

The Effectiveness of Barre & Conventional Core Training program along with Meridian exercise on Women's Health with Primary Dysmenorrhea – A RCT study (Pilot Study)

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KEYWORDS

Primary Dysmenorrhea, Meridian Exercise, Core Strengthening, Barre Core Training.

ABSTRACT

Aim: This randomized controlled trial (RCT) aims to evaluate the effectiveness of Barre and Conventional Core Training programs, combined with Meridian exercise therapy, in improving women's health with primary dysmenorrhea.

Background: Primary dysmenorrhea poses a significant health concern for women, impacting their quality of life. Exercise interventions, including Barre and conventional core training, along with Meridian exercise therapy, have shown promise in managing dysmenorrhea symptoms. However, their combined effectiveness remains understudied.

Materials and Methods: Fifteen participants were randomly assigned to three groups: Barre with Meridian exercise therapy (GROUP A), conventional core training with Meridian exercise (GROUP B), and conventional core training with lifestyle modification (GROUP C). The study duration was 12 weeks, with assessments conducted at baseline and post-intervention.

Results: Participants in all groups exhibited differences in pain levels, core strength, abdominal adiposity, waist-hip ratio, and quality of life post-intervention. Notably, GROUP A showed significant improvements compared to GROUP B and GROUP C, suggesting the superior effectiveness of the Barre and Meridian exercise combination.

Conclusion: Integrating Barre with Meridian exercise therapy offers a promising approach for managing primary dysmenorrhea, enhancing women's overall well-being. This pilot study underscores the importance of adopting a holistic exercise-based intervention to address the multifaceted aspects of dysmenorrhea and improve women's health outcomes.

1. Introduction

Primary dysmenorrhea is a prevalent gynecological condition characterized by cramping pain in the lower abdomen, which often radiates to the lower back and thighs. It is commonly accompanied by symptoms such as nausea, headaches, fatigue, dizziness, and gastrointestinal disturbances, all of which contribute to a decline in overall well-being and daily productivity (Harel, 2006). This condition predominantly affects adolescent and young adult females, with studies indicating that approximately 60–90% of menstruating women experience dysmenorrhea to varying degrees (Iacovides et al., 2015). The impact of primary dysmenorrhea extends beyond physical discomfort, as it frequently results in absenteeism from school and work, leading to disruptions in academic and professional performance (Dawood, 2006).

Dysmenorrhea is classified into two types: primary and secondary. Primary dysmenorrhea occurs in the absence of any underlying gynecological pathology and is mainly attributed to excessive levels of prostaglandins, which induce hypercontractility of the uterine muscles, leading to ischemia and pain (Proctor & Farquhar, 2006). In contrast, secondary dysmenorrhea is associated with conditions such as endometriosis, uterine fibroids, and pelvic inflammatory disease, requiring medical intervention for effective management (Habibi et al., 2015). The pain in primary dysmenorrhea typically begins just before or at the onset of menstruation and subsides as the menstrual cycle progresses (Al-Kindi et al., 2022).

Several risk factors have been identified for primary dysmenorrhea, including early menarche, prolonged

menstrual flow, smoking, obesity, a family history of dysmenorrhea, and high levels of stress (Duman et al., 2022). The traditional approach to managing primary dysmenorrhea involves the use of nonsteroidal anti-inflammatory drugs (NSAIDs), which help reduce pain by inhibiting prostaglandin synthesis (Marjoribanks et al., 2015). However, long-term use of NSAIDs is associated with potential side effects such as gastrointestinal disturbances, headaches, and dizziness (Zhou et al., 2010). As a result, there has been growing interest in non-pharmacological interventions, particularly exercise-based therapies, for managing dysmenorrhea without adverse effects.

Exercise has been widely recognized as an effective non-pharmacological strategy for alleviating menstrual pain, primarily due to its role in enhancing blood circulation, reducing stress, and promoting the release of endorphins, which act as natural pain relievers (Shahrjerdi et al., 2012). Among the various exercise modalities explored for primary dysmenorrhea management, Barre training, conventional core training, and Meridian exercises have gained attention for their potential benefits.

