International Journal of Health Sciences and Research
Vol.13; Issue: 9; September 2023
Website: www.ijhsr.org
Original Research Article *ISSN: 2249-9571*

A Comparative Study to Assess the Effectiveness of Epsom Salt with Hot Water Versus Plain Water on Pain and Functional Performance Among Arthritis Patients at Selected Hospital, Udaipur

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DOI: https://doi.org/10.52403/ijhsr.20230921

ABSTRACT

Introduction: Arthritis profoundly impacts an individual's daily life and overall well-being, with knee joint pain being a predominant reason for seeking treatment. One prevalent form of arthritis, osteoarthritis (OA), often stems from the aging process, particularly affecting the elderly population, detrimentally influencing health and quality of life. Joint pain and stiffness, intensifying with age, are primary arthritis symptoms. While no absolute cure exists for most arthritis types, personalized treatments can alleviate or even eliminate symptoms, enhancing functional capacity. Epsom salt, characterized by anti-inflammatory and analgesic properties, emerges as a side-effect-free pain relief option and complementary alternative medicine. It's easy availability and affordability further recommend it as a home remedy for arthritis patients.

Methodology: A study aimed to evaluate the efficacy of Epsom salt with hot water compared to plain water for pain reduction and functional enhancement in arthritis patients at a selected Udaipur hospital. Employing purposive sampling, 60 arthritis patients were divided into two groups: one treated with Epsom salt and hot water (30 participants) and the other with Epsom salt and plain water (30 participants). The interventions spanned 10 days, administered twice daily. Data collection encompassed socio-demographic and clinical variables, the Numerical Pain Rating Scale (NPRS), and a modified WOMAC index. Pre- and post-intervention data were gathered via interviews and analyzed descriptively and inferentially.

Results: revealed Epsom salt with hot water effectively reduced pain and improved function. Post-test scores showed mean pain values of 5.35 (SD 1.729) for Epsom salt with hot water and 6.47 (SD 1.756) for plain water. Unpaired t-test (t=2.519, p=.015*) favored Epsom salt for pain reduction. In functional performance, hot water group mean was 31.90±11.874; plain water was 41.03±9.654. The unpaired t-test (t=3.269, p=.002*) showed potential for functional enhancement. Gender and family osteoarthritis history linked to Epsom salt group's post-test pain; plain water had no links. Pain-function correlation significantly associated in both groups.

Conclusion: arthritis reduces quality of life and function, driving diverse strategies for pain relief and functionality. The study confirms Epsom salt with hot water effectively reduces pain and may enhance function in arthritis patients. This highlights its worth as a non-pharmacological method for nurses and health workers to ease arthritis-related discomfort.

Keywords: Pain, Functional Performance, Osteoarthritis, Epsom salt, Elderly.

INTRODUCTION

Arthritis, characterized by joint inflammation, leads to pain and swelling in joints like knees and hips. Joints, where bones meet, allow movement. Joint pain, aches, and soreness impact daily activities, often associated with rheumatic and musculoskeletal issues. Joint pain, stemming from illness or injury, impairs functional performance and is a crucial public health concern.[1]The most common types of arthritis are osteoarthritis and rheumatoid arthritis.[2] Aging is natural and prevalent among living organisms. The main symptoms of arthritis are joint pain and stiffness, which typically worsen with age. Elderly people often suffer from musculoskeletal pain, especially knee and low back pain, due to conditions like osteoarthritis (OA). OA, a cartilage disorder, causes joint degradation and inflammation. Knee joint pain is more common than back pain among the elderly, predominantly affecting females. OA's prevalence rises with age, significantly impacting health and quality of life. It leads to stiffness, swelling, tenderness, and mobility issues, affecting daily activities. OA, a common rheumatologic issue, hinders mobility in females, making it a significant health concern.[3]

Rheumatoid arthritis (RA) is an inflammatory condition impacting about 1% of adults globally. It involves symmetrical polyarticular synovial inflammation, commonly in small hand joints, wrists, and feet. This leads to pain, stiffness, joint damage, deformities, and functional loss. Organ damage worsens disability, while chronic inflammation from RA heightens cardiovascular risk and affects bone metabolism.[4] Globally, RA has an annual incidence of about 3 cases per 10,000 people, with a prevalence of approximately 1%, peaking between ages 35 and 50.[5] RA is believed to impact 0.24% to 1% of the population, with women twice as affected as men. In China and India, married men had the highest prevalence (11.9% and 8.8%, respectively). In other countries, separated, divorced, or widowed men had the highest prevalence.[6]

Epsom salt is a pure, time-tested mineral compound with many uses ranging from creating at-home spas to soothing achy muscles and reduces pain.[7]Epsom salt, a mineral of magnesium sulfate, relieves pain. Soaking and using it as a compress draws out toxins, aiding healing. Elderly with knee pain can benefit due to its high sulfate and magnesium content, low cost, availability, and health advantages.[8]

