



## International Journal of Allied Medical Sciences and Clinical Research (IJAMSCR)

IJAMSCR |Volume 11 | Issue 1 | Jan - Mar - 2023  
www.ijamscr.com

ISSN:2347-6567

Research article

Medical research

### Effects of ultrasound therapy and open kinetic chain exercises in pes anserine bursitis among obese women

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Published on: 20-02-2023

#### ABSTRACT

**Background and objective:** Obesity is defined as the condition in which the body is having body mass index (BMI) > 30. The term Pes anserine (PA) is composed of the combination of tendinous insertions of the sartorius, gracilis, and semitendinosus muscles. These three muscles attach to the medial side of tibia to generate a shape reminiscent of a goose's foot. Ultrasound therapy is found to be more convenient and effective in treating bursitis. The objective of this study was to study the effects of Ultrasound therapy and open kinetic chain exercises to reduce Pain, Symptoms, Activities of daily living, Sports and Recreation and Quality of living in Pes anserine bursitis patients.

**Design:** An experimental study.

**Methods:** 20 subjects who fulfilled the inclusion and exclusion criteria were selected for the study. Interventions conducted on the subjects were explained to them and consent was taken. PAB in obese women, using validated scale, Knee injury and osteoarthritis outcome score (KOOS). The study was conducted using Ultrasound therapy and Open kinetic chain exercises.

**Results:** The result shows average improvement in pain, symptoms, ADL, S&R and QOL from pre to post with  $p < 0.001$ .

**Conclusion:** There is significant difference of pain, reduction in symptoms, improvements in ADL, sports and recreational activities, improvement quality of living of knee. As per data analysis and interpretation and clinical improvement, null hypothesis is rejected, and alternate hypothesis is accepted.

**Keywords:** Obesity, Pes anserine, Ultrasound therapy, Open kinetic chain exercises

#### INTRODUCTION

The evidence for the adverse effects of obesity on women's health is overwhelming and indisputable<sup>1</sup>. Obesity is defined as the condition in which the body is having body mass index (BMI) > 30. Obesity in women is a condition associated with morbidity and mortality of chronic diseases and health problems such as cardiovascular diseases, type II diabetes and some musculoskeletal disorders like osteoarthritis knee pain, low back pain<sup>2</sup>. Obesity leads to knee pain and Pes Anserine Bursitis. Diabetes mellitus, overweight, osteoarthritis of

knee, trauma, valgus deformity, are the predisposing factors, however their role in pathophysiology of disease is not yet understood<sup>3,4</sup>

The term Pes anserinus (PA) is composed of the combination of tendinous insertions of the sartorius, gracilis, and semitendinosus muscles. These three muscles attach to the medial side of tibia to generate a shape reminiscent of a goose's foot<sup>5</sup>. Movements of muscles are assisted by the synovial tissues lined with fluid filled cavity called as Bursa<sup>6</sup>. Bursitis is usually associated with tenderness, swelling and redness<sup>6</sup>. Inflammation of the bursa which is

beneath the common insertional tendons of the pes anserine muscle group is Pes anserine bursitis<sup>7</sup>. Pain in the inferomedial aspect of the knee is the most common symptom among patients<sup>3</sup>.

Knee Osteoarthritis and Pes anserine bursitis share many similarities. According to a survey, more than 90% of people with knee osteoarthritis had pes anserine pain<sup>8,9</sup>. Pain is aggravated when climbing stairs, during leg crossing, from sitting to standing, during external rotation of tibia. It should be highlighted that not all the patients with pain and tenderness over pes anserine bursa necessarily have pes anserine bursitis<sup>10</sup>.

One of the Electrotherapy modality used in physical therapy to treat inflammatory disorders is ultrasound therapy (US). Ultrasound therapy is found to be more convenient and effective in treating bursitis. In US therapy, electrical energy is transformed into acoustic energy by deforming the piezoelectric crystal inside the transducer. Non-thermal effect of ultrasound is used for treating Pes anserine bursitis<sup>11</sup>.

Exercises employed in this rehabilitation program have shown to be individually effective for the improvement of quadriceps muscle strength and range of motion<sup>12</sup>. The functional deficit in the quadriceps muscle may cause impaired balance and gait, thus reducing mobility and function in patients with knee OA<sup>13</sup>.

