

## A study to assess the effectiveness of hot water with Epsom salt application for reduction of pain and improving mobility in patients with knee joint osteoarthritis admitted in orthopaedic ward at AVMC&H, Puducherry

<sup>1</sup>Batnavadi. R., <sup>2</sup>Saritha. R., <sup>3</sup>Sherin Thomas, <sup>4</sup>Shruthi. K.

<sup>1</sup>Assistant professor, Department of Medical Surgical Nursing, Vinayaka Mission's College of Nursing, VMRF (DU), Puducherry

<sup>2,3,4</sup> B.Sc. Nursing students, Vinayaka Mission's College of Nursing, VMRF (DU), Puducherry

Email – <sup>1</sup>anubathus@gmail.com, <sup>2</sup>sarithachu2001@gmail.com, <sup>3</sup>sherinthomasvkm@gmail.com, <sup>4</sup>shruthiprt@gmail.com

**Abstract:** Joint osteoarthritis affect the millions of people throughout the world, causing pain and disability with great impact on individuals and on society as a whole. The aim of the study was to assess the effectiveness of hot water with Epsom salt application for reduction of pain and improving mobility in patients with knee joint osteoarthritis admitted in orthopaedic ward at AVMC&H, Puducherry. A Quasi experimental pre and post- test control group design of 52 knee joint osteoarthritis patients with 26 an experimental group and 26 control group by convenience sampling technique. Visual Analogue Scale and Western Ontario and McMaster Universities Osteoarthritis index were used. In experimental group, pre-intervention of pain were 53.84% severe, 34.62% moderate and 11.54% mild whereas in post intervention of pain were 50% mild, 30.77% no pain, 19.33% moderate. The pre-intervention of mobility status were 42.31% severe, 34.62% worse, 15.38% moderate and 7.69% mild symptoms whereas in post intervention of mobility status were 42.31% mild, 38.46% moderate and 19.33% no symptoms. The age ( $x_2=14.350$ ,  $P=0.026$ ) has shown statistically association with post intervention level of pain among patients with knee joint osteoarthritis. The hot water with Epsom salt application was highly effective in reducing level of knee joint pain and improving physical mobility.

**Key Words:** Hot Water, Epsom Salt Application, Knee Joint Osteoarthritis, Pain, Mobility, Puducherry.

### 1. INTRODUCTION:

Osteoarthritis is primarily a degenerative, non-inflammatory disorder of movable joints characterized by an imbalance between the synthesis and degradation of particular cartilage leading to the classic pathologic changes of wearing away and destruction of cartilages. Joint diseases affect the millions of people throughout the world, causing pain and disability with great impact on individuals and on society as a whole. Men are more often affected than women before the age of 50. Women are affected twice as often as men after the age of 50. <sup>(1)</sup>

Osteoarthritis affects 9.6% of men and 18% of women ages above 60 years or older and the condition will be fourth leading causes of disability by 2020. <sup>(2)</sup>

The signs and symptoms of osteoarthritis may include stiffness, crepitus, swelling, bony tenderness, and limp. A person may experience instability of the joint in case of advanced condition. Osteoarthritis affects every aspect of an individual's day-to-day activities and quality of life. Pain in the knee joint is the primary reason for access treatment. <sup>(3)</sup>

Thermotherapies have been used in the conservative management of osteoarthritis, the local stimulations of temperature sensitive receptors in the skin, impulses travel from the periphery to the hypothalamus and the cerebral cortex. The hypothalamus then initiates heat producing or heat reducing location on the body. The conscious sensation of temperature are aroused in the cerebral cortex. <sup>(4)</sup>

Applying the heat by general or local which produce the physiological change in the body such as vasodilatation and relaxation of muscles which produce the beneficial therapeutic effect of relieving the pain. In the hot water application with Epsom salt bath is very effective in the treatment of joint pain. The 200 mg of Epsom salt mixed in hot water, and the painful joints will be bathed with hot water for 20 minutes thrice a week. It is very effective to relieve morning stiffness in joints. <sup>(5)</sup> So, investigator selected this study to assess the effectiveness of hot water with Epsom

salt application for reduction of pain and improving mobility in patients with knee joint osteoarthritis admitted in orthopaedic ward at Avmc&H, Puducherry.

