

Ayurveda for management of migraine: A narrative review of clinical evidence

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ABSTRACT

Migraine is a primary headache disorder characterized by recurrent attacks. The economic and societal burden of migraine is substantial, affecting patients' quality of life in terms of work, social activities, and family life. This article attempts to review the available literature for clinical evidence of Ayurveda in the management of migraines. We performed a literature search from January 2000 to July 2020 on popular search engines such as Pub Med, Google Scholar, and AYUSH Research Portal using the keywords "Complementary and Alternative Medicine (CAM) and Migraine", "Ayurveda and Migraine" and "Panchakarma and Migraine". The selection criteria involved published clinical trials, including pilot studies, whereas review articles, concept papers, letters to the editor, and studies published in languages other than English were excluded. Out of 77 studies that were screened, 12 articles that satisfied the selection criteria consisted of six Randomized controlled Trials (RCTs), five non-RCTs, and one pilot study. Among them, ten studies used polyherbal and Herbo mineral formulations, two studies contained no oral medications, three trials utilized external therapies, and ten studies used panchakarma procedures. Eleven studies found Ayurveda to be clinically beneficial as monotherapy, while one study demonstrated the usefulness of Ayurveda as an add-on to conventional management. This review reveals the beneficial role of Ayurveda in the management of migraines without many side effects. Yet several limitations exist, like small sample size, short follow up, and lack of better outcome measures for pre and post-assessments. Future research should overcome these limitations and follow a robust methodology so that definitive conclusions can be drawn.

Keywords: Ardhavabhedaka, Ayurveda, migraine, Nasya, shirashoola, virechana

Background

Migraine being a primary headache, affects one in seven globally.^[1] Characterized by a unilateral, pulsatile, throbbing sensation, it limits day-to-day activities of daily living. Ranked third most

prevalent and seventh highest specific cause of disability worldwide (GBD 2012),^[2] migraine is currently the leading cause of Years Lived with Disability/Disease (YLD) among individuals under 50 years with a male, female ratio of 1:3.^[3] Migraine therapy involves the use of non-specific and specific drugs, and more recently, "gepants" are used for prevention and acute management.^[4] Though these conventional treatments have proved to be satisfactory, they are associated with side effects. Complementary and alternative medicine (CAM) therapies are increasingly being sought after by migraineurs worldwide for prophylaxis and treatment of attacks. Acupuncture, yoga,

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meditation, Ayurveda, biofeedback, cognitive behavior therapy, massage therapy, and Nutraceuticals are some of the popular methods.^[5] A cross-sectional study shows among 685 patients with headaches, 478 of them were using CAM, out of which 44.4% were suffering from migraine.^[6] In another national cross-sectional survey, adults with migraine/severe headaches used CAM more often as compared to those without, i.e., 49.5% vs. 33.9%.^[7] In India, Ayurveda medicines are widely used for the cure and management of various disorders, including migraines. Despite being widely practiced, there are no well-documented studies evaluating their safety and efficacy. Hence, in the present paper, an attempt has been made to review and analyse the available literature on various Ayurveda approaches in migraines. The review accentuates the role and scope of evidence-based Ayurveda measures as a stand-alone or as added to the existing conventional measures in migraine.

