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Impact of Different Exercise Techniques on Menstrual Pain Severity in Postacute Covid-19 Women

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ABSTRACT

Background: The purpose of this investigation was to determine the impact of different exercise techniques on menstrual pain severity in post-acute covid-19 women.

Methods: Thirty post-acute COVID-19 women suffering from primary menstrual pain. Their body mass index ranged from 25 to 35 kg/m2, and their age was between 18 and 25 years old. They were split up into two groups randomly. The control group (n=15) were instructed to avoid regular physical exercise during the study period, and the exercise group (n=15) were requested to perform set of home-based exercise protocol, from the fourth day of the menstrual cycle till the onset of the second menstrual cycle. Both groups were examined for pain intensity Pre-treatment and post-treatment using visual analogue scale (VAS).

Results: Menstrual pain intensity was significantly reduced in the exercise group (p=0.000) but not statistically different in the control group (p=0.089).

Conclusion: Different exercise techniques has a positive impact on menstrual pain severity in post-acute covid-19 women. Therefore, it can be recommended for menstrual pain relief in post-acute covid-19 women to promote their daily activities, independent living and quality of life.

Keywords: *Primary Dysmenorrhea; COVID-19; Exercise Techniques; Isometric Exercises; stretching exercises*

INTRODUCTION

Coronavirus (COVID-19), broke out in December 2019, quickly turned into a major disaster affecting public health (Li et al., 2021). Psychological stress related to the COVID-19 pandemic and SARS-CoV-2 infection may influence the menstrual cycle.

Menstrual cycle alternations is associated with missed periods as well as augmenting menstrual symptoms. Studies have documented that new dysmenorrhea or increased painful periods are reported by cases during the COVID-19 pandemic (Malloy and Bradley, 2021, Phelan et al., 2021).

Additionally, it is proposed that SARS-CoV-2 infection can affect the production of the ovarian hormone and the endometrial response at menses. Furthermore, it is associated with immune disruption, endothelial cell dysfunction and alterations in the coagulation system causing menstrual disturbance (Sharp et al., 2022). SARS-CoV-2 positive cases reported stronger menstrual pain or cramps after infection, which increase attention to the sequelae of post-acute SARS-CoV-2 (PASC) (Khan et al., 2022).

Menstrual pain can significantly affect the quality of life; Medication is most frequently used to treat it using analgesic tablets and Oral Contraceptive Pills. These drugs have well-known side effects, including breast discomfort, intermenstrual haemorrhage, dizziness, sleepiness, nausea, and hearing and vision abnormalities (Saleh et al., 2016). Alternatively, physical exercises are suggested to be a non-medical intervention for managing menstrual pain. Active or passive exercise can reduce the frequency, the severity of dysmenorrhea syndrome and the amount of analgesics medication. Various forms of exercise such as: free exercise, stretching, aerobic exercise, or even participation in athletic competitions can completely resolve primary dysmenorrhea due to different effects: stress reduction, the analgesic effect through increasing the endorphin levels, the hormonal changes effect on uterine epithelial tissues, the increased local pelvic region metabolism and blood flow (Saleh et al., 2016, Shahr-Jerdy et al., 2012). Moreover, abdominal breathing exercises can activate the pelvic floor muscles and decrease the menstrual pain (Pyo et al., 2015). Participation in exercises rehabilitation program in regular basis is recommended as a component of post COVID-19 patient's plan of care to enhance performance of their activities of daily living, level of independence, and quality of life (Barbara et al., 2022). Therefore, this research was designed to identify the impact of exercises program composed of different forms of exercises on menstrual pain severity in post-acute covid-19 women.

