

## RESEARCH ARTICLE



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# Core Stability Exercise on Low Back Ache, Back Endurance and Health Related Quality of Life in Primary Dysmenorrhea-A Single Group Experimental Study

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## Abstract

**Objective:** To analyze the effect of core stabilization exercises on LBA, back endurance, and HRQoL in primary dysmenorrhea. **Method:** 58 subjects were included in a single group experimental study based on selection criteria from gynecology hospitals and clinics in Bangalore. Subjects underwent 8 weeks of core stability exercise in a 45 min session. The data was analyzed using a paired t test, descriptive analysis, and frequency distribution. **Findings:** A significant difference was seen in the pre- post test score for low back ache following 4 weeks. A similar reduction in LBA was seen following 8 weeks of treatment, with a p value= .001. A significant improvement was also noted in trunk endurance and HrQoL, with a p value = 0.001. **Novelty:** This study is one of its kind wherein the effect of core stability exercise focusing on improvement in back endurance and thereby impacting low back ache and health related quality of life in primary dysmenorrhea is studied in a relatively larger group. **Conclusion:** Core stability exercises improved back endurance and reduced low back ache, as well as improved the HRQoL in primary dysmenorrhea.

**Keywords:** painful period; low back ache; back endurance; health-related quality of life; core stability exercise

## 1 Introduction

Dysmenorrhea is termed as painful uterine cramps, experienced during the menstrual cycle and one of the leading causes of pelvic discomfort and menstrual disorder. Low back ache is the second most leading symptom in people with primary dysmenorrhea<sup>(1)</sup>. According to Karakus, et al., reduced back endurance is correlated with higher intensity of back pain in women with primary dysmenorrhea<sup>(2)</sup>. Dysmenorrhea negatively impacts HRQoL in females suffering from primary dysmenorrhea<sup>(3)</sup>. Medication, TENS, Kinesio taping and heat therapy have been used to alleviate the low back ache in women with the primary dysmenorrhea, yet it provides only symptomatic relieve with its own limitation such as skin irritation as with the use of Kinesio taping<sup>(4)</sup>. Core stability exercises may be an effective alternative which can be practiced by the young

female without continuous monitoring from the physical therapist once the exercises are learned. To our knowledge, the studies done on effect of core stability exercises in dysmenorrhea have been on smaller sample sizes. The researches done on larger sample groups have limited their focus on pain and its duration without exploring its effect on increased low back ache in relation to poor back endurance and health related quality of life in women with primary dysmenorrhea<sup>(5)</sup>. Thus, finding the effect of core stability exercises on increased low back ache in relation to poor back endurance and health related quality of life in women with primary dysmenorrhea may be useful to in cooperate as a non-pharmacological intervention in primary dysmenorrhea prevention. The aim of the study was to understand how core stability training affects low back ache, back endurance and HRQoL in women having primary dysmenorrhea.

## 2 Methodology

### Materials and methodology

Following the ethical clearance received from the institutional ethical committee with reference number ECMPT/21/PHY/019, a single-group pre-test and post-test experimental study was conducted from June 2021 to September 2022. A convenience sampling technique was used for the study. Biases in the selection were avoided by carefully assessing the subjects for the inclusion and exclusion criteria so that the sample is an actual representation of population. To further avoid any bias arising from convenience sampling the representative sample size was kept relatively large. The subjects were informed of the research study's aim, process and outcome. Fifty-eight female participants were enrolled based on the diagnosis of primary dysmenorrhea by the gynaecologist. The inclusion criteria were age group of 18 to 25 years<sup>(6)</sup>, primary dysmenorrhea for over 6 months<sup>(7)</sup>, regular menstrual cycle of 28-30 days<sup>(8)</sup> and BMI<30<sup>(9)</sup>. The exclusion criteria were recent history of systemic disease, PCOD, participant indulging in any form of exercise<sup>(10)</sup>, secondary dysmenorrhea<sup>(11)</sup>, history of pregnancy or childbirth<sup>(12)</sup> and recent history of thyroid disorders<sup>(13)</sup>. Written informed consent was obtained from the participants.

### Outcome measures

The severity of low back ache in primary dysmenorrhea was measured using a visual analogue scale<sup>(14,15)</sup>, back endurance was measured using Biering Sørensen's test<sup>(16,17)</sup> and HRQoL was measured using the SF-36 questionnaire<sup>(18,19)</sup>. The baseline measurements included demographic data and outcome measures. The demographic data included personal information, menstrual status characteristics and a questionnaire for determining the severity level of pain based on the VAS.

