

A Pilot Feasibility Study of a Sequential Yoga and Rāga-Based Music Intervention for Menstrual Cramps Among College Students

Sreenidhi. A¹, Dr. Karuna Nagarajan ², Dr. Mangesh Pandey³

¹Post-Graduate Student, Centre for Open and Distance Education (CODE), SVYASA Deemed to be University

^{2,3}Professor, Centre for Open and Distance Education (CODE), SVYASA Deemed to be University

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ABSTRACT

Background: Menstrual cramps (Kaṣṭa Ārtava) are described in Āyurveda as arising from imbalance of Apāna Vāta, manifesting as abdominal pain, uterine spasms, and psychological disturbances such as irritability, anxiety, fear, and worry, reflecting deviation in Vāta Doṣa. This highlights the need for holistic, non-pharmacological interventions. Yoga has consistently been recognized as beneficial, while Music Therapy employing Hindustani Rāgas from Thāṭas such as Kāfī, Āsāvari, Bhairavī, and Todi was selected for therapeutic resonance in balancing Vāta Doṣa and evoking Vīra Rasa to transform fear and anxiety into courage.

Objective: To preliminarily assess the feasibility and potential effects of Yoga followed by Yoga combined with Indian Rāgas on menstrual cramps among college students, with emphasis on pain, premenstrual symptoms, emotional symptoms, and Doṣa-related measures.

Methodology: A pilot study with a pre–post within-subject design was conducted among twelve female students aged 17–26 years. Phase I involved Yoga practice alone for three weeks, followed by Phase II combining Yoga with music sessions for 3–4 weeks, with a pause during menstruation. Interventions were delivered in two batches under identical protocols, both online and offline.

Key Results: Within this pilot sample, VAS scores decreased by 76% ($p < 0.001$, $d = 2.245$), while premenstrual symptoms decreased by 48% ($p = 0.031$, $d = 1.140$). Emotional symptom scores also decreased across several domains. Doṣa-related measures showed reductions in Vāta Vṛddhi (54%), Vāta Kṣaya (57%), Pitta Vṛddhi (40%), and Kapha Vṛddhi and Kapha Kṣaya (both 41%) These findings indicate potentially meaningful changes that warrant evaluation in controlled studies.

Conclusion: The sequential Yoga and Yoga–Music intervention was feasible to implement and was associated with reductions in menstrual pain, premenstrual symptoms, and selected emotional and Doṣa-related measures in this small pilot sample. Given the absence of a control group and the sequential intervention design, these findings should be considered preliminary and interpreted cautiously. Controlled studies are needed to determine the specific and combined effects of Yoga and Music.

Keywords: Menstrual cramps, Yoga-Music Therapy, Rāga Chikitsā, Anxiety, Vīra Rasa

INTRODUCTION

Menstrual pain, or dysmenorrhea, is among the most common gynaecological complaints, closely linked to hormonal fluctuations, particularly shifts in progesterone levels. A sedentary lifestyle and inadequate physical activity can intensify the severity of cramps[1]. Population-based studies suggest that almost half of young women experience primary dysmenorrhea, with up to 90% reporting menstrual pain of varying severity during their menstrual cycles.[2]. This pain occurs mainly because the body produces excess prostaglandins during menstruation, causing strong uterine contractions, reduced blood flow, and ischemia. This results in sharp pain in the lower abdomen that may radiate to the back and thighs, often accompanied by nausea, headaches, and

fatigue. [3]. While pharmacological management typically involves analgesics, but adverse effects highlight the need for safe, sustainable complementary approaches [4]. Furthermore, the heavy public health burden of absenteeism highlights the urgent need for safe, holistic, and sustainable complementary approaches [5].

Ayurvedic perspective

Āyurveda identifies three fundamental biological forces, the Doṣas: Vāta (movement), Pitta (transformation), and Kapha (structure and cohesion). An individual's Prakṛti (unique balance of Doṣas) determines health, while disturbance of this balance leads to Vikṛti (disease) [6]. Restoration of Doṣic balance is therefore central to Āyurvedic management of menstrual health.

Within this framework, Apāna Vāta, the subtype of Vāta governing downward movement in the pelvic region, plays a critical role in reproductive functions, including menstruation. When disturbed (Apāna-vaiguṇya), it impairs the normal process of menstruation, producing painful uterine contractions[7] and psychological disturbances such as anxiety, fear, restlessness, and insomnia[8]. This pathological state is termed Kaṣṭhārtava (painful menstruation), arising from aggravated Vāta and vitiated Rakta dhātu. When tissue depletion (dhātu kṣaya) combines with Vāta aggravation (Vāta prakopa), the uterine environment becomes unstable, manifesting as dysmenorrhea [9]. Because Āyurveda views health as an integrated state of body and mind, the somatic pain of Kaṣṭhārtava inevitably magnifies psychological distress. In this philosophy, imbalance of the Trigūṇas with Rajas (restlessness) and Tamas (inertia) dominating further destabilizes mental well-being. Cultivation of Sattva (clarity, harmony, balance) restores equilibrium.[6]

Thus, comprehensive management requires stabilizing both the physical body and the mind. Yoga offers mechanical regulation of Apāna Vāta, while Music Therapy complements it as the psychological dimension, enabling deeper emotional restoration.

Yogic Approach

Yoga progresses from ethical foundations (Yama, Niyama) and physiological stabilization (Āsana, Prāṇāyāma) to sensory withdrawal (Pratyāhāra) and cognitive absorption (Dhāraṇā, Dhyāna, Samādhi), culminating in a tranquil state.[10]. Yoga cultivates mindfulness and introspection, fostering clarity, emotional stability, and mind-body harmony through a biopsychosocial approach. [6]

As a comprehensive therapeutic system, Yoga serves as a natural intervention for menstrual pain, nurturing resilience to pain and promoting musculoskeletal adaptability.[11] Subtle joint movements (Sūkṣma Vyāyāma) along with classical postures such as Matsyāsana, Ardha Matsyendrāsana, Śalabhāsana, Uṣṭrāsana, Bhadrāsana, Bālāsana, Jānu Śīrṣāsana, Gomukhāsana, Pavanamukthāsana and Vajrāsana have been associated with the management of menstrual discomfort [12]. Evidence that Prāṇāyāma and breath awareness reduce menstrual pain and premenstrual tension highlights the therapeutic value of practices that harmonize psychological and physical states, underscoring the interconnectedness of mental and bodily health in menstrual distress [13].

Music Therapy and Ayurveda

Music Therapy draws on classical principles of Nāda (sound), Svara (notes), Tāla (rhythm), Rāga (melodic framework), and Rasa (aesthetic emotion), as articulated in the Nāṭyaśāstra and Saṅgīta Ratnākara. Historical texts such as the Caraka Saṃhitā acknowledge music's therapeutic role in easing Vāta-related disorders, while modern studies highlight its capacity to reduce anxiety and enhance resilience.[14]

Indian classical music is not merely sound, it is a carefully structured interplay of foundational elements. As identified in classical texts such as the Nāṭyaśāstra and Śāraṅgadeva's 13th-century Saṅgīta Ratnākara, these include Nāda (sound), Śruti (microtones), Svara (notes), Tāla (rhythm), Thāṭa (scale framework), Rāga (melodic framework), and Rasa (aesthetic mood).[15] When specific notes of a Thāṭa are organized through precise phrasing and omission, they crystallize into a Rāga. Set within the stabilizing pulse of Tāla, this melodic structure awakens a distinct Rasa, imparting a predictable physiological rhythm that grounds the agitated mind and enhances resilience.[14]

Classical texts strongly affirm this therapeutic capacity to calm Vāta doṣa. The Caraka Saṃhitā explicitly describes severe Vāta disorders being eased through the gentle power of music: “gītavāditraśabdaiḥ ca prīṇayet, evaṃ rogarājo nivartate” (Caraka Saṃhitā, Sūtrasthāna 6.186–188; Caraka, trans. 2016, Vol. III, p. 406). For the management of menstrual pain, Music Therapy acts as an interpersonal psycho-acoustic process, enabling emotional release and mitigating the pain sensitivity heightened by stress and anxiety.[16].

