



A COMPARATIVE STUDY OF STRETCHING EXERCISES VERSUS CORE STRENGTHENING EXERCISES ON PRIMARY DYSMENORRHEA IN YOUNG SEDENTARY FEMALES

Ronika Agrawal*¹ and Rushda Ahmed²

¹Principal – M A Rangoonwala College of Physiotherapy.

²Intern – M A Rangoonwala College of Physiotherapy.

*Corresponding Author: Prof. Ronika Agrawal

Principal - M A Rangoonwala College of Physiotherapy.

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ABSTRACT

Background: Primary dysmenorrhea is one of the most common complaint in females and most common gynecological problem worldwide. It is a leading cause of absenteeism in work and school amongst adolescent girls and it affects their academic performance, school and sports activities. Out of the two stretching exercises versus core strengthening exercises which reduces pain and distress needs to be studied. Hence the study. **Methods:** Sixty female students were assigned in two groups. One group was given stretching exercises of all major groups while second group was given core strengthening exercises. Exercises were given six days/week for 8 weeks. Pre –post NRS, Menstrual Distress Questionnaire, Number of pain killer Tablets, Core Muscle Strength and Sit And Reach Test scores were taken. Student's t-tests were used to find the significance of study. **Results:** The results of this study showed that there was significant reduction in NRS($p < 0.0001$), Menstrual Distress Questionnaire($p < 0.0001$), Number of pain killer Tablets($p < 0.0001$), Core Muscle Strength($p < 0.0001$) and Sit And Reach Test scores($p < 0.001$) in both the groups. **Conclusion:** Our study shows that stretching exercises and core strengthening exercise to girls suffering from primary dysmenorrhea can reduce pain and menstrual symptoms and no of tablets consumed during menstruation. Thus it could be performed as an effective treatment method for girls suffering from primary dysmenorrhea.

KEYWORDS: Primary dysmenorrhea, Core Strengthening, Stretching exercise, Sedentary females.

INTRODUCTION

Primary dysmenorrhea is a painful menstruation of significant magnitude so as to incapacitate the everyday activities in the absence of any pelvic pathology.^[1] It is one of the most common complaint in females and most common gynecological problem worldwide^[2,3,4,5], with a prevalence of 63 % to 93%.^[3] In India 70.2 adolescent girls suffer from dysmenorrhea and 60% of them have disrupted daily routine.^[6]

Dysmenorrhea has a great impact on quality of female life. It can cause psychological problems in some females and can result in loneliness and inactive participation in activities.^[3,5,7,8] Dysmenorrhea is a leading cause of absenteeism in work and school amongst adolescent girls, because it affects their academic performance, school and sports activities.^[3,4,7,9]

Menstrual pain may be due to increased contraction of uterine muscle which is supplied by sympathetic nervous system. Stress increases the sympathetic activity. One reason for primary dysmenorrhea is an increase in the

production of uterine prostaglandins F₂ (PFG) which results in uterine contractions and ischemia.^[3,5,9,10] Other reasons that has been suggested are dysperistalsis and hyperactivity of the uterine JZ (junctional zone), imbalance in autonomic nervous control of uterine muscle and psychosomatic factors. It is also believed that contracted ligamentous bands in abdominal region causes physical compression of nerve pathways and irritation.^[2,3,4]

Results of various studies have shown that with regular physical activity the intensity of symptoms and pain has decreased.^[2,3,7] Non pharmacological treatments for primary dysmenorrhea include strengthening exercises of upper and lower extremities, aerobic exercises and physiotherapy treatment like application of hot packs, TENS, aerobic exercise, pilates and connective tissue massage.^[3]

Medical interventions for relief in dysmenorrhea pain can be in the form of NSAIDS which have various side effects.^[3] Considering the side effects of medical

interventions, stretching exercises and core strengthening exercises which no side effects or risks and also cost effective and easy to carry out.^[3,7]

Out of the two which reduces pain and distress needs to be studied. Hence the study.

