertensive and Diabetic.

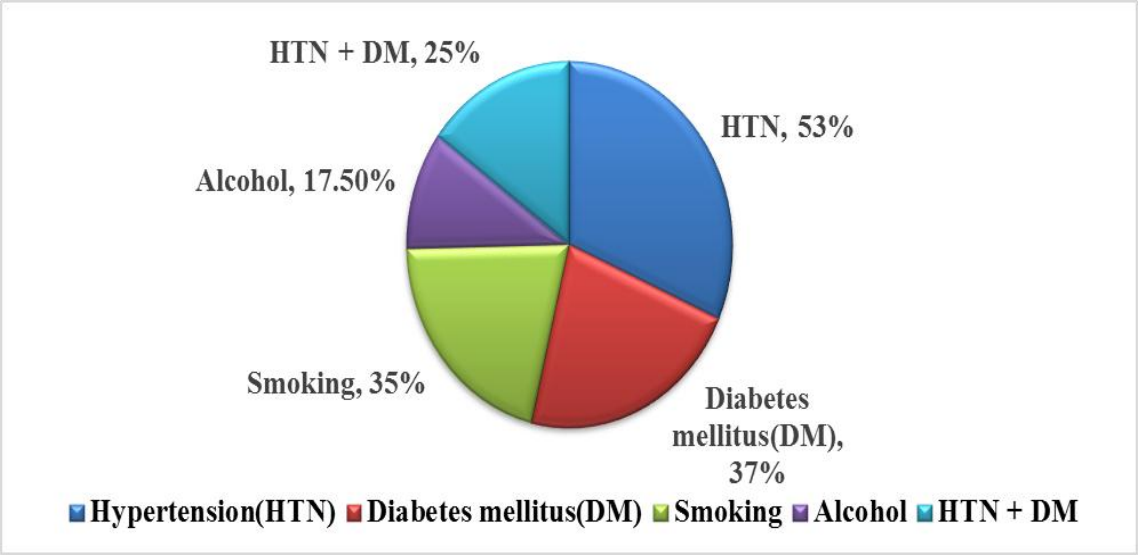

Figure 3: Risk factors in heart failure patients.

Causes of heart failure

In this study, Heart failure is caused due to Ischemic cardiomyopathy anddilated cardiomyopathy (fig.4). Ischemic cardiomyopathy accounted for 124(62%), Dilated cardiomyopathy accounted for 76(38%).

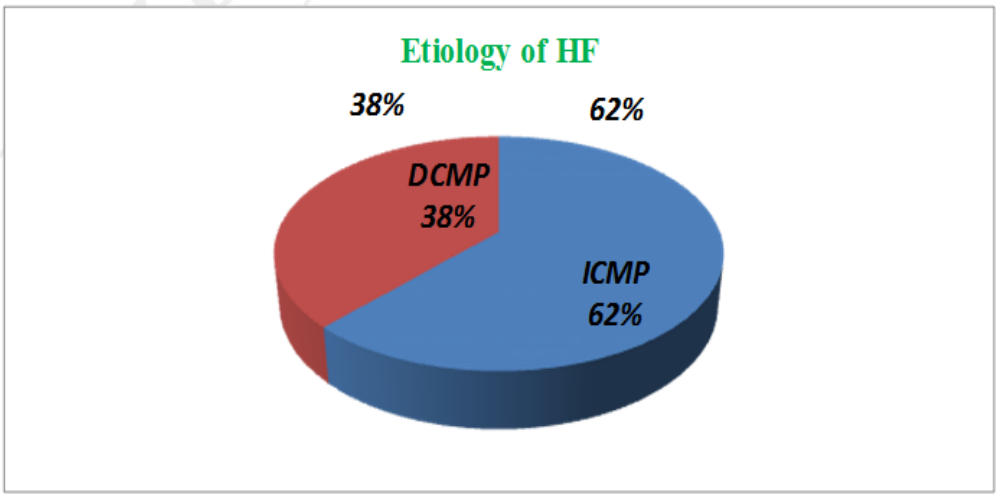

Figure 4: Causes of Heart Failure.

Anemic condition in heart failure patients

In this study, 90 (45%) patients were observed to be with anemia condition and baseline clinical characteristics of patients were compared with Anemic and Non – anemic Patients (Table 2).

