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Combined Effects of Barre and Gym Ball Exercises on Pain Distress and Quality of Life in Primary Dysmenorrhea

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ABSTRACT

OBJECTIVE: The study aimed to determine the combined effects of Barre and gym ball exercises on pain, Distress, and quality of life in primary dysmenorrhea

METHODOLOGY: A randomized controlled trial was conducted with 42 participants, equally divided into two groups (n=21). Group A received a combination of barre and gym ball exercises, while Group B performed barre exercises only. Each session lasted 30 minutes and was conducted three times per week for 12 weeks. Pre- and post-assessments of pain, Distress, dysmenorrhea severity, and quality of life were carried out using the NPRS, MEDI-Q, WaLLiD scale, and Q-LES-Q-SF questionnaires.

RESULTS: No statistically significant differences were observed between Group A and Group B for NPRS, WaLLiD, and MEDI-Q scores ($p > 0.05$). However, Group A demonstrated a significant improvement in quality of life ($p = 0.005$), whereas Group B did not ($p = 0.11$). Within-group comparisons revealed statistically significant improvements across all outcome measures ($p < 0.001$), indicating that both interventions were effective.

CONCLUSION: The results indicate that both barre and gym ball exercises, as well as Barre exercises alone, are useful for reducing pain and discomfort and improving quality of life in women with primary dysmenorrhea. However, the study found that combining gym ball with barre exercises improves quality of life more effectively.

KEYWORDS: Barre, Dysmenorrhea, Female, Gym, Menstrual Cycle, Quality of Life

INTRODUCTION

Dysmenorrhea is derived from the Greek words dys meaning difficult, mens meaning month, and rhoia meaning flow, collectively referring to painful menstruation[1]. It is a highly prevalent condition, affecting approximately 16% to 93% of women who are of reproductive age[2]. In Pakistan, particularly in Karachi, prevalence has been reported to be as high as 72.7% [3]. Dysmenorrhea is broadly classified into two groups based on its underlying pathophysiology: Primary and Secondary. Primary dysmenorrhea (PD) refers to painful menstruation in the absence of identifiable pelvic pathology.

In contrast, secondary dysmenorrhea is associated with underlying conditions such as endometriosis, fibroids, adenomyosis, or pelvic inflammatory disease. The highest prevalence of primary dysmenorrhea is observed in women aged 16–25 years[4]. The pathophysiology of primary dysmenorrhea is primarily linked to elevated levels of prostaglandins, which induce uterine contractions during menstruation. Symptom severity is strongly correlated with prostaglandin levels[5]. Typically, pain begins a few hours before or at the onset of menstruation, lasting for 24–48 hours, and often peaks on the first day. It is commonly localized in the lower abdomen and may radiate to the lower back and thighs.

Factors that increase the likelihood of having primary dysmenorrhea are tobacco use, a family member with a history of the condition, obesity, heavy monthly flow, an early onset of menstruation, and alcohol use[6]. Exercise plays a significant role by enhancing blood circulation, increasing oxygenation, improving tissue flexibility, and promoting endorphin release, which act as natural analgesics [7]. Barre exercise is a modern fitness approach that is relatively new, alternative, inexpensive, and a highly efficient way of improving health. Barre exercise is an exercise regimen built around a fusion of Pilates, yoga, functional strength training, and ballet moves[8]. Similarly, gym ball exercises concentrate on improving core strength, stability, balance, and circulation. Improved blood circulation, stability, and balance can eventually help lessen menstruation pain[9]. The objective of this study is to determine the combined effects of Barre and gym ball exercises on pain, Distress, and quality of life in primary dysmenorrhea. Pain related to dysmenorrhea can be quite incapacitating and is linked to limitations in daily activities and physical activities. One major factor contributing to a low quality of life is pain. Primary dysmenorrhea is considered to be the major cause of absence from work in teenage girls. Thus, this research on the combined effect of Barre and gym ball exercises aims to show the importance of exercises as a non-pharmacological intervention for menstrual pain in individuals with primary dysmenorrhea.

METHODOLOGY

The study was designed as a single-blinded randomized controlled trial (NCT06750393). The sample size was calculated using Open Epi, with the Quality-of-Life Enjoyment and Satisfaction Questionnaire Short Form as the outcome measure from a previous study. The total sample size was 42. Participants were recruited through non-probability convenience sampling and randomly allocated into two groups using the lottery method. The study followed a single-blind design, in which the assessor was blinded to group allocation. Data were gathered from Allama Iqbal Memorial and Teaching Hospital in Sialkot, as well as Islam Teaching Hospital, from March to May 2025.