To effectively counteract the psychological distress of Kaṣṭārtava, it is achieved by cultivating Vīra Rasa, the aesthetic mood of courage and self-assurance through the application of Sāmānya–Viśeṣa Siddhānta (Ch. Su.1/44) [17,18]. Patañjali shares a similar view, teaching that whenever negative emotions arise, they should be replaced with positive thoughts (Yoga Sūtra II.33: “Vīṭarkabādhane pratīpakṣabhāvanam”), thus, the chosen Rāgas embodied resilience, countering fear and anxiety. Timed with circadian rhythm, the Hindustānī Rāgas ensured therapeutic depth and cultural relevance.

Classical texts such as the Saṅgīta Makaranda emphasize the circadian application of music while, in the modern era, Pandit Vishnu Narayan Bhatkhande systematized Rāga performance into Praharas aligned with the sun’s movement. This time theory synchronizes melodic healing with natural biological rhythms.[19]. Since Vāta is considered most active during the early morning (2 AM–6 AM) and late afternoon (2 PM–6 PM) periods, and the intervention was structured to align with these time windows, thereby harmonizing musical time theory with yogic practices to restore balance and alleviate symptoms.[20].

However, while time-specific Rāga-based music intervention has been documented for other physiological disorders, there is currently no structured Rāga module based on classical time theory specifically designed for the management of menstrual cramps.

To address this gap, this study integrates a combined Rāga-based music intervention, similar to the approach reported in the paper on Rheumatoid Arthritis[21], applying it to the management of menstrual cramps. By integrating both modalities, Yoga addresses the physical aspects associated with Apāna Vāta, while Music Therapy supports emotional resilience, thereby offering a holistic therapeutic framework for menstrual health which contributes to the application of Indian Knowledge System.

Given the limited evidence on structured Yoga–Rāga interventions for menstrual cramps, the present study was designed as a preliminary pilot to examine the feasibility and potential changes associated with a sequential intervention comprising Yoga alone followed by Yoga combined with Rāga-based music. The findings were intended to inform the design and parameters of future controlled trials rather than establish comparative treatment efficacy.

METHODOLOGY

Stage 1: Rāga Selection and Rationale

Rāgas were shortlisted based on their Thāṭa classification, Svara structure (Komal ga and Komal ni), and therapeutic relevance for pacifying Vāta Doṣa. The selection of Rāgas was guided by both classical musicology and therapeutic considerations. Rāgas under Thāṭas such as Kāfī, Āsāvārī, Bhairavī, and Tōḍī were prioritized because they employ Komal ga and Komal ni Svaras, which are traditionally associated with calming and pacifying Vāta Doṣa. [22]

The time theory (Prahar) was respected to ensure alignment with circadian rhythms, thereby enhancing the resonance of the intervention. Each Rāga was cross-referenced with authoritative sources, particularly Rāganidhi: A Comparative Study of Hindustani and Karnatak Ragas (Subba Rao, B, Vol 1-4) to validate its therapeutic relevance.

The rationale for each Rāga is presented in Figure 1 – Rāga Rationale.

Figure 1 – Rāga Rationale



Stage 2: Alignment of Raga with Yoga Practices

Stage 2 emphasizes the integration of the selected Rāgas into yogic practice. Each Rāga was paired with specific techniques that help pacify menstrual cramps such as subtle joint movements (Sūkṣma Vyāyāma) that coordinate breath with body movement, Āsanas, Prāṇāyāma, and conscious relaxation to reinforce grounding, emotional stability, and therapeutic resonance. This alignment ensured that the musical framework established in Stage 1 was translated into practical yogic application. The table for each Rāga and its corresponding yogic practice is presented in Table 1 – Yoga–Rāga alignment.

Table 1- Yoga–Rāga alignment

S.No	Time Slot	Rāga Used	Yoga Practices	Duration
			Session Instruction for practices Starting Prayer	
1.	5:30 am to 6:30 am (Morning) and	Gopikā Basant (Raganidhi: A Comparative Study of Hindustani and Karnatak Ragas Vol 2. p 84)	Sūkṣma Vyāyāma - Subtle joint movements 1. Neck movements (Up and down, right and left, neck rotation) 2. Hands stretch breathing practices 3. Shoulder and Hand movements	

	5 pm to 6 pm (Evening)	Pīlū (Raganidhi: A Comparative Study of Hindustani and Karnatak Ragas Vol 3. p 227)	(Shoulder rotation, full hand rotation) 4. Trunk movement (forward and backward bending, side bending, waist rotation) 5. Knee Movement 6. Chakki chalana 7. Butterfly loosening 8. Ankle stretches Tiger stretch practices	15 minutes
2	5:30 am to 6:30 am (Morning) and 5 pm to 6 pm (Evening)	Guṇakālī (Raganidhi: A Comparative Study of Hindustani and Karnatak Ragas Vol 2. p 95) Multānī (Raganidhi: A Comparative Study of Hindustani and Karnatak Ragas Vol 3. p 160)	Standing Āsanās: Tādāsana, Trikoṇāsana, Pādahastāsana Sitting Āsanās: Paścimottānāsana / Jānu Śīrṣāsana Ardha Matsyendrāsana Vajrāsana / Uṣṭrāsana Bhadrāsana Gomukhāsana Prone Āsanās- Bhujangāsana, Śalabhāsana, Dhanurāsana Supine Āsanās- Matsyāsana, Setubandhāsana, Pavanamukt āsana Viparītakarāṇī with wall support and Aśvinī Mudrā	
3	5:30 am to 6:30 am (Morning) and 5 pm to 6 pm (Evening)	Kāfī (Raganidhi: A Comparative Study of Hindustani and Karnatak Ragas Vol 3. p 2) and Bhīmpalāsī (Raganidhi: A Comparative Study of Hindustani and Karnatak Ragas Vol 1. p 93)	Relaxation Deep Relaxation Technique (DRT)	15 minutes
4	5:30 am to 6:30 am (Morning) and 5 pm to 6 pm (Evening)	Bhairavi (Raganidhi: A Comparative Study of Hindustani and Karnatak Ragas Vol 1. p 78) Kāfī	Prāṇāyāma Deep breathing Technique Nādī Śodhana Chandra Bhedana, Ujjāyī, Bhrāmārī	15 minutes
			Closing Prayer	
			Total Time	60 minutes

Stage 3: Pilot Feasibility and Preliminary Outcome Evaluation

Participants

The pilot study included N = 12 female college students (aged 17–26 years), all unmarried and nulliparous, with regular menstrual cycles (21–35 days). Participants reported primary dysmenorrhea with premenstrual

symptoms and provided informed consent. Exclusion criteria were: secondary menstrual disorders (PCOD/PCOS, endometriosis, fibroids), current engagement in yoga or other therapies, and use of hormonal or menstrual related medications.