Heat application, whether general or local, triggers physiological changes like vasodilation and muscle relaxation, providing therapeutic pain relief. Epsom salt hot water baths are notably effective for joint pain treatment. Epsom salt, when mixed (200 mg) in hot water and applied topically, swiftly alleviates joint pain. Soaking painful joints for 20 minutes, three times weekly, notably reduces pain and morning stiffness.[9] Epsom salt's anti-inflammatory and analgesic properties make it an effective pain reliever without significant side effects. It serves as complementary alternative medicine, surpassing hormonal and steroidal therapies. Inexpensive and readily accessible, it's a viable home remedy for arthritis patients.[10]

Nutritional therapist Adam Ramsay (2014) recommends Epsom salt compresses for arthritis. Epsom salts, rich in magnesium, alleviate joint pain. To apply, dissolve three teacups of Epsom salts in hot water, soak a cloth, and compress the affected knee area for 10–15 minutes. This method, combined with gentle joint exercises, provides relief. In India, around 80% of OA patients experience knee joint pain, with 20% facing activity limitations and 11% requiring special care. In the age group above 70, 40% have OA, with 2% suffering severe knee pain and disability.[3]

According to the WHO, globally, 18.0% of women and 9.6% of men aged 60 or above have symptomatic OA. Around 80% of those with OA face movement limitations, and 25% struggle with major daily activities. In India, around 80% of OA

patients experience knee joint pain, with 20% having difficulties in daily activities and 11% requiring specialized care. Among those over 70 years old, 40% have OA, with 2% having severe knee pain and disability.[3]Joint diseases impact many worldwide, causing pain and disability. Osteoarthritis will soon be a leading cause of disability globally. Men are more vulnerable before 50, while women are more affected after 50. Applying heat, generally or locally, brings physiological changes like vasodilation and muscle relaxation, aiding pain relief. In clinical observation, elderly commonly use remedies like hot water bags, massages, and wet cloth with Epsom salt for knee pain. The study aims to compare Epsom salt, hot water, or both for knee joint pain relief, based on prior research.[11]

Sankar L (2019) studied Epsom Salt's effect on knee pain in elderly. 29 participants over 60 from T.N. Palayam were selected purposively. Pretest pain mean: 2.93 (SD: 0.593). After Epsom salt-hot water use, posttest pain means: 2.17 (SD: 0.384). Paired t-test showed high significance ($p < 0.001$). Conclusion: Epsom salt-hot water reduces elderly knee pain effectively.[3]

PROBLEM STATEMENT

A comparative study to assess the effectiveness of Epsom salt with hot water versus plain water on pain and functional performance among arthritis patients at selected hospital, Udaipur.

OBJECTIVES OF STUDY

1. To assess pre-test and post-test level of pain and functional performance among arthritis patient.
2. To assess the effectiveness of Epsom salt with hot water and Epsom salt with plain water on pain and functional performance among arthritis patient.
3. To find out the association between pre-test level of pain and functional performance after application of Epsom salt with hot water among arthritis patient with their selected socio-demographic variables.

HYPOTHESIS

H_0: There will be no effect of Epsom salt with hot water versus plain water on level of pain and functional performance among arthritis patients.

H_1: There will be significant effect of Epsom salt with hot water versus plain water on level of pain and functional performance among arthritis patients.

MATERIAL AND METHODS

Research approach and design

Quantitative approach with Comparative true experimental (two group pre-test post-test design) was utilized to achieve the objectives of the study.

Variables under study

- Independent variables: Epsom salt with hot water versus plain water
- Dependent variables: Pain and functional performance of arthritis patients

Socio demographic data and clinical variables

- Socio demographic data includes age, gender, marital status, educational status and dietary habits of residents of old age homes.
- Clinical variables include co-morbidities, duration of illness, duration of treatment, type of previous treatment and BMI of residents of old age homes.

Research setting

The present study was conducted at selected hospital, Udaipur.

Target population

For the present study, population was Arthritis patients at selected hospital, Udaipur.

Sampling technique

Non-probability purposive sampling technique was used to select the samples.

Sample and sample size

This study was conducted on 60 elderly arthritis patients (30 in Epsom salt with hot water and 30 in Epsom salt with plain water).

Sampling criteria:

Inclusion criteria:

a) The age group of 60 years and above.
b) Who able to understand Hindi or English
c) Who willing to give consent.
d) Who available at the time of data collection.
e) Who have joint pain.

Exclusion criteria:

a) Who had severe neuropathies, burns, skin lesion on the joints.
b) Who were ill during time of data collection.
c) Mentally disturb or have any neurological disorders.

Description of tool

The tool consists of 3 sections: -

SECTION A: Socio demographic data and clinical variables

Socio demographic data includes age, gender, marital status, educational status and dietary habits of residents of old age homes.

Clinical variables include co-morbidities, duration of illness, duration of treatment, type of previous treatment and BMI of residents of old age homes.

