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CURRENT TRENDS IN THE PRESCRIBING PATTERN AND RISK FACTOR ANALYSIS OF HEART FAILURE PATIENTS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Aim: The aim was to identify the prescription trends and risk factors that heart failure patients deal with.

Background: Heart failure is a complicated clinical syndrome characterized by the heart's ability to pump or fill with blood may decrease. It is a highly growing worldwide public health problem. It continues to be a significant cause of illness and death worldwide. Auditing the prescription of heart failure patients and analyzing the risk factor of it can reduce morbidity, mortality, and health expenditure. The research made it easier to analyze the heart failure patients' prescription patterns and risk factors who were hospitalized at Mallige Hospital in Bangalore. The study objectives were to analyze prescribing patterns, identify risk factors, and evaluate prescription rationale.

Result: In most of the cases it shows that 54.5% were male patients, the age group of most of the patients was 61-70 years. When risk factors were analyzed, it was discovered that hypertension (77.7% of risk factors) and low sodium diet (43.1%) were the two most frequently prescribed risk factors. The most commonly prescribed drug was diuretics (63.4%) Furosemide (62.6%) was the most common drug. Followed by statin and fibrinolytic namely, atorvastatin, rosuvastatin, aspirin, and clopidogrel.

Conclusion: According to the study, dual and multiple drug combinations were usually provided after prescription diuretics as a common medication. The most prevalent risk factor was discovered to be hypertension, and this includes aspirin, clopidogrel, atorvastatin, and rosuvastatin for patients with heart failure. In addition, we have found that most of the patients were taking statins and few of them are having myalgia, as we all know statins are well known for their adverse drug reaction which is rhabdomyolysis so as a pharmacist intervention, we suggested the physicians change the drug to other lipid-lowering drugs like bempedoic acid and gave patients counseling regarding the condition.

Keywords: Heart failure, prescription pattern, risk factor analysis, congestive cardiac failure, cardiovascular drugs, Monotherapy, diuretics, and dual therapy.

INTRODUCTION

Heart failure occurs when the heart is unable to adequately supply the body with essential oxygen and blood. To put it simply, the heart is overworked. It's important to note that even if someone has heart failure, it doesn't mean their heart has stopped beating. It indicates that a variety of potential factors may result in a slower flow of blood through the heart and body and an elevation in heart rate. As a result, the body's demand for oxygen and nutrition cannot be met due to insufficient blood flow caused by the heart's inability to pump effectively **[1]**. The chambers of the heart may either expand to accommodate more blood for pumping throughout the body or become stiff and thickened **[2]**. As time passes, the heart muscle walls may experience a weakening effect that can lead to reduced pumping effectiveness. Nevertheless, this process helps to keep blood flow going. The body may respond by retaining fluid (water) and salt as a renal response. The body becomes clogged when fluid accumulates in the lungs, arms, legs, ankles, or other organs. The illness is known by the phrase congestive heart failure. Heart failure can be classified into several distinct subtypes, such as congestive, right-sided, and left-sided heart failure. According to the severity and symptoms, the American Heart Association has also classified heart failure into the following stages: stage A, stage B, stage C, and stage D **[3]**.

Causes

Heart failure is often caused by an underlying condition. The most frequent cause of heart failure is coronary artery disease (CAD), a disorder that narrows the arteries supplying the heart with blood and oxygen. Other risk factors for heart failure include heart attack, heart valve disease, rheumatoid heart disease,

specific types of arrhythmias (irregular heartbeats), high blood pressure, emphysema, sleep apnea, diabetes, thyroid disease, HIV, severe anemia, and certain cancer treatments like chemotherapy **[4]**.

Risk Factors

Anyone can get heart failure. Your chance of getting this ailment, however, may be increased by several variables. Medical conditions like sleep apnea, high blood pressure, anemia, thyroid and coronary artery disease, valve disease, and emphysema can lead to heart failure. Behaviors like smoking and unhealthy eating habits also increase the risk **[5]**.