Barre training is a fusion of ballet, Pilates, and strength training that focuses on improving flexibility, posture, and muscle endurance. This form of exercise is particularly beneficial in strengthening the core and lower body muscles, which can help in reducing menstrual pain and discomfort (Krasova et al., 2023). Conventional core training programs, which include exercises targeting the abdominal, pelvic, and lower back muscles, have also been shown to improve postural stability and muscular endurance, thereby alleviating dysmenorrhea-related discomfort (McGill, 2010). Additionally, Meridian exercises, which are rooted in traditional Chinese medicine, involve acupressure, stretching, and energy flow techniques aimed at enhancing circulation and reducing pain perception (Lee et al., 2013).

Despite increasing evidence supporting exercise-based interventions for primary dysmenorrhea, there remains a gap in understanding the comparative effectiveness of Barre training, conventional core training, and Meridian exercises. This randomized controlled trial (RCT) aims to bridge this gap by evaluating these methods in terms of their impact on menstrual pain intensity, overall discomfort, and quality of life among women with primary dysmenorrhea. The findings of this pilot study will contribute to evidence-based recommendations for non-pharmacological interventions, providing women with safe and effective strategies for managing primary dysmenorrhea.

2. Materials and Methods

This randomized controlled trial (RCT) was conducted over 12 weeks at the School of Physiotherapy, AVMC to evaluate the effectiveness of different exercise interventions in managing primary dysmenorrhea. A total of 15 participants, selected through simple random sampling, were divided into three groups: Group A underwent Barre training combined with Meridian exercise therapy, Group B received conventional core training with Meridian exercise therapy, and Group C engaged in conventional core training with lifestyle modifications. Participants were women aged 18 to 23 years with regular menstrual cycles and complaints of pain during menstruation. Their BMI ranged from 18 to 29, and their waist-to-hip ratio fell between 0.70 to 0.90 (Shobeiri et al., 2018). The study excluded individuals with irregular menstruation, endometriosis, fibroids, adenomyosis, pelvic inflammatory diseases, reproductive organ carcinoma/tumors, intrauterine devices, hormonal birth control, recent surgery or trauma, and those who were pregnant or lactating (Proctor et al., 2007).

Resistance bands and weights were integrated into the exercise regimen to enhance muscle activation, strengthen core stability, and improve blood circulation. These tools were deliberately utilized to increase the intensity of the exercises, facilitating better neuromuscular engagement and physiological adaptations. This approach aimed to alleviate pain and enhance overall functional performance (Kraemer et al., 2004).

The outcome measures in this pilot study encompass various aspects of women's health and dysmenorrhea management. The WALIDD Score was used to evaluate the severity of dysmenorrhea based on factors such as pain intensity, duration, and associated symptoms (Teherán et al., 2018). The Menstrual Distress Questionnaire, a validated tool, assessed the severity of menstrual symptoms and their impact on daily functioning (Moos., 1968). Waist and hip circumference measurements were taken to evaluate changes in body composition and the distribution of adipose tissue, which may influence dysmenorrhea (Rad et al., 2018). Skin fold thickness was measured using a caliper to assess changes in subcutaneous fat distribution, which may correlate with hormonal fluctuations and dysmenorrhea severity (Taheri et al., 2020). Additionally, pressure biofeedback testing was employed to measure the ability of core muscles to contract and relax effectively (Cairns et al., 2000), as this can impact pelvic pain and dysmenorrhea. These outcome measures and assessment tools provided

