Effectiveness of Pilates and Self-Stretching Exercise on Pain and Quality of Life in Primary Dysmenorrhea" - A Comparative Study

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Abstract

Background: Dysmenorrhea, defined as painful cramps that occur with menstruation that prevents a woman from performing normal activities. Incidence of Primary dysmenorrhea is very high among the females of reproductive age group. It is responsible for the school, college and work absenteeism because of pain and discomfort.

Objective: The aim of the study was to find out the effectiveness of Pilates and self-stretching on pain and quality of life in primary dysmenorrhea.

Methodology: In this study 38 female subjects meeting inclusion criteria were selected. Subjects were randomly divided into two groups. Group – A was treated with Pilates and Group – B was treated with Self-stretching. Both interventions were given for 30 minutes for 3 days per week for 4 weeks. To assess pain intensity Visual Analogue Scale was used and to assess quality of life Menstrual Distress Questionnaire was used. Both the outcome measures were assessed before and after treatment on the day of maximum pain intensity of menstrual cycle.

Result: Parametric tests were used for statistical analysis. Within group analysis showed statistically significant reduction in pain and improvement in quality of life in both the groups ($p \leq 0.005$). Between groups analysis showed statistically significant reduction in pain ($p \leq 0.005$) in group A (Pilates) and no significant changes were found in quality of life.

Conclusion: Pilates and Self-stretching both interventions are effective in relieving pain and improving quality of life in primary dysmenorrhea. Pilates was found superior to Self-stretching in relieving pain.

Key Words: *Dysmenorrhea, Pilates, Self – stretching, VAS, MDQ.*

Introduction

Dysmenorrhea is defined as painful menstruation that prevents a woman from performing normal activities.[1] Dysmenorrhea literally means painful menstruation, in realistic and practical definition includes cases of painful menstruation of sufficient magnitude so as to incapacitate day-to-day activities.[2]

The term "Dysmenorrhea" is derived from the Greek word 'Dys' (disorder) or (severe pain) or (abnormality), 'Meno' (month) and 'Rhea' (flow).[3]

Along with painful menstruation, it is often accompanied by other symptoms including diarrhea, nausea, vomiting, headache, dizziness, backache, leg

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pain, etc.[1, 4]

There are two types of Dysmenorrhea,

1. Primary Dysmenorrhea.
2. Secondary Dysmenorrhea.

Primary dysmenorrhea is more common type of dysmenorrhea, which is due to excessive production and release of prostaglandins that make uterine muscles to more contract.[1] Its onset shortly after menarche and mostly pain is felt over lower pelvic or abdominal pain that is associated with menstrual flow and lasts 8-72 hours.[5] Its prevalence increases during adolescence (15-17 years) and reaches to its highest in 20- 24 years and decreases progressively thereafter.[6] Primary dysmenorrhea is one where there is no identifiable pelvic pathology.[2]

Secondary dysmenorrhea is defined as menstrual pain occurring in the presence of pelvic pathology.[2] It results from well-defined gynecological and pelvis conditions.[3] Onset occur at any time after menarche (typically after 25 years of age).[2]

Dysmenorrhea can be treated with non – steroidal anti – inflammatory drugs, oral contraceptives, and vitamins[7]. Primary dysmenorrhea can also be treated with non-pharmacological treatments like bed rest, exercises, application of heat packs, yoga, aerobics, TENS, Pilates, Connective tissue massage, stretching, warm bath, acupuncture etc[7].

Joseph Humbertus Pilates has developed a series of exercises based on progressive movements the body is able to make, currently called Pilates[7]. Pilates exercises belong to a group of Body – Mind Exercises, where the focus is on controlled movement, posture, and breathing pattern[8]. Pilates is a dynamic technique aiming at working strength, stretching and flexibility, concerned with maintaining physiological body curves with the abdomen as the strength center, which constantly works during all Pilates exercises[7].Exercises have hormonal effects on the lining of the uterus, or increased level of circulating endorphins[9].

