

Physiotherapy Intervention for Primary Dysmenorrhea - A Narrative Review

Ruchi. G. Desai

Assistant Professor, L J Institute of Physiotherapy, L J University, Ahmedabad

DOI: <https://doi.org/10.52403/ijrr.20220349>

ABSTRACT

Primary dysmenorrhea (PD) refers to painful cramps before and/or during menstruation. There are two types of Dysmenorrhea: Primary and secondary. Different approaches to the treatment of Primary dysmenorrhea are applied to manage the symptoms of dysmenorrhea.

Purpose: the aim of this study was to find out the most effective physiotherapy treatment for primary dysmenorrhea.

Methods: scientific literature relevant to physiotherapy for dysmenorrhea published in India between September 2014- august 2021 through popular databases such as google scholar, PubMed, Pedro was searched. Total Eleven articles met the objectives and criteria and they were reviewed main outcome measures of study was pain intensity and was measured mainly through VAS (visual analogue scale) and NPRS (Numerical pain rating scale). Apart from pain intensity, other outcome measures such as core strength, flexibility and quality of life also have been recorded. Isometric exercises, core strengthening exercises, aerobic exercises including chair exercises, stretching exercises, moist pack and TENS are different physiotherapy approaches to the treatment of Primary dysmenorrhea.

Conclusion: The current review suggests that physiotherapy specially core strengthening exercises and various stretching exercises help to provide a clinically significant reduction in menstrual pain intensity and also helps to increase core muscles strength and flexibility.

Key Word: Isometric exercises, Core strengthening exercises, Aerobic exercises including chair exercises, Stretching exercises, Moist pack and TENS

INTRODUCTION

Dysmenorrhea is the medical term for pain with menstruation, is the most prevalent periodical pelvic pain.^{1, 2} Dysmenorrhea is obtained from Greek word “dyes” (difficult, painful, abnormal), “meno” (month) and “rrhea” (flow).³ Dysmenorrhea affects mental health and the quality of life in females as well as for adolescent girls, which is ultimately responsible for loss of working hours and economic loss specially for working female and affects academic performance, school and sports activities for school going girls^{3,4}. Primary dysmenorrhoea is widely prevalent; more than 50% of teenagers and 30–50% of menstruating women suffer from varying degrees of discomfort⁵. The prevalence of PD is highest in the 16–25-year age group but is greatly underestimated as many women consider pain a normal part of the menstrual cycle and do not seek medical treatment, despite the considerable distress they experience⁵.

There are two types Dysmenorrhea: Primary and secondary. Primary dysmenorrhea is common menstrual cramps that are recurrent accompanied by nausea, vomiting, fatigue, and diarrhoea and typically lasting from 12 h to 72 h². Primary dysmenorrhoea occurs begins before or concurrent with the menstrual bleeding onset and decreases gradually after 12–72 hours in ovulatory cycles; It often lessens with passage of time and after childbirth. The causes are excessive myometrial contractions, ischemia, and excessive prostaglandin production⁶. due to primary

dysmenorrhea most commonly, females experience cramping lower abdominal pain usually concentrated in the pubic area and may radiate to the back of the legs or the lower back.⁷ Whereas Secondary dysmenorrhea is defined by dull ache which is associated with infertility, menstrual disorder and dyspareunia. For which the main causes were adenomyosis, fibroids endometriosis and Pelvic inflammatory diseases.

The major cause for menstrual pain is ischemia. Uterine contractions are caused due to release of prostaglandins during menstruation. Prostaglandin has two main actions in uterus: first Spiral artery vasospasm: Leading to ischemic necroses which result into muscle spasm and cramps and shading of superficial layer of endometrium and secondly Increase myometrial contractions.