- Batch 1 (n = 5): Students recruited through conventional sampling from different colleges in Madurai; sessions conducted in hybrid mode (online and offline).
- Batch 2 (n = 7): Students from Anna University Regional Campus, Madurai; sessions conducted offline at the college.

The study employed a single-group, sequential pre–post pilot design without a separate control group. Outcomes were assessed at baseline, following Phase I (Yoga only), and following Phase II (Yoga combined with music). Because the interventions were administered sequentially, the design does not permit independent estimation of the effect of Yoga versus the additional effect of Music Therapy. Institutional ethical approval was obtained and informed consent was secured from all participants involved.

Intervention

The intervention was delivered in two sequential phases:

- Phase I (Weeks 1–3): Yoga practice only, including selected Āsanās, Prāṇāyāma, and relaxation techniques. Menstruation days were designated as rest days.
- Phase II (Weeks 4–7): Yoga practice combined with music therapy, integrating selected Rāgas to enhance therapeutic outcomes.

A sequential, additive design was chosen to observe preliminary changes associated with Yoga alone and to examine whether further trends emerged after introducing Rāga-based music. Because all participants received Yoga prior to the combined phase without an intervening wash-out period or control arm, changes observed in Phase II cannot be attributed solely to music therapy and may reflect cumulative intervention exposure, continued Yoga practice, or time effects.

Sessions were scheduled in two time slots to accommodate student timetables:

- Morning batch: 5:30–6:30 AM
- Evening batch: 5:00–6:00 PM

Each slot incorporated Rāgas aligned with the time theory of music, ensuring correspondence between musical selection and time of day. During Phase II, background music tuned to 396 Hz was played to promote harmony and grounding. Online participants received streamed audio, while offline sessions used Bluetooth speakers. Morning Rāga schedule: Table 2 and Evening Rāga schedule: Table 3.

Table 2- Songs Used in the Intervention (Morning batch: 5:30–6:30 AM)

Day	Rāga	Description	Name of Composer	Instrument
Monday	Gopikā Basant	Dhanjibhai Gandhi on flute alap jod zala	Dhanjibhai Gandhi	Flute
	Gunkali	Rāga Gunkali on Bansuri	Pt Rajendra Kulkarni	Flute
	Kāfi	Hindustani Classical Music	Pt Jabahar Mishra	Flute
	Bhairavi	The last word in Santoor	Pt Shiv Kumar Sharma	Santoor
Tuesday	Gopikā Basant	Rāga Gopikā Basant	Pt Sunder Lal Gandharv	Flute

	Gunkali	Dhyana at break	Pandit Shiv Kumar Sharma	Santoor
	Kāfi	Pratik Shrivastava: Rāga Kāfi	Pratik Shrivastava	Sarod
	Bhairavi	Komal Nishad Concert	Pandit Hari Prasad Chaurasia	Flute
Wednesday	Gopikā Basant	Dhanjibhai Gandhi on flute alap jod zala	Dhanjibhai Gandhi	Flute
	Gunkali	Samvad & Hannah L.W. - Rāga Gunkali - Morning Meditation	Hannah L.W. and team	Multiple Instruments
	Kāfi	Kāfi Dhun	Pt Hariprasad Chaurasia	Flute
	Bhairavi	Traditional Music of India	Ustad Ali Akbar Khan	Sarod
Thursday	Gopikā Basant	Rāga Gopikā Basant	Pt Sunder Lal Gandharv	Flute
	Gunkali	Rāga Gunkali on Santoor Alap and Jod	Pt Sandeep Chatterjee	Santoor
	Kāfi	Brooklyn Rāga Massive (BRM): June 8, 2014	Pt Krishna Bhatt, Pt Anindo Chatterjee	Flute, Tabla
	Bhairavi	Morning Rāga Bhairavi	Ustad Amjad Ali Khan	Sarod
Friday	Gopikā Basant	Dhanjibhai Gandhi on flute alap jod zala	Dhanjibhai Gandhi	Flute
	Gunkali	Rāga Gunkali - Matta Taal (9 beat cyclic rhythm)	Jay Thakkar	Flute
	Kāfi	Rāga Kāfi	Pt Hariprasad Chaurasia	Flute
	Bhairavi	Rāga Bhairavi - Stornoway Concert	Roopa Panesar, Dalbir S Rattan	Sitar, Tabla

Table 3- Songs Used in the Intervention (Evening batch: 5:00–6:00 PM)

Day	Rāga	Description	Name of Composer	Instrument
Monday	Pīlū	Sounds Of The River Raag Pilu- Destiny Call Of The Divine	Pt. Rakesh Chaurasia	Flute
	Multānī	Indian Classical Music Boulevard	Ustad Ali Akbar Khan	Sarod
	Bhīmpalāsī	Album Afternoon Meditation Music	Bhaskar Das	Flute
	Kāfi	Pratik Shrivastava: Rāga Kāfi	Pratik Shrivastava	Sarod
Tuesday	Pīlū	Raag PILU on FLUTE	Pt. Hariprasad Chaurasia	Flute
	Multānī	Rāga Multānī Alap and Gat Sitar	Ustad Abdul Halim Jaffer Khan	Sitar
	Bhīmpalāsī	Discovering Healing Music of Rāga (Fusion Music)	Avaneendra Sheolika and team	Sitar, Sarod flute and tabla

	Kāfī	Rāga Kāfī / Hindustani Classical Music	Pt Jabahar Mishra	Flute
Wednesday	Pīlū	Album: Sangeet Sartaj	Ustad Amjad Ali Khan	Sarod
	Multānī	Masters of the Reed	Pt Hariprasad Chaurasia	Flute
	Bhīmpalāsī	Music of India (2 albums merged)	Debasmita Bhattacharya	Sarod
	Kāfī	Kāfī Dhun	Pt Hariprasad Chaurasia	Flute
Thursday	Pīlū	Raaga piloo Ustad Ali Akbar Khan	Ustad Ali Akbar Khan	Sarod
	Multānī	The Ravi Shankar Collection - Portrait of Genius	Pt Ravi Shankar	Sitar
	Bhīmpalāsī	Komal Nishad Classical Music	Pt Hariprasad Chaurasia, Tabla: Pt Yogesh Samsee	Flute, Tabla
	Kāfī	Brooklyn Rāga Massive (BRM): June 8, 2014	Pt Krishna Bhatt, Pt Anindo Chatterjee	Flute, Tabla
Friday	Pīlū	United Nations 1967 Rarest concert	Ravi Shankar, Yehudi Menuhin And Alla Rakha	Sitar, Violin and Tabla
	Multānī	Rāga Multānī	Pt Nikhil Banerjee	Sitar
	Bhīmpalāsī	Rāga Bhīmpalāsī	Pt Ajay Shankar Prasanna (Flute), Pt Ram Kumar Mishra (Tabla)	Flute, Tabla
	Kāfī	Rāga Kāfī	Pt Hariprasad Chaurasia	Flute

Statistical tools

Four validated instruments were employed:

- Visual Analog Scale (VAS): Intensity of menstrual cramps and pain.[27]
- Premenstrual Symptom Screening Tool (PSST) : Presence and severity of premenstrual symptoms, including mood changes, physical complaints, and functional impairment [28]
- Prototype Prakṛti Analysis Tool (PPAT):Ayurvedic constitution (Prakṛti) assessment [29]
- Vikṛti Tridoṣa Diagnostic Scale (VTDS): Current imbalances in Vāta, Pitta, and Kapha.[30]

