Prescription pattern in patients having heart failure in a south Indian tertiary care hospital: A retrospective study

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Abstract

Introduction & Objectives: Heart failure (HF) is a common cardiovascular condition with increasing incidence and prevalence and many drugs are used especially in combination to treat this condition. Our objective of the study was to study drug prescribing pattern in patients with heart failure.

Materials and Method: The data was collected retrospectively and recorded in a preformed proforma obtained from Medical Records Department, A.J. Institute of Medical Sciences and Research Centre, Mangalore, Karnataka, India of patients admitted for congestive heart failure during the period of 2 years from January 2013 - December 2014.

Results: Our study reveals about 871 drugs were prescribed for 100 patients who are included in the study 715 (82%) received the drug by oral route, 104 (11.9%) by parenteral route and 52 (5.9 %) drugs by inhalational route. The drugs prescribed were Angiotensin receptor blockers (ARBs) (13%), Diuretics (92%), Beta blockers (37%), Hypolipidemic agents (34%), Bronchodilators (56%), Sympathomimetics (75%), Antiplatelets (63%), Anticoagulant (11%), Antiulcer drugs (72%) and Positive inotropic drug (70%) and Antimicrobial drugs (99%). Out of the 871 drugs prescribed only 15.95% (139) of the drugs were prescribed by generic names and rest of 732 (84.05%) were prescribed by brand names. About 627 (71.98%) of the total drugs prescribed were from the essential drugs list.

Interpretation & Conclusions: We try to conclude that polytherapy is the better than monotherapy in patients with CCF. Prescription of generic drugs reduces the patients' burden making it more affordable and also the chance of survival for long time depends on absence or presence of co-morbidities.

Keywords: Congestive Heart Failure, Prescription Pattern, Retrospective Study

Introduction

Heart failure (HF) is a common cardiovascular condition with increasing incidence and prevalence.[1] Several large clinical trials on use of pharmacological therapy and devices have resulted in an increasing use of evidence based therapy of heart failure. Despite these advances the morbidity and mortality of those afflicted with heart failure continues to remain high. Adherence to guidelines, results in improved outcomes of heart failure patients. Education of caregivers on evidence based therapy is the cornerstone of a successful heart failure programme. Unlike western countries where heart failure is predominantly a disease of elderly, in India it affects younger age group. The important risk factors for heart failure include coronary artery disease, hypertension, diabetes mellitus, cardiotoxic drugs, valvular heart disease and obesity.[2,3] In India coronary artery disease, diabetes, hypertension, valvular heart diseases and primary muscle diseases are the leading causes for heart failure. Rheumatic heart disease is still a common cause of heart failure in Indians. However, an important question is whether all patients are being afforded the same advantages of current treatment approaches.[4]

The 'epidemic' of increasing rates of heart failure, thought to have peaked in the mid-1990s, still remains an important cause of morbidity and mortality in the elderly today.[5-7] Treatment guidelines for heart failure were modified to include evidence-based treatments. Despite an initial increase in the numbers of patients treated using these drugs, the dissemination of the evidence-based treatments to routine clinical practice has been repeatedly reported to be low.[8-11] There are large differences between studies examining prescriptions of drug therapy for patients with heart failure. Population- based studies have reported high rates for under- utilization of evidence-based therapy for patients with heart failure.[12,13] Hospital-based studies, especially in specialized heart centres, show higher uptake of use of ACE inhibitors and beta-blockers.[14-18] However, as most studies of prescribing and drug utilization in patients with heart failure are cross- sectional, they do not always present data on continuation of therapy after hospital discharge.

There are very few researches throwing light on the impact of present medical treatments for heart failure on the actual pharmacotherapy patients received after a first hospital admission for heart failure. This research focuses on these deficits in order to extend the present knowledge in the treatment of patients with congestive heart failure. Our objectives of the study are, to develop a baseline data on drug prescribing pattern in patients with heart failure, to evaluate the prevalent prescribing practices in accordance with the guidelines and to study the relative use of monotherapy, combination drugs and adverse drug reactions associated with heart failure patients.

Materials and Method

After obtaining approval and clearance from institutional ethics committee data was collected retrospectively from Medical Records Department, A.J. Institute of Medical Sciences and Research Centre, Mangalore, Karnataka, India of patients admitted for congestive heart failure during the period of 2 years from January 2013 - December 2014. Both males and females greater than 18 years with congestive cardiac failure and treated in A.J. Institute of Medical Sciences and research centre were included in the study. Inclusion criteria's are (1) Patients above the age of eighteen years and (2) Patients of either gender. Exclusion criteria's are (a) Patients below 18 years of age and (2) Pregnant women. Data were recorded in a preformed proforma with the following consideration as Age, Gender, Date of admission and discharge, Presenting complaint, Occupational history, Personal history, Past history, Family history, General and Systemic examination, Investigations performed, Heart failure drugs given, Dose, Mode of administration, Duration, Drugs prescribed by generic name and brand name, Other treatment [if any] given, Outcome of treatment.

