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Research Article

A Study to Assess the Effectiveness of Epsom Salt Hot Water Application and Plain Hot Water Application to Reduce Knee Joint Pain Among Old Age People in Selected Old Age Homes in Rajahmundry

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ABSTRACT

Background: Injury or damage to a joint can involve any of these structures and because of this; it is sometimes difficult to be precise as to which of these are the cause of pain. **Objectives:** The objectives of the study were to assess the pre-test level of pain scores in both the experimental group and control group, to administer the Epsom salt hot water application in the experimental group, to administer the plain hot water application in the control group, to assess the post-test level of pain scores in both the experimental group and control group, to compare the pre-test and post-test level of pain scores in the experimental group, to compare the post-test scores between both the experimental and control group, and to find out the association between the experimental group with their selected demographic variables. **Materials and Methods:** The setting was the physical location and conditions where data collection takes place in the study. The present study was conducting pain scores at Sri Gowthami Jeeva Karunya old age home, Lalacheruvu, Rajahmundry. The sample for the present study consists of old age people. The sample size consists of 60 clients. The sample will be divided into two groups. The experimental group consists of 30 clients and the control group consists of 30 clients. **Results:** With regard to age in the experimental group, eight samples were in the age group of 55 years, seven samples were in the age group of 56–59 years, and 15 samples were in the age group of 60 years and above. In the control group, 26 samples were in the age group of 55 years. Eleven samples were in the age group of 56–59 years and 11 samples were in the age group of 60 years and above. **Conclusion:** From the study finding, it is concluded that Epsom salt hot water application is effective in reducing knee joint pain among old age people.

Keywords: Epsom salt hot water, Plain hot water, Knee joint pain, Old age people

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Introduction

Knee pain is a common musculoskeletal problem in older adults, and its prevalence increases with age.[1] The joints in our body are complex structures consisting of bones, muscles, ligaments, tendons, and other tissues. Injury or damage to a joint can involve any of these structures and because of this; it is sometimes difficult to be precise as to which of these are the cause of pain. Often, all parts of the joint are affected and become inflamed.[2] The most commonly affected joints are the knee and the hip. This is because these joints are flexible and have a wide range of movement.

Many types of minor knee pain respond well to self-care measures. Physical therapy and knee braces also can help relieve knee pain. In some cases, however, the knee may require surgical repair.[3]

Knee pain is the most common musculoskeletal complaint that brings people to their doctor. With today's increasingly active society, the number of knee problems is increasing. Knee pain has a wide variety of specific causes and treatments. The components of each of these compartments can suffer from repetitive strain, injury, or disease. Running the long distance can cause pain to the knee joint, as it is a high impact exercise.[4]

One of the most physical marks of the old age is bone and joint. Old bones are marked by "thinning and shrinkage." This might result in a loss of height, a stooping posture in many people, and a greater susceptibility to bone and joint problems such as knee joint pain and some other diseases such as osteoarthritis and osteoporosis.[5]

The objectives of the study were to assess the pre-test level of pain scores in both the experimental group and control group, to administer the Epsom salt hot water application in the experimental group, to administer the plain hot water application in the control group, to assess the post-test level of pain scores in both the experimental group and control group, to compare the pre-test and post-test level of pain scores in the experimental group, to compare the post-test scores between both the experimental and control group, and to find out the association between the experimental group with their selected demographic variables.

Materials and Methods

Setting of the study

The setting was the physical location and conditions where data collection takes place in the study. The present study was conducting Pain scores at Sri Gowthami Jeeva Karunya old age home, Lalacheruvu, Rajahmundry.

Sample

The sample for the present study consists of old age people.

Sample size

The sample size consists of 60 clients. The sample will be divided into two groups. The experimental group consists of 30 clients and the control group consists of 30 clients.

Sample technique

The sampling technique refers to the process of selecting a portion of the population to represent the entire population. The sample was selected using a probability simple random sampling technique.

Study period

The study was conducted for 2 years and data were collected over a period of 10 days [Figure 2].

Criteria for sample selection

Inclusion criteria

The following criteria were included in the study:

- Samples are elderly people living in selected old age homes of Rajahmundry
- Elderly people who complaints of knee joint pain.

