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A Prospective Study on Prescribing Pattern and Utilization of Diuretics in Management of Cardiovascular Diseases in Tertiary Care Hospital



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ABSTRACT

BACKGROUND: Diuretics, usually referred to as water pills, are the most frequently given medications for various illnesses. These substances stimulate the kidneys to eliminate excess water from the body and reduce fluid overload. Diuretics are effective in managing multiple illnesses, including heart failure, pulmonary edema, and hypertension. Due to the loss of serum electrolytes, these medications require electrolyte monitoring.

METHODS: A prospective and observational study was conducted in a tertiary care hospital among 100 patients with cardiovascular diseases who underwent diuretic therapy. The data was collected with the physician's recommendations in a data collection form. In this, we studied drug selection, dosage regimen, and route of administration of diuretics.

RESULTS: The prescribing patterns and utilization of diuretics were made based on the patient's condition and severity of the disease, route of administration, and dose. On the evaluation of prescriptions, the most commonly prescribed drugs were Furosemide, Torsemide, Torsemide + Spironolactone, and the most frequently used doses were Furosemide at the dose of 20 mg, 40 mg, Torsemide at the dose of 5 mg, 10 mg in both intravenous (IV) and oral (PO) forms, Spironolactone + Torsemide at the dose of 10mg in only oral (PO) form.

CONCLUSION: The prescribing patterns of diuretics were analyzed, and Furosemide was found to be the most frequently used diuretic when compared to other diuretics.



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INTRODUCTION

Diuretics are medications used to manage various cardiovascular diseases, like hypertension, subsets II and IV of acute decompensated heart failure, stage C heart failure, cardiogenic pulmonary edema, and resistant hypertension. [1] [2] [3]

According to the world health organization, 17.9 million deaths were due to cardiovascular diseases in 2019, constituting 32% of fatalities.[4] Cardiovascular illnesses are managed with the use of diuretics. These agents possess a natriuretic effect, which causes the removal of excess sodium. Loop diuretics act by inhibiting sodium-potassium-chloride co-transport and prevent the reabsorption of sodium. Thiazides and thiazide like diuretics act on sodium-chloride co-transport and inhibit sodium reabsorption. Renal epithelial sodium channel blockers support natriuresis and prevent kaliuresis. Aldosterone antagonists promote natriuresis and decrease kaliuresis.[5]

Cardiovascular mortality is correlated with blood pressure.[6]Diuretics play a pivotal role in the reduction of blood pressure. Thiazide diuretics are considered first-line agents in managing hypertension, and these agents are combined with other classes of antihypertensives like beta blockers and ACE inhibitors. Loop diuretics are preferred agents in managing renal insufficiency and heart failure. Potassium-sparing diuretics have weak antihypertensive action, so these agents are integrated with other classes of diuretics.[7]

Resistant hypertension is characterized by excessive blood pressure despite adequate antihypertensive therapy with three different pharmacological classes of antihypertensives.[8] Mineralocorticoid receptor antagonists, loop diuretics, and thiazide-like diuretics are used to treat resistant hypertension. Additionally, these agents are used with others, like calcium channel blockers, ACE inhibitors, or ARBS.[9]

Heart failure is when the heart doesn't pump enough blood to the tissues. Loop diuretics and potassium-sparing diuretics, thiazide diuretics are used in management of heart failure.[10] These medications are combined with other agents like ACE inhibitors, beta-blockers, and digitalis. These agents cause symptomatic relief in patients with pulmonary congestion and improve exercise tolerance.[11]

When treating acute decompensated heart failure, intravenous loop diuretics are primarily used when compared to other diuretics.[10]The management of acute decompensated heart failure involves the use of inotropes and, vasodilators, diuretics.[12]

Loop diuretics cause effective preload reduction, and these agents are used to manage cardiogenic pulmonary edema.[13]

Few complications of diuretic therapy: gynecomastia, ototoxicity, electrolyte imbalances, decreased renal function, acid-base imbalances, nephrolithiasis, hyperuricemia. [14] [15]

METHODOLOGY

STUDY AIM & OBJECTIVES

STUDY AIM - To study the prescription pattern of diuretics and their utilization in cardiovascular diseases in a tertiary care hospital.