Data Collection Tools: A numeric pain rating scale was used to assess pain. The Menstrual distress Questionnaire assessed Menstrual Distress. Severity of Dysmenorrhea was assessed using the WaLLiD score scale, and Quality of life was assessed using the Q-LES-Q-SF. Inclusion criteria included females aged 17-25 years, with a WaLLiD score of 5-12, a score of 5 or above on the NPRS, and regular menstrual periods for at least three months. Exclusion criteria included women who use hormonal contraception, married women, women with secondary dysmenorrhea, women diagnosed with Polycystic Ovary Syndrome and those suffering from menstrual irregularities.

Intervention: Participants in both groups underwent a 30-minute supervised physiotherapy session, consisting of a 5-minute warm-up, 20-minute exercise phase, and a 5-minute cool-down period. The warm-up and cool-down phases included low-intensity activities such as walking and light jogging, aimed at preparing the musculoskeletal system for exercise and gradually restoring heart rate and breathing to baseline levels. For pain management during menstruation, superficial heat therapy was applied using hot packs. The hot packs were placed over the lower abdomen and lower back for 10 minutes each, specifically during the first day of the menstrual cycle, to alleviate discomfort and muscle spasm.

The experimental group received Barre exercise and gym ball exercises. The control group did Barre exercises for a period of 3 months. Each exercise featured a 10-second hold for 12 repetitions per set, 3 sets per day, and 3 days per week. During menstruation, no exercises were performed.

Gym ball Exercises:

Knee tucks: Tuck the knees into the chest, roll the ball forward, and then return to the beginning position.

Leg curls: Bend the knee and move heels toward the buttocks while the rest of the body remains still.

Back extension exercise: Facing the floor, place the thighs on the gym ball and allow the spine to expand upward

Barre Exercises

Ballerina squats: With your toes pointing slightly outward, place your feet shoulder-width apart. Keep your back straight as you slowly lower into a squat. Instead of putting your weight on your toes, keep it on your heels. Return to standing slowly while keeping your back straight.

Arabesque leg lift: Maintain an even weight distribution between both legs while standing with your feet shoulder-width apart. Keeping the working leg straight and aligned with your spine, raise and lower it up and back. Do not bend your knee or raise your hip. Maintaining your ankle dorsiflexed, keep the working leg extended until it is nearly parallel to the floor.

Allege propeller: Maintain a straight posture. Keep your ankle dorsiflexed and extend the working leg until it is nearly parallel to the floor. Use your other leg to create a propeller-like motion while keeping the working leg in place. Lift your foot off the ground, keeping your knee straight, and move your ankle in circles. Assume you're producing power with a

propeller. Repeat the motion on the opposing side, swapping legs and maintaining control throughout.

Releve plie: Lift your heels off the floor and stand up on the balls of your feet. Lower your body into a pile by bending your knees while remaining on the balls of your feet. To return to the beginning posture while staying on the balls of your feet, straighten your knees.

Parallel plie pulse: Place your feet hip-width apart, parallel to the ground. Engage your core and maintain a neutral spine while your arms are relaxed in front of your chest, on your hips. Then, to squat, bend your knees and drop your hips. Keep your thighs parallel to the floor, but only drop them as far as you feel comfortable without losing form.

Reaching rond de jambe: Keep the leg straight and shift your weight onto it. Maintain turnout by extending the other leg in front of you and pointing its toes. The outstretched leg should move in a circle. Sweep the leg out to the side. To complete the circle, move the leg behind you. Bring the leg back to the front to resume the starting position.

Plie pulse topassé: Bend your knees to lower yourself into the plie posture. Perform mild, controlled pulses by slightly elevating and lowering your hips. After you finish the pulses, shift your weight to one leg. Slide your foot up the standing leg, bend the knee, and bring your toes to rest just behind the knee to elevate the opposing leg into passé. Turn your lifted knee out to the side while keeping your hips level and facing forward. Return the elevated leg to the original position. On the opposite leg, repeat the plie pulses and switch to passé.

