

# Effect of core strengthening exercises as an adjunct to stretching exercises on pain and quality of life in females with primary dysmenorrhea: An experimental study

## Research Article

**Neha J Kulkarni<sup>1\*</sup>, Shubhangi P Patil<sup>2</sup>**

1. Clinical Therapist, Department of community Physiotherapy, CMFs College of Physiotherapy, Chinchwad, Pune, India.
2. Professor and HOD, Department of Community Health Physiotherapy, Ravi Nair Physiotherapy College, Datta Meghe Institute of Medical Sciences Sawangi (Meghe), Wardha, Maharashtra, India.

### Abstract

**Introduction:** Primary dysmenorrhea is a common gynecological problem in females, which affects their overall health and quality of life. The objective of the study was to find the effect of core strengthening and stretching exercises on pain and quality of life in females with Primary Dysmenorrhea. **Method:** Twenty-seven unmarried girls with primary dysmenorrhea, aged between 18 to 25 years were divided into two groups by using simple random sampling i.e Group A (n=14) and Group B (n=13). Group A received core strengthening and stretching exercises and group B received stretching exercises alone, three times a week for 4 weeks. Outcomes measures included in the study were the Numerical Pain Rating Scale (NPRS) and HRQOL SF 36 which was collected at baseline and at week 4 after treatment and follow-ups were taken after 8 weeks. **Result:** The result showed that all outcome measures improved significantly ( $p < 0.05$ ) in both groups. Significantly more improvement was seen in patients with primary dysmenorrhea who received combined strengthening and stretching exercises. **Conclusion:** Both the stretching and strengthening exercises are effective in lowering pain and improving the quality of life in females with primary dysmenorrhea but the combination of the two is more effective than stretching exercises alone.

**Key Words:** Primary dysmenorrhea, Core stabilization exercises, Stretching exercises, Quality of life.

### Introduction

Primary dysmenorrhea is the commonest gynecological problem among women in their reproductive years (1). Primary dysmenorrhea causes pain in the pelvic and lower abdominal region along with diarrhea, fatigue muscle cramps, headache, stress, and depressive illness etc. These symptoms can affect their quality of life and participation in social life (2). The prevalence of primary dysmenorrhea in India ranges between 50 to 87.8% in adolescent girls (3). Primary dysmenorrhea also affects the functional capacity of many women which increases stress levels and absenteeism from work or school. The overall effects of primary dysmenorrhea can be seen in the quality of life of many women (4). Though it is a very common condition, it is often less investigated and not properly treated due to lack of knowledge (5).

The cause of primary dysmenorrhea is not fully understood but the most widely accepted explanation is the overproduction of prostaglandins in the

endometrium of the uterus in the ovulatory phase (6). The production of Prostaglandins causes the excessive contraction of the myometrium which may cause a reduced supply of blood and oxygen to the muscle of the uterus and results in pain.

The prostaglandins play an important role in various biological and physiological functions of the body such as pain, inflammation, the temperature of body, and regulation of sleep. Symptoms have also been connected to the musculoskeletal system in other research. Some studies show a strong correlation between improper positioning of the pelvis, lumbar vertebrae, and abdominal muscles spasm, which affect the position of the uterus, thus, increasing the risk of dysmenorrhea. The position of the lumbar vertebrae can cause constriction of blood vessels which can reduce the supply of blood to the uterus which causes the pain (7).

Stress increases sympathetic activity, which can increase pain and discomfort during menstruation by increasing uterine contractions. So, stretching may reduce the hyperactivity of the sympathetic system and help in reducing menstrual symptoms (8). Stretching exercises increase joint mobility, reduce the chances of injury, boost energy levels, improve blood flow, and relieve stress resulting in the reduction of pain (9). This can be the reason for the reduction in muscle spasms, generalized body pains, and lower back problems.

Core strengthening has become well-known for fitness. The stabilization of the spine and pelvis during

#### \* Corresponding Author:

**Neha J Kulkarni**

Clinical Therapist,  
Department of Community Physiotherapy,  
CMFs College of Physiotherapy,  
Chinchwad, Pune, India.