MATERIAL AND METHODOLOGY

Study Design was experimental design with random allocation by chit method in two groups. Sixty female students between age group 16-25 years who were unmarried with regular menstrual cycle and could understand basic English were included. Subjects had moderate and severe dysmenorrheal score of 5-12 according to WaLIDD score.^[11]

Females with diagnosed PCOS, any musculoskeletal problems causing inability to perform the stretching exercises and core strengthening, mental, psychological problems and doing regular exercise were excluded from the study.

After taking permission from Institutional Ethical Committee, study was started.

The subjects were divided into two groups by chit method

Group A: The subjects were asked to report on 2nd day of their menstrual cycle and fill the menstrual distress questionnaire and score their pain on NRS for pain and symptoms perceived on 1st and 2nd day of their menstrual cycle. The subjects were told to rest for 5 days of menstrual cycle. On the 6th day the strength of the core muscles by the pressure biofeedback method was checked and the number of tablets consumed during the menstrual cycle was recorded. From the 6th day the subjects were asked to perform the following 8 stretching exercises 6 times a week and once daily.

Stretching exercises were taught to group A for the first two days which was a supervised session. They were showed how to perform the stretching exercise with the correct number of repetitions and rest period. After that they were given a calendar in which they have to tick every day after the exercise to maintain the track and record of the exercise.

A whatsapp group was created, where they were reminded every day to perform the exercise and pictures of the stretching exercise were also forwarded.

Each stretching exercise done were held for 5 seconds and repeated 5 times followed by 20 second rest period. Stretching exercises of all major muscle groups was given.

Following exercises were done.

- 1-forward bend stretch
- 2-lunges of both legs
- 3-squats
- 4-forward standing cross stretch
- 5-dorsolumbar fascia stretch
- 6-pectoral stretch
- 7-adductor stretch
- 8-prone knee bending

These exercises were continued till next menstrual cycle. Then again on the 2nd day of menstrual cycle the subjects were asked to fill the questionnaire and score their pain on NRS, followed by rest till the 5th day of menstrual cycle. Again from the 6th day the same exercises were performed till next cycle. The questionnaire and the NRS were filled thrice by each subject, so the response of two cycles will be noted.

The strength of the core muscles and the number of tablets consumed was recorded on the 6th day of the first and second menstrual cycle of the subjects. These stretches were performed for one month and the same stretches are then continued for the second month but ranges are increased in the second month. Again same procedure of measuring the strength and ranges was carried out.

Group B

Same procedure as earlier was followed.

From the 6th day the subjects were asked to perform the following core muscle strengthening exercises 6 times a week and once daily.

The following exercises were given

Core strengthening exercises was a supervised session. Each contraction was held for 10 seconds and performed 10 reps followed by 30 sec rest period. This group was given a calendar to tick every day after the exercise so as to maintain the track and record of the exercise sessions. Exercises were progressed after 2 weeks, 4 weeks and 6 weeks. Exercises done were

- 1.Transversus abdominis strengthening
2. Multifidus strengthening
3. Diaphragm strengthening
4. Pelvic floor muscle strengthening.

Same procedure as Group A was followed for recording and measuring the parameters.

Statistical analysis was performed after entering the data in MS Excel. SPSS IBM version 20. Each factor in the two groups including pre intervention, post intervention at one month and post intervention at two months were analyzed by performing unpaired t-test. p value of ≤ 0.05 was considered statistically significant.

RESULTS

Table 1: a. Numerical Rating Scale.

NUMERICAL RATING SCALE						
	GROUP A			GROUP B		
TITLE	PRE-INTERVENTION	POST 1 MONTH	POST 2 MONTHS	PRE-INTERVENTION	POST 1 MONTH	POST 2 MONTHS
MEAN	7.00	5.30	3.60	7.73	5.57	3.23
S.D.	1.20	1.29	1.10	1.34	1.22	1.25

	GROUP A			GROUP B		
Title	PRE-INTERVENTION VS POST 1 MONTH	POST 1 MONTH VS POST 2 MONTHS	PRE-INTERVENTION VS POST 2 MONTHS	PRE-INTERVENTION VS POST 1 MONTH	POST 1 MONTH VS POST 2 MONTHS	PRE-INTERVENTION VS POST 2 MONTHS
T Test Value	5.28	5.49	11.43	6.52	7.33	13.45
P Value	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Group A: Post 2 Months Vs Group B Post 2 Months.