RESULTS

A total of 42 participants were part of this study. Twenty-one participants in each group were allocated to Group A and Group B via a lottery method. A sample size of 42 was calculated, assuming a 10% attrition rate. All 42 participants completed the study, out of a total sample size of 42, and there were no dropouts. After data collection, we analysed the data using the latest version of SPSS, for the presentation of demographics and categorical features were presented as frequencies, mean ± SD, and percentages.

Table I showed demographic data analysis for Group A: the participants' mean age was 19.4762 years (SD of 1.28915). The average BMI was 19.8381±3.17183. Participants in Group B had a mean age of 19.2381 years and a standard deviation of 1.70014. On average, they had a BMI of 20.6571±3.53618. Normality of the data was tested using the Shapiro-Wilk test: NPRS and WALLID scores were not normally distributed ($p < 0.05$), while MEDQI and QLESQSF were normally distributed ($p > 0.05$).

Table II showed between-group comparisons for NPRS and WALLiD scores using the Mann-Whitney U test. For NPRS, groups A and B were compared; results showed a p-value of 0.172 before therapy and 0.646 after treatment. The difference was no longer statistically significant, as evidenced by the post-treatment p-value of 0.110. For WALLiD scores, results showed p-values of 0.255 pre-intervention and 0.143 post-intervention, indicating no significant difference between groups.

Table III presents Wilcoxon signed-rank test within-group comparisons for NPRS, yielding $p < 0.001$ for both groups and indicating considerable pain reduction after therapy. The Wilcoxon test results for WALLID score revealed a significant difference ($p < 0.001$) in both groups.

Table IV showed the independent-samples t-test results for MEDI-Q and QLESQSF. There was no statistically significant difference between the groups, as indicated by the pre-treatment p-value of 0.216 and the post-treatment p-value of 0.761. Group B had higher QoL scores at baseline, as shown by an independent-samples t-test for QLESQSF, which showed a significant difference ($p = 0.005$). Nevertheless, the difference was no longer statistically significant, as indicated by the post-treatment p-value of 0.110.

Table V showed that paired t-tests for MEDI-Q and QLESQSF revealed $p < 0.001$ for both groups, suggesting a statistically significant improvement in menstrual Distress and quality of life, especially for Group A, which closed the baseline difference with Group B. Within each group, all evaluated outcomes improved significantly. Following the intervention, no statistically significant differences were seen between the groups for NPRS, WALLID, MEDI-Q, or QLESQSF, indicating that both treatment regimens were useful and effective.

Table I: Demographic Data

Table of Mean and Standard Deviation of Age, Height, Weight and BMI		
Variables	**Group A**	**Group B**
	Mean (SD)	Mean (SD)
Age (Years)	19.4762±1.28915	19.2381±1.70014
Height (Feet)	5.3048±0.15645	5.3667±0.20331
Weight (Kg)	51.3810±9.04697	54.0000±8.58487
BMI	19.8381±3.17183	20.6571±3.53618

Table II: Between-group comparison of Group A and Group B for change in NPRS and WALLID Score (Mann-Whitney U)

NPRS					**WALLID Score**				
Treatment	Group	Median	Mean Rank	P-value	Treatment	Group	Median	Mean Rank	P-value
Pre treatment	A	8.0000	24.02	0.172	Pre treatment	A	8.0000	23.62	0.255
	B	8.0000	18.98			B	8.0000	19.38	
Post treatment	A	4.0000	20.67	0.646	Post treatment	A	7.0000	18.90	0.143
	B	4.0000	22.33			B	3.0000	24.10	

Table III: Within-Group Comparison of Group A And Group B For Change In NPRS and WALLID Score (Wilcoxon Test)

NPRS					**WALLID SCORE**				
Group A	Pre NPRS	Median	Mean Rank	P value	Group A	Pre WALLID	Median	Mean Rank	P value
		8.0000	11.0	<0.001			7.0000	11.0	<0.001
	Post NPRS	4.0000	11.0			Post WALLID	3.0000	11.0	
Group B	Pre NPRS	Median	Mean Rank	P value	Group B	Pre WALLID	Median	Mean Rank	P value
		8.0000	11.0	<0.001			6.0000	11.0	<0.001
	Post NPRS	4.0000	11.0			Post WALLID	3.0000	11.0	

Table IV: Between-Group Comparison For MEDI-Q and QLESQ-SF Using Independent-Samples t-test