Exclusion criteria

The following criteria were excluded from the study:

- Mentally ill clients
- Chronically ill patients
- Hypersensitive for skin reactions.

Section-A

It consists of questions for the collection of demographic data. It was developed by the researcher. It had 11 questions with multiple options. The study participants had to tick the appropriate answer in the given box. It had questions related to age, gender, religion, education, occupation, marital status, family income, type of diet, how long are you have knee joint pain, how long are you taking treatment for knee joint pain, and do you perform any exercises.

Section-B

The 0–10 numerical is pain intensity scale. It is a standardized tool. The scoring key is given Table 1 and Figure 1.

Statistical analysis

Paired "*t*" test method was used to compare the levels of pre- and post-test scores in the experimental group. Unpaired "*t*" test method was used to compare the levels of post-test scores of Epsom salt hot water application among old age people in the experimental and control group and Chi-square test was used to find out the association between

Table 1: Scoring key

Description	Rater	Score
No pain	0	0
Mild pain	0–3	1
Moderate pain	4–6	2
Severe pain	7–9	3
Worst possible pain	10	4

level of pain scores of Epsom salt hot water application in the experimental group with their selected demographic variables.

Results

The analysis and interpretation of the data collected from 60 old age people with knee joint pain to assess the effectiveness of Epsom salt hot water application and plain hot water application.

Table 2 shows that with regard to age in the experimental group, eight samples were in the age group of 55 years, seven samples were in the age group of 56–59 years, and 15 samples were in the age group of 60 years and above. In the control group, 26 samples were in the age group of 55 years. Eleven samples were in the age group of 56–59 years and 11 samples were in the age group of 60 years and above. With regard to gender in the experimental group, 20 samples were female and 10 samples were male. In the control group, 21 samples were female and nine samples were male. With regard to religion in the experimental group, 18 samples were belong to Hindu, 10 samples were belong to Christian, and two samples were belong to Muslim. In the control group, 19 samples were belong to Hindu, 10 samples were belong to Christian, and one sample was belong to Muslim. With regard to how long are you taking treatment, in the experimental group, 19 samples were suffering from knee joint pain from 1 to 3 months, seven samples were from 4 to 6 months, four samples from 10 months, and above. In the control group, 22 samples were suffering from knee joint pain from 1 to 3 months, seven samples were from 4 to 6 months, and 1 sample from 7 to 9 months. With regard to performing exercises, both in the experimental group and control group, 30 samples were not performing any exercises.

Table 3 shows that pre-test and post-test scores of old age people with knee joint pain mean were 2.8 and 1.6, respectively. The mean difference was 1.2. The standard deviation was 0.94 and 0.74, respectively. The calculated "*t*" value was 4.9 greater than tabulated "*t*" value 2.05. :"*P*" value was 0.000 which shows that there was a significant difference in knee joint pain between pre-test and post-test in the experimental group. It shows that Epsom salt hot water application was effective. Hence, hypothesis H1 states that there will be a significant difference between pre-test and post-test levels of pain scores among the experimental group was accepted.

Table 4 shows that pre-test and post-test knee joint pain mean were 2.7 and 1.8, respectively. The mean difference was 0.9. The standard deviation was 0.84 and 0.68, respectively. The calculated "*t*" value was 5.6 greater than tabulated "*t*" value 2.05. "*P*" = 0.000 which shows that there was a significant difference in knee joint pain between pre-test and post-test. The plain hot water application was effective.

Table 2: Frequency and percentage distribution of old age people with knee joint pain according to demographic variables (*n*=30)