SECTION B: Numerical Pain Rating Scale

The numerical pain rating scale is an eleven-point rating scale for self-reporting of pain, residents of old age homes were asked to indicate the numeric value on the segmented scale that best describes the pain intensity.

Level of pain	Score
No pain	0
Mild pain	1-3
Moderate pain	4-6
Severe pain	7-10

SECTION C: Modified WOMAC (Western Ontario and McMaster Arthritis Index) scale

WOMAC index was developed in year 1982, to assess and quantify pain and disability related to knee and hip arthritis. It can be used to monitor the course of the disease or to determine the effectiveness of intervention i.e., isometric exercises. This modified WOMAC index contains 22 questions, 5 related to pain and 17 related to physical function.

- **Pain (5 items):** during walking, using stairs, in bed, sitting or lying, and standing upright
- **Physical Function (17 items):** using stairs, rising from sitting, standing, bending, walking, getting in / out of a car, shopping, putting on / taking off socks, rising from bed, lying in bed, getting in / out of bath, sitting, getting on / off toilet, heavy domestic duties, light domestic duties.

It is available in form of 5 - point Likert scale and questions are scored on a scale from 0-4, which correspond to: None (0), Mild (1), Moderate (2), Severe (3), and Extreme (4). Higher scores on the WOMAC index indicate worse pain and functional limitations.

Pain	Score
None	0
Mild pain	1-5
Moderate pain	6-10
Severe pain	11-15
Worst pain	16-20
Functional Difficulty	Score
Normal functional performance	0
Mild limitation in functional performance	1-17
Moderate limitation in functional performance	18-34
Severe limitation in functional performance	35-51
Extreme limitation in functional performance	52-68

Description of intervention

For the hot water compress, 30 grams of Epsom salts (1/4 cup) were dissolved in client-tolerated hot water. A clean washcloth was soaked in the solution and applied as a hot compress over the joint for 20 minutes, twice a day, for 10 days. Similar to the Epsom salt compress, the plain water compress was applied over the

joint for the same length of time and frequency using 30 grams of Epsom salts diluted in plain water.

Method of data collection

The study was conducted at a selected hospital in Udaipur. Formal permission was obtained from the ethical committee as well the hospital's management authority. Subjects were informed about the study's purpose, and informed consent was acquired, indicating their voluntary participation and right to withdraw. Pre-intervention assessment encompassed socio-demographic and clinical data, pain evaluation, and functional performance using the Numerical Pain Rating Scale and modified WOMAC index. Epsom salt, a water-soluble magnesium sulfate with medicinal use, was administered with hot water and plain water for 20 minutes twice a day over 10 days. Post-intervention assessment of pain and functional performance was conducted after 10 days in both Epsom salt with hot water and plain water conditions.

RESULTS AND DISCUSSION

Table 1: Frequency and percentage distribution of socio- demographic variables in Epsom salt with hot water versus plain water N=60

S. No	Socio-Demographic variables	Epsom salt with Hot water (n = 30)		Epsom salt with Plain water (n = 30)		Chi-square df p value
		f	%	f	%	
1	Age in years					
	60-69	9	30.0	7	23.3	0.417
	70-79	11	36.7	13	43.3	2
	80 and above	10	33.3	10	33.3	0.811^{NS}
2	Gender					
	Male	11	36.7	11	36.7	NA
	Female	19	63.3	19	63.3	
3	Marital status					
	Married	1	3.3	0	0	3.754
	Unmarried	6	20.0	12	40.0	3
	Widow	21	70.0	17	56.7	0.289^{NS}
	Divorced	2	6.7	1	3.3	
4	Educational status					
	Non-formal	12	40.0	5	16.7	7.082
	Primary education	11	36.7	11	36.7	3
	Secondary education	6	20.0	14	46.7	0.069^{NS}
	Graduate and above	1	3.3	0	0	
5	Dietary habits					
	Vegetarian	15	50.0	10	33.3	2.471
	Non-vegetarian	15	50.0	19	63.3	2
	Eggetarian	0	0	1	3.3	0.290^{NS}

Table 1 displays socio-demographic distribution of elderly home residents by age, gender, marital status, education, and dietary habits. In Epsom salt with hot water, 70-79 age groups constituted 36.7%, 80+ age group 33.3%, 60-69 age group 30%. Females were 63.3%, males 36.7%. Widows accounted for 70%, unmarried 20%, divorced 7%, married 3.3%. Education-wise, non-formal education was 40%, primary 36.7%, secondary 20%, graduate and above 3.3%. Vegetarians and non-vegetarians each comprised 50%. In Epsom salt with plain water, 70-79 age group was 43.3%, 80+ age group 33.3%, 60-69 age group 23.3%. Females were 63.3%, males 36.7%. Widows were 56.7%, unmarried 40%, divorced 3.3%. Education-wise, secondary education was 46.7%, primary education 36.7%, non-formal education 16.7%. Non-vegetarians were 63.3%, vegetarians 33.3%, eggetarians 3.3%.