Stretching is a general term used to describe any therapeutic maneuver designed to increase the extensibility of soft tissues, thereby improving flexibility by elongating (lengthening) structures that have adaptively shortened and have become hypo mobile overtime. Self-stretching is a type of stretching procedure a patient carries out independently after careful instruction and supervised practice.[10] It was 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 as it will increase the blood flow and metabolism of the uterus so reduces dysmenorrheal symptoms.[11]

Material & Methodology

Inclusion Criteria:

1) Females with Primary dysmenorrhea
2) Age between 18 to 25 years
3) Having regular menstrual cycle of 28 – 35 days
4) VAS more than or equal to 4
5) Spinster
6) Individual with BMI 18.5 to 29.9 kg/m^2

Exclusion Criteria:

1) Acute or chronic pelvic pathology
2) Subjects having any history of regular exercises 3days/week [daily average 30-45 min]
3) Attending physical activity like swimming, running or fitness center
4) Who cannot perform exercise
5) Not willing to participate

Study Design: Comparative study

Study Setting: The study was conducted at Physiotherapy OPD, Vadodara

Study Duration: 5 months between November

2019 to March 2020

Sample Size: The calculated sample size came out to be 38. They were divided into two groups; Group A (Pilates) 19 participants and Group B (Self-stretching) 19 participants.

Sample size was calculated using G* Power software version 3.1.9.2

Questionnaire and scale:

- Menstrual Distress Questionnaire
- Visual Analog Scale

Outcome measure:

- Quality of Life
- Pain

Procedure: This study was ethically approved by Institutional Review board. 40 Subjects between the age group of 18 – 25 years were given screening forms. 38 subjects out of 40 subjects who met inclusion criteria were included in this study. Consent was obtained from all the subjects before starting the study. Assessment of each subject was performed before starting the treatment. The participants were randomly divided into two groups.

GROUP A: SUBJECTS WERE TREATED WITH PILATES (N = 19)

GROUP B: SUBJECTS WERE TREATED WITH SELF-STRETCHING (N = 19)

Treatment was started after 4th day of menstruation & given for 3 days per week for 4 weeks to all subjects. To assess pain intensity (VAS) was used and to assess quality of life (MDQ) was used. Both the outcome measures were assessed on the day of maximum pain intensity (i.e., first/second day of menstruation) of the menstrual cycle and reassessed after completion of 12 sessions of the interventions on the day of maximum pain intensity (i.e., first/second day of menstruation) of next menstrual cycle.

GROUP A: PILAES (All exercise should be done in supine lying)

v **SINGLE LEG STRETCH: -** Inhale as doing Curl head forward and simultaneously bend right knee and pull it in toward chest. Place right hand on the outside of your right ankle, and place left hand on the outside of right knee. Keep left leg fully extended with toes pointed then change legs.

v **DOUBLE LEG STRETCH: -** Inhale with stretch the body long means reaching arms back by ears and legs are extended. Exhale with pull knees back into chest as arms again hold knees.

v **BRIDGING: -** Slowly raise the hips off the grounds so that only forearms and heels are touching the ground after that raise one leg straight.

v **THE ROLL UP: -** Inhale with curl head up by bringing chin towards the chest. Exhale with straighten legs and toes pointed as articulate spine like rolling up off the mat ("c" curve). Inhale as stretching forward. Exhale with begin to roll back revering the sequence of the movement. Imprint spine one vertebrae at a time into mat.

v **THE HUNDRED: -** Inhale with lift the leg to 90-90 (Hip & knee flexion), pumping the arm till 5 counts.

v **PLANK: -** Lie prone on the elbow. Raise body upwards with supporting the body's weight between the forearms and toes.

GROUP B: SELF-STRETCHING

v In this stretching exercise, the subjects were asked to stand, and bend their trunk forward from the hip joint so that the shoulders and back were positioned on a straight line and the upper body was placed parallel to the floor, duration of holding time was 5 sec. with 10 repetitions.

v In this stretching exercise, the subjects were requested to stand and then raise one heel off the floor, then repeat the exercise with the other heel alternatively. The exercise was performed 10 times for each heel.

v In this stretching exercise, the subjects were 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 was 5 sec, the subjects then raised their body and repeated the same movement 10 times.

v In this stretching exercise, the subjects were asked to spread their feet wider than shoulder width. Then the subjects were asked to bend and touch right ankle with their left hand while putting right hand in a stretched position above head so that the head was in the middle and head was turned and looked for their right hand, this exercise was repeated for the opposite foot with the same method. The exercise was repeated alternatively 10 times for each side.

v In this stretching exercise, the subjects were asked to lie down in the supine position so that the shoulder, back and feet remain on the floor. In this position the knees were bent with the help of hands and reached to chin, the repetition frequency was 10 times.

v In this stretching 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 verbal column, the abdominal muscle wall was contracted for 10 sec. This exercise was repeated 10 times.

