RESEARCH PAPER

Impact of Comprehensive Therapeutic Milieu on Selected Physiological Parameters and Activities of Daily Living in patients with Heart Failure - An experimental study

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ABSTRACT

Background: Heart failure (HF) is a chronic, progressive clinical syndrome caused by structural or functional cardiac abnormalities. Despite advances in recommended medical therapy, many patients continue to experience physiological instability and progressive decline in activities of daily living (ADL), which requires multidimensional interventions such as therapeutic milieu to enhance physiological regulation and functional independence.

Aim: This study evaluated the effect of a comprehensive therapeutic milieu on selected physiological parameters and activities of daily living among patients with heart failure.

Materials and Methods: A true experimental pretest- post-test design was conducted among 240 patients with heart failure. Participants were randomly assigned to study (n = 120) & control (n = 120) groups. Selected physiological parameters were assessed using a 4-point rating scale, and Activities of Daily Living (ADL) were assessed using the Modified Lawton Instrumental Activities of Daily Living Scale. The intervention group received a comprehensive therapeutic milieu comprising dyadic education, low-intensity chair-based exercises, and a mindful moist mouth technique.

Results: At pretest, most participants in the study and control groups had moderate alterations in the mean score of selected physiological parameters (12.32 ± 3.49 vs.12.43 ± 3.38). By post-test III, the study group demonstrated a significant reduction in mean selected physiological parameter (10.50 ± 2.52) compared to the control group (11.97 ± 2.49) ($p < 0.001$). Significant improvements were noted in heart rate, respiratory rate, blood pressure, edema, and oxygen saturation in the study group. ADL scores also improved significantly in the study group among both males (2.92 ± 1.16 to 3.72 ± 1.02) and females (4.12 ± 1.43 to 4.64 ± 1.75) ($p < 0.001$), while no improvement was observed in the control group. A moderate positive correlation was observed between selected physiological parameters and ADL among female participants in the study group ($r = 0.59$ at $p < 0.001$).

Conclusion: The comprehensive therapeutic milieu significantly improved physiological stability and functional independence among patients with heart failure. The research findings highlight the value of incorporating structured dyadic education and low-intensity physical activity as adjunct therapeutic strategies alongside standard pharmacological management.

Keywords: Heart failure; therapeutic milieu; selected physiological parameters; activities of daily living; low-intensity physical activity; mindful moist mouth technique; dyadic education

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BACKGROUND

Heart failure is a multifactorial clinical syndrome characterized by structural or functional cardiac

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abnormalities that impair the ability of the ventricles to fill with or eject blood adequately and cause subsequent systemic congestion**.[1]** Globally, heart failure affects approximately 64 million individuals and continues to be a leading cause of hospitalization, disability, and mortality [**2**].

Heart failures clinical features, persistent fatigue and reduced exercise tolerance interfere with self-care activities, including bathing, dressing, grooming, and toileting, as these tasks require sustained physical effort and postural change. These limitations significantly limit ambulation, transfers, stair climbing, and household activities, leading to increased functional dependence, frequent hospital readmissions, and increased mortality among patients with HF [**3 - 5**].

Psychological distress and inadequate supportive environments negatively influence motivation, self-care behaviours, and functional recovery **[6]**. Autonomic dysfunction associated with blood pressure instability and psychological stress may lead to dizziness and reduced postural tolerance, thereby affecting mobility and standing activities **[7]**. Moreover, fluid retention and peripheral edema impair lower-body dressing, footwear use, and transfers due to discomfort and restricted joint movement [**1**]. HF-related skeletal muscle wasting and reduced muscle strength compromise feeding, grooming, and ambulation, contributing to progressive functional decline [**4**].

Given its long - term and progressive nature of HF, many patients continue to experience physiological deterioration, increased dependency, reduced functional independence in ADL, and poorer clinical outcomes [1,**2,7**]. These changes emphasize the importance of comprehensive, non-pharmacological interventions in addition to standard medical and device-based therapies.

