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THE RELATIONSHIP BETWEEN FLUID RESTRICTION AND THIRST DISTRESS IN PATIENTS WITH HEART FAILURE

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ABSTRACT
Heart failure is a chronic cardiovascular disease that is often accompanied by thirst distress. Fluid restriction, which is commonly recommended as part of heart failure management, may increase thirst and potentially affect patients' comfort and quality of life. To identify the relationship between fluid restriction and thirst distress in patients with heart failure based on a literature review. This literature review was conducted using a systematic approach based on the PRISMA guidelines. Literature searches were performed in ProQuest, PubMed, Scopus, ScienceDirect, and JSTOR databases. A total of 10,762 articles were initially identified. Eligible articles included cross-sectional studies, cohort studies, and randomized controlled trials (RCTs) published between 2016 and 2026 that examined fluid restriction and thirst distress in patients with heart failure. Following the removal of duplicates and screening based on predefined inclusion and exclusion criteria, study quality was assessed using the JBI Critical Appraisal Checklist. A total of eight articles met the inclusion criteria and were analyzed narratively. Fluid restriction was associated with increased thirst intensity and thirst distress among patients with heart failure. Several studies reported that patients undergoing fluid restriction experienced higher thirst distress scores than those without fluid restriction. However, some studies did not find a significant association, particularly in populations with similar participant characteristics. In addition to fluid restriction, thirst distress was influenced by various factors, including diuretic use, urea levels, psychological conditions, and patients' clinical status. Fluid restriction is associated with increased thirst intensity and thirst distress in patients with heart failure. However, thirst distress is also influenced by various other factors.

Keywords: fluid restriction; heart failure; thirst distress

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INTRODUCTION

Heart failure is one of the major cardiovascular diseases that constitutes a global health problem and contributes substantially to increased morbidity, mortality, and reduced quality of life among patients (Colin-Ramirez et al., 2024). It is a clinical syndrome that occurs when the heart is unable to pump or fill with blood adequately to meet the body's metabolic demands (Luo et al., 2025). Globally, more than 64 million people are estimated to be living with heart failure, and its prevalence has continued to increase over recent decades (Savarese et al., 2022; Ran et al., 2025). Impaired cardiac function in heart failure leads to reduced cardiac output, which triggers the activation of neurohormonal systems, including the renin–angiotensin–aldosterone system (RAAS). Activation of this system increases angiotensin II levels, stimulating the thirst center in the hypothalamus and consequently enhancing the sensation of thirst in patients (Hahn et al., 2013; Parizad et al., 2025).

Fluid retention is one of the primary clinical manifestations of heart failure and can increase cardiac workload, thus worsening patients' clinical conditions (PERKI, 2020). Therefore, heart failure management involves both pharmacological and non-pharmacological approaches to maintain fluid balance (PERKI, 2023). One of the recommended non-pharmacological strategies is fluid restriction

to prevent excessive fluid accumulation (Dugal et al., 2024; Aqilah et al., 2024). However, fluid restriction often presents challenges for patients, as it may provoke significant thirst and cause discomfort during treatment (Jankowska-Pola et al., 2020; Eng, Jaarsma, et al., 2021).

Fluid restriction implemented in heart failure management is frequently associated with the development of thirst distress. Several studies have reported that daily fluid restriction of approximately 1,000–1,500 mL may increase thirst sensation and contribute to thirst-related distress among patients with heart failure (Vedad et al., 2024). Other studies have shown that most patients adhere to fluid restrictions ranging from 1,500–2,000 mL per day, which may affect patient comfort and adherence to treatment regimens (Hagelberg Eng et al., 2021). These findings suggest that fluid restriction, as an integral component of heart failure management, has the potential to influence patients' experience of thirst.

Thirst in patients with heart failure is a multidimensional symptom encompassing the intensity, frequency, quality, and distress associated with the sensation of thirst (Hahn et al., 2013). Thirst distress reflects the extent to which thirst is perceived as bothersome and burdensome in patients' daily lives. Several studies have indicated that thirst distress is a common symptom among patients with heart failure, particularly those with more advanced functional classes. Approximately 68–73% of patients with heart failure have been reported to experience moderate to severe levels of thirst distress (Younes et al., 2025; Gong et al., 2022). Therefore, investigating the relationship between fluid restriction and thirst distress in patients with heart failure is essential to provide scientific evidence for effective symptom management strategies aimed at improving patient comfort and overall well-being.