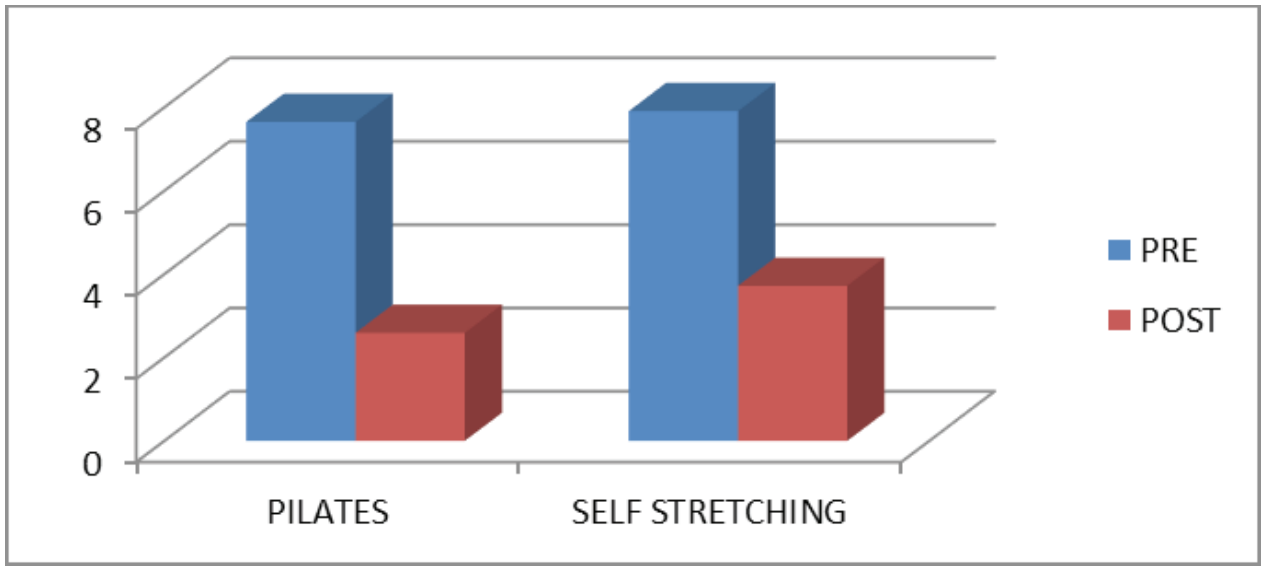
Results

TABLE 1: WITHIN AND BETWEEN GROUP PRE – POST TREATMENT MEAN VAS SCORE

GROUP	PRE – TREATMENT		POST – TREATMENT		t VALUE	p VALUE	REMARKS
	MEAN	SD	MEAN	SD			
GROUP – A (PILATES)	7.65	0.73	2.59	0.80	38.885	0.000	SIGNIFICANT
GROUP – B (SELF – STRETCHING)	7.91	0.61	3.72	0.65	29.512	0.000	SIGNIFICANT

GROUPS	DIFFERENCE PRE AND POST TREATMENT		t VALUE	p VALUE	REMARKS
	MEAN	SD			
GROUP – A (PILATES)	4.98	0.52	4.230	0.000	SIGNIFICANT
GROUP–B (SELF-STRETCHING)	4.19	0.61			

GRAPH: 1 PRE – POST TREATMENT MEAN VAS SCORE IN GROUP A (PILATES) AND GROUP B (SELF-STRETCHING)



GRAPH 2: MEAN DIFFERENCE IN VAS SCORE IN GROUP A (PILATES) AND GROUP B (SELF – STRETCHING)