Table 2: Baseline clinical characteristics and outcomes of HF with and without anemia.

Variable		Non-Anemic(110)	Anemic (90)	P – value
Age, Mean± SD		55.20 ± 12.67	59.6 ± 12.7	0.0155*
Gender, n%	Male	90 (81.81%)	60 (66.7%)	0.01
	Female	20 (18.19%)	30 (33.3%)	
Hypertension		56	52	-
AF		2	5	-
Systolic BP, Mean± SD		118.81 ± 18.64	123.4 ± 21.3	0.1059
Diastolic BP, Mean± SD		75.22 ± 9.96	78.6 ± 9.9	0.0176*
Etiology of HF	ICMP	65	59	0.381
	DCMP	45	31	

Comparison of Hospital Stay in Anemic and Non – Anemic Patients

Out of 59 In Patients, It was observed that the average hospital stay of anemic patients progressively increased with their severity, when compared to Non – anemic patients (Normal) as shown in fig.5.

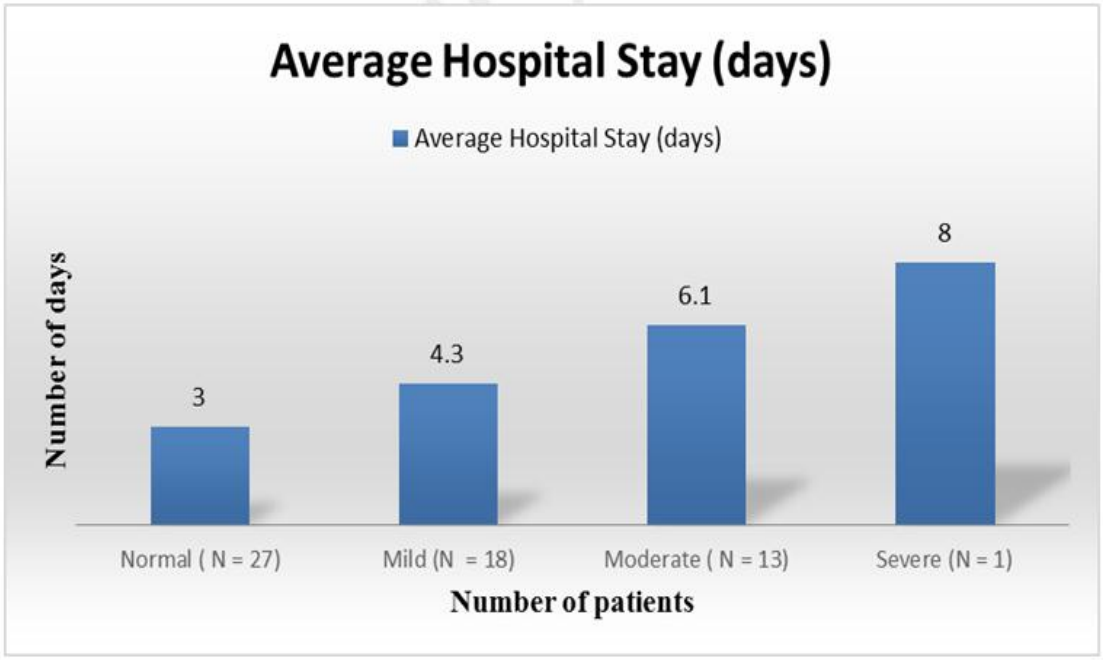

Figure 5: Comparison of hospital stay in anemic and non-anemic patients.

Types of heart failure in patients

Heart failure is classified as compensated and decompensated. 91(45.5%) of patients were of decompensated heart failure and 109(54.5%) of patients were of compensated heart failure. The mean of ejection fraction of compensated and decompensated HF was 33.50 and 31.54 and was observed to be statistically significant with Ejection Fraction of the Patients (Table 3).

Table 3: Heart failure types in patients.

	Heart failure	Mean ± SD	Percentage (%)	P – value
Ejection Fraction (%)	Decompensated HF (N=91)	33.50 ± 5.432	46.5	0.012*
	Compensated HF (N=109)	31.54 ± 5.427	54.5	

Laboratory data

Table 4 shows the comparison of means of following laboratory parameters with severity of Left Ventricular Dysfunction (LVD). The Means of blood urea, serum creatinine, serum sodium and serum potassium were observed to be 46.74, 6.68, 134.39 and 4.86 respectively. The p- value was observed to be >0.05. Thus we did not find significant relationship between these laboratory parameters and Severity of Left Ventricular Dysfunction (LVD).

