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# The Effect of Chair Aerobic Exercises and Core Strengthening Exercises on Pain and Functional Disability in Primary Dysmenorrhoea

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## ABSTRACT

**Introduction:** This study aimed to investigate the impact of chair aerobic exercises and core strengthening exercises on primary dysmenorrhea, assessing pain and disability scores using the Numeric Pain Rating Scale (NPRS) and Women's Low Back Pain and Disability Index (WaLLID). The effectiveness of these exercise interventions in reducing pain and disability associated with primary dysmenorrhea was examined.

**Methods:** A randomized controlled trial was conducted with participants diagnosed with primary dysmenorrhea. Two exercise groups were formed: chair aerobic exercises and core strengthening exercises. Pain and disability scores were measured using NPRS and WaLLID before and after the intervention. The exercises were performed for a specific duration, and the scores were compared within and between the exercise groups.

**Results:** Both chair aerobic exercises and core strengthening exercises significantly decreased pain and disability scores of NPRS and WaLLID. However, no significant difference was observed in the scores between the two exercise groups. These findings indicate that both exercise modalities are effective in reducing pain and disability associated with primary dysmenorrhea.

**Conclusion:** This study concludes that chair aerobic exercises and core strengthening exercises are effective in managing pain and disability in individuals with primary dysmenorrhea. Both exercise interventions offer comparable benefits in terms of pain management and functional improvement. The results support previous research highlighting the positive impact of exercise interventions on menstrual pain management. Chair aerobic exercises provide a suitable option for individuals with limited mobility or a preference for seated exercise, while core strengthening exercises focus on enhancing core strength and stability. Further research is needed to explore the long-term effects, optimal exercise protocols, and potential combinations with other treatment modalities for primary dysmenorrhea management. Understanding the underlying physiological mechanisms of these exercise interventions would provide valuable insights for improving dysmenorrhea management.

***Keywords:*** Primary dysmenorrhea, Chair aerobic exercises, Core strengthening exercises, pain, disability, Numeric Pain Rating Scale, Women's Low Back Pain and Disability Index.

## INTRODUCTION

It is a cramping pain which is mostly perceived in the lower abdomen, but it can also spread to the lower back and upper legs (Durain, 2004). Primary dysmenorrhea, characterized by painful menstrual cramps without any underlying pelvic pathology, affects a significant proportion of women worldwide. Dysmenorrhoea is the term for pain with menstruation. The debilitating nature of this condition can greatly impact a woman's quality of life, leading to missed work or school days and reduced overall productivity. While pharmacological

interventions are commonly used to alleviate the symptoms of primary dysmenorrhea, there is growing interest in non-pharmacological approaches, such as exercise, to provide a holistic and sustainable solution.

Exercise has been widely recognized as an effective intervention in various health conditions, including pain management. Regular physical activity has been associated with improved cardiovascular health, enhanced mood, and decreased stress levels (Hassmén et al., 2000). In recent years, research has also explored the potential benefits of exercise in mitigating the symptoms of primary dysmenorrhea.

Among the different types of exercises, both aerobic and strengthening exercises have been investigated for their effects on primary dysmenorrhea (Kirmizigil & Demiralp, 2020). Aerobic exercise, which involves sustained rhythmic movements that increase heart rate and oxygen consumption, has been shown to have positive effects on pain perception and overall well-being. Similarly, core strengthening exercises, targeting the muscles of the abdomen, back, and pelvis have demonstrated potential benefits in reducing pain and improving physical function (Saleh et al., 2016).

However, the specific impact of chair aerobic exercises and core strengthening exercises on primary dysmenorrhea remains relatively unexplored. Chair aerobic exercises are modified aerobic movements performed while seated, making them accessible to individuals with limited mobility or those who prefer a lower-impact exercise option (Berde et al., 2019). These exercises are beneficial and handy for office workers who spend prolonged period of time in a seated position. Core strengthening exercises, on the other hand, primarily focus on strengthening the deep abdominal and back muscles to provide stability and support to the pelvic region (Borghuis et al., 2008).

