

A Study to Assess the Effectiveness of Hot Water Application on Restless Leg Syndrome and Its Relationship with the Quality of Sleep Among Adults, Thirubhuvanai at Puducherry

M. YAMUNAMBIGAI¹, DR. G. MUTHAMILSELVI², D. MARY SNEGA³, S. MEENATCHI⁴, F. MOHAMED IRFAAN⁵

¹Assistant Professor in Department of Community Health Nursing, SMVNC, Puducherry.

²Principal, Dept of Obstetrics and Gynecological Nursing, SMVNC Puducherry,

^{3,4,5} B.Sc., Nursing-IV Year, Sri Manakula Vinayagar Nursing College, Puducherry. India.

Abstract—Introduction: Restless Leg Syndrome (RLS) is a neurological sensorimotor disorder that significantly disrupts sleep quality and overall well-being. Non-pharmacological interventions such as hot water application have emerged as simple and cost-effective therapeutic approaches. **Objective:** To assess the effectiveness of hot water application on Restless Leg Syndrome and its relationship with the quality of sleep among adults. **Methodology:** A quantitative pre-experimental one-group pre-test and post-test design was adopted among 50 adults in Thirubhuvanai, Puducherry using purposive sampling. The intervention consisted of hot water application for 20 minutes daily for 7 consecutive days. Data were collected using the RLS Severity Scale and Pittsburgh Sleep Quality Index. Statistical analysis included descriptive statistics, paired comparison, correlation (r), and Chi-square test. **Results:** The mean pain score reduced from 4.2 ± 0.45 to 3.2 ± 0.45 , indicating significant improvement. Sleep quality improved remarkably, with 36% achieving good sleep post-intervention compared to 0% in pre-test. A moderate positive correlation ($r = 0.54$) was observed between RLS severity and sleep quality. Significant associations were found with selected demographic variables. **Conclusion:** Hot water application proved to be an effective, safe, and economical intervention in reducing RLS symptoms and enhancing sleep quality.

Index Terms—Restless Leg Syndrome, Hot Water Application, Sleep Quality

I. INTRODUCTION

Restless Leg Syndrome is a chronic neurological condition characterized by an irresistible urge to move the legs, often accompanied by unpleasant sensations. These symptoms intensify during rest and night time, leading to profound sleep disturbances (disturbed sleep patterns affecting daily life).

In community settings, especially semi-urban areas, access to advanced treatments is limited. Therefore, simple interventions like hot water application, which promote vasodilation (increase in blood flow) and muscle relaxation, are of paramount importance.

II. STATEMENT OF THE PROBLEM

“A STUDY TO ASSESS THE EFFECTIVENESS OF HOT WATER APPLICATION ON RESTLESS LEG SYNDROME AND ITS RELATIONSHIP WITH THE QUALITY OF SLEEP AMONG ADULTS, THIRUBHUVANAI AT PUDUCHERRY.”

III. OBJECTIVES OF THE STUDY

1. To assess the level of restless leg syndrome and its relationship with the quality of sleep among adults.
2. To evaluate the effectiveness of hot water application on Restless leg syndrome and its relationship with the quality of sleep among adults.

3. To correlate the relationship between restless leg syndrome and quality of sleep after hot application among adults.
4. To associate the hot water application on restless leg syndrome and quality of sleep among adults with their selected demographic variables

IV. METHODOLOGY

The present study was conducted to assess the effectiveness of hot water application on Restless Leg Syndrome (RLS) and its relationship with sleep quality among adults in Thirubhuvanai, Puducherry. A quantitative approach with a pre-experimental one-group pre-test and post-test design was adopted. A total of 50 participants with RLS symptoms were selected using a convenience sampling technique.

Data were collected using a structured questionnaire, a pain rating scale, and a sleep quality assessment tool. The study was carried out in two phases: pre-test and post-test. During the pre-test, baseline data on pain and sleep were assessed. The intervention consisted of hot water application (40–45°C) for 20 minutes once daily at night for seven consecutive days. Post-test assessment was conducted using the same tools to evaluate the effectiveness.

Data were analyzed using descriptive statistics (frequency, percentage, mean, standard deviation) and inferential statistics (correlation and Chi-square test) to determine relationships and associations.

Inclusion criteria:

- Community people belongs to 20–80 years.
- Individuals experiencing restless leg syndrome and disturbed sleep pattern symptoms at least twice a week.
- Individuals who are willing to participate in the study.
- Both female and male.