OBJECTIVES-

The main objectives of the study

- To study the prescribing and utilization pattern of diuretics in the Cardiology Department.

STUDY METHODOLOGY:

Study design: Prospective and Observational

Proposed sample size: 100

Study duration: 6 months

Study criteria:

Inclusion criteria:

1. All the Outpatients and Inpatients treated with diuretics in the cardiology department.
2. Outpatients and Inpatients >18 years

Exclusion criteria:

1. Patients < 18 years
2. Pregnant women and lactating women.

Sources of data: patient demographic details and appropriate subjective and objective evidence will be collected from medical records and physicians.

Study procedure: A prospective and observational study was conducted to study the prescribing pattern and utilization of diuretics in the management of cardiovascular diseases in a tertiary care hospital after obtaining approval from the research and ethics department. Relevant data from the patient profile chart and physician recommendations of all selected subjects undergoing diuretic therapy was collected in a data collection form. Studying the process of drug selection, timing, and duration of diuretics was done.

RESULTS:

Our study titled “A Prospective Study on Prescribing Pattern and Utilization of Diuretics in Management of cardiovascular diseases at Tertiary Care Hospital” was conducted on a total number of 100 patients who were admitted to the hospital between the time frame of December 2021 and May 2022.

Out of 100 patients (65%) were Male, and (35%) were Female.

In our study, the age group of 60-70yearshad an increased risk of cardiovascular diseases accounting for 28% of the patients, followed by the age group of 70-80years with 27% of the patients, and the age group of 50-60 years with 24% of the patients.

In our study, 80% of patients had more than one comorbid condition, 18% showed one comorbidity, and 2% had no comorbidities.

Patients were classified based on serum sodium levels, where 91% of patients were found to have hyponatremia, and 8% of patients had normal sodium levels.

Patients were categorized based on potassium levels, where 9% of patients were found to have hypokalemia, 86% of patients had normal potassium levels, and 5% of patients were found to have hyperkalemia.

95 % of patients had non-oliguria, and 5% of patients had oliguria.

TABLE 1: DISTRIBUTION BASED ON CARDIAC MARKERS

CARDIAC MARKER	NO.OF PATIENTS
Troponin I <35 ng/ml	20
Troponin I >35 ng/ml	70
Nt pro bnp < 125 pg/ml	8
Nt pro bnp > 125 pg/ml	73