This manuscript aims to investigate and evaluate the effect of chair aerobic exercises and core strengthening exercises on primary dysmenorrhea. We conducted a randomized controlled trial involving women experiencing primary dysmenorrhea, examining the impact of these exercise interventions on pain severity, menstrual symptoms, and overall quality of life. For this evaluation we included Numerical pain rating scale (NPRS) and working ability, location, intensity, days of pain, dysmenorrhea (WaLIDD) score. By providing evidence-based insights into the effectiveness of these exercises, this study aims to contribute to the development of non-pharmacological interventions that can alleviate the burden of primary dysmenorrhea.

Understanding the potential benefits of exercise interventions for primary dysmenorrhea is crucial in developing comprehensive treatment strategies that empower women to manage their symptoms and improve their well-being. The findings of this study may have implications for healthcare professionals, physiotherapists, and women seeking alternative approaches to pain management during menstruation.

## METHODS

A total of 30 female students, between the age group of 18- 25 from the students of LNCT university department of physiotherapy were selected using purposive sampling technique. The procedure of testing protocol was explained to the participants thoroughly and informed consent was obtained from all participants in verbal as well as in written form. The study was approved by Institutional Ethical committee of LN Medical University, Bhopal. The subjects were divided into two groups using, fish bowl method random sampling. Group A Performed core strengthening exercises, while group B performed chair aerobic exercise. Details of Different exercises performed by group A and B are presented in Table 1 and 2.

### Inclusion and Exclusion criteria

Participants were included in the study if students had primary dysmenorrhea,

Unmarried and sexually inactive participants were involved in this study. We filled WaLLID scores before the commencement of the study and included only those, who had WaLLID score of 1 and above. Participants were excluded if they had a known history of musculo-skeletal, cardio-respiratory or cerebrovascular disease, had psychiatric or neurological disease, had done strenuous activity or had consumed alcohol 24 hour prior to the testing. Participants with known history of poly cystic ovarian disease and poly cystic ovarian syndrome, other menstrual problems like heavy menstrual bleeding, irregular and abnormal menses and low back pain were also excluded. We excluded the participants who were athletes or played professional sports for at least three years.

**Intervention protocols**

Core strengthening and chair aerobic exercises were used as exercise interventions in two different groups. These exercises were performed maximum with 12 repetitions, for total 2 months with a frequency of 4 days a week. Participants progressed to 5 repetitions each in the first few weeks and progressed as time passed by. The duration of session was kept 40 minutes a day. The instructions were given to each participant in different groups which were followed under the supervision of trained therapists. Regular follow ups were taken during 1st and 2nd month.

**Core strengthening exercises (group A):**

The strengthening program consisted of following exercise protocols (Table 1)

**Table 1: Description of core strengthening exercises**

| S. No | Exercise | Description of exercise |
|---|---|---|
| 1 | Plank | The exercise involves placing the forearms or palms on a flat, elevated surface with the elbows positioned directly under the shoulders. The feet are then walked back until the body forms a straight line on a diagonal. |
| 2 | Crunches | This exercise involves lying on back with knees bent and feet flat on the ground, creating a stable base. Participants were asked to place their hands lightly behind their head, avoiding any excessive pulling or tension on the neck. Exercise was initiated as the participant, engaged their abdominal muscles by drawing their navel toward spine, creating a slight posterior pelvic tilt. With the core engaged, they begun to lift head, neck, and shoulders off the ground, aiming to bring chest towards knees. They maintained a steady and controlled pace, avoiding any jerky or sudden movements. |
| 3 | Toe taps | Stand on one foot and slowly lift the other foot off the ground. Tap the toe of the lifted foot on the ground in front of the standing leg. Repeat the movement for the desired number of reps. |
| 4 | Beetle | It involves lying on back, raising and lowering opposite arms and legs while keeping abdominal muscles engaged. As the position resembles a bug on its back, the exercise has been also named "dead bug" |
| 5 | Superman | Participants were instructed to lie on the floor in a prone (facedown) position, with legs straight and arms extended in front of. Keeping head in a neutral position (avoid looking up), participants slowly lifted arms and legs around 6 inches (15.3 cm) off the floor, or until they felt their lower back muscles contracting. |
| 6 | Bridging | Participants were instructed to lie on back with knees bent. Keep your back in a neutral position, not arched and not pressed into the floor. Avoid tilting hips. |

(Patel, 2020; Rajalaxmi et al., 2016)

