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Effects of stretching versus isometric exercises in primary dysmenorrhea

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Abstract
Background: Dysmenorrhea defined as pain associated with menstruation of sufficient magnitude so as to affect day to day activities. Primary dysmenorrhoea is one of the most common medical complaints without any known pathologic pelvic disease. The pain is spasmodic and is located in lower abdomen; may radiate to back and medial aspects of thighs. Systemic discomforts like nausea, vomiting, fatigue, diarrhea and headache may be associated.
Materials and Methodology: Subjects with Primary dysmenorrhea (n=30) were included in this study. Total of 30 females subjects with primary dysmenorrhea were selected with their consent. Subjects those matching the inclusion criteria with age group of 18-25 were included for the study. They were randomly divided into two groups; Group A was of 15 subjects and Group B was of 15 subjects. Group A were asked to perform stretching exercises and Group B were asked to perform isometric exercises. For 8 weeks and 4 days per week. Visual analogue scale and verbal multidimensional scoring system was used assess the pre and post effects of exercise.
Result: Group A showed significant improvement in the pain and activities of daily living as compared to group B. Mean pre VAS of young females receiving isometrics exercises was 7.95 and mean pre VAS of young females receiving stretching exercises was 7.58. Mean post VAS of young females receiving stretching exercises 3.03 was significantly lower than mean post VAS of young females receiving isometrics exercises 3.94 (p=0.04). Mean pre VMSS of young females receiving isometrics exercises was 2.80 and mean pre VMSS of young females receiving stretching exercises was 2.67. Mean post VMSS of young females receiving isometrics exercises and mean post VMSS of young females receiving stretching exercises was 0.93.
Conclusion: The study concluded that stretching exercises are more effective than isometric exercises in reducing pain and improving ADLs in primary dysmenorrhea.

Keywords: primary dysmenorrhea, young females, stretching exercises, isometric exercises, verbal multidimensional scoring system

1. Introduction
Dysmenorrhea defined as pain associated with menstruation of sufficient magnitude so as to affect day to day activities1. Primary dysmenorrhea is one where there is no identifiable pelvic pathology. But there are few factors that are too often related i.e. mostly confined to adolescents, always confined to ovulatory cycles, pain is usually cured following pregnancy and vaginal delivery, pain is related to dysrhythmic uterine contractions and uterine hypoxia, psychomotor factors such as tension and anxiety, abnormal anatomical and functional aspect of uterus, increased vasopressin release during menstruation etc.1
In primary dysmenorrhea, there is abnormal and increased prostanoid and possibly eicosanoid secretion which in turn induces abnormal uterine contractions. PGF2 alpha stimulates myometrial contractions leading to ischaemia and sensitization of nerve endings1. The contractions reduce uterine flow, leading to uterine hypoxia thereby causing pain. The increased vasopressin release during menstruation in women results in persistence pain2.
Primary dysmenorrhea is one of the most common medical complaints without any known pathologic pelvic disease. It begins when young girls first experience the ovulatory cycle. The pain begins in few hours before ore after the menstrual cycle. Then intensity of pain is more in first and rarely continues to next day. The pain is spasmodic and is located in lower abdomen; may radiate to back and medial aspects of thighs. Systemic discomforts like nausea, vomiting, fatigue, diarrhea and headache may be associated. It ay be accompanied by vasomotor changes causing pallor, cold sweats and occasional fainting1,3,4.
Dysmenorrhea is mostly relieved by pharmacological method i.e. oral contraceptive pills, non-steroidal anti-inflammatory drugs, analgesic tablets. Non-pharmacological method of treatments consists of bed rest, exercise, application of heat pack, yoga aerobics, TENS, Pilates, acupressure. Isometric exercises are a subgroup of exercises, in which the muscle length and joint range remain constant. It reduces pain via inhibitory effects of pain by activating constant muscles which are of A-delta and C-fibres3,4.
To assess the effectiveness for abdominal pain it is necessary to measure the severity of pain and changes in pain with a valid and reliable outcome measure. Visual analogue scale is the most common outcome measure used to assess the severity of pain. It has advantages which does not requires verbal or reading skills and is easily administered. Visual analogue scale is a methodologically sound instrument for quantitative assessment of acute abdominal pain and for detecting clinically important changes in such pain4,5.
There is a widespread belief that exercise can reduce dysmenorrhoea, though evidence-based studies are limited.

