Comparison of Structured Exercise Program and Aerobic Exercise on Reducing Pain in Females with Cyclic Mastalgia

Padmasaranya Ramalingam¹, Vinodhkumar Ramalingam², Karthika Ramalingam³

¹Post Graduate Student, ²Professor, ³Tutor, Saveetha College of Physiotherapy, Saveetha Institute Of Medical & Technical Sciences, Chennai, Tamil Nadu, India.

How to cite this article: Padmasaranya Ramalingam, Vinodhkumar Ramalingam, Karthika Ramalingam. Comparison of Structured Exercise Program and Aerobic Exercise on Reducing Pain in Females with Cyclic Mastalgia. Indian Journal of Physiotherapy and Occupational Therapy / Volume 18, Year 2024.

Abstract

Background: Cyclic mastalgia is described as pain occurring in the breast that begins before menstruation and subsides with the onset of the menstrual cycle. Studies indicate the usage of yoga, LASER and various other pharmacological methods for treating cyclic mastalgia. There is inadequate literature to report the effect of exercises on cyclic mastalgia.

Purpose: To compare the effect of structured exercise program and aerobic exercise on reducing pain in females with cyclic mastalgia.

Materials and Methods: In phase 1, the prevalence of cyclic mastalgia was analyzed using premenstrual syndrome scale from a private institute. In phase 2, a total of 52 subjects were selected from phase 1 based on the inclusion and exclusion criteria and were divided randomly into two groups, where group A (n = 26) received structured exercises and group B (n = 26) received aerobic exercises, along with breast massage and advice on usage of properly fitting brassiere for both the groups. NPRS and Cardiff breast pain charts were used as outcome measures.

Results: In phase 1, percentage calculation was used to determine the prevalence. In phase 2, t test analysis and non-parametric tests were used for post intervention analysis. Both groups have shown a significant reduction in severity and duration of breast pain, but the difference was higher in group A.

Conclusion: In phase 1, the prevalence of cyclic mastalgia was 69%. In phase 2, structured exercise protocol was more effective in reducing pain in females with cyclic mastalgia when compared with aerobic exercise.

Keywords: Breast pain, menstruation, premenstrual syndrome, discomfort, massage

Introduction

Mastalgia is a term used to describe breast pain, which is one of the common symptoms experienced by women of the age 15 to 40 years. Studies report that approximately 70% of women are affected in their lifetime. The pain reported is described as sharp, shooting, stabbing, aching, throbbing and a feeling of heaviness.

Mastalgia is classified into three types based on the nature of pain and its etiology: Cyclic mastalgia, non-cyclic mastalgia and extramammary mastalgia. Non-cyclic mastalgia is often associated with the anatomical changes, injuries, surgeries, any breast pathology such as cysts or fibroadenoma. It is not related to the menstrual cycle. The pain is usually localized, sharp and unilateral. Extramammary...
mastalgia is used to describe pain in the breast having its origin from region outside the breast such as heart, lungs, chest wall or esophagus.\textsuperscript{1,2}

Cyclic mastalgia is described as pain in the breast that begins before menstruation and subsides with the onset of the menstrual cycle. Studies report that 67%-75% of women experience premenstrual breast discomfort\textsuperscript{2}. It is reported that 20 to 40 years of life is the period where the occurrence of cyclic mastalgia spikes\textsuperscript{1}. The unilateral or bilateral pain experienced is often accompanied with breast tenderness\textsuperscript{3}. The pain typically occurs during the luteal phase of the menstrual cycle.\textsuperscript{3} Excess estrogen, progesterone inadequacy, an imbalance in the estrogen/progesterone ratio, changes in the secretion of follicle stimulating hormone and luteinizing hormone, low levels of androgens and high levels of prolactin are considered to be contributing elements to cyclic mastalgia.

Studies report the positive association between physical activity and menstrual period\textsuperscript{4}. Exercise leads to the release of prostaglandins in the body contributing to reduction of pain and discomfort. Exercises also have an impact in regulating hormones such as estrogen, progesterone which are the major causative factor of cyclic mastalgia.\textsuperscript{3,5}. Similarly, another intervention for cyclic mastalgia was found to be breast massage which stimulates the touch receptors and improves blood circulation thereby providing relief from mastalgia.\textsuperscript{6}

Another simple method reported to reduce the severity of cyclic mastalgia is using proper brassiere. 60%-70% of women experienced reduction in discomfort by using proper fitted brassiere as it provides support to the breast during movement\textsuperscript{7,8}. A set of guidelines have been suggested by Triumph International regarding the observational criteria to be met for selecting a properly fitting brassiere, where a score of zero indicates the usage of properly supporting and fitting bra whereas a positive score (+1 for each question in section A) indicates the bra is too large and a negative score (-1 for each question in section B) indicates the bra is too small\textsuperscript{9}.