S. No.	Demographic variables	Experimental		Control group	
		F	%	F	%
1	Age in years				
	55	8	27	8	26
	56–59	7	23	11	37
	60 and above	15	50	11	37
2	Gender				
	Female	20	67	21	70
	Male	10	33	9	30
3	Religion				
	Hindu	18	60	19	64
	Christian	10	33	10	33
	Muslim	2	7	1	3
	Others	0	0	0	0
4	Educational status				
	No formal education	14	47	14	47
	Primary education	12	40	8	27
	Secondary education	4	13	8	26
	Graduate and above	0	0	0	0
5	Occupation				
	Govt. employee	2	7	2	7
	Private employee	4	13	05	17
	Self-employee	17	57	13	43
	House wife	7	23	10	33
6	Marital status				
	Single	0	0	3	10
	Married	13	43	10	34
	Separate	3	10	7	23
	Widow	14	47	10	33
7	Family income per month in rupees				
	<10,000/-	13	43	14	47
	10,001–15,000/-	8	27	8	27
	15,001–20,000/-	7	23	5	16
	>20,000/-	2	7	3	10
8	Type of diet				
	Vegetarian	5	17	4	13
	Non-vegetarian	25	83	26	87
9	How long are you have joint pain				
	1–3 months	4	13	4	13
	4–6 months	9	30	9	30
	7–9 months	12	40	13	44
	10 months and above	05	17	4	13
10	How long are you taking treatment joint pain				
	1–3 months	19	64	22	74
	4–6 months	7	23	7	23
	7–9 months	0	0	1	3
	10 months and above	4	13	0	0
11	Do you perform any exercises				
	No	30	100	30	100
	Yes	0	0	0	0

Table 5 shows that post-test scores of old age people with knee joint pain in both the experimental and control group mean were 1.6 and 1.8, respectively. The standard deviations were

Table 3: Difference between pre-test and post-test scores of old age people with knee joint pain in the experimental group (*n*=30)

Category	Mean	Mean difference	S.D	Paired "*t*" test		"*P*" value	Significance
				Calculated value	Table value		
pre-test	2.8	1.2	0.94	4.9	2.05	0.000	Significant at the level of 0.05
Post-test	1.6		0.74				

Table 4: Difference between pre-test and post-test scores of old age people with knee joint pain in the control group (*n*=30)

Category	Mean	Mean difference	S.D	Paired "*t*" test		"*P*" value	Significance
				calculated Value	Table value		
Pre-test	2.7	0.9	0.84	5.6	2.05	0.000	Significant at the level of 0.05
Post-test	1.8		0.68				

Table 5: Difference between post-test scores of old age people with knee joint pain in both the experimental and control group (*n*=30)

Category	Mean	Mean difference	S.D	Unpaired 't' Test		"*P*" value	Significant
				Calculated value	Table value		
Experimental group	1.6	0.2	0.74	9.09	2	0.000	Significant at the level of 0.05
Control group	1.8		0.68				

0.74 and 0.68, respectively. The calculated "*t*" value was 9.09 greater than tabulated "*t*" value 2. "*P*" = 0.000 which shows that there was a significant difference in the post-test knee joint pain scores in both the experimental and control group. Hence, Epsom salt hot water application was effective than plain hot water application. Hence, hypothesis H_2 states that there will be a significant difference between post-test levels of pain scores in both the experimental group and control group was accepted. Table 6 shows that there was a statistically significant association between old age people with knee joint pain in the experimental group with their selected demographic variables. Hence, H_3 states that there will be a significant association between knee joint pain post-test scores of the experimental group with their selected demographic variables was accepted.

Discussion

This chapter deals with the interpretation of results and discussion of findings. Old age clients were commonly affected by knee joint pain. The main focus of this study was to assess the effectiveness of Epsom salt hot water application among old age patients with knee joint pain who are residing in old age homes at Rajahmundry. The research design adopted was an experimental pre-test and post-test control group design. The population was old age patients in the age group of 55 to above 60 years suffering from joint pain. The conceptual framework of this research was based on Roy's adaptation model. The study adopted was a simple random sampling technique and the estimated sample size was 60 old age patients. Descriptive statistics were used to analyze the data and to test the study hypothesis.

The first objective is to assess the pre-test level of pain scores in both the experimental group and control group

Pre-test scores of old age people with knee joint pain show that of 30 samples, in the experimental group two samples (6%) had mild pain, 11 samples (37%) had moderate pain, eight samples (27%) had severe pain and 9 (30%) had worst pain. In the control group, of 30 samples, four samples (13%) had mild pain, six samples (20%) had moderate pain, 10 samples (33%) had severe pain, and 10 samples (34%) had worst pain.