## 2. MATERIALS & METHODS:

**Design:** A Quasi experimental pre and post- test control group design was adapted for the present study.

**Sample Size:** A sample of 52 patients with knee joint osteoarthritis in that 26 were in an experimental group and 26 were in control group.

**Sampling Technique:** Convenience sampling technique was used to select the sample.

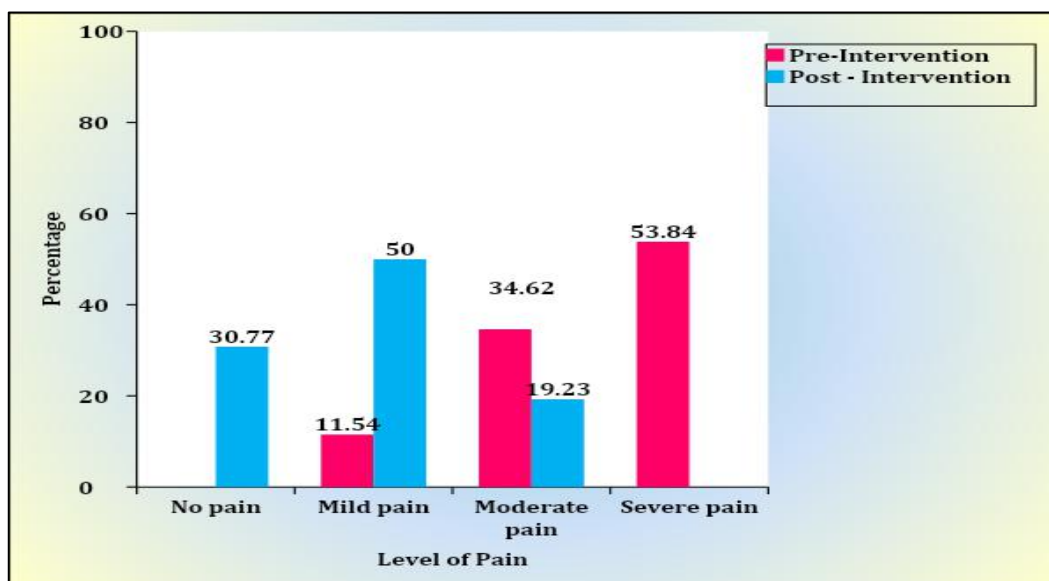
**Data collection Procedure:** The formal setting permission was obtained from AVMC&H at Puducherry. The data were collected by using structured questionnaire contains demographic variables, intensity of the pain will be assessed by using Visual Analogue Scale (VAS) and the WOMAC OA (Western Ontario and McMaster Universities Osteoarthritis) index used to assess the mobility status of patient with osteoarthritis. For experimental group, the hot water application with Epsom salt (42°- 45° C) will be applied two times a day for 20 minutes on osteoarthritis patient for three days continuously. Patients in the control group were in routine medication prescribed by the physician. The post-test were conducted at the end of the 7th day by using the same instrument for the both experimental and control group.

## 3. RESULTS:

The demographic variables of patients with knee joint osteoarthritis, In experimental group, majority 8(30.8%) were aged between 45 – 50 years, 13(50%) were male and female, 20(76.9%) had an income of Rs.5000 – 10000, 13(50%) had school education, 19(73.1%) were married, 14(53.8%) were moderate worker, 16(61.5%) were non-vegetarian, 15(57.7%) had no personal habits, 9(34.6%) were diagnosed of knee osteoarthritis for 2 years – 4 years and 15(57.7%) had taken pain medications. In control group, majority 7(26.9%) were aged between 55 – 60 years, 14(53.8%) were male, 11(42.3%) had an income of Rs.5000 – 10000 and below Rs.5000, 18(69.2%) had school education, 20(76.9%) were married, 18(69.2%) were moderate worker, 23(88.5%) were non-vegetarian, 8(26.9%) had the habit of alcoholism and no personal habits, 14(53.8%) were diagnosed of knee osteoarthritis for 2 years – 4 years and 19(73.1%) had taken pain medications.