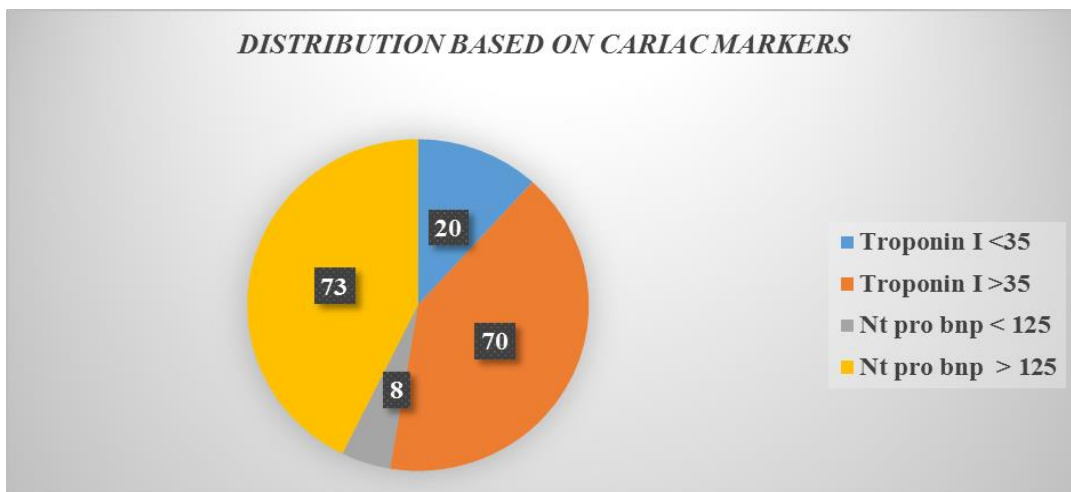


FIGURE 1: 70% of patients had a higher Troponin I level of > 35 ng/ml, which indicated a greater risk of cardiovascular diseases, and 20% of patients had a Troponin I level of < 35 ng/ml, indicating a healthy cardiac index. 73% had a higher Ntpro-BNP level of > 125 pg/ml, and 8% had an Nt pro-BNP level of < 125 pg/ml.

