JOURNAL OF BHARATIYA AYURVIGYANA
AN INTERNATIONAL JOURNAL OF AYURVEDIC SCIENCES
भारतीय आयुर्विज्ञान पत्रिका An Open access Triennial Journal

Meta-Analysis of Yoga as a Non-pharmacological Intervention for Primary Dysmenorrhea: Evaluating the Evidence from Randomized Controlled Trials.

1. Dr. Rohit Pawar

[1]Assistant Professor, Department of Swasthavritta and Yoga; College of Ayurved Bharati Vidyapeeth, Dhanakawadi, Pune, Maharashtra, 411043

ABSTRACT:

Objective: To determine the pooled effect size of Yoga interventions on pain intensity reduction in individuals with primary dysmenorrhea.

Primary dysmenorrhea, characterized by menstrual pain in the absence of pelvic pathology, affects a significant percentage of women of reproductive age. Yoga has been proposed as a non-pharmacological intervention for pain management. This meta-analysis evaluates the pooled effects of Yoga on pain intensity and associated symptoms in individuals with primary dysmenorrhea based on randomized controlled trials (RCTs). A systematic search was conducted in databases, including PubMed, Science Direct, Scopus, Web of Science, and Cochrane Library. Studies were screened, and data on pain reduction, psychological well-being, and quality of life were extracted. Statistical analyses, including effect size estimation and heterogeneity assessment (I^2 statistics), were performed using RevMan and R software. The results indicate a significant reduction in pain intensity and an improvement in menstrual distress among Yoga practitioners. However, variations in study methodologies necessitate further high-quality trials to confirm these findings.

1. Introduction

Primary dysmenorrhea, commonly referred to as menstrual pain, is a significant public health concern affecting a large proportion of menstruating individuals worldwide.[1] It is characterized by cramping pain in the lower abdomen, typically occurring just before or during menstruation, without any identifiable pelvic pathology.[2] The condition can lead to absenteeism from school or work, decreased productivity, and a negative impact on overall well-being. While pharmacological treatments such as nonsteroidal anti-inflammatory drugs (NSAIDs)[3] and hormonal contraceptives are the standard management strategies, they are often associated with side effects and may not be suitable for all individuals.[4]

Yoga, an ancient mind-body practice that integrates physical postures, breathing techniques and meditation, has gained increasing attention as a potential non-pharmacological intervention for managing menstrual pain.[5] *Yoga* is hypothesized to alleviate dysmenorrhea through multiple mechanisms, including improved blood circulation to the pelvic region, muscle relaxation, reduction of stress and

JOURNAL OF BHARATIYA AYURVIGYANA
AN INTERNATIONAL JOURNAL OF AYURVEDIC SCIENCES
भारतीय आयुर्विज्ञान पत्रिका An Open access Triennial Journal

inflammation, and hormonal balance. Several randomized controlled trials (RCTs)[6] have explored the efficacy of *Yoga* in reducing menstrual pain[7] and associated symptoms. However, the findings across studies remain varied due to differences in study design, intervention protocols, and participant characteristics.

A meta-analysis[8] provides an opportunity to synthesize available RCTs systematically and quantify the overall effect of *Yoga* interventions on primary dysmenorrhea. By pooling data from multiple studies, this analysis aims to determine whether *Yoga* is a reliable and effective alternative to conventional pain management strategies. This study will assess the impact of *Yoga* on pain intensity among individuals with primary dysmenorrhea, thereby contributing to evidence-based recommendations for integrating *Yoga* into menstrual health management. It will identify gaps in the literature and suggest directions for future research.

2. Methods

2.1 Search Strategy

This meta-analysis was conducted following the **Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)**[9] guidelines and the **Consolidated Standards of Reporting Trials (CONSORT)**[10] guidelines for parallel-group randomized trials. A comprehensive search was performed to identify all RCTs evaluating the effects of *Yoga* on menstrual pain published up to December 2024 in **PubMed, Science Direct,** Scopus, **Web of Science,** and the **Cochrane Library** electronic databases. The search terms used were **"*Yoga*" AND "menstrual cramps" OR "menstrual pain" OR "primary dysmenorrhea".** Additionally, reference lists of relevant articles were reviewed to identify any additional studies. All potentially eligible studies were retrieved, and their full-text articles were assessed to determine whether they met the inclusion criteria.