Data Analysis: The data collected were processed and subjected to relevant statistical analysis. Descriptive statistical procedure and evaluation were done to analyse the results using SAS University Edition analytics software.

Results

Gender Distribution of subjects: A total 871 drugs were prescribed for 100 patients who are included in the study 59 males and 41 female patients.

Table 1: Age wise distribution of patients

Age in Years	Number	Percentage (%)
18-20	0	0
21-30	1	1
31-40	8	8
41-50	11	11
51-60	23	23
61-70	38	38
71-80	13	13
81-90	6	6
Total	100	100

Route of drug administration: Most commonly used route of administration was Oral (82.08%), parenteral (11.94%) followed by Inhalation (5.97%)

Drugs prescribed by brand and generic names: Out of the 871 drugs prescribed only 15.95% (139) of the drugs were prescribed by generic name and rest of 84.05% of the drugs were prescribed by brand names.

Table 2: Different drugs used in patients with CHF

Drug Class	Drugs	Number of Patients	Percentage
ACE inhibitors and angiotensin receptor blockers	Ramipril	64	64
	Enalapril	16	16
	Losartan	11	11
	Telmisartan	3	3
beta blockers	Metoprolol	7	7
	Carvedilol	30	30
Diuretics	Furosemide	76	76
	Spironolactone	92	92
	Torasemide	9	9
	Hydrochlorothiazide	7	7
Antiplatelet Agents	Aspirin	4	4
	Clopidogrel	59	59
Antiarrhythmic drugs	Amiodarone	18	18
Antianginal drug	Ranolazine	22	22
Potassium Channel Opener	Nicorandil	5	5
Thrombolytic Agent	Streptokinase	2	2
Anticoagulants	Low molecular weight heparin	11	11
Hypoglycemics	Insulin	21	21
Antimicrobials	Antimicrobials	99	99
Oxygen	Oxygen	28	28
Benzodiazepines	Alprazolam	1	1
Tricyclic Antidepressants	Amitriptyline	2	2

Anti Emetics	Domperidone	6	6
	Ondansetron	2	2
NSAID	Paracetamol	15	15
Nitrates	Isosorbide dinitrate	11	11
Others	Others	2	2
Antiplatelet Agents	Aspirin Clopidogrel	4 59	4 59
Antiarrhythmic drugs	Amiodarone	18	18
Antianginal drug	Ranolazine	22	22
Potassium Channel Opener	Nicorandil	5	5
Thrombolytic Agent	Streptokinase	2	2
Anticoagulants	Low molecular weight heparin	11	11
Hypoglycemics	Insulin	21	21
Antimicrobials	Antimicrobials	99	99
Oxygen	Oxygen	28	28
Benzodiazepines	Alprazolam	1	1
Tricyclic Antidepressants	Amitriptyline	2	2
Anti Emetics	Domperidone	6	6
	Ondansetron	2	2
NSAID	Paracetamol	15	15
Nitrates	Isosorbide dinitrate	11	11

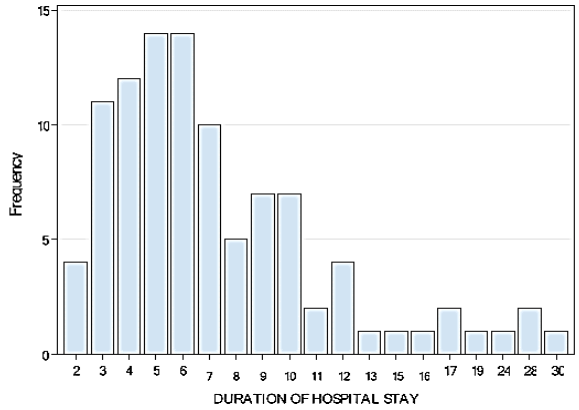

Fig. 1: Duration of hospital

Table 3: Co-morbid conditions to CHF

Co-morbid condition to CHF	No. of patients	Percentage (%)
Hypertension	18	18
Hypertension and diabetes	21	21
Idiopathic Dilated cardiomyopathy	30	30
Dyslipidemia	37	37
Rheumatic Heart Disease	8	08
Atrial Fibrillation	1	01
Ischaemic Heart Disease	38	38

Table 4: Two drug combinations prescribed in a regimen

Drug Combination	Number	Percentage
ACE-I + Diuretics	3	18.75
Diuretics + Digoxin	8	50.00
Diuretics + B-blockers	1	6.25
ACE-I + Digoxin	4	25.00