#### **INCLUSION CRITERIA**

- Obese women
- Knee osteoarthritis
- Pes anserine bursitis

#### **EXCLUSION CRITERIA**

- Any surgery of lower extremity
- Rheumatoid arthritis
- Deep vein thrombosis
- Ligament injury
- Meniscal tear
- Fractures of lower limb

#### **Procedure**

Twenty patients associated with per anserine bursitis were screened for inclusion and exclusion criteria and consent was taken. Assessment was taken using KOOS. Therapeutic ultrasound was used over the inferomedial aspect of tibia, after sterilizing the treatment area, coupling media was

applied over the affected side and transducer head. The transducer was moved in circular pattern. The frequency of 1MHz, in Pulsed mode and intensity of 0.5-0.8 W/cm<sup>2</sup> was employed. The duration of treatment was 10mins for 10 consecutive days.

Open kinetic chain exercises given during the intervention are;

#### **Quadriceps settings**

Participants assumed a supine position on a plinth and were instructed to perform isometric contraction of quadriceps muscles of the affected lower extremity by drawing up patella while maintaining knee extension. The contraction was held for a count of 10, then the participants relaxed and repeated the exercise 10 times.

#### **Straight leg raise (SLR)**

Participants in the supine position isometrically contracted their quadriceps and lifted the lower extremity up to achieve about 45° of hip flexion while maintaining knee in extension. They held the position to count of 10, and then lowered the limb, repeating the exercise 10 times.

#### **Quadriceps strengthening exercises**

participants was seated on a quadriceps table, with hip and knee in 90° of flexion. Then the participant is asked to extend the knee and hold for 3-5 seconds. Then allowed to bend the knee to its starting position, repeat this exercise for 10mins. These exercises were carried out by the participant throughout the duration of the study.

#### **Data analysis**

Statistical analysis of the data was done using SPSS 20.0. Descriptive statistics were calculated and summarized which includes mean and standard deviation. Inferential statistics had been carried out in the study. Pre post comparison was done using paired t test. Level of significance was set at 5%.

## **RESULTS**

The present study was conducted on 20 obese women with an average age of 47.75±5.981years. The minimum age seen in the study was 38 years and maximum was 60 years. The average BMI was 33.80±2.948. The minimum BMI seen was 30 and the maximum BMI was 40.

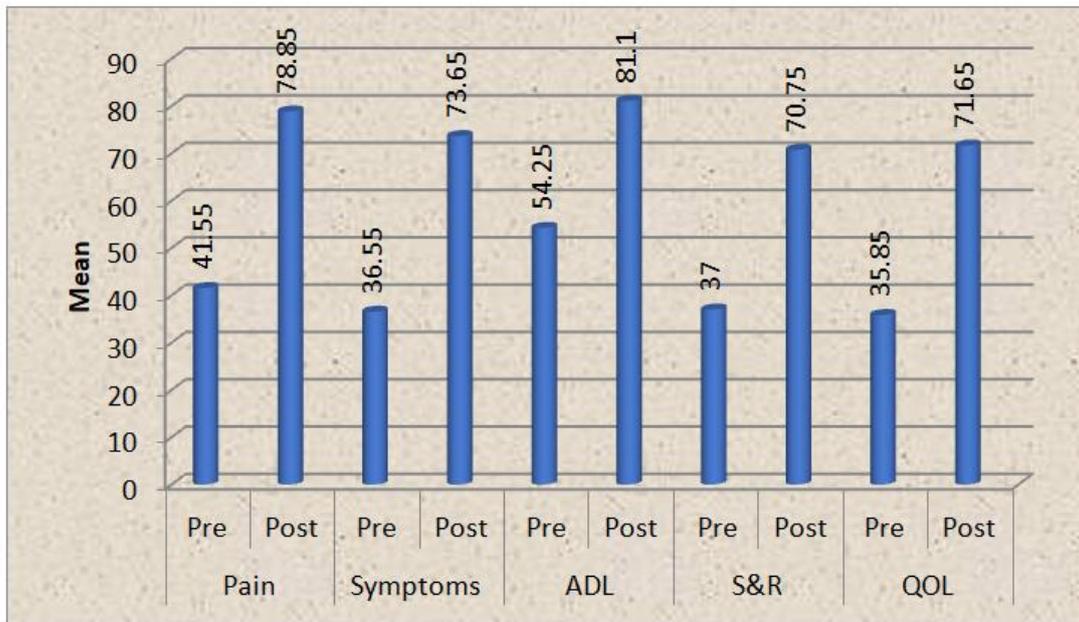
**Table 1: Showing mean and standard deviation of age**