**Chair aerobics (group B).** Subjects of group B exercises performed the following exercises (Table 2)

**Table 2: Description of Chair aerobic exercises**

| S. No | Exercise | Exercise instructions to the participants |
|---|---|---|
| 1 | Warm-up | In a chair seated position, place fingertips on shoulders. Circle shoulders forward for fifteen repetitions. Reverse the movement, and circle backward for fifteen repetitions. |
| 2 | Toe-taps | Push off the ground with left foot and switch legs mid-air, so that left foot touches the platform and right foot is on the ground. The arms can remain at sides or alternate with legs, like they do when running. Repeat alternating toe taps. |
| 3 | Forward Clapping | Extend one leg forward in a smooth, controlled kick while clapping your hands about shoulder height. |
| 4 | Upward Clapping | Start by sitting up straight and pressing palms together. Reach palms up towards the ceiling while relaxing your your shoulders and back and engaging your buttocks and core |
| 5 | March | Sit fully back into chair with back straight. Alternate lifting legs up and down, as if one is marching up and down stairs |
| 6 | Sprint | The seated chair sprint exercise mimics the sprinting motion while utilizing a chair for support. It starts by sitting on a stable chair with feet flat on the floor and knees bent at a 90-degree angle. Place your hands on the sides of the chair seat for support and stability. Engage core muscles by drawing navel towards spine. Begin the exercise by driving one knee upward toward chest, simulating the motion of running. As the participant brings one knee up, he/ she simultaneously extends the opposite |

| | | |
|---|---|---|
| | | leg straight out in front, maintaining a controlled and balanced movement. Continue alternating legs in a running or sprinting motion, driving knees up while extending the opposite leg. |
| 7 | knee lift with arm touch | Pull knees toward chest like crunching upper body forward using abs, not arms. |
| 8 | Diagonal toe-touch | Sit on the chair with torso upright. Take a deep breath and then extend the arms towards the toes. The goal is to be able to touch toes. |
| 9 | Chair bridging | Tighten abdominal and buttock muscles by pushing low back into the ground. Raise hips to create a straight line from knees to shoulders. Squeeze core and pull belly button back toward spine. |
| 10 | Chair lunges | To perform a chair lunge, place the rear foot on a chair, and have the lead foot slightly in front. Keeping abdominals and gluteus muscles tight, take a medium to long step forward and slowly lower the body through leading knee until the thigh is parallel to the ground. |
| 11 | Cool-down | It included:<br>Sit to stand - Keep back and neck as straight as possible, with chest slightly forward. Breathe in slowly. Lean forward and slightly shift weight to the front of feet. Breathe out slowly standing up.<br>Arm swings - Extend both arms forward at shoulder level, then promptly swing the arms down and backward. Continue swinging back and forth for 10 minutes |

(Patel, 2020; Rajalaxmi et al., 2016)

## STATISTICAL ANALYSIS

We used SPSS- version 21 (IBM Chicago, IL, USA) for the analysis of data. Normality of the data was assessed using Shapiro-Wilk test. We found that the data was normally distributed. We used one way repeated measure ANOVA to analyze NPRS and WaLLID scores difference between three sessions (pre, Post 1 month and post 2 month). Bonferroni's Post hoc test was applied for multiple comparisons. Further, we used paired t- test to compare the scores of NPRS and WaLLID between the two groups.

## RESULT

30 girls were recruited for the study (mean age 19 ± 1.5 years). Out of which two groups of 15 samples were divided for the study. 15 samples were selected for chair aerobic session and 15 were selected for core strengthening exercises.

Our results demonstrated that both the exercise interventions (Chair aerobic exercises and core strengthening exercises) decreased pain and disability scores of NPRS and WaLLID significantly. However, there was no significant difference in the scores of NPRS and WaLLID between the two groups. NPR and WALLID tests were assessed at baseline and the groups were found to be homogeneous.