Data Analysis

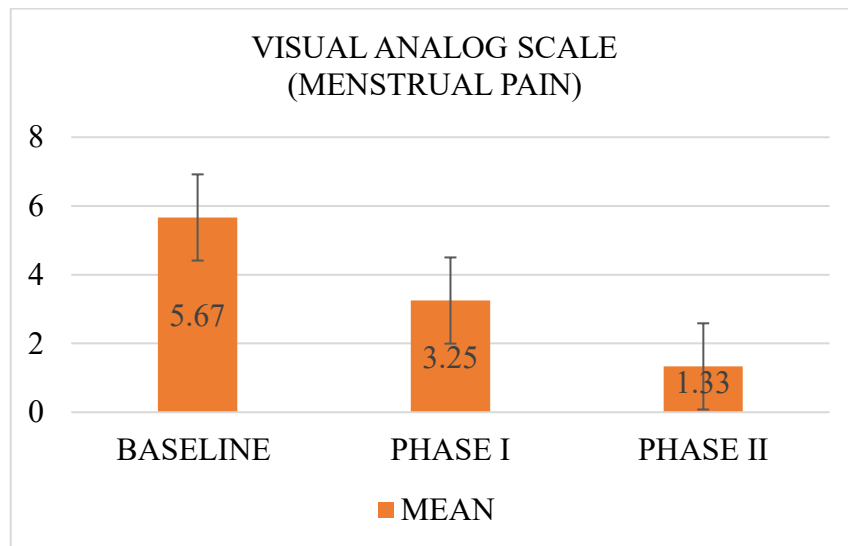
Statistical analysis was performed using Microsoft Excel. Descriptive statistics were calculated as mean and standard deviation for continuous outcome measures. Within-participant changes were examined using paired-samples t tests for the relevant phase comparisons. Cohen's d was calculated to estimate the magnitude of within-participant change.[31] Given the small sample size (n = 12), effect sizes were interpreted descriptively rather than as evidence of treatment efficacy. Statistical significance was set at $p < 0.05$. Comparisons between baseline and Phase II were considered the primary exploratory comparisons, while baseline-to-Phase I and Phase I-to-Phase II comparisons were examined to describe temporal changes across the sequential intervention.

Because this was an exploratory pilot study with a small sample, no formal adjustment for multiple comparisons was applied. Therefore, individual p-values should be interpreted cautiously and alongside effect sizes and the direction of change.

RESULTS

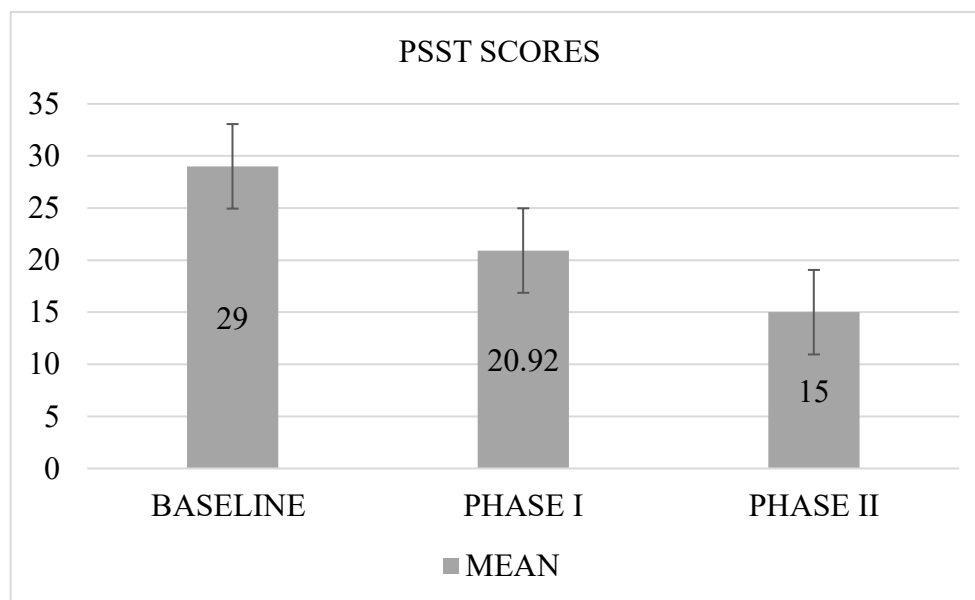
Menstrual Pain

Visual Analog Scale (VAS) scores decreased substantially following the sequential intervention. Mean scores decreased significantly from a baseline of 5.67 ± 2.43 to 1.33 ± 1.44 at Phase II, representing a 76.47% reduction in menstrual cramp intensity ($p < 0.001$, Cohen's $d = 2.25$; Figure 1)



Premenstrual Symptom Screening Tool (PSST)

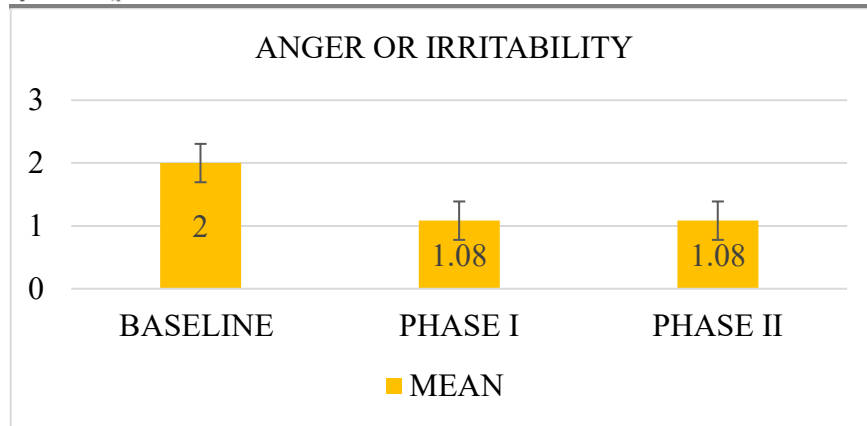
PSST scores were significantly lower at Phase II than at baseline of 29 ± 12.380 to 15 ± 12.173 by Phase II, representing a 48.28% reduction from baseline to Phase II ($p = 0.031$, Cohen's $d = 1.14$; Figure 2)



Core Emotional symptoms in PSST

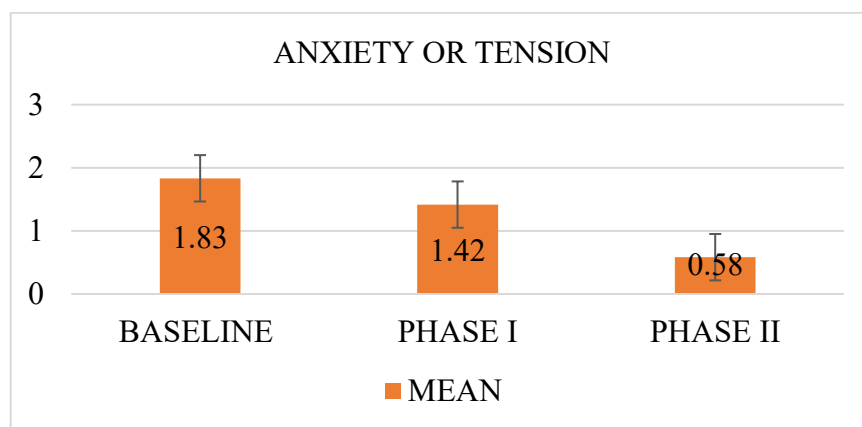
Anger or Irritability

Anger or Irritability scores were significantly lower from Baseline (2 ± 0.85) to Phase I (1.08 ± 0.90 , $p = 0.002$) and remained stable through Phase II (1.08 ± 0.67 , $p = 1.00$), representing a 45.83% reduction ($p = 0.002$, Cohen's $d = 1.205$; Figure 2a).



