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# Effectiveness of Rock Salt Hot Application on Level of Pain among Patients with Arthritis

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**ABSTRACT**
*Pain is defined as an unpleasant sensation occurring in varying degrees of severity as a consequence of injury, disease, or emotional disorder. Arthritis is a term often used to mean any disorder that affects joints. Symptoms generally include joint pain and stiffness. A hot application increases blood flow and circulation because of the elevated temperature, which aids in healing and soothes muscle spasms. The objectives of the study were to assess the level of pain among patients with arthritis, evaluate the effectiveness of rock salt hot application on the level of pain among patients with arthritis, find out the association between the pre-test level of pain of arthritis patients with selected socio-demographic variables, find out the association between the pre-test level of pain of arthritis patients with selected clinical variables. In this study, a quantitative research approach and one group pre-test post-test research design were used to assess the effectiveness of rock salt hot application on the level of pain among patients with arthritis. Non-probability convenience sampling technique was used to select 50 arthritis patients with orthopedic OPD and the ward of Parul Sevashram Hospital, Vadodara. A structured questionnaire was used to assess sociodemographic and clinical data, and a standardized tool was assessing patients' level of pain by the numerical pain rating scale. The day–1 pre-test mean pain score was 5.84 with a standard deviation of 0.510 and on day-7 the post-test mean pain score was 1.68 with a standard deviation of 0.621, the t-value was found to be 77.858, and the significance level was 0.00. There was an association between the pre-test level of pain and socio-demographic variable, occupation (p=0.0036). There was no association between the pre-test level of pain with clinical variables. The study findings concluded that rock salt hot application was effective in reducing the level of pain among patients with arthritis as it is an easily available and cost-effective therapy.*
***Keywords:*** *Rock salt, Hot application, Level of pain, Arthritis*

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## INTRODUCTION

Pain is characterized as an uncomfortable feeling that develops as result of an accident or illness and can vary in intensity. The nervous system's primary component is pain. In the end, pain is both a sensation and a state of the body [1]. There are two types of pain: acute and chronic. Based on the pain itself, a person may differentiate between acute and chronic pain, not how long it lasts. In 80% of cases, joint pain is a musculoskeletal condition that people experience at some point in their lives [2].

Arthritis means any disorder that affects joints. Pain and stiffness of the joints are typical signs of arthritis. Redness, warmth, swelling, and a reduced range of motion in the afflicted joints are possible additional symptoms [3]. Many different forms of arthritis exist, each with its own unique symptoms and causes. Joints, surrounding tissue, and tissues related to joints are all impacted by arthritis. It is not true to say that arthritis affects only older people but arthritis occurs in all age groups including children [4].

Most of the time, as the body ages, arthritic pain and inflammation cannot be prevented. In fact, arthritic symptoms are present in the majority of adults over 50 years of age. Arthritis can be controlled by a mix of drugs, physical activity, rest, weight control, nutrition, surgery etc [5].

It may be unable to carry out daily duties if a person has severe arthritis, especially if it affects their hands or arms. In some cases, joints may gradually lose their shape and alignment [6]. The body's defense mechanism includes pain as well, which sets off cerebral problem-solving techniques meant to put a stop to the uncomfortable situation. Its severity can range from mild to severe [7].

Heat therapy has the therapeutic benefit of reducing pain by causing changes in physiological processes in the body, such as vasodilatation and muscular relaxation [8]. Physicians must be careful with selecting the right medication for each individual patient, taking into consideration the cost, effectiveness, and toxic profile because arthritis patients are more likely to develop complications from NSAIDs [9].

Rock salt hot application to the affected area causes physiological changes in the body, including relaxation of muscles and joints and vasodilatation, which have the therapeutic benefit of reducing pain. It is an intervention without any side effects and a less expensive therapy [10].

## MATERIAL AND METHODS

The present study was conducted using a quasi-experimental research design and a quantitative research methodology. The convenience sampling technique was used to select the samples for the current investigation, which included 50 patients. The study was conducted in the orthopedic ward and orthopedic OPD in Parul sevashram hospital, Vadodara. Before gathering the data, necessary permissions were obtained from the institutional ethical committee and also informed consent was taken from the study participants. Patient's Socio-demographic and clinical history was taken using a self-structured questionnaire and the level of pain was assessed by means of the Numerical pain rating scale. The tool was given to 8 experts in the field of medical-surgical nursing to ensure content validity. The numerical pain rating scale is a standardized tool and its reliability established in literate patients with arthritis is r = 0.96 and in illiterate patients with arthritis is r = 0.95[11]. The data was analyzed using inferential and descriptive statistics.