Migraine in Ayurveda

Migraine can be correlated to “Ardhavabhedaka” in Ayurveda. Detailed description of specific etiology, pathogenesis, and treatment for Ardhavabhedaka is explained in treatises. Etiological factors such as excessive consumption of dry/ununctuous substances, exposure to cold, inappropriate sexual activity, withholding of natural urges, exhaustion, and exercise are quoted as the causes for Vata (biological humour ~ neurological function) vitiation. Frequent intake of food before the digestion of a previous meal, intake of heavy to digest food, drinking excess cold water contribute to Kapha (biological humour ~ systemic integrity) vitiation and formation of ama (a by-product of impaired metabolism). Due to the above etiological factors, Vata alone or along with Kapha affects the head and produces severe unilateral pain in the neck, eyebrow, temples, ear, eye, and forehead. Pain is acute, similar to a blow from sharp weapons, pricking, or splitting, and when severe, it impairs the functions of the eye and ear.^[8,9] Pain is paroxysmal, occurring once in ten days, twelve days, or daily.^[10] This phenomenon can be closely read in line with the series of events such as vasodilatation, secondary extravasation, edema, mast cell degranulation, and cortical spreading depression that is triggered by the release of neuropeptides from the trigeminal innervation in migraine. The treatment includes Snehapana (internal Oleation), Svedana (sudation), Virechana (Therapeutic Purgation), and Nasya (Nasal Instillations), followed by oral intake of Polyherbal and Herbo-mineral medications. Further symptoms of migraine often correlate with those of ‘Amlapitta’ (state of hyperacidity) characterized by giddiness, fainting, dysgeusia, fatigue, nausea, vomiting, and headache. Hence, therapies that aid in hyperacidity and correction of digestive fire also aid in improving migraine symptoms.^[11]

Materials & Methods

A thorough literature search was conducted in three electronic databases (PubMed, AYUSH Research Portal, and Google Scholar) from January 2000 to July 2020. Clinical trials, pilot

studies, and case reports published in the English language were included. Preclinical studies, conceptual reviews, and unpublished manuscripts were excluded. The keywords used in PubMed were “Complementary and Alternative Medicine (CAM) and Migraine”, “Ayurveda and Migraine”, “Panchakarma and Migraine”. Sixty-two articles were obtained, out of which one pilot study and three clinical trials were shortlisted. The filters used in AYUSH Research Portal were (a) Medical system: Ayurveda, (b) Category: Clinical research, followed by (c) Body system: Neurological, and (d) Disease: Migraine, yielding seventeen articles graded A, B, and C, based on the WHO recommendations. Under Grade A, there were no articles, Grade B had five papers, and Grade C had twelve articles. Two of these studies were found in PubMed. After screening through the title, abstract, and year of publication, eight articles were found to meet our criteria. Finally, twelve eligible articles were shortlisted, i.e., eleven clinical trials and one pilot study. The details of the inclusion and exclusion criteria of the articles shortlisted from various sources are depicted in the PRISMA flow chart [Figure 1]. The details of the studies included in this review are summarized in a table [Table 1].

Results

Out of twelve studies included in this review, six studies were RCTs, five were non-RCTs, and one was a pilot study. Eight studies used polyherbal formulations, four used Herbo-mineral formulations, and one study had a combination of both. Ten trials had employed panchakarma procedures; among them, eight studies included Nasya in the treatment protocol, and three trials included Virechana. Two studies were devoid of oral therapy, wherein Nasya alone or along with external therapies were administered. Eleven studies found Ayurveda to be clinically beneficial as monotherapy, while one study demonstrated the usefulness of Ayurveda as an add-on to conventional management. Among these, two studies incorporated an integrated approach of Ayurveda and yoga to give statistically significant results.^[12,13] One clinical trial has included Behavioral Toxicity and Neurological Side effect as assessed by DOTES (Dose recorded and treatment-emergent symptom scale) criteria and found minimal side effects.^[14] No side effects or adverse events were reported in any other studies.

Discussion

The use of CAM in migraines is a growing phenomenon that is poorly understood. Currently, among the CAM treatment approaches to migraine, the evidence is mainly available for yoga, Tai, and acupuncture.^[7] Ayurveda has a holistic approach, which comprehensively promotes mind-body medicine. Furthermore, Ayurveda therapies are known to influence physiological processes, including autonomic modulation and metabolic profiles.^[15]

Shodhana (purification) and Shamana (pacifying) therapy are two limbs of Ayurveda treatment. Migraine being correlated to