Exclusion criteria:

- Adults with neurological disorders other than RLS (e.g., Parkinson's disease, epilepsy).
- Adults with skin lesions or contraindications for hot water application

DESCRIPTION OF THE TOOL

SECTION A:

Demographic variables include age, gender, education, residence, religion, family monthly income, occupation of father, occupation of mother, socio economic status, family history of psychiatric illness, type of family, number of siblings, marital status and sleep habits etc.

SECTION B:

Restless leg syndrome severity scale standardized RLS scale was used to assess the severity. Pittsburgh sleep quality index standardized tool to assess the quality of sleep before and after intervention.

SCORING INTERPRETATIONSLEEP QUALITY

SCORES	QUALITY OF SLEEP	PATTERN OF SLEEP
0	Good sleeping quality	normal sleep pattern
(1-4)	poor sleep quality	mild sleep disturbance
(5-9)	very poor sleep quality	severe sleep disturbance
(>=10)	worst sleep quality	very severe sleep disturbance

RLS RATING

total score	severity of RLS	Interpretation
0	none	no RLS symptoms present
(1-10)	mild	mild RLS symptoms, minimal impact of daily life
(11-20)	moderate	moderate RLS symptoms, some impact on daily life and sleep
(21-30)	severe	severe RLS symptoms , significant impact on daily life and sleep
(31-40)	very severe	very severe RLS symptoms, major impact on daily life, sleep and mood

V. DATA ANALYSIS AND INTERPRETATION

Section A: Description of demographic variables of adults.

Section B: Assessment of the level of Restless Leg Syndrome and its relationship with the quality of sleep among adults.

Section C: Evaluation of the effectiveness of hot water application on Restless Leg Syndrome and its relationship with the quality of sleep among adults.

Section D: Correlation between Restless Leg Syndrome and quality of sleep after hot water application among adults.

Section E: Association of the effects of hot water application on Restless Leg Syndrome and quality of sleep with selected demographic variables among adults.

Table 1.1: Frequency and percentage wise distribution of demographic variables (age, gender, marital status, educational qualification, occupation) of adults. N=50

S.NO	DEMOGRAPHIC VARIABLES	FREQUENCY	PERCENTAGE
1.	Age (in years):		
	18–30	0	0
	31–45	16	32
	46–60	24	48
	61 & above	10	20
2.	Gender:		
	Male	8	16
	Female	42	84
	Others	0	0
3.	Marital Status:		
	Single	0	0
	Married	47	94
	Widowed	3	6
	Divorced	0	0
4.	Educational Qualification:		
	Illiterate	0	0
	Primary School	47	94
	Secondary School	3	6
	Higher Secondary	0	0
	Graduate & above	0	0
5.	Occupation:		
	Unemployed	8	16
	Housewife	14	28
	Daily Wage Worker	21	42
	Private Employee	7	14
	Government Employee	0	0
	Retired	0	0

Table 1.1 highlights the demographic characteristics of the participants show that the majority were in the age

group of 46–60 years (48%), followed by 31–45 years (32%), while 20% were aged 61 years and above. None

of the participants belonged to the 18–30 years category. Most participants were female (84%), whereas only 16% were male. Regarding marital status, the majority were married (94%), and a small proportion (6%) were widowed. In terms of educational qualification, 94% had completed primary school education and 6% had completed secondary

school, with none being illiterate or having higher education. Considering occupation, 42% were daily wage workers, 28% were housewives, 16% were unemployed, and 14% were private employees, indicating that most participants belonged to lower-income occupational groups.

