

Efficacy of Isometric Abdominal Contraction Combined with Diaphragmatic Breathing Exercise in the Management of Dysmenorrhea: A Case Study

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ABSTRACT

Background: Primary dysmenorrhea is one of the most prevalent gynecological conditions affecting adolescent girls and young women. It is characterized by painful menstrual cramps in the absence of identifiable pelvic pathology and can adversely affect daily activities, academic performance, and quality of life. Physiotherapy interventions, including therapeutic exercises and breathing techniques, have emerged as safe, non-pharmacological approaches for symptom management.

Objective: To evaluate the Efficacy of Isometric Abdominal Contraction Combined with Diaphragmatic Breathing Exercises in the Management of Dysmenorrhea

Methodology: A case study was conducted on a 23-year-old female college student with a 4-year history of primary dysmenorrhea. Outcome measures included the Visual Analogue Scale (VAS), Numeric Pain Rating Scale (NPRS), Menstrual Symptom Questionnaire (MSQ), Moos Menstrual Distress Questionnaire (MDQ), Verbal Multidimensional Scoring System (VMSS), and pain duration. The participant underwent a structured 4-week intervention program consisting of isometric abdominal

contraction and diaphragmatic breathing exercises.

Results: The participant demonstrated improvement following the intervention. VAS scores reduced from 5/10 to 2/10 and NPRS scores reduced from 5/10 to 2/10. MSQ scores improved from 39 to 17, while MDQ scores reduced from 35 to 14. VMSS grading improved from Grade II to Grade I, and pain duration decreased from 2 days to 1 day.

Conclusion: Isometric abdominal contraction combined with diaphragmatic breathing exercises appeared to be effective in reducing pain intensity, menstrual symptom severity, and pain duration in this patient with primary dysmenorrhea. These exercises may be considered as a safe and cost-effective physiotherapy intervention for symptom management.

Keywords: Primary dysmenorrhea, Isometric abdominal contraction, Diaphragmatic breathing, Exercise therapy, VAS.

INTRODUCTION

One of the most frequent gynecological disorders in adolescent girls and young women is primary dysmenorrhea. It is marked by painful menstrual cramps in the

absence of any detectable pelvic pathology and typically starts within a few years after menarche. The pain is usually spasmodic, and localized to the lower abdomen, and can extend to the lower back and thighs. Other related symptoms, including nausea, vomiting, fatigue, headache, and mood disturbances are also frequently reported. Primary dysmenorrhea affects greatly the quality of life and is a leading contributor to school absenteeism and less involvement in social and academic activities.¹

Excessive secretion of prostaglandins, especially prostaglandin F2a, in the endometrium during menstruation is the primary cause of the pathophysiology of primary dysmenorrhea. High levels of prostaglandins lead to higher uterine contractions, vasoconstriction, and uterine ischemia, which are factors in pain and other related symptoms. Additional causes like hormonal imbalance psychological stress, lifestyle habits may also contribute to the severity of the symptoms.²

“There is a growing interest in the use of physiotherapy interventions as a non-pharmacological intervention to manage primary dysmenorrhea. Exercise therapy has been demonstrated to alleviate menstrual pain through better blood flow to the pelvis, reduction of uterine ischemia, endorphin secretion, and physical fitness. Isometric abdominal contraction exercises build abdominal muscles, enhance core stability, and can decrease the perception of pain, with the help of neuromuscular processes.³ One of the relaxation methods is the diaphragmatic breathing where breathing is slow and controlled by the diaphragm. It facilitates parasympathetic stimulation, lowers sympathetic hyperactivity, lowers muscle tension and increases oxygen supply to tissues these physiological responses lead to pain regulation and emotional well-being. Past research has established positive outcomes of breathing exercises and mind-body interventions in alleviating menstrual pain and enhancing the quality of life in women with primary dysmenorrhea.⁴

The synergistic effects of isometric abdominal contraction with diaphragmatic breathing could be of benefit because they would be able to deal with both physical and autonomic aspects of pain at the same time. Nonetheless, there is minimal evidence on the efficacy of this combined intervention on patients with primary dysmenorrhea. Thus, the current case study was conducted to assess the efficacy of the isometric abdominal contraction and diaphragmatic breathing exercises on the level of pain and the menstrual symptoms in a patient with primary dysmenorrhea.⁵

Objective

To evaluate the Efficacy of Isometric Abdominal Contraction Combined with Diaphragmatic Breathing Exercises in the Management of Dysmenorrhea