## RESULTS

**Section A:** Patient distribution based on their socio-demographic data.

**Table 1: Frequency and Percentage distribution of patients according to their socio-demographic data.**

**n=50**

| Socio-Demographic Data | | Frequency (f) | Percentage (%) |
|---|---|---|---|
| Age | 20 – 30 | 2 | 4.0 |
| | 31 – 40 | 11 | 22.0 |
| | 41 – 50 | 21 | 42.0 |
| | 51 – 60 | 11 | 22.0 |
| | 61 – 70 | 5 | 10.0 |
| Gender | Male | 24 | 48.0 |
| | Female | 26 | 52.0 |
| | Trance gender | 0 | 0.0 |
| | Other | 0 | 0.0 |
| Level of education | Illiterate | 6 | 12.0 |
| | No formal education | 0 | 0.0 |
| | Primary | 12 | 24.0 |
| | Secondary | 21 | 42.0 |
| | High secondary or diploma | 7 | 14.0 |
| | Degree | 4 | 8.0 |
| | Master degree or above | 0 | 0.0 |
| Occupation | Unemployed | 20 | 40.0 |
| | Daily work / Labor work | 0 | 0.0 |
| | Self-employed | 17 | 34.0 |
| | Private | 10 | 20.0 |
| | Government job | 3 | 6.0 |
| | Student | 0 | 0.0 |
| Religion | Hindu | 42 | 84.0 |
| | Muslim | 6 | 12.0 |
| | Christian | 2 | 4.0 |
| | Other | 0 | 0.0 |
| Marital status | Married | 48 | 96.0 |
| | Unmarried | 2 | 4.0 |
| | Divorced | 0 | 0.0 |
| Living status | With spouse and children | 40 | 80.0 |
| | With children | 5 | 10.0 |
| | Live in relationship | 0 | 0.0 |
| | With spouse | 1 | 2.0 |
| | With friend | 0 | 0.0 |
| | With relative | 0 | 0.0 |
| | With parents | 4 | 8.0 |

**Table 1** Results showed that out of 50 patients, 21(42%) were 41-50 years-old, 11(22%) were 31-40 years-old, 11(22%) were in the age group of 51-60 years, 5(10%) between 61-70 years, and 2(4%) were 20-30

years. 26(52%) were females and 24(48%) were males. 21(42%) had secondary education, 4(8%) had degree, 12(24%) had primary education and 7(14%) of patients had higher secondary or diploma education, none of the patients had formal education, and master's degree or above. There were 20(40.0%) unemployed, 17(34%) were self-employed, 10(20.0%) had private job, 3(6.0%) had government job. In religion Hindu were 42(84.0%), Muslim 6(12.0%), Christian 2(4.0%). 48(96%) married and 2(4%) unmarried. There were 40(80%) living with spouse and children, 5(10%) living with children, 4(8%) living with parents, and 1(2%) living with spouse.

**Section B:** Patients distribution based on their clinical data.

**Table 2: Frequency and Percentage distribution of patients according to their clinical data n=50**

| Clinical Data | | Frequency (f) | Percentage (%) |
|---|---|---|---|
| Types of arthritis | Osteoarthritis | 49 | 98.0 |
| | Reactive arthritis | 01 | 2.0 |
| Duration | < 6 months | 23 | 46.0 |
| | 6 months – 2 years | 27 | 54.0 |
| Currently taking medicine | Yes | 50 | 100.0 |
| | No | 00 | 0.0 |
| If yes, which medicine | Analgesic | 08 | 16.0 |
| | NSAIDs | 40 | 80.0 |
| | Steroids | 02 | 04.0 |
| Comorbid conditions | Cardiovascular problem | 04 | 8.0 |
| | Stoke | 00 | 0.0 |
| | Autoimmune disorder | 01 | 2.0 |
| | Diabetes | 24 | 48.0 |
| | Cancer | 00 | 0.0 |
| | Hypertension | 11 | 22.0 |
| | None | 10 | 20.0 |
| Performs physical activity | Daily | 10 | 20.0 |
| | 3 – 4 times/weeks | 26 | 52.0 |
| | Once in week | 04 | 8.0 |
| | No physical active | 10 | 20.0 |
| Take rest periods in between activities | Never | 09 | 18.0 |
| | Seldom | 00 | 0.0 |
| | Occasional | 21 | 42.0 |
| | Sometimes | 17 | 34.0 |
| | Always | 03 | 6.0 |
| Use any stress management techniques / relaxation techniques | Yes | 04 | 8.0 |
| | No | 46 | 92.0 |
| If yes, specify | Yoga | 04 | 8.0 |
| | None | 46 | 92.0 |
| Take regular follow up to physician | Never | 02 | 4.0 |
| | Occasional | 29 | 58.0 |
| | Regular | 19 | 38.0 |
| Take prescribed medications regularly | Yes | 16 | 32.0 |
| | No | 34 | 68.0 |
| If no, specify | Forget to take medicine | 20 | 40.0 |
| | Lack of time | 02 | 4.0 |
| | Side effects | 14 | 28.0 |
| | Other | 2 | 4.0 |
| | None | 12 | 24.0 |
| Joint pain | Yes | 50 | 100.0 |
| | No | 00 | 0.0 |
| Swelling | Yes | 26 | 52.0 |
| | No | 24 | 48.0 |
| Morning stiffness | Yes | 17 | 34.0 |
| | No | 33 | 66.0 |
| Fatigue | Yes | 06 | 12.0 |
| | No | 44 | 88.0 |
| Other | Yes | 00 | 0.0 |
| | No | 50 | 100.0 |

