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Advanced in the Acute and the Preventive Treatment in Paediatric Migraine

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Abstract: *The most frequent cause of acute recurrent headaches in children is migraine.*
Children frequently experience migraines, but they are frequently misdiagnosed. Because there are few studies on the effectiveness of treatment for this population, it is difficult to expand the range of options.
The idea of pathophysiology has changed over time, moving from a vascular a etiology to a neuroinflammatory process. The foundation of diagnosis is clinical evaluation, which should also take family history into account.
Acetaminophen and ibuprofen are both advised for use in children to treat acute migraine attacks. Antiepileptic medications (AEDs), calcium antidepressants and channel blockers have been utilised to prevent migraines in children.
In particular, it covers preclinical and clinical evidence regarding drugs that affect the serotonin 5-HT1F receptor, calcitonin gene-related peptide or its receptor, nitric oxide synthase, and acid-sensing ion channel blockers.
Comorbidities related to migraine include everything from stress and sleep disorders to suicidal thoughts and behaviours.
Due to the intricate and mainly unknown processes underlying the development of migraines, a number of biological and social risk factors, including hormonal abnormalities, genetic and epigenetic modifications, and neurological, autoimmune, and cardiovascular illnesses, have been proposed.
This review highlights the knowledge gaps and provides a thorough analysis of the most recent research on the epidemiology and risk factors.

Keywords: migraine, acute treatment, preventive treatment, child, adolescents

I. INTRODUCTION

Migraine is one of the most prevalent disorders seen in clinical practice today, Affecting nearby 28 million Americans. The word migraine is derived from the Greek word "hemikrania," After converted into Latin word "hemigranea."
A common disorder known as migraine is characterised by recurrent headache attacks that can vary greatly in intensity, frequency, and duration. Attacks are typically unilateral in nature and are linked to nausea, vomiting, and anorexia.
Early recognition &establishment Of acute therapies & lifestyle adjustments Can affect:

- avoid Prolonged Pain
- Improve living conditions.
- The course of the illness for the duration of the person's life.

More than 90% of cases have a history of migraines. 10% of children between the ages of 5 and 15 suffer from migraines, which also cause 75% of the headaches in young children who are referred for a neurological consultation.
In children under the age of seven, the prevalence of this condition is 2.5% (equally affecting both genders). In children aged seven to puberty, the prevalence is 5% (female to male ratio: 3:2), and in postpubertal boys, it is 10%.

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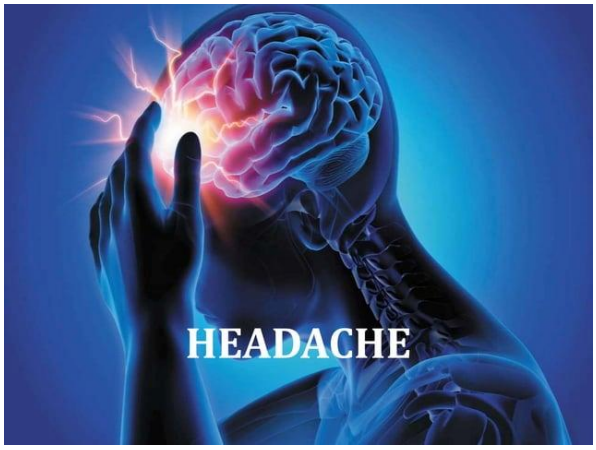
By the time they are 25 years old, about 25% of kids will be migraine-free; boys will experience this percentage much higher than girls, and over half of them will still experience headaches when they reach 50.

Children should use over-the-counter analgesics and US Food and Drug Administration-approved triptans as part of their acute treatment regimen.

Migraine is a very debilitating illness that lowers children's quality of life. Children's headaches may be secondary to a variety of causes or a primary disorder.

Tension type headache (TTH), cluster headache, trigeminal autonomic cephalalgias, and other primary headaches are the four types of primary headaches.

Head and neck trauma, intracranial mass lesions, and infections both intracranially and extracranially can all cause secondary headaches.



Recognition of migraine:

The quality of life for migraine sufferers can be greatly enhanced by early diagnosis and treatment.

It's crucial to keep in mind that patients have probably been experiencing headaches for a long time by the time they complain of them.

It is common mistake to refer to a headache that is accompanied by bilateral nasal drainage as "sinus headache."

In the history of migraines, the existence of autonomic symptoms such as rhinorrhea and lacrimation is significant.

A thorough history is especially important for patients with frequent migraine, multiple comorbidities, or excessive use of analgesics.

Diagnostic criteria of paediatric migraine:

A thorough neurological examination and a comprehensive clinical history are necessary for the diagnosis of paediatric migraines.

The presentation and response to treatment of paediatric migraine is different from that of adult migraine.

It is more frequently bilateral and has a shorter duration.