METHOD

This literature review was conducted to identify and analyze studies examining the relationship between fluid restriction and thirst distress among adult patients with heart failure. The literature search was performed regularly based on a research question developed using the PICO framework, which consisted of: (1) Population/Problem: patients with heart failure; (2) Intervention: fluid restriction; (3) Comparison: patients without fluid restriction or those subjected to different levels of fluid restriction; and (4) Outcome: thirst distress. The literature search was carried out using several electronic databases, including ProQuest, PubMed, Scopus, ScienceDirect, and JSTOR. The search strategy employed Boolean operators with a combination of Medical Subject Headings (MeSH) terms and keywords derived from previous relevant studies. The search terms included: (“heart failure” OR “cardiac failure” OR “heart decompensation” OR “congestive heart failure”) AND (“fluid restriction” OR “fluid intake”) AND (“thirst distress” OR “thirst”). The article selection process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2009).

Article selection was conducted in two stages using predefined inclusion and exclusion criteria. The inclusion criteria were: (1) original research articles addressing fluid restriction and thirst distress in patients with heart failure; (2) participants aged ≥18 years; (3) articles published in English employing cross-sectional, cohort, longitudinal, or randomized controlled trial (RCT) designs; (4) articles published between 2016 and 2026; and (5) availability of full-text access. The exclusion criteria included case reports, narrative reviews, studies lacking sufficient quantitative data for comprehensive analysis, and studies involving pediatric populations. The first stage of selection consisted of screening titles and abstracts to assess relevance to the research topic, followed by a full-text review to determine eligibility based on the study objectives. Articles meeting the required quality standards were included in the final synthesis, and the selection process was illustrated using a PRISMA flow diagram.

The methodological quality of each eligible study was assessed using appraisal tools appropriate to the respective study designs. For cross-sectional studies, the Joanna Briggs Institute (JBI) Critical Appraisal Checklist was utilized. Only studies meeting the predetermined methodological quality threshold were included in the final synthesis to ensure the validity and reliability of the findings. Articles achieving a quality assessment score of ≥75% based on the JBI Critical Appraisal Checklist were classified as high-quality studies and deemed suitable for further analysis.

A total of 10,762 articles were initially identified through database searching. Following the removal of duplicate records and the screening of titles, abstracts, and full-text articles based on predefined inclusion and exclusion criteria, 8 studies were included in the final review. Data from each included study were extracted using a standardized data extraction form that collected information on article characteristics, including authors, publication year, country of origin, sample characteristics, study methodology, instruments used, and research findings. The extracted data were then analyzed and synthesized narratively by summarizing similarities and differences across studies. This approach was chosen due to variations in study designs and participant characteristics among the included studies. Reporting of this literature review followed the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, the most recently internationally recognized standard for systematic review reporting, including the development of a flow diagram that clearly and dramatically illustrates the entire article selection process.