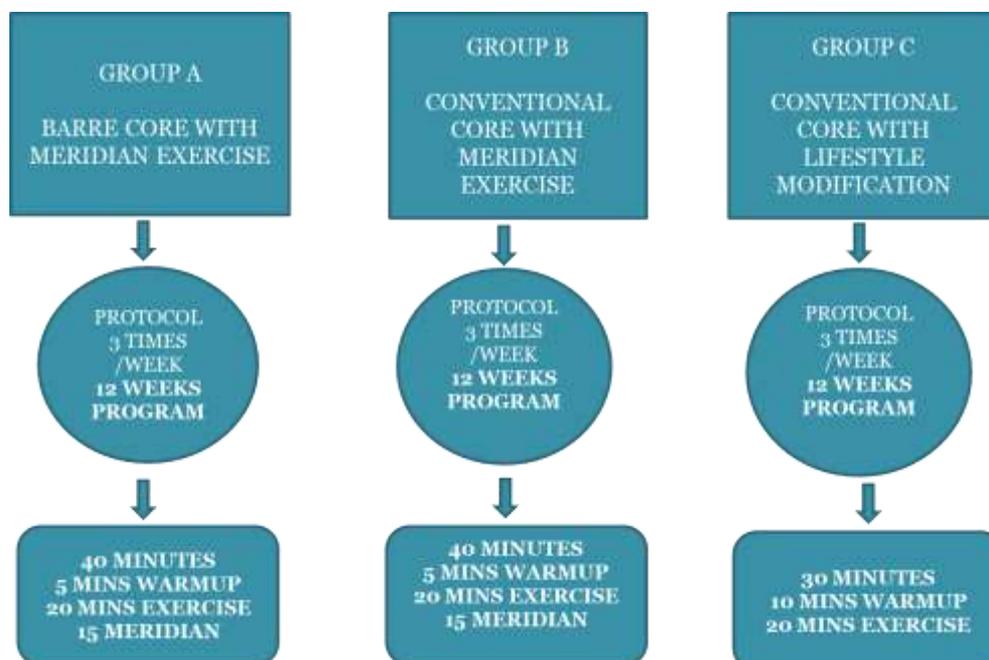
comprehensive insights into the effectiveness of Barre training and conventional core training programs, along with Meridian exercise therapy, in managing primary dysmenorrhea and improving women's health.

The outcome measures for this pilot study encompass a comprehensive assessment of various factors related to primary dysmenorrhea and overall women's health. These measures include evaluating pain in terms of its location, intensity, impact on working ability, and the number of days it occurs during the menstrual cycle. Additionally, peri-menstrual symptoms will be assessed to understand the broader spectrum of symptoms experienced before and during menstruation. Waist-hip ratio and body fat composition, particularly subcutaneous adipose tissue, will be measured to explore any associations between body composition and dysmenorrhea. Furthermore, muscle strength and function will be evaluated to investigate potential correlations between muscular health and menstrual pain. By employing these outcome measures, this pilot study aims to provide a comprehensive understanding of the effectiveness of the intervention in managing primary dysmenorrhea and improving women's overall health and well-being.

3. Procedure

The intervention for managing primary dysmenorrhea and improving women's health was divided into three groups, each undergoing a unique protocol. Group A engaged in "Barre Core with Meridian Exercise," Group B participated in "Conventional Core with Meridian Exercise," and Group C followed "Conventional Core with Lifestyle Modification." Each group adhered to a structured protocol conducted three times per week for a duration of 12 weeks.