Table 2: Frequency and percentage distribution of clinical variables in Epsom salt with hot water versus plain water N=60

S. No	Clinical variables	Epsom salt with Hot water (n = 30)		Epsom salt with Plain water (n = 30)		Chi-square df p value
		f	%	f	%	
1	Comorbidities					

	Hypertension Diabetes mellitus Both a and b Others	11 5 8 6	36.7 16.7 26.7 20.0	11 4 11 4	36.7 13.3 36.7 13.3	0.985 3 0.804^{NS}
2	Duration of illness 0-2 years 2-4years 4-6 years More than 6 years	 2 16 10 2	 6.7 53.3 33.3 6.7	 3 12 11 4	 10.0 40.0 36.7 13.3	 1.486 3 0.685^{NS}
3	Type of previous treatment Ayurveda Allopathy Homeopathy Others	 0 30 0 0	 0 100.0 0 0	 0 30 0 0	 0 100.0 0 0	 NA
4	BMI(body mass index) Underweight Normal Overweight	 4 9 17	 13.3 30.0 56.7	 1 11 18	 3.3 36.3 60.0	 2.029 2 0.362^{NS}
5	Family history of osteoarthritis Yes No	 14 16	 46.7 53.3	 15 15	 50.0 50.0	 0.067 1 0.795^{NS}
6	Use of alternative therapy Yes No	 0 30	 0 100.0	 0 30	 0 100.0	 NA
7	Use of hot application Yes No	 0 30	 0 100.0	 0 30	 0 100.0	 NA
8	Use of cold application Yes No	 0 30	 0 100.0	 0 30	 0 100.0	 NA
9	Use of analgesics for pain Yes No	 30 0	 100.0 0	 29 1	 96.7 3.3	1.107 1 0.313^{NS}
10	Use of joint braces while walking Yes No	 7 23	 23.3 76.7	 26 4	 86.7 13.3	24.31 1 0.001*

Table 2 outlines clinical characteristics of elderly home residents. In Epsom salt with hot water, hypertension was 36.7%, a and b conditions 26.7%, other diseases 20%, diabetes mellitus 16.7%. Duration: 53.3% had illness for 2-4 years, 33.3% for 4-6 years, 6.7% under 2 years, and 6.7% over 6 years. All used allopathy treatment. BMI: 56.7% were overweight, 30% normal, 13.3% underweight. Family history: 53.3% no history, 46.7% with history. No use of alternative therapy or hot application. Cold application: none. Analgesics used by 100%, or 96.7% in plain water, 3.3% didn't. Braces usage varied: 23.3% with, 86.7% without in plain water.

Table 3: Level of pain among arthritis patients in Epsom salt with hot water versus plain water N=60

Level of pain	**Epsom salt with Hot water (n=30)**				**Epsom salt with Plain water (n=30)**			
	Pre-test		**Post-test**		**Pre-test**		**Post-test**	
	f	**%**		**%**	**f**	**%**	**f**	**%**
No pain	0	0	0	0	0	0	0	0
Mild	0	0	9	30.0	0	0	0	0
Moderate	8	26.7	12	40.0	15	50.0	16	53.3
Severe	22	73.3	9	30.0	15	50.0	14	46.7
Mean SD	7.53 1.525		5.33 1.729		6.80 1.606		6.47 1.756	
t value df p value	13.030 29 .000*				3.808 29 .001*			

***p<0.05 level of significance NS-Non significance**

Table 3, Figure 1 & 2 detail pain levels of elderly home residents in Epsom salt with hot water vs. plain water. Hot water pre-test: 73.3% severe pain, 26.7% moderate, mean 7.53±1.525. Post-test: 40% moderate pain, 30% mild, severe each, mean 5.33±1.729. Paired t test (t=13.030, p<0.000) indicated significant pain reduction with hot water for

arthritis. Plain water pre-test: 50% moderate pain, 50% severe, mean 6.80±1.606. Post-test: 53.3% moderate, 46.7% severe, mean 6.47±1.756. Paired t test (t=3.808, p=0.001) showed significant reduction in plain water's pain level.

Study findings was supported by Sankar L (2019) conducted a study to assess the effectiveness of epsom salt with hot water application on knee joint pain among elderly revealed that pretest mean pain score was 2.93±0.593, whereas after implementation of Epsom salt with hot water application, the post-test mean pain score was 2.17±0.384. The effectiveness was statistically highly significant at p<0.001. Concluded that was hot water application with Epsom salt was effective in reducing knee joint pain among elderly.[3]