Different approaches to the treatment of Primary dysmenorrhea are applied to manage the symptoms of dysmenorrhea, including medication, acupuncture, local application of heat or massage, herbal therapy, transcutaneous nerve stimulation, Various forms of exercises like core muscle strengthening, aerobic exercises including chair exercises, stretching exercises like forward bend stretch, lunges of both legs, squats, forward standing cross stretch, dorsolumbar fascia stretch, pectoral stretch , adductor stretch, prone knee bending have been shown different results in pain relief and premenstrual syndrome. Exercise have been shown as preventive measures as well. and prescription of various vitamins and minerals such as vitamins B1, B6, E, and magnesium also prescribed for reduction of dysmenorrhea. Among these approaches, the Nonsteroidal Anti-inflammatory Drugs (NSAIDs) and the prostaglandin inhibitors are considered the first-line agents for the treatment of primary dysmenorrhea. However, several side effects, including nausea, digestive system dysfunction, diarrhoea, and fatigue, have been commonly reported for these medications⁸. 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. aim of this study is to review the effect of various forms of non-medical physiotherapy intervention as well as to find out evidence based best form of physiotherapy interventions for dysmenorrhea.

METHOD

Scientific literature relevant to physiotherapy in dysmenorrhea in India published between September 2014 august 2021 was searched. The search was performed online for English language articles through popular databases such as google scholar, PubMed, Pedro using key words dysmenorrhea, core strengthening, stretching exercises, TENS, aerobic exercises, primary dysmenorrhea, physiotherapy. screening of the reference list of the retrieved articles for any relevant research was also done

The following PICOS eligibility criteria were used for the selection of the articles (see table 1)

Table no:1 Inclusion criteria

Criterion	Description
Design	Randomized controlled trial, quasi experimental studies
Participants	Female with primary dysmenorrhea
Intervention	Physiotherapy treatment
Comparisons	Comparisons for any physiotherapy treatment
Outcome measures	Pain intensity

Apart from pain intensity, other outcome measures such as core strength, flexibility and quality of life also have been recorded.

Article were not be considered for reviews if women were diagnosed with gynaecological diseases, surgery, or serious diseases, women using intracavitary or oral contraceptives, Treatment of other pathologies such as endometriosis or dyspareunia, any musculoskeletal problems causing inability to perform the stretching exercises and core strengthening, mental, psychological problems and doing regular exercise. In other languages published

article, and unavailability of full text were also be excluded from this review.

RESULT

A summary of the main characteristics of each study is described in Tables 2

Table no: 2 Summary of the main characteristics of studies

Sr.no	Author	Study type	Age group & Sample size	variables	Description of intervention	Result
1.	Sara Azima et al. (2015)	Randomized controlled trial	19-22 68 students	Pain intensity (Numerical pain Rating Scale) Duration of pain (In the 1st month, and after the second and third menstrual cycles)	intervention group: Isometric exercises since the 3 rd day of their menstrual cycle 5 days a week, 2 sessions/day, and 10 times/session for 8 weeks. Position: supine, each position hold for 5s, and then relax. 1. extending feet next to each other, pressing feet on each other 2. putting feet crossed and pressing them on each other 3- bending knees and thighs, putting a pillow between two knees, pressing knees to each other 4-putting hand below waist and pressing waist to the ground 5-bending knees and thighs and trying to raise head and neck above the ground level 6, 7 -bending knees and thighs and trying to move head and neck toward the right and left thigh 8- abdominal deep breathing exercise Control group students: no interventions.	difference between exercise and control groups in terms of pain intensity in the second and third months (p<0.001) Also, a significant difference was observed between exercise and control groups regarding the mean of pain duration in the second and third months (p<0.001)
2.	Ronika Agrawal et al. 2021	Randomized controlled trial	60 16-25 unmarried with regular menstruation	Pain intensity: Numerical Rating Scale. Menstrual Distress Questionnaire. Number of Tablets. Core Muscle Strength: Flexibility: Sit and Reach Test.	6th day the strength of the core muscles by the pressure biofeedback method and the number of tablets consumed during the menstrual cycle was recorded In both groups Exercises were started by the 6th day, 8 stretching exercises 6 times a week and once daily. Group A: a supervised session Stretching exercises were taught to for the first two days. Group A: 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 All exercises for two months, ranges are increased in the second month. Group B: core muscle strengthening exercises Exercises were progressed after 2 weeks, 4 weeks and 6 weeks Strengthening Exercises for below muscles: 1. Transversus abdominis 2. Multifidus 3. Diaphragm 4. Pelvic floor	Numerical rating scale and Statistical evaluation of menstrual distress questionnaire showed a steady decline in both the groups A and B. However, there was no statistically significant (p = 0.2285) difference between the two groups A and B at the end. The picture demonstrates diminution in the number of tablets post intervention. In group A the core muscle strength does not show a substantial increase as compared to group B. This increase is more prominent in stretching group in each visit. This is statistically highly significant.