Every 3rd individual was selected as a study sample using a systematic random sampling technique. The pre-test scores of knee joint pain are 23.2% had mild pain, 34.9% had moderate pain, 18.7% had severe pain, and 23.3% had worst pain in the experimental group. In the control group, 25% had mild pain, 27.3% had moderate pain, 18.2% had severe pain, and 29.5% had worst pain.[6]

A true experimental study was conducted to assess the effectiveness of magnesium sulfate application on knee joint pain. A random sampling technique was used. 0-10 numerical pain scale was used to assess the knee joint pain. The result showed that magnesium salt application was effective in comparison with the control group.[7]

The second objective is to administer the Epsom salt hot water application in the experimental group

Pre-test scores of old age people with knee joint pain show that of 30 samples, in the experimental group, two samples

Table 6: Association of old age people with knee joint pain in the experimental group with their selected demographic variables (*n*=30)

S. No.	Demographic variables	Experimental				Chi-square χ^2			Inference
		Mild pain	Moderate pain	Severe pain	Worst pain	CV	TV	df	
1	Age in years								
	55 years	6	1	1	0				
	56–59 years	3	1	3	0	9.62	9.49	4	S
	60 and above	6	8	1	0				
2	Gender								
	Female	10	6	4	0	0.1	5.99	2	NS
	Male	5	4	1	0				
3	Religion								
	Hindu	8	9	1	0				
	Christian	7	1	2	0	16.63	9.49	4	S
	Muslim	0	0	2	0				
	Others	0	0	0	0				
4	Educational status								
	No formal education	9	1	4	0				
	Primary education	4	7	1	0	9.01	9.49	4	NS
	Secondary education	2	2	0	0				
	Graduate and above	0	0	0	0				
5	Occupation								
	Govt. employee	1	1	0	0				
	Private Employee	1	2	1	0	10.47	12.59	6	NS
	Self-employee	11	2	4	0				
	House wife	2	5	0	0				
6	Marital status								
	Single	0	0	0	0				
	Married	5	4	4	0	6.22	9.49	4	NS
	Separate	3	0	0	0				
	Widow	7	6	1	0				
7	Family income per month in rupees								
	<10,000/-	9	3	1	0				
	10,001–15,000/-	5	1	2	0	11.84	12.59	6	NS
	15,001–20,000/-	1	4	2	0				
	>20,000/-	0	2	0	0				
8	Type of diet								
	Vegetarian	3	2	0	0	1.51	5.99	2	NS
	Non-vegetarian	12	8	5	0				
9	How long are you have joint pain								
	1–3 months	4	0	0	0				
	4–6 months	2	6	1	0	10.47	12.59	6	NS
	7–9 months	7	2	3	0				
	10 months and above	2	2	1	0				
10	How long are you taking treatment for knee joint pain								
	1–3 months	11	6	2	0				
	4–6 months	3	3	1	0	4.69	12.59	6	NS
	7–9 months	0	0	0	0				
	10 months and above	1	1	2	0				
11	Do you perform any exercises								
	No	15	10	5	0	0	0	0	NS
	Yes	0	0	0	0				

(6%) had mild pain, 11 samples (37%) had moderate pain, eight samples (27%) had severe pain, and 9 (30%) had worst pain. In the control group, of 30 samples, four samples (13%) had mild pain, six samples (20%) had moderate pain, 10 samples (33%) had severe pain, and 10 samples (34%) had worst pain.

A true experimental study was conducted to evaluate the effectiveness of hot water application with Epsom salt and plain water among 60 old age people with knee joint pain. Experimental showed effective Epsom salt hot water application in comparison with the control group of patients.[8]

The third objective is to administer the plain hot water application

Pre-test scores of old age people with knee joint pain in the control group were four samples (13%) had mild pain, six samples (20%) had moderate pain, 10 samples (33%) had severe pain, and 10 samples (34%) had worst pain. Post-test scores of old age people with knee joint pain in the control group, 10 samples (33%) had mild pain, 15 samples (50%) had moderate pain, five samples (17%) severe pain, and none of them had worst pain.