### Intervention

Pre-intervention, the subjects were assessed, and all the baseline measurements were taken which included, demographic data, menstrual cycle history, VAS scale, Biering-Sørensen test and SF-36 questionnaire. VAS score for pain was taken based on the previous menstrual cycle's peak intensity of the pain. The subjects were requested to perform core stability exercises<sup>(20)</sup> during the follicular phase<sup>(21)</sup>. The exercise dosage was for a duration of 45 min, 3 sessions per week for 8 weeks, which includes 10 minutes of warmup, 25 minutes of core stabilization exercises and 10 minutes of cool down. 10 repetitions of each core exercise were asked to perform and the increase in repetitions was based on the patient's tolerance level. Post- intervention, VAS was taken after 4 weeks of intervention to check the short-term effect of core stability exercise on low back ache as well as after 8 weeks of intervention. The bearing- Sorensen test and SF-36 were assessed after 8 weeks of intervention. Warm-up as well as cool- down consists of cat and camel stretches.

### Statistical analysis

SPSS (version 29.0) for Windows was used for the data analysis. The Mean and Standard deviation of both outcome and demographic variables were found using descriptive statistics for the demographic variable and outcome variable. The significant difference among the variables such as the Visual analogue scale, Biering Sorensen test and SF-36 was found using Paired t-test. Microsoft Excel was used to generate graphs and tables.

## 3 Results and Discussion

A study sample of 58 participants with primary dysmenorrhea and a mean age of  $23.34 \pm 1.65$  were taken for the study as reflected in Table 1. The mean BMI of the participants of the study was  $21.5672 \pm 2.7048$ .

VAS score for pain was assessed at the beginning, after 4 weeks and after 8 weeks of interventions. The pre- test, post-test 1 and post-test 2 mean score for pain can be inferred from Table 2. An improvement was observed in low back ache post 4 weeks and 8 weeks of intervention in primary dysmenorrhea.

Tables 3 and 4 reflects the mean pre and post test scores for back endurance and health related quality of life. As inferred from Tables 3 and 4, an improvement was observed for both back endurance and health related quality of life post 8 weeks of intervention in primary dysmenorrhea.

**Table 1. Descriptive statistics of baseline characteristics**

Variables	Mean	Standard Deviation
Age in years	23.34	1.650
Height (cm)	159.86	5.101
Weight (Kg)	55.19	7.765
BMI (Kg/m <sup>2</sup> )	21.5672	2.70480

**Table 2. VAS Score of study subjects –descriptive statistics**

Variable	Pre-Test		Post-Test 1		Post-Test 2	
	Mean	SD	Mean	SD	Mean	SD
VAS (score)	6.79	1.166	4.2672	0.87967	3.24	0.904

VAS = Visual Analogue Scale

**Table 3. BST Score of study subjects –descriptive statistics**

Variable	Pre-Test		Post-Test	
	Mean	SD	Mean	SD
BST (Sec)	61.1	18.539	95.95	31.336

BST= Biering-Sorensen Test

**Table 4. SF-36 Score of study subjects – descriptive statistics**

Variable	Pre-Test		Post-Test	
	Mean	SD	Mean	SD
SF-36 (%)	52	4.82	81.12	5.099

SF-36= Short Form 36

From Table 5 it is inferred that the difference between the VAS pre-test and VAS post-test-1 mean was  $2.52586 \pm 0.82941$  after 4 weeks of intervention. The obtained t-value of the study participant was  $t = 23.193$  and a table from the student's t-distribution was used to find the p-value. The p-value calculated is less as compared to the threshold selected for statistical significance = 0.001 ( $<0.05$ ) for the VAS (post-test-1) scale. The VAS pre and post-test-2 mean difference was  $3.552 \pm 0.902$  after 8 weeks of intervention. The obtained t-value of the study participant was  $t = 29.998$  and the p-value was found using a table from the student's t-distribution. The p-value calculated is less as compared to the threshold selected for statistical significance = 0.001 ( $<0.05$ ) VAS (post-test-2). The BST pre and post-test mean difference was  $-34.845 \pm -34.845$  after 8 weeks of intervention. The obtained t-value of the study participant was  $t = -11.248$  and the p-value was found using a table from the student's t distribution. The p-value calculated is less as compared to the threshold selected for statistical significance = 0.001 ( $<0.05$ ) for BST. The SF-36 pre and post-test mean difference was  $-29.121 \pm 6.678$  % after 8 weeks of intervention. The obtained t-value of the study participant was  $-33.209$  and the p-value was found using a table from the student's t-distribution. The p-value calculated is less as compared to the threshold selected for statistical significance = 0.001 ( $<0.05$ ) for SF-36 for core stability exercise in primary dysmenorrhea.