The premenstrual syndrome scale is a 5 point Likert scale consisting of 40 questions comprising 3 sub divisions- physical, physiological and behavioral. The response for each item involves: never, rarely, sometimes, very often and always which are given scores from ranging from 5 to 1 respectively. Score value ranging from 1-40 indicates absence of symptoms, from 41-80 indicates mild symptoms, 81-120 indicates moderate symptoms, 121-160 indicates severe and 161-200 indicates very severe state of premenstrual syndrome\textsuperscript{10}.

The Cardiff breast pain chart is used to document the severity and duration of the pain in correlation to various shapes such as a circle for no pain, a triangle for mild pain, and a square for severe pain. The day of the onset of menstruation is marked by the letter P.\textsuperscript{11}

Cyclic mastalgia tends to affect the individual’s work performance and quality of life. Women tend to manage pain by either oral or topical NSAIDS. Topical application of creams has been reported as inconvenient and individuals are more likely to discontinue using it and oral consumption of drugs interferes with the menstrual cycle, weight gain and so on\textsuperscript{12}. Due to these side effects women tend to approach conservative therapies. There are studies indicating the usage of yoga\textsuperscript{14}, LASER\textsuperscript{15}, and Primrose oil\textsuperscript{15,16} for treating cyclic mastalgia. However, the effect of structured exercises in comparison to aerobic exercises along with the impact of breast massage and supported brassiere in the management of cyclic mastalgia is lacking and this study aims to compare the effect of structured exercise protocol with aerobic exercises in cyclic mastalgia.

Aim

To compare the effect of structured exercise programs and aerobic exercise on reducing pain in females with cyclic mastalgia.

Materials and Methods

This study was conducted in two phases from October 2022 to January 2023 in a private university. In phase 1, the prevalence of cyclic mastalgia was determined. In phase 2, the comparison between the effectiveness of structured exercise programs and aerobic exercises in reducing pain in females with cyclic mastalgia was determined.
Inclusion criteria:
- Subjects within the age group of 18-40 years
- Subjects with the symptoms of cyclic mastalgia
- Subjects with regular menstrual cycle

Exclusion criteria:
- Subjects with irregular menstrual cycle
- Subjects who were pregnant and lactating
- Subjects complaining of pain arising from the chest wall
- Subjects under hormonal therapy
- Subjects taking any medications for mastalgia
- Subjects with the presence of breast pain associated with the lump (non cyclical mastalgia)
- Subjects who are diagnosed with cases of breast cancer or any other condition which is under investigation.

Outcome Measures

NPRS and Cardiff breast pain charts were used to analyze the severity and duration of breast pain before and after the study to evaluate the effect of exercises.

Procedure

In phase 1, the prevalence of cyclic mastalgia among college students was analyzed using the premenstrual syndrome scale (PMSS). 390 subjects from the age group 18-30 were selected from Saveetha Institute of Medical and Technical Sciences and were explained about the study. The study was conducted from the month of July 2022 to February 2023. Informed consent form was obtained from the participants before the commencement of the study.

