



DEVELOPMENT OF A HERBAL FORMULA OF BREADFRUIT (ARTOCARPUS ALTILIS) LEAF EXTRACT FOR FLUID RETENTION MANAGEMENT IN CONGESTIVE HEART FAILURE

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ABSTRACT

Congestive heart failure (CHF) is characterized by persistent fluid retention leading to edema and dyspnea, which significantly impair functional capacity and increase hospital readmission rates. Although loop and thiazide diuretics are effective in decongestion, long-term use frequently results in electrolyte imbalance, renal dysfunction, and diuretic resistance. Breadfruit leaf (*Artocarpus altilis*), containing flavonoids, tannins, and saponins with natural diuretic mechanisms, has been traditionally used to reduce fluid accumulation and edema. This study aimed to evaluate the effectiveness of standardized breadfruit leaf extract in improving fluid retention and dyspnea among CHF patients. This study aimed to evaluate the effectiveness of standardized breadfruit leaf (*Artocarpus altilis*) extract in reducing fluid retention and improving dyspnea in patients with congestive heart failure (CHF). A quasi-experimental one-group pretest–posttest design was conducted on 15 CHF patients who received standardized breadfruit leaf extract for five consecutive days. Parameters measured included body weight and dyspnea severity using the Borg Modification Scale. Data were analyzed using paired t-tests. A statistically significant reduction in body weight was observed after intervention (61.9 ± 5.2 kg to 61.7 ± 5.2 kg; $p = 0.005$), indicating decreased fluid retention. Dyspnea scores also showed significant improvement (5.6 ± 0.6 to 4.5 ± 0.8 ; $p = 0.001$), reflecting meaningful clinical relief in respiratory symptoms associated with congestion. Standardized breadfruit leaf extract demonstrated beneficial effects in reducing body fluid accumulation and improving dyspnea among CHF patients, supporting its potential as a complementary therapy with minimal adverse effects.

Keywords: breadfruit leaf extract; congestive heart failure; diuretic therapy; dyspnea improvement; fluid retention

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INTRODUCTION

Congestive Heart Failure (CHF) remains a major global health problem with an increasing prevalence each year. CHF is characterized by the inability of the heart to pump blood effectively, leading to excessive fluid retention in the body. This condition results in edema, dyspnea, and progressive weight gain, ultimately reducing patients' functional capacity and quality of life (McMurray et al., 2019; Ponikowski et al., 2016). Conventional pharmacological therapy for fluid retention in CHF primarily relies on loop and thiazide diuretics. Although effective in reducing volume overload, their long-term use is associated with electrolyte imbalance, hypotension, renal dysfunction, and diuretic resistance (Yancy et al., 2017; Gheorghide, Pang, & Ambrosy, 2013). Therefore, alternative supportive therapies that are safer and accessible are urgently required in CHF management.

Breadfruit leaves (*Artocarpus altilis*) have historically been utilized in traditional medicine and contain active compounds including flavonoids, tannins, and saponins known for their natural diuretic mechanisms (Subroto & Fitriani, 2020; Nurhayati & Lestari, 2021). Several recent studies have demonstrated that breadfruit leaf extract enhances diuresis without inducing significant

electrolyte disturbance when compared to synthetic diuretics (Hassan & Omar, 2022; Kimura & Saito, 2023). Additional findings show that breadfruit leaf standardized extract contributes to improved urine output and reduction in peripheral edema among cardiac patients, confirming its potential role as a complementary diuretic therapy (Sutrisno, Wardhana, & Mulyani, 2023). Furthermore, phytopharmacological standardization of breadfruit leaf formulations exhibits stable bioactive concentration and a low risk of nephrotoxicity, supporting its feasibility for chronic cardiac use (Dewi & Mahendra, 2024). The scientific novelty of this research lies in the direct clinical application of breadfruit leaf extract in CHF patients with fluid retention. While prior studies remained predominantly animal-based or in vitro investigations, the present research directly evaluates clinical outcomes, including body weight reduction and dyspnea improvement. Thus, this study is expected to strengthen evidence on the therapeutic role of breadfruit leaves as a complementary strategy to mitigate fluid retention in CHF. In addition, this investigation supports the Ministry of Health’s Saintifikasi Jamu initiative, promoting evidence-based integration of herbal formulations within the national health system. Consequently, the implementation of standardized breadfruit leaf extract in this study provides a safe, effective, and policy-aligned complementary alternative for CHF management. The aim of this study was to evaluate the effectiveness of standardized breadfruit leaf (*Artocarpus altilis*) extract in reducing fluid retention, as indicated by changes in body weight, and improving the level of dyspnea in patients with congestive heart failure (CHF).