METHODS

A randomised controlled trial was used in this study from January 2022 to November 2022 on thirty post-acute COVID-19 women suffering from primary menstrual pain. They were selected from Kasr El Aini Hospital outpatient clinic according to the following inclusion criteria; they ranged in age from 18 to 25 years old, had medically stable conditions, and had body mass indices (BMI) between 25 and 35 kg/m2. A positive SARS-CoV-2 reverse transcription polymerase chain reaction (RT-PCR) result or viral pneumonia led to the diagnosis of COVID-19, which was corroborated by standard computed tomography (CT) evidence. Contrarily, the COVID-19 staff review and a negative RT-PCR test provided evidence that they had recovered from COVID-19. All enrolled subjects were not previously vaccinated. Subjects suffered from primary menstrual pain without underlying pelvic pathology, they experienced moderate to severe menstrual pain developed 3 weeks after symptom-onset of covid-19 infection (A range between 21 to 84 days elapsed from positive SARS CoV-2 test to the last reported painful menstrual cycle). The diagnosis of primary dysmenorrhea was based on the menstrual history and clinical examination. Sonography was used to confirm diagnosis of primary dysmenorrhea. Menstrual pain severity was evaluated using visual analogue scale (VAS), which has been shown in numerous studies to be a valid, reliable, and accurate method to determine pain intensity. The women's perception of the pain level is shown by a 10-cm line. The line's two extremes stood for "unbearable pain" at one end and "no pain at all" at the other. The subjects were instructed to mark on the line how much discomfort they were experiencing. The results of the scale were divided into three categories: mild (4 or fewer points), moderate (4 to 7 points), and severe dysmenorrhea (8 and 10 points) (Saleh et al., 2016). Subjects were recruited if their pain intensity were 4 or above in visual analogue scale (VAS). The study did not include women if they were pregnant or lactating women, suffering from systemic illnesses, genital organs diseases,

abnormal vaginal bleeding, infrequent or irregular menstrual cycles. Also, women undergoing pharmacological or non-pharmacological methods for pain relief, oral contraceptive users, women who had severe covid-19 illness or those who were hospitalised and women with any history of regular exercises were excluded from this study.

The study protocol was approved by the Ethical Committee of the Faculty of Physical Therapy (no. P.T.REC/012/003572). Each woman had the study methodology described to her, and signed an informed consent form. Using randomly generated computer numbers, the women were divided into two equal groups. In consecutively numbered opaque envelopes, allocation was hidden. Fifteen post-acute COVID-19 women made up the control group, and they were instructed to avoid regular physical exercise during the research period. The exercise group consisted of fifteen post-acute COVID-19 women who were requested to perform set of home-based exercise protocol, which included seven stages of isometric exercises ended by abdominal breathing exercise and six stretching techniques in the abdominal, pelvic and groin regions. All women in this group performed the prescribed exercises from the fourth day of their menstrual cycle till the onset of the second menstrual cycle, 3 days a week, two sessions a day, 30 minutes per session, and 10 repetition each exercise (Khare and Jain, 2015). The correct techniques of performing exercises were explained to all women in the exercise group and their performance were monitored through scheduled phone call once weekly. The prescribed exercises were as follows:

Isometric Exercises: the protocol of isometric exercises included 7 stages ended by abdominal breathing exercise, stages were as follows: The first isometric exercise: Lying on the back with extended feet next to each other and pressing them together for five seconds before releasing. The second isometric exercise: Lying on the back with crossed feet and pressing them on each other. Hold for five seconds before releasing. The third isometric exercise: Lying on the back while bending both knees and thighs, placing a cushion between two knees, pressing knees together, holding for five seconds, and then releasing. The fourth isometric exercise: involved returning to the third position, placing a hand below the waist, forcing the waist to the ground, holding the position for five seconds, and then releasing. The fifth isometric exercise: Lying on the back while trying to lift head and neck off the ground for five seconds. The sixth isometric exercise: Lying on the back while bending both knees and thighs and trying to bring head and neck towards the right thigh, holding the position for five seconds then relax. Repeating stage 6 toward the left thigh. The final isometric exercise involved taking a deep belly breath while lying supine with bent knees and thighs, and breathing through nose so that abdomen expands. To guarantee abdominal breath, one hand can also be placed on the stomach. Then, exhaling through mouth so that abdomen stick to waist.

Stretching Techniques: Women were instructed to perform the six stretching exercises, which targeted the abdominal, pelvic, and groin regions, short of the discomfort zone. The exercises included the following: The first stretching exercise: The participant was instructed to stand behind a chair and bend forward from the hip joint until the upper body was parallel to the ground with the shoulders and back were in alignment. Five seconds of holding time with ten repetitions. The second stretching exercise: The participant was told to left one heel off the ground while standing 10–20 cm behind a chair and alternately perform the activity with the other heel. The exercise was performed 10 times. The third stretching exercise: The participant was instructed to stand with her feet shoulder width apart, extend her arms and trunk forward, bend both of her knees fully, and keep squatting position. The participant held this position for 5 seconds before rising and performing the same motion 10 times. The fourth stretching exercise: The participant spread her feet out past shoulder width. The participant was then instructed to bend over and touch her left ankle with her right hand while stretching her left arm over her head such that her head was in the middle while she was looking for her left hand. The same exercise was repeated for the other foot. Ten alternate repetitions of the exercise were performed for each side of the body. The fifth stretching exercise: The participant was instructed to rest

while the feet, back, and shoulders were kept flat on the ground. With the aid of the hands, the knees were flexed towards the chin. Ten times were repeated. The sixth stretching exercise: The participant was instructed to stand against a wall with her elbows pointing forward towards her eyes and hands behind her head. The abdominal muscle was then squeezed for 10 seconds without bending the subject's vertebral column.