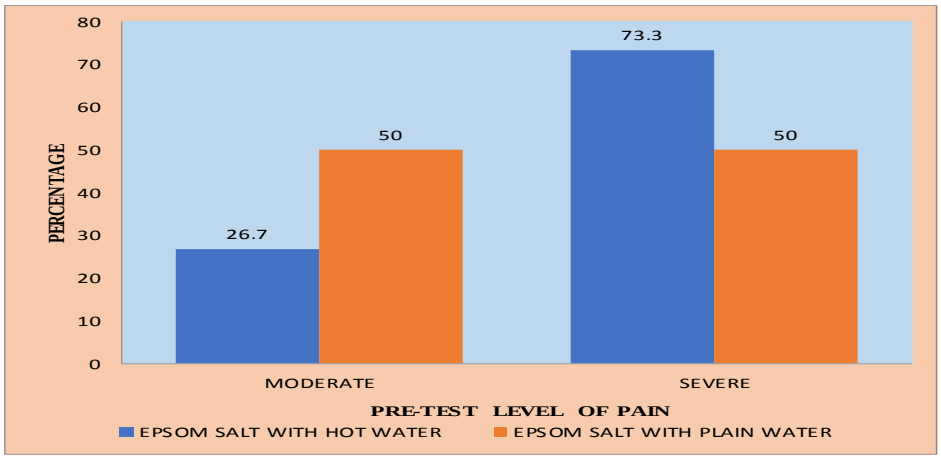

Figure 1: Pre-level of pain among arthritis patientsin Epsom salt with hot water and Epsom salt with plain water

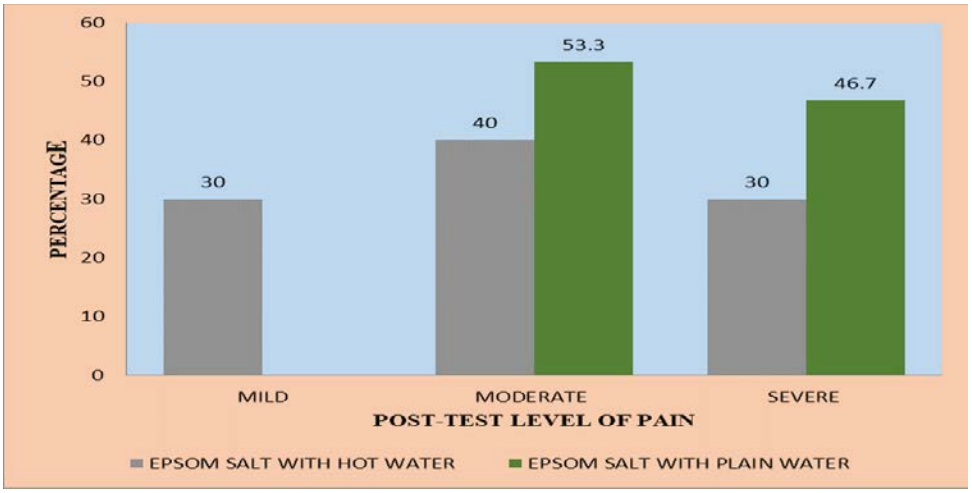

Figure 2: Post-test level of pain among arthritis patientsin Epsom salt with hot water and Epsom salt with plain water

Table 4: Level of functional performance according to modified WOMAC SCALE among residents of old age home in Epsom salt with hot water versus plain water N=60

Level of functional performance	Epsom salt with Hot water (n=30)				Epsom salt with Plain water (n=30)			
	Pre-test		Post-test		Pre-test		Post-test	
	f	%	f	%	f	%	f	%
Mild	0	0	7	23.3	0	0	0	0
Moderate	6	20.0	12	40.0	13	43.3	16	53.3
Severe	16	53.3	11	36.7	17	56.7	14	46.7
Extreme	8	26.7	0	0	0	0	0	0
Mean SD	47.47 11.178		31.90 11.874		42.17 9.990		41.03 9.654	
t value df p value	10.794 29 .000*				1.530 29 .137^{NS}			

***p<0.05 level of significance** **NS- Non significance**

Table 4, Figure 3 & 4 depict functional performance levels of elderly home residents in Epsom salt with hot water vs. plain water. Pre-test in hot water: 53.3% severe limitation, 26.7% extreme, 20% moderate, mean 47.47±11.178. Post-test: 40% moderate, 36.7% severe, 23.3% mild, mean 31.90±11.874. Paired t test (t=10.794, P<0.05) signified significant improvement. Plain water pre-test: 56.7% severe, 43.3% moderate, mean 42.17±9.990. Post-test: 53.3% moderate, 46.7% severe, mean 41.03±9.654. Paired t test (t=1.530, p>0.05) indicated plain water's lack of efficacy in enhancing functional performance among residents.