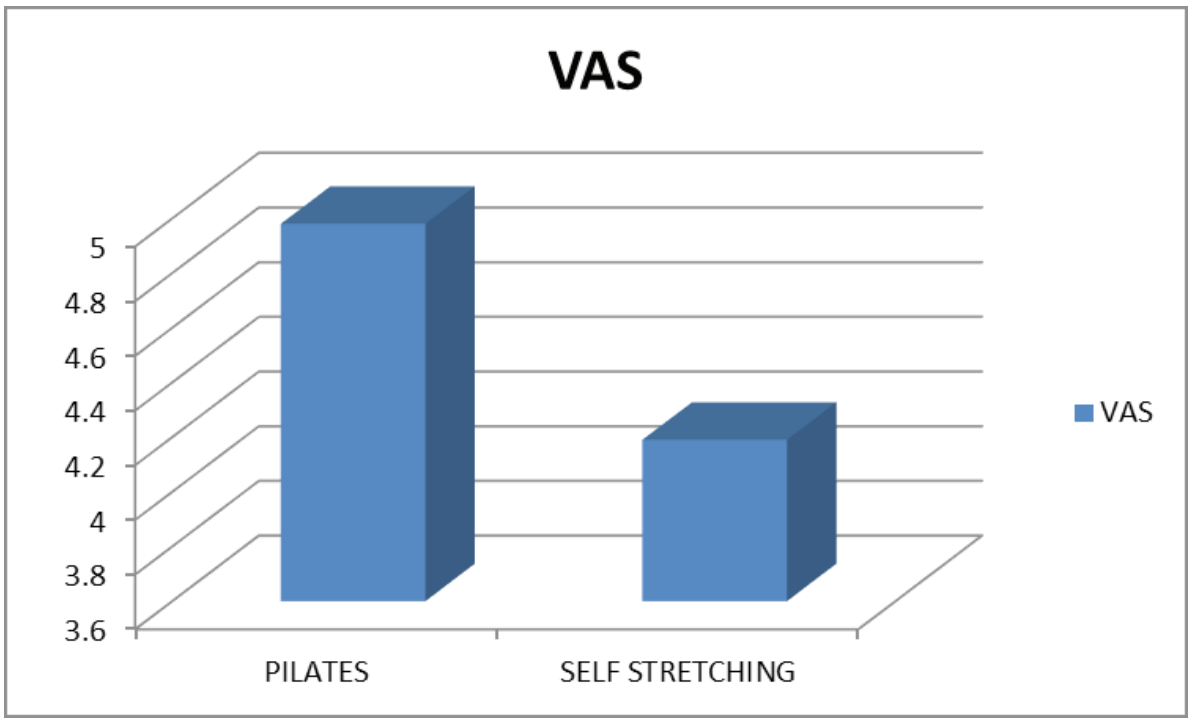
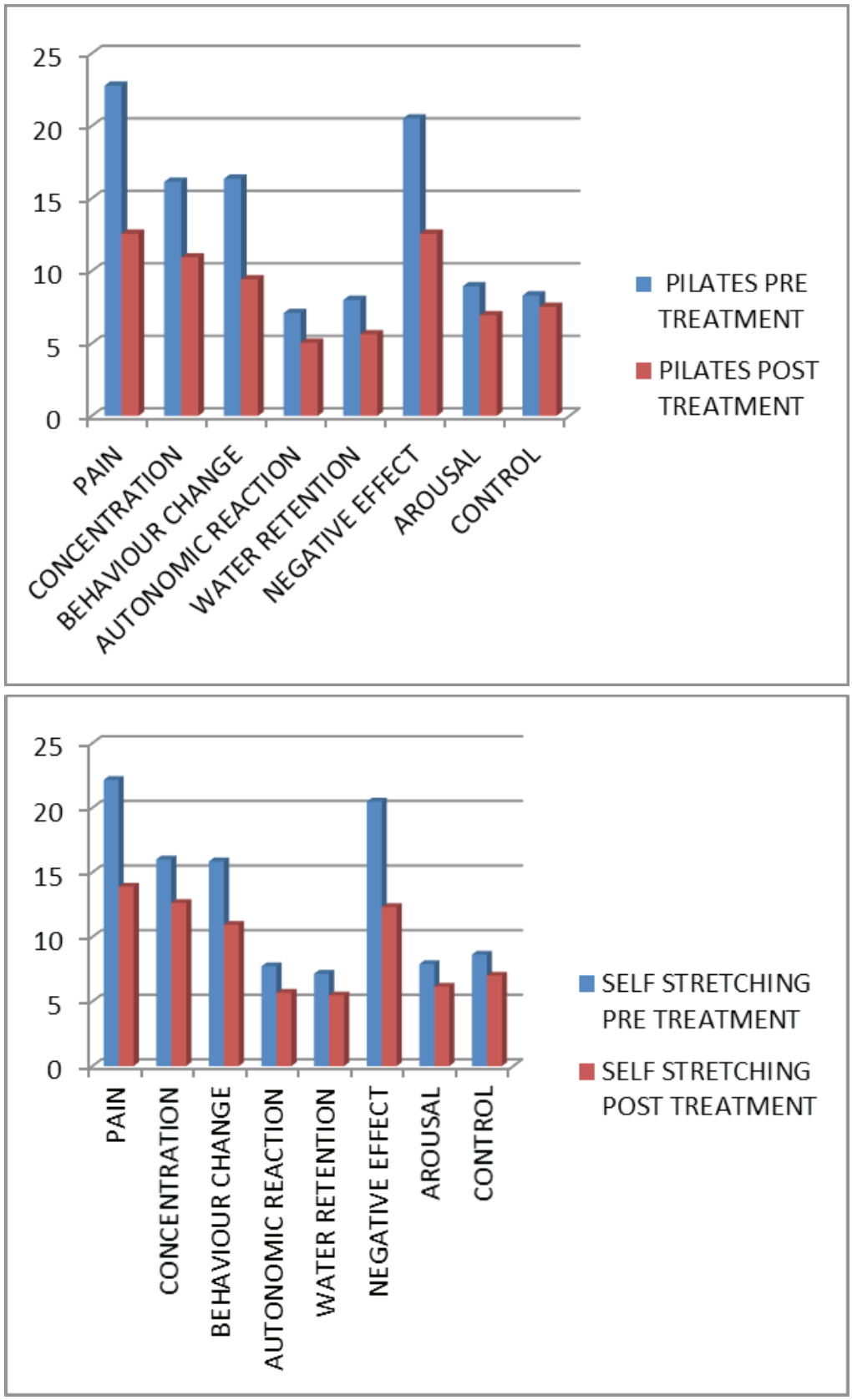


