



## EFFECT OF PILATES AND YOGA ON PRIMARY DYSMENORRHEA AMONG WOMEN WITH FIBROMYALGIA

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### Abstract

**Background:** Primary Dysmenorrhea (PD), depression, anxiety, and stress among women with Fibromyalgia (FM) and healthy females are the common problems seen these days. It is important to determine possible factors related to Primary Dysmenorrhea in FM.

**Methodology:** The present study was conducted on 90 female patients diagnosed with FM and age and sex-matched healthy controls. All patients were evaluated primary dysmenorrhea (PD). The premenstrual syndrome was assessed among the patients for the presence of one or more affective or somatic symptoms within the five days preceding menses. The diagnosis of primary dysmenorrhea was defined as having abdominal pain or lower back pain lasting at least two days during a menstrual period. Dysmenorrhea was assessed via a visual analogue scale. Dysmenorrhea was rated via a Menstrual distress questionnaire Scale in all the participants.

**Results:** Primary dysmenorrhea was established in 41% of FM patients and 28% of the control group. A statistically significant difference was found in PD between the two groups ( $p = 0.03$ ). PMS was established in 42% of the FM patients and 25% of the control group. A statistically significant difference was found in PMS between the two groups ( $p = 0.03$ ).

**Conclusion:** There is an increased frequency of premenstrual syndrome and dysmenorrhea in FM patients. The patients with high symptom severity scores and high depression scores among the FM patients are at risk of PMS and PD.

**Keywords:** Pain, Anxiety, Depression, Primary dysmenorrhea, Fibromyalgia, Pilates, Yoga

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## Introduction

Adolescence is a phase which is marked by the onset of crucial endocrinological, metabolic, somatic and psychological changes in girls. Menstruation is also a very important phenomenon occurring in the adolescent phase in a girl's life. A normal menstrual cycle depends on the action and interaction of the hormones released from the pituitary-hypothalamus and the ovaries, and these hormones have direct effects on the endometrium. Menstruation is a periodic process therefore it is also referred to as periods in general. The onset of first menstrual cycle at the mean age of 13 years in the life of an adolescent girl is referred to as menarche. The length of a menstrual cycle ranges between 24-32 days. The length of the menstrual flow is usually about 3-7 days and amount of flow  $\geq 80$  ml. The definition of menstruation is "Visible manifestation of cyclic, physiologic uterine bleeding due to shedding of endometrium every  $28 \pm 7$  days in response to hormones". Menstruation is a natural phenomenon of the reproductive age in a women's life.<sup>1</sup>

Dysmenorrhea is a usual phenomenon occurring to a lot of females worldwide. It commonly attributes to the cyclic lower abdomen or pelvic pain that can easily divaricate to the back or the thighs, which transpire during menstruation very frequently coexisting with other indications inclusive of dizziness, fatigue, sweating, backache, headache, nausea, vomiting and diarrhoea. It fractionates into two types: Primary dysmenorrhea and secondary dysmenorrhea. The characteristic feature of Primary dysmenorrhea is the cramping pain in the lower abdomen at the inception of menstruation in the non-appearance of any recognizable pelvic disease. On the contrary secondary dysmenorrhea is the menstrual pain related to any fundamental pathology whose beginning might have started years after menarche.

Premenstrual syndrome, (PMS), also demonstrated as premenstrual tension (PMT), is a symptom perceived as predominantly.<sup>2</sup>

The underlying cause for primary dysmenorrhea is suspected to be prostaglandin and oxytocin hormone which starts the contraction of uterine muscles which eventually reduces the blood supply to the uterus and hence resulting into cramping. The prostaglandins are generated by the cells in the inner lining of the uterus which leads to uterine muscle contraction and aids the uterus to shed the lining which is generated during the menstrual cycle. If these prostaglandins are generated in a quantity greater than which is required, the female

tend to have more uterine contractions than the normal followed by pain or dysmenorrhea with her menstrual cycle.<sup>3</sup> This enhanced pain sensitivity may increase susceptibility to other chronic pain conditions in later life; dysmenorrhea is a risk factor for fibromyalgia.<sup>4</sup>