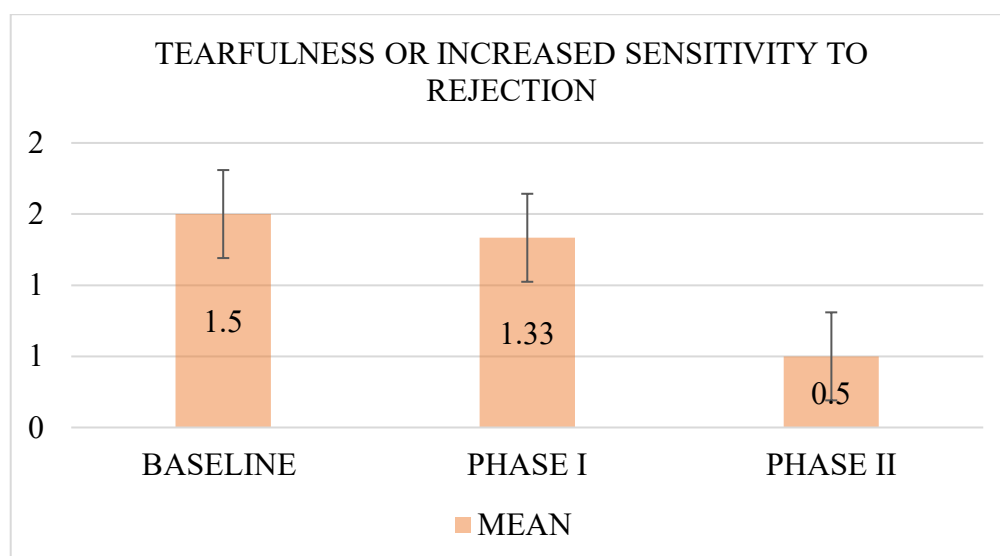
Anxiety or Tension

Anxiety or Tension Showed a non-significant initial decline from Baseline (1.83 ± 1.03) to Phase I (1.42 ± 1.17 , $p=0.175$), followed by a significant drop at Phase II (0.58 ± 0.90 , $p=0.017$), representing a 68.18% reduction from baseline to Phase II. ($p=0.001$, Cohen's $d=1.295$; Figure 2b).



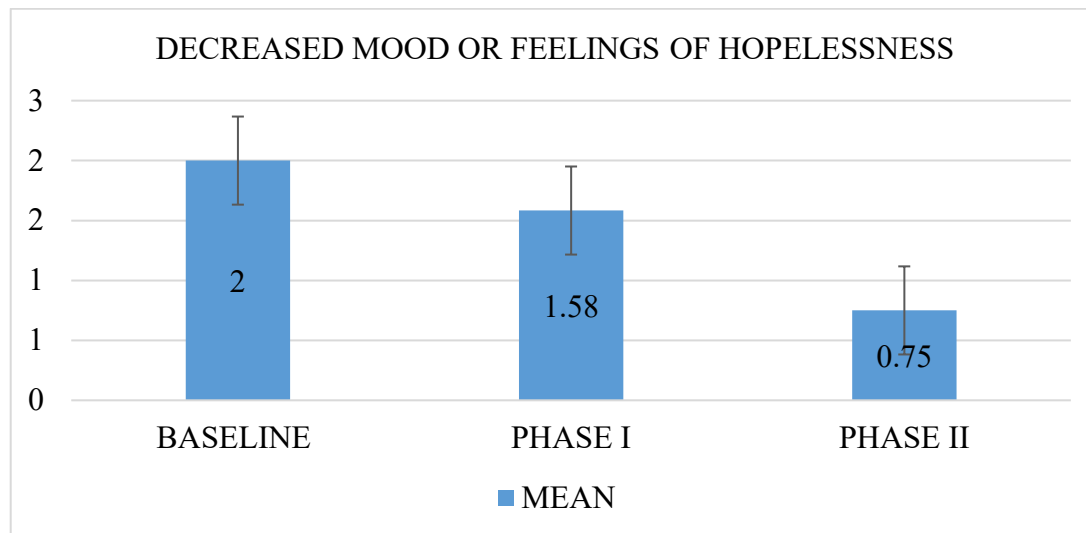
Tearfulness or Rejection

Tearfulness or Rejection scores decreased non-significantly from Baseline (1.50 ± 1.09) to Phase I (1.33 ± 1.07 , $p=0.503$), followed by a significant drop at Phase II (0.50 ± 1.00 , $p=0.02$), representing a 66.66% reduction from baseline to Phase II ($p=0.02$, Cohen's $d=0.958$; Figure 2c).



Decreased Mood or Hopelessness

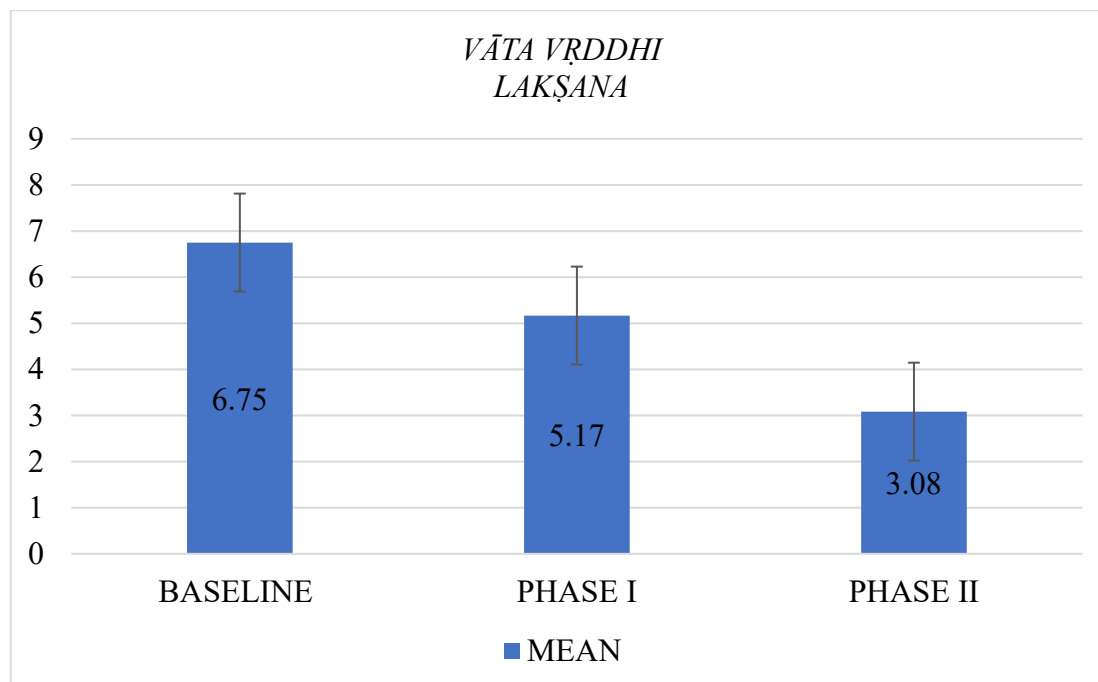
Decreased mood or Hopelessness scores showed gradual reductions from Baseline (2 ± 0.95) to Phase I (1.58 ± 1.38 , $p=0.317$) and Phase II (0.75 ± 0.97 , $p=0.096$), representing 62.50% reduction from baseline ($p=0.004$, Cohen's $d=1.303$; Figure 2d).



