



## PAEDIATRIC MIGRAINE: AN INTEGRATIVE REVIEW

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**ABSTRACT** Migraine in children is common but frequently under-recognised neurological disorder characterized by recurrent episodes of headache accompanied by sensory, gastrointestinal, and autonomic symptoms. Unlike adult migraine, paediatric migraine presents with distinct clinical features, including shorter duration, bilateral pain, and higher association with gastrointestinal disturbances. Despite growing recognition, challenges persist in early diagnosis and effective long-term management. Ayurveda describes similar conditions under Ardhavabhedaka and Suryavarta, characterized by unilateral headache and associated systemic symptoms. These conditions are attributed to Dosha imbalance, particularly Vata and Pitta. This review aims to critically analyse current evidence on paediatric migraine, including its pathophysiology, aetiology, diagnostic approaches, and management strategies, while integrating Ayurvedic perspectives.

**KEYWORDS :** Pediatric Migraine; Ardhavabhedaka; Ayurveda; Neurovascular Headache; Nasya; Panchakarma; Integrative Medicine.

### 1. INTRODUCTION

Migraine is a common neurological disorder in children, characterized by recurrent episodes of moderate to severe headache, often associated with nausea, vomiting, and sensitivity to light and sound [1]. The prevalence of migraine in children ranges from 5% to 10%, increasing with age and showing a gender shift during adolescence [2].

Pediatric migraine differs from adult migraine in its clinical presentation, duration, and associated symptoms. Children often present with bilateral pain, shorter attack duration, and prominent gastrointestinal symptoms, making diagnosis challenging [3].

Due to frequent Absenteeism, despite its high prevalence, pediatric migraine remains underdiagnosed and undertreated. Delayed diagnosis can significantly impact academic performance, social functioning, and quality of life [4].

Pediatric migraine is classified according to the International Classification of Headache Disorders, 3rd edition (ICHD-3), which has also been adopted in pediatric headache practice guidelines. Diagnostic criteria include at least five headache attacks lasting 2–72 hours, with at least two of the following characteristics [5]:

1. Unilateral or bilateral location, pulsating quality, moderate to severe intensity, and aggravation by routine physical activity.
2. During headache, at least one associated symptom such as nausea, vomiting, photophobia, or phonophobia should be present.

In children, migraine attacks are often shorter in duration and more frequently bilateral than in adults. Cluster headache, although rare in childhood, should be considered in the differential diagnosis of recurrent headaches because of its severe unilateral orbital or temporal pain associated with autonomic symptoms [6,7].

#### 1.1 Pathophysiology

Migraine is primarily a neurovascular disorder involving activation of the trigeminovascular system [8]. Cortical spreading depression is considered the underlying mechanism for aura, leading to transient neuronal dysfunction [9].

Neurotransmitters such as serotonin play a crucial role in migraine pathogenesis. Altered serotonin levels contribute to vascular changes and pain signalling [10].

In Ayurveda, these mechanisms can be correlated with Vata Dosha (pain transmission) and Pitta Dosha (inflammatory processes).

#### 1.2 Aetiology and Risk Factors

Genetic predisposition is a significant factor in paediatric migraine, with a positive family history observed in most cases [11].

Environmental triggers include stress, irregular sleep, dietary factors, and hormonal changes [12].

Ayurveda attributes causation to:

- Asatmya Ahara (incompatible diet)
- Vega Dharana (suppression of natural urges)
- Manasika Nidana (psychological stress)

#### 1.3 Clinical Features

Paediatric migraine presents with:

- Bilateral or unilateral headache
- Nausea and vomiting
- Photophobia and phonophobia
- Shorter duration compared to adults [13]

Variants such as abdominal migraine and cyclic vomiting syndrome are more common in children [14].