Few observational studies concluded that exercise were associated with a reduced prevalence of dysmenorrhoea, although several other studies found no significant association between outcomes. Evidence from several controlled trials suggest that exercise can reduce dysmenorrhoea and their associated symptoms4,5.

A cross sectional study was conducted on 370 female students of Immam Abdulrahman bin faisal university, from march 2016 till march 2017 to study the prevalence of primary dysmenorrhea. Pretested dysmenorrhea questionnaire was filled by the students. This study showed that 85.7% of the students were suffering from primary dysmenorrhea, out of which 12.7% had mild, 65.6% had moderate and 8.4% had severe dysmenorrhea. Intotal 54.5% of the students mentioned that dysmenorrhea interferes with their daily activities. Whereas 55.8% of the students mentioned that they got pain relief by using non-steroidal anti-inflammatory drugs7.

Physical exercise has been suggested as non-pharmacological approach for managing the symptoms of dysmenorrhea. It is believed that women who exercise have a reduced incidence of dysmenorrhea. Exercise is known to cause the release of endorphin hormones in brain that raise the pain threshold and is shown to improve mood of exercising subjects. Physiotherapy has a diversity of therapeutic resources aiming at decreasing or eliminating pain and promoting better quality of life.2

There have been a lot of studies in assessing the effectiveness of exercise in primary dysmenorrhea, such as effect of stretching exercise comparing with controlled group or effect of isometric exercise comparing with controlled group.3,4

None studies have been conducted on comparing the effectiveness of stretching versus isometrics exercise. Hence, the purpose of study was to find out the effectiveness of stretching versus isometric exercises in primary dysmenorrhea among the young females.

2. Materials and Methodology

An approval for the study was obtained from the institutional Ethical Committee of College of Physiotherapy, Wanless Hospital, Miraj Medical Centre, Miraj. A Randomized controlled trial was conducted in subjects with Primary Dysmenorrhea in Miraj Medical Centre, Wanless Hospital, Miraj. Sample was achieved by Simple random sampling. A Total of n=30 subjects were selected. All the subject were screened for inclusion criteria i.e. Healthy unmarried females, Age group of 18-25 years, Regular menses with complaint of primary dysmenorrhea, Students who are willing to participate in this study. The exclusion criteria included of subjects with Inter-menstrual bleeding, Diagnosed cases of urinary tract infection, Irregular menstrual cycle, Polycystic ovarian syndrome, Married females. The Demographic data including age, gender, weight, menstrual history, pain and other symptoms were collected through data sheet. All the subjects were given written consent prior to the intervention and were briefed about the study. Subjects were randomly divided into two groups with Group A of 15 and Group B of 15 subjects. Group A performed Stretching exercises and Group B performed Isometric exercises for 8 weeks and 4 days per week. The data was collected pre and post treatment using visual analogue scale and verbal multidimensional scoring system.

VISUAL ANALOGUE SCALE: Pain intensity is measured on a 10cm line. Which starts from no pain to worst possible pain. Reliability-0.99.

VERBAL MULTIDIMENSIONAL SCORING SYSTEM: It is multidimensional grading system. From Grade 0 to Grade 3. It evaluates the Working abilities of subjects, Systemic symptoms of subjects and the use of Analgesia.

STRETCHING EXERCISE: 6 Self stretching exercises in the muscles of abdomen, pelvic and gron region were asked to perform. In the first stretching exercise, the subject is asked to stand, and bend their trunk forward from the hip joint so that the shoulders and back are positioned on a straight line and the upper body is placed parallel to the floor, duration of holding time is 5 sec. In the second stretching exercise, the subjects are requested to stand and then raise 1 heel off the floor, then repeat the exercise with the other heel alternatively. The exercise is performed 20 times. In the third exercise, the subjects are asked to spread their feet shoulder width apart, place trunk and hands in forward stretching mode, then completely bend their knees and maintain a squatting position, duration of this position is 5 sec, the subjects then raised their body and repeated the same movement 10 times. In the fourth exercise, the subjects are asked to spread their feet wider than shoulder width. Then the subjects are asked to bend and touch left ankle with hat the shoulder, back and feet were kept on the floor. In this position the knees their right hand while putting left hand in stretched position above head so that the head was in the midline and head was turned and looked for their left hand, this exercise is repeated for the opposite foot with the same method. The exercises are repeated alternatively 10 times for each side of the body. In the fifth exercise, the subjects are asked to lie down in the supine position so t are bent with the help of their hands and reached to their chin, the repetition frequency is 10 times. In the sixth and last exercise, the subjects were asked to stand against a wall and put their hands behind their head and elbows pointed forward in the direction of the eyes, then without bending the vertebral column, the abdominal muscle wall is contracted for 10 sec, The is exercise was repeated 10 times.