Table 4: ANOVA table for LVD and Laboratory test.

Laboratory Test	LVD	N	Mean ± SD	p-value
Blood Urea	Mild	9	29.56 ± 10.175	0.173
	Moderate	77	46.44 ± 31.507	
	Severe	62	49.60 ± 29.479	
	Total	148	46.74 ± 30.017	
Serum Creatinine	Mild	9	1.11 ± 0.782	0.497
	Moderate	83	1.31 ± 0.795	
	Severe	66	17.61 ± 1.317	
	Total	158	6.68 ± 0.305	
Serum Sodium	Mild	9	137.44 ± 4.746	0.552
	Moderate	74	133.49 ± 15.928	
	Severe	64	135.00 ± 5.040	
	Total	147	134.39 ± 11.84	
Serum Potassium	Mild	9	4.00 ± 0.500	0.388
	Moderate	73	4.11 ± 0.636	
	Severe	64	5.83 ± 11.302	
	Total	146	4.86± 7.514	

Causes of HF with HTN

Out of 124 Patients with ICMP 73(36.5%) patients were Hypertensive and 51 (25.5%) were Non – Hypertensive. Out of 76 patients with DCMP, 33 (16.5%) were Hypertensive and 43 (21.5%) were Non – Hypertensive. This shows that, the Patients with Hypertension and ICMP were relatively high (36.5%) compared to HTN with DCMP (16.5%) (Fig. 6).

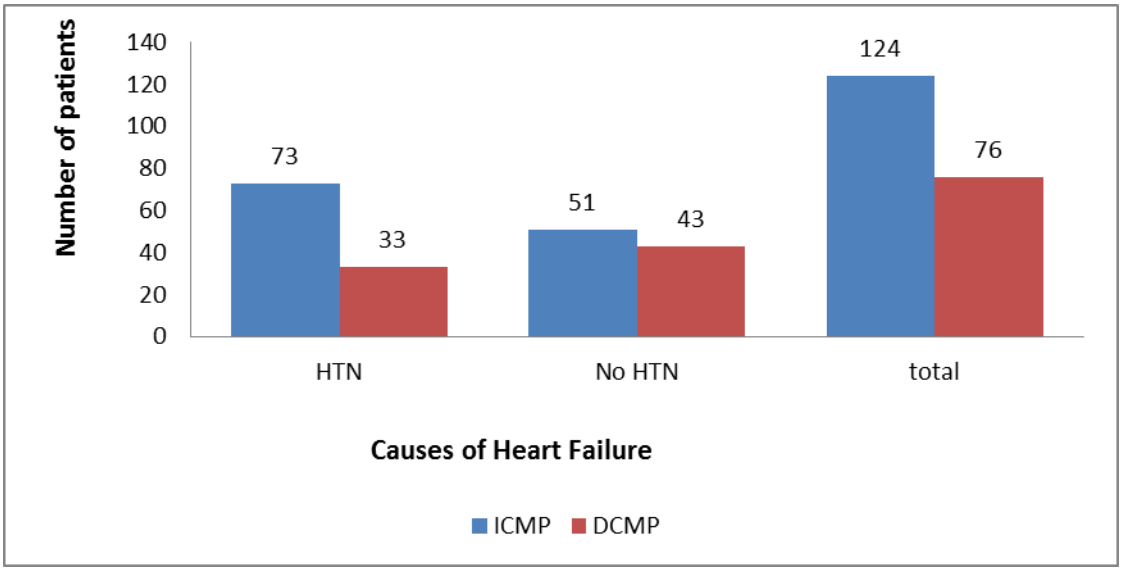

Figure 6: Causes of HF with HTN.

Route of administration of drugs

Most commonly used route of administration of drugs was Oral route in 1073 (84.48%) of patients, parenteral route in 130(10.24%) of patients and sublingual route was used in 42(3.31%) of patients, followed by inhalational route in 25(1.97%) which is shown in figure 7.