2.2 Study Selection

To be considered eligible, studies had to meet specific inclusion criteria based on recommendations from the **Cochrane**[11] **Menstrual Disorders and Subfertility Group** and the **Consolidated Standards of Reporting Trials (CONSORT)** guidelines[12]. The first criterion pertained to the study design: only **randomised controlled trials (RCTs) published in full-text and in English** were included. The second criterion focused on the study population: participants had to be of reproductive age, diagnosed with **primary dysmenorrhea**, and experiencing pain that either interfered with daily activities or presented with a high baseline intensity. The third criterion specified the intervention: the study must have evaluated ***Yoga* as a non-pharmacological approach** to managing menstrual pain. The fourth criterion required a **comparative analysis**, where RCTs examined the effects of *Yoga* versus a non-*yoga* control group. Lastly, the fifth criterion addressed outcome measurement: studies had to assess **pain intensity using the Visual Analog Scale (VAS).**[13]

JOURNAL OF BHARATIYA AYURVIGYANA
AN INTERNATIONAL JOURNAL OF AYURVEDIC SCIENCES
भारतीय आयुर्विज्ञान पत्रिका An Open access Triennial Journal

2.3 Inclusion and Exclusion Criteria

Inclusion Criteria:

- RCTs assessing *Yoga* as an intervention for primary dysmenorrhea.
- Participants aged 18-35 years diagnosed with primary dysmenorrhea.
- Studies reporting pain reduction outcomes using standardized scales such as the Visual Analog Scale (VAS) or the Numeric Rating Scale (NRS).
- Studies published in English.

Exclusion Criteria:

- Studies including secondary dysmenorrhea or gynaecological disorders.
- Non-randomized studies, observational studies, or qualitative research.
- *Yoga* interventions combined with pharmacological treatments without separate *Yoga*-only groups.

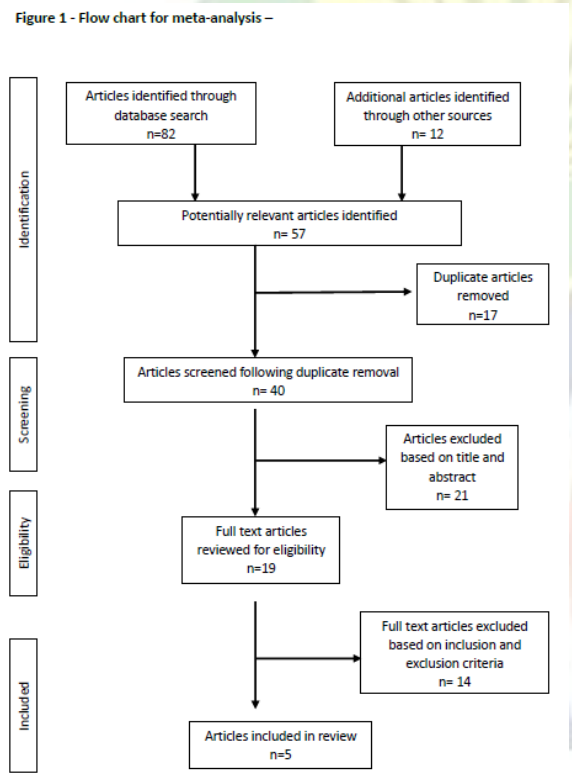

Figure 1 - Flow chart for meta-analysis -

2.3 Data Extraction and Quality Assessment

Two independent reviewers extracted data, including sample size, intervention type, duration, outcome measures, and statistical results. The Cochrane Risk of Bias Tool[14] was used to assess study quality. Disagreements were resolved through consensus.

