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Research Article

The Effectiveness of Hot Water Footbath Therapy on Sleep Quality Among Senior Residents in Old Age Homes- A Pilot Study

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Abstract

Introduction: Insomnia is a common condition among the elderly, often leading to reduced quality of life and increased health risks. Pharmacological treatments may have adverse effects; hence, there is growing interest in non-pharmacological alternatives such as hot water footbath therapy. This study aimed to evaluate the effectiveness of hot water footbath therapy on improving sleep quality among elderly residents in old age homes in Ahmedabad.

Methodology: A quasi-experimental pretest-posttest design was employed with 20 participants aged 60–80 years, randomly divided into experimental and control groups. The experimental group received a nightly hot water footbath for 15–20 minutes over 10 consecutive days, while the control group continued their routine without intervention. Sleep quality was measured using a modified Pittsburgh Sleep Quality Index (PSQI), and demographic data were collected via a structured questionnaire.

Results: Pre-intervention, 50% of participants in the experimental group reported poor sleep quality. Post-intervention, none reported poor sleep, with improvements seen in both mild and moderate categories. The mean PSQI score in the experimental group significantly decreased from 16.90 to 10.90 ($p < 0.001$), while the control group showed only a marginal improvement (from 17.00 to 14.90).

Analysis: Paired t-tests confirmed a statistically significant enhancement in sleep quality in the experimental group ($t = 14.230$, $p < 0.000$). Chi-square tests found no significant association between sleep quality and most demographic variables, except for sex in the control group. Common sleep disturbances included joint pain, nighttime urination, emotional stress, and environmental factors like noise and light.

Discussion: The findings support hot water footbath therapy as an effective, safe, and affordable method to improve sleep quality in the elderly. The intervention helps alleviate physical discomfort and promotes relaxation, addressing key causes of sleep disturbances. Despite the small sample size and short follow-up, the results are promising and warrant further large-scale studies.

Keywords: Hot water footbath therapy, sleep quality, elderly, insomnia, non-pharmacological intervention.

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Introduction

Sleep is an essential component of overall health, facilitating tissue repair, immune function, and mental clarity. Among the elderly, sleep disturbances are particularly common due to physiological ageing, chronic illnesses, and psychosocial factors.[1] Insomnia, characterized by difficulty in falling or staying asleep, diminishes the quality of life and increases the risk of accidents, depression, and other health problems.[2]

Non-pharmacological interventions, such as relaxation techniques and hydrotherapy, are gaining attention for their efficacy in managing sleep disorders without the side effects associated with medications.[3] Hot water footbath therapy, which involves immersing the feet in warm water for a prescribed duration, has shown promise in promoting relaxation and improving sleep onset and quality.[4] This study aims to identify the factors contributing to insomnia and assess the effectiveness of hot water footbath therapy among elderly individuals in selected old-age homes in Ahmedabad.

Objectives

1. Assess the factors contributing to sleep disturbances among elderly individuals.
2. Evaluate the effectiveness of hot water footbath therapy on sleep quality.
3. Examine the association between sleep quality and selected demographic variables.

Methods

Study Design

A quasi-experimental pretest-posttest design was adopted to compare the effects of hot water footbath therapy between experimental and control groups.

Participants

The study recruited 20 elderly residents aged 60–80 years from selected old-age homes in Ahmedabad using a simple random sampling technique. Inclusion criteria required participants to be willing to participate and free from conditions such as skin sensitivity or communicable diseases. Exclusion criteria included the use of sedative agents and physical challenges.

Intervention

Participants in the experimental group underwent a hot water footbath therapy session for 15–20 minutes at bedtime for 10 consecutive days. The control group continued with their usual routines without any specific intervention.

Data Collection Tools

Sleep quality was assessed using a modified Pittsburgh Sleep Quality Index (PSQI), which measures various components such as sleep latency, duration, and disturbances. Demographic and health-related data were collected using a structured questionnaire.

Statistical Analysis

Descriptive statistics, such as frequency, percentage, mean, and standard deviation, were used to summarize the data. Inferential statistics, including paired t-tests and Chi-square tests, were employed to analyze the effectiveness of the intervention and explore associations with demographic variables.