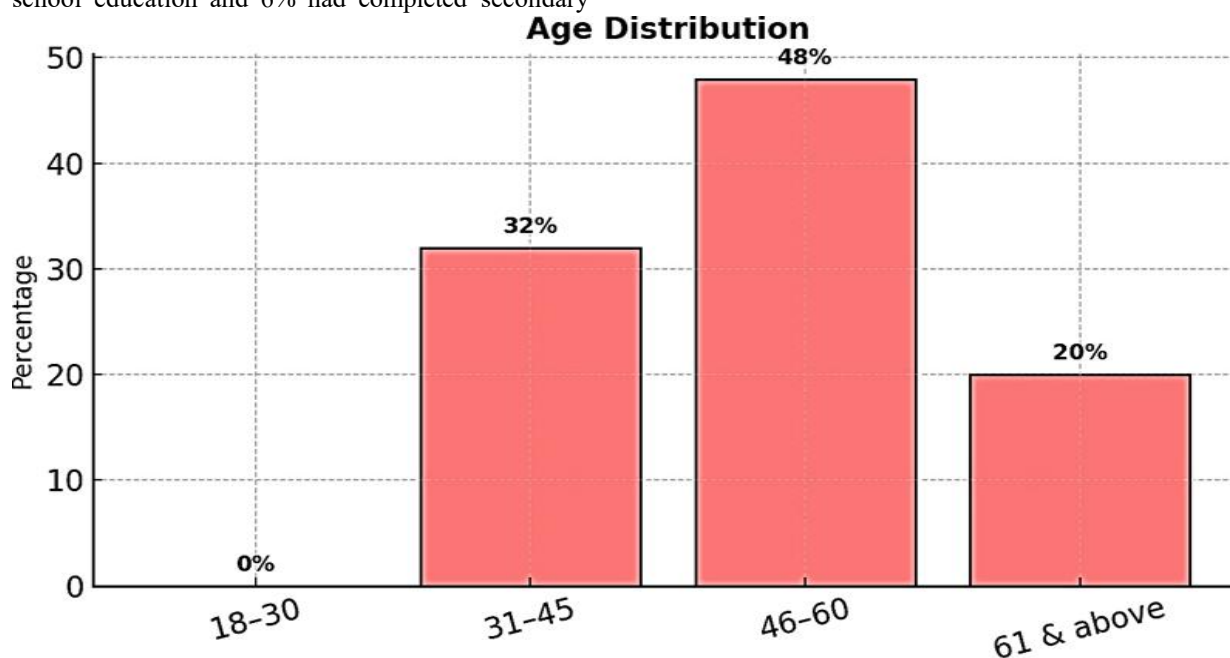


Figure 1.1 : Bar diagram represents the percentage wise distribution of age in years.

Most of the participants belonged to the middle and older age groups. Nearly half of the respondents were in the age group of 46–60 years (24; 48%), about one-third were between 31–45 years (16; 32%), and one-fifth were 61 years and above (10; 20%). There were no participants in the 18–30 year age group.

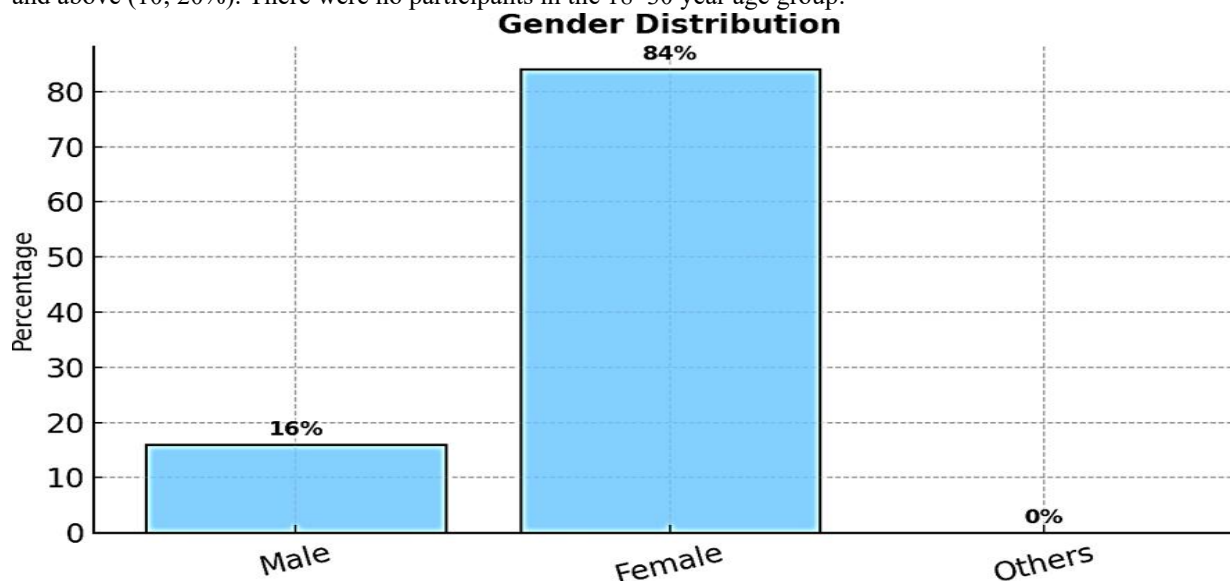


Figure 1.2: Bar diagram represents the percentage wise distribution of gender

With respect to gender, the majority of the study participants were females. Forty-two participants (84%) were female and only eight (16%) were male, and no participants identified as others.