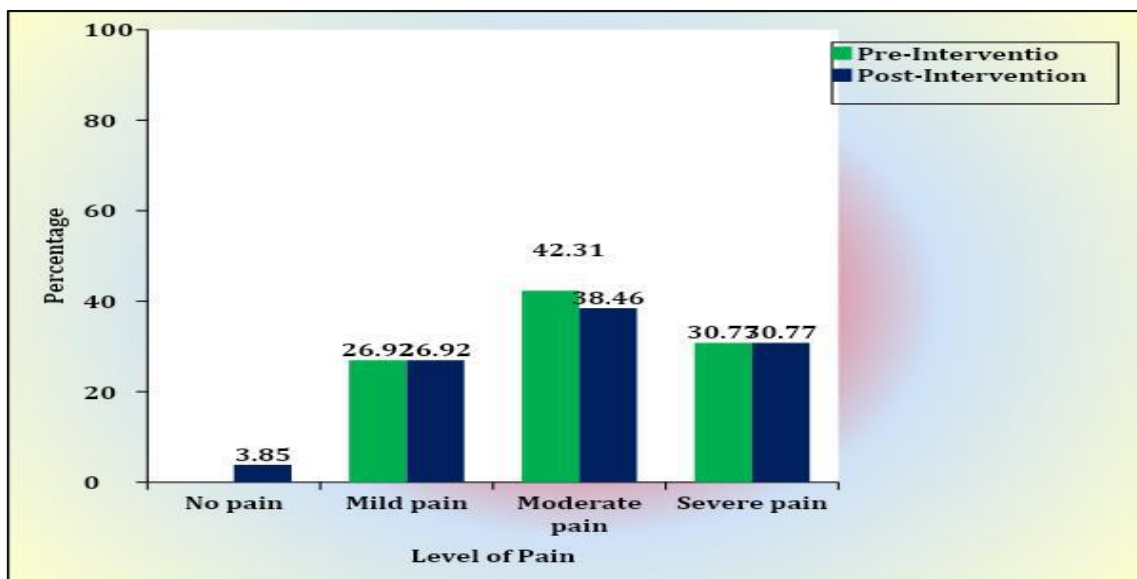
In experimental group, the pre-intervention 14(53.84%) had severe pain, 9(34.62%) were moderate pain and 3(11.54%) had mild pain whereas in the post intervention, 13(50%) had mild pain, 8(30.77%) had no pain and 5(19.23%) had moderate pain. (Figure 1)

**Figure 1: Percentage wise distribution of pre and post intervention level of pain among patients with knee joint osteoarthritis in the experimental group**



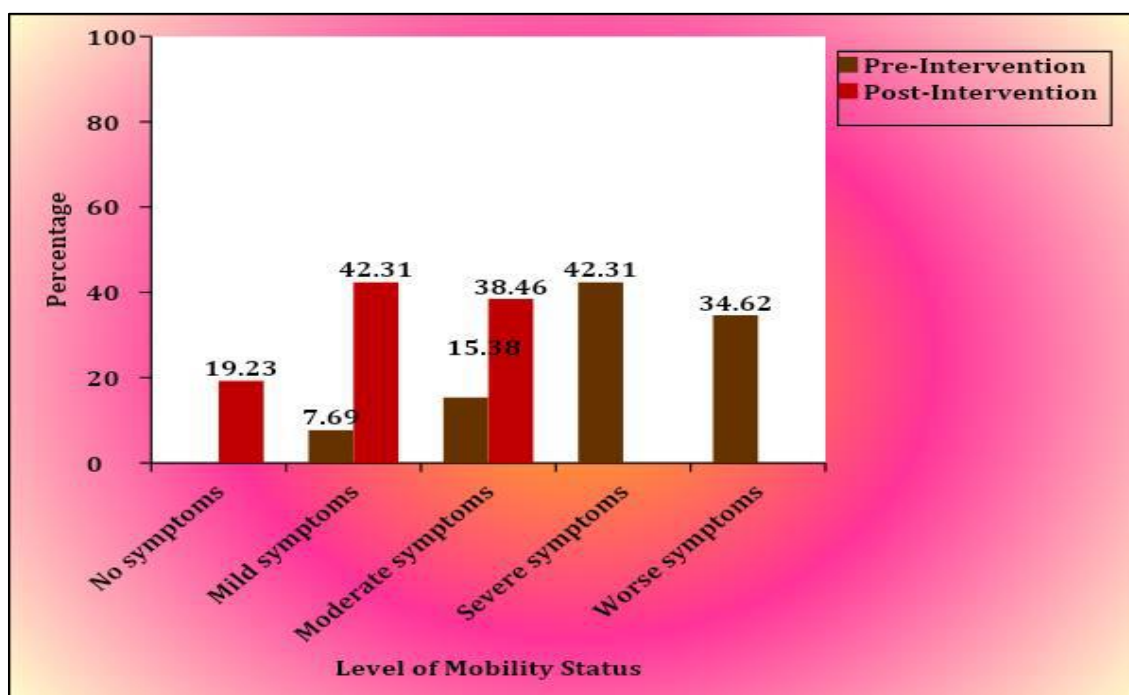
In control group, the pre-intervention 11(42.31%) had moderate pain, 8(30.77%) were severe pain and 7(26.92%) had mild pain whereas in the post intervention, 10(38.46%) had moderate pain, 8(30.77%) had severe pain, 7(26.92%) had mild pain and 1(3.85%) had no pain. (Figure 2)