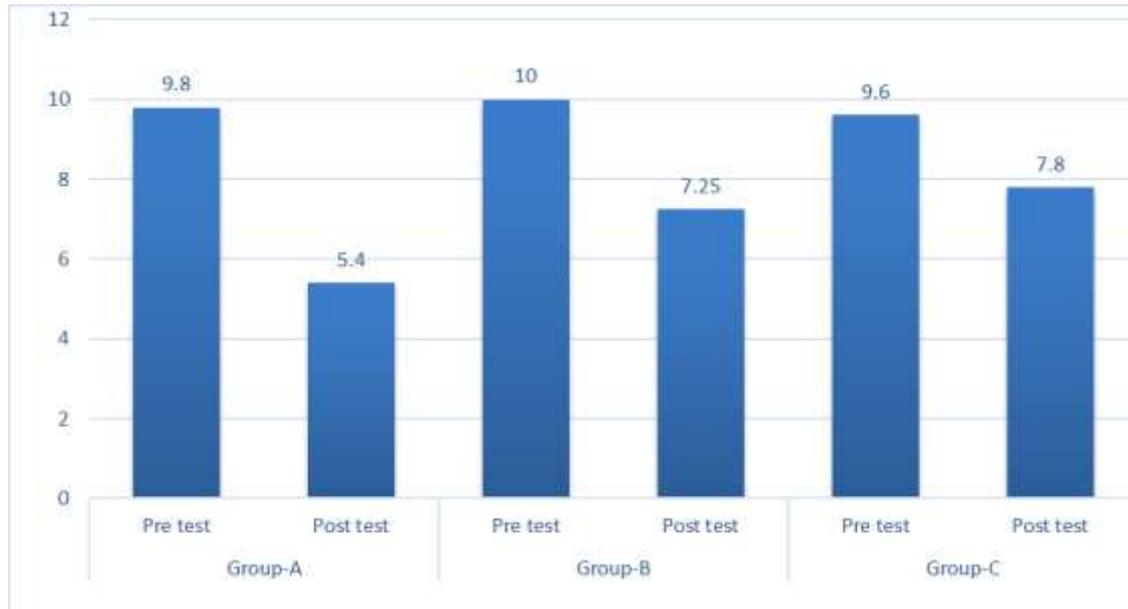
For Group A, the session comprised a 40-minute routine, beginning with a 5-minute warmup, followed by 20 minutes of barre core exercises, and concluding with 15 minutes of meridian exercises. Similarly, Group B underwent a 40-minute session, also starting with a 5-minute warm up, engaging in 20 minutes of conventional core exercises, and ending with 15 minutes of meridian exercises. In contrast, Group C's protocol consisted of a 30-minute routine, which included a 10-minute warm up and 20 minutes of conventional core exercises, along with lifestyle modifications tailored to the participants. Written informed consent was secured from the subjects for using their images while performing the exercise intervention in both groups which can be utilized when the research is submitted for publication.



4. Results

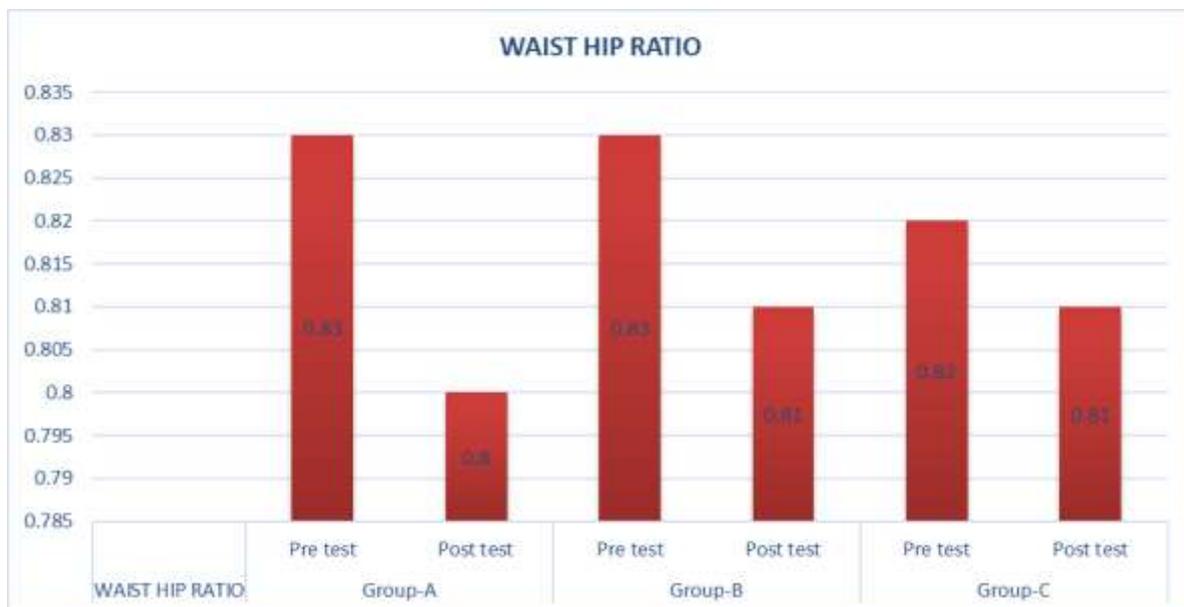
This pilot study investigated the impact of an intervention on three different groups—Group-A, Group-B, and Group-C—by evaluating several variables before and after the intervention. The variables assessed included the WALIDD score, waist-to-hip ratio, skin fold measurements, pressure biofeedback, and menstrual distress levels. Non-parametric tests were employed to analyze the data and identify any significant changes between pre- and post-test results.