T TEST VALUE	1.21
P VALUE	0.2285

INFERENCE: Numerical rating scale showed a steady decline in both the groups A and B. This decline was statistically significant at the first post month intervention and also between first and second month intervention visit. However, there was no statistically significant ($p = 0.2285$) difference between the two groups A and B at the end. This indicates that stretching treatment and core muscle strengthening treatment are comparable with no superiority of either group.

Table 2: a. Menstrual Distress Questionnaire.

Menstrual Distress Questionnaire						
	GROUP A			GROUP B		
TITLE	PRE-INTERVENTION	POST 1 MONTH	POST 2 MONTHS	PRE-INTERVENTION	POST 1 MONTH	POST 2 MONTHS
MEAN	53.20	35.30	23.23	61.53	42.07	24.90
S.D.	24.66	16.73	10.29	23.98	16.40	8.85

	GROUP A			GROUP B		
TITLE	PRE-INTERVENTION VS POST 1 MONTH	POST 1 MONTH VS POST 2 MONTHS	PRE-INTERVENTION VS POST 2 MONTHS	PRE-INTERVENTION VS POST 1 MONTH	POST 1 MONTH VS POST 2 MONTHS	PRE-INTERVENTION VS POST 2 MONTHS
T TEST VALUE	3.29	3.36	6.14	3.66	5.04	7.84
P VALUE	0.0017	0.0014	0.0001	0.0005	0.0001	0.0001

Group A Post 2 Months Vs Group B Post 2 Months.

T TEST VALUE	0.673
P VALUE	0.5030

INFERENCE: Statistical evaluation of menstrual distress questionnaire reveals significant mean decline in distress levels between the two visits (post intervention visits). This phenomenon is seen in both the groups A and B, indicating effectiveness of both treatments. However, there is no statistically significant difference in the results obtained by both the methods. This points to the similar efficacy of both the groups.

Table 3: a. Number of Tablets.

NUMBER OF TABLETS						
	GROUP A			GROUP B		
TITLE	PRE-INTERVENTION	POST 1 MONTH	POST 2 MONTHS	PRE-INTERVENTION	POST 1 MONTH	POST 2 MONTHS
MEAN	1.07	0.53	0.03	1.20	0.60	0.07
S.D.	0.74	0.68	0.18	0.71	0.56	0.25

	GROUP A			GROUP B		
TITLE	Pre-intervention vs post 1 month	Post 1 month vs post 2 months	Pre-intervention vs post 2 months	Pre-intervention vs post 1 month	Post 1 month vs post 2 months	Pre-intervention vs post 2 months
T TEST VALUE	2.94	3.89	7.47	3.63	4.73	8.22
P VALUE	0.0047	0.0003	0.0001	0.0006	0.0001	0.0001

GROUP A POST 2 MONTHS VS GROUP B POST 2 MONTHS.

T TEST VALUE	0.711
P VALUE	0.479

INFERENCE: Drug history describes the number of tablets consumed for relief of menstrual distress. The picture demonstrates diminution in the number of tablets post intervention. (post intervention 1 and post intervention 2). The difference between the records in each group separately is statistically significant. But, on comparing the groups at the end of the study, it is found that the difference is not statistically significant. This shows that either treatment can be used effectively to relieve menstrual stress.

Table 4: a. Core Muscle Strength.

CORE MUSCLE STRENGTH						
	GROUP A			GROUP B		
TITLE	PRE-INTERVENTION	POST 1 MONTH	POST 2 MONTHS	PRE-INTERVENTION	POST 1 MONTH	POST 2 MONTHS
MEAN	40.00	40.14	40.48	40.67	42.87	44.87
S.D.	0.00	0.52	0.87	0.96	1.25	1.63

	GROUP A			GROUP B		
TITLE	Pre-Intervention Vs Post 1 Month	Post 1 Month Vs Post 2 Months	Pre-Intervention Vs Post 2 Months	Pre-Intervention Vs Post 1 Month	Post 1 Month Vs Post 2 Months	Pre-Intervention Vs Post 2 Months
T TEST VALUE	1.47	1.83	3.02	7.64	5.33	12.16
P VALUE	0.145	0.071	0.0037	0.0001	0.0001	0.0001

Group A Post 2 Months Vs Group B Post 2 Months.