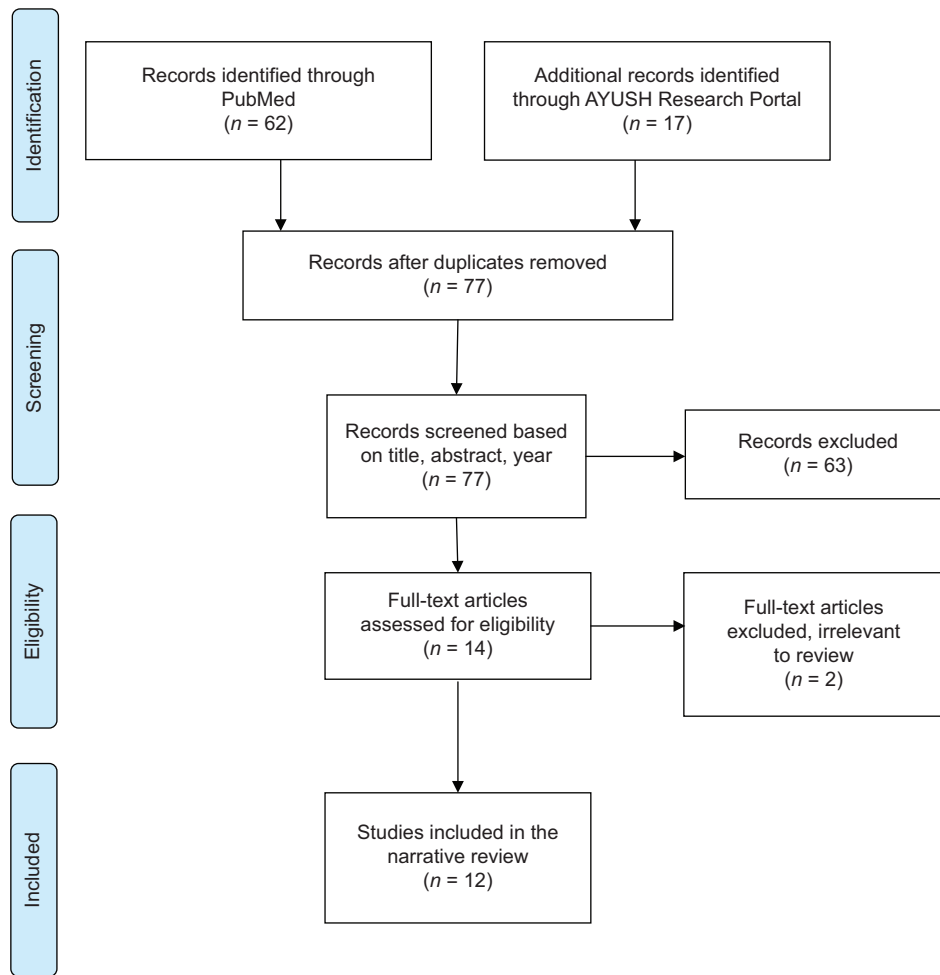


Figure 1: PRISMA flow diagram

Ardhavabhedaka, Shodhana procedures Nasya and Virechana, and Shamana medicines in the form of medicated ghee and polyherbal decoctions have been vividly prescribed as effective interventions in the classics.^[16] Most of the studies have employed Virechana along with Nasya and Shamana medicines for better efficacy in terms of severity, frequency, and duration of the headache. In line with classical management, few trials have employed Virechana before Nasya and pacifying medicines; there was no common formulation of choice across them. But all the medications were targeted against involved dosha (Humour). Hence, discussed mainly focuses on the interventions like Nasya, Virechana, and Shamana medicines comprising different Herbal and Herbo-mineral preparations and External therapy.