In phase 2, a total of 74 females between the age group of 18-30 years with the symptoms of cyclic mastalgia and with regular menstrual cycle were selected from the phase 1 study. Based upon the inclusion and exclusion criteria, 52 females were recruited in phase 2 and the consent was obtained prior to the commencement of the intervention. The NPRS and Cardiff breast pain chart was used to evaluate the severity and duration of breast pain before the study. Using the sealed envelope method, the 52 participants were divided randomly into two groups - Group A (Structured exercise protocol) and Group B (Aerobic exercise protocol). The participants in experimental group A (n=26) received structured exercises such as (Diaphragmatic breathing exercise, thoracic expansion exercise, pectoral stretch, cobra stretch, retractor strengthening- wall push-up, shoulder shrugging and bracing and trunk mobility exercise) in addition to breast massage and advice on usage of supported brassiere. Whereas, the participants in experimental group B (n=26) received aerobic exercises such as (warm up involving diaphragmatic breathing exercise, ankle rotation, ankle toe movements, neck movements, wrist movements for 10 minutes, exercises involving arm rotation, trunk rotation, jogging in place, jumping jacks, marching in place, alternate knee tapping and a cool down phase involving diaphragmatic breathing exercise, ankle toe movements. hamstring stretch, calf stretch for 5 minutes), breast massage and advice on usage of supported brassiere. Table 1 shows the exercise frequency for both structured exercise protocol and aerobic exercise protocol. The participants in both the groups were instructed to perform breast massage in a circular motion by placing both the hands over the upper and lower breast. Selection of a proper well-fitting bra was taught to both the groups using the guidelines set by Triumph. Both the groups performed the exercises on alternate days a week for a total of 8 weeks. After initial training of the exercises, follow up was done using a phone call. The NPRS and Cardiff breast pain chart was used to assess the severity of pain again at the end of 8th week to evaluate the effectiveness of the exercises.

Figure 1: Participant from the study performing cobra stretch
Table 1: Structured exercise and aerobic exercise protocol

<table>
<thead>
<tr>
<th>S.NO</th>
<th>GROUP A (STRUCTURED EXERCISE)</th>
<th>EXERCISE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Diaphragmatic breathing</td>
<td></td>
<td>4 min</td>
</tr>
<tr>
<td>2.</td>
<td>Thoracic expansion, Wall push-ups, Shoulder shrugging, Shoulder bracing, Trunk mobility exercise (flexion, extension, lateral flexion and rotation to both sides)</td>
<td>4 sets with 8 repetitions</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Pectoral stretch, Cobra stretch</td>
<td>30 seconds hold with 4 repetitions</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GROUP B (AEROBIC EXERCISE)</th>
<th>EXERCISE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 min</td>
</tr>
<tr>
<td></td>
<td>4 sets with 8 repetitions</td>
</tr>
<tr>
<td>Jogging in place, Marching in place,</td>
<td>3 min</td>
</tr>
<tr>
<td>Hamstring stretch, Calf stretch</td>
<td>30 seconds hold with 4 repetitions</td>
</tr>
</tbody>
</table>

Data Analysis

In this study, SPSS version 27.0 was used for statistical analysis. In phase 1, frequency was analyzed using percentage calculation for finding the prevalence. The normality was assessed using the Shapiro-Wilk test were p>0.05 is indicated as a normally distributed variable. In phase 2, the variable NPRS was found to be normally distributed (p = 0.056 for group A and p = 0.119 for group B) whereas the variables severity of breast pain (p<0.00 for group A and p<0.001 for group B) and duration of breast pain (p = 0.188 for group A and p = 0.02 for group B) were found to be non-normally distributed. For statistical analysis, Independent t test and paired t test was used for the variable NPRS as the data was normally distributed. Mann Whitney and Wilcoxon test was used for the analysis of the variables severity of breast pain and duration of breast pain as the data were not normally distributed. The significant results were confirmed if p 0.05.

Results

In phase I, 390 participants responded to the online google survey with the mean age
of 24.2 ± 2.1 years and with an average BMI of 23.4 ± 2.4 kg/m². From the 390 participants, 270 participants responded as having regular periods while 120 had irregular periods. The participants’ severity of physical, psychological and behavioral components of premenstrual syndrome was assessed using the premenstrual syndrome scale. The severity of the physical component is shown in figure 3, the severity of the psychological component is shown in figure 4 and the severity of the behavioral component is shown in figure 5. Among 390 participants, 67 participants had no history of premenstrual symptoms while 44 of them had symptoms quite severe which interfered with their daily activities. Also, the cyclic mastalgia prevalence in the participants was found to be 69%, the occurrence of breast pain was responded as never in 31%, rare in 12%, sometimes in 6%, very often in 36% and always in 15% which is depicted in figure 6.

For phase 2, the mean age and BMI of the subjects in group A was 23.3 ± 3.2 years and 23.5 ± 3.5 kg/m² and in group B was 24 ± 2.8 years and 22 ± 3.8 kg/m². The baseline variables (age and BMI) were assessed for normality using Shapiro-Wilk test (p > 0.05 indicates normal distribution). The p value for the variable age in group A was 0.770 and in group B was 0.494. Similarly for the variable BMI, the p value for group A was 0.356 and for group B was 0.640. Both the baseline variables were found to be normally distributed as their p values were greater than 0.05. Paired t test was used to analyze the differences in the baseline variables between the groups. The p value for age was 0.45 and for BMI was 0.78 indicating that the baseline variables had statistically no difference between the groups (p > 0.05).