Assessment

A 23-year-old female college student was referred with a 4-year history of primary dysmenorrhea. She had moderate cramping pain in the lower abdomen on the first two days of menstruation that was linked with slight functional restriction. The patient complained that the pain disrupted normal activities at menstrual time, but was not linked to any known pelvic pathology. No history of gynecological problems, pelvic inflammatory disease, endometriosis or prior abdominal surgery. The Visual Analogue Scale (VAS), Numeric Pain Rating Scale (NPRS), Menstrual Symptom Questionnaire (MSQ), Moos Menstrual Distress Questionnaire (MDQ), Verbal Multidimensional Scoring System (VMSS), and pain duration, were used to conduct baseline assessment. The pre-intervention VAS and NPRS were 5/10, MSQ score was 39, MDQ score was 35, VMSS grading was Grade II and pain duration was 2 days. The participant was put into a 4 weeks intervention program based on isometric abdominal contraction and diaphragmatic breathing exercises.”

MATERIALS AND METHODS

Study Design: Case study.

Materials Used: Visual Analogue Scale (VAS), Numeric Pain Rating Scale (NPRS), Menstrual Symptom Questionnaire (MSQ), Moos Menstrual Distress Questionnaire (MDQ)

Verbal Multidimensional Scoring System (VMSS), Treatment couch, Yoga mat

PROCEDURE

The participant was given a short explanation about the study and intervention protocol before the study started. Participation was informed beforehand.

VAS, NPRS, MSQ, MDQ, VMSS, and duration of pain were used to conduct pre-intervention assessment. The subject was then subjected to a combination of physiotherapy intervention program that included isometric abdominal contraction and diaphragmatic breathing exercises.

The therapist supervised the intervention sessions, which lasted about 20-30 minutes per session, 5 days a week, and 4 weeks. The exercises were advanced slowly depending on the performance and tolerance of the participant.

Following completion of the intervention period post-intervention assessment was performed using the same outcome measures to evaluate the effectiveness of the intervention.

INTERVENTION

“The participant was put on a structured physiotherapy intervention program of isometric abdominal contraction exercises and diaphragmatic breathing exercises during 4 weeks.

Isometric Abdominal Contraction Exercises

The participant was placed in crook lying in a comfortable position. She was asked to pull the abdominal muscles inwards without holding the breath or causing the trunk movement. The duration of each contraction was 5-10 seconds, then relaxation.

The exercise was performed for.

- 10 repetitions
- 2-3 sets per session

- 5 sessions per week

- Duration: 4 weeks

The goals of these exercises were to enhance the strength of abdominal muscles, increase core stability, and decrease the perception of pain using neuromuscular mechanisms.

Diaphragmatic Breathing Exercises

The participant was also told to lie in a comfortable supine position with a hand over the chest, and the other over the abdomen. She was requested to breathe in slowly using the nose, letting the abdomen to lift and breathe out softly using the mouth and relaxing the body.

The breathing exercises were performed as:

- Slow, controlled breathing
- Approximately 10 repetitions per set
- 2-3 sets per session
- 5 sessions per week
- Duration: 4 weeks

Diaphragmatic breathing was also included to facilitate relaxation, enhance oxygenation, decrease sympathetic activity, and alter pain perception.

Combined Intervention Rationale.

Isometric abdominal contraction and diaphragmatic breathing were chosen as a combination to treat both physical and autonomic components of primary dysmenorrhea. Whereas isometric exercises enhance the activation of abdominal muscles and the stability of the core, diaphragmatic breathing promotes relaxation and pain management. These interventions can have a synergistic effect, which can help to reduce menstrual pain and functional outcomes.

OUTCOME MEASURES

The effectiveness of the intervention was assessed using the following outcome measures:

1. Visual Analogue Scale (VAS)

The Visual Analogue Scale (VAS) is a reliable and valid tool used to assess pain intensity. It consists of a 10-cm horizontal line ranging from 0 (no pain) to 10 (worst imaginable pain). The

- participant was asked to indicate the intensity of menstrual pain on the scale.
2. **Numeric Pain Rating Scale (NPRS)**
The Numeric Pain Rating Scale (NPRS) is an 11-point scale ranging from 0 to 10, where 0 indicates no pain and 10 indicates the worst possible pain. The participant rated the intensity of menstrual pain before and after the intervention
 3. **Menstrual Symptom Questionnaire**
The Menstrual Symptom Questionnaire (MSQ) is a self-reported questionnaire used to assess the severity and frequency of menstrual symptoms. Higher scores indicate greater symptom severity.
 4. **Moos Menstrual Distress Questionnaire (MDQ)**
The Moos Menstrual Distress Questionnaire (MDQ) evaluates