Nasya

Nasya is one of Bio-purificatory measures; the procedure involves the administration of medicines through the nasal route. Medicines administered through the nasal route directly deliver the medicine to the brain, thereby disseminating it to the entire body.^[17] On administration, the potency of the herbs used for nasal instillation reach *shringataka* (the vital point at the base of the nose), and then the potency spreads to the head, eyes, ear, and throat, and aids in expelling the morbid *doshas* (*initiated humour*)

from the head. The probable mode of action may be imputed to its stimulating effect on the brain through olfactory and respiratory pathways. The nasal epithelium is a highly permeable monolayer, and the submucosa also has extensive vasculature; it promotes rapid absorption and direct entry of the drug into the systemic circulation, bypassing hepatic metabolism. Intranasal drug delivery via olfactory and respiratory pathways is a promising option to deliver medication to the central nervous system. Lipid-based drugs of lower molecular weight less than 400–600 Da (Dalton), with a positive charge, have a better capacity to cross the blood-brain barrier.^[18]

There are eight studies on Nasya. Two studies are on Brhat Dashamoola taila, wherein it was compared with Laghu Sutashekhara rasa (LSR), go-ghrta, and placebo. Four sittings of Nasya for one week with a gap of one week were administered. Although significant improvement was found in severity and frequency of headache, the LSR group fared better than the other three groups.^[19] In another study, LSR alone was more efficacious than LSR and three sittings of Brhat Dashamoola taila nasya with a gap of one week in reducing the severity, frequency, and duration of headaches as well as associated symptoms of nausea, vomiting, vertigo, and aura.^[20] In a study on Gunja

Table 1: Clinical trials involving ayurveda intervention in migraine

Author (year)	Study design and sample size	Medicine dosage and duration	Outcome measures	Results
Dr.MS Vasudha, NK Manjunath, HR Nagendra (2018)	Clinical Trial <i>n</i> =30 Ayurveda and Yoga (AY) <i>n</i> =30 (Control group)	Virechana comprising - 1) Deepana - with Hinguvachadi churnam-2.5 to 5g Duration: 3 days 2) Snehapana with Kalyanaka ghrta (30 ml-150 ml), duration - 3 to 5 days. 3) Abhyanga and sveda 4) Virechana with Trivrt lehyam Oral Medication - 5) Pathyaksha dhatryadi Kashaya -15 ml bd for 75 days. 6) Thalam with Kachooradi churna and milk 7) Yoga	Migraine Disability Assessment Scale (MIDAS) Perceived Stress Scale (PSS 10)	Significant reduction in MIDAS, PSS, and improved symptho-vagal balance were observed in the AY group. The EMG also showed decreased activity of the frontalis muscle in the AY group compared to the control group.