Sign and Symptoms

The symptoms can include:

- Congested lung; Exercise-induced breathlessness or breathing difficulties at rest or while flat on one's back in bed might be brought on by a fluid backlog in the lungs. Wheezing or a dry, hacking cough can also be brought on by lung congestion.
- The retention of fluid and water; Edema, or swelling ankles, legs, and belly is brought on by less blood reaching your kidneys, which also results in weight increase. Fluid and water retention is another effect. The desire to urinate more frequently at night may be brought on by symptoms. nausea or a loss of appetite might result from stomach bloating.
- Dizziness, fatigue, and weakness; You feel weak and fatigued when less blood flows to your key organs and muscles. Confusion or vertigo might result from decreased blood flow to the brain.
- Irregular or rapid heartbeats; For the body to receive adequate blood, the heart beats more quickly. This may result in a quick or erratic heartbeat. **[6]**

Diagnosis

- A thorough physical examination is conducted by medical professionals to identify potential symptoms of heart failure. Indications such as pitting leg edema, irregular heartbeat, or swollen neck veins may be used to diagnose heart failure.
- Echocardiogram
- Blood test; troponin-1, troponin-T, creatinine kinase, and others
- Breathing test**;** spirometry & peak flow test

Other tests

Table 1: Diagnostic tests for Heart failure [7]

TEST	RESULT
Chest X-ray	Examination of the heart and the surrounding organs by using xray particles may be seen in a picture format.
Heart MRI	Produces images of the heart with the help of sound waves.
Nuclear scan	A very small dosage of radioactive material is delivered into your body to produce photos of your heart's chambers.
Coronary angiogram or catheterization	The doctor places a catheter into a blood artery in your body during this form of X-ray examination, often in the arm or groin. Then they direct it toward the heart. This test tells us how much blood is now pumping through the heart.
Stress examination	During a stress test, an EKG machine examines your heart activity while you exercise—whether it's running on a treadmill or engaging in another activity.
Holter monitoring	To conduct this test, electrode patches will be placed on your chest and connected to a small holter monitor device. The test will last for a minimum of 24 to 48 hours. the device logs your heart's electrical activity.
BNP blood test	To check for potential heart failure, a BNP test can be conducted by drawing blood from a vein in the arm. This test can detect elevated levels of B-type natriuretic peptide (BNP), a hormone that may signal heart problems.

Ejection fraction: The ejection fraction (EF) is a means of quantifying the amount of blood that the left ventricle expels during each contraction. This metric is expressed as a percentage and serves as a reliable indicator of heart function. An EF of 60% denotes that 60% of the blood within the left ventricle is expelled with each heartbeat. Accurately assessing EF is important in the identification and monitoring of heart failure.

Heart failure also referred to as heart failure with preserved ejection fraction (HFpEF), can persist even if an ejection fraction test shows normal results. A healthy heart's ejection fraction can typically range from 50 to 70%. However, due to the thickening and stiffness of the heart muscle, the ventricle can only hold a smaller volume of blood than usual, even though it may appear to pump out a normal amount of blood. Unfortunately, this amount of blood is often insufficient to provide the body with all the necessary nutrients. An ejection fraction measurement under 40 percent may indicate heart failure or cardiomyopathy.

An EF between 41 and 49 percent is regarded as "borderline." It is not always a sign that someone is going into heart failure. Instead, it can be a sign of damage, possibly from a prior heart attack.

Ejection percent may be exceedingly low in severe situations. A heart disorder called hypertrophic cardiomyopathy may be present if the ejection fraction is measured at a level higher than 75% **[8]**.

Treatment

It is not possible to treat heart failure brought on by accumulated damage to the heart. But it can be treated, frequently using methods that will make symptoms better.

Your therapy program can include:

- Modifications, Adjustments, and transformations
- Drugs and pills
- Surgical procedures
- Devices
- Ongoing care **[9]**

Medicatons

- **Angiotensin-converting enzyme inhibitors (ACEI);** These medicines help to decrease tension in blood vessels, resulting in lowered blood pressure, improved blood circulation, and reduced stress on the heart. Enalapril, lisinopril, and captopril are some common examples.
- **Angiotensin II receptor blockers (ARBs);** The drugs Valsartan, losartan, and candesartan are excellent replacements for ACE inhibitors, providing equal benefits. Patients who are unable to tolerate ACE inhibitors without jeopardizing their treatment can be advised to take them.
- **Beta blockers;** Beta-blockers are essential in reducing blood pressure and regulating heart rate. They are also highly effective in alleviating symptoms of heart failure, improving heart function, and even extending lifespan. It is important to note that carvedilol, metoprolol, and bisoprolol are some examples of these vital beta-blockers.
- **Diuretics;** Diuretics are water tablets that prevent fluid from accumulating in your body by increasing urination. They also reduce fluid in the lungs for easier breathing. Potassium and magnesium supplements may be advised as these nutrients are lost with diuretic use. Doctors will monitor potassium and magnesium levels through routine blood tests.
- **Aldosterone antagonists;** Eplerenone and spironolactone are diuretics that help severe systolic heart failure patients. They spare potassium, which can extend life. However, they can cause high levels of potassium.
- **Positive inotropes;** People who are hospitalized and have specific forms of severe heart failure may get these drugs intravenously. Positive inotropes can improve the heart's ability to pump blood and keep blood pressure stable. Some individuals' risk of mortality has been associated with prolonged usage of certain medicines. Discuss the advantages and disadvantages of these medications with your doctor.