In this study, Table 2 shows the mean and standard deviation (SD) values of both the experimental groups (group A and group B) for NPRS, severity of breast pain and duration of breast pain. The mean value of NPRS was 4.9 ± 1.5 cm at the baseline and 1.46 ± 1.1 cm post intervention for group A and was 4.6 ± 1.4 cm at the baseline and 2.19 ± 1.2 cm post intervention for group B, which is depicted in figure 7. The severity of breast pain as assessed by Cardiff breast pain chart had a mean value of 1.76 ± 0.42 pre intervention and was 0.76 ± 0.42 post intervention for group A and for group B it was 1.76 ± 0.42 pre-intervention and was 1.15 ± 0.54 post intervention, which is depicted in figure 8. The mean value of the duration of breast pain assessed by Cardiff breast pain chart for group A was 4.2 ± 1.2 at the baseline and 2.1 ± 1.0 at the end of the study, and or group B, the mean duration was 4.7 ± 1.25 at the baseline and 3.2 ± 1.37 at the end of the study, which is depicted in figure 9. After the completion of the intervention, the mean and SD values of NPRS for group A was 1.46 ± 1.1 and for group B was 2.19 ± 1.2. The mean ± SD values of severity of breast pain for group A was 0.76 ± 0.42 and for group B was 1.15 ± 0.54. Similarly, the mean ± SD values of duration of breast pain for group A was 2.1 ± 1.0 and for group B was 3.2 ± 1.37. The p values of NPRS was 0.0334, for severity of breast pain was 0.008 and for the duration of breast pain was 0.001 thereby indicating the statistically significant difference between the groups as p < 0.05 for all the three variables. The differences in the mean ± SD of the three variables indicated that the participants who received structured exercise protocol (group A) were highly benefitted than those who received aerobic exercise protocol (group B).

Table 3 shows the analysis of non-parametric tests which was analyzed using the Mann Whitney U test and Wilcoxon test. The Z score of the variable severity of breast pain was -2.636 and for the duration of the breast pain was -3.224 indicating the statistical significance of hypothesis testing. Similarly, the p value for the variable severity of breast pain was 0.001 and for the duration of the breast pain 0.008 indicating the significant reduction of pain by both the structured exercise protocol and the aerobic exercise protocol.

![Figure No 3](image)

**PHYSIOLOGICAL SYMPTOMS**

**INTERPRETATION:** Severity of physiological symptoms
**Figure No 4**

**INTERPRETATION:** Severity of psychological symptoms

**Figure No 5**

**INTERPRETATION:** Severity of behavioural symptoms

**Figure No 6**

**INTERPRETATION:** Prevalence of the severity of cyclic mastalgia

**Figure No 7**

**INTERPRETATION:** Difference in the NPRS (cm) score within and between the groups before and after the interventions

**Figure No 8**

**INTERPRETATION:** Difference in the severity of breast pain within and between the groups before and after the interventions
**Figure No 9**

**INTERPRETATION:** Difference in the duration (number of days) of breast pain within and between the groups before and after the intervention.

**Table 2:** Analyses of pre and post mean values of the outcome measures of both the groups

<table>
<thead>
<tr>
<th>STATISTICAL ANALYSIS</th>
<th>GROUP</th>
<th>MEAN ± SD</th>
<th>p VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PRE-TEST VALUES</td>
<td>POST-TEST VALUES</td>
</tr>
<tr>
<td>NPRS</td>
<td>GROUP A</td>
<td>4.9 ± 1.5</td>
<td>1.46 ± 1.1</td>
</tr>
<tr>
<td></td>
<td>GROUP B</td>
<td>4.6 ± 1.4</td>
<td>2.19 ± 1.2</td>
</tr>
<tr>
<td>SEVERITY OF</td>
<td>GROUP A</td>
<td>1.76 ± 0.42</td>
<td>0.76 ± 0.42</td>
</tr>
<tr>
<td>BREAST PAIN</td>
<td>GROUP B</td>
<td>1.76 ± 0.42</td>
<td>1.15 ± 0.54</td>
</tr>
<tr>
<td>DURATION OF</td>
<td>GROUP A</td>
<td>4.2 ± 1.2</td>
<td>2.1 ± 1.0</td>
</tr>
<tr>
<td>BREAST PAIN</td>
<td>GROUP B</td>
<td>4.7 ± 1.25</td>
<td>3.2 ± 1.37</td>
</tr>
</tbody>
</table>