MEDI-Q						QLESQ-SF					
Treatment	**Group**	**Mean± SD**	**Mean Difference**	**t-statistic**	**p-value**	**Treatment**	**Group**	**Mean± SD**	**Mean Difference**	**t-statistic**	**p-value**
Pre Treatment	A	71.1905 ±12.89	5.95238	1.256	0.216	Pre Treatment	A	34.76±9.267	-9.371	-2.97	0.005
	B	65.23±17.469					B	44.04±11.077			
PostTreatment	A	47.8571 ±13.745	-1.28	-0.306	0.761	Post Treatment	A	54.966±9.30	-10.04	-2.68	0.11
	B	49.14±13.499					B	65.00±14.525			

Table V: MEDI-Q and QLESQ-SF Comparison Within Group Using Paired Sample t-test

Tools	**Group A**		**t-value**	**p-value**	**Group B**		**t-value**	**p-value**
	Pre-Treatment	Post-Treatment			Pre-Treatment	Post-Treatment		
	Mean±S.D	Mean±S.D			Mean±S.D	Mean±S.D		
MEDI-Q	71.1905±12.98	47.8571±13.745	12.361	<0.001	67.23±17.469	49.14±13.499	5.313	<0.001
QLESQSF	34.67±9.260	54.967±9.305	-10.425	<0.001	44.04±11.07	65.009±14.525	-10.452	<0.001

DISCUSION

The present study evaluated the effects of Barre exercises alone and in combination with gym ball exercises on pain intensity, menstrual Distress, and quality of life in individuals with primary dysmenorrhea. The findings indicate that both interventions reduced symptoms; however, the combined approach showed additional benefits, particularly in improving quality of life. **Jayasree et al. 2025** reported significant reductions in dysmenorrhea severity and improvements in women's health following Barre exercises combined with Meridian therapy, which supports the present findings. Although they observed statistically superior symptom reduction in the intervention group, the present study found no significant between-group difference for pain intensity, despite greater improvement in quality of life in the combined group[10]. Similarly, Oz and Yana et al. (2025) reported significant reductions in pain, menstrual symptoms, and functional impairment following resistance and stretching exercises, with no significant between-group differences in pain reduction, which aligns with the present findings. The present study additionally demonstrated better quality-of-life outcomes with the combined intervention, suggesting added benefits of multimodal exercise approaches[11]. **Aksu and Yılmaz (2025)** reported that yoga practice significantly reduced pain intensity and menstrual symptoms and improved quality of life. These findings are consistent with the present study, where both Barre exercises alone and Barre combined with gym ball exercises significantly improved pain and functional outcomes. Barre combined with gym ball exercises significantly improved pain and functional outcomes[12]. **Veena Kirthika et al. 2024** reported that a structured 12-week exercise program significantly reduced pain and menstrual Distress, with Pilates showing superior outcomes compared to gym ball exercises[6]. Furthermore, **Zheng et al. 2024** concluded in a systematic review and network meta-analysis that multi-component exercise interventions and resistance training were among the most effective strategies for reducing dysmenorrhea-related pain. These findings strongly support the present study, particularly because the combined Barre and gym ball intervention utilized a multimodal approach involving flexibility, stabilization, muscular endurance, and postural control exercises[13]. **Song and Kim et al. 2023** also found that Pilates significantly improved menstrual pain, sleep quality, psychological status, and physical function. Unlike the present study, their work focused mainly on Pilates and included broader psychological variables. In contrast, the present study focused on Barre and gym ball exercises with emphasis on quality of life[14]. Similarly, **Hemalatha et al. 2023** reported that Barre and Pilates exercises were more effective than aerobic exercise in alleviating both physical and psychological symptoms of premenstrual syndrome. Although their study focused on PMS, the overlap in symptomatology suggests that these findings apply to dysmenorrhea. The current study extends this evidence by directly comparing a single-modality intervention with a combined exercise approach[15]. **Kirca et al. (2023)** reported that both aerobic exercise and yoga training significantly reduced menstrual pain and distress and improved quality of life in women with primary dysmenorrhea, with aerobic exercise showing greater improvement in functional capacity. This is consistent with the present study, where both Barre alone and Barre plus gym ball exercise groups showed significant reductions in pain and dysmenorrhea-related disability. However, unlike their study, which compared aerobic exercise with yoga, the present study showed a greater quality-of-life benefit with the combined Barre and gym ball program[16]. **El-Kholy and Shalaby (2022)** reported that Pilates exercises significantly reduced pain severity and menstrual symptoms. These findings are consistent with the present study, where both intervention groups demonstrated significant improvements in NPRS and WaLIDD scores[17]. **Salman et al. (2022)** reported that yoga was associated with lower pain scores and better quality of life in women with primary dysmenorrhea, consistent with the present study showing significant improvement in pain and quality of life-related outcomes