**Table 1. IAP/ICHD-Based Diagnostic Criteria for Pediatric Migraine and Cluster Headache [15,16,17,18]**

| Feature                | Pediatric Migraine                               | Cluster Headache                                                                                  |
|------------------------|--------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Number of attacks      | ≥ 5 attacks                                      | ≥ 5 attacks                                                                                       |
| Duration               | 2–72 hours                                       | 15–180 minutes                                                                                    |
| Location               | Unilateral or bilateral, commonly frontotemporal | Strictly unilateral, orbital, supraorbital, or temporal                                           |
| Nature of pain         | Pulsating/throbbing                              | Severe, piercing, excruciating                                                                    |
| Intensity              | Moderate to severe                               | Severe to very severe                                                                             |
| Associated symptoms    | Nausea, vomiting, photophobia, phonophobia       | Lacrimation, conjunctival injection, rhinorrhoea, nasal congestion, eyelid oedema, ptosis, miosis |
| Aggravated by activity | Yes                                              | Usually associated with restlessness/agitation                                                    |
| Frequency              | Variable                                         | 1 attack every alternate day to 8 attacks/day                                                     |
| Prevalence in children | 7.7–17.8%                                        | 0.03–0.1%                                                                                         |
| Diagnostic Basis       | ICHD-3 Pediatric Migraine Criteria               | ICHD-3 Cluster Headache Criteria                                                                  |

#### 1.4 As per Ayurveda:

Ayurveda correlates migraine with conditions such as Ardhavabhedaka and Suryavarta, attributed primarily to Vata-Pitta Dosha imbalance. Ayurvedic interventions, including Nasya, Shirodhara, offer potential benefits in symptom management and recurrence prevention [19,20,21,22]

While modern pharmacological treatments provide symptomatic relief, they are often associated with adverse effects such as gastrointestinal discomfort, dizziness, sedation, and fatigue, and may have limited long-term efficacy. Integrative approaches combining conventional and Ayurvedic therapies may provide a holistic and sustainable management strategy [23,24,25,26]

The present review aims to provide a comprehensive analysis of paediatric migraine from both modern and Ayurvedic perspectives, emphasizing integrative management strategies [27,28].

2. MATERIAL AND METHODS

A systematic literature search was conducted using PubMed, Scopus, Web of Science, and Google Scholar. Classical Ayurvedic texts were also reviewed.

3. Review of Literature

3.1 Diagnostic Approaches

Diagnosis is primarily clinical, based on ICHD criteria. Neuroimaging is reserved for atypical cases or red flag symptoms.

Ayurvedic diagnosis involves assessment of Dosha, Nidana, and clinical features.

3.2 Detailed Management of Pediatric Migraine: Modern and Ayurvedic Approaches

A. Modern Management of Pediatric Migraine  
Management of pediatric migraine includes acute treatment, preventive therapy, and non-pharmacological interventions aimed at reducing attack frequency, severity, and disability.

Table 2. Acute (Abortive) Treatment of Pediatric Migraine

| Category              | Commonly Used Drugs      | Mechanism/Role                                                        |
|-----------------------|--------------------------|-----------------------------------------------------------------------|
| First-line Analgesics | Paracetamol, Ibuprofen   | Provide symptomatic relief and reduce headache severity               |
| Triptans              | Sumatriptan, Rizatriptan | 5-HT1B/1D receptor agonists that inhibit trigeminovascular activation |
| Antiemetics           | Ondansetron, Domperidone | Control nausea and vomiting and improve treatment tolerance           |

Ibuprofen has demonstrated superior efficacy compared with paracetamol in several pediatric studies [29]. Triptans are particularly useful in moderate-to-severe migraine attacks not responding to simple analgesics [30]. Antiemetics improve associated gastrointestinal symptoms and enhance patient comfort [31].

Table 3. Preventive (Prophylactic) Therapy in Pediatric Migraine

| Drug Class               | Common Agents | Therapeutic Role                         | Duration of Therapy                                                    |
|--------------------------|---------------|------------------------------------------|------------------------------------------------------------------------|
| Beta-blockers            | Propranolol   | Reduce migraine frequency and severity   | Usually continued for 3–6 months, followed by gradual reassessment     |
| Antiepileptics           | Topiramate    | Modulate neuronal excitability           | Generally evaluated after 3–6 months of therapy                        |
| Antidepressants          | Amitriptyline | Useful in chronic and recurrent migraine | Commonly continued for 6 months or more depending on clinical response |
| Calcium Channel Blockers | Flunarizine   | Prevent recurrent migraine episodes      | Usually prescribed for 3–6 months with periodic evaluation             |

Preventive therapy is indicated in children experiencing frequent, prolonged, or disabling migraine attacks.