<i>Table 2 Continued...</i>						
3.	Neha et al 2015	Quasi experimental	120 17-25 college students	Pain: Visual analogue scale The severity the subjects Moos menstrual Distress were taken before initiating program, after 4 weeks and after 8 weeks of active stretching exercises for the both groups.	3 days/week and two times a day, for 8 weeks except 4 days of menstruation. holding time was 5 seconds; with 10-20 Repetitions. Experimental Group: 1. stand behind a chair, bend trunk forward from the hip joint so that the shoulders and back were positioned in a straight line and the upper body was placed parallel to the floor. 2. stand 20 cm behind a chair, then raise one heel off the floor, then repeat the exercise with the other heel alternatively. 3. standing position, spread their feet shoulder width, place trunk and hands in forward stretching mode, then completely bend her knees and maintain a semi squatting position. 4. standing positions with feet wider than shoulder width and asked to bend and touch left ankle with her right hand while putting her left hand in a stretched position above her head, so that the head was in the middle and her head was turned and looked for her left hand. (B/L) 5. supine, knees were bent with the help of her hands and reached to her chin. 6. stand against a wall and put her hands behind her head and elbows touching the wall, then without bending the vertebral column, the abdominal muscle wall was contracted . Control Group: No Intervention	The average VAS score showed significant reduction after intervention in experimental group, from 7.133 to 3.017 after 8 weeks of protocol
4.	Himani Parikh et al. 2021	Randomized controlled trial	50 25-35 years	Degree of Pain (WALIDD scale) Regularity of menstruation Interval of menstruation Duration of menstrual flow After 3 months application of moist pack	Group A: moist pack Group B: Core Strengthening Exercise Abdominal curl up, Bridging and Cat and Camel exercise in form of Grade-3 for 10 repetitions in one session per day 3 continuous days for 3 months	Group B (Core Strengthening exercises) is more effective than group A (Moist pack), in reducing intensity of pain experienced and the overall pain score. Core strengthening exercises (group 2) was effective at the end of second cycle and the moist pack application (group 1) was effective at the end of first cycle but the great improvement was found at the end of third cycle for both the groups.
5.	Kristina S Gamit et al. 2015	Quasi experimental	30 18-25	Pain: Visual analogue scale (VAS) Verbal Multidimensional Scoring System for Assessment of Dysmenorrhea Severity (VMS).	Group A active stretching exercise program for 4 weeks (6 days per week, 2 times per day) at home. 9 stretching exercises. Group B were asked to be in waiting period for 4 weeks	pain has reduced in primary dysmenorrhea more in stretching exercise group than in control group.
6.	Asmaa M 2021	Randomized controlled trial	105 18-25 years	pain intensity: Visual analogue scale (VAS) at the beginning of the study and at the end of the second menstrual cycle determination of the intensity of primary dysmenorrhea- Modified Menstrual Symptom Questionnaire (MSQ)	(1) aerobic exercise group, (2) isometric exercise group, and (3) control group. Exercises were done over a period of 8 weeks, at 3 sessions in a week with 45 min for each session excluding days of menstruation. Control group (CG): no intervention.	Both aerobic and isometric exercises are effective in reducing the severity of dysmenorrhea.