ISOMETRIC EXERCISES: 8 Isometric exercises 10 times per session were asked to perform. Sleeping in supine position, extending feet next to each other, pressing feet on each other, holding for 5 second, and relaxing. Sleeping in supine position, putting feet crossed and pressing them on each other, holding for 5 sec and relaxing. Sleeping in supine position, bending knees and thighs, putting a pillow between two knees, pressing knees to each other, holding for 5 sec and relaxing. Going back to third position, putting hand below waist and pressing waist to the ground, holding for 5 sec and relaxing. Sleeping in supine position, bending knees and thighs and trying to raise head and neck above the ground level, holding for 5 sec and relaxing. Sleeping in supine position, bending knees and thighs and trying to move head and neck toward the right thigh, holding for 5 sec and relaxing. Repeating stage 6 toward the left thigh. Taking on abdominal deep breath among above mentioned movements (sleeping in supine position with bent knees and thighs and breathing through nose in a way that abdomen expand. One hand can also be placed on abdomen to ensure abdominal breath. Then exhaling from mouth such a way that abdominal muscles stick to waist).

3. Results and Discussion

Table 1: Average age of young females

Age	N	Minimum	Maximum	Mean	Std. Deviation
Isometrics group	15	18	25	21.47	1.64
Stretching group	15	17	23	20.73	2.09

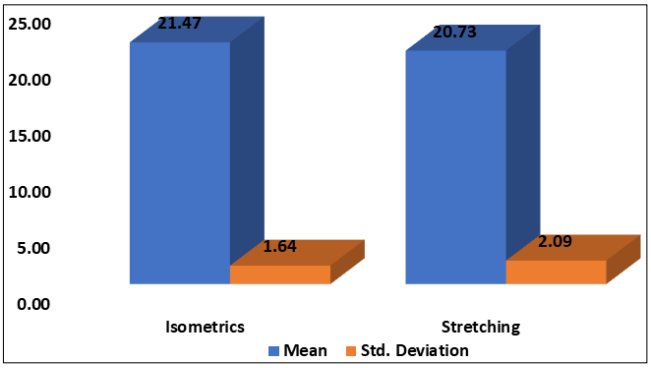

Fig 1: Bar diagram representing average age of young females

Table and fig 1 shows that mean age of young females receiving isometrics exercises was 21.47 years and mean age of young females receiving stretching exercises was 20.73 years.

Table 2: Distribution of young females according to menstrual cycle

Menstrual cycle	Isometrics		Stretching		Total	
	Frequency	%	Frequency	%	Frequency	%
Irregular	1	50	1	50	2	6.67
Regular	14	50	14	50	50	93.33
Total	15	50	15	50	30	100

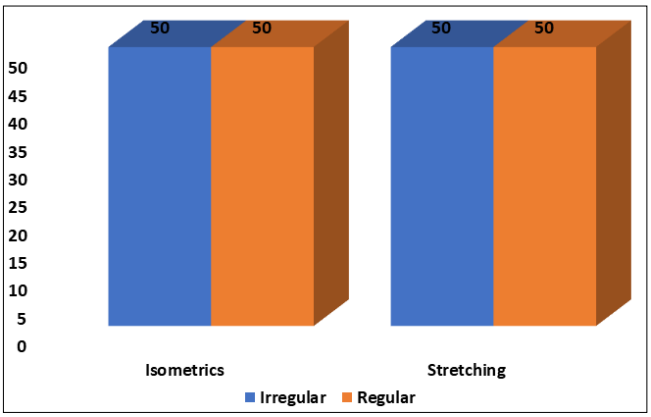

Fig 2: Bar diagram representing distribution of young females according to menstrual cycle

Table and fig 2 shows that, out of 30 young females, 2(6.67%) had irregular menstrual cycle, 1(50%) belong to each group receiving isometrics or stretching exercises.
28(93.33%) had regular menstrual cycle, 14(50%) belong to each group receiving isometrics or stretching exercises.