RESULT

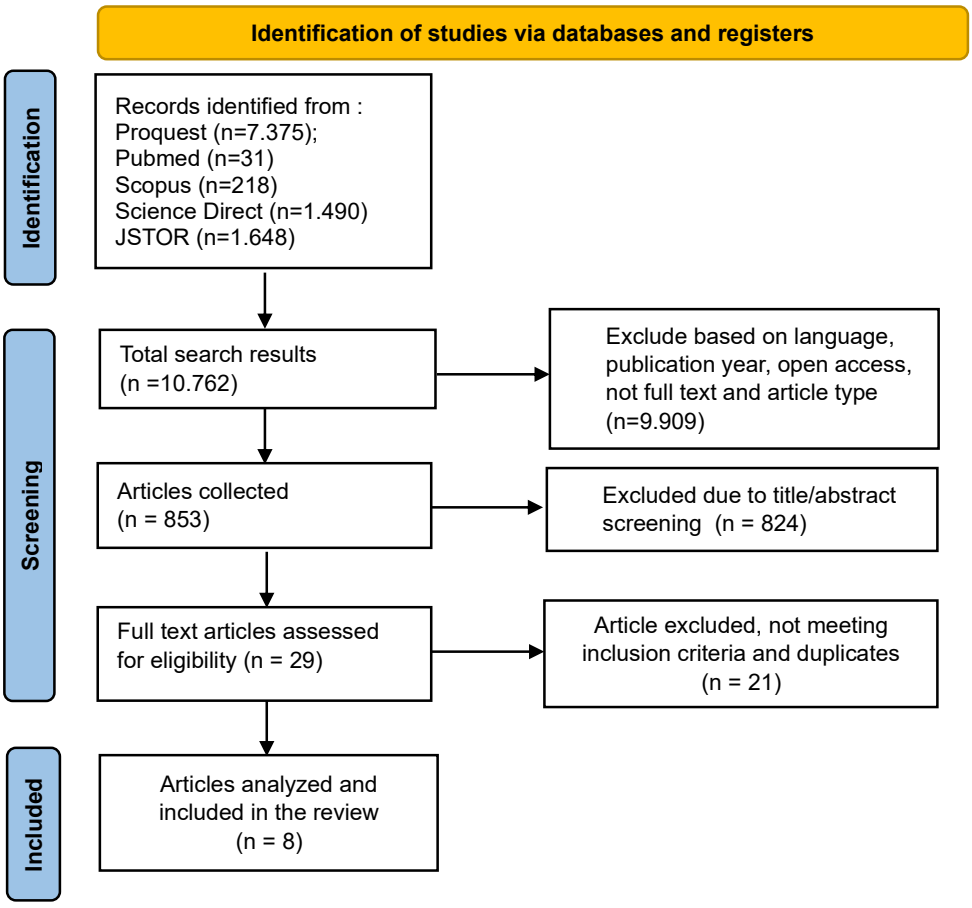

Figure 1. Literature Search Flowchart Prisma

Based on the PRISMA flow diagram, the literature selection process in this review was conducted through several stages. During the initial screening stage, a total of 10,762 records were identified

from the predefined electronic databases using a Boolean search strategy, including ProQuest (n = 7,375), PubMed (n = 31), Scopus (n = 218), ScienceDirect (n = 1,490), and JSTOR (n = 1,648). Application of the eligibility criteria related to language, publication year, article type, and full-text availability resulted in the exclusion of 9,909 records, leaving 853 articles for further screening.

The second stage involved screening titles and abstracts based on their relevance to the research topic, which reduced the number of eligible articles to 29. In the third stage, duplicate articles and studies that did not align with the research focus were removed, resulting in 8 articles being retained for full-text assessment. During the fourth stage, the full-text articles were critically appraised using the Joanna Briggs Institute (JBI) Critical Appraisal Tool to evaluate their methodological quality. Articles that met the predetermined quality standards were included in the final synthesis. Consequently, a total of 8 studies satisfied the inclusion criteria and were incorporated into this literature review as the primary sources of scientific evidence underpinning the analysis and discussion of the study findings.

Table 1.
Research Journal Synthesis

No	Author, Year & Country	Objective	Method	Instrument	Results
1	Hagelberg Eng et al. (2021), Spain	Identifying factors associated with thirst distress in outpatient heart failure patients.	Cross-sectional study of 302 outpatients with heart failure	• Thirst Distress Scale for Heart Failure (TDS-HF) has been shown to be valid and reliable (Cronbach's alpha 0.95). • Fluid intake data was obtained through medical records.	The mean thirst distress score was 16.2 ± 9.3, with most experiencing mild-moderate thirst distress and 18% experiencing severe distress. Ninety-nine percent of participants underwent fluid restriction, with 92% of patients restricted to 1500 mL/day. However, fluid restriction was not a significant predictor of thirst distress in the final analysis, as nearly all respondents underwent similar restrictions.
2	Van der Wal et al. (2022), Netherlands	To describe the prevalence of severe thirst in patients with stable heart failure and to assess factors associated with severe thirst , including fluid intake.	Cross-sectional study of 100 outpatients with heart failure (NYHA II–IV).	• Thirst intensity: Visual Analogue Scale (VAS 0–100) • Thirst distress: Thirst Distress Scale for Heart Failure (TDS-HF). • Fluid intake data was obtained through medical records.	The mean thirst score was 28 ± 25, and 25% of patients experienced severe thirst. Ninety-four percent of heart failure patients underwent fluid restriction, with 32% restricted to 1500 mL and 37% between 1500–2000 mL, but no significant difference was found in the level of thirst distress between patients who were compliant and non-compliant with fluid restriction.
3	Van der Wal et al., (2019) Sweden, Netherlands, Japan	Describe factors associated with thirst, patient reasons, and interventions to relieve thirst in heart failure patients in three countries.	Cross-sectional observational study of 269 heart failure patients	• Thirst intensity: Visual Analogue Scale (VAS 0–100) • Thirst distress: Thirst Distress Scale.	Fluid restriction was significantly associated with increased thirst (OR 2.21; p=0.03). Patients with fluid restriction more frequently reported increased thirst. Patients with high-intensity fluid restriction had scores of 53 ± 15, indicating clinical distress.