TABLE 2: WITHIN GROUP PRE – POST TREATMENT MEAN FOR EIGHT GROUP OF SYMPTOMS OF MDQ IN (I) [GROUP A PILATES] AND (II) [GROUP B SELF – STRETCHING]

(I)	GROUP – A (PILATES)				t VALUE	p VALUE	REMARKS
	PRE		POST				
	MEAN	SD	MEAN	SD			
PAIN	22.78	3.72	12.57	3.06	10.04	0.000	SIGNIFICANT
CONCNTRATION	16.15	5.50	10.94	2.32	5.39	0.000	SIGNIFICANT
BEHAVIOUR CHANGE	16.36	4.54	9.42	2.00	6.67	0.000	SIGNIFICANT
AUTONOMIC REACTION	7.10	2.88	5.05	1.87	4.02	0.001	SIGNIFICANT
WATER RETENTION	8.00	1.59	5.63	2.19	5.29	0.000	SIGNIFICANT
NEGATIVE EFFECT	20.52	5.12	12.57	3.80	7.04	0.000	SIGNIFICANT
AROUSAL	8.94	2.52	6.94	2.27	5.23	0.000	SIGNIFICANT
CONTROL	8.31	1.88	7.52	2.06	1.56	0.135	NOT SIGNIFICANT

(II)	GROUP – B (SELF-STRETCHING)				t VALUE	p VALUE	REMARKS
	PRE		POST				
	MEAN	SD	MEAN	SD			
PAIN	22.15	3.25	13.89	2.07	11.66	0.000	SIGNIFICANT
CONCNTRATION	16.00	2.60	12.63	2.36	4.21	0.001	SIGNIFICANT
BEHAVIOUR CHANGE	15.84	3.32	10.94	2.52	7.11	0.000	SIGNIFICANT
AUTONOMIC REACTION	7.73	1.88	5.68	1.41	5.03	0.000	SIGNIFICANT
WATER RETENTION	7.15	2.58	5.47	0.90	2.96	0.008	SIGNIFICANT
NEGATIVE EFFECT	20.47	6.14	12.31	1.82	5.53	0.000	SIGNIFICANT
AROUSAL	7.89	2.90	6.15	0.95	2.60	0.018	SIGNIFICANT
CONTROL	8.63	1.70	7.00	1.29	5.00	0.000	SIGNIFICANT