DISTRIBUTION BASED ON DIAGNOSED CARDIOVASCULAR DISEASES

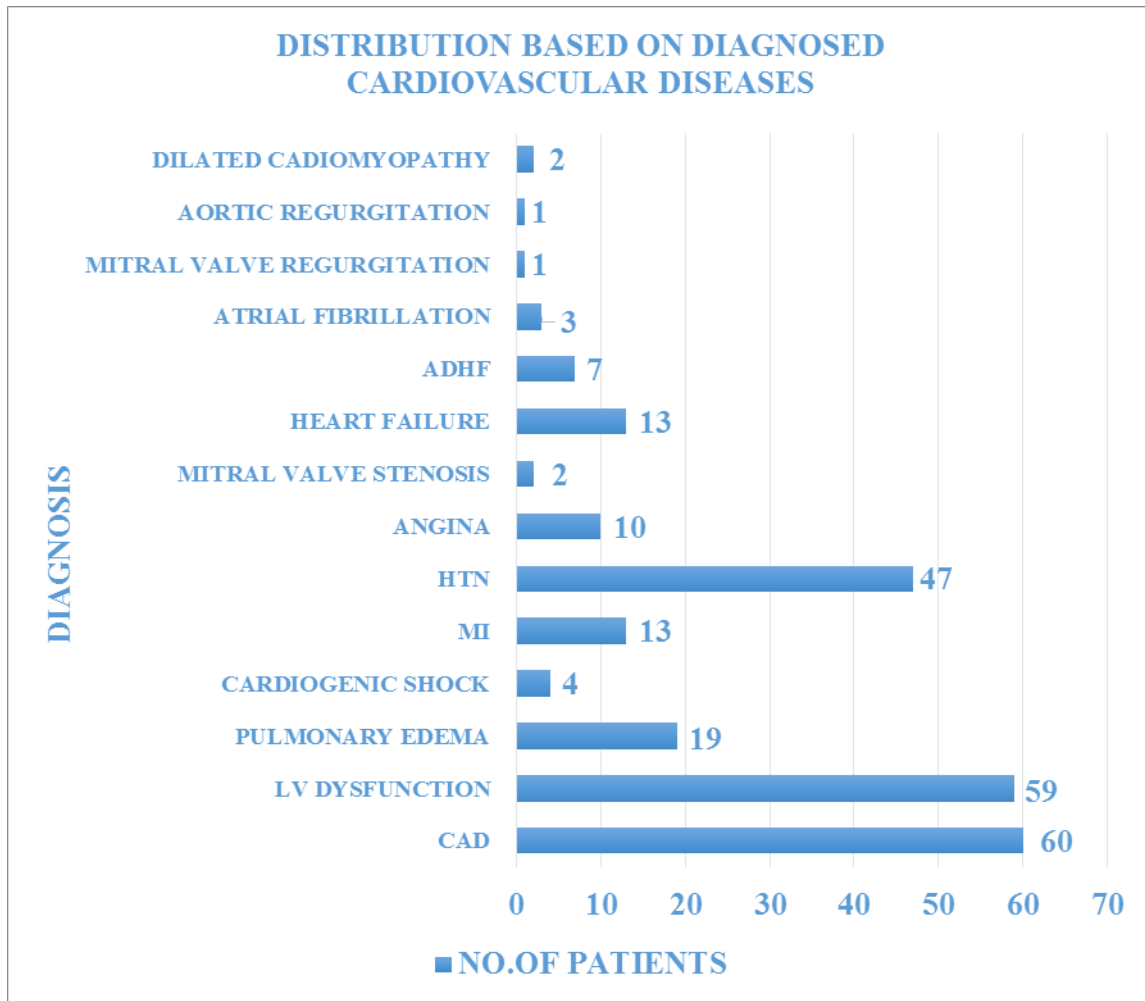


FIGURE 2: The primary diagnosis in our study was found to be coronary artery disease, followed by Lv dysfunction, hypertension, and pulmonary edema. The minor diagnosis was MI, angina, heart failure, and ADHF, followed by cardiogenic shock, atrial fibrillation, mitral valve regurgitation, aortic regurgitation, and dilated cardiomyopathy.