**Figure 2: Percentage wise distribution of pre and post intervention level of pain among patients with knee joint osteoarthritis in the control group**



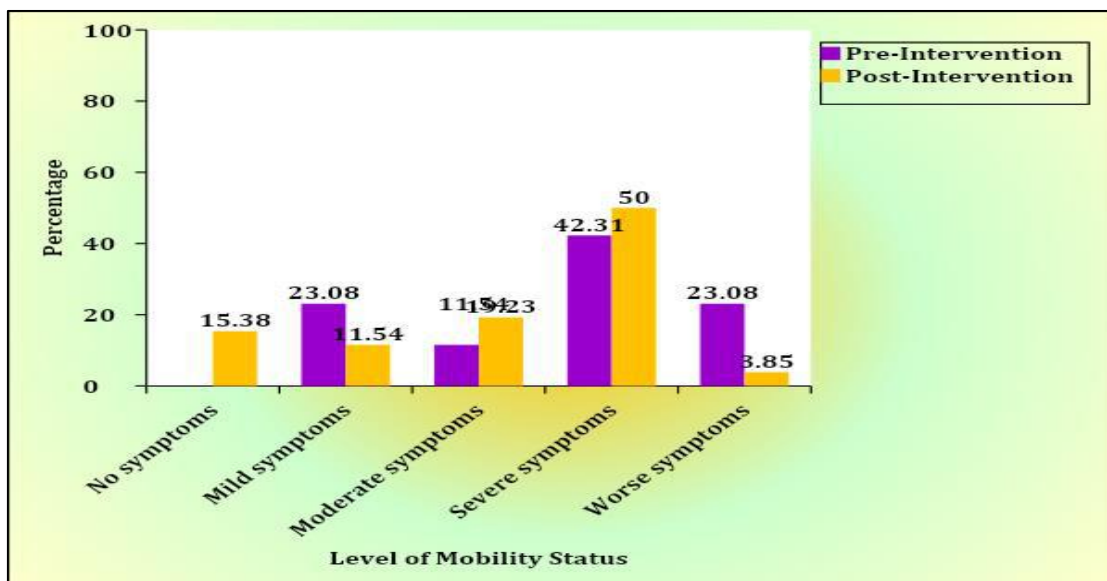
In experimental group, the pre-intervention 11(42.31%) had severe symptoms, 9(34.62%) had worse symptoms, 4(15.38%) had moderate symptoms and 2(7.69%) had mild symptoms whereas in the post interventional level, 11(42.31%) had mild symptoms, 10(38.46%) had moderate symptoms and 5(19.33%) had no symptoms in the experimental group. (Figure 3)

**Figure 3: Percentage wise distribution of pre and post intervention level of mobility status among patients with knee joint osteoarthritis in the experimental group**