Table 3: Distribution of young females according to menstrual flow

Menstrual flow	Isometrics		Stretching		Total	
	Frequency	%	Frequency	%	Frequency	%
Heavy	3	100	0	0	3	10
Normal	12	44.4	15	55.6	27	90
Total	15	50	15	50	30	100

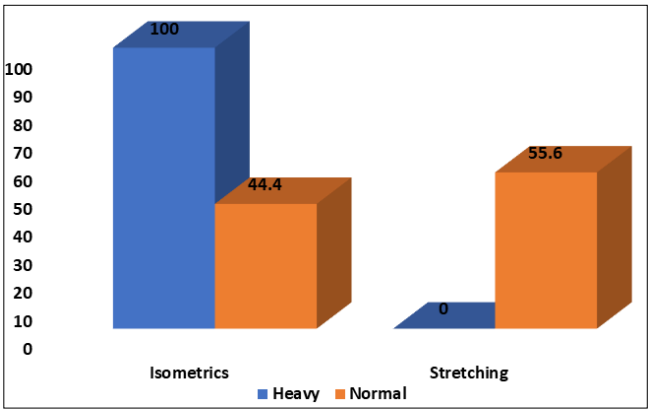

Fig 3: Bar diagram representing distribution of young females according to menstrual flow

Table and fig 3 shows that, out of 30 young females, 3(10%) had heavy menstrual flow, 3(100%) belong to group receiving isometrics exercises.
27(90%) had normal menstrual flow, 12(44.4%) belong to group receiving isometrics exercises and 15(55.6%) belong to group receiving stretching exercises.

Table 4: Descriptive statistics of young females receiving isometrics and stretching exercises on pain during dysmenorrhea via visual analogue scale (VAS) and verbal multidimensional scoring system (VMSS) and its comparison using paired t test.

Group	Scale	N	Mean	Std. Deviation	Paired t statistic	p value
Isometrics	Pre-VAS	15	7.95	1.42	9.87	<0.01
	Post VAS	15	3.94	1.28		
	Pre VMSS	15	2.80	0.41	11.29	<0.01
	Post VMSS	15	0.93	0.70		
Stretching	Pre-VAS	15	7.58	1.16	14.55	<0.01
	Post VAS	15	3.03	1.08		
	Pre VMSS	15	2.67	0.49	9.54	<0.01
	Post VMSS	15	0.93	0.70		

Paired t test was done to compare between young females receiving isometrics and stretching exercises on pain during dysmenorrhea via visual analogue scale (VAS) and verbal multidimensional scoring system (VMSS)
It was found that:

- Mean pre-VAS of young females receiving isometrics exercises was 7.95 which was significantly higher than mean post VAS 3.94 ($p<0.01$)
- Mean pre VMSS of young females receiving isometrics exercises was 2.80 which was significantly higher than mean post VMSS 0.93 ($p<0.01$)
- Mean pre-VAS of young females receiving stretching exercises was 7.58 which was significantly higher than mean post VAS 3.03 ($p<0.01$)
- Mean pre VMSS of young females receiving stretching exercises was 2.67 which was significantly higher than mean post VMSS 0.93 ($p<0.01$)

Hypothesis

- Stretching and Isometric exercises may reduce pain and improve activities of daily living in young adults with primary dysmenorrhea.

Is accepted

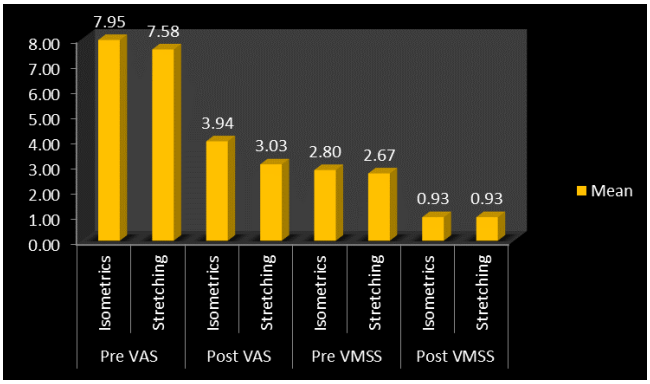

Fig 4: Average VAS and VMSS of young females receiving isometrics and stretching exercises on pain during dysmenorrhea

Table 5: Descriptive statistics of young females receiving isometrics and stretching exercises on pain during dysmenorrhea via visual analogue scale (VAS) and verbal multidimensional scoring system (VMSS) and its comparison using unpaired t test.