- **Digoxin;** Digoxin, also known as digitalis, effectively enhances heart muscle contractions and decelerates pulse rates. For individuals experiencing systolic heart failure, digoxin is an effective medication that can alleviate heart failure symptoms. Those who suffer from atrial fibrillation, a heart rhythm disorder, may also be frequently prescribed this drug.
- **Hydralazine and isosorbide dinitrate (BiDil);** This cocktail of medications relaxes blood vessels. If beta blockers or ACE inhibitors have failed to relieve your severe heart failure symptoms, they could be added to your therapy regimen.
- **Vericiguat;** This new medicine for long-lasting heart problems is taken once a day. It is a type of medicine called an oral soluble guanylate cyclase (sGC) stimulator. Compared to those who got a fake pill (placebo), patients with high-risk heart problems who took vericiguat needed to go to the hospital less often for heart problems and had fewer deaths related to heart disease.
- **Other medications;** In case you encounter any symptoms, your physician must prescribe additional medications to effectively manage them. For example, chest pain requires the use of nitrates, statins are effective in lowering cholesterol levels, and blood-thinning drugs are highly recommended to prevent blood clots **[10]**.

METHODOLOGIES

Study site:

- This research was carried out at Mallige Hospital. A multispecialty tertiary care hospital with about 126 beds, Mallige Hospital is ideally situated in Bengaluru, the state capital of India's Karnataka region. Nephrology, Cardiology, Radiology, General Medicine, Surgical, Paediatrics, Obstetrics & Gynecology, and other departments make up Mallige Hospital.

Study Centre:

- For this study data were collected from IPD (Male ward, Female ward, General ward, Intensive Care Unit) and Medical Record Department (MRD).

Study design:

- The research comprises both forward-looking and backward-looking observational studies.

Study duration:

- This study was conducted for 6 months with which the data collection period for 3 months

Study population:

- The study involved patients from the inpatient department.

Sample size:

- For the research project, it was imperative to register precisely 350 patients.

AIMS AND OBJECTIVES:

(a) Aim:

- To evaluate the current trends in the prescription pattern and risk factor analysis of heart failure patients in tertiary care hospitals.

(b) The primary objective

- To evaluate the Prescribing Patterns in heart failure patients.

(c) Secondary objectives

- To analyze the risk factor of heart failure patients.
- To analyze the rationality of prescriptions.

Tools:

- Patient data collection forms
- Patient-informed consent forms

EXAMINATION REQUIREMENTS:

Inclusion criteria;

- Patients of age 18 years and above
- The patients with heart failure
- The patients with known cases of heart failure

Exclusion criteria;

- Individuals who are under 18 years of age
- Incomplete cases
- Patients who are not willing to participate in the study

Data Sources:

- Prescriptions of patients/medication chart
- Laboratory investigational data
- Notes written by nurses and doctors.

Procedure:

Regarding this research, patients' data were collected using the data collection form after the patient gives the data voluntarily after signing the consent form or from the medical record department after their approval. After collecting the data distribution of cardiovascular (CVS) drugs in patients was analyzed from their medication charts. This study aimed to determine the current trends in the prescribing pattern and risk factor analysis of heart failure patients.

Statistical analysis:

We utilized MS Excel for the statistical analysis and ensured that we employed the appropriate techniques to comprehensively examine the findings.

Table 2: Parameters used in the study (n = Number of the patient)

VARIABLE	PATIENTS (N: 350)
GENDER	n (%)
Male	191 (54.5%)
Female	159(45.5%)
Age distribution (years)	n (%)
18-30	0 (0%)
31-40	3 (0.9%)
41-50	31 (8.9%)
51-60	54 (15.4%)
61-70	103 (29.3%)
71-80	74 (21.1%)
81 and above	85 (24.4%)
BMI	n (%)
Normal	199 (56.9%)
Underweight	60 (17.1%)
Obese	57 (16.3%)
Overweight	34 (9.8%)
SEVERITY OF HEART FAILURE	n (%)
Mild	117 (33.3%)
PRESCRIBED DIET	n (%)
Low sodium diet	150 (43.1%)
Diabetic diet	68 (19.5%)
Soft diet	60 (17.1%)
Fluid restriction	40 (11.4%)
Normal	17 (4.9%)
Low potassium	15 (4.0%)