A very positive impact of physical activity on primary dysmenorrhea is observed. Those females who indulge into physical activities experience reduced dysmenorrhea. This happens because of the reduced uterine contraction due to increased  $\beta$ -endorphin levels. Blood releases  $\beta$ -endorphin from hypothalamus, neurons from brain and spinal cord and also the pituitary gland. It has a very positive effect on various hypothalamic activities such as modulation of fertility, heat, cardiovascular actions, respiration, perception of mood, pain, and increment in the pain threshold.)<sup>5</sup>

It is observed that non-steroidal anti-inflammatory drugs are the influential first line treatment for primary dysmenorrhea. Whereas, combined oral contraceptives pills are efficacious second line treatment for the same. Roughly 25% of the females deny to take non-steroidal anti-inflammatory drugs and combined oral contraceptive pills for treating primary dysmenorrhea, as they impose many side effects including nausea, gastric ulcers etc. On the contrary most of the females welcome the idea of cost-effective treatment for primary dysmenorrhea such as Pilates, Yoga, Zumba, Hot packs, Aerobics, Aromatherapy, meditation, self-massage, acupressure etc. These alternatives to pharmacological treatment are fashionable, attractive, interesting and at the same time proves worthy. Zumba exercise represented a positive effect on the severity and duration of pain in females suffering from primary dysmenorrhea. Zumba arbitration lessen the severity and duration of menstrual pain as it is also a form of exercise which lead to release of endorphins leading to reduction in uterine contractions when the females experiencing primary dysmenorrhea are submitted to Zumba protocol. Hence proposing the need of regularly involving in Zumba exercise which might possibly be a powerful treatment for primary dysmenorrhea.<sup>6</sup>

A non-intrusive treatment method for primary dysmenorrhea includes transcutaneous electrical nerve stimulation (TENS) which remits electrical currents through the skin. High frequency (HF) TENS was exemplified to be potent in reducing menstrual pain. TENS is a secure and fruitful method for curtailment of pain.<sup>7</sup> Yoga and Pilates

are a remarkable disposition of exercise for females suffering from primary dysmenorrhea. The foundation of these two exercises is the priority given to the diaphragmatic breathing. In females suffering from menstrual problems, such as menstrual cramps, massive bleeding. Clotting and spotting can be a result of stiff strangulated pelvic floor muscles. By treating these tight pelvic floor muscles, we can enhance the blood flow and can also eliminate the old remaining blood and thus encouraging the elevation of the tight pelvic floor muscles.<sup>8</sup> After performing yoga a feeling of relaxation is initiated as the body secrete endorphin hormone which eventually lessen the uterine contractions as well as the abdominal cramps which is also in accordance to a theory declaring the relaxing ramifications leading to an increase in parasympathetic nerve response ensuing in vasodilation effects of vessels uterine blood in such a manner that uterine blood flow increases and uterine contractions decrease.<sup>9</sup> The pain and symptoms of primary dysmenorrhea consequentially reduce quality of life associated to physical health and the symptoms of dysmenorrhea hampered work concomitant productivity and efficiency. Symptoms of primary dysmenorrhea impacted social activities, work-efficiency, and also lead to absenteeism in working females. Meal skipping also increased the chances of primary dysmenorrhea by two times. Tremendous decrement in mobility, self-care, usual activities, pain/discomfort, and anxiety/depression is also noticed.<sup>10</sup>