Email Id: [nk15060@gmail.com](mailto:nk15060@gmail.com)

functional activities is the primary function of core muscles. Reduced core muscle strength can lead to abnormal movement of the spine resulting in back strain and overuse injuries of the spine (10). The core strengthening exercises hold the body in position and it is shown to improve the lumbar spine stability which maintains functional stability (11). Hence the purpose of this study was to find out the effect of Core strengthening exercises as an adjunct to stretching exercises on pain and quality of life in females with Primary Dysmenorrhea.

#### Materials & Methods

This was an experimental study on the effect of stretching and strengthening exercises on pain and quality of life in patients with primary dysmenorrhea. A study was conducted between November 2019 to October 2020. The Institutional Ethical Committee of Chaitanya Medical Foundations College of physiotherapy Chinchwad Pune approved the study and approval number was MPT/CMF/201920. Twenty-seven patients were enrolled for the study.

#### Inclusion criteria

- Unmarried females suffering from primary dysmenorrhea
- Age group between 18 to 25 years
- The participant should have moderate or severe pain, with an NRS score  $\geq 5$  out of 10 at the time of menstruation,
- Having a regular menstrual cycle of 28-30 days.

#### Exclusion criteria

- Patients suffering from any pelvic disease
- Gynecological surgery
- Chronic diseases such as diabetes, renal disease or cardiovascular disease
- Secondary dysmenorrhea
- Regular exercising females
- Those who are taking any hormonal medications

The patient was explained about the study procedure and informed consent was taken from all the females who participated in the study. A chit method was used to randomly divide the patients into two groups. Group A received core strengthening along with stretching exercises and Group B received stretching exercises alone. Both the groups received supervised outpatient treatment, 3 times a week for 4 weeks from the 4th day of menstruation till the onset of the next menstruation. A standardized exercise program was planned and delivered to the patients. After 4 weeks the patients were instructed to do the same exercises at home upto 8 weeks.

#### Core strengthening and stretching exercise protocol:

##### First week

In the first week, the participants performed stretching exercises such as spinal twist, abdominal stretch, adductor stretch, hamstring stretch, forward bend stretch, Oblique stretch, Quadriceps stretch, and Calf stretch. In the first week, Stretching was given for 5-10 sec followed by 10-sec relaxation twice. After stretching, core strengthening exercises were performed

which includes abdominal drawing-in maneuver (ADIM) in a hook lying position, ADIM (Abdominal drawing-in maneuver) in a quadruped position, and half side plank with elbows and knees flexed in a side-lying position (figure 1).

##### Second week

Stretching exercises were performed in the same manner as performed in the first week. Duration of stretching in the second week was 10 to 15 seconds followed by 10-15 sec rest in between and three repetitions were given. Following stretching the participants performed abdominal drawing-in maneuver in a hook lying position with alternate arm movements, abdominal drawing-in maneuver in a quadruped position with alternate arm movements, and a full side plank with elbows flexed and knees extended in side-lying position (figure 2).

##### Third week

Stretching exercises were the same as given in the second week but the stretching was repeated for 4 times. Following stretching exercises, the participants performed an abdominal drawing-in maneuver in a hook lying position with alternate leg movements, an abdominal drawing-in maneuver in a quadruped position with alternate leg movements, and a half side plank with the elbow straight (figure 3).

##### Fourth week

Stretching exercises were the same as given in the third week but the duration of stretching was 15 to 20 sec with 20 to 25-sec rest in between, repeated 5 times. After stretching the participants performed an abdominal drawing-in maneuver in a hook lying position with the opposite arm and leg movements, an abdominal drawing-in maneuver in a quadruped position with the opposite arm and leg movements, and a full side plank with the elbow straight (figure 4).

The participants in Group B received stretching exercises alone. Protocol of stretching exercises was the same as given in group A.

Both the groups were assessed for the above-mentioned outcome measures pre-treatment and 4<sup>th</sup>-week post-treatment.

#### Data collection

The patients were evaluated for pain and quality of life by using the Numerical pain rating scale and HRQOL SF 36 questionnaire respectively before and after starting the treatment.