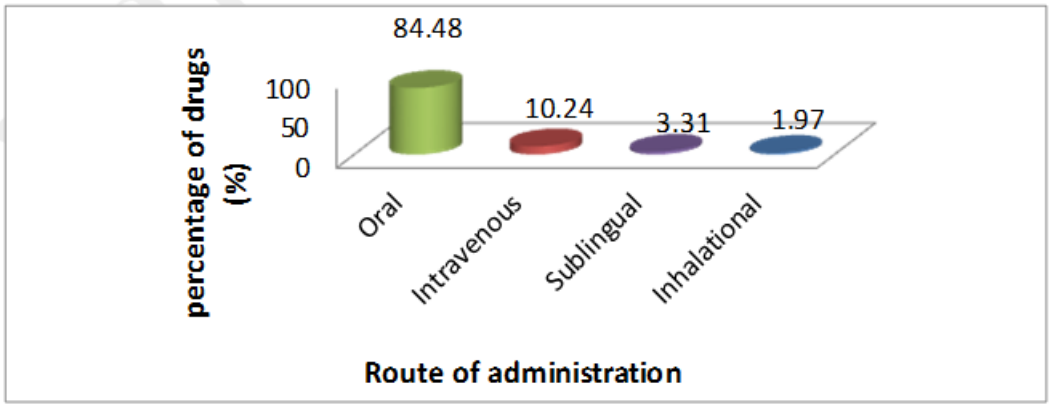

Figure 7: Route of administration of drugs.

Cardiovascular drugs used in patients

Table 5 shows the prescription pattern of various classes of drugs for treatment of Heart failure patients namely Antihypertensives, Anti-anginals, Inotropes, antiplatelet drugs, Anticoagulants, Hypolipidemic agents, Diuretics and Thrombolytic agents. The usage of these drugs were recorded and analyzed. Most common class of drugs observed in the treatment were Diuretics, Antiplatelets, Hypolipidaemics, Beta Blockers, and Cardiac Glycosides.

Table 5: Different cardiovascular drugs used in patients.

Drug Class	Drugs	Number of prescriptions	Percentage (%)
ACE inhibitors	Ramipril	61	30.5
	Enalapril	0	0
Angiotensin receptor blockers	Telmisartan	64	32
	Losartan	1	0.5
Beta blockers	Metaprolol	73	36.5
	Carvedilol	70	35
	Nebivolol	8	4
Diuretics	Furosemide	79	39.5
	Spironolactone	120	60
	Torsemide	115	57.5
	Metolazone	35	17.5
	Hydrochlorothiazide	1	0.5
Antiplatelet agents	Aspirin	139	69.5
	Clopidogrel	120	60
	Prasugrel	8	4
	Cilostazol	6	3
Vasodilators	Nitroglycerin	25	12.5
	Isosorbide dinitrate	24	12
	Nicorandril	2	1
	Isosorbide mononitrate	2	1
HCN Channel blocker	Ivabradin	1	0.5
Hypolipidaemics	Atorvastatin	147	73.5
	Rozuvastatin	6	3
Inotropes	Digoxin	91	45.5
	Noradrenaline	11	5.5
	Dopamine	4	2
	Dobutamine	3	1.5
Calcium channel blockers	Amlodipine	10	5
	Cilindipine	9	4.5
Anticoagulants	Heparin	22	11
	Acenocoumarol	3	1.5
Antiarrhythmics	Amiodarone	3	1.5
	Lidocaine	2	1
Alpha blocker	prazosin	4	2
Fibrinolytics	streptokinase	1	0.5

Percent of Drugs prescribed with Brand and Generic Names

95.27% of the drugs were prescribed by various brands and only 4.73% of the drugs were prescribed by their generic names was shown in fig.8 & 9.