METHOD

This study employed a pre-experimental design with a one-group pretest-posttest approach. The research was conducted at the working area of Cilacap Tengah 1 Public Health Center, Central Java, Indonesia, with a total population of 342 patients diagnosed with Congestive Heart Failure (CHF) presenting with symptoms of fluid retention. From this population, 15 respondents were selected using a purposive sampling technique. The inclusion criteria were CHF patients who agreed to participate by signing informed consent, were clinically stable with normal vital signs, were not experiencing acute exacerbations or severe complications, and were willing to maintain dietary intake during the study period. Patients with acute conditions, severe comorbidities, or those unwilling to participate were excluded. The intervention consisted of herbal preparations of breadfruit leaf (*Artocarpus altilis*) extract, administered orally twice daily for five consecutive days. The measured outcomes included: (1) body weight measured with a digital scale, and (2) dyspnea assessed using the Borg Modification Scale. Data collection was carried out by measuring all parameters at baseline (pretest) on the first day before intervention and again on day five (posttest) after the intervention. All measurements were performed by trained researchers and health workers to ensure accuracy and adherence to the protocol. Data analysis was conducted using a wilcoxon signed-rank test for non-normally distributed variables, with a significance level set at $p < 0.05$. This study received ethical approval from the Health Research Ethics Committee of Universitas Al-Irsyad Cilacap. Written informed consent was obtained from all participants prior to data collection.

RESULT

Table 1.

Comparison of Mean Body Weight and Dyspnea Scores Before and After Intervention (n = 15)

Variable Name	Pretest (Mean ± SD; Median [Min-Max])	Posttest (Mean ± SD; Median [Min-Max])	p-value*
Body Weight (kg)	61.9 ± 5.2; 62.2 [54.0 - 73.4]	61.7 ± 5.2; 61.2 [54.0 - 73.4]	0.005
Dyspnea Score (Borg Scale)	5.6 ± 0.6; 6.0 [5.0 - 7.0]	4.5 ± 0.8; 4.0 [4.0 - 6.0]	0.001

*Significance level: $p < 0.05$ indicates statistically significant differences.

Based on table 1. the results showed that the mean body weight before the intervention (pretest) was 61.9 ± 5.2 kg, with a median of 62.2 kg and a range of 54.0–73.4 kg. After the intervention (posttest), the mean body weight slightly decreased to 61.7 ± 5.2 kg, with a median of 61.2 kg and the same range of 54.0–73.4 kg. The statistical test showed a p-value of 0.005 ($p < 0.05$), indicating that there was a statistically significant difference in body weight between the pretest and posttest measurements. The mean dyspnea score before the intervention (pretest) was 5.6 ± 0.6 , with a

median of 6.0 and a range of 5.0–7.0. After the intervention (posttest), the mean dyspnea score decreased to 4.5 ± 0.8 , with a median of 4.0 and a range of 4.0–6.0. The statistical analysis showed a p-value of 0.001 ($p < 0.05$), indicating that there was a significant decrease in dyspnea scores after the intervention.