Vāta Lakshana

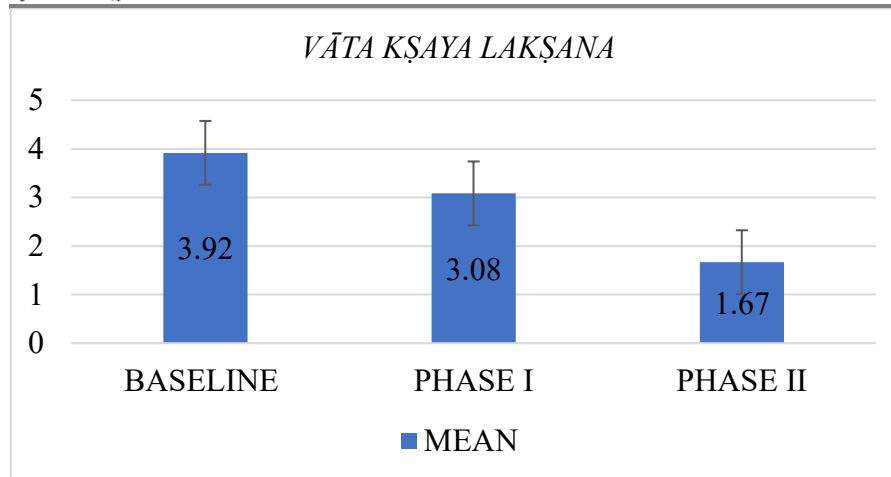
Vāta Vṛddhi

Vāta Vṛddhi scores significantly decreased from Baseline (6.75 ± 4.39) to Phase I (5.17 ± 3.21 , $p=0.012$) and Phase II (3.08 ± 2.64 , $p=0.0001$), representing a 54.32% significant reduction from baseline to phase II ($p=0.0007$, Cohen's $d=1.042$; Figure 3a).



Vāta Kshaya

Vāta Kṣaya scores showed a non-significant initial decline from Baseline (3.92 ± 2.94) to Phase I (3.08 ± 1.83 , $p=0.184$), followed by a significant drop at Phase II (1.67 ± 0.99 , $p=0.0014$), representing a 57.44% reduction from baseline to Phase II ($p=0.003$, Cohen's $d=1.147$; Figure 3b).

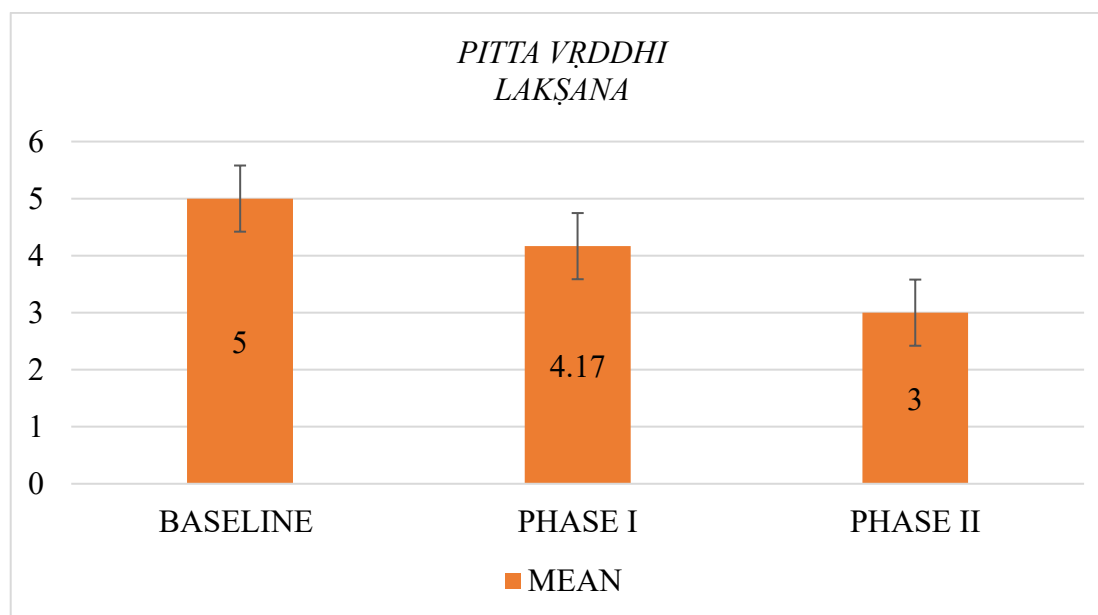


The observed reductions in Vāta-related symptoms, including Mano Vyāharṣa (confused mind), Bhaya (fear), and related distress features, were consistent with a reduction in the symptom pattern interpreted within the Ayurvedic framework as Vāta-related. However, these findings should be regarded as exploratory because the study design does not permit causal attribution or independent confirmation of Doṣa normalization.

Pitta Lakshana

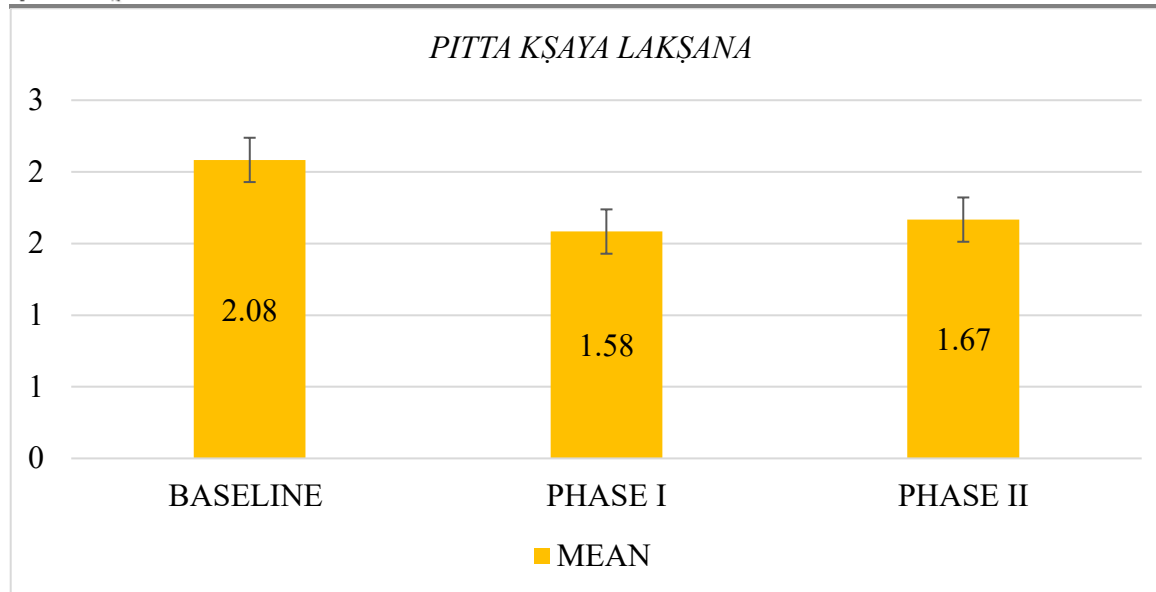
Pitta Vṛddhi

Pitta Vṛddhi scores decreased significantly from Baseline (5 ± 2.17) to Phase I (4.17 ± 1.59 , $p=0.01$) and further at Phase II (3 ± 1.60 , $p=0.0012$), representing a 40% reduction from baseline to Phase II ($p=0.0002$, Cohen's $d=1.061$; Figure 4a).