GRAPH 3: PRE – POST TREATMENT MEAN FOR EIGHT GROUP OF SYMPTOMS OF MDQ IN GROUP A (PILATES) AND GROUP B (SELF STRETCHING)

TABLE 3: BETWEEN GROUP MEAN DIFFERENCE FOR EIGHT GROUP OF SYMPTOMS OF MDQ SCORE

	GROUP – A (PILATES)		GROUP – B (SELF-STRETCHING)		t VALUE	p VALUE	REMARKS
	MEAN DIFFERENCE PRE – POST TREATMENT		MEAN DIFFERENCE PRE – POST TREATMENT				
	MEAN	SD	MEAN	SD			
PAIN	10.21	4.42	8.26	3.08	1.572	0.125	NOT SIGNIFICANT
CONCNTRATION	5.21	4.21	4.10	2.51	0.982	0.332	NOT SIGNIFICANT
BEHAVIOUR CHANGE	7.00	4.49	4.89	2.99	1.698	0.98	NOT SIGNIFICANT
AUTONOMIC REACTION	2.15	2.24	2.05	1.77	0.160	0.874	NOT SIGNIFICANT
WATER RETENTION	2.57	1.50	2.05	2.17	0.869	0.391	NOT SIGNIFICANT
NEGATIVE EFFECT	7.94	4.91	8.15	6.42	-0.113	0.910	NOT SIGNIFICANT
AROUSAL	2.21	1.54	2.15	2.58	0.076	0.940	NOT SIGNIFICANT
CONTROL	1.52	1.74	1.78	1.18	-0.544	0.590	NOT SIGNIFICANT

Discussion

Subjects were matched for Age, BMI, Age of menarche and days of menstrual cycle for both the group in order to minimize the difference.

The first objective of this study was to study the effect of Pilates on pain and quality of life. Result showed significant reduction in pain and improvement in quality of life by Pilates. Pilates exercises belong to a group of Body-Mind Exercises, where the focus is on controlled movement, posture, and breathing. Pilates improves mental and physical wellbeing, increases flexibility and strengthens muscles through controlled movements. The physiological basis for dysmenorrhea is associated with increased levels of prostaglandins, which results in uterine contraction and ischemia. [12] It seems that women who exercise have a reduced incidence of dysmenorrhea. These may be due to exercises have hormonal effects on

the lining of the uterus, or increased level of circulating endorphins.

Dr. Shachi M Paithankar et al (2016)[13] studied effects of Pilates and conventional physiotherapy in primary dysmenorrhea on pain and quality of life. They found similar effects as this present study. Neha oswal et al (2017)[14] also concluded that Pilates improves quality of life and reduces pain intensity. Even similar result was found in a study conducted by Luana Macêdo (2012).[7]

The second objective of this study was to study the effects of self-stretching on pain and quality of life. Result showed significant reduction in pain and improvement of quality of life. In quality of life, result showed significant effects in following components of menstrual distress questionnaire like pain, concentration, behavior change, autonomic reaction and negative effect ($p<0.005$). A study done by Dawood MY (2006)[15] has shown that therapeutic exercise can increase the secretion of endorphins from the brain, and these materials in turn raise the pain threshold of the body. Daley AJ (2009)[16] 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.

Reda Mohamed (2016)[4] conducted study comparing, stretching versus mefanamic acid tablets. Results of this study found self-stretching exercises as an effective intervention in the management of primary dysmenorrhea.

The third objective of the study was to compare effect of Pilates and self-stretching on pain and quality of life. Result of the present study showed that Pilates was superior to self-stretching in pain reduction and no significant changes were found in quality of life.

Conclusion

Pilates and self-stretching were found effective in reducing pain and improving quality of life in primary dysmenorrhea. Between groups analysis found Pilates more effective in reducing pain than self-stretching.

Hence, Pilates and self-stretching both can be used as a treatment for primary dysmenorrhea.

Conflict of Interest: None

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