<i>Table 2 Continued...</i>						
7.	Shahnaz Shahrjerdi et al. 2019	Randomized controlled trial	34 18-25	Pain intensity (NPS score) Pain duration (h) Use of drugs (No.)	Group: A 8-week core stability exercise program. Each session lasted about 45-60 minutes, which started with 10 minutes of warm-up, followed by 25-40 minutes of the main program, and ended with 10 minutes of cool-down. Group: B control no intervention	In comparison with the control group, there was a significant decrease in pain intensity, pain duration and the number of painkillers consumed in the experimental group.
8.	Chaitany Patel et al. 2020	Experimental study	120 15-25 years professional athletes	symptoms and severity of intensity of dysmenorrhea severity moos Questionnaire WaLLID Score quality of life - SF-36	4 sessions / week, for 8 weeks 40 mins protocol 10 mins warm up, 20 mins exercises, 10 minutes cool down Group: A chair aerobic Knee lift Diagonal toe touch Lunges Flip kicks Half jacks Punches Criss -cross Group: B core strengthening Pelvic bridging Plank Cat and camel Curl ups Superman Bilateral straight leg raising Prone cobra's Supine twist	the chair aerobic exercise is significantly helped in improving the quality of life as well as reducing the symptoms of dysmenorrhea. Furthermore, the strengthening exercise has only proven to be effective in reducing the severity of symptoms but has negligible effect on improvement of quality of life.
9.	Shreeya Dilip Berde et al. 2019	Experimental study	50	intensity of pain and improving the quality of life Visual analogue scale and Verbal multidimensional scoring system. (VMSS)	Group A: Core strengthening exercises (same as above) Group B: Chair aerobic exercises (Same as above) for 4 days per week, 8 weeks	there was significant difference in reducing the intensity of pain and improving the quality of life after 8 weeks of intervention in both the groups.
10.	Hend S Saleh et al. 2016	Randomized controlled trial	126 20-25	pain intensity was measured using Visual Analog Scale (VAS) pain duration by hours.	For 8 weeks at home (3 days per week and 3 times per day for 10 minutes). 10 times for each side of the body Group: A 4 stretching exercises Group: B core strengthening protocol Group: c no intervention	Intensity and duration of pain were significantly reduced in exercise groups as comparing to control group but no significant differences between readings of post-test in both interventions' groups.
11.	Vrunda Patel et al. 2016	Quasi experimental	30 18-25	Pain intensity: visual analogue scale	Both groups were given 20 minutes of TENS, to back over para spinal region (L5-S1) at 100 Hz frequency with 80 μ s at comfortable intensity, once daily for 3 days. One of 2 groups was treated on three premenstrual days and other group was treated at same dose during initial three days of menstrual cycle.	Use of TENS for 3 days before or during menstrual cycle is effective in reducing pain. However, use of TENS in premenstrual phase is more effective for reducing pain.

DISCUSSION

Isometric exercises^{1,11,12,13}: Isometric exercises are a subgroup of exercises, during which the muscle length and joint angle remain constant. Isometric exercises reduce pain via their inhibitory effects of A-delta type and C fibers, decrease the duration of primary dysmenorrhea due to the increase in blood flow and metabolism of the uterus during exercise. Many studies have suggested the impact of isometric exercises on primary dysmenorrhea on female students, concluding that isometric exercises such as abdominal, pelvic, and groin enhancement exercises decrease the severity and duration of dysmenorrhea as well as the rate of using drugs. Studies also revealed that exercising due to the release of endorphins, relaxation, stress relief, and improved blood flow can reduce the severity and duration of dysmenorrhea. The mechanism of isometric exercising impact on dysmenorrhea is probably through strengthening pelvic muscles, facilitating bleeding, and excreting wastes containing prostaglandins that result in contraction. Moreover, increasing the proprioception and control of pelvic motions and muscular balance leads to the reduction of backache. Exercising also increases the blood flow and metabolism in the uterus and thus, decreases the severity of dysmenorrhea.

Stretching exercise^{17,18,24,25,26} :

Various studies have suggested stretching exercises like forward bend stretch, lunges of both legs, squats, forward standing cross stretch, dorsolumbar fascia stretch, Pectoral stretch, adductor stretch, prone knee bending have effect on dysmenorrhea. It facilitates blood supply and oxygen to the uterine musculature and excreting waste metabolites containing excess prostaglandins thereby relaxing the contracted uterine muscle. Other studies have also suggested, 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. In addition, the sympathetic nerve which supplies uterine muscles is responsible to increase the menstrual pain by uterine muscle contraction. Hence stress through hyperactivity of sympathetic nerve system via the increase contractility of uterine muscles lead to menstruation symptoms. Consequently, it might be possible to reduce dysmenorrhea symptoms by decreased sympathetic overactivity through active stretching. Studies have also found, 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.