In control group, the pre-intervention 11(42.31%) had severe symptoms, 6(23.08%) had mild and worse symptoms, 3(11.54%) had moderate symptoms whereas in the post interventional level, 13(50%) had severe symptoms, 5(19.23%) had moderate symptoms, 4(15.38%) had no symptoms, 3(11.54%) had mild symptoms and 1(3.85%) had worse symptoms. (Figure 4)

**Figure 4: Percentage wise distribution of pre and post intervention level of mobility status among patients with knee joint osteoarthritis in the control group**



**Table 1: Effectiveness of hot water with Epsom salt application for reduction of pain and improving mobility in patients with knee joint osteoarthritis in the experimental group**

Variables	Test	Mean	S.D	Mean Difference	Paired 't' test
Pain	Pre-intervention	68.42	22.01	43.23	t=12.213 p=0.0001 S***
	Post-intervention	25.19	20.81		
Mobility Status	Pre-intervention	55.96	18.51	37.77	t=17.193 p=0.0001 S***
	Post-intervention	18.19	11.46		

\*\*\*p<0.001, S – Significant

The pre-intervention mean score of pain was 68.42±22.01 and the post-intervention mean score of pain was 25.19±20.81. The mean difference was 43.23. The calculated paired 't' test value of t = 12.213 was found to be statistically significant at p<0.001. The pre-intervention mean score of mobility status was 55.96±18.51 and the post-intervention mean score of mobility status was 18.19±11.46. The mean difference was 37.77. The calculated paired 't' test value of t = 17.193 was found to be statistically significant at p<0.001. (Table 1)

**Table 2: Comparison of pre-intervention and post intervention level of pain and mobility status among patients with knee joint osteoarthritis in the control group**

Variables	Test	Mean	S.D	Mean Difference	Paired 't' test
Pain	Pre-intervention	56.84	28.94	1.15	t=2.739 p=0.011 S*
	Post-intervention	55.69	28.94		
Mobility Status	Pre-intervention	46.42	22.76	0.19	t=2.440 p=0.022 S*
	Post-intervention	46.23	22.70		

\*p<0.05, S – Significant

The pre-intervention mean score of pain was 56.84±28.94 and the post-intervention mean score of pain was 55.69±28.94. The mean difference was 1.15. The calculated paired 't' test value of t = 2.739 was found to be statistically significant at p<0.05. The pre-intervention mean score of mobility status among patients with knee joint osteoarthritis was 46.42±22.76 and the post-intervention mean score of mobility status was 46.23±22.70. The mean difference was 0.19. The calculated paired 't' test value of t = 2.440 was found to be statistically significant at p<0.05. (Table 2)



**Table 3: Comparison of post-intervention level of pain and improving mobility in patients with knee joint osteoarthritis between the experimental and control group**

Variables	Group	Mean	S.D	Mean Difference	Student Independent 't' test
Pain	Experimental Group	25.19	20.81	30.50	t=4.363 p=0.0001 S***
	Control Group	55.69	28.94		
Mobility Status	Experimental Group	18.19	11.46	28.04	t=5.622 p=0.0001 S***
	Control Group	46.23	22.70		

\*\*\*p<0.001, S – Significant

The post-intervention mean score of pain in experimental group was 25.19±20.81 and the post-intervention mean score of pain in control group was 55.69±28.94. The mean difference was 30.50. The calculated student independent 't' test value of t = 4.363 was found to be statistically significant at p<0.001. The post-intervention mean score of mobility status in experimental group was 18.19±11.46 and the post-intervention mean score of mobility status in the control group was 46.23±22.70. The mean difference was 28.04. The calculated student independent 't' test value of t = 5.622 was found to be statistically significant at p<0.001. (Table 3)

The demographic variable age ( $\chi^2=14.350$ , p=0.026), had shown statistically significant association with post intervention level of pain among patients with knee joint osteoarthritis at p<0.05 level.

#### 4. DISCUSSION:

A Quasi experimental pre and post- test control group design was used to select the sample; Total 52 knee joint osteoarthritis patients with 26 experimental group and 26 control group were selected by convenience sampling technique. The aim of the study was to assess the effectiveness of hot water with Epsom salt application for reduction of pain and improving mobility in patients with knee joint osteoarthritis.