DISTRIBUTION BASED ON PRESCRIBING PATTERN AND UTILIZATION OF DIURETICS

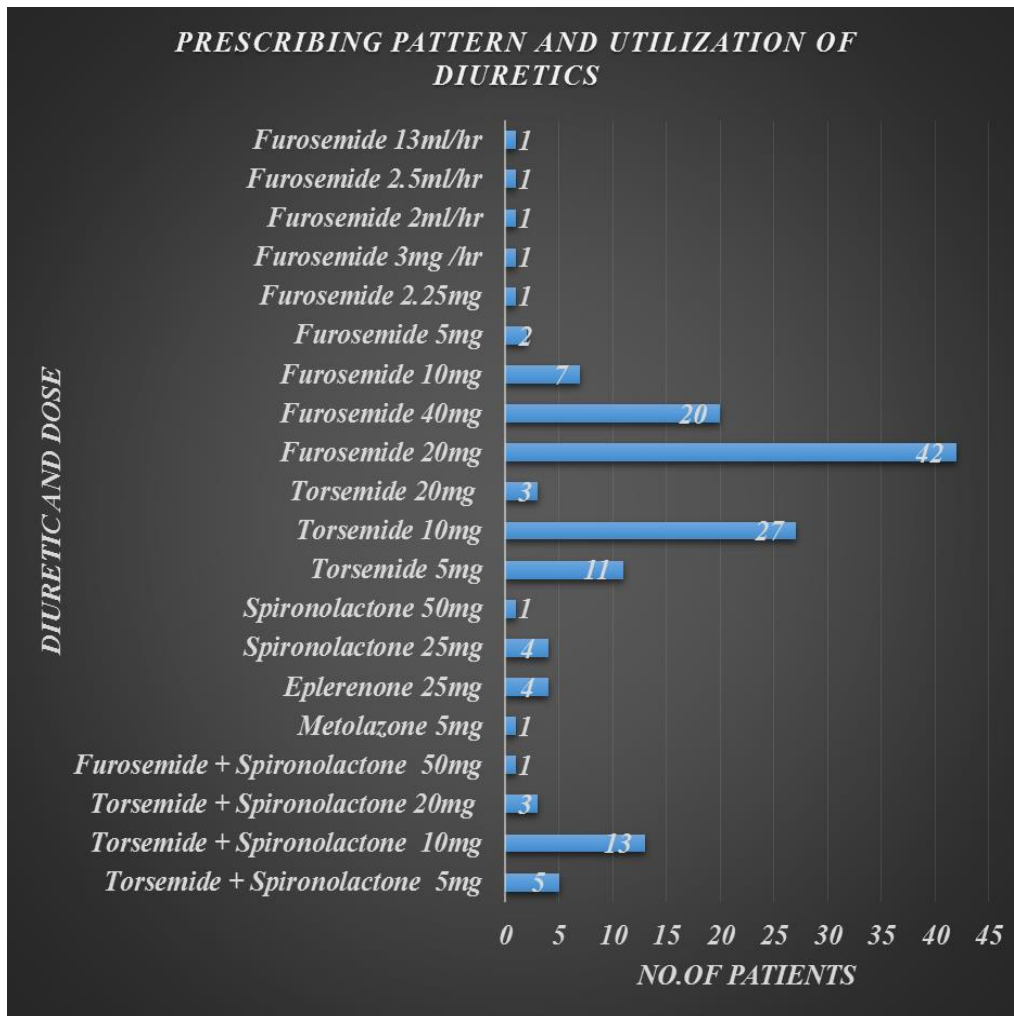


FIGURE 3: The most commonly used diuretics in our study were Furosemide (20 mg, 40 mg), followed by Torsemide (5 mg, 10 mg), and Torsemide + Spironolactone (10 mg). The less commonly used diuretics in our study were found to be Eplerenone 25 mg and Spironolactone 25 mg, followed by Torsemide + Spironolactone 5 mg, 20 mg, and Furosemide + Spironolactone 50 mg, and Torsemide 20 mg, Furosemide 5 mg, 10 mg, 2.25 mg, 3 mg/hr, 2 ml/hr, 2.5 ml/hr, and 13 ml/hr.