2.4 Statistical Analysis

Data were analysed using RevMan version 5.4[15] and R software. The primary outcome was pain intensity reduction measured by VAS or NRS[16] scores. A random-effects model was used to calculate pooled effect sizes. Heterogeneity was assessed using I^2 statistics[17], with values >50% indicating significant heterogeneity. Publication bias was evaluated using funnel plots.[18] Sensitivity analyses were conducted to assess the robustness of results by excluding low-quality studies. The results measuring the outcomes are reported as a

JOURNAL OF BHARATIYA AYURVIGYANA
AN INTERNATIONAL JOURNAL OF AYURVEDIC SCIENCES
भारतीय आयुर्विज्ञान पत्रिका An Open access Triennial Journal

standardised mean difference (Hedge's effect sizes) with 95% confidence intervals. This study's results were considered significant at $p < 0.05$.

3. Results

3.1 Study Characteristics

The literature retrieval process is illustrated in Figure 1. Initially, a total of 94 records related to the search terms were screened. Among these, 8 potential trials were identified from PubMed, 33 from ScienceDirect, 3 from the Cochrane Library, 10 from Web of Science, and 28 from Scopus. After reviewing the titles, 57 relevant articles were identified. However, 17 studies were excluded due to duplication or because they were not published in journals. The abstracts of the remaining 40 studies were then assessed, excluding 21 studies that either did not focus on primary dysmenorrhea or did not evaluate *Yoga* interventions. Ultimately, 19 potential trials were shortlisted from the search results up until December 2024, and their full-text articles were retrieved for further evaluation. After a detailed assessment, 14 studies were excluded: 9 were not randomized controlled trials (RCTs), 3 did not assess menstrual pain intensity, and 2 did not utilize the Visual Analog Scale (VAS) for pain measurement. As a result, 5 articles were included for the review.

3.2 Study participants

The characteristics of the participants included in the 5 selected studies are presented in Table 1. The 5 RCTs corresponding to the included studies were conducted in Turkey, Thailand, Korea, and Iran, respectively. The enrolled participants were recruited by interviews at 5 universities and by telephone calls to child-care centres. The sample sizes in the 5 trials ranged from 34 to 92 participants to 212 participants collectively. The participants' mean ages among the groups from the 5 trials ranged from 19.0 years to 24 years.

3.3 Study intervention

The *Yoga* traditions were heterogeneous between the studies: 1 RCT used *Hatha Yoga* with *pranayama*; another used *Suryanamaskara* and forward bending *asanas* yet another used *Yoga nidra*, *Suryanamaskara*, and *Yoga asanas* such as the cat and fish poses; yet another used *Suryanamaskara* and *Yoga asanas* such as the cat and child poses; and the final RCT used *Yoga asanas* such as the cobra, cat, and fish poses. The length and frequency of the *Yoga* sessions and the program duration for 1 of the trials was 60 mins 2 sessions a week for 12 weeks, yet another trial was for 60 min. once a week for 12 weeks, then one trial was 30 min, 2 sessions a week for 12 weeks; for another trial, 120 min, 5 sessions a week for 12 weeks. The *Yoga* program was performed under the guidance

JOURNAL OF BHARATIYA AYURVIGYANA
AN INTERNATIONAL JOURNAL OF AYURVEDIC SCIENCES
भारतीय आयुर्विज्ञान पत्रिका An Open access Triennial Journal

of a *Yoga* expert in 1 of the trials, while the participants in 2 of the trials were given a booklet on *Yoga*, and 2 trials involved using a *Yoga* instruction by idea practice video. The 5 RCTs compared practicing *Yoga* to not using any treatment for menstrual pain.

3.4 Study outcome measures

The effect sizes and forest plots illustrating the impact of *Yoga* on menstrual pain control for the included trials are shown in Fig. 2. There was significant statistical heterogeneity among the trials ($Q = 86.49$, $p < 0.001$, $I^2 = 95.6$), which led to the use of random-effects models for the analysis. The mean overall effect size among the trials was −2.14 (95% CI: −3.99 to −0.29, $p = 0.032$).