Prakash Balendu Vaidya, Babu S. R. Vaidya, and Sureshkumar K. Vaidya (2010)	Observational prospective clinical study <i>n</i> =409 (2005-2007)	Ayurveda Treatment Protocol (AyTP) -7.3 g per day. Duration: 90 days	Headache frequency Headache intensity- Visual Analogue Scale, Numeric Rating Scale MIDAS	204 (50.2%) patients completed the study. Complete disappearance of headache and associated symptoms was observed in 72 (35.2%); mild episode of headaches without the need of any conventional medicines in 72 (35.2%); the low intensity of pain along with conventional medicines in 50 (24.5%); no improvement in seven (3.4%) and worst pain was noted in three (1.4%) patients.
Vasudha M. Sharma, N.K. Manjunath, H.R. Nagendra, Csaba Ertsey (2018)	RCT <i>n</i> =30 Control (CT) = 15 Ayurveda and Yoga=15	Therapeutic Purgation followed by Yoga therapy in AY group. Symptomatic treatment (NSAID's) in CT group. Duration: 90 days	Symptom check-list, Comprehensive Headache related Quality of Life Questionnaire, and Visual Analogue Scale	Forty-six (76.6%) out of 60 subjects belonging to both groups had Pitta-based body constitution. AY group showed a significant reduction in Migraine symptoms, including pain intensity.
Brinda Kanakhara and Varsha Chaudhari (2018)	Pilot study <i>n</i> =15	<i>Agnikarma</i> (thermal cautery) over the affected temporal side of the face, dot type for one time, once in a week, followed by application of honey- <i>Ghee</i> . <i>Pathyadi</i> Khada 40 ml twice a day. Duration: 30 days.	Headache Impact Test 6 score	Significant relief ($P<0.001$) was noted in headache, photophobia, and phonophobia, and significant ($P<0.05$) relief was noted in vomiting, nausea, and vertigo.
Hemal Parekh, Manjusha Rajagopala (2009)	RCT <i>n</i> =44 Group A=23 Group B=21	A- Laghu Sutashekhara Rasa (500 mg twice daily) B - Brhat Dashamoola Taila Nasya (4-8 drops in each nostril, three sittings. Duration: 7 days each with a gap of 1 week plus Laghu Sutashekhara Rasa (500 mg twice daily)	Symptom Checklist	Marked improvement was seen in 52.94% in Group B and 35% in Group A. Complete improvement in 5.88% in Group B, against 5% in Group A. Group B fared better than Group
Mohit Trivedi, Vikash Dixit, Syed Esam Mahmood, Sunil Kumar Mishra, S. S. Keshari (2017)	prospective randomized open-label blinded end-point (PROBE) <i>n</i> =60 Group A=20 Group B=20 Group C=20	Group A- Flunarizine 10 mg. Group B-Flunarizine 10 mg plus Placebo Group C- Flunarizine 10 mg plus Panchagavya Ghita Nasya	MIDAS, Clinical Global Impression (CGI), Visual Analog Scale (VAS), Numerical Rating Scale (NRS), Numerical Pain Rating Scale (NPRS)	CGI scores came down significantly in group C implying a rapid rate of recovery in the clinical status of Group C as compared to the other two groups. Reduction in the number of migraine days decreased perception of pain, and less intake of abortive medications was noted.
Vaghela DB, Shweta Mata, Dhiman KS, Manjusha R (2016)	RCT <i>n</i> =150	Group A: Laghu Sutashekhara Rasa - 500 mg tid Duration: 2 Months. Group B: Brihat Dashamoola Taila Nasya 6-8 drops in each nostril Duration: 2 Months. Group C:	Subjective symptoms and salivary tests	The overall effect of therapy on symptoms showed that Laghu Sutashekhara Rasa is more effective than Brihat Dashamoola Taila Nasya and Go Ghrita Nasya.