The following section presents the findings for each of these parameters, showcasing the differences observed within each group as well as the overall trends.



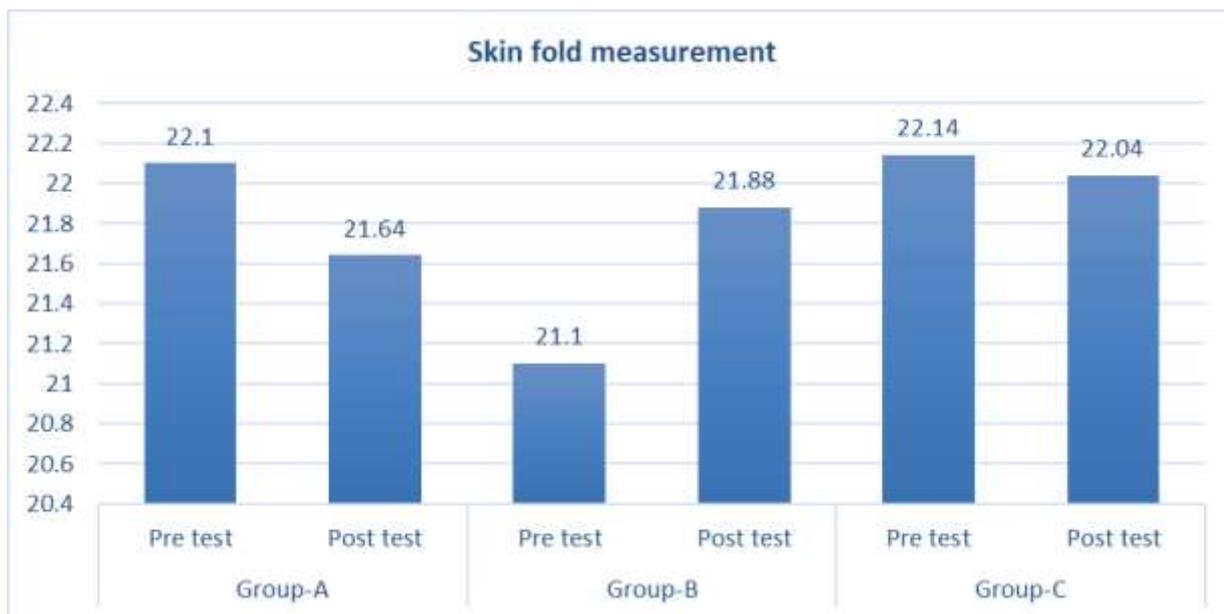
Graph-1: WALIDD SCORE distribution.