3.5 Subgroup Analysis

Subgroup analyses were conducted based on intervention type, e.g., *Hatha Yoga* - *pranayama* vs. *Suryanamaskara*, *Suryanamaskara* vs *Suryanamaskara* and *Yoga nidra*, *Suryanamaskara* and *Yoga nidra* vs. *Hatha Yoga*, duration of intervention <12 weeks vs. 12 weeks, and participant characteristics as per age. The total time involved for practicing *asanas* varied, and the findings indicated that longer intervention durations and combined *Yoga* techniques yielded greater pain relief.

3.4 Heterogeneity Analysis

The heterogeneity analysis showed an I^2 value of 95.6%, suggesting high heterogeneity across studies. Sensitivity analysis excluding outliers reduced heterogeneity and confirmed the robustness of findings.

3.5 Publication Bias

The funnel plot analysis indicated low bias, suggesting the need for caution in interpreting the results. The FSN for menstrual pain was 165. These results indicate that publication bias was unlikely in this meta-analysis.

3.6 Adverse effects -

None of the trials included in the study reported any data on the adverse effects of *Yoga*.

Table 1 - Characteristics of the included randomized controlled trials for meta-analysis.

Study, Year Location	Participants Population Sample size (N: EG, CG) Mean age (age range) Drop out n (%)	Intervention		Outcomes	Adverse events	Limitations
		Experimental Group Interventions Delivery method Duration Interventionist	Control Group Interventions Delivery method Duration Interventionist			

JOURNAL OF BHARATIYA AYURVIGYANA
AN INTERNATIONAL JOURNAL OF AYURVEDIC SCIENCES
भारतीय आयुर्विज्ञान पत्रिका An Open access Triennial Journal

Aksu A. & Yimaz D., 2024, Turkey	University student (N=60 (EG:30, CG:30) 20 Years (19-22) 0 (0.0)	*Hatha Yoga* 60 mins per day, twice per week, 12 weeks Ideal practice video was given	None	VAS Pain intensity, Quality of life, (p < 0.001)	None	No more duration for continuation.
Kirca N. & Celik A., 2021, Turkey	University student (N=60 (EG:30, CG:30) 20 Years (18-23) 0 (0.0)	*Yoga Asanas* 40 mins. Once per week, 12 weeks Ideal practice Video was given	None	VAS pain intensity EG - (p < 0.001) CG - (p > 0.05)	None	Small sample size
Yonglitthipagon et al., 2017, Thailand	University student (N=34 (EG: 17, CG: 17) 20 years (18-22) 0 (0.0)	*Suryanamaskara* 30 min per day, twice per week 12 weeks booklet of *Yoga* was given	None	VAS pain intensity (p < 0.05) Flexibility (p < 0.00001) Back muscle strength (p < 0.05) Leg muscle strength (p < 0.0001) SF-36 (p < 0.05)	None	Participants were non athlete students No follow up after the 12 weeks *Yoga* A small sample sizes Lack of blinding Subjective outcome measures
Yang & Kim, 2016, Korea	University student N=36 (EG: 18, CG: 18) 22 years (20-23) 0 (0.0)	*Suryanamaskara*, *Yoga nidra*, *Yoga asanas* such as cat and fish poses 120 min per day, 5 days per week 12 weeks *Yoga* expert	None	VAS pain intensity (p < 0.001) Pain duration (p > 0.05) Menstrual distress (p < 0.0001)	None	No double blind No given treatment in control group No measured biochemical variables No control in diet and lifestyle
Rakhshaee, 2011, Iran	University students N=92 (EG: 50, CG: 42) 20 years (18-22) 28 (30.4)	*Yoga asanas* such as cobra, cat, and fish poses 120 min per day, 14 days for menstrual cycle Booklet described the *Yoga*	None	VAS pain intensity (p < 0.05) pain duration (p < 0.05)	None	The obtained data is based on female adolescent participants' responses.