Contd...

Table 1: Contd...

Author (year)	Study design and sample size	Medicine dosage and duration	Outcome measures	Results
		Placebo Tablet prepared by wheat flour-500 mg Tablet thrice per day orally. Duration: 2 Months. Group D: Go-Ghrita Nasya -6-8 drops in each nostril. Duration: 2 Months.		
Shweta Mata, Vaghela DB, Dhiman KS, Parth Dave (2015)	RCT n=30 Group A=15 Group B=15	Group A-Brihat Jeevakadya Taila Nasya: 6 drops in each nostril for two sittings of seven days with the interval of 15 days after each sitting. Orally Sutashekhar Rasa - 250 mg BD with Drakshajala Anupana for one and half month. Group B- Control group: Flunarizine Tab 10 mg OD-45 days	Symptom checklist	The trial group had 80. 00% patients with marked improvement, followed by moderate improvement in 13. 33% and complete improvement in 6. 67%. In control group marked and moderate improvement was seen in 60. 00% and 33. 33% respectively; and 6. 67% had mild improvement.
Ajay Kumar Sharma, Vikas Singh (2014)	RCT n=31 Group I=10 Group II=10 Group III=11	Group I-GunjaTaila Nasya (Shodana)- 4-6 drops in each nostril for 21 days Group II- Pathyadi Ghana Vati- 2 gm/day with lukewarm water for 3 days. Group III- GunjaTaila Nasya plus Pathyadi Ghana Vati.	Symptom Checklist	74.90% clinical relief was observed in Group III, 66.41% clinical relief was noticed in Group I, while patients of Group II witnessed 49.19% improvement. It was concluded that GunjaTaila Nasya, along with Pathyadi Ghana Vati was effective.
Shree Vidhya P <i>et al.</i> (2013)	Observational Study n=30	Shatahvadi Taila Nasya - 6 drops in each nostril Duration: 7 days Orally - Nimbadi guggulu - 1 tid, Mashadi Kwatha - 15 ml tid. Duration: 30 days	Subjective Symptom Assessment	18 (60%) patients got complete relief, and 12 (40%) patients got marked relief. The study has shown highly significant results with a $P<0.001$.
Dr. Mridul Ranajan, Dr. Sarvesh Singh, Vd. Srinivas Sharma, Prof. Ajay Kumar Sharma (2015)	RCT n=30 A=10 B=10 C=10	Group A- Kumkumadi Ghrita Nasya - 6 drops in each nostril. Group B-Shirodhara -with Dashmoola-Shrita Ksheera for 45 min/day. Group C-Both interventions Duration: 21 days.	Subjective Symptom Assessment	Kumkumadi Gritha Nasya alone was more effective in alleviating symptoms than Dashmoolashrita ksheera Shirodhara. Combined therapy had greater potential in ameliorating the symptoms of migraine.
Sandeep Madaan, Medhavi Lal Sharma (2005)	Comparative Clinical study n=30 Group A=10 Group B=10 Group C=10	Group A - Anu taila Nasya - 6 Drops in each nostril on alternate days for 14 days Group B-Kaphaketu Rasa - 65 mg bid-Duration: 30 days Group C - Both	Severity of headache and Symptom Checklist.	Group A & B showed good results in 10% of cases. Good overall relief was seen in 70% of the subjects of Group A and C, and 60% of Group B.

taila shodhana nasya (eliminating nasal instillation), Nasya was administered after following pre and post-therapeutic measures as per treatise. Significant improvements with delayed response were noticed in the frequency of headache, nausea/vomiting, photophobia, and anorexia. But when administered with Pathyadi Ghana Vati, the clinical response was faster and more beneficial.^[21] A study on Kumkumadi Ghrita was significant in ameliorating symptoms related to migraine headache compared to Dashamoolashrtaksheera Shirodhara (dipping of milk boiled medicated herbs on forehead). Yet the therapies Nasya and Shirodhara, in combination, had greater potential in the management of the same.^[22]

In another study, Brhat Jeevakadi taila nasya showed better results in symptoms associated with migraine headache, including severity and frequency, compared to Flunarizine 10 mg, wherein it fared better only in reducing the associated vomiting.^[23] In another

study, Panchagavya Ghrta nasya along with Tab. Flunarizine 10 mg scored better on pain scales. A lower proportion of patients had Behavioural Toxicity and Neurological Side effects as compared to the Flunarizine-placebo and Flunarizine-only groups.^[14] A study on Shatahvadi taila showed significant improvement in migraine severity, frequency, and duration of attack.^[24] Anutaila nasya, every alternate day for fourteen days, showed good relief in 70% of cases in comparison to 60% of subjects with Kaphaketu rasa. Better results were obtained when both medicines were combined, and poor results were observed in 10% of subjects that received Anutaila nasya.^[25]

Virechana

Virechana is one of the Bio-purificatory measures. Virechana drains the cellular fluid into the interstitial fluid. Later, the fluid moves into the vascular compartment, which is further

drained into the Gastrointestinal tract for expulsion. Thus, the process creates a biochemical alteration as it modulates the fluid compartments of the body. The fluid which gets drained out contains dissolved biochemicals.^[26] Oral medications administered after bio-purificatory measures exert better efficacy owing to improved metabolic status. The procedure includes measures that augment digestive fire followed by oral intake of medicated fats, therapeutic massage, sudation, and finally induced purgation. In the present review, Virechana was carried out in three studies. Vasudha MS *et al.* administered Trivrt Lehya for virechana, while Shweta Mata *et al.*^[19] chose Triphala churna for mridu (mild) virechana for three days.