Core strengthening exercises^{7,19,20,21,24,25,26}:

In studies, various core strengthening exercises for local and global muscles like Transversus abdominis, Multifidus, Diaphragm(superior), rectus abdominus, internal and external oblique (anterior-lateral), the multifidus and gluteus maximus, medius and minimus and Pelvic floor muscles have been performed. Which will allow small intrinsic muscles around the lumbar spine to be conditioned to increase performance; training of this muscles allows the isolation and strengthening of core muscle groups. which have a corset-like stabilization effect on the trunk and spine. The anatomical structure of lumbar spine is designed in such a way that it can take the force of the body. If the lumbar spine is weak and is not at its best to handle functional stress then it may lead to pain throughout the abdomen, low backs and thighs. These are those main areas affected in females suffering from primary dysmenorrhea irrespective of stress do menstrual cycle. When these muscles are strong, they are much more ready to deal with daily troops of natural biomechanics, even when the body is under the tension of

the monthly cycle. Core strengthening is also a description of the muscular control around the thoracic spine to keep the function stability. It reduces stress thereby reducing sympathetic activity and thus causing relaxation and increases flexibility of the trunk and abdominal and pelvic muscles thereby reducing back pain and general aches. Studies have also suggested, core muscle conditioning might increase the circulation and metabolism in the pelvic region and results in the improvement of primary dysmenorrhea. Exercises are increase the release of endorphins by the brain leading to rise in the pain threshold and help to increase blood circulation which leads to decrease in cramps. Thus, proving that exercise has an analgesic effect against pain in primary dysmenorrhea.

In studies, Various form of core strengthening exercises like Pelvic bridge, plank, cat and camel, curl up, superman, bilateral straight leg raises, supine twist, prone cobras Single Leg Abdominal Press, Double Leg Abdominal Press have been performed. this Core strengthening exercises work on lumbar spine in the form of muscular control and maintain functional stability and also strengthens the musculature, which in term improved performance.

Moist pack^{7,15}:

Studies have found that, Superficial heat that ranges from 40–45 °C has effect to a depth of about 1 cm. Traditionally, superficial heat has been used in different forms e.g., hot water bags, towels, or bottles to ease menstrual pain. the application of local heat in dysmenorrhea can reduce muscle tension and relax abdominal muscles and ultimately reduces muscle spasms. Heat also increases pelvic blood circulation to eliminate local blood and body fluid retention as a result it diminishes congestion and swelling, thereby enabling a reduction in pain caused by nerve compression.

TENS^{14,15,23,27}:

TENS is one of the simplest electrotherapy modalities, and it's an appropriate method to control dysmenorrhea. Transcutaneous electrical nerve stimulation (TENS) is an application of a pulsed rectangular wave current via surface electrodes on the patient's skin. This current is often generated by small battery-operated machines. TENS' pulse width is from 50 µs through 300 µs and frequency can be as low as 2 Hz or as high as 600 Hz. It has a wide range of variation in pulse width, frequency and intensity (0 to 60 mA) gives great flexibility in terms of treatments for chronic pain syndromes.

The mechanism of the effect of TENS on primary dysmenorrhea is also based on the pain gate theory. In addition, skin stimulation causes local vasodilatation in the same dermatome area. So along with pain relieving effect it reduces muscle ischemia of the uterus through increased blood flow to the corresponding skin area.

Vasodilation, increased blood flow, and menstrual fluid prostaglandins may be altered by TENS, and may indirectly induce analgesic effects. These effects are probably mediated by the inhibition of nociceptive fiber-evoked responses in the dorsal horn. Based on the gate control theory of pain, this inhibition is caused by stimulation of large diameter afferents which are stimulated by TENS. Sensory stimulation of the skin may also cause local vasodilation in the same dermatome via axonal reflexes. The effects of TENS are also modulated by anatomic pathways, opioid release, decreased release of prostaglandins, and possibly eicosanoids that are released from the endometrium during menstruation following antidromic blockage of nerve fibers with large diameters. The current review suggests that physiotherapy specially core strengthening exercises and various stretching exercises help to provide a clinically significant reduction in menstrual pain intensity, duration and also helps to increase core muscles strength and flexibility.