after an exercise-based intervention[18]. The findings of the present study are comparable to those reported by **Soni and Desai (2021)**, who examined the effects of Pilates and self-stretching exercises on pain and quality of life in women with primary dysmenorrhea. Their study demonstrated significant improvements in both outcomes following intervention, with the Pilates group showing greater reductions in pain and superior improvements in quality of life compared to the self-stretching group. Similarly, the present study revealed significant reductions in NPRS and WaLIDD scores in both the Barre exercise group and the Barre plus gym ball exercise group. The superior outcomes observed in the Pilates group by Soni and Desai may be attributed to enhanced core stabilization, postural alignment, and neuromuscular control, which are also key components of Barre training[19]. **Kirmizigil and Demiralp (2020)** reported significant VAS pain reductions following an eight-week functional exercise program in primary dysmenorrhea, consistent with the present study's significant within-group improvements in NPRS, WaLLiD, and MEDI-Q across both groups ($p<0.001$), confirming exercise as an effective analgesic intervention regardless of modality(20). The beneficial effects of exercise observed in the current study are further supported by the meta-analysis conducted by **Dehnavi et al. (2018)**, which demonstrated a substantial reduction in dysmenorrhea-related pain across 10 randomized controlled trials. Consistent with these findings, both intervention groups in the present study showed significant reductions in pain scores, as confirmed by within-group analyses ($p < 0.001$)(21). Furthermore, **Ortiz et al. (2015)** conducted a randomized controlled trial evaluating the effectiveness of a physiotherapy program in women with primary dysmenorrhea and reported significant reductions in pain intensity and analgesic consumption following therapeutic exercise. These findings align closely with the present study, where both exercise interventions significantly reduced NPRS and WaLLiD scores[22]. Another randomized controlled trial conducted by **Motahari Tabari et al. (2017)** demonstrated that both stretching and aerobic exercises significantly improved pain intensity and daily functioning among women with dysmenorrhea. Although their findings are consistent with the present results regarding pain reduction, the current study incorporated Barre and gym ball exercises, which additionally target postural control, core stabilization, flexibility, and neuromuscular coordination[23]. **Yonglitthipagon et al. (2017)** conducted a clinical trial on young women with primary dysmenorrhea and reported significant improvements in menstrual pain, physical fitness, and quality of life in the yoga. This is consistent with the present study, where both groups showed significant within-group improvements in pain and dysmenorrhea severity. However, unlike the yoga study, the present research directly compared two active physiotherapy interventions, and the combined Barre-gym ball group showed greater improvement in quality of life, suggesting that adding stabilization work may provide extra functional benefit[24].

CONCLUSION

Both Barre exercises alone and in combination with gym ball exercises were effective in reducing pain and menstrual Distress in individuals with primary dysmenorrhea. Although no significant between-group differences were observed in symptom reduction, the combined intervention yielded greater improvements in quality of life. These findings support the integration of multimodal physiotherapy strategies to enhance overall clinical outcomes in dysmenorrhea management.

RECOMMENDATION

- As part of their self-management techniques, women with dysmenorrhea should be informed about the advantages of Barre and gym ball activities.
- Further research is needed to examine the long-term effects of Barre and gym ball workouts in primary dysmenorrhea, including maintenance of dysmenorrhea and prevention of recurrence.

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Data Sharing Statement: The corresponding author can provide the data proving the findings of this study on request. Privacy or ethical restrictions prevented us from sharing the data publicly.

AUTHOR CONTRIBUTION

Muqaddas Aslam: Study idea and design, literature search, guided the questionnaire preparation, and wrote the first draft of the manuscript.
Hina Gul: Oversaw the overall progress of the study, guided in study design and interpretation of results, and carefully revised the manuscript.
Husna Amjad: Refined the study design, supported the literature review, and data collection.
Muqadas Shehzadi: Played an active role in shaping the questionnaire, organizing data collection, and conducting data analysis and interpretation.
Ezza Zainab: Performed statistical analysis and reviewed the manuscript with helpful suggestions.

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