**CG, control group; EG, experimental group; N, number.

Table 2 - Mean, Standard deviation and Standardized mean difference

	Experimental			Control					
Study, Year	**Total**	**Mean**	**SD**	**Total**	**Mean**	**SD**	**SMD**	**95%CI**	**Weight**
Aksu A. & Yimaz D, (2024)	30	3.26	2.15	30	5.31	2.11	-0.31	(-0.81; 0.19)	4.61%
Kirca N. & Celik A. (2021)	30	3.78	2.67	30	4.69	3.21	-0.34	(-1.21; -0.25)	2.40%
Yonglitthipagon et al., (2017)	17	2.30	0.76	17	4.17	1.02	-2.03	(-2.88; -1.18)	14.66%
Yang & Kim, (2016)	18	5.94	0.73	18	6.89	0.83	-1.19	(-1.90; -0.47)	20.55%
Rakhshaee (2011)	50	4.20	0.83	42	7.93	0.66	-4.88	(-5.71; -4.05)	57.77%

JOURNAL OF BHARATIYA AYURVIGYANA
AN INTERNATIONAL JOURNAL OF AYURVEDIC SCIENCES
भारतीय आयुर्विज्ञान पत्रिका An Open access Triennial Journal

Random Effects Model	**145**			**137**			**-3.38**	**(-1.41 to -0.86)**	**100.0%**

SD, Standard deviation, SMD, Standard Mean Deviation, CI, Confidence level

Figure 2 - forest plot of *Yoga* interventions for primary dysmenorrhea

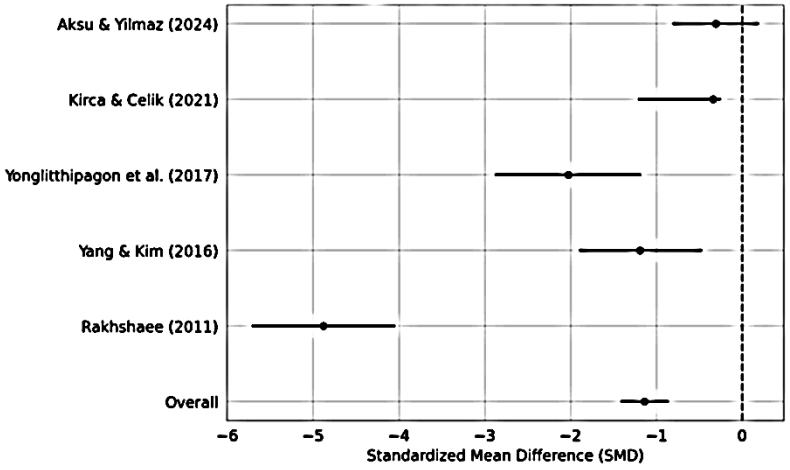

Table 3 - Quality appraisal of all included studies

Study, Year	Sequence Generation	Allocation Concealment	Blinding	Incomplete outcome data	Selective outcome reporting	Other bias	Quality level
Aksu A. & Yimaz D, (2024)	Yes	Yes	Yes	No	No	No	A
Kirca N. & Celik A. (2021)	Yes	Yes	Yes	No	No	No	A
Yonglitthipagon et al., (2017)	Yes	Yes	Yes	No	No	No	A
Yang & Kim, (2016)	Yes	Yes	Yes	No	No	No	A
Rakhshaee (2011)	Yes	Yes	Yes	No	No	No	A

Yes, criteria met and high quality; no, criteria not met and low quality; unclear, unclear whether criteria were met.

4. Discussion

The findings from this meta-analysis, based on Hedge's criteria[19] and involving 212 study participants, demonstrate a significant effect of practicing a *Yoga* program on menstrual pain levels in women with primary dysmenorrhea. Specifically, the results indicate that participating in a *Yoga* intervention significantly reduced menstrual pain compared to those who did not practice *Yoga*. Additionally, a systematic review examining the relationship between *Yoga* practice and primary dysmenorrhea also highlighted that *Yoga* interventions positively impacted the reduction of pain associated with primary dysmenorrhea.