T TEST VALUE	13.01
P VALUE	0.0001

INFERENCE: The parameter of Core muscle strength shows a different picture. In group A the core muscle strength does not show a substantial increase as compared to group B. Group B shows

increase right from the first month post intervention, which is statistically highly significant. This increase is there till the end in group B. At the termination of the study this incline is prominent (statistically highly significant $p = 0.0001$).

This indicates comprehensive superiority of core muscle strengthening group.

Table 5: a. Sit And Reach Test.

SIT AND REACH TEST						
	GROUP A			GROUP B		
TITLE	PRE-INTERVENTION	POST 1 MONTH	POST 2 MONTHS	PRE-INTERVENTION	POST 1 MONTH	POST 2 MONTHS
MEAN (cm)	22.83	25.10	27.10	24.17	24.27	24.20
S.D.	1.76	1.79	1.67	3.95	3.89	3.86

TITLE	GROUP A			GROUP B		
	Pre-intervention vs post 1 month	Post 1 month vs post 2 months	Pre-intervention vs post 2 months	Pre-intervention vs post 1 month	Post 1 month vs post 2 months	Pre-intervention vs post 2 months
T TEST VALUE	4.95	4.47	9.63	0.09	0.07	0.02
P VALUE	0.0001	0.0001	0.0001	0.9216	0.9445	0.9764

Group A Post 2 Months Vs Group B Post 2 Months.

T TEST VALUE	3.776
P VALUE	0.0004

INFERENCE: The sit and reach test, as expected shows increasing values in cms, post intervention. This increase is more prominent in stretching group in each visit. This is statistically highly significant. The same pattern is not seen in group B. The difference between two groups at the end of the treatment is highly significant ($p = 0.0004$) as seen by t test, indicating better impact of stretching on sit and reach.

DISCUSSION

Primary dysmenorrhea is a painful menstruation of significant magnitude so as to incapacitate everyday activities in the absence of any pelvic pathology.^[1]

Dysmenorrhea pain begins few hours before and after the onset of menstruation and lasts for 24-48 hours.

This study was done to evaluate a comparative study of stretching exercises versus core strengthening exercises in primary dysmenorrhea in young sedentary females. In the study thirty females performed 8 stretching exercises 6 days a week for 2 months and thirty females performed core strengthening exercise 6 days a week for 2 months so as to study three menstrual cycles.

Our study showed that there was significant difference in pain intensity score on NRS after the intervention in both the groups. However, there was no statistically significant ($p = 0.5030$) difference between the two groups A and B at the end. This indicates that stretching treatment and core muscle strengthening treatment are comparable with no superiority of either group.

Many studies have evaluated effect of various types of exercises on primary dysmenorrhea. There results collaborate with our results.^[3,8,12]

Based on current scientific knowledge prior to menstruation, progesterone withdrawal occurs and arachidonic acid is released, which triggers a cascade of prostaglandins (PGs) and leukotrienes (LTs) in the uterus. These potent mediators of the inflammatory response induce uterine contractions and vasoconstriction, leading to uterine ischemia and pain.^[3,12]

The potential mechanism of the effect of stretching exercise is facilitating blood supply and oxygen to the

uterine musculature and excreting waste metabolites containing excess prostaglandins thereby relaxing the contracted uterine muscle.^[3,4,7] It is said that ligamentous bands which are contracted in the abdominal area are the contributory factor for substantial compression of nerve pathways and their irritation, so stretching exercise is considered very effective.^[3] It is also suggested that increased menstrual pain by uterine muscle contraction is derived from a nervous system that is innervated by the sympathetic nerve. Hence stress through hyperactivity of sympathetic nerve system via the increase contractility of uterine muscles lead to menstruation symptoms.^[3,4,7] Consequently, it might be possible to reduce dysmenorrhea symptoms by decreased sympathetic overactivity through active stretching.^[3,5,8,9]

Exercise causes release of endorphins that raise the pain threshold. Exercises also cause release of Serotonin which is also called as happy hormone which may be helpful during the stressful period of menstruation and reduce stress.