Premenstrual syndrome is a multi-disciplinary syndrome indicated by the demonstration of psychological, physical and behavioural symptoms. The tendency of developing fibromyalgia was seen more in females with primary dysmenorrhea, especially in patients who have shown multiple psychosomatic symptoms.<sup>[12]</sup> The peculiar symptoms include irritability, lack of concentration, mood swings, depression, stress, anxiety, abdominal bloating, breast tenderness, fatigue. Utilization of junk food, lack of physical activity and increase in BMI was tremendously linked to pre-menstrual syndrome and primary dysmenorrhea. Healthy eating habits, exercising on a regular basis might lessen the symptoms associated to primary dysmenorrhea. Lifestyle refinement should be practised by patients suffering from primary dysmenorrhea.<sup>13</sup> Regular exercise is usually linked with many positive effects on body outcome, for instance enhanced insulin sensitivity, reduced visceral adipose tissue mass and refinement in cardiovascular function, vigorous training has been revealed to cause luteal

phase inadequacy (oligomenorrhea and other menstrual dysfunctions) and amenorrhea. And moderate exercise was linked with a marginally increased likelihood of longer cycles, as unwanted side effect of exercise that nullify its positive effects. Endorphin levels decreased during the study time.<sup>14</sup> Pilates gymnastics was established by Joseph Pilates since 1920 which comprises of movements by merging flexibility, strength, breathing, and relaxation. The prime postulates of Pilates include accuracy control in performing movements, shielding of muscles that are customarily trained by supervised movements and breathing. They are crafted to toughen the inner postural muscles and build panty girdle muscles around the trunk that safeguard the back from probable injury, aches, and pain during menstruation. Pilates exercises concentrate on the strength of stomachic muscles and the muscles of the waist, toughening the back, encircling the pelvis, and glutes. Pilates exercise also instruct deep muscles to have an impression on muscle strength and improved resilience. Pilates can be used to minimize the pain since the brain and spinal cord will eventually produce endorphins, the hormones which will act as a non-artificial tranquilizer and narcotic causing comfort.<sup>15</sup>

There is lack of literature concerning the impact of Pilates and Yoga in pain felt during menstrual distress and other pain characteristics of primary dysmenorrhea in females with fibromyalgia. when the females are submitted to Pilates and Yoga exercise protocol for the median time period of a menstrual cycle (which is 28 days with most lengths between 25-32 days) for a total of 4 weeks consisting of 5 sessions a week. Therefore, the present study is sculpted to interrogate that out of both the exercise protocol which serve better results in the management of primary dysmenorrhea. The Aim of the study is to compare the impact of Pilates and Yoga exercise protocol in pain during menstrual cycle in females suffering from primary dysmenorrhea.

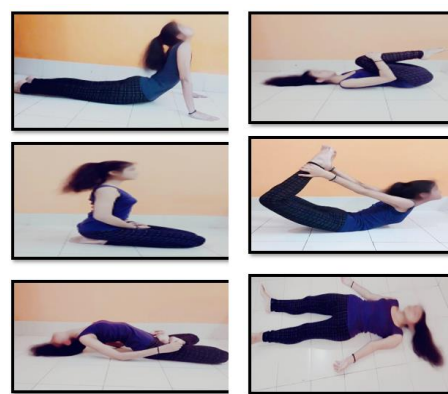
## METHODS & MATERIALS

The present study was performed on 90 female patients with known history of primary dysmenorrhea and diagnosed with fibromyalgia and age and sex-matched healthy controls. All Women were examined for the related somatic symptoms and primary dysmenorrhea. Dysmenorrhea was quantified via visual analog scale and was rated via Multidimensional Scoring System. The Mensural Distress questionnaire (MDQ) was applied to all patients. Subjects were informed about the procedure individually and

consent form was signed by them and height and weight were taken. Then the subjects were enquired about their menstrual pain history of about 4 months, those who accepted that they experienced pain intensity greater than 40mm on a visual analogue scale (VAS) consecutively for 4 months and patients with moderate to severe category of MDQ were selected for the procedure. One introductory session was conducted for all the subjects of the Pilates and Yoga groups. The subjects were divided into three groups. The study was conducted for 4 weeks with 5 sessions of 60 minutes. Post data was collected at the end of this research.