These unusual findings include double vision, increased headaches accompanied by postural changes, and difficulties speaking, walking, and balancing.

In these situations, one should suspect neurological abnormalities as well as secondary headache causes.

There are six main types of migraine, the two most significant of which are aura-free and aura-accompanied.

2004 International Headache Society Criteria For Migraine Without Aura:

A) ≥5 attacks fulfilling features B to D

B) Headache attack lasting 1 to 72 hours

C) Headache has at least 2 of the following 4 features:

✓ Bilateral or unilateral (frontal/temporal) location

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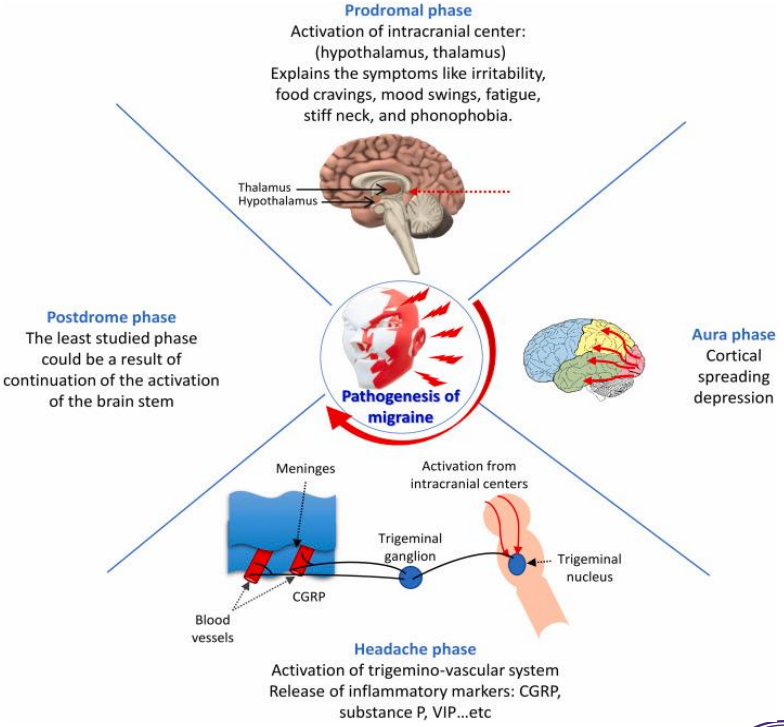
✓ Pulsating quality
✓ Moderate to severe intensity
✓ Aggravated by routine physical activity
D) At least one of the following accompanies headache's
✓ Nausea and/or vomiting
✓ Photophobia and phonophobia ((maybe inferred from their behavior)
E) Not attributed to another disorder

Epidemiology:

Migraine is one of the most common forms of headache.
The 1-year prevalence of migraine is between 10% and 15%.
11–15 Prior to puberty, the 1-year prevalence of migraine is 3–7%.14,
16 Boys and girls are about equally often affected.
The highest prevalence is observed between the ages of20 and 50.
In this phase of life, women are up to three timesmore often affected than men.
The difference in the prevalence between the sexes is greatest at about age 30.
A genetic predisposition in children that is triggered by physiological or environmental stimuli results in migraine headaches.
Among these stimuli are drug exposure, food, anxiety, or adolescence. Most kids who Migration history appears to have a favourable family background. Certain research has demonstrated hereditary contributions.

Pathophysiology of Migraine:

The pathophysiological concepts of migraine have advanced considerably over the last 20 years.
Migraine is now considered to originate in the brain, thus making it a neurological rather than vascular disease.
There are two main categories into which migraine pathophysiology theories have historically been divided:
that is, neurogenic and vasogenic.



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Diagnosis Test for Migraine:

When it comes to migraines, accurate diagnosis is essential. It directs appropriate care, facilitates better symptom management, and raises the standard of living for those who experience it.

The following is a list of tests that are frequently used to diagnose migraines:

1] CBC, or complete blood count
2] A scan using magnetic resonance imaging
3] A CT (computerised tomography) scan
4] The EEG, or electroencephalogram
5] Spinal puncture
6] Eye examination.
7] Hormone Level Testing

1] Complete Blood Count (CBC):

This test counts the red and white blood cells as well as the haemoglobin and platelet counts.

It aids in the diagnosis of anaemia, infections, and anomalies in the production of red blood cells.

The complete blood count (CBC) offers important information for the diagnosis of underlying migraine-related conditions.

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2] A scan using magnetic resonance imaging (MRI)
An MRI scan creates precise images of the brain by using radio waves and strong magnets.
It aids in ruling out additional underlying migraine causes, such as anomalies or tumours.
For the purpose of correctly diagnosing and treating migraines, medical professionals can obtain important information from an MRI scan.