Pitta Kṣaya

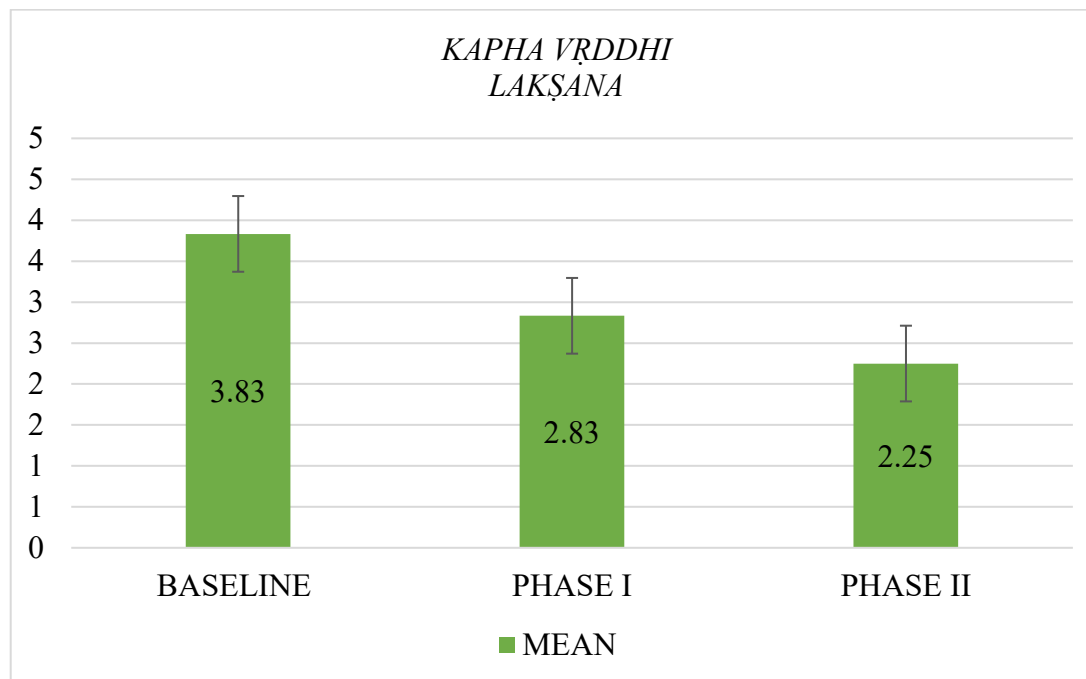
Pitta Kṣaya scores decreased significantly from Baseline (2.08 ± 1.78) to Phase I (1.58 ± 1.62 , $p=0.026$, representing a 24% reduction), but stabilized with no significant change from Phase I to Phase II (1.67 ± 1.61 , $p=0.586$). The overall reduction from baseline to Phase II was 20% and did not reach statistical significance ($p=0.09$, Cohen's $d=0.245$; Figure 4b).



Kapha Lakshana

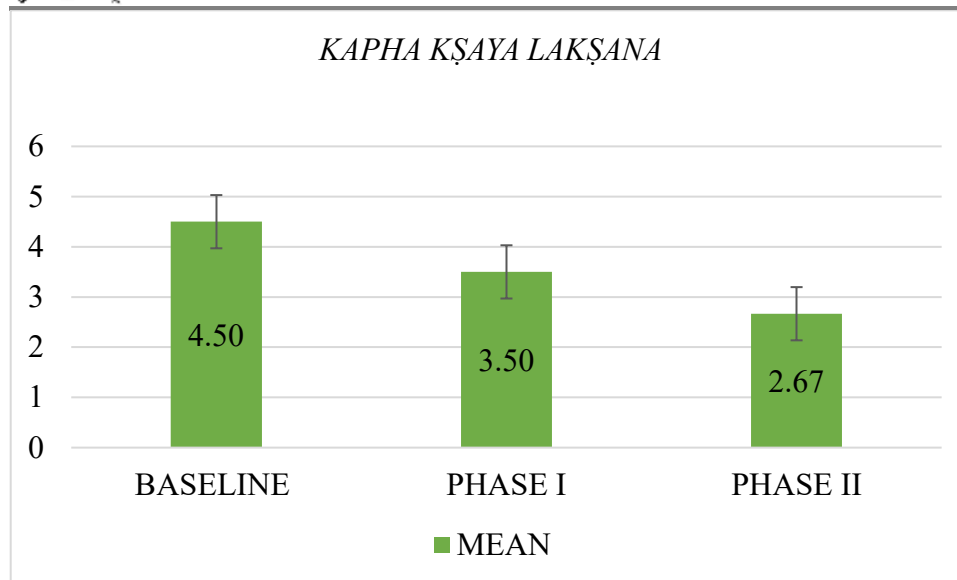
Kapha Vṛddhi

Kapha Vṛddhi scores decreased significantly from Baseline (3.83 ± 3.24) to Phase I (2.83 ± 2.79 , $p=0.003$), followed by a non-significant reduction from Phase I to Phase II (2.25 ± 2.70 , $p=0.189$), representing a 41.30% reduction from baseline to the Phase II ($p=0.008$, Cohen's $d=0.533$; Figure 5a).



Kapha Kṣaya:

Kapha Kṣaya scores decreased steadily from Baseline (4.50 ± 2.81) to Phase I (3.58 ± 2.47 , $p=0.004$) and further at Phase II (2.67 ± 2.46 , $p=0.03$), representing 40.74% reduction from baseline to Phase II ($p=0.002$, Cohen's $d=0.695$; Figure 5b).



DISCUSSION

These preliminary findings describe the application of a complementary module aligning Rāga and Yoga, structured around addressing Vāta imbalance recognized as an important etiological factor in the Āyurvedic understanding of primary menstrual cramps. Recent research underscores the therapeutic value of Hindustānī Rāgas in easing stress and anxiety. Rāga Bhairavī, for example, has been shown to reduce stress by influencing psychophysiological markers[32]. Likewise, Rāgas Bhīmpālāsī and Kaunsī Kanadā have demonstrated benefits in alleviating anxiety [33,34]. Several Rāgas in our study have already been employed in published interventions. According to Sangeeta Makaranda attributed to Sage Nārada, Rāgas composed in heptatonic (Sampūrṇa) scales are traditionally associated with promoting longevity and bestowing benefits such as wealth, fame, and vitality. Conversely, Rāgas structured in pentatonic (Audava) scales are recognized for their therapeutic efficacy, capable of alleviating diseases, dispelling fear, and neutralizing adversarial influence.[35]