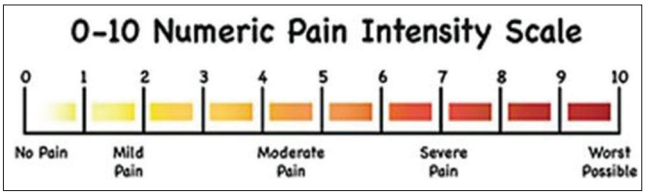

Figure 1: 0–10 numerical pain intensity scale

Totally 50 women in the age of 30–60 years who meet the inclusion criteria were selected by a random sampling method. In the pre-test, 285 of the women had moderate knee joint pain and in the post-test after 2 weeks of the intervention of hot water application, 24% of the women had moderate pain and 76% women had mild pain. The study concluded that a significant reduction in pain using hot water applications.[9]

The fourth objective is to assess the post-test level of pain scores in the experimental group and control group

Post-test scores of old age people with knee joint pain show that of 30 samples in the experimental group, 15 samples (50%) had mild pain, 10 samples (33%) had moderate pain, five samples (17%) had severe pain, and none of them had worst pain. In the control group, of 30 samples, 10 samples (33%) had mild pain, 15 samples (50%) had moderate pain, five samples (17%) severe pain, and none of them had worst pain.

Brosseau *et al*., a study was conducted in The Cochrane Library for the purpose of determining the effectiveness of heat in knee OA, and they found three randomized controlled trials involving 179 patients. This study was concluded that

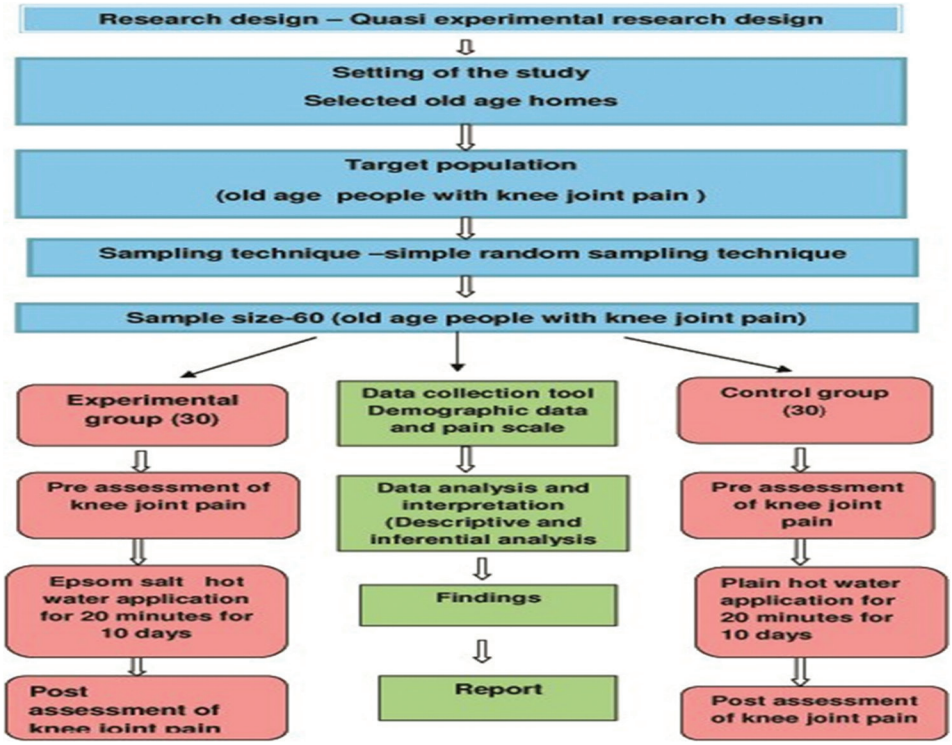

Figure 2: Schematic representation of research methodology

there is a significant improvement in hot water application to relieve knee joint pain.[10]

The fifth objective is to compare the pre-test and post-test level of pain scores in the experimental group

Pre-test scores of old age people with knee joint pain show that of 30 samples, in the experimental group, two samples (6%) had mild pain, 11 samples (37%) had moderate pain, eight samples (27%) had severe pain, and 9 (30%) had worst pain. Post-test scores of old age people with knee joint pain show that of 30 samples in the experimental group, 15 samples (50%) had mild pain, 10 samples (33%) had moderate pain, five samples (17%) had severe pain, and none of them had worst pain.