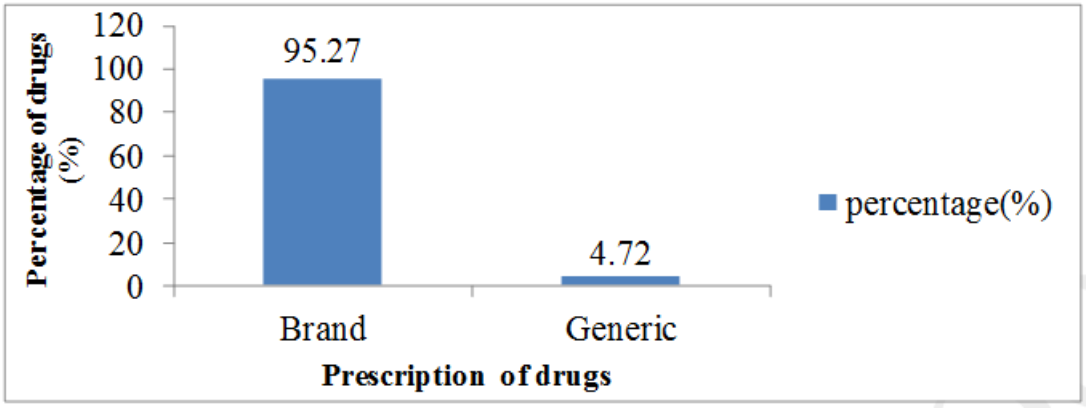

Figure 8: Showing branded and generic drugs used in treatment of HF patients.

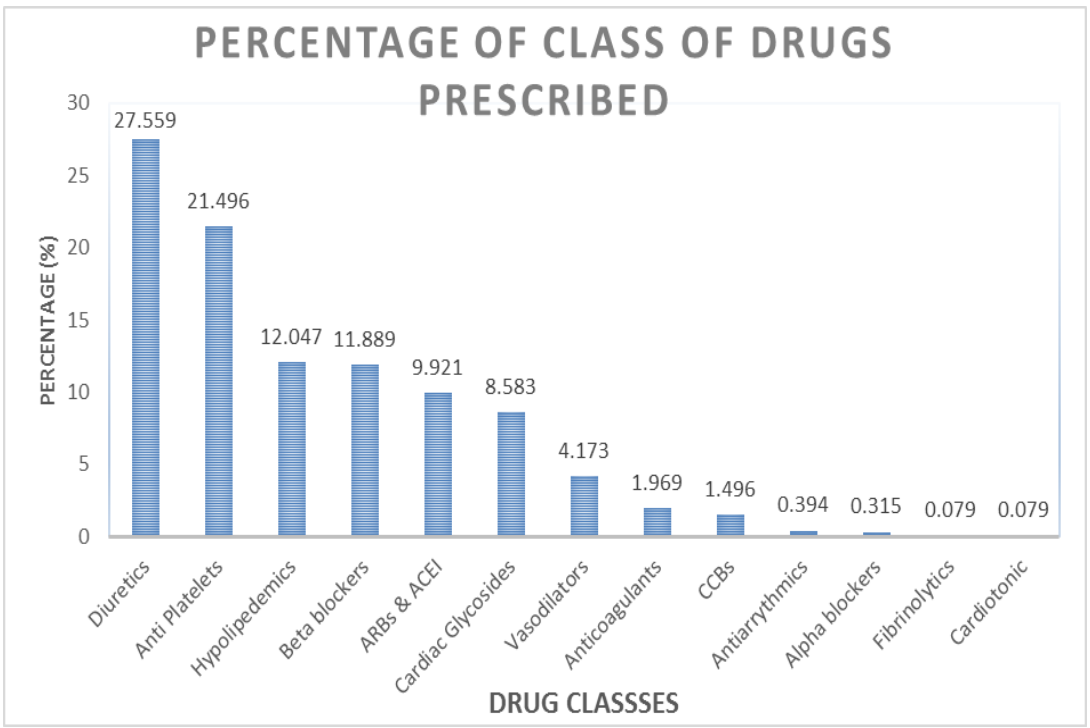

Figure 9: Commonly prescribed Drug classes in HF patients.

Combination of drugs used in patients

The cardiovascular drugs were given in combinations was shown in Table 6. Where, 14%(28) of patients received Aspirin, Clopidogrel and Atorvastatin, 7.5% of patients were given Aspirin and Clopidogrel combination and 30.5% of patients were administered with

Torasemide and Spironolactone, followed by 4% of patients were received Clopidogrel and Atorvastatin.

Table 6: Different cardiovascular drug combinations used.

Combinations	Number of patients	Percentage (%)
Aspirin+Clopidogrel+Atorvastatin	28	14
Aspirin+Atorvastatin	15	7.5
Clopidogrel+Atorvastatin	8	4
Torasemide+spironolactone	61	30.5

Number of drugs prescribed in a regimen

Polytherapy was observed in most of the patients with HF was shown in fig 10. Monotherapy was seen only in 3(1.5%) of patients, 2-drug therapy was found in 2(1%) of patients, 3-drug therapy in 19(9.5%) of patients, 4-drug therapy was in 46(23%) of patients and 5-drug therapy in 130(60%) of patients.