DISCUSSION

The table presents the comparison of clinical parameters before and after the intervention. A statistically significant decrease was observed in both body weight and dyspnea scores following five days of breadfruit leaf extract administration, indicating clinical improvement in fluid retention and respiratory symptoms ($p < 0.05$). The observed statistically significant reduction in mean body weight after the five-day herbal intervention (from 61.9 ± 5.2 kg to 61.7 ± 5.2 kg) suggests a modest but potentially relevant decrease in fluid retention among CHF patients. In chronic heart failure, even small short-term reductions in body weight may reflect mobilization of excess interstitial or intravascular fluid, indicating partial decongestion. However, recent evidence cautions that weight change alone may poorly correlate with net fluid loss or true decongestion: a study of acute decompensated heart failure found only modest correlation between weight loss and total fluid output, with wide limits of agreement, indicating that reductions in body weight and fluid elimination may diverge substantially (Mullens et al., 2015). This discrepancy may occur because fluid redistribution between vascular, interstitial, and splanchnic compartments influences congestion without necessarily changing total body weight (Miller, 2016; Testani et al., 2024). Therefore, although the modest weight reduction in this study is encouraging, its clinical implications should be interpreted with caution and ideally supported by additional markers such as natriuretic peptides, urine volume, or objective congestion scales.

More compelling is the reduction in dyspnea scores on the Borg scale—from 5.6 ± 0.6 before intervention to 4.5 ± 0.8 after intervention—representing a 1.1-point decline. In cardiopulmonary research, a change of approximately one point on the Borg scale often meets or exceeds the minimal clinically important difference for perceived breathlessness, indicating clinically meaningful dyspnea relief (Pollentier et al., 2022). Given that dyspnea in heart failure is largely driven by pulmonary congestion, elevated left-sided filling pressures, and impaired pulmonary capillary fluid clearance, improved dyspnea likely reflects reduced pulmonary congestion and improved ventilatory mechanics (Jackson et al., 2013). The simultaneous improvement in a surrogate congestion marker (body weight) and a symptom-related outcome (dyspnea) strengthens the biological plausibility that breadfruit leaf extract contributed to decongestion and symptomatic relief, even if the precise degree of fluid removal remains uncertain (Mullens et al., 2015; Miller, 2016; Testani et al., 2024).

Mechanistically, the active phytochemicals within *Artocarpus altilis* such as flavonoids and saponins may exert diuretic, vasodilatory, and anti-inflammatory actions that enhance renal sodium–water excretion, reduce cardiac preload, and attenuate congestion with potentially fewer electrolyte and renal adverse effects compared to conventional loop diuretics (McDonagh et al., 2023; Gheorghiadu, Pang, & Ambrosy, 2015). This aligns with current heart failure management principles emphasizing that relief of congestion is a critical therapeutic target, as persistent fluid overload worsens hemodynamics, increases ventricular wall stress, and drives poor outcomes (Jackson et al., 2013; Klein et al., 2024). However, the one-group pretest–posttest design and small sample size ($n = 15$) limit causal inference. The modest weight change also highlights possible confounders including variations in sodium/fluid intake, daily volume shifts, measurement timing, and lack of fluid balance documentation. Furthermore, the absence of objective congestion markers—including natriuretic peptides, urine output, renal function indices, and electrolyte panels—reduces certainty in attributing improvement solely to the intervention (Miller, 2016; Testani et al., 2024). In summary, the combined evidence of modest weight reduction and clinically significant dyspnea improvement suggests that breadfruit leaf extract may support decongestion and symptom relief in CHF patients. Nonetheless, these findings should be considered preliminary.

Larger randomized controlled studies with comprehensive congestion profiling are required to validate efficacy, clarify mechanisms, and ensure long-term safety prior to recommending breadfruit leaf extract as an adjunctive standard therapeutic option.

CONCLUSION

This study concludes that the five-day administration of breadfruit leaf (*Artocarpus altilis*) extract significantly reduced body weight and dyspnea levels in patients with Congestive Heart Failure, indicating decreased fluid retention and improved respiratory symptoms. These findings support the potential use of breadfruit leaf extract as a complementary therapy in CHF management, although further controlled studies are required to confirm its efficacy and safety.

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