**Figure 2.** Exercises for the Pilates Group

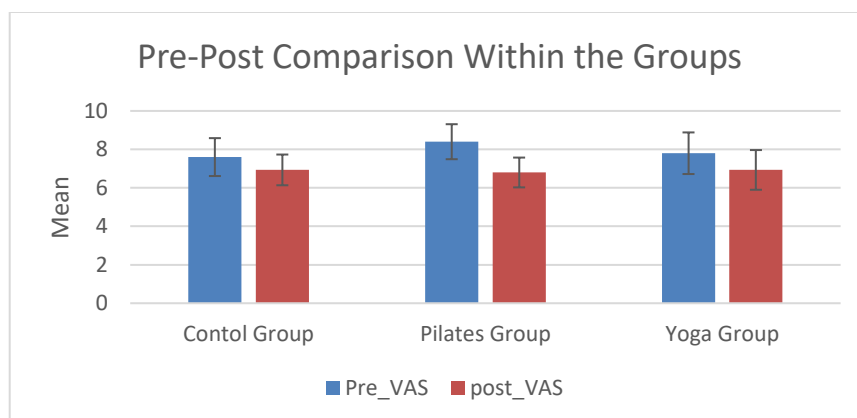


**Figure 3.** Exercises for the Yoga Group

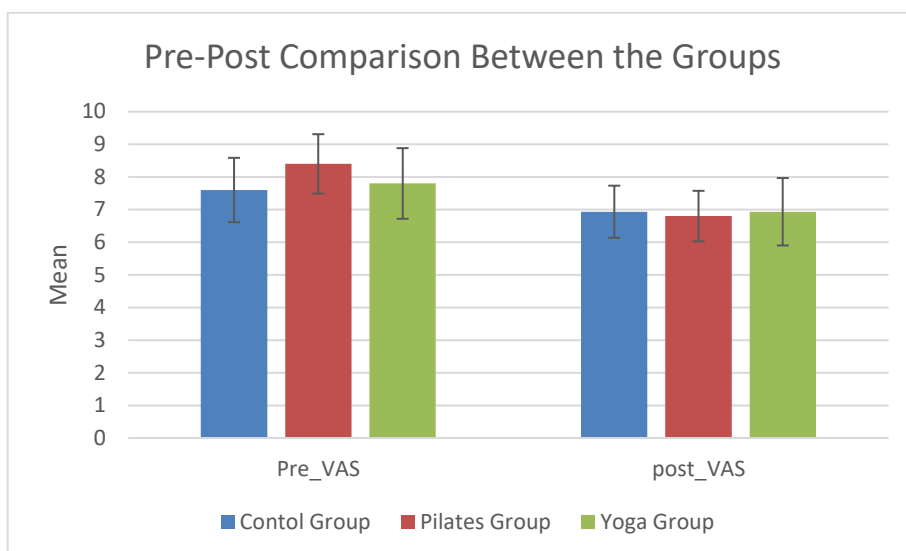
## RESULT ANALYSIS

90 subjects were taken which were assigned into three groups comprising of 30 subjects in each group namely group A (Control group), group B (Pilates group) and group C (Yoga group).

The mean standardized value for pain as measured with Pre-VAS group A (Control Group) was  $7.6 \pm 1.08$  in group B (Pilates) was  $8.4 \pm 0.91$  and in group C (Yoga) was  $7.8 \pm 0.98$  respectively.



**FIGURE 1** Shows the Pre and Post VAS Mean and Std. Dev. values for the Control Group, Pilates Group and Yoga Group within the group's comparison.



**FIGURE 2** Shows the Pre and Post VAS Mean and Sd values for the Control Group, Pilates Group and Yoga Group between the group’s comparison values

| Variables | Control Group |                | Pilates |                | Yoga |                | F value | P value | Partial Eta Squared |
|-----------|---------------|----------------|---------|----------------|------|----------------|---------|---------|---------------------|
|           | Mean          | Std. Deviation | Mean    | Std. Deviation | Mean | Std. Deviation |         |         |                     |
| Pre-VAS   | 7.80          | 0.986          | 8.40    | 0.910          | 7.60 | 1.082          | 2.625   | 0.084   | 0.111               |
| Post-VAS  | 6.93          | 0.799          | 6.80    | 0.775          | 6.93 | 1.033          | 0.116   | 0.891   | 0.005               |

**Table 1:** Representing the Pre and Post VAS Mean and SD values for the Control Group, Pilates Group and Yoga Group.

After intervention the mean value for pain as found among the subjects in group B was  $6.8 \pm 0.77$  and in group C was  $6.93 \pm 0.79$  discretely.

