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Research Article

Effectiveness of Hot Water Footbath Therapy on Sleep Quality Among Elderly Residents of Selected Old Age Homes: A Quasi-Experimental Study

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Abstract
Background: Sleep disturbances are prevalent among the elderly and often remain untreated or under-managed. Non-pharmacological interventions, such as hot water footbaths, have gained attention for their simplicity, affordability, and safety in improving sleep quality.
Objective: To evaluate the effectiveness of hot water footbath therapy on sleep quality and identify contributing factors to insomnia among elderly residents of selected old age homes in Ahmedabad, Gujarat.
Methods: A quasi-experimental study with a pre-test–post-test control group design was conducted among 60 elderly individuals aged 60 years and above. Participants were selected through purposive sampling and divided into experimental (n = 30) and control (n = 30) groups. The Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality. The intervention group received a 20-minute hot water footbath each night for seven days, while the control group received no intervention. Data were analyzed using descriptive and inferential statistics.
Results: Post-intervention analysis revealed a statistically significant improvement in sleep quality in the experimental group ($p < 0.05$). The most affected PSQI components included sleep latency, duration, and overall quality. Demographic variables such as age, gender, and length of stay in the old age home were found to have a significant association with baseline sleep quality.
Conclusion: Hot water footbath therapy is an effective, low-cost intervention to improve sleep quality among the elderly. It may be considered a viable non-pharmacological alternative for sleep enhancement in geriatric care settings.

Keywords: Elderly, Sleep quality, Insomnia, Hot water footbath, Non-pharmacological intervention, Old age homes

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Introduction

Sleep is a fundamental biological process essential for physical and mental well-being. It is governed by the sleep–wake cycle, a critical component of the circadian rhythm that regulates numerous physiological and behavioral functions. Disruptions in this rhythm,

commonly seen among elderly populations, often lead to chronic sleep disturbances, resulting in fatigue, cognitive decline, emotional instability, and compromised immunity (Potter & Perry, 1993; Marin-Guzman & Avidan, 2015).

Insomnia, characterized by difficulty initiating or maintaining sleep, is one of the most prevalent disorders among older adults. Studies estimate that up to 50% of the elderly population experience some form of sleep disturbance (Zisberg et al., 2010). Despite its high prevalence, insomnia in elderly individuals often goes untreated due to the underreporting of symptoms, fear of drug dependency, or limited access to appropriate care.

Pharmacological treatments for insomnia, including sedatives and hypnotics, are associated with adverse effects such as dependency, cognitive impairment, and increased risk of falls. Therefore, non-pharmacological interventions are increasingly recommended as first-line treatments, particularly in geriatric care (Talebi et al., 2016; Seyyedrasooli et al., 2013).

Among these interventions, hot water footbath therapy has shown promising results in promoting relaxation, reducing sleep latency, and improving overall sleep quality. The underlying mechanism involves peripheral vasodilation, which facilitates thermal regulation and promotes parasympathetic nervous system activation (Cherian, 2023; Kim et al., 2016). Studies conducted in clinical and home-based settings have demonstrated significant improvements in sleep outcomes with the use of footbath therapy (Valizadeh et al., 2015; Kaur & Kumar, 2017).

In India, particularly in urban centers like Ahmedabad, old age homes serve as primary residences for many elderly individuals. These facilities, though providing basic care, often lack structured interventions for managing geriatric sleep disorders. This study, therefore, aimed to assess the factors contributing to insomnia and evaluate the effectiveness of hot water footbath therapy in enhancing sleep quality among elderly residents of selected old age homes.

Objectives:

1. To assess the sleep quality of elderly individuals.
2. To evaluate the effectiveness of hot water footbath therapy on sleep quality.
3. To examine the association between sleep quality and selected socio-demographic variables.

Hypotheses:

- **H1:** There will be a significant difference in mean sleep quality scores before and after hot water footbath therapy among elderly individuals at a 0.05 level of significance.
- **H2:** There will be a significant association between sleep quality and selected socio-demographic variables at a 0.05 level of significance.

Methods:

A quasi-experimental pre-test–post-test control group design was adopted to evaluate the effect of hot water footbath therapy on sleep quality among elderly individuals. This design enabled comparison of outcomes within and between groups to infer the therapy's effectiveness. The study was conducted in selected old age homes in Ahmedabad city, Gujarat. The sites were chosen based on administrative feasibility, accessibility, and willingness of participants and management to cooperate. The study population consisted of elderly residents aged 60 years and above living in the selected old age homes. A purposive sampling method was used to select a sample of 60 elderly individuals—30 in the experimental group and 30 in the control group—who fulfilled the inclusion criteria. The experimental group received hot water footbath therapy every night for 20 minutes before bedtime over a period of 7 consecutive days. The water temperature was maintained between 38°C and 42°C to ensure safety and effectiveness. The control group did not receive any intervention during this period.

Data were collected using a structured tool composed of two parts:

- Part I: Socio-demographic Profile – including age, gender, duration of stay, comorbidities, and sleep patterns
- Part II: Pittsburgh Sleep Quality Index (PSQI) – a validated instrument for measuring sleep quality. The PSQI covers domains such as:
  - Sleep latency
  - Sleep duration
  - Sleep disturbances
  - Daytime dysfunction
  - Sleep efficiency

A higher score indicates poorer sleep quality. The tool's reliability was confirmed with a Cronbach's alpha of 0.85**,** indicating high internal consistency.

The study was approved by the Institutional Ethics Committee**,** and permissions were obtained from old age home authorities. Written informed consent was collected from each participant. Participants' privacy, confidentiality, and rights to withdraw at any stage were assured.