Study findings was supported by Shilpa Parag satralkar and Basvant Dhudun (2018) conducted a study to assess the effectiveness of application of warm compress with epsom salt to reduce knee joint pain among women revealed that post-test pain score in experimental group was (1.03) lower than per test (8.22) indicates warm epsom salt application is highly effective in reduction of knee joint pain in arthritis patient.[10]

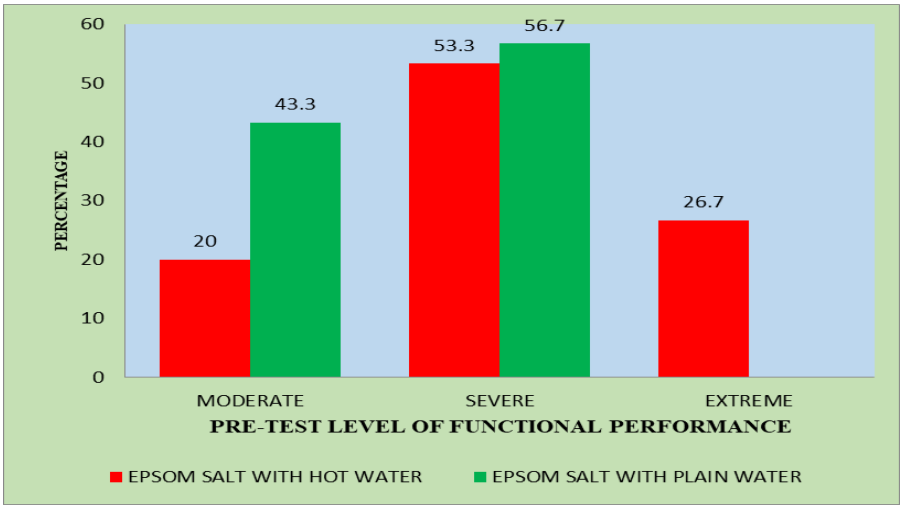

Figure 3: Pre-test of functional performance among arthritis patientsin Epsom salt with hot water and Epsom salt with plain water

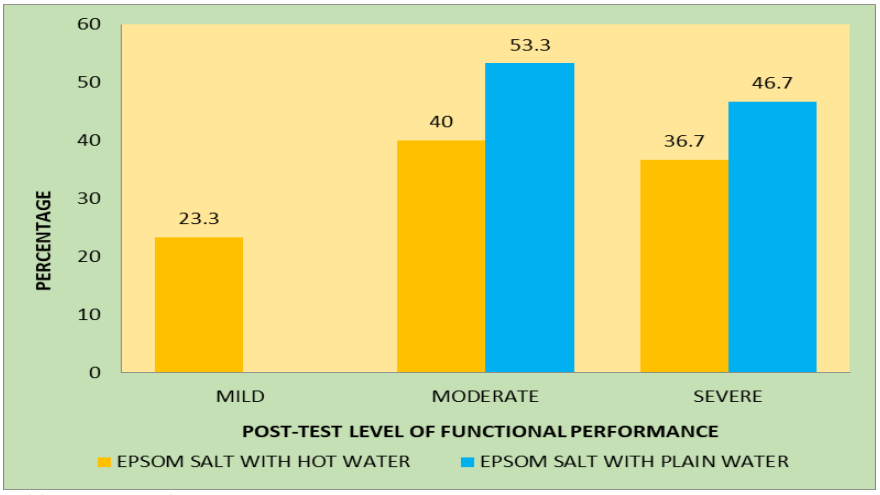

Figure 4: Post-test of functional performance among arthritis patientsin Epsom salt with hot water and Epsom salt with plain water

Table 5: Comparison of post-test level of pain and functional performance among arthritis patients in Epsom salt with hot water versus plain water N=60

Comparison	Epsom salt with Hot water Mean ± SD	Epsom salt with Plain water Mean ± SD	t value	df	p value
Level of pain	5.33±1.729	6.47±1.756	2.519	58	.015*
Functional performance	31.90±11.874	41.03±9.654	3.269	58	.002*

***p<0.05 level of significance NS- Non significance**

Table 5 compares pain and functional performance in Epsom salt with hot water vs. plain water. Pain level: hot water means 5.33, SD 1.729; plain water means 6.47, SD 1.756. Unpaired t test (t=2.519, p=.015*) signifies significant reduction in hot water group's pain. Functional performance: hot water means 31.90±11.874. Unpaired t test (t=3.269, p=.002) indicates significant improvement in hot water group's functional performance over plain water.

Table 6: Correlation between level of pain and functional performance among arthritis patient N=60

Arthritis patient		Mean	SD	r value	p value
Pre-test Epsom salt with Hot water	Pain	7.53	1.525	.859	.000*
	Functional performance	47.47	11.178		
Post-test Epsom salt with Hot water	Pain	5.33	1.729	.874	.000*
	Functional performance	31.90	11.874		
Pre-test Epsom salt with Plain water	Pain	6.80	1.606	.873	.000*
	Functional performance	42.17	9.990		
Post-test Epsom salt with Plain water	Pain	6.47	1.756	.880	.000*
	Functional performance	41.03	9.654		

Table 6 presents the correlation between pain and functional performance in arthritis patients using Epsom salt with hot water. Pre-test: Pain means 7.53, SD 1.525, functional performance means 47.47, SD 11.178, r=0.859 (significant). Post-test: Pain means 5.33, SD 1.729, functional performance means 31.90, SD 11.874, r=0.874 (significant). In Epsom salt with plain water pre-test: Pain means 6.80, SD 1.606, functional performance means 42.17, SD 9.990, r=0.873 (significant). Post-test: Pain means 6.47, SD 1.756, functional performance means 41.03, SD 9.654, r=0.880 (significant).