**Table 3: Comparison of means of NPRS and WaLLID scores between three sessions in Group A**

| | | Mean | Std. Deviation | F- Value | p-value |
|---|---|---|---|---|---|
| NPR | Pre | 7.73 | .799 | 47.34 | 0.0001* |
| | One Month later | 5.40 | 1.682 | | |
| | Two months later | 3.00 | 1.363 | | |
| WaLLID | Pre | 8.20 | 1.082 | 49.96 | 0.0001* |
| | One Month later | 5.13 | 1.407 | | |
| | Two months later | 3.67 | 1.291 | | |

**Table 4: Multiple comparison of NPRS and WaLLID scores between three sessions in Group A**

| Dependent Variable | Session | Session | Mean Difference (I-J) | Sig. |
|---|---|---|---|---|
| NPR-pre | Pre | One Month later | 2.333* | .000 |
| | | Two months later | 4.733* | .000 |
| | One Month later | Pre | -2.333* | .000 |
| | | Two months later | 2.400* | .000 |
| | Two months later | Pre | -4.733* | .000 |
| | | One Month later | -2.400* | .000 |
| WALLID-pre | Pre | One Month later | 3.067* | .000 |
| | | Two months later | 4.533* | .000 |
| | One Month later | Pre | -3.067* | .000 |
| | | Two months later | 1.467* | .009 |
| | Two months later | Pre | -4.533* | .000 |
| | | One Month later | -1.467* | .009 |

We found a significant difference in the values of pre- one month later, pre- two months later and one month later- two month later scores of both NPRS and WaLLID scores in group A.'*' Represents a significant difference at $p<0.05$ level of significance

**Table 5: Comparison of means of NPRS and WaLLID scores between three sessions in Group B**

| | | Mean | Std. Deviation | F- Value | p- value |
|---|---|---|---|---|---|
| NPR_pre | Pre | 6.21 | 1.477 | 11.93 | 0.0001 |
| | One Month later | 4.69 | 1.702 | | |
| | Two months later | 3.20 | 1.781 | | |
| Walid_pre | Pre | 7.21 | 1.188 | 14.76 | 0.0001 |
| | One Month later | 5.23 | 1.536 | | |
| | Two months later | 4.20 | 1.740 | | |

**Table 6: Multiple comparison of NPRS and WaLLID scores between three sessions in Group B**

| Dependent Variable | Session | Session | Mean Difference | Sig. |
|---|---|---|---|---|
| NPR_pre | Pre | One Month later | 1.522 | .067 |
| | | Two months later | 3.014* | .000 |
| | One Month later | Pre | -1.522 | .067 |
| | | Two months later | 1.492 | .068 |
| | Two months later | Pre | -3.014* | .000 |
| | | One Month later | -1.492 | .068 |
| Walid_pre | Pre | One Month later | 1.984* | .005 |
| | | Two months later | 3.014* | .000 |
| | One Month later | Pre | -1.984* | .005 |
| | | Two months later | 1.031 | .239 |
| | Two months later | Pre | -3.014* | .000 |
| | | One Month later | -1.031 | .239 |

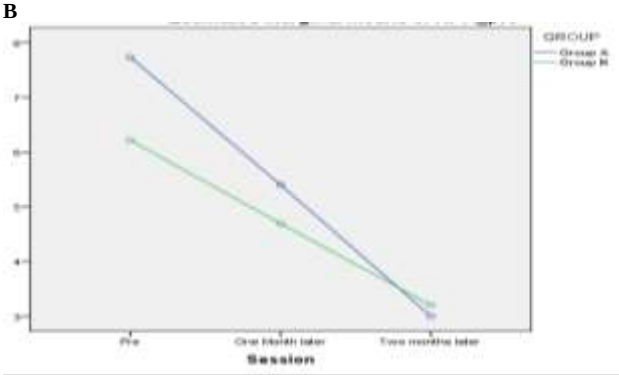
We found a significant difference in the values of pre- one month later, pre- two months later and one month later- two month later scores of both NPRS and WaLLID scores in group B.'*' Represents a significant difference at $p<0.05$ level of significance