**The first objective was to assess the pre-intervention level of pain and mobility status among patient with osteoarthritis in experimental and control group:** In experimental group, the pre-intervention symptoms were 42.31% severe, 34.62% worse, 15.38% moderate and 7.69% mild symptoms whereas in post intervention 42.31% mild, 38.46% moderate and 19.33% no symptoms. In control group, the pre-intervention pain were 42.31% moderate, 30.77% severe and 26.92% mild pain whereas in post intervention 38.46% moderate, 30.77% severe, 26.92% mild and 3.85% no pain. The supported study was conducted by Deshmukh, Jaya (2019) shows level of pain (19.58, 19.75) was almost same in both the experimental groups, the feelings related to pain was reported more in group 2 (15.57%), clinical outcome was almost same (15.52, 15.53) in both the groups and the level of activity was more in experimental group 1 as compared to other one. The total mean pain score of 58.67 was more in experimental group 2. <sup>(6)</sup>

**The second objective was to evaluate the effectiveness of hot water application with Epsom salt on osteoarthritis pain and mobility status among patient with osteoarthritis in Experimental group:** In experimental group, pre-intervention 53.84% severe pain, 34.62% moderate pain and 3(11.54%) had mild pain whereas in post intervention 50% mild pain, 30.77% no pain and 19.33% moderate pain. Level of mobility status in pre-intervention 42.31% severe symptoms, 34.62% worse symptoms, 15.38% moderate symptoms and 7.69% mild symptoms whereas in post intervention 42.31% had mild symptoms, 38.46% moderate symptoms and 19.33% no symptoms. The supported study was conducted by Sankar L (2019) shows pretest mean score level of pain was 2.93 with the standard deviation of 0.593, whereas after implementation of Epsom salt with hot water application, the posttest mean pain score was 2.17 with the standard deviation of 0.384. <sup>(7)</sup>

**The third objective was to compare the pre and post-intervention level of pain and mobility status among patient with osteoarthritis in between experimental and control group:** The pre-intervention mean score of pain was 56.84±28.94 and the post-intervention mean score of pain was 55.69±28.94. The mean difference was 1.15. The calculated paired 't' test value of t = 2.739 was found to be statistically significant at p<0.05 level which clearly infers that after the administration of hospital routine measures among patients with knee joint osteoarthritis was found to be effective in the reduction of pain to some extent in the control group. The pre-intervention mean score of mobility status was 46.42±22.76 and the post-intervention mean score of mobility status was 46.23±22.70. The mean difference was 0.19. The calculated paired 't' test value of t = 2.440 was found to be statistically significant at p<0.05 level which

clearly infers that after the administration of hospital routine measures among patients with knee joint osteoarthritis was found to be effective in the reduction of symptoms in the control group. The supported study was conducted by Pallavi Nimkar et al., (2021) shows the hot water application with Epsom salt has shown highly significant difference ( $t=39.41$  at  $p<0.0001$ ) between pretest and posttest with a mean and SD of  $2.68 \pm 0.67$ . The hot water application with Epsom salt is effective among the urban women those who suffers from mild and moderate knee joint pain. <sup>(8)</sup>

**The fourth objective was to find the association between the level of pain and mobility status with their selected demographic variable of patients with osteoarthritic pain:** The association between the demographic variable age ( $\chi^2=14.350$ ,  $p=0.026$ ), had shown statistically significant association with post intervention level of pain among patients with knee joint osteoarthritis at  $p<0.05$ . The supported study was conducted by Lisa C Carlesso et al (2022) shows mean age 63.9 years, body mass index 29.5 kg/m<sup>2</sup>, and 57% female. Lower pain sensitization by wrist pressure pain threshold (odds ratio [OR] 0.80 [95% confidence interval (95% CI) 0.68, 0.93]) and adequate conditioned pain modulation (OR 1.45 [95% CI 1.10, 1.92]) were associated with having constant  $\pm$  intermittent pain compared with intermittent pain only. Higher pain sensitization (by pressure pain thresholds and temporal summation) was associated with a higher likelihood of unpredictable pain. <sup>(9)</sup>

## 5. CONCLUSION:

The study concluded that the hot water with Epsom salt application was highly effective in reducing level of knee joint pain and improving physical mobility when compare to control group.

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