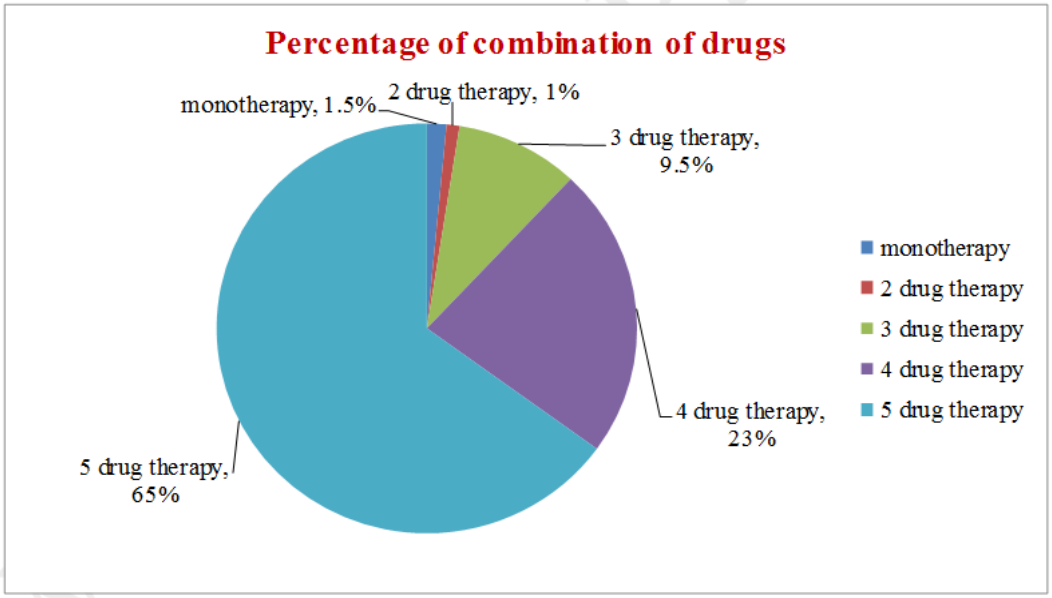

Figure 10: Showing percentage of combination of drugs used.

Prescription details of Heart Failure patients

In the present study, a total of 200 prescriptions were analyzed. A total of 1270 drugs were given to the patients. So the average number of drugs per prescription was 5.52 was shown in table 7.

Table 7: Details of prescriptions of heart failure patients.

Details of prescription	Number
Total number of patient's prescriptions analyzed	200
Total number of drugs prescribed	1270
Average number of drugs per prescription	5.52

DISCUSSION

The study was carried out with the aim to study the prescribing patterns of cardiovascular Medications in patients in Congestive Heart Failure (CHF) in a tertiary care hospital.

Heart failure was most common in the age group of 51-60 years (34.5%) followed by 24.5% in the age group of 61-70 years(Fig 1). In this study 150(75%) were males and 50(25%) were females (Fig. 2). The mean age of patients was 59 ± 14.14 years. These results are in concordance with the study by Patil SB, et al[6], Abijoithrao et al[7], Mitu Bascota et al.[8]

The major risk factors for heart failure were observed (Fig.3) to be Hypertension (HTN), Diabetes Mellitus (DM), smoking and alcohol consumption. 53% of patients were observed to be Hypertensive, 37% of patients were Diabetic and 35% of patients were smokers, followed by 17.5% of patients were alcoholics. 25% of patients were observed to be both Hypertensive and Diabetic. Besides this, 14.5% of patients were observed with Respiratory failure and 3.5% of patients were with atrial fibrillation.

The main causes of HF included (Fig. 4) are Ischaemic Cardiomyopathy (ICMP), and Dilated Cardiomyopathy (DCMP). 62% of patients were with ICMP and 38% of patients were with DCMP were observed to be with both DM and ICMP. These results are showing compliance with Mitu Bascota et al.[8]

In the present study, 90 (45%) patients were observed to be anemic. Baseline clinical characteristics of patients were compared with or without anemia (Table-2) and among our 90 anaemic patients with congestive heart failure, 75 (66.7%) were males and 40 (33.3%) were females. Silverberget al 18 documented 79% male patients having congestive heart failure[9], in compliance with our study results. Dai et al[10], Rasheed et al[11], Khan et al[12], Nasir et al[13] also reported similar results.

