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A STUDY TO FIND THE RELATIONSHIP BETWEEN FLUID RESTRICTION, AND URINARY TRACT INFECTION RISK IN HEART FAILURE PATIENTS USING SGLT-2 INHIBITORS

Manasa Priya Maroju[1]*, Vijaya Keerthi Pallikonda[2], Mounika Karaka[3], Devi Vaishnavi Buddha[4], Anusri Lakshmi Machavarapu[5] and Dattala Leena Rose[6]

[1]Pharm.D, Vikas Institute of Pharmaceutical sciences, Rajahmundry, Andhra Pradesh
manasapriya245392@gmail.com

[2]Pharm.D, Vikas Institute of Pharmaceutical sciences, Rajahmundry, Andhra Pradesh
vijayakeerthi2000@gmail.com

[3]Pharm.D, Vikas Institute of Pharmaceutical sciences, Rajahmundry, Andhra Pradesh
mounika.karaka6@gmail.com

[4]Pharm.D, Vikas Institute of Pharmaceutical sciences, Rajahmundry, Andhra Pradesh
sevithavaishnavi@gmail.com

[5]Pharm.D, Vikas Institute of Pharmaceutical sciences, Rajahmundry, Andhra Pradesh
anusrimachavarapu@gmail.com

[6]Pharm.D, Vikas Institute of Pharmaceutical sciences, Rajahmundry, Andhra Pradesh
leenarosedattala@gmail.com

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***Corresponding Author**
Dr. Manasa Priya Maroju
Pharm. D, Vikas Institute of Pharmaceutical Sciences, Rajahmundry, Andhra Pradesh.

ABSTRACT

Introduction: This study aimed to investigate the relationship between fluid restriction levels and the risk of urinary tract infections (UTIs) in heart failure patients prescribed SGLT-2 inhibitors (Dapagliflozin). **Methodology:** A total of 100 heart failure patients on SGLT-2 inhibitors were categorized into three fluid restriction groups: mild (≤ 2 to 3 liters/day), moderate (1 to 2 liters/day), and severe (<1 liters/day). The prevalence of UTIs was assessed across these categories. **Results:** The overall prevalence of UTI among participants was 25.0%. The UTI prevalence was 16.7% in the mild restriction group, 26.7% in the moderate restriction group, and 30.0% in the severe restriction group. **Conclusion:** Severe fluid restriction is associated with a higher risk of UTI in heart failure patients using SGLT-2 inhibitors. Clinicians should consider moderate fluid restriction to reduce UTI risk while

managing heart failure. Further research is needed to explore long-term effects and other contributing factors.

KEYWORDS: Fluid Restriction, Urinary Tract Infection (UTI), Heart Failure, SGLT-2 Inhibitors, Dapagliflozin.

INTRODUCTION

Heart failure is a chronic, progressive disease that develops whenever an individual's heart is unable to pump adequate blood to meet his or her nutrient and oxygen requirements. It is considered a significant health problem worldwide since it affects millions of people, thus contributing to high morbidity and mortality. In its management, there are medications, lifestyle modifications, and fluid status monitoring. Particular attention has been given to the drugs belonging to the class of SGLT-2 inhibitors, of which Dapagliflozin is a representative, after large studies have demonstrated that these drugs lower the rate of hospitalization and increase the chances of survival in patients with heart failure. The use of these agents, however, combined with fluid restriction—a common strategy of HF management—has raised concerns for the potential risk of UTIs in this already vulnerable population.[1,2,3]

Fluid overload is the hallmark of heart failure and definitely one of the major promoters of symptoms and complications of the disorder. Fluid restriction has thus been adopted as part of the treatment strategy in HF, particularly in advanced patients or those with fluid retention propensity. Fluid restriction is important in minimizing the amount of fluid in the circulatory system, therefore reducing the workload on the heart and thus preventing development of further exacerbations in HF patients of symptoms such as dyspnea and edema. The degree of fluid restriction may be adjusted according to the degree of illness and by several individual parameters of the patient. Usual advice includes limiting fluid intake to between 1.5 and 2.5 liters per day, with more severe restrictions in advanced cases of heart failure.[4,5,6]

Though the fluid restriction helps in the symptomatic management of heart failure, it also poses problems, mainly with the risk of dehydration and possible consequences. Decreased fluid intake could result in concentrated urine, thereby increasing the risk of UTIs, which are quite common and potentially serious complications among older people and in those with certain chronic diseases like heart failure. In heart failure patients, it can contribute to decreased renal function, an increase in hospitalization, and even mortality.[7,8,9]

Currently, there are limited numbers of studies that have focused on the interaction between categories of fluid restriction, use of SGLT-2 inhibitors, and UTI risk for patients with heart failure. This paper considers factors that have been researched independently but actually not examined for the combined interventions on UTI risk. This piece of work is set out to fill this gap by making an in-depth analysis of how different levels of fluid restriction impact UTI risk in patients on SGLT-2 inhibitors. The results from this study will set a basis for further studies on the interaction between fluid management and pharmacotherapy in heart failure. These may include long-term effects of restriction of fluids to different levels, how other medications used during the management of heart failure affect their metabolism, and intervention designed to reduce the risk of UTIs in this patient group.[10,11,12]

OBJECTIVE

The main objective of this study to investigate the association between different levels of fluid restriction and the risk of urinary tract infections (UTIs) in heart failure patients.