**Table 7: Between the groups comparison Using Two Way ANOVA**

| Source | Dependent Variable | Type III Sum of Squares | Df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|---|
| Corrected Model | NPR_pre | 244.837[a] | 5 | 48.967 | 21.786 | .000[a] | .574 |
| | Walid_pre | 228.388[b] | 5 | 45.678 | 23.637 | .000[b] | .593 |
| Intercept | NPR_pre | 2203.404 | 1 | 2203.404 | 980.314 | .000 | .924 |
| | Walid_pre | 2727.566 | 1 | 2727.566 | 1411.427 | .000 | .946 |
| GROUP | NPR_pre | 9.898 | 1 | 9.898 | 4.404 | .039 | .052 |
| | Walid_pre | .304 | 1 | .304 | .157 | .693 | .002 |
| Session | NPR_pre | 221.182 | 2 | 110.591 | 49.203 | .000 | .549 |
| | Walid_pre | 216.804 | 2 | 108.402 | 56.094 | .000 | .581 |
| GROUP * Session | NPR_pre | 10.906 | 2 | 5.453 | 2.426 | .095 | .057 |
| | Walid_pre | 8.957 | 2 | 4.478 | 2.317 | .105 | .054 |

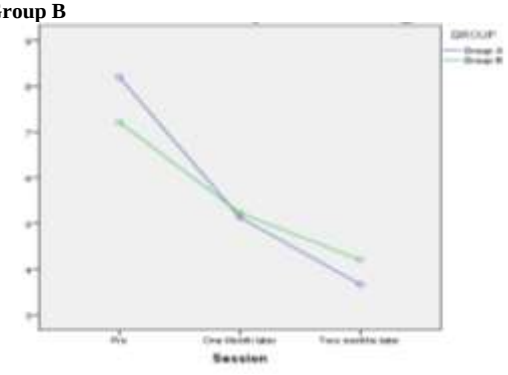
The mean plots of NPR and WALLID scores are shown below:

**Figure 1: Comparison of NPRS Score of Group A and Group B**




The above figure shows that there is a significant difference in NPRS scores between the three sessions. However, there is no significant difference between the groups.

**Figure 2: Comparison of WaLLID Score of Group A and Group B**



The above figure shows that there is a significant difference in WaLLID scores between the three sessions. However, there is no significant difference between the groups.

## DISCUSSION

The aim of this study was to investigate the impact of chair aerobic exercises and core strengthening exercises on primary dysmenorrhea, specifically focusing on pain and disability scores measured using the Numeric Pain Rating Scale (NPRS) and the Women's Low Back Pain and Disability Index (WaLLID). Our results demonstrated that both exercise interventions significantly decreased pain and disability scores of NPRS and WaLLID. However, there was no significant difference observed in the scores of NPRS and WaLLID between the two exercise groups.

The findings of this study indicate that both chair aerobic exercises and core strengthening exercises are effective in reducing pain and disability associated with primary dysmenorrhea. These results align with previous research highlighting the positive impact of exercise interventions on menstrual pain management (Kannan et al., 2015). Engaging in physical activity has been shown to release endorphins, improve blood circulation, and alleviate muscle tension, contributing to pain relief during menstruation (Jaleel et al., 2022; Kusumaningrum et al., 2019).

Chair aerobic exercises involve low-impact movements performed while seated, typically targeting cardiovascular fitness and overall muscle endurance. The positive outcomes observed in this study suggest that chair aerobic exercises can be considered as a suitable option for individuals who may have limited mobility or prefer seated exercise modalities. These exercises may offer a practical and accessible alternative for those experiencing primary dysmenorrhea, allowing them to engage in physical activity and potentially reduce pain and disability levels.

Core strengthening exercises, on the other hand, primarily focus on enhancing the strength and stability of the abdominal and lower back muscles (Hibbs et al., 2008). The effectiveness of core strengthening exercises in managing primary dysmenorrhea has been supported by previous research (Saleh, et al., 2016), as they contribute to improved posture, pelvic stability, and overall core strength. The reduction in pain and disability scores observed in this study following core strengthening exercises reinforces their role in alleviating symptoms associated with primary dysmenorrhea.

Interestingly, our study did not identify any significant difference in pain and disability scores between the chair aerobic exercises and core strengthening exercises groups. This finding suggests that both exercise modalities may offer comparable benefits in terms of pain management and functional improvement for individuals with primary dysmenorrhea. It is important to note that the lack of significant difference could be attributed to factors such as the study sample size, exercise duration, or the similarity in the mechanisms through which both interventions address dysmenorrhea symptoms.