#### Statistical analysis

The mean and standard deviation (SD) were described as baseline measures. Initially, the Shapiro Wilk test was used to assess the normality of data. The pre and post-treatment comparison within the group was done by using Wilcoxon signed-rank test whereas the pre and post-treatment comparison between the two groups was done using Mann-Whitney test for normally distributed data. A priority alpha level of 0.05

was used and 95% confidence level was used. Data were analyzed by using SPSS Version 21.0.

## Results

Thirty-eight subjects were examined for eligibility with 8 subjects excluded as they were not

meeting the inclusion criteria. Thirty subjects remained and were randomized with 15 subjects in each group. After starting treatment, one subject from group A (Experimental group) and two subjects from group B (control group) did not follow-up. This left 14 participants in group A and 13 participants in group B

**Table 1: Baseline characteristics of sample**

Variable	Group A - Core strengthening with stretching (Mean/ SD)	Group B - Stretching exercises alone (Mean/ SD)	P value
Age	21.79±1.52	21.69±1.60	0.86
Body Mass Index	24.66±3.18	24.33±1.94	0.74

Table 1 displays the characteristics of the sample and found to be similar between both the groups (P>0.05). The mean age of the participants in group A was 21.79 (1.52) and group B was 21.69 (1.60).

**Table 2: Pre and Post treatment analysis of NPRS in Group A and Group B**

Variable	Baseline			Post-treatment 4 <sup>th</sup> week			Follow up 8 <sup>th</sup> week		
	Group A Mean/SD	Group B Mean/SD	P value	Group A Mean/SD	Group B Mean/SD	P value	Group A Mean/SD	Group B Mean/SD	P value
NPRS	8.07±0.99	8.07±0.75	1.00	6.50±0.94	7.23±0.59	0.00	4.07±1.26	5.69±0.94	0.00

In table 2 Pre-treatment, statistically no significant difference was found between both the groups (p>0.05). The between-group result shows significantly more improvement in NPRS score in Group A as compared to group B at 4 weeks post-treatment and eight weeks follow-up points (p<0.05) favoring the group receiving stretching along with strengthening exercises.

**Table 3: Pre and Post treatment analysis of HRQOL SF 36 in group A and group B**

Variable	Baseline			Post-treatment -4 <sup>th</sup> week			Follow up- 8 <sup>th</sup> week		
	Group A Mean/SD	Group B Mean/SD	P value	Group A Mean/SD	Group B Mean/SD	P value	Group A Mean/SD	Group B Mean/SD	P value
<b>SF 36</b>									
<b>Physical functioning</b>	30.35±21.79	30.76±22.06	0.96	70.71±15.67	52.30±16.66	0.00	95.35±5.35	64.28±18.79	0.00
<b>Role – Physical</b>	28.21±12.02	28.07±12.67	0.99	73.21±15.39	58.84±12.93	0.01	93.92±7.38	73.84±15.83	0.00
<b>Role -Emotional</b>	41.69±14.30	40.79±14.18	0.87	74.64±11.05	62.30±10.91	0.00	93.21±12.65	75.38±14.21	0.00
<b>Energy</b>	33.92±19.82	34.23±21.39	0.99	69.64±17.14	54.23±17.42	0.02	89.28±14.78	67.30±18.44	0.00
<b>Emotional well being</b>	51±10.42	48.53±17.83	0.66	82.28±10.01	65.7±10.52	0.00	97±3.98	78.07±12.43	0.00
<b>Social Functioning</b>	29.96±18.11	33.38±18.45	0.63	70.21±15.56	54.84±14.73	0.01	90.78±11.72	65.5±16.03	0.00
<b>Pain</b>	36.92±14.42	39.26±15.60	0.70	68±19.29	48.23±16.37	0.00	87.8±13.96	62.09±17.39	0.00
<b>General Health</b>	41.07±19.23	37.69±21.17	0.66	72.85±15.40	58.84±14.31	0.02	72.85±15.40	58.07±15.07	0.00

Table 3 shows significant improvement in HRQOL (P < 0.001) within both groups. However, more improvement was observed in Group A as compared to group B when assessed at post-treatment 4 weeks and 8 weeks follow up points (p<0.05).