Shamanaoushadhi (pacifying medications)

Pathyadi Khada (Polyherbal decoction) is commonly prescribed for migraine.^[27] It was effective in two controlled clinical trials and one pilot study.^[2,12,13] In an RCT, Pathyadi Khada was administered in the form of a tablet, i.e., Pathyadi Ghanavati^[21] was effective in improving the severity, frequency, and duration of headaches measured on MIDAS and CHQQ (Comprehensive-Headache Specific Quality of Life Questionnaire). Further, sympathovagal balance and reduced frontalis muscle activity were recorded with its use in combination with yoga. The ingredients of Pathyadi Khada possess anti-oxidant anti-inflammatory properties, and are neuroprotective.^[12] Additionally, Pathya (*Terminalia chebula* Retz.) has analgesic properties.^[28] Mashadi kashaya and Nimbadi Guggulu were administered in a single group of migraineurs along with Shatahvadi taila nasya. The overall assessment showed complete relief in eighteen patients and marked relief in twelve patients.^[24]

Herbo-mineral medications

Five clinical trials utilized Herbo-mineral preparations in their study. Ayurveda Treatment Protocol (AyTP) consisting of a combination of Narikela Lavana 2000 mg, Sootashekhara Rasa 375 mg, Sitopaladi Churna 1425 mg, Rasona Vati 3000 mg, and Godanti Mishran 500 mg at a dose of 7.3 g per day was administered in a large sample of 406 subjects.^[11] The combination of the AyTP safety profile of Sootashekhara Rasa, Rasona Vati, and Godanti Mishran was initially established in animal models.^[29] Seventy-two (35.2%) of the patients got completely cured, and no improvement was seen in seven (3.4%) patients. Forty-five (11%) patients discontinued the therapy due to deterioration of the condition. But there were no noticeable adverse events in the patients who completed 90 days of treatment. In another study, Sutashekhara Rasa with drakshajala (raisins-soaked water) as an adjunct was administered along with Brhat Jeevakadi taila nasya. Compared to Flunarizine, Sutashekhara Rasa, along with Nasya ameliorated most symptoms associated with migraine.^[23] Laghu Sutashekhara rasa (LSR) was administered in two studies as stand-alone and in combination with nasya.^[19,20] LSR as a stand-alone was found to be more effective compared to Nasya. Similarly, Kaphaketu rasa as stand-alone and along with Anutaila Nasya showed significant results.^[25]

External therapy

Agnikarma (cautery)^[30] with Panchadhatu Shalaka (an instrument for cautery made of five metals) was carried out in a pilot study for four settings with a gap of one week, and Pathyadi Khada was administered internally. Significant improvements were seen in eleven (78.6%) patients. Studies claim probable stimulation of lateral spinothalamic tract due to heat which intern stimulates the descending pain inhibitory fibres. This, in turn, inhibits the release of P substance (Presynaptic inhibition) and blocks the transmission of pain sensation. Heat has also been thought to act as a counter-irritant. According to the pain-gate control theory, heat stimulates the nociceptor fibres residing in the superficial skin. These fast-acting fibres, after being stimulated, close the gate for slow-acting fibres for chronic pain.^[2] Shirodhara (dipping therapy) with Dashmoolashrita Ksheera over the forehead for 45 min/day for 21 days exerted soothing effects but was not effective compared to Kumkumadi Ghrita Nasya. But studies have shown the efficacy of Shirodhara in chronic daily headaches.^[31] Kachooradi churna application over the forehead along with purificatory and pacifying medications was effective in migraine.^[12]