All participants in both groups were investigated in two menstrual cycles, the first month or first cycle is the cycle in which no intervention was performed. VAS was assessed in both groups after the first and second menstrual cycles. The exercises performed by the exercise group were taught to the control group after the study was finished in the hopes that they would perform these exercises (Khare and Jain, 2015).

Data were analysed using SPSS (v. 20). Independent t-test and dependent t- test were used to compare mean of pain intensity between and within groups respectively. Significance was tested at $P<0.05$.

RESULTS

This study was designed to determine the impact of different exercise techniques on menstrual pain severity in post-acute covid-19 women. Independent t- test was conducted to compare between demographic data of women in the control and exercise groups (table 1). The thirty women who participated in the 2 groups of the study had comparable demographic data that showed non- significant differences

TABLE 1: Demographic data of patients in control and exercise groups

Demographic data	Control Group (n= 15 patients) Mean (+ SD)	Exercise Group (n= 15 patients) Mean (+ SD)	Independent t- test	
			T- stat	Sig.
Age (years)	24.67 (+ 2.49)	24.33 (+ 2.79)	0.344	0.733
Weight (kg)	75.28 (+ 11.49)	73.16 (+ 10.76)	0.767	0.449
Height (meters)	1.59 (+ 0.07)	1.57 (+ 0.06)	0.294	0.771
BMI (Kg/m2)	29.85 (+ 4.27)	28.95 (+ 3.91)	0.667	0.510

$P<0.05$

To show whether there was an effect of exercise intervention on pain intensities in post-acute covid-19 women with primary dysmenorrhea, both within groups (pre- post) comparisons and between groups' comparisons, pre and post experimental were conducted, at $p< 0.05$.

Within groups, comparisons were conducted using dependent t- test. These tests showed significant decrease in mean pain intensities in the exercise group (P=0.000) post-experimental compared to pre-experimental. On the contrary, no significant difference was found comparing mean pain intensities in control group post-experimental compared to pre- experimental (P= 0.089).

Between groups comparisons were conducted using independent t- test. These tests showed non- significant difference in mean pain intensities between patient in control and treatment groups pre- experimental (P=0.189). On the other hand, post- experimental comparison between mean pain intensities in both groups showed significantly lower mean pain intensity in exercise group compared to mean pain intensity in control group (P=0.001) (Table 2, figure 1).

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TABLE 2: Comparison of mean pain intensities between and within control and exercise groups at pre and post experimental evaluation times

Demographic data	**Control Group (n= 15 patients) Mean (+ SD)**		**Exercise Group (n= 15 patients) Mean (+ SD)**	**Independent t- test**	
				T- stat	**Sig.**
VAS PRE	6.43 (+ 1.44)		7.07 (+ 1.12)	-1.347	0.189
VAS POST	6.20 (+ 1.31)		4.33 (+ 1.48)	3.656	0.001
Dependent t- test	T-stat	1.825	8.458		
	Sig.	0.089	0.000		

P<0.05

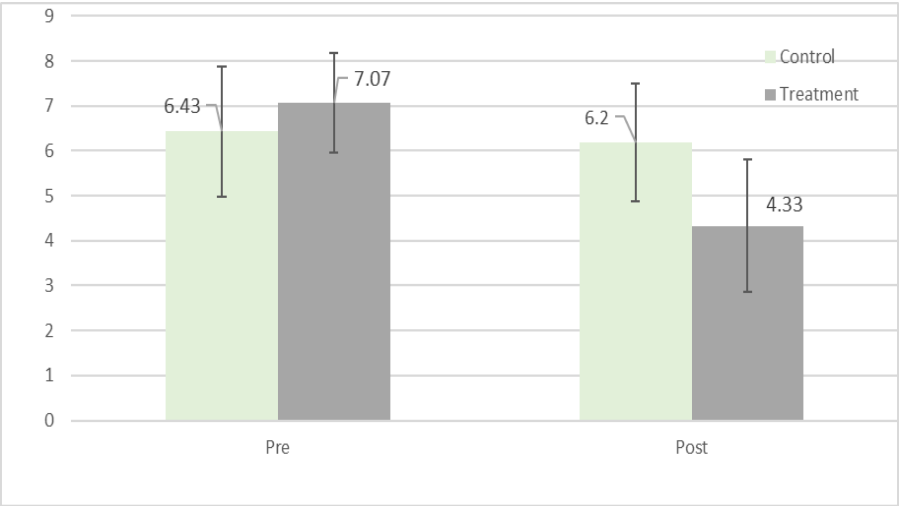

FIG 1: comparison between mean pain intensities of control and treatment groups at pre and post-experimental evaluation time