**Table 2** Results showed that out of 50 patients, 49(98%) had osteoarthritis, and 1(2%) had reactive arthritis. 23 patients (46%) had less than 6-month duration and 27(54%) had 6 months - 2 years duration. 50 (100%) patients were currently taking medicine, out of which 40(80%) were on NSAIDs, 8(16%) were taking analgesics, and 2(4%) steroids. In the comorbid condition, 24(48%) had diabetes, 11(22%) had hypertension, 4(8%) had cardiovascular problems and 1(2%) had autoimmune disorder. Those performing physical activity were 26(52.0%) 3 – 4 times/week, 10(20.0%) daily, 10(20.0%) were not performing physical activity, 04(8.0%) once in a week. Taking rest periods in between activities 21(42%) were doing occasionally, 17(34%) sometimes, 09(18%) never, and 03(6%) were taking always rest. In use of any stress management technique or relaxation techniques 46(92.0%) did not use any stress management and 04(8.0%) were using yoga. Regarding taking follow-ups of physicians 29(58.0%) were taking occasionally, 19(38.0%) regularly doing follow-up, and 02(4.0%) never taking regular follow-up. Taking prescribed medications regularly 34(68.0%) were not taking, and 16(32.0%) were taking their medications. The reasons for not taking medications were that 20(40.0%) forgot to take them, 14(28.0%) due to their side effects, 02(4.0%) due to lack of time was 02(4.0%). 50(100.0%) had symptoms such as joint pain, 26(52.0%) had swelling and 24(48.0%) had no swelling, 17(34.0%) had morning stiffness and 33(66.0%) had no morning stiffness, 06(12.0%) had fatigue and 44(88.0%) had no fatigue.

**Section C**: Assessment of the level of pain score among the patients with arthritis.

**Table 3: Day wise frequency and percentage distribution of pre-test and post-test levels of pain among patients with arthritis.n=50**

| Days | Level of pain | Pre-test | | Post-test | |
|---|---|---|---|---|---|
| | | Frequency (f) | Percentage (%) | Frequency (f) | Percentage (%) |
| Day-1 | Mild pain | 00 | 0.0 | 01 | 2.0 |
| | Moderate pain | 01 | 2.0 | 49 | 98.0 |
| | Severe pain | 49 | 98.0 | 00 | 0.0 |
| Day-2 | Mild pain | 00 | 0.0 | 01 | 2.0 |
| | Moderate pain | 01 | 2.0 | 49 | 98.0 |
| | Severe pain | 49 | 98.0 | 00 | 0.0 |
| Day-3 | Mild pain | 00 | 0.0 | 07 | 14.0 |
| | Moderate pain | 01 | 2.0 | 43 | 86.0 |
| | Severe pain | 49 | 98.0 | 00 | 0.0 |
| Day-4 | Mild pain | 00 | 0.0 | 37 | 74.0 |
| | Moderate pain | 01 | 2.0 | 13 | 26.0 |
| | Severe pain | 49 | 98.0 | 00 | 0.0 |
| Day-5 | Mild pain | 00 | 0.0 | 49 | 98.0 |
| | Moderate pain | 06 | 12.0 | 01 | 2.0 |
| | Severe pain | 44 | 88.0 | 00 | 0.0 |
| Day-6 | Mild pain | 00 | 0.0 | 49 | 98.0 |
| | Moderate pain | 36 | 72.0 | 01 | 2.0 |
| | Severe pain | 14 | 28.0 | 00 | 0.0 |
| Day-7 | Mild pain | 00 | 0.0 | 50 | 100.0 |
| | Moderate pain | 45 | 90.0 | 00 | 0.0 |
| | Severe pain | 05 | 10.0 | 00 | 0.0 |