A therapeutic milieu involves an integrated care environment that combines physical care, structured daily routines, psychosocial support, stress management strategies, and patient engagement to improve physiological regulation and functional outcomes [**8]**

Although recent research studies highlight the importance of, holistic and integrated care approaches in heart failure management,

Empirical evidence examining the therapeutic milieu interventions on physiological parameters alongside activities of daily living in HF patients remains uncommon. Addressing this gap is essential for developing evidence-based, patient-centred care models that promote physiological stability and functional independence.

Therefore, the present study primarily aimed to evaluate the effect of a comprehensive therapeutic milieu on the selected physiological parameters and activities of daily living, among patients with Heart failure.

This study is among the first to evaluate the combined effect of dyadic education, low-intensity exercise, and mindful self-care strategies as a comprehensive therapeutic milieu on both physiological parameters and functional outcomes in patients with heart failure.

MATERIALS AND METHODS

Ethical clearance was obtained from the Institutional Ethics Committee (IECVBMHR/LTR/2022/021). Participants were informed about the study purpose, and written consent was obtained from all participants before the data collection. Ethical principles were strictly adhered to and Confidentiality was maintained throughout the study

A true experimental pretest-post-test design was adopted. The study was conducted in the cardiac ward of a multispecialty hospital in Chennai, South India, from April 2022 to May 2023. Power analysis determined the required sample size based on 5% level of significance and 80% statistical power **[9,10].** 240 patients with heart failure who met the inclusion criteria were selected using a simple random sampling technique and allocated equally to study (n = 120) and control (n = 120) groups using matching criteria for age and gender. After accounting for attrition, the final analysis included 115 participants in the study group and 116 in the control group. Patients aged ≥30 years with New York Heart Association (NYHA) Class I–III heart failure admitted to cardiac wards were included.

Demographic and clinical data were collected using a structured questionnaire in the local language. Selected physiological parameters were assessed using a 4-point rating scale. Activities of daily living were assessed using the Modified M.P Lawton & E.M. Brody's Instrumental Activities of Daily Living (IADL) Scale [**11**]

Following the pre-test assessment, the study group received a comprehensive therapeutic milieu, while the control group continued with routine hospital care. The intervention comprised dyadic care education, low-intensity physical activity, and a mindful moist mouth technique.

The dyadic care intervention included a structured 30–45-minutes education session for patients and their primary caregivers, focusing on the heart action plan, heart failure management, heart-healthy diet, and self-care behaviours. Low-intensity chair-based aerobic and stretching exercises were demonstrated and participants were instructed to perform 10 repetitions of each exercise twice daily under supervision during hospitalization. The mindful moist mouth technique was demonstrated and reinforced, with participants advised to practice it regularly during fluid intake. The intervention was continued for 90 days. Post-test assessments were conducted on Day 7, Day 30, and Day 90.

Data were coded, entered into Microsoft Excel and analysed using Jamovi statistical software. Descriptive statistics, frequency, percentage, mean, and standard deviation were used to summarize the demographic variables, clinical variables, and study variables. Chi-

square tests assessed the group homogeneity. Paired *t*-tests compared within-group differences, Z- tests compared between-group differences. Pearson correlation assessed relationships between physiological parameters and ADL. One-way ANOVA examined associations with demographic variables. Multiple regression analysis identified predictors of post-test outcomes [**9,10**].

Study Participants were equally distributed between the study and control groups using matching criteria for age and gender. The majority of participants in both groups, were aged 61–70 years 60% and male 70%. Most participants, 50% in both groups were graduates or had higher education. Additionally, 20.83% of the study group and 25.83% of control group were retired from employment; furthermore, 69.17% of the study and 64.17% of the control group sample lived in joint families. More than half of the participants resided in urban areas (55% in the study group and 65% in the control group), and 38.33% in the study group and 40.83% of control group samples reported watching television as their primary mode of relaxation.