Scale	Group	N	Mean	Std. Deviation	Unpaired t statistic	p value
Pre-VAS	Isometrics	15	7.95	1.42	0.79	0.44
	Stretching	15	7.58	1.16		
Post VAS	Isometrics	15	3.94	1.28	2.10	0.04
	Stretching	15	3.03	1.08		
Pre VMSS	Isometrics	15	2.80	0.41	0.81	0.43
	Stretching	15	2.67	0.49		
Post VMSS	Isometrics	15	0.93	0.70	0.00	1.00
	Stretching	15	0.93	0.70		

Unpaired t test was done to compare between young females receiving isometrics and stretching exercises on pain during dysmenorrhea via visual analogue scale (VAS) and verbal multidimensional scoring system (VMSS)

It was found that:

- Mean pre-VAS of young females receiving isometrics exercises was 7.95 and mean pre-VAS of young females receiving stretching exercises was 7.58
- Mean post VAS of young females receiving stretching exercises 3.03 was significantly lower than mean post VAS of young females receiving isometrics exercises 3.94 (p=0.04).
- Mean pre VMSS of young females receiving isometrics exercises was 2.80 and mean pre VMSS of young females receiving stretching exercises was 2.67
- Mean post VMSS of young females receiving isometrics exercises and mean post VMSS of young females receiving stretching exercises was 0.93

The present study was conducted to see the effects of stretching versus isometric exercises in young females on primary dysmenorrhea. An imbalanced or excess amount of prostaglandins is released from the endometrium during menstruation. Thus, uterus is contracted frequently and dysrhythmic ally, with active pressure and basal tone increasing. This increases peripheral nerve hypersensitivity and reduce in uterine blood flow resulting in dysmenorrhea [8].

The first objective of study was to investigate the effect isometric exercises on pain and activities of daily living during primary dysmenorrhea on visual analogue scale and verbal multidimensional scoring system. Results indicated a significant difference between the two groups regarding pain intensity and on activities of daily living. Shavandi *et al*. (2010) conducted a experimental study on female students suffering from primary dysmenorrhea. The exercise group did 8 weeks of isometric exercises. Pian intensity and duration of pain decreased after 4 weeks [9]. Noorbaksh *et al*. (2012) reported that 8 weeks of exercise significantly reduced drug consumed, amount and duration of menstrual cycle and intensity of pain in students with primary dysmenorrhea [10].

The second objective of the study was to investigate the effect of stretching exercise on pain and activities of daily living during primary dysmenorrhea on visual analogue scale and verbal multidimensional scoring system. In present study pain has reduced in primary dysmenorrhea more in stretching group than in other group. Golumb *et al*. concluded that exercise is a means of moderating stress and biomechanical changes in immune system. A mechanism by which exercise can decrease the symptoms of primary dysmenorrhea [11]. Daley AJ believed that contracted ligamentous bands in the abdominal region were the causative factor for physical compression of nerve pathways and their irritation, so the proposed series of stretching exercise was considered very effective [12].

The main objective of the study was to compare the effect of stretching versus isometric exercises in primary dysmenorrhea. The study results showed a significant difference between the two groups where the stretching group was more effective improving the symptoms of primary dysmenorrhea.

The prevalence of age-related dysmenorrhea in the study was mean age of 20-21. And out of 30 young females 93.33% had regular menstrual cycle and 6.67% had irregular menstrual cycle. The menstrual flow shows that 90% had normal menstrual flow and 10% had heavy menstrual flow.

4. Conclusion

In this study there was significant difference between stretching exercise and isometric exercise in primary dysmenorrhea. Stretching exercise was more beneficial than the isometric exercise. Thus, The study concluded that stretching exercises are more effective than isometric exercises in reducing pain and improving ADLs in primary dysmenorrhea.

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