DISTRIBUTION BASED ON ROUTE OF ADMINISTRATION OF DIURETICS

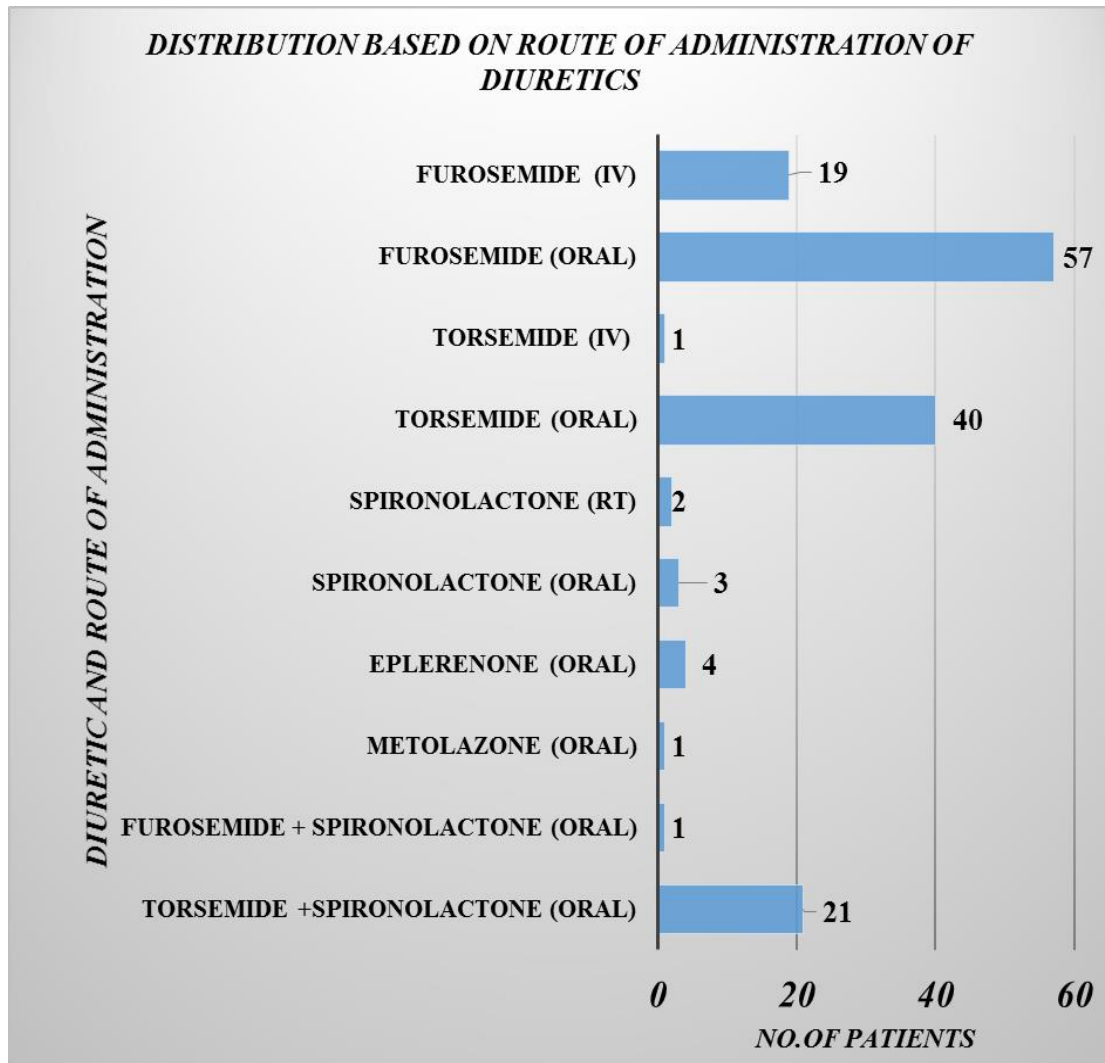


FIGURE 4: The majority of drugs in the current study were administered through the oral route (Torsemide + Spironolactone, Furosemide + Spironolactone, Furosemide, Torsemide, Eplerenone, Spironolactone, Metolazone), followed by the intravenous route (Furosemide, Torsemide), and the RT route (Spironolactone).

DISCUSSION

A Study was conducted on prescribing pattern and utilization of diuretics in the management of cardiovascular diseases. The current study included both edematous and non-edematous conditions like hypertension, heart failure, acute decompensated heart failure, and pulmonary edema. Diuretic therapy is common in cardiovascular diseases such as LV dysfunction, Hypertension, Acute decompensated heart failure, pulmonary edema.

One hundred subjects, both with and without comorbidities, were included in our study. Males were predominantly higher (65%) in the study when compared to females (35%). The age group of 60–80 years had an increased risk of cardiovascular diseases compared to other age groups, accounting for 79 percent of the population.

Coronary artery disease, left ventricular dysfunction, pulmonary edema, and hypertension were the most common diagnosis. Most patients had increased levels of troponin I and NT-pro BNP. Indicating cardiovascular disease risk.

The utilization pattern of diuretics was analyzed, and loop diuretics (Furosemide, Torsemide) were most commonly used in the study, followed by potassium-sparing diuretics (Spironolactone and Eplerenone) and Thiazide-like diuretics (Metolazone).

On the evaluation of prescriptions, commonly prescribed categories of drugs were antihypertensives, anticoagulants, vasodilators, antiarrhythmics, and HMG-CoA reductase inhibitors. Most other antihypertensives used in the current study were calcium channel blockers, ACE inhibitors, angiotensin receptor blockers, and beta blockers.

Diuretics used as monotherapy were Furosemide, Torsemide, Eplerenone, Metolazone, and Spironolactone. Diuretics used as combination therapy were Furosemide + Spironolactone and Torsemide + Spironolactone.

CONCLUSION

Diuretics effectively manage fluid retention and volume overload and provide symptomatic relief in various cardiovascular diseases. Loop diuretics were predominantly used when compared to other classes of diuretics.

The prescribing patterns of diuretics were analyzed, and Furosemide was found to be the most commonly used diuretic when compared to other diuretics.

The addition of diuretic therapy to patients with cardiovascular diseases will improve patients' quality of life.

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