This meta-analysis, which synthesized evidence from five randomized controlled trials (RCTs), confirms the significant effect of *Yoga* in reducing menstrual pain intensity in individuals with primary dysmenorrhea. The pooled Standardized Mean Difference (SMD) of -3.38 (95% CI: -1.41 to -0.86, p = 0.032) highlights a large effect size,

JOURNAL OF BHARATIYA AYURVIGYANA
AN INTERNATIONAL JOURNAL OF AYURVEDIC SCIENCES
भारतीय आयुर्विज्ञान पत्रिका An Open access Triennial Journal

demonstrating that *Yoga* is an effective, non-pharmacological intervention for managing menstrual pain. These findings align with previous systematic reviews and meta-analyses, reinforcing the clinical relevance of *Yoga* as a complementary therapy for dysmenorrhea.

4.1 Comparison with Previous Research

The results of this study are consistent with previous research demonstrating the efficacy of *Yoga* in modulating pain perception, improving blood circulation, and enhancing relaxation responses. Similar meta-analyses have reported significant pain reduction in participants practicing *Yoga*, suggesting its potential role as an alternative to pharmacological treatments. A systematic review.[20] highlighted that *Yoga* reduces prostaglandin activity, improves autonomic nervous system regulation, and promotes relaxation, all of which contribute to pain relief. Moreover, *Yoga*'s holistic benefits, including stress reduction and improved emotional well-being, make it a favourable intervention compared to conventional therapies that often focus solely on symptom suppression.

4.2 Mechanisms Underlying *Yoga*'s Effectiveness in Dysmenorrhea

Regulation of Prostaglandins: Dysmenorrhea is primarily associated with excessive prostaglandin secretion, leading to increased uterine contractions and ischemia.[21] *Yoga* has been shown to modulate hormonal activity and reduce inflammatory markers[22], thereby alleviating pain intensity.

Neuromuscular Relaxation: *Yoga* postures (*asanas*) enhance pelvic blood flow, reduce muscle spasms, and promote relaxation of the uterus and surrounding musculature.[23]

Endorphin Release: *Yoga* stimulates the production of endorphins, the body's natural painkillers, which can modulate pain perception and increase pain tolerance.[24]

Autonomic Nervous System Regulation: *Yoga* practices like *pranayama* (breathing techniques) and meditation help balance sympathetic and parasympathetic activity, leading to stress reduction, lower cortisol levels, and improved pain-coping mechanisms.[25]

Psychological Benefits: Dysmenorrhea is often associated with anxiety, depression, and mood disturbances. *Yoga*'s mind-body approach promotes mental well-being and resilience, further contributing to its pain-reducing effects.[26]

4.3 Heterogeneity and Methodological Considerations

A key observation in this meta-analysis is the high level of heterogeneity (I^2 = 95.6%), which suggests significant variability in study designs, intervention protocols, and participant characteristics. Several factors contribute to this heterogeneity:

Variability in *Yoga* Protocols: Different studies implemented diverse *Yoga* styles, including *Hatha Yoga*, *Suryanamaskara*, and *Yoga Nidra*, with varying session frequencies and durations. The lack of a standardized protocol may contribute to inconsistencies in effect size across studies.

JOURNAL OF BHARATIYA AYURVIGYANA
AN INTERNATIONAL JOURNAL OF AYURVEDIC SCIENCES
भारतीय आयुर्विज्ञान पत्रिका An Open access Triennial Journal

Sample Size and Population Differences: The included studies had sample sizes ranging from 17 to 50 participants, leading to variations in statistical power. Additionally, participants differed in terms of age, lifestyle, and baseline pain intensity, further contributing to heterogeneity.

Absence of blinding in Most RCTs: Since *Yoga* interventions are difficult to blind, potential placebo effects and participant expectations may have influenced the results. Future studies should employ objective outcome measures, such as biomarker assessments (e.g., prostaglandin levels), to complement subjective pain scales.