	No. of participants	Minimum	Maximum	Mean	Std. Deviation
<b>Age</b>	20	38.00	60.00	47.75	5.981
<b>BMI</b>	20	30.00	40.00	33.80	2.948

The comparison between pre and post KOOS evaluation score is shown in table 2. The average pre pain score was 41.55±7.5 and post pain score was 78.85±7.161. The average pre symptom score was 36.55±15.418 and post symptom score was 73.65±9.98. The average pre ADL score was 54.25±8.866 and post ADL score was 81.10±6.995. The average pre Sports & Recreation score was 37.00±15.078 and post Sports & Recreation score was 70.75±914.074. The average pre QOL score was 35.85±13.554 and post QOL score was 71.65±15.301.

**Table 2: Mean and standard deviation of KOOS evaluation scores**

		Mean	Std. Deviation
Pain	Pre	41.55	7.500
	Post	78.85	7.161
Symptom	Pre	36.55	15.418
	Post	73.65	9.980
ADL	Pre	54.25	8.866
	Post	81.10	6.995
S&R	Pre	37.00	15.078
	Post	70.75	14.074
QOL	Pre	35.85	13.554
	Post	71.65	15.301

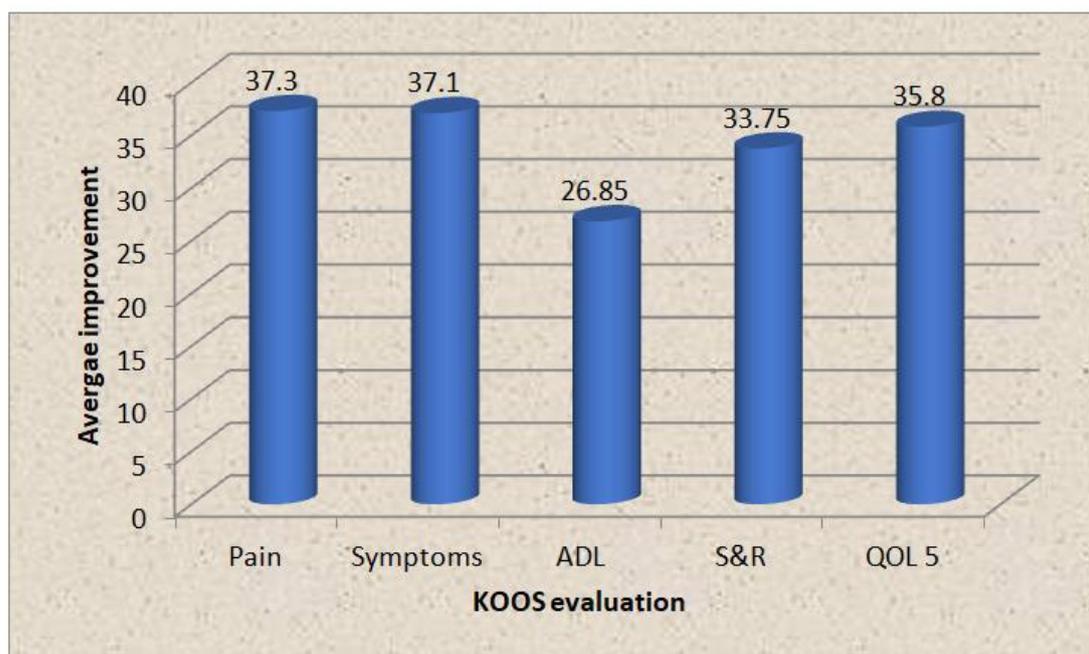


**Fig 1: Mean and standard deviation of KOOS evaluation scores**

The table 3 shows pre post comparison of KOOS evaluation scores. It can be seen that the average improvement in pain was  $37.30 \pm 5.592$ , in symptom was  $37.10 \pm 8.447$ , in ADL was  $26.85 \pm 7.4$ , in Sports & Recreation was  $33.75 \pm 9.157$  and QOL was  $35.8 \pm 11.514$ . The analysis shows there was an average improvement in pain, symptoms, ADL, Sports & Recreation and QOL from pre to post with  $p < 0.001$ .