3] CT (Computerised Tomography) Scan
• Non-invasive imaging procedures that produce finely detailed cross-sectional images of the brain using X-rays.
• Assists in the detection of any anomalies, tumours, bleeding, or structural problems.
• Offers useful information for diagnosing migraines and ruling out other illnesses.

4] Electroencephalogram (EEG):
• Assesses brain electrical activity.
• Aids in identifying aberrant brain patterns of waves.
• Helps rule out alternative ailments with comparable symptoms.

5] Spinal Puncture
• Cerebrospinal fluid measurement composition and pressure.
• Identifies inflammation, infections, or additional underlying issues.
• Assists in eliminating secondary causes of migraines.

6]Eye Examination:
Clarity and sharpness of vision are evaluated.
• Checking for anomalies in the retina and optic nerve.
• Examining for migraine-related loss of peripheral vision.
7] Level Testing:
Check progesterone, oestrogen, and other hormone levels.
Recognise any hormonal imbalances that might be migraine triggers.
Assess the need for hormonal therapy or other management techniques
Neuroimaging: When a person has regular headaches and normal brain function, neuroimaging is not always required. Neurologicalanalysis. Neuroimaging ought to taken into account in kids who have an abnormal neurological assessment, co-occurrence of seizures, or both, and if past experience indicates sudden onset of intense headaches, getting worseheadache frequency, shift in headache type of migraine, or mild neurological malfunction. signs and symptoms of neuroimaging in kids with headaches.
1. Severe headache.
2. Continuously increasing pattern focal neurological problems.
3. Examining abnormal neurologic symptoms.
4. Neurocutaneous syndrome is present.
5. Modifying headache pattern.
6. Age less than three years.

International Classification of Headache Disorders:
Migraine
Migraine without aura

- Migraine with aura
- Childhood periodic syndromes that are commonly precursors of migraine
- Retinal migraine
- Complications of migraine
- Probable migraine

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Tension-type headache (TTH)

- Infrequent episodic tension-type headache
- Frequent episodic tension-type headache
- Chronic tension-type headache
- Probable tension-type headache

Cluster headache and other trigeminal autonomic cephalalgias

- Cluster headache
- Paroxysmal hemicrania
- Short-lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing (SUNCT)
- Probable trigeminal autonomic cephalalgia

Other primary headaches

- Primary stabbing headache
- Primary cough headache
- Primary exertional headache
- Primary headache associated with sexual activity
- Hypnic headache
- Primary thunderclap headache
- Hemicrania continua
- New daily-persistent headache (NDPH)

Differentiating Migraine from Tension-type headache:

Characteristics	Migraine	Tension type headache
Pain features of acute attacks	Throbbing Mostly unilateral Worsening of pain with head movement	Boring or squashing Usually bilateral No effect of head movement
Associated features	Nausea or vomiting Photophobia and phonophobia	None
Triggering factors	Altered sleep patterns (too little or too much) Skipping meals Overexertion Change in stress level (too much or relaxation) Excess afferent stimuli (such as bright lights) Menstruation	Psychological stress

Features Suggesting Migraine As Cause of Recurrent Headache in A Child:

1] family history
2] relief by sleep
3] presence of trigger factor
4] presence of aura symptoms
5] impairment of child's social functioning

Treatment of Migraine:

Non-pharmacologic and pharmaceutical interventions, as well as an individually designed regimen for prophylactic migraine prevention, are all part of the treatment of paediatric migraine.

Treatment for migraines is split into two main categories:

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1] Short-term treatment.
2] prophylactic medicine.

1] Short-term treatment[Acute Therapy]:

Children with migraine attacks can be classified into two groups: those who are diagnosed with a specific type of migraine but, at that particular time, continue to have worsening headaches despite taking medication, and those who are taken to the emergency room during their first severe migraine attack.

Management of acute migraine attacks:

Class	Drug	Comments
Analgesic	Ibuprofen Acetaminophen Nimuselide	First line drug, safe and effective in children Comparable efficacy and safety profile with ibuprofen
Triptans	Sumatriptan Nasal spray,5mg,20 mg Subcutaneous,0.06mg/kg Oral,50 to 100mg Zolmitriptan,PO 2.5-5mg	Easy administration, faster initial relief,& more side effects as compared to placebo Administration difficulty, chest and neck discomfort, and reported side effects Not effective Evaluated 12-17 years
Other medications	Ketorolac IV 0.5mg/kg, maximum 30mg Prochlorperazine IV (0.15mg/kg,maximum 10 kg)	Iv prochlorperazine is superior to Iv ketorolac in the acute treatment of migraine headache in emergency department

Table No.2.

A] Analgesic:

The medication used to treat acute migraine attacks
[1] Ibuprofen
[2] Acetaminophen

For the acute treatment of paediatric migraines, ibuprofen is a viable option due to its effectiveness (Level A).