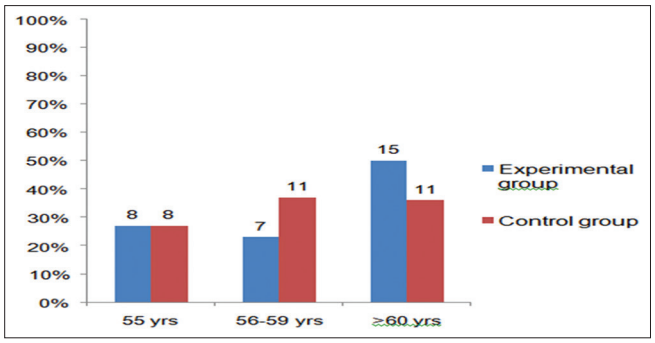

Figure 3: Frequency and percentage distribution of old age people with knee joint pain according to age

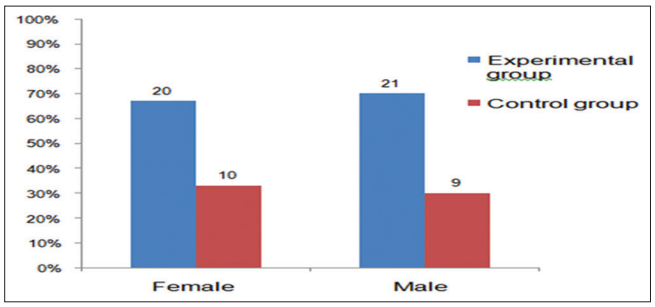

Figure 4: Frequency and percentage distribution of old age people with knee joint pain according to gender

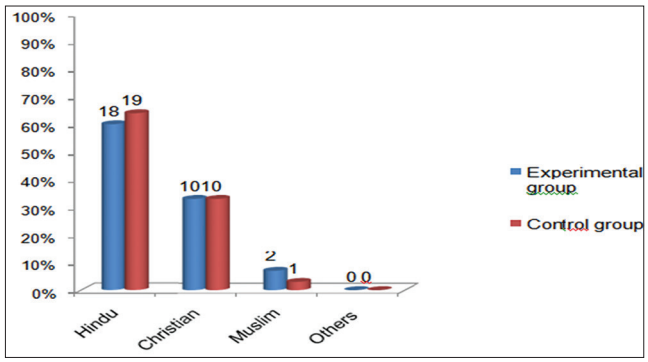

Figure 5: Frequency and percentage distribution of old age people with knee joint pain according to religion

The sixth objective is to compare the post-test scores between both the experimental and control group

Post-test scores of old age people with knee joint pain show that of 30 samples in the experimental group, 15 samples (50%) had mild pain, 10 samples (33%) had moderate pain, five samples (17%) had severe pain, and none of them had worst pain. In the control group, of 30 samples, 10 samples (33%) had mild pain, 15 samples (50%) had moderate pain, five samples (17%) severe pain, and none of them had worst pain.

Anitha *et al*., an experimental study was conducted to assess the effectiveness of Epsom salt fomentation on

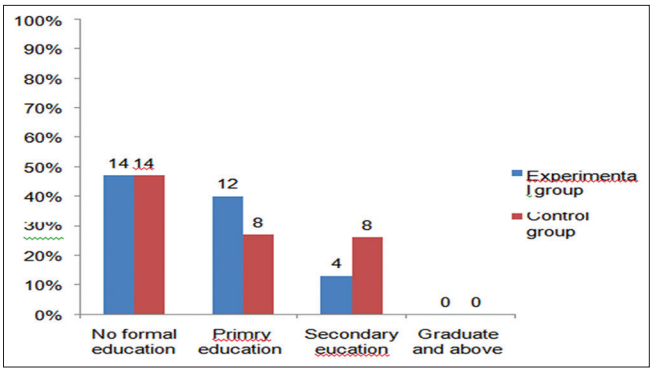

Figure 6: Frequency and percentage distribution of old age people with knee joint pain according to educational status

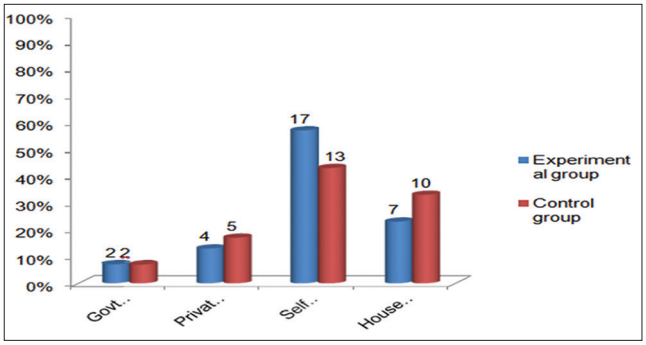

Figure 7: Frequency and percentage distribution of old age people with knee joint pain according to occupation