Table1.2: Frequency and percentage wise distribution of demographic variables (discomfort, duration, treatment of RLS , average sleeping duration) of adults.

N=50

1	Do you currently experience leg discomfort during rest or sleep?		
	Yes	49	98
	No	1	2
2	Duration of Restless Leg Symptoms (if present):		
	< 6 months	18	36
	6–12 months	18	36
	>1 year	14	28
	Not Applicable	0	0
3	Are you taking any treatment for leg discomfort?		
	Yes → Specify:	6	12
	No	44	88
4	Average Sleep Duration per Night:		
	< 4 hours	6	12
	4–6 hours	41	82
	6–8 hours	3	6
	More than 8 hours	0	0

Table 1. overwhelming majority (98%) experienced leg discomfort during rest or sleep, while only 2% did not. Equal proportions (36%) had symptoms lasting less than six months or between 6–12 months, and 28% had experienced symptoms for more than one year. Only 12% of participants were taking treatment for

their leg discomfort, while 88% were not receiving any therapy. In terms of sleep duration, most participants (82%) reported sleeping 4–6 hours per night, 12% slept less than 4 hours, and only 6% slept 6–8 hours, indicating that sleep deprivation was common among the study population.

Table 2: Assess frequency and percentage wise distribution on level of pain on both pre test and post test.

Level of pain	Pre test		Post test	
	Frequency	Percentage	Frequency	Percentage
None	0	0	0	0
Mild	0	0	0	0
Moderate	0	0	48	96
Severe	48	96	2	4
Very severe	2	4	0	0

Table 3: Assess frequency and percentage wise distribution on quality of sleep on both pre test and post test.

Quality of sleep	Pre test		Post test	
	Frequency	Percentage	Frequency	Percentage
Good sleeping quality	0	0	18	36
poor sleep quality	0	0	7	14
very poor sleep quality	0	0	25	50
worst sleep quality	50	100	0	0

Table 4: Mean and Standard deviation of effectiveness of hot water application on Restless leg syndrome and its relationship with the quality of sleep among individuals.

Effectiveness	Mean	Standard Deviation
Level of Pain (Pre-test)	4.2	0.45
Level of Pain (Post-test)	3.2	0.45
Quality of Sleep (Pre-test)	4	0
Quality of Sleep (Post-test)	2	1

The mean and standard deviation values were calculated to assess the changes in the level of pain and quality of sleep before and after the intervention. The mean score for pain in the pre-test was 4.2 ± 0.45 , indicating that the majority of participants experienced severe pain before the intervention. In the post-test, the mean pain score decreased to 3.2 ± 0.45 , reflecting a

marked improvement in pain reduction. Similarly, the mean quality of sleep score in the pre-test was 4.0 ± 0.00 , showing that all participants had the worst sleep quality prior to the intervention. In contrast, the post-test mean score for sleep quality decreased to 2.0 ± 1.00 , suggesting a shift toward better sleep quality after the intervention.

Table 5: correlation and p value of the relationship between restless leg syndrome and quality of sleep after hot application among adults.

Statistic	Value
Correlation coefficient (r)	0.54
p-value	0.05

The $r = 0.54$ indicates a moderate positive correlation, meaning that as pain increases, sleep quality worsens. However, the $p\text{-value} \leq 0.05$, so this correlation is not statistically significant — likely due to the small sample size.

TABLE 6.1: Association between the level of pain on restless leg syndrome adults with their selected demographic variables (age, gender, marital status, educational qualification, occupation).

S.NO	DEMOGRAPHIC VARIABLES	Pre test				Post test				X ² DF PA VALUE
		SEVERE		VERY SEVERE		MODERATE		SEVERE		
		N	%	N	%	N	%	N	%	
1	Age (in years):									
	18–30	0	0	0	0	0	0	0	0	1.606