The table presents the mean scores of three different groups (Group-A, Group-B, and Group-C) on a pre-test and a post-test. For Group-A, the mean score on the pre-test is 9.8, while the mean score on the post-test drops significantly to 5.4. Similarly, Group-B has a mean pre-test score of 10, which decreases to 7.25 on the post-test. Group-C shows a pre-test mean of 9.6, with a post-test mean of 7.8.



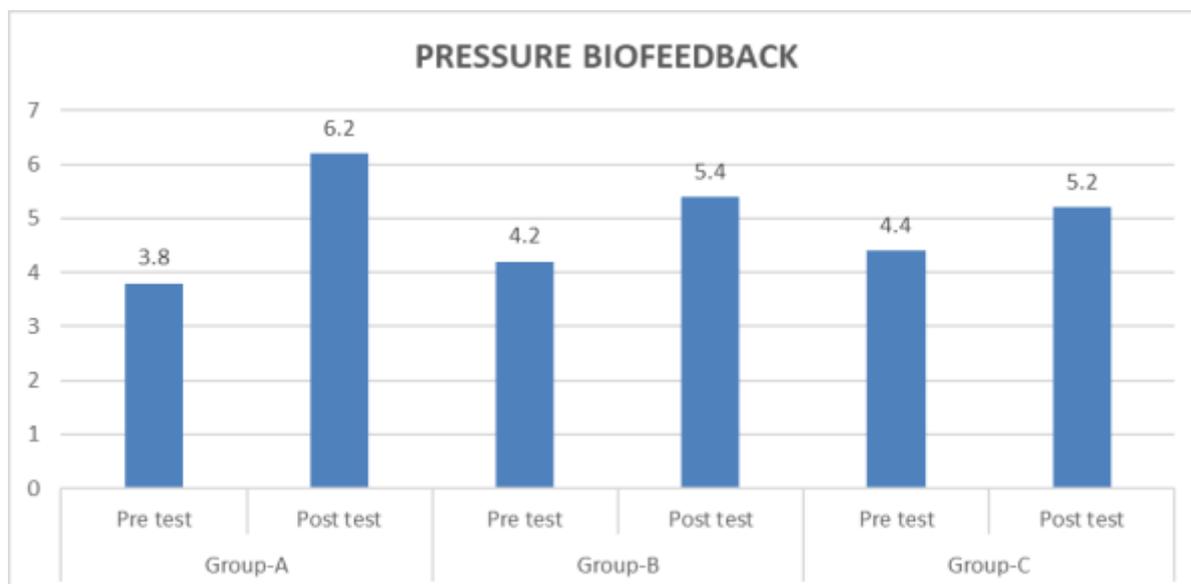
Graph-2. Pre of post condition of patients according to Waist hip ratio

The table displays the waist-to-hip ratios for three different groups (Group-A, Group-B, and Group-C) measured both before (pre-test) and after (post-test) a certain intervention or period. Group-A starts with a pre-test waist-to-hip ratio of 0.83, which slightly decreases to 0.80 in the post-test. Group-B also begins with a waist-to-hip ratio of 0.83, with a minor reduction to 0.81 in the post-test. Group-C has an initial ratio of 0.82, which decreases marginally to 0.81 post-test.