Regarding clinical characteristics, hypertension and coronary artery disease were reported as comorbidities in 25% of the study group and 35% of the control group. An illness duration of 1–2 years was observed in 43.33% of the study group and 38.33% of the control group. The majority of participants were classified as NYHA Class II (55% in the study group vs. 49.16% in the control group). A history of one hospitalization in the past year was noted in 58.33% of participants in both groups. The use of beta-blockers and digoxin was reported in 23.33% and 12.5% of participants, respectively. Non-smoking status (56.67% in the study group vs. 61.66% in the control group) and non-alcohol use (60.8% in the study group vs. 58.33% in the control group) were predominant. Rare engagement in exercise was reported by 55% of the study group and 40% of the control group.

Table 1. Comparison of pre-test and post-test III mean scores of selected physiological parameters among patients with heart failure between the study and control group

Selected Physiological Parameters	Pre-test		Post-test III							
	Study Group n=115		Control Group n=116			Study Group n=115		Control Group n=116		
	Mean	SD	Mean	SD	p value	Mean	SD	Mean	SD	p-value
Heart rate /min	82.1	7.1	83.3	6.4	< 0.001***	79.2	4.9	83.8	8.5	< 0.001***
Respiratory rate/min	20.6	2.9	21.9	3.9	< 0.001***	19.3	2.4	22.2	3.8	< 0.001***
Systolic BP (mmHg)	133.7	11.7	135.5	11.2	< 0.001***	131.9	10.7	136.9	11.1	< 0.001***
Diastolic BP(mmHg)	80.8	10.2	78.8	4.4	< 0.001***	78.8	9.3	80.4	5.6	< 0.001***
BMI (kg/m²)	24.8	3.4	25.5	2.3	< 0.001***	24.7	3.3	25.6	2.3	< 0.001***
Edema score	1.5	0.7	1.4	0.8	0.17NS	1.1	0.6	1.5	0.7	0.007**
SpO_2 (%)	95	3.1	93.2	3.3	< 0.001***	95.9	2.8	93.3	3.5	< 0.001***
LVEF (%)	41.5	5.5	44.4	6.6	< 0.001***	41.1	5.1	43.8	6.2	< 0.001***

In the study group, comparison of pre-test and post-test III scores indicates a marked improvement in most physiological parameters, including reductions in heart rate, respiratory rate, systolic and diastolic blood pressure, BMI, and edema, along with improved SpO_2 levels. Left Ventricular Ejection Fraction (LVEF) remained relatively stable. Conversely the control group exhibited minimal improvement or slight deterioration in physiological parameters, with persistently lower SpO_2 and no improvement in edema or LVEF (Table-1)

Overall, selected physiological parameter's pre-test results showed that most participants in both the study (58.26%) and control (59.48%) groups had moderate alterations in selected physiological parameters, with mean scores of 12.32 ± 3.49 and 12.43 ± 3.38, respectively. At post-test III, the majority of the study group (60.87%) remained in the moderate category, with a reduced mean score of 10.50 ± 2.52, whereas, 80.17% of the control group samples remained with, moderate alteration, with a mean score of 11.97 ± 2.49. Overall, a reduction in post-test III mean scores was observed in the study group compared to the control group that was significant at $p < 0.001$

Table-2. Comparison of Activities of Daily Living, of heart failure patients between the study and control group

Study duration	Study Group n=115		Control Group n=116		Mean Difference	p Value
	Mean	SD	Mean	SD		
Pretest Male	2.915	1.156	2.940	1.1652	-0.025	0.885 NS
Pretest Female	4.121	1.430	3.281	1.590	0.84	0.443 NS
Post-test I Male	2.963	1.201	2.821	1.183	0.142	0.443 NS
Post-test I Female	4.242	1.714	3.25	3.25	0.992	0.014**
Post-test II – Male	3.341	1.326	2.214	1.018	1.127	0.001***
Post-test II – Female	4.151	1.372	3.156	1.461	0.995	0.005 **
Post- test III Male	3.719	1.021	2.416	1.372	1.303	0.01***
Post-test III Female	4.636	1.746	2.656	1.428	1.980	0.001***

Regarding ADL at pre-test, considerable proportion of participants in both groups required assistant with activities of daily living. 34.78% of males (2.92 ± 1.16) and 16.52% of female participants (4.12 ± 1.43) in the study group and 33.62% of male (2.94 ± 1.17) and 16.37% of female (3.28 ± 1.59) in the control group required assistance in performing ADL.