ACE-I= Angiotensin Converting Enzyme Inhibitors

Table 4: Three drug combinations prescribed in a regimen

Drug Combination	Number	%
ACE-I+ DIR + DIG	7	24.13
ACE-I+ DIR + AC	6	20.68
BB + ACE-I + DIR	2	6.89
BB + AC + DIR	2	6.89
DIR + DIG + AC	5	17.24
DIR + BB + AC	3	10.34
ACE-I+ BB + NIT	2	6.89
ACE-I + BB + DIG	2	6.89

ACE-I= Angiotensin Converting Enzyme Inhibitors, DIR-Diuretics, DIG-Digoxin, BB-Beta blockers, AC-Anticoagulants, NIT-Nitrates

Table 5: Four drug combinations prescribed in a regimen

Drug Combination	Number	%
ACE-I + DIR + DIG + AC	24	58.53
BB + ACE-I + DIR + AC	6	14.63
ACE-I + DIR + DIG + NIT	3	7.31
ACE-I + DIR + AC + NIT	2	4.87
BB + ACE-I + DIR + DIG	5	12.19
NIT + BB + AC + DIR	1	2.43

ACE-I= Angiotensin Converting Enzyme Inhibitors, DIR-Diuretics, DIG-Digoxin, BB-Beta blockers, AC-Anticoagulants, NIT-Nitrates

Table 6: Five drug combinations prescribed in a regimen

Drug Combination	Number	%
ACE-I + DIR + DIG + AC + BB	11	78.57
ACE-I + DIR + DIG + AC + NIT	1	7.14
ACE-I + DIR + BB + AC + NIT	2	14.28

ACE-I= Angiotensin Converting Enzyme Inhibitors, DIR-Diuretics, DIG-Digoxin, BB-Beta blockers, AC-Anticoagulants, NIT-Nitrates

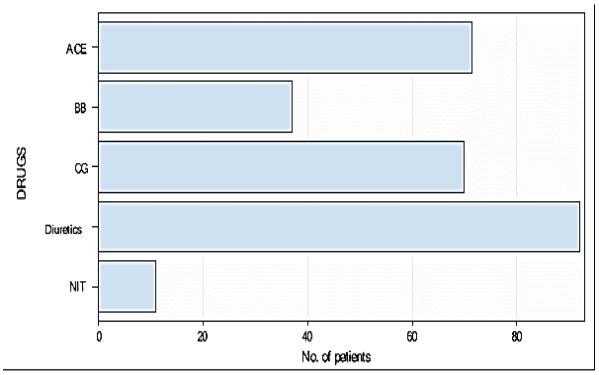

Fig. 2: Distribution pattern of overall use of dugs in heart failure

ACE-Angiotensin converting enzyme, BB-beta blocker, CG-cardiac glycoside, NIT-nitrates

Discussion

A total 871 drugs were prescribed for 100 patients who are included in the study, of which 715 drugs were given by oral route, 104 drugs were given by parenteral route and 52 drugs were given by inhalational route.

The drugs that are most effective are the drugs which cause both venous and arterial dilatation, most forms of heart failure have elevated preload and after load. The ACE-I have effect on both preload and after load. In addition they cause a rise in bradykinin levels which result in the nitric oxide release and other important endogenous vasodilators.[19] Various prospective randomized placebo-controlled trials, particularly CONSENSUS I, V-HEFT II and SOLVD have shown improvement in symptoms and mortality in patients with mild to severe heart failure.[20-22] About 13% of the patients received ARBs, out of them 11% patients received Losartan and 3% patients received Telmisartan. The ARBs act at the angiotensisn II receptor level blocking the downstream effects of angiotensin II. ARBs can be used in treatment of heart failure instead of ACEI.[23-25] Added advantage of ARBs is they do not produce the cough seen with the ACEI.

Diuretics were administered to patients and Furosemide was the most commonly prescribed diuretic 76% of patients received Furosemide, 9% of patients received Torasemide and 7% of patients received Hydrochlorothiazide. Diuretics remain the first line of treatment of edema or volume overload particularly in patients of CHF. Diuretics reduce pulmonary edema and venous congestion, and in some cases it may be the only drug needed in management of mild heart failure.[26] About 37% of the patients received Beta Blockers, of which 7% patients received Metoprolol & 30% received Carvedilol. The beneficial role of β- blockers in the treatment of heart failure is well established. Agents commonly used in clinical practice are sustained release metoprolol, bisoprolol, carvedilol, and nebivolol. Multiple large scale randomized placebo- controlled studies class II-IV heart failure patients like MERIT- HF, COPERNICUS, CIBIS and COMET trials have shown to reduce the mortality and morbidity.[27-29]