In healthy individuals, activation of core muscles occurs before any movement of the body or body segment. This concerns that core muscles are essential for optimal stabilization.

As people become more inactive, the core muscles are used less often causing them to deteriorate and provide less spinal hold up. This weakness opens the door for a possible injury, which may lead to low back pain. Functional movements are highly dependent on the core and lack of core development can result in a predisposition to injury. Core is the basis or centre of the functional kinetic channel comparable to the groundwork of a house, the core supports and stabilizes the spine during stationary pose and movement. Core stability is essential for well-organized and injury free movement patterns.

Instability can lead to injury and pain specifically during stressful times of the female body and one of these repetitive stressful times is dysmenorrhea.^[3,5] Core strengthening allows the small intrinsic musculature adjoining the lumbar spine to be trained for superior performance. This kind of exercise allows for separation and strengthening of core muscle groups. When these muscles are strong, they are much more prepared to handle daily forces of work, even when the body is under the stress of the menstrual cycle. Core strengthening maintains the muscular control around the lumbar spine to maintain functional stability.^[3,13]

The menstrual distress questionnaire score of pre intervention was compared with the score after 1st and 2nd month of intervention using unpaired t-test. In both groups there was statistically significant reduction in scores pre intervention compared to post 2nd month $p=0.0001(p \leq 0.05)$. After stretching exercises and core strengthening exercise training their symptoms have reduced and quality of life improved.

The study also evaluated the no of tablets consumed by the subjects pre-intervention and post intervention to control their pain. The mean no of tablets consumed post 2nd month of intervention showed significant reduction with $p=0.001$. The potential reduction in the number of antispasmodic tablets consumed by the subjects to control pain could be because of increase in beta endorphin levels which increases the pain threshold thus reducing the need to consume tablets to control pain.^[8]

Core muscle strength shows that in group A (stretching group) the core muscle strength does not show a substantial increase as compared to group B (core strengthening group) which is statistically highly significant $p=0.0001(p \leq 0.05)$. This increase is maintained till the end in group B. This indicates comprehensive superiority of core muscle strengthening group.

The sit and reach test, shows increasing values in cms, post intervention. This increase is more prominent in stretching group in each visit. This is statistically highly significant. The same pattern is not seen in group B. The difference between two groups at the end of the treatment is highly significant ($p = 0.0004$), as seen by the un-paired t test, indicating better impact of stretching group on sit and reach test.

Julie A, Aganoff examined effect of regular moderate exercise on menstrual symptoms using menstrual distress questionnaire and observed that there was significant lower scores in impaired concentration, negative effect, behavior change and pain post intervention.^[14]

Dysmenorrhea related symptoms like depression, anxiety, stress, nausea etc. could be reduced as stretching exercise increases serum progesterone which may give optimistic benefit to alter mood and reduce stress via neurotransmitter system. Raised endorphin levels have been associated with reduction of depression.

Also exercise reduces stress thereby reducing sympathetic activity and thus causing relaxation.^[2,3] and increases flexibility of the trunk and abdominal and pelvic muscles thereby reducing back pain and general aches.^[2]

Since Dysmenorrhea is a functional problem and not a disease state, alternative measure like active stretching and core strengthening that lessen psychosocial stress levels should be implemented among college students in

order to augment their overall wellbeing and physical fitness and reach quality of life values as of normal days.^[15]

CONCLUSION

Our study shows that stretching exercises and core strengthening exercise to girls suffering from primary dysmenorrhea can reduce pain and menstrual symptoms and no of tablets consumed during menstruation. Thus it could be performed as an effective treatment method for girls suffering from primary dysmenorrhea.

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