Table 3: Parameters used in the study (n = Number of the patient)

LENGTH OF HOSPITAL STAY	n (%)
1-5 Days	74 (21.1%)
6-10 Days	159 (45.5%)
11-15 Days	97 (27.6%)
16-20 Days	20 (5.7%)
DUAL THERAPY	n (%)
Atorvastatin + Aspirin	136 (38.9%)
Aspirin + Clopidogrel	117 (33.35%)
Sacubitril + Valsartan	68 (19.4%)
Clopidogrel + Rosuvastatin	29 (8.3%)
Isosorbide dinitrate + Hydralazine	49 (13.9%)
Atorvastatin + Fenofibrate	10 (2.8%)
Olmesartan + Chlorthalidone	10 (2.8%)
MULTI-DRUG COMBINATION	n (%)
Aspirin + Atorvastatin+ Clopidogrel	186 (53.3%)
Aspirin +rosuvastatin +Clopidogrel	163 (46.7%)
SURGICAL TREATMENT	n (%)
YES	265 (75.6%)
NO	85 (24.4%)

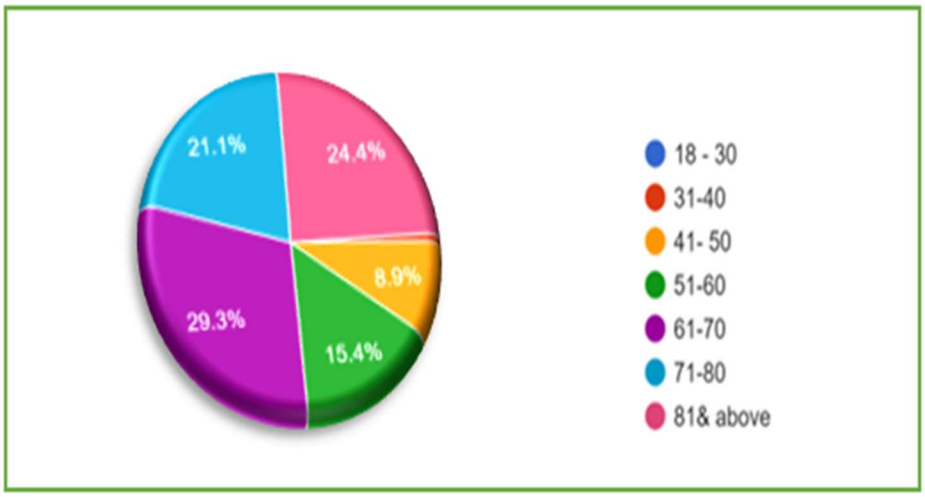

Figure 1: Distribution of patient age in the study

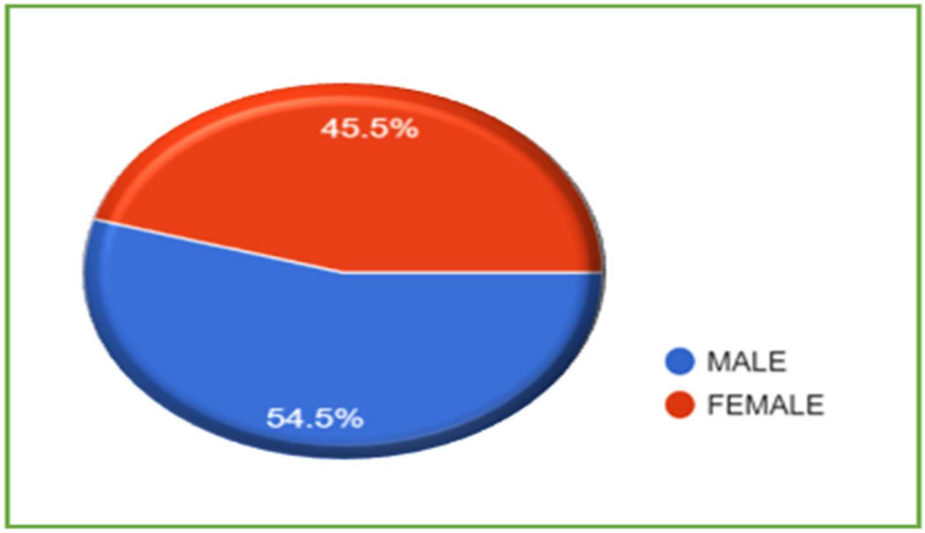

Figure 2: The patient gender distribution in the study

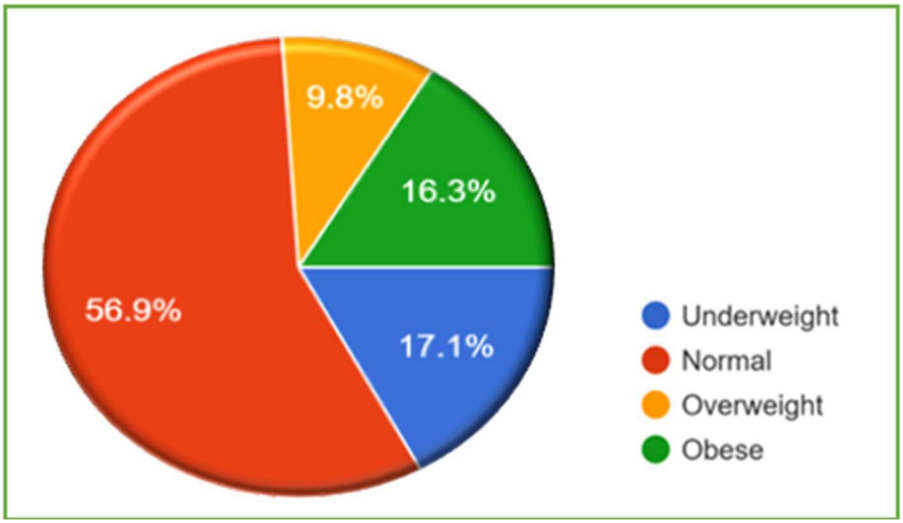

Figure 3: BMI in the study

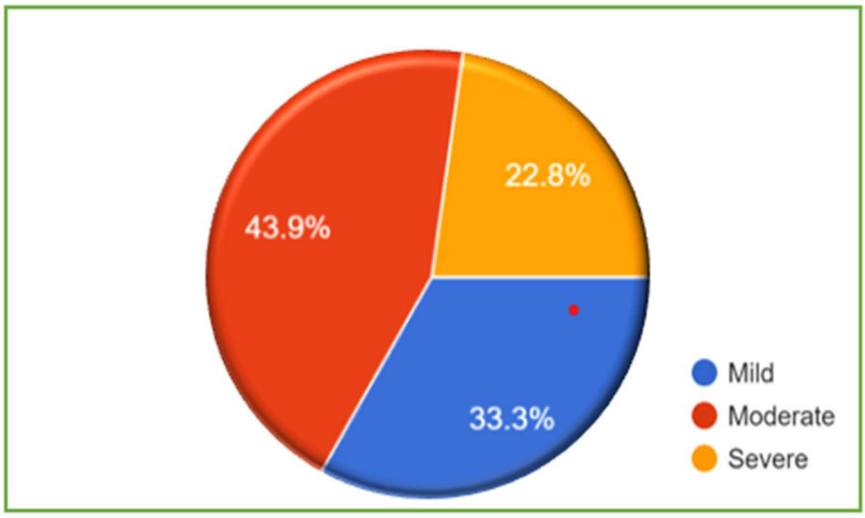

Figure 4: Severity 0f heart failure with ejection fraction

COMPETING INTERESTS

None of the authors had any competing interests.

ETHICS APPROVAL STATEMENT

The Research Review Board of Mallige College of Pharmacy has approved the project entitled **"CURRENT TRENDS IN THE PRESCRIBING PATTERN AND RISK FACTOR ANALYSIS OF HEART FAILURE PATIENTS IN A TERTIARY CARE HOSPITAL"** for conducting.

Approval number: MCP/RRB/005/21-22

Contributorship Statement

1) **Ajmal Hassin H (The first author and the corresponding author) -** The procedure entails strategizing, ideating, crafting, obtaining data, scrutinizing it, and comprehending the outcomes.
2) **Muhamed Haris P (The first author) -** The process of planning, conceptualizing, and gathering data, followed by analyzing it.
3) **Sumayya M (The first author) -** The process of planning, conceptualizing, and gathering data, followed by analyzing it.
4) **Ammu K Sajeev (The first author)-** The process of planning, conceptualizing, and gathering data, followed by analyzing it.
5) **Dr. Shailesh Yadav (Preceptor) –** Guided the study, provided guidance, and reviewed the progress of the study.
6) **Dr. Purushothama K R (CO-GUIDE) –** Co-guided the study, provided guidance, and reviewed the progress of the study.

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