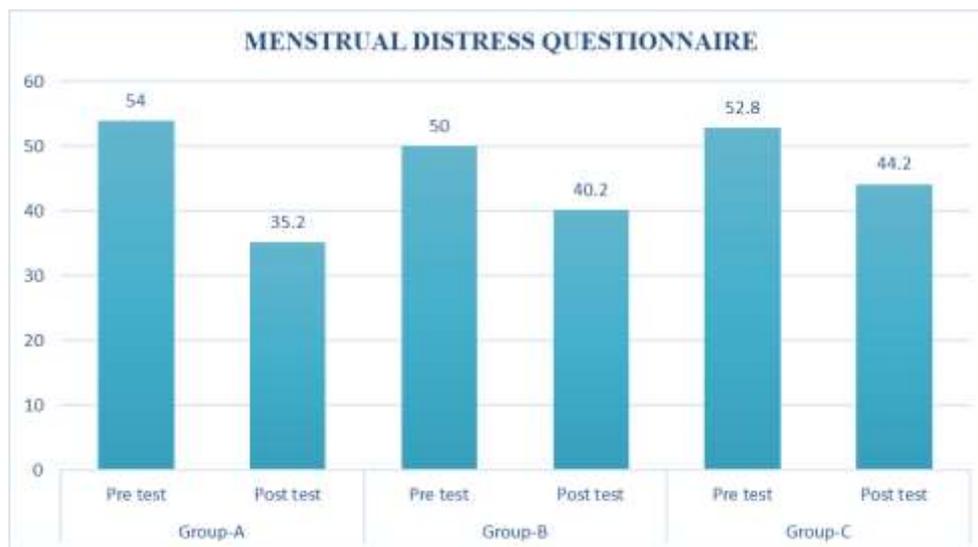
Graph-3: Classification of skin fold measurement in pre and post condition.

In Group-A, the mean skin fold measurement decreases from 22.1 in the pre-test to 21.64 in the post-test, indicating a slight reduction in skin fold thickness. Group-B shows a different trend, with an increase in skin fold measurement from 21.1 in the pre-test to 21.88 in the post-test, suggesting a slight increase in skin fold thickness. Group-C's measurements show a minor decrease from 22.14 in the pre-test to 22.04 in the post-test.



Graph-4. Classification of pressure biofeedback in pre and post condition.

The table presents the pressure biofeedback scores for three groups (Group-A, Group-B, and Group-C) before (pre-test) and after (post-test) a specific intervention or period. Group-A shows a notable increase in pressure biofeedback scores from 3.8 in the pre-test to 6.2 in the post-test, indicating a significant improvement. Group-B also exhibits an increase, with scores rising from 4.2 in the pre-test to 5.4 in the post-test. Similarly, Group-C's scores increase from 4.4 in the pre-test to 5.2 in the post-test.



Graph-5: Menstrual distress questionnaire

From the above graph Menstrual Distress Questionnaire (MDQ) scores for three groups (Group-A, Group-B, and Group-C) before (pre-test) and after (post-test) an intervention or period. Group-A shows a significant reduction in MDQ scores from 54 in the pre-test to 35.2 in the post-test, indicating a marked decrease in menstrual distress. Group-B also experiences a decrease in MDQ scores, from 50 in the pre-test to 40.2 in the post-test, though the reduction is less pronounced compared to Group-A. Similarly, Group-C's scores decrease from 52.8 in the pre-test to 44.2 in the post-test.

Comparison of parameters among groups					
Variables	Group	Mean	Std. Deviation	F Value	P value
PRE_WALIDD_SCORE	1	9.80	0.84	0.133	0.876
	2	10.00	1.58		
	3	9.60	1.14		
POST_WALIDD_SCORE	1	5.40	0.55	10.636	0.002*
	2	7.20	1.10		
	3	7.80	0.84		
PREW_H_RATIO	1	0.83	0.02	0.581	0.575
	2	0.83	0.02		
	3	0.82	0.02		
POSTW_H_RATIO	1	0.80	0.01	1.323	0.303
	2	0.81	0.02		
	3	0.81	0.02		
PRESKIN_FOLD	1	22.10	0.16	0.151	0.862
	2	22.10	0.12		
	3	22.14	0.11		
POSTSKIN_FOLD	1	21.64	0.15	16	<0.001*
	2	21.88	0.08		
	3	22.04	0.09		
PRE_PBF	1	3.80	0.84	0.824	0.462
	2	4.20	0.84		
	3	4.40	0.55		
POST_PBF	1	6.20	0.45	6	0.016*
	2	5.40	0.55		
	3	5.20	0.45		
PRE - 4 days before	1	54.00	16.52	0.085	0.919
	2	50.80	11.08		
	3	52.80	8.08		
PRE - Most recent	1	112.40	11.06	0.876	0.441
	2	115.80	19.07		
	3	126.00	19.27		
PRE remainder	1	47.60	9.63	0.417	0.668
	2	44.40	10.97		
	3	41.80	9.52		
POST 4 days before	1	35.20	14.70	0.801	0.471
	2	40.20	9.73		
	3	44.20	8.35		
POST Most recent	1	78.20	12.80	4.142	0.043*
	2	96.00	19.47		
	3	111.80	21.93		
POST remainder	1	30.60	6.58	0.299	0.747
	2	32.40	8.93		
	3	34.40	7.64		