Assessment tools

Most of the studies employed a subjective parameter scale for the assessment of the outcome. The items of assessment include severity, frequency, and duration of headache, associated symptoms like photophobia, phonophobia, aura, nausea, and vomiting. Migraine Disability Assessment (MIDAS) questionnaire was utilized for assessment in three studies.^[11,12,14] Visual Analogue Scale (VAS) for measurement of the intensity of the pain was employed in three studies.^[11,13,14] Headache Impact Test-6 and Perceived Stress Scale-10 were utilized in two studies.^[2,12] Clinical Global Impression rating scale to assess severity, as well as improvement after therapy (CGI, CGI-I), Numeric pain rating scale (NPRS), Verbal Rating Scale (VRS), were used in one study. Behavioral Toxicity and Neurological Side effects using DOTES criteria as well as presenting the patient-reported side effects or symptoms associated with migraine during the therapy were administered in one study.^[14] One study appreciably incorporated Heart Rate Variability (HRV) and surface Electromyography (sEMG). In this study, ten patients with migraine with aura (MA) had reduced SDNN, as well as an increased LF/HF ratio, suggesting sympathetic hyperactivity. The migraine without aura (MO) patients ($n = 17$) had a similar impairment, though not as severe as in the MA group.^[32] The study outcome confirms an attenuated stress response after Ayurveda and Yoga integrated approach.^[12]

Limitations

Randomization was the major limitation; even though the studies were systematically conducted and showed significant results, there was a lack of randomization. Out of twelve studies reviewed, only six studies were Randomized Control Trials. None of the studies were double-blinded, whereas

few were rater blinded studies. Only one study had placebo and active control (flunarizine) in comparison to Ayurveda intervention. Most of the studies were underpowered with a small sample size to answer the research question of interest. In the Study by Trivedi M *et al.*, though the sample size was good, uniformity across the group was not maintained. A study by Vaidya PB *et al.* included a large sample size of 406, but it was a single group observational study. Though the study was the only multi-centric study, the study lacked a control group, scales for assessment of tolerability and toxicity of Herbo-mineral medications were not included. Further, no proper response was stated for the dropout of 45 (11.0%) patients from the study. The sample size justification was available in only two studies conducted by Vasudha MS *et al.*^[12] Another major limitation of the studies was employing subjective grading of the symptoms for the assessment of the outcome. Though few studies showed significant results, the assessment scales were subjective. In the studies on Nasya, only one study had employed the pre and post-measures of Nasya therapy as per classical treatises. Apart from one study, no other studies had employed tests to assess toxicity, neurological Side effects, and patient-reported side effects or symptoms of migraine.

Scope for Further Research

Adopting the line of treatment of Ardhavabhedaka (migraine) as per classical treatises and use of Herbo, Herbo-mineral, and various ghee-based preparations for purificatory measures and pacifying the condition in the form of RCTs with adequate sample size. Adopting standardized assessment outcome measures with the assessment of safety of the intervention and drug interactions. Incorporating advanced techniques like Blood Oxygen Level Dependent functional MRI (BOLD fMRI), functional Near-Infrared Spectroscopy (fNIRS), Heart Rate Variability (HRV) would aid understanding the pathophysiology, neurobiology of the intervention and would help in generating solid evidence for Ayurveda interventions.

Conclusion

Ayurveda has a holistic approach to treatment rather than symptom-specific management, be it a migraine or any other disease. Intervention from the level of etiology, pathogenesis, aggravating and relieving factors, and disease-specific management along with diet and lifestyle is vital in Ayurveda. Bio-purificatory measures like Virechana and Nasya have shown good efficacy as stand-alone and as an add-on with oral herbal and Herbo-mineral preparations. Though few studies have shown significant results, they are underpowered due to the small sample size, lack of control group, and randomization. Future research should target to understand the pathophysiology of migraine and the changes Ayurvedic therapies could bring in, with adequate sample size, use of validated scales, biomarkers, neuroimaging, and autonomic function tests for better understanding of the neurobiology of Ayurveda intervention.

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Conflicts of interest

There are no conflicts of interest.

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