No intervention was done in group A and therefore the standardized mean value for pain after completion of four weeks were found to be  $7.8 \pm 1.08$  respectively.

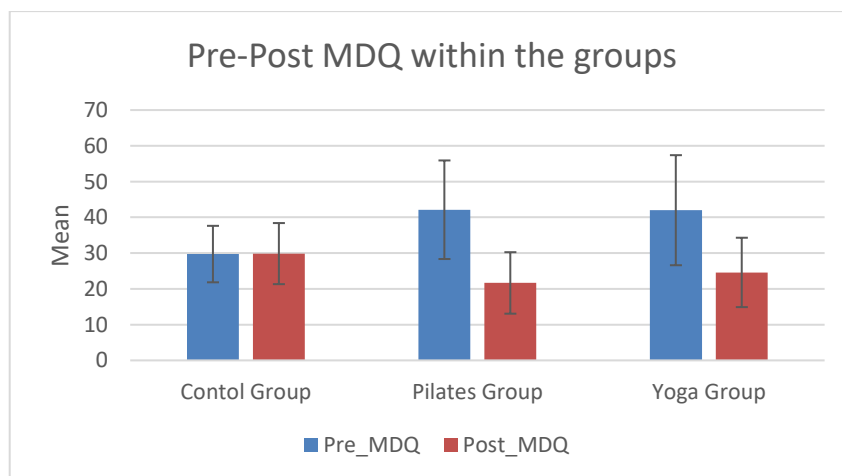
This shows that Pilates is slightly more efficacious in comparison to Yoga and no exercise at all in the treatment of pain due to primary dysmenorrhea.

Menstrual Distress Questionnaire was chosen to investigate Quality of life before and after the four weeks of intervention.

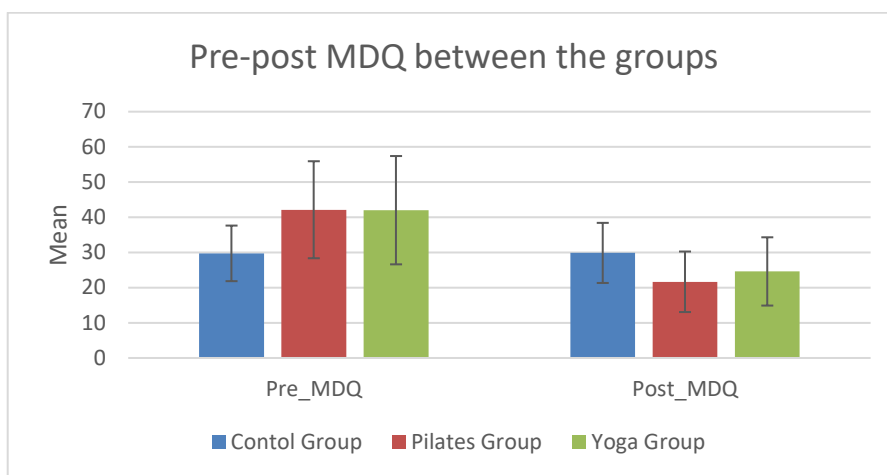
In group A the mean values of Menstrual Distress Questionnaire before the onset of the study were  $29.73 \pm 7.89$ .

In group B the mean pre-intervention values of Menstrual Distress Questionnaire were found to be  $42.13 \pm 13.78$ .

In group C the mean pre-intervention values of Menstrual Distress Questionnaire were found to be  $42 \pm 15.39$ .



**Figure-3.** Shows the Pre and Post mean MDQ Mean and SD values for Control Group, Pilates Group and Yoga Group within the group’s comparison.