The hospital stay of HF patients was compared with their anemic status and it was observed that the average hospital stay (Fig. 5) of severe anemic patients was higher than moderate and

mild anemic patients and also progressively increased when compared to Non – anemic patients (Normal). This study shows that it was statistically significant (p=o.oo).

Heart failure is classified as compensated and decompensated. In this study, 93(46.5%) of patients were with decompensated heart failure, 107(53.5%) of patients were with compensated heart failure. The mean of ejection fraction of compensated and decompensated HF was 33.50 and 31.54 and was observed to be statistically significant (Table-3). Decompensated HF is a sudden worsening of the signs and symptoms includes difficulty breathing (dyspnoea), Leg or feet swelling, and fatigue whereas compensated HF is not associated with any symptoms.

The mean of blood urea was calculated 46.74 and was observed to be statistically not significant (p=0.173), similarly the mean of serum creatinine was found to be 6.68 and it was not statistically significant (p=0.497), although the mean of serum sodium and potassium were observed to be 134.39 and 4.86 respectively and were also statistically not significant (Na: p=0.55, K: p=4.86) (Table-4).

The causes of HF were compared with HTN (Fig. 6). It was found that the patients with ICMP were more than DCMP, of them the patients of ICMP with HTN were higher compared to patients with ICMP without HTN. The patients of DCMP without HTN were more when compared to patients with both HTN and DCMP.

Most commonly used route of administration of drugs was Oral route in 1073 (84.48%) of patients, parenteral route in 130(10.24%) of patients and sublingual route was used in 42(3.31%) of patients, followed by inhalational route in 25(1.97%) was shown in Fig. 7.

Table-5 shows the prescription pattern of various class of drugs for treatment of heart failure patients namely antihypertensive, anti-anginal, antiplatelet drugs, anticoagulants, Inotropes, hypolipidemic agents, Diuretics and thrombolytic agents. The usage of these drugs were recorded and analyzed. 95.27% of the drugs were prescribed by various brands and only 4.73% of the drugs were prescribed by their generic names (Fig. 8). These are compliance with Abijithrao et al.[7]

Most common class of drugs Prescribed in the treatment were Diuretics (27.56%), Antiplatelets (21.50%), Hypolipidaemics (12.05%), Beta Blockers (11.89%), ARBs & ACEIs

(9.92%), Cardiac glycosides such as Digoxin (8.6%) (Fig. 9). These results are not concordance with Mitubascota et al.[8]

About 30.5% of the patients received ACE Inhibitors (ACE-I) with Ramipril and 32.5% of thepatients received ARBs, out of them 32% of patients received Telmisartan and 0.5% of patients received Losartan. Beta Blockers (BB) were prescribed to the patients, where 36.5% of patients received Metaprolol and 35% of patients received Carvedilol, followed by 4% of patients received Nebivolol.

Diuretics were administered to the patients and Spironolactone was the most commonly prescribed diuretic followed by Torasemide and Furosemide. 60% of patients received Spironolactone, 57.5% of patients received Torasemide, 39.5% of patients received Furosemide and 17.5% of patients received Metolazone, followed by 0.5% of patients received Hydrochlorothiazide. Diuretics remain the first line oftreatment of edema or volume overload particularly inpatients of CHF. Diuretics reduce pulmonary edema and venous congestion, and in some cases it may be theonly drug needed in management of mild heart failure.

Anti-platelet drugs were prescribed, of which Aspirin was commonly prescribed drug followed by Clopidogrel. About 69.5% of patients received Aspirin, 60% of patients received Clopidogrel and 4% of patients received Prasugrel followed by 3% of patients received Cilostazol.

About 26.5% of patients were prescribed with Vasodilators, 12.5% of them received Nitroglycerin, 12% of patients received Isosorbide dinitrate and 1% of patients received Nicorandril, 1% with Isosorbide Mononitrate, followed by 0.5% of patients received Ivabradin (cardiotonic).