CONCLUSION

Based on above studies we can conclude, for long term management in primary dysmenorrhea, multimodal approach including strengthening exercises of core muscles (isometric exercises, aerobic exercises, chair aerobic exercises), stretching exercises of various muscles for 8 weeks with 4 sessions per week with 40 mins protocol including 10 mins warm up, 20 mins exercises, 10 minutes cool down will be more effective to reduce primary dysmenorrhea. along with this based on requirement, pain relieving modalities like moist pack and TENS can also be given to relieve pain. based on therapist and patient conveniency physiotherapist can teach combined form of exercises.

Acknowledgement: None

Conflict of Interest: None

Source of Funding: None

REFERENCES

1. Azima S, Bakhshayesh HR, Abbasnia K, Kaviani M, Sayadi M. The Effect of Isometric Exercises on Primary Dysmenorrhea: A Randomized Controlled Clinical Trial. *Galen Medical Journal (GMJ)*. 2015;4(1):26-32
2. Shah, Salvi et al. "Effect Of Exercises On Primary Dysmenorrhoea In Young Females." *International journal of physiotherapy and research* 4 (2016): 1658-1662.
3. Ronika Agrawal And Rushda Ahmed. A Comparative Study of Stretching Exercises Versus Core Strengthening Exercises on Primary Dysmenorrhea in Young Sedentary Females. *EJBPS*. 2021; 8(8); 368-374.
4. Motahari-Tabari N, Shirvani MA, Alipour A. Comparison of the Effect of Stretching Exercises and Mefenamic Acid on the Reduction of Pain and Menstruation Characteristics in Primary Dysmenorrhea: A Randomized Clinical Trial. *Oman Med J*. 2017 Jan;32(1):47-53. Doi: 10.5001/omj.2017.09. PMID: 28042403; PMCID: PMC5187401.
5. Patel C, Patel S, Prajapati S, Ladumor S. Effect of Chair Aerobic Exercises Vs. Effect of Core Strengthening Exercises with Education on Primary Dysmenorrhea in Adult Girls-RCT. *Ann Rehabil Res Pract*. 2020; 1(1): 1001
6. Berde SD, Yadav TS, Gosavi PM, Gijare Sayali Shreenivas. Effect of Core Strengthening Exercises & Chair Aerobic Exercises in Primary Dysmenorrhoea. *Int J Health Sci Res*. 2019; 9(3);77-82
7. Himani Parikh, Sana Mohamadhanif Khokhar. Comparative Study of Effect of Moist Pack V/S Effect of Core Strengthening Exercises in Primary Dysmenorrhea for Three Consecutive Months. October-December 2021;15(4)
8. Saleh HS, Mowafy HE, El Hameid AA (2016) Stretching or Core Strengthening Exercises for Managing Primary Dysmenorrhea. *J Women's Health Care*. 5; 295
9. Kubo K, Kanehisa H, Fukunaga T. Influences of Repetitive Drop Jump and Isometric Leg Press Exercises on Tendon Properties in Knee Extensors. *The Journal of Strength & Conditioning Research*. 2005;19(4):864-70
10. Umeda M, Newcomb LW, Ellingson LD, Koltyn KF. Examination Of the Dose-Response Relationship Between Pain Perception and Blood Pressure Elevations Induced By Isometric Exercise In Men And Women. *Biological Psychology*. 2010;85(1):90-6
11. Shavandi, N., Taghian, F., & Soltani, V. (2010). The Effect of Isometric Exercise on Primary Dismenorrhea. *Journal Of Arak University of Medical Sciences*.13(1):71-77
12. Chantler, I., Mitchell, D., & Fuller, A. Diclofenac Potassium Attenuates Dysmenorrhea and Restores Exercise Performance in Women with Primary Dysmenorrhea. *Journal Of Pain*, (2009); 10(2):191-200
13. Asmaa M. Elbandrawy and Sahar M. Elhakk. Comparison Between the Effects of Aerobic and Isometric Exercises on Primary Dysmenorrhea. *Acta Gymnica*, 2021;51
14. Manisha Mistry, Vishnu Vardhan, Tushar Palekar, Rasika Panse. Effect Of Conventional TENS Versus Spinal Mobilization in Primary Dysmenorrhea in Adolescent Girls: A Comparative Study. *Int J Physiother Res*. 2015; 3(5): 1227-1232
15. Ho-Yen Liu, and Wen-An Chang. Effects of Somatothermal Far-Infrared Ray on Primary