As per the data presented in **Table 3** level of pain among arthritis patients, day 1 in the pre-test 98% had severe pain, 2% had moderate pain no one had mild pain and in the post-test 98% had moderate pain, 2% had mild pain, no one had severe pain. In day 2, in the pre-test 98% had severe pain, 2% had moderate pain no one had mild pain and in the post-test 98% had moderate pain, 2% had mild pain, no one had severe pain. Day 3 in the pre-test 98% had severe pain, 2% had moderate pain no one had mild pain and in the post-test 86% had moderate pain, 14% had mild pain, no one had severe pain. Day 4 in the pre-test 98% had severe pain, 2% had moderate pain, no one had mild pain and in the post-test 74% had mild pain, 26% had moderate pain. Day 5 in the pre-test 88% had severe pain, 12% had moderate pain, and in the post-test 98% had moderate pain, 2% had mild pain, no one had severe pain, Day 6 in the pre-test 72% had moderate pain, 28% had severe pain, no one had mild pain, and in the post-test 98% had mild pain, 2% had moderate pain, no one had severe pain. Day 7 in the pre-test 90% had moderate pain, 10% had severe pain, no one had mild pain, and in the post-test 100% had mild pain, no one had moderate pain and severe pain.

**Section D**: Assessment of the effectiveness of rock salt hot application on the level of pain score among patients with arthritis.

**Table 4: Comparison of Mean, Standard deviation, and "t" Value of pre-test and post-test levels of pain among patients with arthritis from day 1 to day 7 n=50**

| | Number of patients | Mean | SD | Calculated "t" value | tabulated 't' value | df | p= value |
|---|---|---|---|---|---|---|---|
| Pre-test Day 1 | 50 | 8.84 | 0.510 | 62.610 | 1.677 | 49 | 0.000016 |
| Post-test Day 1 | 50 | 4.84 | 0.584 | | | | |
| Pre-test Day 2 | 50 | 8.44 | 0.644 | 53.973 | 1.677 | 49 | 0.00 |
| Post-test Day 2 | 50 | 4.20 | 0.535 | | | | |
| Pre-test Day 3 | 50 | 7.82 | 0.523 | 69.649 | 1.677 | 49 | 0.00 |
| Post-test Day 3 | 50 | 3.86 | 0.452 | | | | |
| Pre-test Day 4 | 50 | 7.44 | 0.611 | 65.740 | 1.677 | 49 | 0.00012 |
| Post-test Day 4 | 50 | 3.24 | 0.476 | | | | |
| Pre-test Day 5 | 50 | 6.92 | 0.444 | 66.943 | 1.677 | 49 | 0.00 |
| Post-test Day 5 | 50 | 2.80 | 0.495 | | | | |
| Pre-test Day 6 | 50 | 6.26 | 0.565 | 80.829 | 1.677 | 49 | 0.000013 |
| Post-test Day 6 | 50 | 2.26 | 0.527 | | | | |
| Pre-test Day 7 | 50 | 5.84 | 0.584 | 79.731 | 1.677 | 49 | 0.00 |
| Post-test Day 7 | 50 | 1.68 | 0.621 | | | | |

*SD – Standard Deviation*
*df – Degree of Freedom*

Data presented in **Table 4** shows the patients' level of pain score after rock salt hot application. Since the calculated 't' value is higher than the tabulated 't' value of 1.677, it can be concluded that applying rock salt hot from day 1 to day 7 is much more beneficial at reducing pain in arthritis sufferers.

**Table 5: Comparison of Mean, Standard deviation, and "t" Value of level of pain among patients with arthritis between day 1 pre-test and day 7 post-test n=50**

| | Number of patients | Mean | SD | Calculated "t" value | tabulated 't' value | df | p= value |
|---|---|---|---|---|---|---|---|
| Pre – test Day 1 | 50 | 8.84 | 0.510 | 77.858 | 1.677 | 49 | 0.00 |
| Post – test Day 7 | 50 | 1.68 | 0.621 | | | | |

*SD – Standard Deviation*
*df – Degree of Freedom*

Data presented in **Table 5** patients' level of pain score after rock salt hot application between day 1 pre-test and day 7post-test. The finding that the calculated 't' value of 77.858 was higher than the tabulated 't' value of 1.677 suggests that the level of pain experienced by patients with arthritis was significantly decreased by the rock salt hot application.