Results

Demographic Characteristics

Table: 1 Frequency and percentage-wise distribution of samples based on Demographic Variables. (N=10)

SL No	Demographic variables	Variables	Experimental group		Control group	
			F	%	F	%
1	Age group	60-65 years	6	60%	1	10%
		66-70 years	1	10%	1	10%
		71-75 years	2	20%	3	30%
		Above 75 years	1	10%	5	50%
2	Sex	Male	3	30%	3	30%
		Female	7	70%	7	70%
3	Marital status	Married	2	20%	3	30%
		Unmarried	3	30%	0	0%
		Widow/Widower	4	40%	5	50%
		Divorced	1	10%	2	20%
4	Children you have	1	6	60%	2	20%
		2	2	20%	3	30%
		3	2	20%	3	30%

		4 and above	0	0%	2	20%
5	**Education qualification**	No formal education	2	20%	4	40%
		Primary education	7	70%	2	20%
		Secondary education	1	10%	3	30%
		Higher Secondary	0	0%	1	10%
		Graduate	0	0%	0	0%
		PG and above	0	0%	0	0%
6	**Past Occupation**	Labor work	3	30%	1	10%
		Housework	5	50%	4	40%
		Job	1	10%	2	20%
		Business	0	0%	0	0%
		Retirement	0	0%	0	0%
		Others	1	10%	3	30%
7	**The monthly income of the family**	10000-20000	6	60%	5	50%
		20001-30000	1	10%	2	20%
		30001-40000	2	20%	1	10%
		40001-50000	1	10%	1	10%
		50001 and above	0	0%	1	10%
8	**Your day-to-day expenses are met by**	Self	8	80%	4	40%
		Sibling	0	0%	2	20%
		A son	2	20%	3	30%
		A daughter	0	0%	1	10%
9	**Suffering from disease**	Yes	6	60%	7	70%
		No	4	40%	3	30%
10	**Since how many months have you been in an old age home**	< 1 year	3	30%	2	20%
		1-2 year	2	20%	2	20%
		2-3 year	1	10%	1	10%
		>3 year	4	40%	5	50%

The study sample comprised 10 participants, evenly divided between the experimental and control groups. The majority of participants in the experimental group were aged 60–65 years (60%), while the control group predominantly consisted of individuals aged 75 years and older (50%). Female participants constituted 70% of both groups. In terms of health status, joint pain was reported by 80% of participants in the experimental group and 70% in the control group, indicating a high prevalence of comorbid conditions affecting sleep.

Pretest and Posttest Sleep Quality
Experimental Group

Table: 2 Pre-test and Post-test scores of quality of sleep in the experimental group (N=10)

Level of Quality of sleep	**PRETEST**		**POSTTEST**	
	F	**%**	**F**	**%**
Mild quality of sleep (1-9)	2	20%	4	40%
Moderate quality of sleep (10-18)	3	30%	6	60%
poor sleep quality (19-26)	5	50%	0	0%

Table: 3 The mean, median, mode, standard deviation, minimum, and maximum values of the quality of sleep score in the experimental group. (N-10)

Statistics		
	Pre-test QoS	**Post-test QoS**
Mean	16.90	10.90
Median	18.50	13.00
Mode	20[a]	13
Std. Deviation	4.725	3.929
Minimum	8	4
Maximum	21	15
a. Multiple modes exist. The smallest value is shown		

Before the intervention, 50% of participants in the experimental group experienced poor sleep quality (PSQI scores 19–26), while 20% reported mild sleep quality (PSQI scores 1–9). Post-intervention, the percentage of participants with poor sleep quality dropped to 0%, with 40% reporting mild sleep quality and 60% achieving moderate sleep quality (PSQI scores 10–18). The mean PSQI score decreased significantly from 16.90 (±4.725) to 10.90 (±3.929).

Control Group

Table: 4 Pre-test and Post-test scores of quality of sleep in the control group (N=10)

Level of	**PRETEST**		**POSTTEST**	
Quality of sleep	**F**	**%**	**F**	**%**
Mild quality of sleep (1-9)	2	20%	2	20%
Moderate quality of sleep (10-18)	2	20%	7	70%
poor sleep quality (19-26)	6	60%	1	10%

Table: 5 The mean, median, mode, standard deviation, minimum, and maximum values of the quality of sleep score in the Control group. (N=10)

Statistics		
	Pre-test QoS	**Post-test QoS**
Mean	17.00	14.90
Median	19.00	16.00
Mode	19	16
Std. Deviation	4.619	4.095
Minimum	8	7
Maximum	21	19

In the control group, 60% of participants reported poor sleep quality at baseline, which reduced to 10% post-intervention. However, the improvement was less pronounced compared to the experimental group, with the mean PSQI score decreasing from 17.00 (±4.619) to 14.90 (±4.095).