DISCUSSION

For many women, dysmenorrhea is an irritating factor in their life (Saleh et al., 2016). Dysmenorrhea has been related to high levels of stress and emotional instability, lifestyle and mental health change during the COVID-19 Pandemic (Phelan et al., 2021). There are a number of adverse effects of the medical treatment for primary dysmenorrhea and the failure rate is around 10-25% (Khare and Jain, 2015). Many studies support the positive effect of physical exercises on primary menstrual pain (Mahvash et al., 2012). The current study assessed the impact of different exercise techniques on menstrual pain severity in post-acute covid-19 women, The workout program included sessions of isometric exercises performed at home ended by abdominal breathing exercise and stretching techniques in the abdominal, pelvic and groin regions. The home based exercise intervention was convenient for every woman. The study revealed that the exercise intervention can significantly decrease the menstrual pain intensity, which was measured by using VAS; furthermore, there was no observable change in the control group. Similar findings concurred with the study of Khare and Jain (2015) who documented that after 1 month of exercise sessions students reported a relief in pain during their menses with improvement in health-related quality of life. Also Gamit et al. (2014) showed that young females with primary dysmenorrhoea can significantly reduce their pain with stretching activities. In addition to the study of Dehnavi et al. (2018) who observed that the severity of dysmenorrhea symptoms diminished after 8 weeks of aerobic exercise.

In respect to abdominal deep breathing exercises it was documented that they are effective in decreasing lumber and lower abdominal menstrual pain in the intervention groups and it can be considered as alternative medicine to decrease the menstrual pain (Pyo et al., 2015). Moreover, Saleh et al. (2016) reported that primary menstrual pain has reduced in active stretching and core strengthening exercise groups than in control group as regard intensity and duration Along these lines, Abbaspour et al. (2006) and Shahr-Jerdy et al. (2012) has been demonstrated that stretching exercises can help girls with primary dysmenorrhea suffer less discomfort and use fewer pain killers overall. The abdominal region's tightened ligamentous bands physically compress nerve pathways and irritate them. So stretching exercises is considered very effective to reduce dysmenorrhea symptoms (Daley, 2009). Also, (Onur et al., 2012) found that the home-based exercise intervention has a positive effect on quality of life of women with primary dysmenorrhea. The underlying mechanism explaining the positive effect of exercise on severity of menstrual pain is that exercise is a mean of moderating stress. Stress intensifies the sympathetic nervous system's activity, which innervates the uterine muscle, leading to forceful uterine muscle contractions and increasing the menstrual pain. By increasing the brain's endorphin production during exercise, this sympathetic activity can be reduced, relieving stress, which raise the pain threshold. Exercise can also decrease the symptoms of dysmenorrhea by enhancing uterine blood flow and metabolism (Saleh et al., 2016). Also, even if the patient was not physically active prior to covid-19, the patient now has the opportunity to start exercising at a manageable intensity. A graded progressive exercise method can be utilised to increase physical activity levels either to pre-illness baseline levels or beyond once a patient has been risk-stratified and symptom-free for at least seven days. After COVID-19, patients can start exercising lightly by doing breathing exercises, stretching exercises, balance activities, and slow walking for at least two weeks. If new symptoms such as a cough, unusual dyspnoea, palpitations, fever, or anosmia appear, patients should stop exercising and, if necessary, seek medical guidance. When patients are symptom-free, they can resume their exercise (Salman et al., 2021). The present research illustrates that exercise intervention has a positive impact on menstrual pain severity in post-acute covid-19 women. Studying the menstrual cycle features is challenging, as menstrual symptoms are subjective and data are collected by self–report, which could be considered a limitation of this study. Hence, generalization of the findings in terms of the entire post covid-19 women ought to be made with caution. There is a need for more investigation to understand the covid-19's effects on menstrual symptoms and how to minimize it with different treatment regimens.

CONCLUSIONS

Our study showed that performing different exercise techniques has a positive impact on menstrual pain severity in post-acute covid-19 women. Therefore, it can be recommended for menstrual pain relief in post-acute covid-19 women to promote their daily activities, independent living and quality of life.

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