- physical, behavioural, and emotional symptoms associated with menstruation. Lower scores indicate improvement in menstrual distress.
5. **Verbal Multidimensional Scoring System (VMSS)**
The Verbal Multidimensional Scoring System (VMSS) is used to classify the severity of dysmenorrhea into different grades based on pain intensity, limitation of activities, and associated symptoms.”
 6. **Pain Duration**
Pain duration was recorded as the total duration of menstrual pain experienced by the participant during each menstrual cycle.

RESULTS

OUTCOME MEASURE	PRE INTERVENTION	DURING INTERVENTION	POST INTERVENTION
VAS	5/10	3	2
NPRS	5/10	4	2
MSQ	39	27	17
MDQ	35	24	14
VMSS	II	II	I
Pain Duration	2 DAYS	1.5 DAYS	1 DAY

Interpretation:

The young subject (23 years) showed a steady progress after the intervention. The pain intensity, the severity of menstrual symptoms and the duration of pain were reduced, which is a positive outcome of the isometric abdominal contraction and diaphragmatic breathing exercises. This treatment seemed to enhance functional tolerance at menstruation and decrease the overall load of primary dysmenorrhea.

DISCUSSION

The current case study assessed the efficacy of the isometric abdominal contraction and diaphragmatic breathing exercises in reducing the intensity of pain and menstrual symptoms in a young female patient with primary dysmenorrhea. The results showed a reduction in the severity of pain, severity of menstrual symptoms and the duration of

pain after four weeks of intervention. Visual Analogue Scale (VAS) and Numeric Pain Rating Scale (NPRS) scores decreased to 2/10 and 5/10 respectively, which showed a clinically significant pain decrease. On the same note, Menstrual Symptom Questionnaire (MSQ) score dropped to 17, and Moos Menstrual Distress Questionnaire (MDQ) score dropped to 14 indicating improvement in menstrual symptoms and functional status.

“Primary dysmenorrhea is largely linked with the production of high levels of prostaglandin, which result in uterine hypercontractility, vasoconstriction, and ischemia, which are causes of menstrual pain. Physiotherapy, especially exercise therapy, has been demonstrated to relieve the symptoms by enhancing pelvic blood flow, decreasing muscle tension and increasing the release of endorphins.

Physical fitness and pain tolerance are also improved with exercise, which improves the quality of life in women with dysmenorrhea.¹

The present study featured isometric abdominal contraction exercises to enhance abdominal muscle activation and core stability. Abdominal musculature strengthening can be used to reduce pain by increasing neuromuscular control, and providing better postural support. Past research has shown positive outcomes of core strengthening and exercise therapy in terms of decreasing pain intensity and enhancing functional results in women with primary dysmenorrhea.²

The diaphragmatic breathing exercises were included to treat the autonomic and psychological aspects of pain. These exercises enhance parasympathetic stimulation, decrease sympathetic hyperactivity, enhance oxygenation, and decrease of muscle tension. Diaphragmatic breathing can help to relax and change the perception of pain and decrease menstrual discomfort.” The same has been observed in the research on breathing exercises and mind-body interventions to manage dysmenorrhea.³

The synergistic effect of isometric abdominal contraction and diaphragmatic breathing seemed to be beneficial in both physical and autonomic pain-mechanisms. The fact that the pain time was decreased by 2 days to 1 day and that VMSS grading was changed to Grade II to Grade I further attests to the usefulness of this method. Nevertheless, since this research was conducted on one patient only, the results cannot be applied to the broader population. It is suggested that future research should consider larger sample sizes and extended follow-up to validate these results and provide more solid evidence on the efficacy of this combined intervention.⁴

CONCLUSION

“Isometric abdominal contraction and diaphragmatic breathing exercises seemed to be helpful in decreasing the intensity of

pain, the severity of menstrual symptoms, and the duration of pain in a patient with primary dysmenorrhea. After four weeks of intervention, VAS, NPRS, MSQ, MDQ, and VMSS scores showed improvement, as well as the duration of pain.” The exercises are cheap, easy to do and simple, and hence they make a viable physiotherapy intervention in the management of primary dysmenorrhea. These findings should be validated by more extensive studies using bigger sample sizes.

Declaration by Authors

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