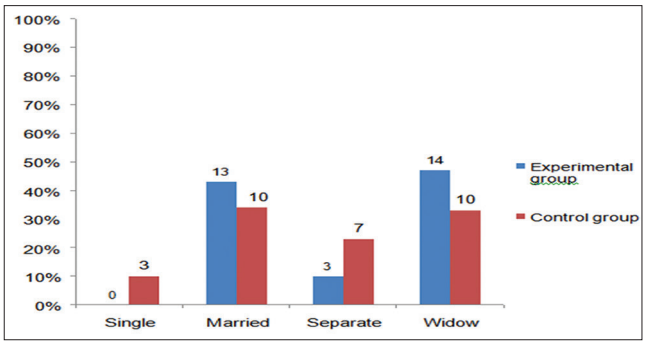

Figure 8: Frequency and percentage distribution of old age people with knee joint pain according to marital status

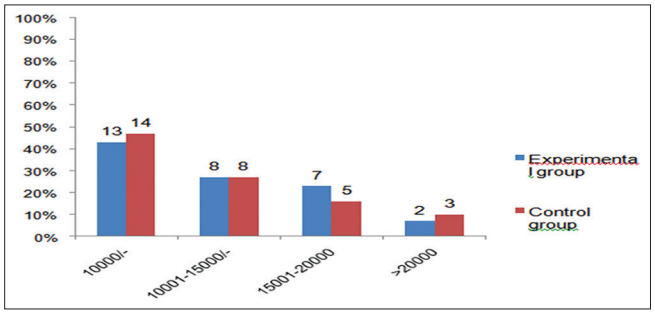

Figure 9: Frequency and percentage distribution of old age people with knee joint pain according to family income

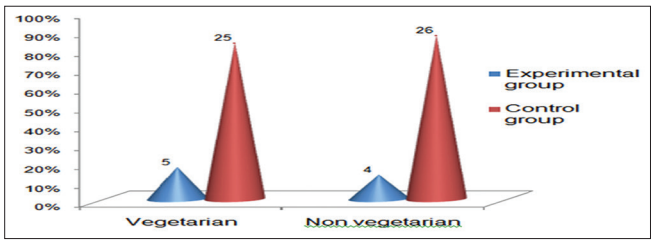

Figure 10: Frequency and percentage distribution of old age people with knee joint pain according to type of diet

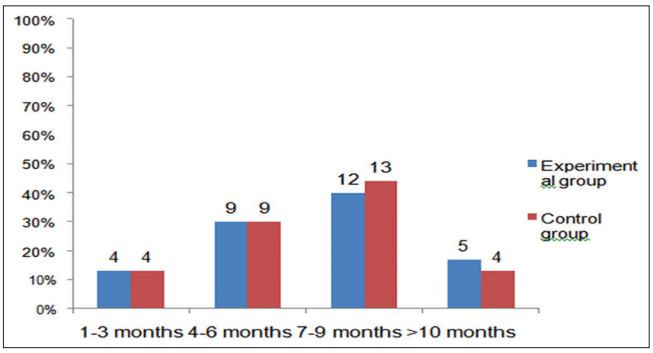

Figure 11: Frequency and percentage distribution of old age people with knee joint pain according to how long are you have joint pain

knee joint pain, knee swelling, and activities of daily living among elderly. The research design adopted an experimental pre-test and post-test control group. The population was old age patients in the age group of 60–80 years with arthritis knee joint pain. There was a significant difference between pre- and post-test levels of joint pain scores among old age patients in the experimental group.[11]

Yildirim *et al.* (2015), an experimental study was conducted to evaluate the effect of heat application on pain, Cumhuriyet University, Turkey. The patients divided into two groups 23 patients in each experimental and control group. Intervention groups before and after were compared, and the differences for both scores in the groups were found to be statistically significant ($P < 0.05$).The result showed that heat application will reduce joint pain.