A total of 76.5% of patients received Anti-Hyperlipidaemic agents, 73.5% of them received Atorvastatin and 3% of them received Rozuvastatin. These agents decrease the level of LDL cholesterol effectively with increasing the HDL level and also reduce the risk of coronary heart diseases, myocardial infarction and stroke effectively with fewer side effects.

About 54.5% of patients were administered Inotropes, where 45.5% of patients received Digoxin, 5.5% of patients received Noradrenaline and 2% of patients received Dopamine, followed by 1.5% of patients received Dobutamine.

Calcium Channel Blockers were also prescribed to the patients in order to control blood pressure, of which Amlodipine was given to 5% of patients, Cilindipine was given to 4.5% of patients. About 12.5% of patients were administered Anticoagulants, out of them, 11% of patients were given Heparin and 1.5% of patients were given Acenocoumarol.

Antiarrhythmic agents were prescribed to patients, where Amiodarone was given to 1.5% of patients and Lidocaine was given to 1% of patients. About 2% of patients received Alpha blockers with Prazosin and 0.5% of patients received Fibrinolytics with Streptokinase. A total of 12.5% of patients were prescribed bronchodilators through inhalational route.7% of them received Salbutamol, 3.5% of them received Budesonide and 2% ofthem received Ipratropium bromide.

The cardiovascular drugs were given in combinations (Table-6). In this combinational drugs, 14%(28) of patients received Aspirin, Clopidogrel and Atorvastatin, 7.5% of patients were given Aspirin and Clopidogrel combination and 30.5% of patients were administered Torasemide and Spironolactone, followed by 4% of patients were received Clopidogrel and Atorvastatin.

In the present study, total numbers of prescriptions were analyzed to be 200. A total of 1270 drugs were given to the patients. So the average number of drugs per prescription was 5.52.

Polytherapy was observed in all patients with HF (Fig. 10). Monotherapy was observed only in 3(1.5%) of patients, 2-drug therapy was found in 2(1%) of patients, 3-drug therapy was found in 19(9.5%) of patients, 4-drug therapy was found in 46(23%) of patients and 5-drug therapy was observed in 130(60%) of patients. Practice of polytherapy is a good practice compared to monotherapy for therapeutic effectiveness.

Therefore, polytherapy is the best option than monotherapy in patients with HF. Prescription of generic drugs reduces the patient's burden. The chance of survival for long term depends on the absence or presence of co-morbidities.

Limitations of the study

- Small sample size (n=200) was the major limitation of our study.
- Short duration of study (6 months) was another limitation of our study.
- The study would have been better if multiple tertiary care hospitals were included.

- The results of our study cannot be extrapolated to general population because study was conducted in only one tertiary care hospital.

CONCLUSION

Heart Failure is caused due to various underlying diseases. Among which ICMP and DCMP are most commonly followed by HTN, DM. The prevalence of HF is high in males than in females and also it is higher in patients under age group of 51 – 60 years. Combination therapy is proved to be more effective than monotherapy and average number of drugs per prescription are 5.52.

A combination of 5 drugs is in practice which is observed to be most common. Polytherapy is advantageous when compared to monotherapy. The present study shows that 95% of the drugs are prescribed with various brands and only 5% of drugs prescribed in generic. We try to conclude that the prescription of generic drugs reduces the economic burden of the patients. The most commonly prescribed class of drugs are Diuretics where, Spironolactone and Torsemide were common followed by Antiplatelets which are given to the patients with history of Myocardial Infarction (MI) which is followed by ACEIs/ARBs, Hypolipidemics and β – blockers. The most common preferred route of administration was Oral followed by Intravenous route.

Anemia remains an important risk factor which contributes towards the worsening of the Outcomes of HF. The prevalence of Anemia is observed to be 45% in our study. The baseline clinical characteristics such as Age, Gender, Systolic BP, and Diastolic BP are compared between anemic and non – anemic patients and observed that there exists a significant difference except with cause.

For All the patients in the study population, Patient counselling regarding Disease, Medications and Life – style modifications were provided. It plays a key role in maintaining the Drug adherence by the patient. It is needed to conduct a study to assess the severity of disease before and after patient counselling to determine the impact of patient counselling on patient health. All the prescription we assessed was rational and adherence to Prescribing Guidelines for HF patients were seen.

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