- Dysmenorrhea: A Pilot Study. *Evid-Based Complement Alternat Med.* 2012
16. Hawkins And Bourne. *Shaw's Textbook of Gynecology.* 16th Ed
 17. Montoya JS. *Menstrual Disorders in Adolescents: Topic in Paediatrics.* *Bol Med Hos Infant Mex.* 2012;69(1):60-72
 18. Bano R, Alshammari E, Salim HK Et Al. *Prevalence and Severity of Dysmenorrhoea.* *International Journal of Health Science and Research.* 2013;3(10):15-22
 19. Shahrjerdi Sh, Mahmoudi F, Sheikhhoseini R, Shahrjerdi S. *Effect of Core Stability Exercises on Primary Dysmenorrhea: A Randomized Controlled Trial.* *Journal Of Modern Rehabilitation.* 2019; 13(1):113-122
 20. VG Padubidri, SN Daftary, *Shaw's Textbook of Gynaecology,* 16th Ed, Hopkin & Bourne, 2011:36
 21. López-Liria, R.; Torres-Álamo, L.; Vega-Ramírez, F.A.; García-Luengo, A.V.; Aguilar-Parra, J.M.; Trigueros-Ramos, R.; Rocamora-Pérez, P. *Efficacy of Physiotherapy Treatment in Primary Dysmenorrhea: A Systematic Review and Meta-Analysis.* *Int. J. Environ. Res. Public Health* 2021; (18)
 22. Elboim-Gabyzon M, Kalichman L. *Transcutaneous Electrical Nerve Stimulation (TENS) For Primary Dysmenorrhea: An Overview.* *Int J Womens Health.* 2020; 12:1-10
 23. Kaplan B, Rabinerson D, Lurie S, Peled Y, Rovburt M, Neri A. *Clinical Evaluation of a New Model of a Transcutaneous Electrical Nerve Stimulation Device for The Management of Primary Dysmenorrhea.* *Obstet Gynecol.* 1990; 75(4): 656-60
 24. Neha S Patel, Tanvi Tanna. *Effect Of Active Stretching Exercises on Primary Dysmenorrhea in College Going Female Students.* *Indian Journal of Physiotherapy & Occupational Therapy.* July-September 2015; 9(3)
 25. Kristina S Gamit, Megha S Sheth, *The Effect of Stretching Exercise on Primary Dysmenorrhea in Adult Girls* *Indian Journal of Physiotherapy & Occupational Therapy.* July-September 2015;9(3)
 26. V. Rajalaxmi, G. Mohan Kumar *A Study to Analyze the Effectiveness of Core Strengthening Exercises and Stretching Program for Young Female Physiotherapy Students with Primary Dysmenorrhea.* *International Journal of Physiotherapy & Occupational Therapy.* Jun 2016; 2 (1): 27-32
 27. Patel V, Sheth M, Vyas N. *Effect of Transcutaneous Electrical Nerve Stimulation on Pain in Subjects with Primary Dysmenorrhea.* *IAI;*2016; 3(6): 1-5
 28. Kaur S, Kaur P, Shanmugam S, Kang Kaur M. *To compare the effect of stretching and core strengthening exercises on primary dysmenorrhoea in young females.* *IOSR Journal of Dental and Medical Sciences.* 2014; 11:22-32

How to cite this article: Desai RG. *Physiotherapy intervention for primary dysmenorrhea - a narrative review.* *International Journal of Research and Review.* 2022; 9(3): 441-449. DOI: <https://doi.org/10.52403/ijrr.20220349>