Table 7: Association between Post-test level of pain with socio-demographic and clinical variables in Epsom salt with hot water n=30

Socio-demographic variables	Level of pain			Chi-square Df p value
	Mild	Moderate	Severe	
Age in years				
60-69	3	3	3	0.962
70-79	4	4	3	4
80 and above	2	5	3	0.915^{NS}
Gender				7.512
Male	0	6	5	2
Female	9	6	4	0.023*
Marital status				
Married	1	0	0	3.889
Unmarried	1	3	2	6
Widow	6	8	7	0.692^{NS}
Divorced	1	1	0	
Educational status				
Non-formal	5	6	1	9.823
Primary education	3	4	4	6
Secondary education	0	2	4	0.132^{NS}
Graduate and above	1	0	0	
Dietary habits				
Vegetarian	5	6	4	0.222
Non-vegetarian	4	6	4	2
Eggetarian	0	0	0	0.895^{NS}
Co-morbidities				
Hypertension	7	3	1	17.141
Diabetes mellitus	0	2	3	6
Both a and b	1	6	1	0.009^{NS}
Others	1	1	4	
Duration of illness				
0-2 years	1	1	0	7.250
2-4years	5	8	3	6
4-6 years	3	3	4	0.298^{NS}
More than 6 years	0	0	2	
BMI (body mass index)				
Underweight	1	3	0	3.621
Normal	2	3	4	4
Overweight	6	6	5	0.460^{NS}

Family history of osteoarthritis				11.138
Yes	1	5	8	2
No	8	7	1	0.004*
Use of joint braces while walking				0.807
Yes	2	2	3	2
No	7	10	6	0.668^{NS}

***p<0.05 level of significance NS- Non significance**

Table 7 examines post-test pain association with socio-demographic and clinical variables in elderly home residents using Epsom salt with hot water, via chi-square test. Results highlight significant associations between post-test pain and gender, as well as the clinical variable of Family history of osteoarthritis ($p<0.05$). No significant associations were found between post-test pain and other variables such as age, marital status, educational status, dietary habits, co-morbidities, illness duration, BMI, or use of joint braces in Epsom salt with hot water group.

Table 8: Association between post-test level of pain with socio-demographic and clinical variables in Epsom salt with plain water n= 30

Socio-demographic variables	Moderate pain	Severe pain	Chi-square Df p value
Age in years			
60-69	4	3	1.107
70-79	8	5	2
80 and above	4	6	0.575^{NS}
Gender			0.741
Male	7	4	1
Female	9	10	0.389^{NS}
Marital status			
Married	0	0	0.930
Unmarried	6	6	2
Widow	9	8	0.628^{NS}
Divorced	1	0	
Educational status			
Non-formal	4	1	2.052
Primary education	6	5	2
Secondary education	6	8	0.358^{NS}
Graduate and above	0	0	
Dietary habits			
Vegetarian	7	3	2.531
Non-vegetarian	9	10	2
Eggetarian	0	1	0.282^{NS}
Co-morbidities			
Hypertension	5	6	4.067
Diabetes mellitus	2	2	3
Both a and b	5	6	0.254^{NS}
Others	4	0	
Duration of illness			
0-2 years	3	0	4.036
2-4years	7	5	3
4-6years	4	7	0.258^{NS}
More than 6 years	2	2	
BMI (body mass index)			
Underweight	1	0	1.185
Normal	5	6	2
Overweight	10	8	0.553^{NS}
Family history of osteoarthritis			0.536
Yes	9	6	1
No	7	8	0.464^{NS}
Use of analgesics for pain			0.905
Yes	15	14	1
No	1	0	0.341^{NS}
Use of joint braces while walking			4.038
Yes	12	14	1
No	4	0	0.044^{NS}

Table 8 assesses the association of post-test pain level with socio-demographic and clinical variables in elderly home residents using Epsom salt with plain water, via chi-square test. The findings show non-significant associations between post-test

pain level and variables including age, gender, marital status, education, dietary habits, co-morbidities, illness duration, BMI, family history of osteoarthritis, use of analgesics, and joint brace usage.

Table 9: Association between Post-test level of functional performance with socio-demographic and clinical variables in Epsom salt with hot water n=30