About 34% of patients were prescribed Hypolipidemic agents, 28% of them received Atorvastatin and 6% of them received Rosuvastatin. Another major risk factor for CHF is atherosclerosis. Lipid lowering strategies alter plaque architecture, resulting in fewer macrophages and a larger collagen and smooth muscle cell - rich fibrous cap. Statins exert their major effects by lowering LDL- C and improving the lipid profile as, a variety of potentially cardioprotective effects are being ascribed to these drugs. Statins are used mainly in patients who are affected by other co-morbid conditions like myocardial infarction.[30,31] A total 56% of patients were prescribed bronchodilators, 4% of them received Salbutamol, 8% of them received Ipratropium bromide, 3% of them received Budesonide, all these drugs were given to these patients by inhalational route and 41% of patients received theophylline.

A total of 62% of patients received Proton pump inhibitors (PPI), 30% of them received Pantoprazole, 12% of them received Omeprazole and 5% of patients received Rabeprzole and 15% of them were given esomeprazole. Most of these patients received these drugs byparenteral route. Out of 100 patients 10 patients received Ranitidine and was given by parenteral route. PPI and H2 blockers mainly help in reducing the gastric acid secretion and were mainly used in these patients to relieve the symptoms of gastritis and also to prevent gastritis.

Digoxin was prescribed to a total of 70% of patients. The Digitalis investigation Group, trial showed a

decrease in the risk of death attributed to worsening of heart failure in the digoxin treated group compared to placebo in patients with mild to moderate heart failure. Greatest increase in contractility is apparent at serum levels of digoxin around 1.4 ng/ml.[32] The doses used in our study were sufficient to achieve the above mentioned serum levels. The randomized trials RADIANCE and the DIG trial showed significant reduction in hospitalizations for worsening heart failure but no reduction in mortality.[33,34]

About 5% of patients received Dobutamine. Dobutamine is a positive inotropic agent, it is used for the short term for support of circulation. So, these drugs are used in acute heart failure only. Although Inotropic agents temporarily stabilize the haemodynamic status, their long term use is associated with increased mortality.[35,36]

Anti-platelet agent clopidogrel was prescribed for 59% of study subjects & aspirin to 4% of patients for its antiplatelet effect. Most of the patients in whom these two drugs were prescribed had a previous or present attack of MI and were on antiplatelet therapy. Then CAPRIE trial has shown that clopidogrel 75 mg daily for 3 years post MI is superior to 325mglday of Aspirin, in terms of reduction in the rate of subsequent atherothrombotic events.[37]

About 11% of the patients received low molecular weight (LMW) heparin. LMW Heparin has been shown to be effective in the treatment of venous thrombosis, pulmonary embolism and unstable angina.[38] Although expensive, the cost- benefit ratio of LMW is acceptable. LMWs were mainly used in those patients who had a prior attack of acute myocardial infarction.

About 99% of patients received antimicrobial agents. Most commonly used AMA was Ceftriaxone in 59% of patients, A fixed dose combination of piperacillin & Tazobactum was used in 10% of patients, and cefotaxime in 16% of patients and a fixed dose combination of cefoperazone & sulbactum was also used in 14% of patients. Most of these AMA were prescribed as prophyaxis.

An average of 8.71 drugs was prescribed for each patient during their hospital stay. The large number of drugs used proves that modern medicine seems to believe in the "most is the best". Out of the 871 drugs prescribed only 15.95% (139) of the drugs were prescribed by generic name showing that most of the drugs were prescribed by brand names which were costlier making the treatment costly and also shows the higher influence of pharmaceutical companies on the doctors. 11.36% (99) of the drugs prescribed were antibiotics; most of them were given by parenteral route and were given prophylactically. About 71.98% (627) of the total drugs prescribed were from the essential drugs list.

Conclusion

Heart Failure is caused due to various underlying diseases among which, Ischemic Heart Disease and dilated cardiomyopathy are most common followed by Hypertension and Diabetes, a few caused by Rheumatic Heart Disease. The incidence of heart failure is slightly higher in males than females and also it is higher in patients between the age group of 61-70 years. A combination therapy proves to be more effective than a single drug. A combination of up to 5 drugs are in practice, the most common being Four-drug and Three-drug therapy. We try to conclude that polytherapy is the better than monotherapy in patients with CCF. Prescription of generic drugs reduces the patients' burden making it more affordable and also the chance of survival for long time depends on absence or presence of co-morbidities.

However further studies are needed with a larger sample size to know the current status of drug utilization in hospital settings involving different centres having data about the prognosis and future follow up of the patients.

Conflict of Interest: None

Source of Support: Nil

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