Table 4. Non-Pharmacological Management

| Intervention                                | Clinical Significance                      |
|---------------------------------------------|--------------------------------------------|
| Regular sleep schedule                      | Prevents sleep-related migraine triggers   |
| Adequate hydration                          | Reduces headache frequency                 |
| Stress management and relaxation techniques | Minimizes psychological triggers           |
| Limitation of screen exposure               | Reduces visual and sensory overstimulation |

|                                   |                                               |
|-----------------------------------|-----------------------------------------------|
| Behavioural and cognitive therapy | Improves coping skills and long-term outcomes |
| Avoidance of dietary triggers     | Helps prevent migraine attacks                |

3.3 Common Dietary Triggers

- Excessively sour foods such as pickles and fermented preparations
- Sauces and processed condiments
- Excessively spicy foods
- Skipped meals and prolonged fasting
- Caffeinated beverages and carbonated drinks
- Highly processed packaged foods

Behavioural therapy and cognitive interventions have shown significant benefits in improving quality of life and reducing migraine-related disability [32].

B. Ayurvedic Management of Pediatric Migraine

Pediatric migraine can be correlated with Ardhavabhedaka, a Vata-Pitta predominant Shiroroga described in Ayurvedic classics [33]. Management includes Nidana Parivarjana, Shamana Chikitsa, and Shodhana Chikitsa.

Table 5. Shamana Chikitsa in Pediatric Migraine

| Category                 | Drugs/Formulations                          | Therapeutic Action                                                                                       |
|--------------------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Deepana-Pachana          | Nagarmotha (Musta), Dalchini (Twak)         | Improves digestion, corrects Agni, reduces Ama formation                                                 |
| Mastishkashamaka Dravyas | Jatamansi, Duralabha, Brahmi, Shankhapushpi | Calms the nervous system, improves cognitive functions, reduces stress-related triggers                  |
| Nidrajanana Dravyas      | Jatamansi                                   | Promotes sleep, reduces mental stress, and helps in sleep-related migraine triggers                      |
| Adaptogenic Dravyas      | Ashwagandha                                 | Improves stress tolerance, supports nervous system balance, and reduces stress-induced migraine episodes |
| Pittavirechaka           | Avipattikara Churna                         | Helps in Pitta regulation and alleviates Pitta-dominant headache symptoms                                |
| Anulomaka                | Pathyadi Kwatha                             | Promotes proper Dosha movement, supports digestion, and helps in Shiroroga management                    |

These formulations are traditionally used in Shiroroga and Pitta-dominant headache disorders [34].

Table 6. Panchakarma in Pediatric Migraine

| Procedure     | Commonly Used Medicines                       | Therapeutic Role                                                                          |
|---------------|-----------------------------------------------|-------------------------------------------------------------------------------------------|
| Nasya Karma   | Anu Taila, Shadbindu Taila, Ksheerabala Taila | Eliminates Urdhvajatrugata Dosha and supports neurological functions                      |
| Shirodhara    | Ksheerabala Taila, Brahmi Taila               | Produces calming effects on the central nervous system and reduces stress-induced attacks |
| Basti Therapy | Dashamoola Kwatha, Bala Taila                 | Regulates Vata Dosha and helps prevent recurrence                                         |

Nasya is considered one of the most important therapies for diseases affecting the head and neck region [35]. Shirodhara has demonstrated beneficial effects in reducing stress and improving mental relaxation [36]. Basti is regarded as the principal therapy for Vata disorders and may play a role in reducing recurrent migraine episodes [37].