## Discussion

The findings of this study demonstrate that Stretching along with core strengthening exercises may be a viable option for addressing primary dysmenorrhea in young women.

Participants who received stretching along with strengthening exercises demonstrated a reduction of NPRS scores. Pretreatment NPRS score in Group A was 8.07 and post-treatment 4<sup>th</sup> week it was reduced to 6.50 and after follow up 8 weeks it was further reduced to

4.07, while in group B, pretreatment the mean score was 8.07 and post-treatment it was reduced to 7.23 which was further reduced to 5.69 at 8<sup>th</sup> week follow up period. Stretching along with core strengthening exercises also improved participants' quantity of life when analyzed by HRQOL SF 36. The result indicates significant between-group differences in pain and quality of life favoring a combination of stretching and strengthening approach over-stretching exercises alone for patients with primary dysmenorrhea.

Previous studies indicate that the pain during the menstrual cycle is caused by an increased level of prostaglandin which is present at a higher amount in menstrual fluid. Prostaglandin causes vasoconstriction causing ischemia of the uterus. A reduction in the level of progesterone may also trigger the release of prostaglandin which is the pain mediator (12). Endorphin, which is the pain-relieving chemical, is released during exercise (13). Another possible mechanism is that the exercises increase the circulation of blood towards pelvis and improve local metabolism (14). As a result, exercise may help to prevent prostaglandin deposition, which can be the cause of uterine contraction, reduced blood supply, and pain (15). The contracted ligamentous bands in the abdominal region can cause compression of nerves and irritation. So the stretching exercises are effective because it improves the blood supply and oxygen to the uterus, thereby reducing dysmenorrhea symptoms (16).

Stretching also enhances energy levels, promotes blood circulation, and relieves tension and discomfort by increasing joint activity and decreasing the chance of injury. As a result, it may aid in the reduction of muscular soreness, general body aches, and pains, as well as the prevention of some lower back problems (17). This could explain why people with primary dysmenorrhea have less pain after receiving stretching exercises.

In the present study stretching exercises proved to be effective in improving pain and quality of life in females with primary dysmenorrhea however the stretching exercises along with core strengthening exercises were found superior in their ability to reduce pain and improve quality of life. These findings support earlier studies in this field and reports are indicating that such techniques can reduce pain and improve quality of life significantly. As the core is the center of the body which stabilizes the trunk while limbs move during the functional movement (18). Stabilization exercises hold the body in a position and forces the muscles to contract to keep the body still or balanced. The weak core muscles do not have the capacity to cope with functional stress and are prone to pain in the abdomen, low back, or thighs during the menstrual cycle when the body is at its high-stress level.

As a result, the core strengthening exercise was intended to increase their core strength, which resulted in reduced low back pain and relief of stress during menstruation

According to a few studies, strengthening core muscles improves the stability of the lumbar spine, which prevent them from injury. (19). When the core muscles are strong, they can reduce the daily forces that can occur during normal biomechanics, even when the body is under continuous stress during the menstrual cycle (20).

The present study also shows that females with primary dysmenorrhea have improved their quality of life. Pain is the factor that affects the physical functioning and quality of life in females with primary dysmenorrhea and a reduction in pain improves the quality of life (21). Core strengthening prevents the

problems which are associated with pain and reduced quality of life in primary dysmenorrhea (22). This might be the reason for the superiority of stretching along with core strengthening exercises over-stretching exercises alone.

### Limitations

In the study, the sample size was small and it did not have a third group of strengthening exercises alone, for comparison purposes. So it was difficult to differentiate between the treatment effects which is affecting the internal validity of the study.

### Conclusion

The result of this study shows that the stretching exercises alone and along with strengthening exercises, both reduced pain and improved quality of life after the treatment. But, the subjects who received stretching along with strengthening exercises showed more improvement. It can be concluded that stretching along with strengthening exercises can be a simple, cheap, and most effective treatment option for females with primary dysmenorrhea.

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