In parallel, a structured set of Sūkṣma Vyāyāma, Āsanās and Prāṇāyāma practices was employed to address menstrual discomfort through musculoskeletal alignment, circulatory enhancement, and psycho-emotional regulation. Gentle joint-mobilizing movements (Sūkṣma Vyāyāma) released somatic tension and improved micro-circulation. [36] Standing postures such as Tādāsana and Trikoṇāsana improved posture, relieved pelvic tension, and reduced irritability. Forward bending postures such as Pādahastāsana and Paścimottānāsana may promote gentle pelvic and musculoskeletal relaxation and may contribute to perceived reductions in abdominal discomfort. Abdominal compression and twisting postures Jānu Śīrṣāsana and Ardha Matsyendrāsana were effective in reducing cramps and pelvic congestion. [37] Restorative and supportive positions such as Vajrāsana, Bhadrasana, and Setubandhāsana aided digestion, strengthened the pelvic floor, and improved circulation, while backbends including Uṣṭrāsana, Bhujangāsana, and Dhanurāsana expanded the chest, toned abdominal organs, and relieved lower back pain.[38] Relaxation techniques like Śavāsana/DRT and Viparītakarṇī with Aśvinī Mudrā restored circulation, balanced hormonal activity, and reduced stress markers [12]. Complementary Prāṇāyāma practices like Nāḍī Śōdhana, Candra Bhedana, Ujjāyī, and Bhrāmārī further harmonized autonomic function, cooled irritability, regulated endocrine balance, and alleviated anxiety and insomnia.[39] These yogic postures helps deep relaxation, ease uterine cramps, and enhance pelvic circulation, thereby offering comprehensive relief from menstrual discomfort.[40]

The observed improvements may reflect the combined exposure to Yoga and Rāga-based music. However, the present sequential design does not allow the independent or synergistic effects of the two modalities to be determined. Music listening may have contributed to relaxation and affective regulation, while Yoga may have contributed through breath–movement integration and relaxation. These potential mechanisms remain hypotheses requiring evaluation in controlled studies.

The combined intervention of Rāga listening and Yoga demonstrated substantial reductions in menstrual pain and associated emotional disturbances. Pain intensity, as measured by the Visual Analog Scale, was reduced by

76% with a large effect size ($d = 2.245$), underscoring the exploratory relevance of this integrative approach. Premenstrual symptoms also declined significantly by 48% ($d = 1.140$), suggesting that the intervention not only alleviated acute pain but also addressed broader cyclical discomfort. Improvements were observed across emotional domains. Anger/irritability decreased by 46%, anxiety/tension by 68%, tearfulness/rejection by 67%, and depressed mood/hopelessness by 63%, all showing large effect sizes. These findings suggest the potential value of integrating music and Yoga, although their independent and combined contributions cannot be separated in the present design. The rhythmic, melodic qualities of Rāga listening may support relaxation responses, while Yoga's breath–movement integration fosters parasympathetic activation, together reducing emotional reactivity and enhancing resilience.

The Prototype Prakṛti Analysis Tool revealed Kapha–Vāta as the predominant constitution, with balanced representation across other dual types. Analysis of doṣa symptom scores demonstrated notable reductions across several domains. Vāta Vṛddhi and Vāta Kṣaya both showed reductions exceeding 50%, while Pitta Vṛddhi decreased by 40%. While the findings are promising, the modest reduction in Pitta Kṣaya (20%, non-significant) indicates variability in responsiveness across individual domains. Kapha imbalances also corrected significantly, with Kapha Vṛddhi and Kapha Kṣaya both reduced by 41%. These results were consistent with changes in selected Doṣa-related symptom scores, broadly aligning with the Ayurvedic framework used to conceptualize the intervention. Whether these changes represent broader systemic Doṣic balance cannot be established from the present pilot design.

The correspondence between North Indian thāṭas and Western modal systems highlights a shared structural logic across musical traditions. Kāfī corresponds to the Dorian mode, Āsāvārī to the Aeolian mode, and Bhairavī to the Phrygian mode, while Todī represents a distinctive variant characterized by a flattened second, minor third, augmented fourth, and flattened sixth. These intervallic frameworks consistently evoke emotional responses such as melancholy, tension, and introspection. At the same time, they reflect Bhatkhande's principle of efficient voice leading, wherein adjacent scales are connected through minimal semitone shifts, thereby preserving tonal coherence while enabling expressive depth[41]

The convergence of quantitative outcomes with traditional Ayurvedic assessment strengthens the case for integrative therapies. The reductions in pain and emotional distress correspond with normalization of Doṣa states, indicating that Rāga listening and yoga may act through both psychophysiological and constitutional pathways. This dual validation enhances credibility for interdisciplinary curriculum development and clinical application.

Strengths

This pilot feasibility study provides preliminary evidence that the sequential intervention can be implemented in a college setting and is associated with potentially meaningful changes in menstrual pain and related symptoms. Participants reported reduced pain and relaxation, alongside psychological gains such as emotional resilience, lower anxiety, improved mood, and sharper focus. Music therapy emerged as a quick, engaging element, capturing student attention immediately after sessions. Together, these culturally rooted practices confirm the feasibility of Yoga and Music therapy as complementary interventions for menstrual health in college settings.

Limitations of The Study

The study has several important limitations. First, the sample size was very small ($n = 12$), and the study was designed primarily to explore feasibility and preliminary outcome patterns rather than establish treatment efficacy. Second, the absence of a control or comparison group prevents determination of whether the observed changes were attributable to the intervention rather than natural variation in menstrual symptoms, regression to the mean, expectancy or placebo effects, researcher attention, or concurrent lifestyle factors. Third, Yoga was administered before the addition of Rāga-based music. Therefore, the additional contribution of music cannot be isolated from the continued effects of Yoga, cumulative intervention exposure, or time effects. Fourth, the absence of a wash-out period further limits interpretation of changes between phases. Fifth, the two batches differed in recruitment setting and mode of delivery, which may have introduced contextual variation. Sixth, multiple outcomes and phase-wise comparisons were examined in a small sample, increasing the possibility of chance findings. Finally, the study did not include physiological or biochemical measures that could directly test

the proposed mechanisms related to autonomic, hormonal, circulatory, or Doṣic changes. Accordingly, the findings should be considered preliminary and hypothesis-generating.

Future Directions

Future studies should employ adequately powered randomized controlled designs with parallel groups to minimize carry-over and temporal effects. Ideally, separate Yoga-only, Rāga-based music-only, combined Yoga–Music, and control groups should be included to estimate the independent and combined contributions of each modality. Standardized intervention schedules, consistent delivery modes, and validated outcome measures should be used across sites. Longer follow-up and repeated menstrual-cycle assessments would help determine the persistence and reproducibility of observed changes. Where mechanistic claims are proposed, future studies should additionally incorporate relevant physiological or biochemical measures.

CONCLUSION

Menstrual pain is a common concern among young women, and complementary approaches such as Yoga and Rāga-based music may have potential value in its holistic management. In this small pilot study, a sequential intervention comprising Yoga followed by Yoga combined with Rāga-based music was associated with reductions in menstrual pain, premenstrual symptoms, selected emotional symptoms, and Doṣa-related symptom scores. However, the absence of a control group, small sample size, sequential intervention design, and lack of a wash-out period prevent attribution of these changes specifically to the combined intervention or to the music component. The findings should therefore be regarded as preliminary and hypothesis-generating. Larger randomized controlled trials with appropriate comparator groups are warranted to determine the independent and combined effects of Yoga and Rāga-based music.

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