Although the current study demonstrates the potential benefits of chair aerobic exercises and core strengthening exercises for individuals with primary dysmenorrhea, further research is warranted to explore the long-term effects, optimal exercise protocols, and potential combinations with other treatment modalities. Additionally, investigating the underlying physiological mechanisms through which these exercises exert their positive effects would provide valuable insights into the management of primary dysmenorrhea.

## CONCLUSION

In conclusion, our study highlights the efficacy of both chair aerobic exercises and core strengthening exercises in reducing pain and disability associated with primary dysmenorrhea. These exercise interventions

offer viable options for individuals seeking non-pharmacological approaches to manage dysmenorrhea symptoms. Future studies should continue to investigate exercise protocols and explore the potential synergistic effects of combining different exercise modalities with other interventions to optimize symptom relief and improve the overall quality of life for individuals with primary dysmenorrhea.

### *Declaration by Authors*

**Ethical Approval:** Approved

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### REFERENCES

1. Berde, S. D., Yadav, T. S., Gosavi, P. M., & Gijare, S. S. (2019). Effect of Core Strengthening Exercises & Chair Aerobic Exercises in Primary Dysmenorrhoea. *International Journal of Health Sciences*, *3*.
2. Borghuis, J., Hof, A. L., & Lemmink, K. A. P. M. (2008). The Importance of Sensory-Motor Control in Providing Core Stability. *Sports Medicine*, *38*(11), 893–916. https://doi.org/10.2165/00007256-200838110-00002
3. Durain, D. (2004). Primary dysmenorrhea: Assessment and management update. *Journal of Midwifery & Women's Health*, *49*(6), 520–528. https://doi.org/10.1016/j.jmwh.2004.08.013
4. Hassmén, P., Koivula, N., & Uutela, A. (2000). Physical Exercise and Psychological Well-Being: A Population Study in Finland. *Preventive Medicine*, *30*(1), 17–25. https://doi.org/10.1006/pmed.1999.0597
5. Hibbs, A. E., Thompson, K. G., French, D., Wrigley, A., & Spears, I. (2008). Optimizing Performance by Improving Core Stability and Core Strength. *Sports Medicine*, *38*(12), 995–1008. https://doi.org/10.2165/00007256-200838120-00004
6. Jaleel, G., Shaphe, M. A., Khan, A. R., Malhotra, D., Khan, H., Parveen, S., Qasheesh, M., Beg, R. A., Chahal, A., Ahmad, F., & Ahmad, M. F. (2022). Effect of Exercises on Central and Endocrine System for Pain Modulation in Primary Dysmenorrhea. *Journal of Lifestyle Medicine*, *12*(1), 15–25. https://doi.org/10.15280/jlm.2022.12.1.15
7. Kannan, P., Chapple, C. M., Miller, D., Claydon, L. S., & Baxter, G. D. (2015). Menstrual pain and quality of life in women with primary dysmenorrhea: Rationale, design, and interventions of a randomized controlled trial of effects of a treadmill-based exercise intervention. *Contemporary Clinical Trials*, *42*, 81–89. https://doi.org/10.1016/j.cct.2015.03.010
8. Kirmizigil, B., & Demiralp, C. (2020). Effectiveness of functional exercises on pain and sleep quality in patients with primary dysmenorrhea: A randomized clinical trial. *Archives of Gynecology and Obstetrics*, *302*(1), 153–163. https://doi.org/10.1007/s00404-020-05579-2
9. Kusumaningrum, T., Nastiti, A. A., Dewi, L. C., & Lutfiani, A. (2019). The Correlation between Physical Activity and Primary Dysmenorrhea in Female Adolescents. *Indian Journal of Public Health Research & Development*, *10*(8), 2559. https://doi.org/10.5958/0976-5506.2019.02252.6
10. Patel, C. (2020). *Effect of Chair Aerobic Exercises vs. Effect of Core Strengthening Exercises with Education on Primary Dysmenorrheal in Adult Girls-RCT*. *1*(1).
11. Rajalaxmi, V., Kumar, G. M., & Veena, S. (2016). 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*, *2*(1), 27–32.
12. Saleh, H., Mowafy, H., & Hameid, A. A. abd E. (2016). Stretching or Core Strengthening Exercises for Managing Primary Dysmenorrhea. *Journal of Womens Health Care*, *05*(01). https://doi.org/10.4172/2167-0420.1000295

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