	31–45	16	32	0	0	16	32	0	0	2
	46–60	23	46	1	2	23	46	1	2	0.448
	61 & above	9	18	1	2	9	18	1	2	NS
2	Gender:									
	Male	8	16	0	0	8	16	0	0	0.397
	Female	40	80	2	4	40	80	2	4	1
	Others	0	0	0	0	0	0	0	0	0.529
										NS
3	Marital Status:									
	Single	0	0	0	0	0	0	0	0	7.151*
	Married	46	92	1	2	46	92	1	2	1
	Widowed	2	4	1	2	2	4	1	2	0.007
	Divorced	0	0	0	0	0	0	0	0	S
4	Educational Qualification:									
	Illiterate	8	16	0	0	8	16	0	0	5.357
	Primary School	12	24	2	4	12	24	2	4	3
	Secondary School	21	42	0	0	21	42	0	0	0.147
	Higher Secondary	7	14	0	0	7	14	0	0	NS
	Graduate & above	0	0	0	0	0	0	0	0	
5	Occupation:									
	Unemployed	0	0	0	0	0	0	0	0	0.397
	Housewife	40	80	2	4	40	80	2	4	1
	Daily Wage Worker	8	16	0	0	8	16	0	0	0.529
	Private Employee	0	0	0	0	0	0	0	0	NS
	Government Employee	0	0	0	0	0	0	0	0	
	Retired	0	0	0	0	0	0	0	0	

TABLE 6.1: The findings revealed that marital status showed a statistically significant association with level of pain ($\chi^2 = 7.151$, $p = 0.007$). All other variables such

as age, gender, educational qualification, and occupation did not show any significant association with level of pain ($p > 0.05$).

TABLE 6.2: Association between the level of pain on restless leg syndrome adults with their selected demographic variables (discomfort , duration, treatment of RLS , average sleeping duration).

1.	Do you currently experience leg discomfort during rest or sleep?									
	No	1	2	0	0	1	2	0	0	

2.	13. Are you taking any treatment for leg discomfort?									
	Yes → Specify:	6	12	0	0	6	12	0	0	0.284 1 0.594 NS
	No	42	84	2	4	42	84	2	4	
3.	Average Sleep Duration per Night:									
	< 4 hours	6	12	0	0	6	12	0	0	0.457 2 0.796 NS
	4–6 hours	39	78	2	4	39	78	2	4	
	6–8 hours	3	0	0	0	3	6	0	0	
	More than 8 hours	0	0	0	0	0	0	0	0	

TABLE 6.2: Highlights the association between current experience of leg discomfort, duration of restless leg symptoms, treatment taken for leg discomfort, and average sleep duration per night with level of pain was analyzed using the Chi-square test.

The findings revealed that none of these variables showed a statistically significant association with level of pain ($p > 0.05$). This indicates that symptom duration, treatment status, and sleep duration did not influence pain severity among the study participants.

TABLE 7.1: Association between the quality of sleep on restless leg syndrome adults with their selected demographic variables (age, gender, marital status, educational qualification, occupation).

	DEMOGRAPHIC VARIABLES	Pre test		Post test						X ² df PA VALUE
		Worst		Good		Poor		Very poor		
		N	%	N	%	N	%	N	%	
1.	Age (in years):									
	18–30	0	0	0	0	0	0	0	0	1.386
	31–45	16	32	5	10	3	6	8	16	4
	46–60	24	48	8	16	3	6	13	26	0.847
	61 & above	10	20	5	10	1	2	4	8	NS
2.	Gender:									
	Male	8	16	4	8	1	2	3	6	0.831
	Female	42	84	14	28	6	12	22	44	2
	Others	0	0	0	0	0	0	0	0	0.660
										NS
3.	Marital Status:									
	Single	0	0	0	0	0	0	0	0	1.458
	Married	47	94	16	32	7	14	24	48	2
	Widowed	3	6	2	4	0	0	1	2	0.482
	Divorced	0	0	0	0	0	0	0	0	NS
4.	Educational Qualification:									

	Illiterate	8	16	3	6	1	2	4	8	2.979 3 0.811 NS
	Primary School	14	28	7	14	2	4	5	10	
	Secondary School	21	42	7	14	3	6	11	22	
	Higher Secondary	7	14	1	2	1	2	5	10	
	Graduate & above	0	0	0	0	0	0	0	0	
5.	Occupation:									
	Unemployed	0	0	0	0	0	0	0	0	0.831 2 0.660 NS
	Housewife	42	84	14	28	6	12	22	44	
	Daily Wage Worker	8	16	4	8	1	2	3	6	
	Private Employee	0	0	0	0	0	0	0	0	
	Government Employee	0	0	0	0	0	0	0	0	
	Retired	0	0	0	0	0	0	0	0	

TABLE 7.1: The findings revealed that none of these variables showed a statistically significant association with quality of sleep ($p > 0.05$). This indicates that age, gender, marital status, educational status, and occupation did not influence the quality of sleep among individuals with Restless Leg Syndrome.