Statistical Significance

Table: 6 Comparison of mean pre-test and mean post-test scores of sleep quality in the experimental group. (N=10)

component	**Observation**	**Mean**	**SD**	**Calculated "t"-Value**	**df**	**Tabulated "t"-value**
Experimental group quality of sleep score.	**Pretest**	16.90	4.725	**14.230**	9	0.000
	Posttest	10.90	3.929			

Table: 7 Comparison of mean pre-test and mean post-test scores of sleep quality in the control Group. (N=10)

Component	**Observation**	**Mean**	**SD**	**Calculated "t"-Value**	**df**	**Tabulated "t"-value**
Control group quality of sleep score	**Pretest**	17.00	4.619	7.584	9	0.000
	Posttest	14.90	4.095			

Paired t-tests revealed a statistically significant improvement in sleep quality scores in the experimental group ($t = 14.230$, $p < 0.000$). In contrast, the control group exhibited a less significant change ($t = 7.584$, $p = 0.000$).

Factors Influencing Sleep

Table: 8 Frequency-wise distribution of samples based on factors affecting Sleep. (N=10)

Sr. No.	Items	Experimental Group		Control Group	
		Yes	No	Yes	No
1	**Sleep and Health Issues**				
a	Are you suffering from any type of major disease?	5	5	6	4
b	Is your sleep disturbed due to frequent going to the washroom or urinary incontinence?	3	7	4	6
c	Do you have problems with heartburn or acidity due to heavy/large meals?	3	7	5	5
d	Is your sleep disturbing due to bad dreams?	3	7	4	6
e	Do you take any type of medication?	8	2	6	4
f	Do you have any type of joint pain?	8	2	8	2
2	**Sleep Quality**				
a	Do you have<8 hours of actual sleep?	5	5	6	4
b	Do you take more than 30 minutes to get sleep?	5	5	6	4
c	Do you wake up in the middle of the night or early morning?	8	2	6	4
d	Do you have any disturbance during sleep?	8	2	7	3
3	**Sleep position**				
	Do you frequently change position while sleeping?	5	5	6	4
4.	**Energy drink:**				
	Do you have tea/coffee every night before bedtime?	1	9	1	9
5.	**Sleep Attire**				
a	Is your sleep disturbed by noise/snoring?	4	6	4	6
b	Is your sleep disturbed by seasonal change?	4	6	4	6
c	Is your sleep disturbed by light?	5	5	3	7
d	Do you feel you do not have a comfortable bed, mattress or bed linen?	5	5	4	6
6.	**Sleep and work**				
a	Do you have any emotional stress?	8	2	7	3
b	Does your enthusiasm towards work affect your sleep?	3	7	3	7
7.	**Tobacco use**				
a	Are you habituated to chewing tobacco or smoking?	2	8	0	10
b	Do you have/had a habit of drinking alcohol?	1	9	0	10

Common factors affecting sleep included frequent nighttime urination, joint pain, and emotional stress. While these factors were prevalent in both groups, the experimental group reported greater relief following the intervention

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Association with Demographic Variables

Table: 9 Association between quality of sleep levels with a selected demographic variable in the Experimental group. (N=10)

SL No	Demographic variables	Variables	Mild	Moderate	Severe	df	Chi-Square	t Value
1	**Age group**	60-65 years	1	1	4	6	10.389	0.109
		66-70 years	0	0	1			
		71-75 years	0	2	0			
		Above 75 years	1	0	0			
2	**Sex**	Male	0	2	1	2	3.016	0.221
		Female	2	1	4			
3	**Marital status**	Married	2	0	0	6	11.111	0.085
		Unmarried	0	1	2			
		Widow/Widow	0	2	2			