4	Herrmann et al., (2025) Netherlands	To assess the effect of free fluid intake compared with fluid restriction (≤1500 ml/day) on quality of life and thirst distress in heart failure patients.	The study design was a multicenter RCT (FRESH-UP trial) in 504 outpatients with heart failure with NYHA class II-III . Patients were randomized into a fluid-free (n=254) or fluid-restricted (n=250) group for 3 months.	• Thirst distress: Thirst Distress Scale for Heart Failure (TDS-HF).	Thirst distress was significantly lower in the liberal fluid intake group compared to the fluid restriction group (STR-HF 16.9 and 18.6), with a mean difference of −2.29 (p<0.001), indicating that fluid restriction increases thirst distress in heart failure patients.
5	Vedad et al., (2024), Iran	To determine the dimensions of thirst in heart failure patients using the *Theory of Unpleasant Symptoms (ToUS) framework.*	Cross-sectional study on 217 patients with heart failure selected through purposive sampling technique	• Thirst intensity: *Thirst Intensity Visual Analogue Scale* (TI-VAS) • Thirst *Frequency Scale* (TFS) • Thirst distress: Thirst Distress Scale for Heart Failure (TDS-HF).	Patients undergoing fluid restriction had significantly higher levels of thirst distress (Mean: 30.66 ± 6.37) compared to patients who were not restricted in their fluid intake (Mean: 22.74 ± 7.63) P < 0.001.
6	Nana Waldréus et al., (2016), Sweden	To assess changes in thirst intensity and factors associated with high thirst intensity during a drug dose increase program in heart failure patients.	Prospective observational study in 66 patients	• Thirst intensity: *Thirst Intensity Visual Analogue Scale* (TI-VAS) • Thirst distress: Thirst Distress Scale for Heart Failure (TDS-HF).	Fluid restriction was associated with high thirst intensity (OR = 6.02; p = 0.003), and patients with high thirst intensity had higher thirst distress than patients with low thirst intensity (p = 0.001).
7	Farah Naaz et al.,(2025), India	To evaluate the effectiveness *of the Thirst Intervention Package* in reducing thirst intensity and thirst distress in heart failure patients undergoing fluid restriction.	Quasi-experimental research design (*one group pre-test and post-test design*) with 35 participants undergoing a fluid restriction of 1.5 L using a purposive sampling technique.	• Thirst intensity: *Thirst Intensity Visual Analogue Scale* (TI-VAS) • Thirst distress: Thirst Distress Scale for Heart Failure (TDS-HF).	Thirst intensity decreased from 3.9 ± 0.78 to 2.73 ± 0.70 (p = 0.01) and thirst distress decreased from 30.2 ± 5.7 to 28.74 ± 4.36 (p = 0.006). The Thirst Intervention Package effectively reduced thirst intensity and thirst distress in heart failure patients undergoing fluid restriction.
8	Nana Waldréus et al., (2018), Sweden	To evaluate changes in thirst intensity and thirst distress from hospital admission to 4 weeks after discharge and to identify factors that influence these changes in	Prospective observational study in 30 patients	• Thirst intensity: *Thirst Intensity Visual Analogue Scale* (TI-VAS) • Thirst distress: Thirst Distress Scale for Heart Failure (TDS-HF).	Heart failure patients with fluid restriction had higher thirst distress on admission (p = 0.013), but fluid restriction did not affect changes in thirst intensity and thirst distress during the 4 weeks after patients returned home.

	heart failure patients.

DISCUSSION

Based on the systematic selection process using the PRISMA flow diagram, a total of eight articles were included in this literature review and underwent methodological quality assessment using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist, which was tailored to the design of each study. Cross-sectional studies were assessed using the JBI Checklist for Analytical Cross-Sectional Studies, while randomized controlled trials (RCTs) were evaluated using the JBI Checklist for Randomized Controlled Trials. The appraisal results indicated that all included studies demonstrated good methodological quality, with most fulfilling more than 75% of the JBI assessment criteria. Therefore, all studies were considered suitable for synthesis and in-depth discussion as scientific evidence meeting the required standards for evidence synthesis.