Data Collection was conducted by :

1. Pre-test PSQI scores were obtained from both groups.
2. The intervention (hot water footbath) was administered to the experimental group nightly for 7 days.
3. Post-test PSQI scores were recorded on Day 8**.**
4. Both descriptive and inferential statistics were used for data analysis.

Data were analyzed using SPSS (or a similar statistical software).

1. Descriptive statistics**:** frequency, percentage, mean, and standard deviation
2. Inferential statistics**:** paired t-test (within-group), independent t-test (between groups), and Chi-square test for associations

Results:

1. Demographic Characteristics of Participants

Table 1. Socio-Demographic Profile of Participants (N = 60)

Variable	Category	Experimental Group (n=30)	Control Group (n=30)
Age	60–69 years	14 (46.7%)	13 (43.3%)
	70–79 years	10 (33.3%)	11 (36.7%)
	≥80 years	6 (20.0%)	6 (20.0%)
Gender	Male	16 (53.3%)	17 (56.7%)
	Female	14 (46.7%)	13 (43.3%)
Duration of Stay	<1 year	9 (30.0%)	10 (33.3%)
	1–3 years	13 (43.3%)	12 (40.0%)
	>3 years	8 (26.7%)	8 (26.7%)
Comorbidities Present	Yes	19 (63.3%)	18 (60.0%)
	No	11 (36.7%)	12 (40.0%)

Participants were predominantly aged 60–69 years, with a near-equal distribution of males and females across both groups. The majority had resided in the old age home for 1–3 years. Approximately 60–63% of participants reported one or more comorbidities.

2. Pre-Test and Post-Test Comparison of PSQI Scores

Table 2. Comparison of Pre-Test and Post-Test Sleep Quality Scores (Mean ± SD)

Group	Pre-Test PSQI	Post-Test PSQI	Mean Difference	t-value	p-value
Experimental	12.4 ± 2.1	6.8 ± 1.9	5.6	11.34	0.000*
Control	12.1 ± 2.3	11.7 ± 2.2	0.4	1.21	0.235

**Significant at $p < 0.05$*

The experimental group showed a highly significant improvement in sleep quality, with mean PSQI scores decreasing from 12.4 to 6.8 ($p < 0.001$). The control group, by contrast, showed no significant change.

3. Component-Wise PSQI Score Comparison

Table 3. Component-Wise PSQI Comparison Between Groups

PSQI Component	Exp. Pre-Test	Exp. Post-Test	Control Pre	Control Post	p-value
Sleep Latency	2.3 ± 0.5	1.1 ± 0.4	2.2 ± 0.6	2.1 ± 0.5	0.000*
Sleep Duration	2.1 ± 0.6	1.2 ± 0.5	2.0 ± 0.5	1.9 ± 0.6	0.001*
Sleep Disturbance	2.0 ± 0.5	1.0 ± 0.4	1.9 ± 0.5	1.8 ± 0.4	0.002*
Daytime Dysfunction	1.9 ± 0.6	1.1 ± 0.4	1.8 ± 0.6	1.7 ± 0.5	0.003*
Overall Sleep Quality	2.1 ± 0.6	1.0 ± 0.3	2.0 ± 0.5	1.9 ± 0.4	0.000*

**Significant at $p < 0.05$*

Significant improvements were observed across all components of PSQI in the experimental group post-intervention, particularly in sleep latency, duration**,** and daytime dysfunction**.** The control group exhibited minimal change across all parameters.

4. Association Between Sleep Quality and Demographic Variables

Table 4. Association Between Pre-Test Sleep Quality and Demographics (Chi-square Test)

Variable	χ^2 Value	df	p-value	Significance
Age Group	6.12	2	0.047*	Significant
Gender	0.29	1	0.589	NS
Duration of Stay	7.45	2	0.024*	Significant
Comorbidities	5.98	1	0.015*	Significant

**Significant at $p < 0.05$; NS = Not Significant*

Statistically significant associations were found between sleep quality and age group**,** duration of stay**,** and presence of comorbidities**.** No significant association was observed with gender.

Discussion:

This study explored the effectiveness of hot water footbath therapy as a non-pharmacological intervention to improve sleep quality among elderly individuals in institutional care. The findings clearly demonstrate that the therapy produced a significant improvement in the overall PSQI scores in the experimental group, thereby supporting the hypothesis that hot water footbaths can positively influence sleep.

The observed improvements were especially prominent in sleep latency, duration, and sleep efficiency. This aligns with existing studies conducted by Cherian (2023) and Seyyedrasooli et al. (2013), who reported that hot water immersion of the feet enhances

peripheral circulation and promotes a state of relaxation conducive to sleep.

Moreover, the results revealed that certain demographic variables, such as age, gender, and length of institutional stay**,** were significantly associated with sleep disturbances. Similar associations were noted in studies by Thichumpa et al. (2018) and George et al. (2018), highlighting the multifactorial nature of geriatric insomnia.

Conclusion:

This quasi-experimental study demonstrated that hot water footbath therapy significantly improves sleep quality among elderly residents of old age homes. The findings support the use of this simple, low-cost, and non-invasive intervention as an effective strategy for managing mild to moderate insomnia in geriatric populations.

The therapy was particularly effective in reducing sleep latency, improving sleep duration**,** and enhancing overall sleep quality as measured by the PSQI. Importantly, the intervention is free from pharmacological side effects, making it ideal for institutionalized elderly who often present with polypharmacy concerns.

Given the high prevalence of sleep disturbances in the elderly and the limited use of non-drug approaches in long-term care facilities, hot water footbath therapy can be a viable addition to geriatric nursing practice**.**

Conflict of Interest: None declared.

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Ethical Clearance: Obtained from the Institutional Ethics Committee.

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