		er						
		Divorced	0	0	1			
4	**Children you have**	1	1	2	3	4	4.222	0.377
		2	0	0	2			
		3	1	1	0			
		4 and above	0	0	0			
5	**Education qualification**	No formal education	1	0	1	4	3.071	0.546
		Primary education	1	3	3			
		Secondary education	0	0	1			
		Higher Secondary	0	0	0			
		Graduate	0	0	0			
		PG and above	0	0	0			
6	**Past Occupation**	Labor work	0	2	1	6	5.378	0.496
		Housework	2	1	2			
		Job	0	0	1			
		Business	0	0	1			
		Retirement	0	0	0			
		Others	0	0	0			
7	**The monthly income of the family**	10000-20000	1	2	3	6	8.389	0.211
		20001-30000	1	0	0			
		30001-40000	0	0	2			
		40001-50000	0	1	0			
		50001 and above	0	0	0			
8	**Your day-to-day expenses are met by**	Self	2	3	3	2	2.500	0.287
		Sibling	0	0	0			
		A son	0	0	2			
		A daughter	0	0	0			
9	**Suffering from disease**	Yes	2	1	3	2	2.222	0.329
		No	0	2	2			
10	**Since how many months have you been in an old age home**	< 1 year	1	1	1	6	4.528	0.606
		1-2 year	0	0	2			
		2-3 year	0	0	1			
		>3 year	1	2	1			

*** Significant at p≤ 0.05 level**

Table: 10 Association between quality of sleep levels with a selected demographic variable in the control group. (N=10)

SL No	Demographic variables	Variables	Mild	Moderate	Severe	df	Chi-Square	t Value
1	**Age group**	60-65 years	0	0	1	6	5.556	0.475
		66-70 years	1	0	0			
		71-75 years	0	1	2			
		Above 75 years	1	1	3			
2	**Sex**	Male	2	0	1	2	6.032	0.049*
		Female	0	2	5			
3	**Marital status**	Married	0	0	3	4	4.667	0.323
		Unmarried	0	0	0			
		Widow/Widower	1	2	2			
		Divorced	1	0	1			
4	**Children you have**	1	0	1	1	6	4.444	0.617
		2	1	0	2			
		3	0	1	2			

		4 and above	1	0	1			
5	**Education qualification**	No formal education	0	1	3	6	7.222	0.301
		Primary education	0	1	1			
		Secondary education	1	0	2			
		Higher Secondary	1	0	0			
		Graduate	0	0	0			
		PG and above	0	0	0			
6	**Past Occupation**	Labor work	0	0	1	6	7.222	0.301
		Housework	1	0	3			
		Job	1	0	1			
		Business	0	0	0			
		Retirement	0	0	0			
		Others	0	2	1			
7	**The monthly income of the family**	10000-20000	1	1	3	8	6.667	0.573
		20001-30000	1	0	1			
		30001-40000	0	0	1			
		40001-50000	0	1	0			
		50001 and above	0	0	1			
8	**Your day-to-day expenses are met by**	Self	1	2	1	6	6.667	0.353
		Sibling	1	0	1			
		A son	0	0	3			
		A daughter	0	0	1			
9	**Suffering from disease**	Yes	1	2	4	2	1.270	0.530
		No	1	0	2			
10	**Since how many months have you been in an old age home**	< 1 year	1	0	1	6	5.333	0.502
		1-2 year	1	0	1			
		2-3 year	0	0	1			
		>3 year	0	2	3			

*** Significant at p≤ 0.05 level**

Chi-square analysis showed no significant associations between sleep quality and demographic variables such as age, gender, and marital status, except for sex in the control group ($\chi^2 = 6.032$, $p = 0.049$).

Discussion

The findings underscore the efficacy of hot water footbath therapy as a non-pharmacological intervention for improving sleep quality among the elderly. By promoting relaxation and alleviating physical discomfort, the therapy addresses key contributors to sleep disturbances. The significant improvement in the experimental group highlights the potential for incorporating this simple, cost-effective method into geriatric care routines.

Limitations

The study includes small sample size and the short duration of follow-up. Future research with larger samples and long-term assessments is recommended to validate and expand upon these findings.

Conclusion

Hot water footbath therapy is an effective, non-invasive method for enhancing sleep quality among elderly individuals. Its simplicity and accessibility make it a valuable addition to elderly care practices, particularly in residential settings. Further exploration of its applications across diverse populations and settings is warranted.

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