The synthesis of the eight studies showed that fluid restriction is one of the non-pharmacological interventions commonly recommended for patients with heart failure to prevent fluid overload. A study by Vedad et al. (2024) demonstrated that patients undergoing fluid restriction experienced significantly higher thirst distress than those who were not subjected to fluid restriction ($p < 0.001$). Similar findings were reported by Herrmann et al. (2025) through the FRESH-UP randomized clinical trial, which showed that patients in the liberal fluid intake group experienced lower thirst distress compared with those in the fluid restriction group ($p < 0.001$). These findings suggest that fluid restriction may increase discomfort related to thirst and contribute to higher levels of thirst distress among patients with heart failure.

In addition to affecting thirst distress, fluid restriction has also been associated with increased thirst intensity. Van der Wal et al. (2019) reported that fluid restriction was significantly associated with increased thirst (OR = 2.21; $p = 0.03$). These findings are consistent with those of Waldréus et al. (2016), who found that patients undergoing fluid restriction were six times more likely to experience high thirst intensity than those without fluid restriction (OR = 6.02; $p = 0.003$). Furthermore, patients with high thirst intensity also reported significantly greater thirst distress than those with low thirst intensity ($p = 0.001$). These findings indicate that fluid restriction may increase thirst intensity, which subsequently contributes to increased thirst distress.

In contrast to the studies mentioned above, several investigations did not find a significant relationship between fluid restriction and thirst distress. Hagelberg Eng et al. (2021) reported that fluid restriction was not a significant predictor of thirst distress in the final analysis. Similar findings were observed in the study by Van der Wal et al. (2022), in which 94% of patients were already following fluid restriction recommendations; therefore, no significant differences in thirst distress were found according to adherence to fluid restriction. This may be explained by the relatively uniform exposure to fluid restriction among participants, resulting in limited variability between groups and making it difficult to distinguish the effect of fluid restriction on thirst distress. Waldréus et al. (2018) found that patients undergoing fluid restriction experienced significantly higher levels of thirst distress at hospital admission ($p = 0.013$). However, fluid restriction did not influence changes in thirst intensity or thirst distress during the four-week period following hospital discharge. These findings suggest that the impact of fluid restriction on thirst distress may be more evident during acute hospitalization than after patients return home.

In addition to fluid restriction, several studies identified other factors contributing to thirst and thirst distress, including the use of high-dose diuretics, elevated urea levels, depression, and the clinical severity of heart failure (Waldréus et al., 2016; Waldréus et al., 2018; Vedad et al., 2024). These findings indicate that thirst distress in patients with heart failure may be influenced by multiple

factors, including both fluid restriction and other clinical conditions. An intervention study conducted by Naaz et al. (2025) demonstrated that the implementation of a Thirst Intervention Package consisting of mouth rinsing with water, administration of 10 mL water sips, provision of 10 mL ice chips, and the use of lip moisturizer significantly reduced thirst intensity from 3.9 ± 0.78 to 2.73 ± 0.70 ($p = 0.01$) and decreased thirst distress from 30.2 ± 5.7 to 28.74 ± 4.36 ($p = 0.006$). These findings indicate that although fluid restriction remains an important non-pharmacological intervention in heart failure management, various strategies to alleviate thirst should be implemented to improve patient comfort.

CONCLUSION

Fluid restriction is a commonly used intervention in patients with heart failure. It is associated with increased thirst intensity and thirst distress, as most studies have shown that patients undergoing fluid restriction experience higher levels of thirst and thirst-related distress than those without fluid restriction, although some studies did not identify a significant relationship in populations with relatively homogeneous participant characteristics. In addition to fluid restriction, thirst distress may also be influenced by other factors, such as the use of high-dose diuretics, elevated urea levels, psychological conditions, and the clinical status of patients. These findings suggest that fluid restriction is one of the factors that may contribute to thirst distress in patients with heart failure. However, thirst distress is a multifactorial condition and is influenced not only by fluid restriction but also by various other factors. Therefore, appropriate strategies are needed to help patients manage thirst effectively in order to improve comfort and quality of life during heart failure treatment.

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