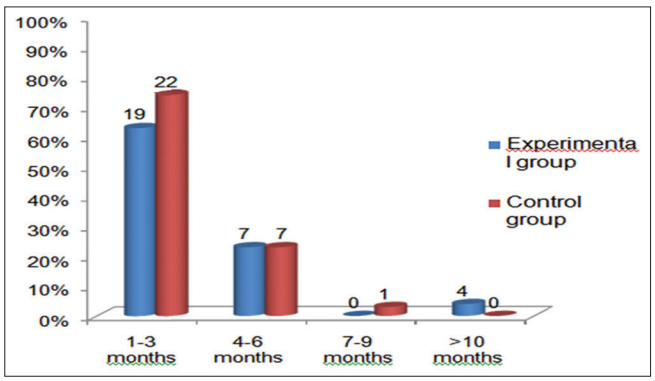

Figure 12: Frequency and percentage distribution of old age people with knee joint pain according to how long they are taking treatment for knee joint pain

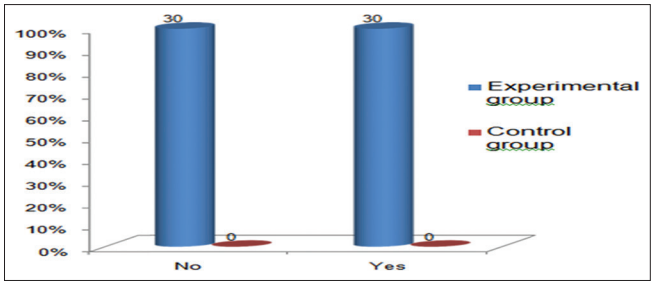

Figure 13: Frequency and percentage distribution of old age people with knee joint pain according to performance of exercises

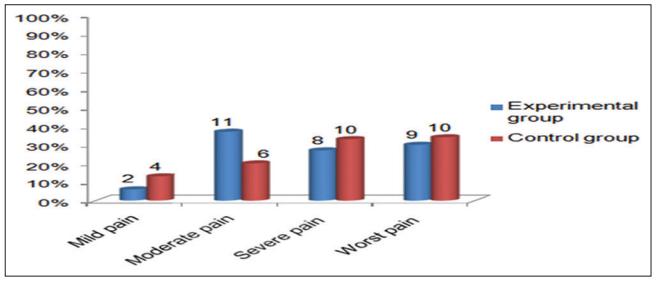

Figure 14: Frequency and percentage distribution of old age people with knee joint pain according to pre-test pain scores

The seventh objective is to find out the association between post-test scores of experimental group with their selected demographic variables

The result showed with regard to age, calculate value is 9.62, and table value is 9.49 while the degree of freedom is 4. In terms of gender, the calculated value is 0.1, and table value is 2 while the degree of freedom is 5.99. In terms of religion, the calculated value is 16.63 and table value is 9.49 while the degree of freedom is 4. In terms of educational status, calculated value is 9.01 and table value is 9.49 and degree of freedom is 4. In terms occupation, calculated value is 10.47 and table value is 12.59 and degree of freedom is 6. In terms of marital status, calculated value is 6.22 and table value is 9.49 and degree of freedom is 4 [Figures 3-15].

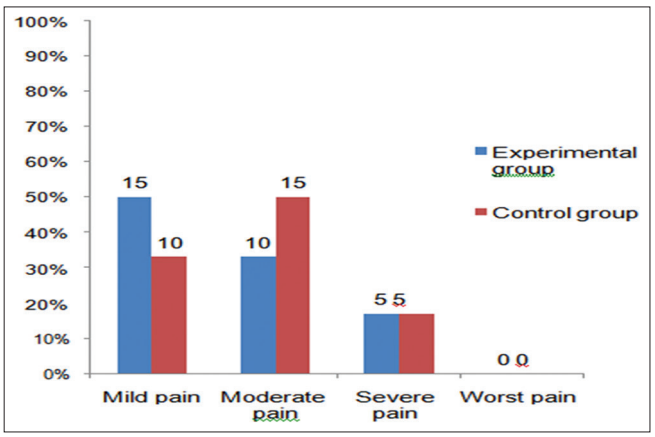

Figure 15: Frequency and percentage distribution old age people with knee joint pain according to post-test pain scores

Conclusion

From the study finding, it is concluded that Epsom salt hot water application is effective in reducing knee joint pain among old age people.

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