**Section E**: Association between pretest level of pain of arthritis patients with selected socio-demographic variables.

**Table 6: Association between pretest level of pain of arthritis patients with selected socio-demographic variables. n=50**

| Demographic variable | | Frequency (f) | $\chi^2$ Value | df Value | Level Of Significance (p=Value) |
|---|---|---|---|---|---|
| Age | 20 – 30 | 2 | $\chi^2$ =9.184 | 4 | 0.06 NS |
| | 31 – 40 | 11 | | | |
| | 41 – 50 | 21 | | | |
| | 51 – 60 | 11 | | | |
| | 61 – 70 | 5 | | | |
| Gender | Male | 24 | $\chi^2$ =1.105 | 1 | 0.29 NS |
| | Female | 26 | | | |
| | Trance gender | 0 | | | |
| | Other | 0 | | | |
| Level of education | Illiterate | 6 | $\chi^2$ =3.231 | 4 | 0.520 NS |
| | No formal education | 0 | | | |
| | Primary | 12 | | | |
| | Secondary | 21 | | | |
| | Higher secondary or Diploma | 7 | | | |
| | Degree | 4 | | | |
| | Master degree or above | 0 | | | |
| Occupation | Unemployed | 20 | $\chi^2$ =50.000 | 4 | 0.0036S |
| | Daily work / Labor work | 0 | | | |
| | Self-employed | 17 | | | |
| | Private | 10 | | | |
| | Government job | 3 | | | |
| | Student | 0 | | | |
| Religion | Hindu | 42 | $\chi^2$ =0.194 | 3 | 0.978 NS |
| | Muslim | 6 | | | |
| | Christian | 2 | | | |
| | Other | 0 | | | |
| Marital status | Married | 48 | $\chi^2$ =0.043 | 1 | 0.837 NS |
| | Unmarried | 2 | | | |
| | Divorced | 0 | | | |
| Living status | With spouse and children | 40 | $\chi^2$ =0.255 | 2 | 0.968 NS |
| | With children | 5 | | | |
| | Live in relationship | 0 | | | |
| | With spouse | 1 | | | |
| | With friend | 0 | | | |
| | With relative | 0 | | | |
| | With parents | 4 | | | |

*S - significant, NS - not significant, $\chi^2$ - Chi-square, df – Degree of Freedom*

**Table 6** depicts the association found between the pre-test level of pain of arthritis patients with socio-demographic variable, occupation ($\chi^2$ =50.000, p=0.0036, df = 4). There was no association between arthritis patients' pre-test levels of pain and variables like age, gender, education level, religion, marital status, and living status.