The results of the present pilot study were calculated using non-parametric tests. The pre-test and post-test values for the WALIDD score, skin fold measurements, pressure biofeedback, and the Menstrual Distress Questionnaire indicate significant differences between the pre and post conditions.

5. Discussion

Primary dysmenorrhea is a major concern for women, often resulting in frequent medical consultations. Effective and accessible treatment options with minimal side effects are essential (Brown et al., 2010). This pilot study evaluated the impact of Barre and conventional core training combined with Meridian exercise on primary dysmenorrhea management.

The results indicate that Group A (Barre with Meridian exercise) showed significant improvements in pain levels, core strength, abdominal adiposity, waist-hip ratio, and overall quality of life compared to Group B (Conventional core with Meridian) and Group C (Conventional core with lifestyle modification). These findings align with previous studies that highlight the benefits of exercise-based interventions in reducing dysmenorrhea symptoms (Hemalatha et al, 2023).

The superior effectiveness of Barre exercises can be attributed to their emphasis on core stability, flexibility, and controlled movement. Barre incorporates isometric and dynamic exercises that engage deep core muscles, enhancing pelvic stability and circulation. When paired with Meridian exercises, which focus on improving energy flow and reducing muscle tension, the combined intervention proves to be highly effective in alleviating menstrual pain.

In contrast, while conventional core exercises also yielded positive results, the improvements were comparatively moderate. Core strengthening contributes to better posture, reduced lower back strain, and enhanced blood circulation, which can help alleviate dysmenorrhea-related discomfort (Agarwal et al., 2021). However, the lack of flexibility-focused elements in conventional core training may explain the comparatively lesser efficacy.

Meridian exercises play a crucial role in stimulating energy pathways and enhancing overall physiological balance (Lin et al., 2018). The findings suggest that the combination of Barre and Meridian exercises works synergistically to relieve menstrual cramps, reduce inflammation, and enhance overall well-being.

Group C, which incorporated lifestyle modifications along with core training, exhibited minimal improvements compared to Groups A and B. This suggests that while lifestyle changes may be beneficial, they may not be as effective in managing primary dysmenorrhea symptoms when compared to targeted exercise interventions (Proctor et al., 2006).

Overall, this pilot study supports the implementation of structured exercise programs, particularly Barre combined with Meridian exercises, as a non-pharmacological approach for managing primary dysmenorrhea. Future research with a larger sample size and longer follow-up periods is recommended to validate these findings and explore long-term benefits.

6. Conclusion

In conclusion, our pilot study underscores a robust association between primary dysmenorrhea and core exercises. Across all three groups, participants exhibited variations in pain levels, core strength, abdominal adiposity, waist-hip ratio, and quality of life post-intervention.

Significantly, the outcomes of Barre with Meridian exercise therapy (GROUP A) differed notably from those of conventional core training with Meridian exercise (GROUP B) and conventional core training with lifestyle modification (GROUP C). Our findings strongly indicate that integrating Barre, renowned for its focus on strength, flexibility, and balance, with Meridian exercise therapy enhances the management of primary dysmenorrhea in women.

This pilot study strongly advocates for the adoption of an integrated approach, particularly incorporating Barre alongside Meridian exercise therapy, as a promising strategy for improving the overall well-being of women grappling with this prevalent health concern.

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