At post-test III, the study group demonstrated improved ADL performance, with mean scores increasing among both males (3.72 ± 1.02) and females (4.64 ± 1.75), indicating better functional independence. In contrast, the control group showed lower mean scores among males (2.42 ± 1.37) and females (2.66 ± 1.42), reflecting continued dependence in performing ADL. A significant difference was observed between the groups at post-test III ($p < 0.001$) **(Table-2)**

Correlation of selected physiological parameters and activities of daily living of patients with heart failure

A moderate positive correlation was observed between selected physiological parameters and activities of daily living among female participants in the study group ($r=0.59$, $p<0.001$). indicating that improvement in physiological status was associated with better functional ability. However, no significant correlation was observed among male participants and in the control group participants.

DISCUSSION

This experimental study evaluates the effectiveness of a comprehensive therapeutic milieu on selected physiological parameters and ADL in patients with heart failure. The participants who received the intervention showed significant improvements in physiological stability and functional ability compared with those receiving routine hospital care alone. These findings support current evidence advocating for multidimensional, non-pharmacological interventions as an essential component of heart failure management [**12**].

The observed reductions in heart rate, respiratory rate, blood pressure, and edema scores, along with improved oxygen saturation in the study group, align with existing studies reporting the beneficial effects of structured education, self-care support, and low-intensity exercise in heart failure management [**13 - 16**]. These improvements suggest enhanced autonomic regulation, improved symptom control, and better fluid management.

No significant changes were observed in LVEF, which is expected, as structural cardiac adaptations typically require longer intervention periods or targeted medical therapies to demonstrate measurable improvement. Similar findings have been reported in previous intervention studies, where symptomatic and functional improvements occurred without significant changes in LVEF **[17–19].**

The significant improvement in ADL observed in the study group at post-test III highlight the positive impact of combining physical activity with education and caregiver involvement. This finding is supported by previous studies showing that caregiver-focused educational interventions significantly improved patient self-care behaviours and functional outcomes **[20,21]**

Low-intensity, chair-based exercises likely enhanced muscle strength and endurance, enabling patients to perform daily tasks with greater independence. Low-intensity physical activity has been shown to improve cardiopulmonary efficiency and peripheral muscle function, even in patients with moderate functional limitation (NYHA Class II–III) [**22,23**]

The control group showed no meaningful improvement in ADL, indicating that routine hospital care alone may not adequately address functional decline in heart failure patients.

The moderate positive correlation between physiological parameters and ADL among female participants in the study group suggests that improvements in physiological

contributed to improved functional performance. This identified relationship got supported by the existing evidence that symptom burden, fatigue, and cardiorespiratory status directly influence daily functioning in heart failure patients [**24**]

Implications for Nursing Practice

The findings emphasize the critical role of nurses in implementing comprehensive, patient-centred interventions in heart failure care. Nurse-led dyadic education, supervised low-intensity exercise, and symptom-focused self-care strategies can significantly improve both physiological stability and functional independence. Integrating caregivers into care planning enhances adherence and continuity of care, consistent with contemporary heart failure management frameworks **[25].**

Strengths and Limitations

The experimental design includes, adequate sample size, and repeated follow-up assessments strengthen the validity of the findings. However, findings may be limited by the single-centre setting that may limit generalizability. Longer follow-up periods are recommended to evaluate sustained effects and potential changes in structural cardiac parameters. Future studies with multi-centre designs and longer follow-up periods are recommended.

CONCLUSION

The comprehensive therapeutic milieu significantly improved physiological stability and functional independence among patients with heart failure. These findings demonstrate the effectiveness of integrating structured dyadic education and low-intensity physical activity as adjunct therapeutic strategies alongside standard pharmacological management. These results highlight the importance of combining therapeutic care approaches with conventional treatment modalities to optimize overall patient management and support holistic healthcare delivery.

Additional Information

Author Contributions: All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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