C. Integrative Approach

An integrative approach combining evidence-based pharmacological therapy with Ayurvedic interventions may improve symptom control, reduce recurrence, and enhance quality of life in children with migraine. Such approaches warrant further evaluation through well-designed clinical studies.

3.4 Recent Advances

Advances in migraine research include:

- CGRP antagonists for prevention
- Neurostimulation techniques

## • Digital therapeutics

These innovations offer promising alternatives for refractory cases.

## 4. DISCUSSION

Pediatric migraine is a common neurological disorder characterized by recurrent attacks of moderate to severe headache associated with nausea, vomiting, photophobia, phonophobia, and autonomic symptoms. Although migraine is not life-threatening, frequent episodes can significantly affect school performance, emotional health, sleep quality, and overall quality of life in children. Early diagnosis and appropriate management are essential to reduce disease burden and prevent chronicity [38,39].

Modern management of pediatric migraine mainly focuses on acute symptomatic relief and prevention of recurrent attacks. Commonly used pharmacological agents include analgesics such as paracetamol and ibuprofen, triptans, antiemetics, and preventive medications including propranolol, topiramate, amitriptyline, and flunarizine [40,41]. These medications act through modulation of pain pathways, serotonin receptors, neuronal excitability, and vascular mechanisms. However, conventional pharmacological therapy may be associated with adverse effects such as gastrointestinal discomfort, dizziness, sedation, fatigue, cognitive disturbances, and behavioural changes. Some preventive drugs require careful monitoring in pediatric patients due to concerns regarding tolerability and long-term safety [42].

Ayurveda describes migraine-like conditions under Shiroroga, particularly Ardhavabhedaka, where involvement of Vata and Pitta Dosha is considered important. Ayurvedic management emphasizes correction of Dosha imbalance, improvement of Agni, removal of Dosha accumulation, and restoration of physiological balance through Shamana and Shodhana approaches [43].

Local Ayurvedic therapies such as Nasya Karma and Shirodhara are traditionally indicated in disorders affecting the head region. Nasya with medicines such as Anu Taila, Shadbindu Taila, and Ksheerabala Taila is described for management of Urdhvajatrugata disorders and may support neurological functions [44]. Shirodhara with medicated oils such as Ksheerabala Taila and Brahmi Taila is considered beneficial for relaxation, reduction of stress, and improvement of mental calmness, which may help in stress-associated migraine triggers [45].

Mastishkashamaka (mind-calming and neuroprotective) Ayurvedic drugs provide supportive management by addressing psychological and neurological components associated with migraine. Jatamansi (Nardostachys jatamansi), Brahmi (Bacopa monnieri), Shankhapushpi (Convolvulus pluricaulis), and Duralabha are traditionally used for their calming, cognitive-supportive, and stress-modulating properties [46].

Adaptogenic drugs are also important in migraine management as stress is a recognized precipitating factor. Ashwagandha (Withania somnifera), an important Rasayana drug, is traditionally used to improve stress tolerance, promote sleep balance, and support nervous system function [47].

Deepana-Pachana drugs such as Musta (Cyperus rotundus) and Twak (Cinnamomum zeylanicum) are used to improve digestive function and reduce Ama formation. Pittavirechaka drugs such as Avipattikara Churna and Anulomaka formulations such as Pathyadi Kwatha may help in maintaining Dosha balance and supporting management of Shiroroga [48].

An integrative approach combining appropriate modern medical therapy with Ayurvedic preventive and supportive interventions may provide a comprehensive strategy for pediatric migraine management. Ayurveda may contribute through individualized treatment, dietary regulation, lifestyle correction, stress management, and improvement in long-term quality of life. However, further clinical studies with standardized protocols are required to establish the efficacy and safety of Ayurvedic interventions in pediatric migraine.

## 5. CONCLUSION

Paediatric migraine is a complex disorder requiring early diagnosis and comprehensive management. Ayurveda provides valuable insights into its pathogenesis and treatment. Integrative approaches combining modern and Ayurvedic therapies hold promise for improving outcomes and quality of life.

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