TABLE 7.2: Association between the quality of sleep on restless leg syndrome adults with their selected demographic variables (discomfort , duration, treatment of RLS , average sleeping duration).

1.	Do you currently experience leg discomfort during rest or sleep?									
	Yes	49	98	17	34	7	14	25	50	1.814 2 0.404 NS
	No									
		1	2	1	2	0	0	1	2	
2.	Duration of Restless Leg Symptoms (if present):									
	< 6 months	18	36	6	12	3	6	9	18	4.780 4 0.0311 S
	6–12 months	18	36	9	18	3	6	6	12	
	>1 year	14	28	3	6	1	2	10	20	
	Not Applicable	0	0	0	0	0	0	0	0	
3.	Are you taking any treatment for leg discomfort?									
	Yes → Specify:	6	12	1	2	1	2	4	8	
	No	44	88	17	34	6	12	21	42	
4.	Average Sleep Duration per Night:									
	< 4 hours	6	12	2	4	1	2	3	6	0.633

	4–6 hours	41	82	15	30	6	12	20	40	4
	6–8 hours	3	6	1	2	0	0	2	4	0.956
	More than 8 hours	0	0	0	0	0	0	0	0	NS

TABLE 7.2 : The findings showed that duration of restless leg symptoms had a statistically significant association with quality of sleep ($\chi^2 = 4.780$, $p = 0.0311$).

Other variables such as current leg discomfort, treatment for leg discomfort, and average sleep duration did not show any significant association with quality of sleep ($p > 0.05$)

VI. MAJOR FINDINGS

The study findings revealed that the majority of participants were aged 46–60 years, predominantly female, and married, with most belonging to a low-income group. A large proportion experienced leg discomfort during rest and had reduced sleep duration, indicating a significant impact of Restless Leg Syndrome on sleep. In the pre-test, most participants reported severe pain and the worst sleep quality. Following seven days of hot water application, a marked improvement was observed, with most participants shifting to moderate pain levels and noticeable improvement in sleep quality, with some achieving good sleep and none remaining in the worst category.

The effectiveness of the intervention was supported by a reduction in mean pain scores from 4.2 ± 0.45 to 3.2 ± 0.45 and improvement in sleep scores from 4.0 ± 0.00 to 2.0 ± 1.00 . A moderate positive correlation ($r = 0.54$) was observed between RLS severity and sleep quality, though not statistically significant. Significant associations were found between pain and factors such as marital status and family size, while sleep quality was associated with chronic illness and duration of symptoms. Overall, the study concludes that hot water application is an effective, simple, and cost-efficient intervention for reducing RLS symptoms and improving sleep quality.

VII. RESULTS AND DISCUSSION

This chapter discusses the findings of the study conducted to assess the effectiveness of hot water application on Restless Leg Syndrome (RLS) and its relationship with sleep quality among adults in Thirubhuvanai, Puducherry. The study included 50 participants selected through convenience sampling, and data were collected using structured tools. The pre-test findings revealed that most participants experienced severe RLS and poor sleep quality, indicating a strong negative impact of RLS on sleep. After seven days of hot water application, a significant reduction in pain and improvement in sleep quality were observed, with mean pain scores decreasing from 4.2 to 3.2 and sleep scores improving from 4.0 to 2.0. A moderate positive correlation ($r = 0.54$) was found between RLS severity and sleep quality, though not statistically significant. Significant associations were observed with selected demographic and health-related variables. Overall, the findings conclude that hot water application is a simple, safe, and cost-effective intervention for reducing RLS symptoms and improving sleep quality.

VIII. CONCLUSION

The study concludes that hot water application is a simple, safe, cost-effective, and clinically beneficial intervention for managing Restless Leg Syndrome and improving sleep quality among adults.

RECOMMENDATIONS

- Conduct educational programs on recognizing symptoms of RLS and adopting non-drug interventions.
- Promote hot water therapy as a safe, affordable home remedy in community health centers.
- Implement screening programs for sleep quality disturbances among adults and older individuals.

- Establish counseling services for individuals with chronic discomfort and sleep problems.
- Conduct future studies with control groups to compare the effectiveness of different therapeutic modalities.
- Encourage healthcare workers to integrate sleep hygiene education into routine community visits.
- Develop IEC materials on RLS, sleep hygiene, and simple home therapies.

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