**Figure-4.** Shows the Pre and Post mean MDQ Mean and SD values for Control Group, Pilates Group and Yoga Group between the group’s comparison.

| Variables | Control Group |                | Pilates |                | Yoga  |                | F value | P value | Partial Eta Squared |
|-----------|---------------|----------------|---------|----------------|-------|----------------|---------|---------|---------------------|
|           | Mean          | Std. Deviation | Mean    | Std. Deviation | Mean  | Std. Deviation |         |         |                     |
| Pre_MDQ   | 29.73         | 7.896          | 42.13   | 13.78          | 42.00 | 15.39          | 4.662   | 0.015   | 0.182               |
| Post_MDQ  | 29.86         | 8.54           | 21.66   | 8.600          | 24.6  | 9.7            | 2.986   | 0.061   | 0.124               |

**Table 2:** Representing the Pre and Post MDQ Mean and Std. Deviation values for the Control Group, Pilates Group and Yoga Group.

In group A no intervention was given and the mean values of Menstrual Distress Questionnaire at the end of four weeks were found to be  $29.86 \pm 8.54$ .

In group B the mean values of Menstrual Distress Questionnaire at the end of four weeks were found to be  $21.66 \pm 8.59$  discretely.

In group C the mean values of Menstrual Distress Questionnaire at the end of four weeks were found to be  $24.6 \pm 9.70$  discretely.

This shows that Pilates is slightly more efficacious in comparison to Yoga and no exercise at all in improving Quality of life in females suffering from primary dysmenorrhea.

**DISCUSSION**

The present study aimed at investigating the effectiveness of Pilates over the Yoga treatment in curtailment of Pain and enhancement in Quality of Life in females suffering from primary dysmenorrhea. The result of present study showcased there was a remarkable difference in Pain intensity and quality of life after four weeks of treatment between the groups (control group, Pilates group and yoga group) in females suffering from primary dysmenorrhea.

The mean standardized value for pain in group A was  $7.8 \pm 1.08$  in group B was  $8.4 \pm 0.91$  and in group C was  $7.6 \pm 0.98$ . After intervention the mean value for pain as found among the subjects in group B was  $6.8 \pm 0.77$  and in group C was  $6.93 \pm 0.79$  discretely. No intervention was done in group

A and therefore the standardized mean value for pain after completion of four weeks were found to be  $7.8 \pm 1.08$  respectively.

In group A the mean values of Menstrual Distress Questionnaire before the onset of the study were  $29.73 \pm 7.89$  and at the end of four weeks were found to be  $29.86 \pm 8.54$ .

In group B the mean pre-intervention values of Menstrual Distress Questionnaire were found to be  $42.13 \pm 13.78$  and the post-intervention values were  $21.66 \pm 8.59$  discretely.

In group C the mean pre-intervention values of Menstrual Distress Questionnaire were found to be  $42 \pm 15.39$  and the post-intervention values were  $24.6 \pm 9.70$  discretely.

The outcomes of the current study demonstrated remarkable improvement in Pain and quality of life after four weeks of treatment in group B and group C.

The outcomes of the current study also demonstrated that Pilates is slightly more efficacious in comparison to Yoga and no treatment at all specially if performed meticulously in a duration of four weeks.

**Pain Relief**

Visual analogue scale was used in the study to evaluate the pain intensity before and after four weeks of intervention.

**Group A:** The mean standardized value for pain in group A was  $7.8 \pm 1.08$ . No intervention was done in group A and therefore the standardized mean value for pain after completion of four weeks were found to be  $7.8 \pm 1.08$  respectively.

**Group B:** The mean standardized value for pain in group B was  $8.4 \pm 0.91$ . After intervention the mean value for pain as found among the subjects of group B was  $6.8 \pm 0.77$ . The Pilates group demonstrated a tremendous decrement in pain after the four weeks of intervention.

**Group C:** The mean standardized value for pain in group C was  $7.6 \pm 0.98$ . After intervention the mean value for pain as found among the subjects of group C was  $6.93 \pm 0.79$  discretely. The Yoga group demonstrated a decent decrement in pain after the four weeks of intervention.