METHODOLOGY

Study site: This study was conducted at KIMS (Bollineni) Hospital, Rajahmundry

Study duration: The study is conducted over a period of 6 months.

Study design: This is a Cross sectional observational study

Sample size: 100 pateints were enrolled into this study

Study method

The study employed a cross-sectional design involving 100 heart failure patients on SGLT-2 inhibitors (Dapagliflozin). Patients were categorized into fluid restriction groups (mild, moderate, severe) based on daily intake. Data collected included demographic information, fluid restriction levels, and UTI status via clinical records and lab tests. Association between fluid restriction and UTI risk was assessed.

Study criteria

Inclusion criteria

1. Patients diagnosed with heart failure.
2. Patients on SGLT-2 inhibitors (Dapagliflozin).
3. Patients willing to provide informed consent.

Exclusion criteria

1. Patients with contraindications to SGLT-2 inhibitors.
2. Patients with other major infections or conditions that could influence UTI risk.

Statistical analysis

After entering the data into a Microsoft Excel spreadsheet, frequencies and [percentages were calculated and represented in tables.

RESULTS

1. Subject characteristics

Characteristic	Number of patients	Percentage (%)
Age		
<40 years	25	25
40-60 years	35	35
>60 years	40	40
Gender		
Male	60	60
Female	40	40
Duration of Heart Failure		
<1 year	20	20
1-3 years	40	40
>3 years	40	40

The majority of patients were over 60 years old (40 patients, 40.0%), followed by those aged 40-60 years (35 patients, 35.0%), and those under 40 years (25 patients, 25.0%). The study population was predominantly male (60 patients, 60.0%), with females constituting 40.0% of the sample (40 patients). Patients were evenly distributed across the duration categories. Forty patients (40.0%) had heart failure for more than 3 years, 40 patients (40.0%) had it for 1-3 years, and 20 patients (20.0%) had it for less than a year.

2. Fluid restriction categories

Fluid restriction category	Number of patients	Percentage (%)
Mild Fluid Restriction (2-3 liters/day)	30	30
Moderate Fluid Restriction (1-2 liters/day):	30	30
Severe Fluid Restriction (<1 liter/day)	40	40

This table summarizes the distribution of patients according to their fluid restriction categories. 30 patients (30.0%) were classified under mild fluid restriction, another 30 patients (30.0%) had moderate fluid restriction and the largest group, with 40 patients (40.0%), fell into the severe restriction category.

3. Prevalence of Urinary Tract Infection (UTI)

UTI Status	Number of patients	Percentage (%)
Positive	25	25
Negative	75	75

This above table shows **t**he overall prevalence of urinary tract infections (UTI) among the study participants. 25 patients (25.0%) tested positive for a UTI. This indicates that 1 in 4 patients in the study had a UTI.

4. Prevalence of UTI Among Fluid Restriction Categories

Fluid Restriction Category	Number of Patients with UTI	Percentage of UTI in Category (%)
Mild	5	16.7
Moderate	8	26.7
Severe Fluid Restriction	40	40

This table shows the prevalence of UTI within each fluid restriction category. The prevalence of UTI was highest in the severe restriction category, indicating a trend where more restrictive fluid intake is associated with a higher risk of UTI.

DISCUSSION

The outcome of this research worked out some important insights into the relationship among fluid restriction, SGLT-2 inhibitors, and the risk of urinary tract infection in heart failure patients.

The distribution of the study population according to age groups showed that the sample population was well balanced. There was a predominance of subjects over 60 years old. The distribution by sex had a greater proportion of males, 60.0%, which was in accordance with some studies stating that there is a higher prevalence of heart failure among the male sex. The duration of heart failure among the participants was well distributed.

Using daily fluid intake, the sample was divided into three fluid restriction categories, with a rather even distribution: mild and moderate restriction groups each accounted for 30.0% of the sample, whereas the severe restriction group represented 40.0% of participants.

The current study recorded an overall prevalence of 25.0% for UTI. In general, these findings are consistent with a growing body of literature suggesting that the incidence of UTIs is higher in individuals with heart failure. This could be partly due to factors such as impaired

renal function and probably reduced fluid intake, which may contribute to urinary stasis, raising the risk of infection.

The greatest UTI prevalence of 30.0% was seen in the severe restriction category. This is of importance, since strict fluid restriction can predispose these patients to UTIs by concentrated urine and urine stasis, thereby providing the medium that enhances bacterial growth and consequent infections.

CONCLUSION

In the present study, it is revealed that there is a strong association of fluid restriction levels with UTI risk among patients with heart failure treated with SGLT-2 inhibitors. The results indicated that individuals with severe fluid restriction have higher UTI prevalence in comparison to mild and moderate restrictors. Clinicians should know the adverse effects associated with stringent fluid restriction and consider moderate fluid intake for maintaining better urinary health to reduce UTI risk. Future studies are needed to examine the longitudinal effects and other factors contributing to UTI risk in patients with HF. This current study suggests an individualized fluid management role in the optimization of patients' outcomes and prevention of complications.

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