Socio-demographic variables	Mean	SD	F/t value	P value
Age in years				
60-69	27.44	9.926	0.956	0.397^{NS}
70-79	33.00	14.014		
80 and above	34.70	10.884		
Gender				
Male	34.27	10.199	0.828	0.415^{NS}
Female	30.53	12.804		
Marital status				
Married	37.00	--	0.636	0.599^{NS}
Unmarried	27.50	11.113		
Widow	33.52	12.343		
Divorced	25.50	12.021		
Educational status				
Non-formal	35.83	13.381	1.579	0.218^{NS}
Primary education	27.73	9.519		
Secondary education	34.17	10.797		
Graduate and above	17.00	0		
Dietary habits				
Vegetarian	32.07	11.762	0.076	0.940^{NS}
Non-vegetarian	31.73	12.395		
Eggetarian	0	0		
Co-morbidities				
Hypertension	30.27	13.425	0.251	0.860^{NS}
Diabetes mellitus	36.00	11.811		
Both a and b	32.00	10.583		
Others	31.33	12.879		
Duration of illness				
0-2 years	17.00	.000	2.548	0.078^{NS}
2-4years	29.62	10.589		
4-6 years	38.20	12.813		
More than 6 years	33.50	.707		
BMI(body mass index)				
Underweight	31.75	8.655	0.026	0.975^{NS}
Normal	32.67	13.105		
Overweight	31.53	12.456		
Family history of osteoarthritis				
Yes	31.71	9.833	0.079	0.938^{NS}
No	32.06	13.738		
Use of joint braces while walking				
Yes				
No	42.00	8.226	2.874	0.008^{NS}
	28.83	11.183		

***p<0.05 level of significance NS- Non significance**

Table 9 examines the link between post-test functional performance and socio-demographic, clinical variables in elderly home residents using Epsom salt with hot water, via ANOVA test. The findings indicate non-significant associations between variables (age, gender, marital status, education, diet, co-morbidities, illness duration, BMI, family history, brace usage) and post-test functional performance.

Table 10: Association between Post-test level of functional performance with socio-demographic and clinical variables in Epsom salt with plain water n=30

Demographic variables	Mean	SD	F/t value	P value
Age in years				
60-69	40.57	9.502	1.999	0.155^{NS}
70-79	37.77	9.859		
80 and above	45.60	8.475		
Gender				
Male	43.18	8.987	0.954	0.350^{NS}
Female	39.79	10.042		
Marital status				
Married	0	0	3.102	0.061^{NS}

Unmarried	42.17	9.064		
Widow	41.53	8.994		
Divorced	19.00	0		
Educational status				
Non-formal	44.20	9.311	0.342	0.713^{NS}
Primary education	39.82	11.294		
Secondary education	40.86	8.831		
Graduate and above	0	0		
Dietary habits				
Vegetarian	42.20	11.849	0.328	0.723^{NS}
Non-vegetarian	40.79	8.741		
Eggetarian	34.00	0		
Co-morbidities				
Hypertension	39.82	11.294	0.292	0.831^{NS}
Diabetes mellitus	38.25	8.500		
Both a and b	42.82	9.031		
Others	42.25	10.112		
Duration of illness				
0-2 years	28.00	7.937	4.388	0.013^{NS}
2-4years	40.75	8.709		
4-6 years	41.27	9.133		
More than 6 years	51.00	.000		
BMI (body mass index)				
Underweight	34.00	0	0.391	0.680^{NS}
Normal	40.09	10.940		
Overweight	42.00	9.172		
Family history of osteoarthritis				
Yes	41.67	10.688	0.354	0.726^{NS}
No	40.40	8.830		
Use of analgesics for pain				
Yes	41.28	9.732	0.735	0.468^{NS}
No	34.00	0		
Use of joint braces while walking				
Yes				
No	41.58	9.790	0.781	0.441^{NS}
	37.50	9.110		

***p<0.05 level of significance NS- Non significance**

Table 10 assesses the association of post-test functional performance with socio-demographic and clinical variables in elderly home residents using Epsom salt with plain water. ANOVA test indicates non-significant associations with variables including age, gender, marital status, education, dietary habits, co-morbidities, illness duration, BMI, family history of osteoarthritis, use of analgesics, and joint braces.

CONCLUSION

Arthritis, a common cause of pain and reduced functionality in older adults, necessitates diverse strategies for pain management and functional improvement. In this study, Epsom salt baths demonstrated significant pain reduction in the hot water group compared to plain water, along with notable enhancement in functional performance. These findings highlight the substantial impact of Epsom salt baths with hot water in alleviating pain and improving functional abilities among elderly residents with arthritis. This study underscores the potential of Epsom salt baths with hot water as a non-pharmacological intervention, suggesting that nurses and community health workers could employ this approach effectively to mitigate arthritis-related pain.

Declaration by Authors

Ethical Approval: Approved

Acknowledgement: The authors would like to acknowledge their family for their constant love and support throughout the research process. The researchers are really grateful for the gracious permission Sai Tirupati University, Udaipur (Raj.) gave them to conduct their research as well as the help and support given by everyone engaged in this project.

Source of Funding: None

Conflict of Interest: The authors declare no conflict of interest.

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How to cite this article: Dinesh Chandra Damor, Jitendra Pujari, M.U Mansuri, Vijay Singh Rawat. A comparative study to assess the effectiveness of Epsom salt with hot water versus plain water on pain and functional performance among arthritis patients at selected hospital, Udaipur. *Int J Health Sci Res.* 2023; 13(9):137-149. DOI: *10.52403/ijhsr.20230921*

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