The physiological grounds of dysmenorrhea are somewhere linked to the increment in the levels of prostaglandins which usually tend to initiate unwanted painful uterine contractions. It is noticed that females who exercise on a regular basis generate endorphins in adequate amounts which is a happy hormone and therefore it can pacify the damage done by the prostaglandins, and thus evidently decreasing the pain occurring due to the harsh uterine contractions on the command of prostaglandins. Exercising also helps in increasing the blood flow to the uterine muscles and hence a reduction in contractions is observed. (Paithankar, S. M., & Hande, D. 2016).

The subjects might have increased their pain threshold after submitting to Pilates and Yoga protocol as their body would have started manufacturing greater amounts of neurotransmitters such as epinephrine, dopamine, serotonin, enkephalin which also popularly known for their ability to hamper pain. (Proctor M, et al 2007).

### Quality of Life

Menstrual Distress Questionnaire was chosen to investigate Quality of life before and after the four weeks of intervention.

In group A the mean values of Menstrual Distress Questionnaire before the onset of the study were

$29.73 \pm 7.89$  and at the end of four weeks were found to be  $29.86 \pm 8.54$ .

In group B the mean pre-intervention values of Menstrual Distress Questionnaire were found to be  $42.13 \pm 13.78$  and the post-intervention values were  $21.66 \pm 8.59$  discretely.

In group C the mean pre-intervention values of Menstrual Distress Questionnaire were found to be  $42 \pm 15.39$  and the post-intervention values were  $24.6 \pm 9.70$  discretely.

Control group demonstrated negligible enhancement in Quality of life, Yoga group demonstrated a decent enhancement in Quality of life and Pilates group demonstrated a significant enhancement in Quality of life after the four weeks of tailored exercise protocol.

Primary dysmenorrhea can be a major setback for many females as it can severely degrade the Quality of life of many females. Many females also experience Premenstrual syndrome which is a multi-disciplinary syndrome indicated by the demonstration of psychological, physical and behavioural symptoms. The peculiar symptoms include irritability, lack of concentration, mood swings, depression, stress, anxiety, abdominal bloating, breast tenderness, fatigue. Utilization of junk food, lack of physical activity and increase in BMI was tremendously linked to pre-menstrual syndrome and primary dysmenorrhea. Exercising on a regular basis might lessen the symptoms associated to primary dysmenorrhea. Lifestyle refinement should be practised by patients suffering from primary dysmenorrhea. (U sreelakshmi, et al 2019).

It can lead to absenteeism from work, lowered school and work performance. It can hamper the social interactions by staying at home, taking naps staying in bed and decreased efficiency. It can impose negative effects such as crying, loneliness, anxiety, irritability and mood disturbances. It can decrease concentration and enhance water retention in the body. Many females also experience skin disorders, painful breasts, swelling and weight gain due to primary dysmenorrhea. (Kroll-Desrosiers, A. R., et al 2017). [38]

The discovery of above-mentioned study is in obedience with study done by Paithankar, S. M., & Hande, D. (2016). In this study Pilates proved to be an efficacious exercise for limiting pain symptoms and improving the quality of life in females suffering from primary dysmenorrhea. They

revealed that Pilates enhanced pelvic blood supply, lead to decrement in muscular stress and allowed stretching of all the associated structures with continuous pain management.

The current study investigated the effectiveness of Pilates as well as yoga, most of our study revelations are similar to that of (Paithankar, S. M., & Hande, D. 2016).

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### LIMITATIONS OF THE STUDY

In the present study, sample size was small and the study was conducted for a short duration of time. The study only focused on the females who complaint of pain associated with primary dysmenorrhea, therefore the study is limited to this specific group only. The study was not blinded.

### FUTURE SCOPES OF THE STUDY

The study can be performed in other age groups also with a larger sample size and a durable follow up. Furthermore, the future studies can also aim at displaying the long-lasting effects of Pilates protocol in females suffering from primary as well as secondary dysmenorrhea.

### CONCLUSION

It is concluded that Pilates is more effective in reducing pain and improving quality of life than Yoga. Although Yoga has also proved to be a powerful exercise protocol in hampering primary dysmenorrhea in women with Fibromyalgia.

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