**Table 3: Showing pre post comparison of KOOS evaluation scores**

	Average improvement	Std. Deviation	t value	p value
Pain	37.30	5.592	29.829	$P < 0.001$
Symptom	37.10	8.447	19.641	$P < 0.001$
ADL	26.85	7.400	16.226	$P < 0.001$
S&R	33.75	9.158	16.480	$P < 0.001$
QOL	35.80	11.514	13.904	$P < 0.001$



**Fig 2: Pre post comparison of KOOS evaluation scores**

## DISCUSSION

This study is designed to see the effectiveness of ultrasound and open kinetic chain exercises in obese women. Middle aged obese women are more prone to have knee pain. The result of this study supports the hypothesis that a physiotherapy treatment program has significant effects in patients with PAB, including the intensity of pain, symptoms, activities of daily living, sports and recreational activities, quality of living. The results of the conducted study shows a significant difference in pre and post evaluation, it can be seen that the average improvement in pain was  $37.30 \pm 5.592$ , in symptom was  $37.10 \pm 8.447$ , in ADL was  $26.85 \pm 7.4$ , in S&R was  $33.75 \pm 9.157$  and QOL was  $35.8 \pm 11.514$ . The analysis shows there was an average improvement in pain, symptoms, ADL, S&R and QOL from pre to post with  $p < 0.001$ .

The application of US during the inflammatory, proliferative, and tissue repair stages is not only of value because it changes the normal sequence of events but also because it has the capacity to stimulate or enhance these normal events and thus increase the efficiency in the healing stages. During the inflammatory phase, US has a stimulating effect on the mast cells, platelets, white cells with phagocytic roles, and macrophages. The US application induces degranulation of mast cells, causing the release of arachidonic acid which itself is a precursor for the synthesis of prostaglandins and leukotriene which in turn act as inflammatory mediators.

Our findings add to previous longitudinal research on the link between obesity and knee OA (OKC). Gelber and colleagues studied male medical students (median follow-up 36 years) and found that a greater BMI in men aged between 20 to 29 was associated with an increased risk of subsequent knee OA. Our population-based findings reinforce the need for early primary prevention. In our study, obesity (defined as BMI  $> 30$ ) was also a strong predictor of progression of non-severe knee pain to severe knee pain at three years. Public health

interventions targeted at avoiding excess weight in those with non-severe knee pain are likely to assist with secondary prevention.

There are several modalities for improving the patient's pain and ensuring a return to complete functionality of the affected area. Physical therapy and range of motion exercises play a role in increasing the strength of the muscles that support the area around the bursa. Previous studies show that, NSAIDs, physical therapy techniques, cold application using icepacks, and corticosteroid injections are a few of the therapeutic approaches that have been attempted with various degrees of success.

The rehabilitation program decreased the pain intensity and improved the knee range of motion, isometric quadriceps strength the level of functional performance in participants. Moreover, the results of the Knoop et al. who reported that all grades of knee OA severity can achieve improvement in pain and functional performance after an exercise therapy program.

## CONCLUSION

The conclusion of this study shows that there is significant difference of pain, reduction in symptoms, improvements in ADL, sports and recreational activities, improvement quality of living of knee. As per data analysis and interpretation and clinical improvement, null hypothesis is rejected, and alternate hypothesis is accepted. This study has several limitations, it did not have control over the daily activities of the participants. If the treatment is given for a longer period of time then long term effects can be seen. Further research studies with large sample size and longer durations evaluating the effects of physiotherapy modality with open kinetic exercises should be conducted. As this study has shown significant improvement in participants who received therapeutic ultrasound for pain and ADL, it can be used in the treatment protocol of Pes anserine Bursitis along with OKC.

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