**Section F**: Association between pretest level of pain of arthritis patients with selected clinical variables.

**Table 7: Association between pre-test level of pain of arthritis patients with selected Clinical variables. n=50**

| Clinical variable | | Frequency (f) | $\chi^2$ Value | df | Level Of Significance (P Value) |
|---|---|---|---|---|---|
| Types of arthritis | Osteoarthritis | 49 | $\chi^2$ =0.021 | 1 | 0.889 NS |
| | Reactive arthritis | 01 | | | |
| Duration | < 6 months | 23 | $\chi^2$ =0.869 | 1 | 0.351 NS |
| | 6 months – 2 years | 27 | | | |
| | 2 – 5 years | 00 | | | |
| | > 5 years | 00 | | | |
| Currently talking medicine | Yes | 50 | NA | NA | NA |
| | No | 00 | | | |
| If yes, medicine | Analgesic | 08 | $\chi^2$ =0.255 | 2 | 0.880 NS |
| | NSAIDs | 40 | | | |
| | Steroids | 02 | | | |
| Any other comorbid condition | Cardiovascular problem | 04 | $\chi^2$ =1.105 | 4 | 0.893 NS |
| | Stoke | 00 | | | |
| | Autoimmune disorder | 01 | | | |
| | Diabetes | 24 | | | |
| | Cancer | 00 | | | |
| | Hypertension | 11 | | | |
| | None | 10 | | | |
| Perform physical activity | Daily | 10 | $\chi^2$ =0.942 | 3 | 0.815 NS |
| | 3 – 4 times/weeks | 26 | | | |
| | Once in week | 04 | | | |
| | No physical active | 10 | | | |
| Take rest periods in between activities | Never | 09 | $\chi^2$ =4.649 | 3 | 0.199 NS |
| | Seldom | 00 | | | |
| | Occasional | 21 | | | |
| | Sometimes | 17 | | | |
| | Always | 03 | | | |
| Use any stress management techniques / relaxation, techniques | Yes | 04 | $\chi^2$ =0.089 | 1 | 0.766 NS |
| | No | 46 | | | |
| If yes, specify | Yoga | 04 | $\chi^2$ =0.089 | 1 | 0.766 NS |
| | None | 46 | | | |
| Take regular follow up to physician | Never | 02 | $\chi^2$ =0.739 | 2 | 0.691 NS |
| | Occasional | 29 | | | |
| | Regular | 19 | | | |
| Take prescribed medications regularly | Yes | 16 | $\chi^2$ =0.480 | 1 | 0.488 NS |
| | No | 34 | | | |
| If no, specify | Forget to take medicine | 20 | $\chi^2$ =2.624 | 4 | 0.623 NS |
| | Lack of time | 02 | | | |
| | Side effects | 14 | | | |
| | Other | 2 | | | |
| | None | 12 | | | |
| Joint pain | Yes | 50 | NA | NA | NA |
| | No | 00 | | | |
| Swelling | Yes | 26 | $\chi^2$ =0.942 | 1 | 0.332 NS |
| | No | 24 | | | |
| Morning stiffness | Yes | 17 | $\chi^2$ =1.981 | 1 | 0.159 NS |
| | No | 33 | | | |
| Fatigue | Yes | 06 | $\chi^2$ =0.139 | 1 | 0.709 NS |
| | No | 44 | | | |
| Other symptoms | Yes | 00 | NA | NA | NA |
| | No | 50 | | | |

S - significant, NS - not significant; $\chi^2$ - Chi-square; df – Degree of Freedom

According to the data in **Table 7** shows that there was no association between pre-test level of pain of arthritis patients with clinical variables like types of arthritis, duration, current medications, comorbid conditions,

physical activity, taking rest periods in between activities, stress management techniques, regular follow up to the physician, taking prescribed medications regularly, and common symptoms experienced.

## DISCUSSION

The findings of the present study revealed that the rock salt hot application therapy was effective in reducing the pain level in patients with arthritis.

A similar study conducted by K. Samayochitha, B. Geetha Praveena in 2020 to assess the effectiveness of applying hot water and Epsom salt to relieve knee pain in old age with a total of 60 samples. It was found that in the experimental group, 2 (6%) had mild pain, 11 (37%) had moderate pain, 8 (27%) had severe pain, and 9 (30%) had the worst pain. And in the control group, 10 (34%) had the worst pain, 4 (13%) had moderate pain, 6 (20%) had severe pain, and 10 (33%) the least pain [12].

In the current study, patients' level of pain score after rock salt hot application between day 1 pre-test and day 7 post-test found that the calculated 't' value of 77.858 was higher than the tabulated 't' value of 1.677 suggesting that the level of pain experienced by patients with arthritis was significantly decreased by the rock salt hot application.

A similar study conducted by Lavanya Sankar in 2019 to assess the effectiveness of Epsom salt with hot water application on knee joint pain with a total of 29 sample, it was found that the calculated t-value 7.085 was higher than the tabulated t-value indicating that Epsom salt with hot water application was effective to revile knee joint pain [13].

The present study findings indicated that there was a significant association found between the pre-test level of pain of arthritis patients with socio-demographic variable, occupation ($\chi^2$ =50.000, p=0.0036, df = 4). A similar study conducted by Ruth Benita. F in 2016 to assess the effect of hot water application with Epson salt in reliving joint pain arthritis patients experiencing joint pain found that old age, education level, and exercise levels had significant association with the pain scores [14].

Our study findings did not show any association between the pre-test level of pain of arthritis patients with clinical variables, whereas an experimental study conducted by Rajapriya, G in 2016 to assess the effectiveness of hot application Vs contrast therapy on knee related symptoms among 60 osteoarthritis patients in selected community area found that physical activity, types and duration of osteoarthritis showed statistically significant association with pre-test level of knee-related symptoms [15].

## CONCLUSION

According to study's findings, rock salt hot application was effective in reducing the level of pain in arthritis patients as it is an easily available and cost-effective therapy. Hence the health care workers can be educated regarding this and encouraged to use rock salt hot application for pain relief of patients in the hospital and in community.

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