* = Statistically significant

**Table 3:** Test statistics

<table>
<thead>
<tr>
<th></th>
<th>SEVERITY OF BREAST PAIN</th>
<th>DURATION OF BREAST PAIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>226</td>
<td>166.5</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>577</td>
<td>517.5</td>
</tr>
<tr>
<td>Z</td>
<td>-2.636</td>
<td>-3.224</td>
</tr>
<tr>
<td>p value</td>
<td>0.008</td>
<td>0.001</td>
</tr>
</tbody>
</table>

**Discussion**

The aim of our study was to compare the effect of structured exercise programs with aerobic exercise programs on reducing the severity and the extent of pain in individuals with cyclic mastalgia. The cyclic mastalgia was found to be prevalent in 69% of women from phase 1 findings. From that around 54 participants in phase 2 received the structured exercise (group A) and aerobic exercise (group B), along with breast massage and usage of supported brassiere. The participant pain severity as measured by NPRS was found to be reduced with mean (SD) 1.46 (1.1) cm in group A when compared with mean (SD) 2.19 (1.3) cm in group B indicating that the participants who received structured exercise responded well compared with aerobic exercise. The severity of pain as measured by the Cardiff breast pain treatment for cyclic mastalgia.
pain chart was reduced with a mean (SD) of 0.77 (0.43) in group A and 1.15 (0.54) in group B indicating the higher reduction in pain in the structured exercise group than the aerobic exercise group. The duration (extent) of breast pain measured using Cardiff breast pain chart was found to be reduced with a mean (SD) of 2.15 (1.08) in group A and 3.27 (1.37) in group B which indicated that participants in structured exercise group had better improvement when compared to those in aerobic exercise group.

A study done by SS Brave (2019) has found the effect of similar structured protocol in reducing pain and tenderness in cyclic mastalgia along with a 12 week yoga therapy which had a mean VAS score of 6.10 ± 1.26 mm before intervention and 2.90 ± 1.24 mm post intervention\(^3\). In comparison to their study, the subjects of our study have undergone either structured exercise protocol or aerobic exercise protocol and no other additional exercise interventions were added.

Our findings was also supported by a case study reported by N Chauhan (2019) to find the effect of similar structured exercise protocol by measuring the values of VAS and breast tenderness which was found to be 8/10 and 6/kg respectively at the baseline and post intervention the values were 3/10 and 3/kg respectively\(^2\).

Studies done by Ugariza\(^{17}\) and Samadi\(^{18}\) suggested that the performance of aerobic exercises improves the overall endurance of the body and enhances the blood circulation, thereby having an effect on premenstrual symptoms which supports our findings of aerobic exercise also being effective in reducing breast pain and its duration. In addition to the designated exercise protocol, all the subjects also received breast massages and advice on wearing supported brassiere which had a supplementary effect in reducing breast pain and its duration.

Studies concluded that performance of exercises majorly focusing on the upper body enhances blood circulation to the target area, and pectoral stretching has a role in reducing the breast pain by breaking the tender points on the muscle fibres which cause pain which, thereby supporting our findings of structured exercise protocol being more effective than the aerobic exercise protocol in reducing the severity and the extent of the breast pain\(^{2,3}\).

This study does not assess the baseline physical activity of the participants and the relationship between the breast size and cyclic mastalgia which could be assessed in future studies. Blood test to examine the hormonal alterations due to the effect of exercises was not assessed in this study which could be evaluated in future studies. Isolated effect of the exercises could be determined in further studies.

**Conclusion**

The prevalence of cyclic mastalgia was 69% which was reported higher from the participants enrolled in this study. Further, study concludes both structured exercise and aerobic exercise combined with breast massage and the practice of wearing an adequately fitting brassiere reduces the pain encountered before and during menstruation. Among the two interventions, the effect of structured exercise was found to be more significant than aerobic exercise in reducing pain on females with cyclic mastalgia

**ISRB Approval:** ISRB clearance was taken before recruiting the participants.

**ISRB number:** 01/052/ISRB/PGSR/SCPTIf

**Funding:** Self

**Conflict of Interest:** Nill

**References**