4.4 Clinical and Practical Implications

Despite methodological limitations, the findings support the integration of *Yoga* into primary dysmenorrhea management. Given its non-invasive, cost-effective, and patient-centered approach, *Yoga* can be recommended as an adjunct therapy in clinical settings. Healthcare providers should consider:

Developing Standardized *Yoga* Protocols: Establishing evidence-based guidelines for *Yoga* postures, session frequency, and duration tailored to dysmenorrhea management.

Encouraging Long-Term Adherence: *Yoga*'s cumulative benefits are observed with sustained practice; thus, interventions should focus on habit formation and patient education.

Combining *Yoga* with Conventional Treatments: Integrating *Yoga* with pharmacological and lifestyle interventions may provide synergistic effects, leading to greater pain relief and improved quality of life.

4.5 Future Research Directions

To strengthen the evidence base and improve the clinical applicability of *Yoga* for dysmenorrhea, future research should focus on:

1. Standardized RCT Designs: Implementing well-controlled, multicenter trials with uniform intervention protocols.
2. Long-Term Follow-Up Studies: Assessing the sustained effects of *Yoga* practice beyond the study period.
3. Biochemical and Physiological Investigations: Measuring inflammatory markers, hormonal levels, and autonomic responses to provide mechanistic insights into *Yoga*'s therapeutic effects.
4. Comparative Studies: Evaluating *Yoga* against NSAIDs, hormonal therapies, and other complementary approaches to determine its relative efficacy.
5. Incorporation of Digital and Home-Based *Yoga* Programs: Exploring mobile applications, online platforms, and guided home-based interventions to enhance accessibility and adherence.

5. Conclusion

This meta-analysis suggests that *Yoga* is a promising non-pharmacological intervention

for managing primary dysmenorrhea. While the results are encouraging, further high-quality, large-scale RCTs are needed to establish definitive clinical guidelines for *Yoga* in menstrual pain management. Additionally, integrating *Yoga* into routine menstrual health management programs may be a feasible and cost-effective strategy.

Use of Generative AI in Writing

Generative AI was used solely for basic grammar and spell-check purposes to enhance clarity and consistency in the manuscript.

Sources of Funding

This study was self-funded. No external funding sources were used.

Acknowledgments

The author acknowledges the valuable support for timely updates and appreciates the editorial team's feedback to improve the manuscript.

Conflict of Interest

The author declares no conflict of interest.

REFERENCES

1. **Harlow SD, Campbell OM.** Menstrual dysfunction: a missed opportunity for improving reproductive health? *Reprod Health Matters.* 2004;12(23):86-91.
2. **Dawood MY.** Primary dysmenorrhea: advances in pathogenesis and management. *Obstet Gynecol.* 2006;108(2):428-41.
3. **Ortiz MI.** Primary dysmenorrhea among Mexican university students: prevalence, impact, and treatment. *Eur J Obstet Gynecol Reprod Biol.* 2010;152(1):73-7.
4. **De Sanctis V, Soliman AT, Elsedfy H, Soliman N, El Kholy M, Fiscina B.** Dysmenorrhea in adolescents and young adults: a review in different country settings. *Acta Biomed.* 2017;87(3):233-46.
5. **Armour M, Smith CA, Steel KA, Macmillan F.** The effectiveness of yoga in relieving menstrual pain: a systematic review and meta-analysis of randomized controlled trials. *J Altern Complement Med.* 2019;25(11):1123-40.
6. **Jiang Q, Li Y, Zhang Y, Chen Y, Wang Y.** The effectiveness of yoga on menstrual pain and overall well-being in women with primary dysmenorrhea: a systematic review and meta-analysis. *Eur J Integr Med.* 2020; 37:101112.
7. Jensen MP, Karoly P, Braver S. The measurement of clinical pain intensity: a comparison of six methods. Pain. 1986;27(1):117-26.
8. Egger M, Davey Smith G, Schneider M, Minder C. Bias in meta-analysis detected by a simple, graphical test. BMJ. 1997;315(7109):629-34.
9. Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. PLoS Med. 2009;6(7):e1000097.
10. Schulz KF, Altman DG, Moher D, CONSORT Group. CONSORT 2010 statement: updated guidelines for reporting parallel group randomized trials. BMJ. 2010;340:c332.
11. Cochrane Collaboration. Cochrane handbook for systematic reviews of interventions. Version 6.2 [Internet]. 2021 [cited 2024 Jan 10]. Available from: https://training.cochrane.org/handbook

12. Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, et al. Cochrane handbook for systematic reviews of interventions. 2nd ed. Chichester (UK): Wiley; 2019.
13. **McCormack HM, Horne DJ, Sheather S.** Clinical applications of visual analogue scales: a critical review. *Psychol Med.* 1988;18(4):1007-19.
14. **Sterne JAC, Savović J, Page MJ, Elbers RG, Blencowe NS, Boutron I, et al.** RoB 2: a revised tool for assessing risk of bias in randomized trials. *BMJ.* 2019;366:l4898.
15. **The Cochrane Collaboration.** Review Manager Web (RevMan Web) [Internet]. The Cochrane Collaboration; 2022. Available from: https://revman.cochrane.org
16. **Hjermstad MJ, Fayers PM, Haugen DF, Caraceni A, Hanks GW, Loge JH, et al.** Studies comparing numerical rating scales, verbal rating scales, and visual analog scales for assessing pain intensity in adults: a systematic literature review. *J Pain Symptom Manage.* 2011;41(6):1073-93.
17. **Higgins JPT, Thompson SG, Deeks JJ, Altman DG.** Measuring inconsistency in meta-analyses. *BMJ.* 2003;327(7414):557-60.
18. **Sterne JAC, Gavaghan D, Egger M.** Publication and related bias in meta-analysis: power of statistical tests and prevalence in the literature. *J Clin Epidemiol.* 2000;53(11):1119-29.
19. H. Cooper, L.V. Hedges, The Handbook of Research Synthesis, Russell Sage Foundation, New York, 1944.
20. C.E. McGovern, C. Cheung, *Yoga* and quality of life in women with primary dysmenorrhea: a systematic review, J. Midwifery Women's Health 63 (4) (2018) 470-482.
21. **Harel Z.** Dysmenorrhea in adolescents and young adults: etiology and management. *J Pediatr Adolesc Gynecol.* 2006;19(6):363-71.
22. **Sharma M, Haider T.** Yoga as an alternative and complementary approach for chronic pain management: a systematic review. *J Evid Based Complementary Altern Med.* 2015;20(1):20-31.
23. **Tekur P, Singphow C, Nagendra HR, Raghuram N.** Effect of short-term intensive yoga program on pain, anxiety, and depression in patients with chronic low back pain: a randomized controlled study. *J Altern Complement Med.* 2008;14(6):637-44.
24. **Streeter CC, Whitfield TH, Owen L, Rein T, Karri SK, Yakhkind A, et al.** Effects of yoga on the autonomic nervous system, gamma-aminobutyric-acid, and allostasis in epilepsy, depression, and post-traumatic stress disorder. *Med Hypotheses.* 2010;75(6):617-8.
25. **Kjaer TW, Bertelsen C, Piccini P, Brooks D, Alving J, Lou HC.** Increased dopamine tone during meditation-induced change of consciousness. *Cogn Brain Res.* 2002;13(2):255-9.
26. **Telles S, Singh N, Puthige R.** Endurance, physiological changes and mood states after a month of intensive yoga practice. *Biopsychosoc Med.* 2013;7(1):11.

Cite this article as: Rohit Pawar. Meta-Analysis of Yoga as a Non-pharmacological Intervention for Primary Dysmenorrhea: Evaluating the Evidence from Randomized Controlled Trials. **J Bharatiya Ayurvigyana**. 2026 April; 2(1):19-29.