**Table 5. Outcome measures pre-test and post-treatment evaluation**

Test	Mean	Standard Deviation	t	p	Significant/ Non-Significant
VAS Pre-Test (Score) - VAS Post-Test 1 (Score)	2.52586	.82941	23.193	.001	SIGNIFICANT
VAS Pre-Test (Score) - VAS Post-Test 2 (Score)	3.552	.902	29.998	.001	SIGNIFICANT
BST Pre-Test (Sec) - BST Post-Test (Sec)	-34.845	-34.845	-11.248	.001	SIGNIFICANT
SF-36 Pre-Test (%) - SF-36 Post Test (%)	-29.121	6.678	-33.209	.001	SIGNIFICANT

The present study focused on understanding the impact of core stability exercise on LBA, back endurance as well and HRQoL in primary dysmenorrhea. There was a statistically significant improvement in low back ache after 4 weeks as well as after 8 weeks of intervention. Also, statistically significant improvement was seen in back endurance and health-related quality after 8 weeks of intervention in primary dysmenorrhea getting a p- value  $< 0.05$ . Stability exercise of core increases strength and coordination of lumbar and pelvic muscles via neural drive. Therefore, there seems to be an increase in the conditioning of core muscle which

enhances metabolism and circulation in the region of the pelvis thus resulting in reduced low back ache and improvement in HRQoL of life in primary dysmenorrhea. Core stability exercises have been recommended to improve Low back ache. A review on effect of core stability in non-specific LBA have documented studies done to assess the effect of core stability exercise and have found it to be useful in reducing pain and improving core muscle activation and strength however these studies have not focused on trunk muscle endurance<sup>(22)</sup>. The present study results indicates that core stability exercises are useful in improving trunk muscle endurance.

An umbrella and mapping review on effect of exercises in primary dysmenorrhea indicated that any exercise model was effective in improving pain intensity however the improvement in quality of life was debatable<sup>(23)</sup>. The current study revealed an improvement in quality of life when given core stability exercises. A systematic review and meta- analysis done by López-Liria, et al. on the effect of various physiotherapy treatment in Primary Dysmenorrhea included nine studies which assessed the effect of non-pharmacological strategies like isometric exercises, yoga, aerobic dance, electrotherapy, stretching, Kinesio tape, massage techniques, connective tissue manipulation, progressive relaxation exercises, etc. Most of these interventions showed an improvement however focusing majorly on pain and level of anxiety<sup>(4)</sup>. In the present study the attempt was made to study the effect of core stability exercises on other measures commonly effected in Primary dysmenorrhea like back endurance and health related quality of life and found it to be effective in improving all these measurements. The current study has assessed the effect of core stability on a relatively larger sample group assessing back endurance and quality of life in addition to low back ache when compared to a study done by Baqir, Rida, et al. who did a comparison between Kinesio-taping and core strengthening exercise on management of only menstrual pain as a measure in primary dysmenorrhea and concluded that core strengthening is more effective and beneficial in primary dysmenorrhea<sup>(24)</sup>. However, this study aimed on assessing the effect on a relatively small sample. Zainab, et al. experimented the difference between the effect of core strengthening exercises in two different phases of the menstrual cycle in primary dysmenorrhea given for 12 weeks and concluded that core strengthening exercises is more effective in phase I rather than the phase II to reduce the symptoms of primary dysmenorrhea<sup>(21)</sup>. The present study also focused on exercise session given during the follicular period and found it to be effective even when given for a shorter period of 8 weeks. A number of studies has been conducted to understand the effect of core strengthening exercises and other physiotherapy intervention such as moist heat, Kinesio taping, TENS and stretching exercises on the pain management in primary dysmenorrhea however all these studies have primarily focused on menstrual pain. The present study has focused on the effect of core stability exercises on specifically on poor low back endurance, low back ache and reduced HRQoL in primary dysmenorrhea. The study result showed that core stability exercises improve low back ache and HRQoL in relation to improvement in back muscle endurance in women with primary dysmenorrhea.

## 4 Conclusion

The study on the effect of core stability exercises in primary dysmenorrhea is one of its kind to know the impact especially on back endurance and low back ache and thus impact on health-related quality of life. The study concluded that core stability exercises have a significant effect on improving low back ache and HRQoL in relation to improvement in the back muscle endurance in women with primary dysmenorrhea. Core stability can be added as an effective non pharmacological intervention to prevent and reduce symptoms in dysmenorrhea.

### Recommendations

Future recommendation can be directed towards monitoring of participant's daily activity of living, diet and sleep schedule as well. The effect of core stability exercises given in both the phases of the menstrual cycle on low back ache in relation to poor back endurance can be further explored.

### Limitation

Our study limited its duration of 8 weeks of the intervention and no further follow up was taken after the 8-week post-test measurement. Daily activity and diet of the patient were not monitored which could have affected the study result.

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