For the acute treatment of paediatric migraines, paracetamol is likely beneficial and ought to be taken into consideration (Level B).

Both ibuprofen (10 mg/kg) and acetaminophen (15 mg/kg) outperformed placebo in terms of efficacy; at two hours, ibuprofen produced better results than acetaminophen.

The medication utilised in According to available research, both can safely and successfully stop a child's acute migraine attack.

There is currently no information on the safety and effectiveness of other non-steroid anti-inflammatory drugs, or NSAIDs, in the treatment of migraine in children and adolescents Evaluated.

The efficacy of aspirin, caffeine, and acetaminophen combined for acute migraine in adults has been demonstrated; however, its potential for mild to moderate migraine in children has not been investigated.

Levels of evidence for the treatment of migraine:

Level	Evidence of treatment of acute migraine
Level A	two or more clinically controlled, randomized studies carried out according to good clinical practice (GCP), versus placebo or versus active treatment of proven efficacy
Level B	clinically controlled, randomized study carried out according to GCP or more than one well-designed clinical case control study or cohort study

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Level C	favorable judgment of two-third of the Ad Hoc Committee members, historical controls, non-randomized studies, case reports

Table No.3.

B] Triptans:

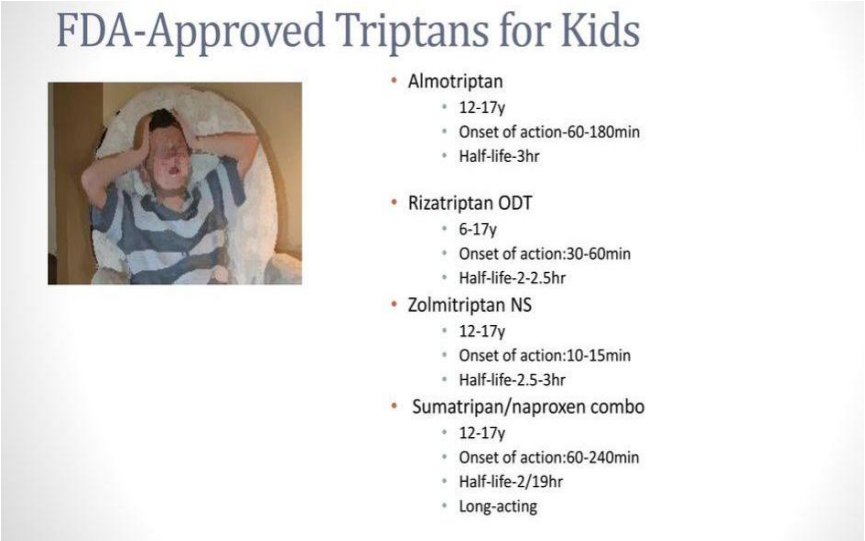

Fig. 4.

Acute migraine medications that target selective serotonin 5-HT1B/1D agonists are highly efficacious.
They are frequently used to treat adult migraine attacks.
Almotriptan was given FDA approval in 2009 to treat teenage migraines.
As serotonin agonists, triptans are a class of tryptamine-based pharmaceuticals that help lower cerebral blood flow and neuropeptide release.
Almotriptan, zolmitriptan, and rizatriptan are additional triptans that have been approved by the FDA for the treatment of migraine attacks in paediatric patients, which includes children and adolescents older than six. Risatriptan reduced associated nausea and vomiting and, at two hours, provided statistically significant pain relief in children with migraine attacks, according to limited studies.

Contraindication of Triptans:
1]Untreated high blood pressure
2] Coronary heart illness
3] The disease Raynaud
4] a pregnancy with an ischemic stroke history
5] nursing a baby with acute liver or renal failure
6] at least 65 years old
7]Hemiplegic or basilar migraine

C] Other Acute Migraine Medications:
There is another class of medications that is commonly used to treat acute migraine attacks.
In the emergency room, prochlorperazine is superior to ketorolac in reducing symptoms one hour after ingestion for managing severe acute migraine attacks.

2] prophylactic medicine[preventive therapy]:
There is little data to support the use of medications in general, despite the fact that many have been used to prevent migraine attacks in children.

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failure of non-pharmacological treatments to alleviate headache symptoms and insensitivity to symptomatic treatment Preventive therapy can also be indicated by the frequency or presence of basilar or hemiplegic migraine.

Drugs used for prevention of migraine attacks.

Class	Drugs	Statements
Beta Blockers	Propranolol	Reduced energy, tiredness, postural symptoms, contraindicated in asthma, depressive side effects, often
Calcium Channel Blockers	Flunarizine Nimodipine	Not recommended for use in pediatric migraine
Anticonvulsant	Valproate Topiramate Levetiracetam	Weight gain, drowsiness,tremor, hair loss, fetal abnormalities, haemato-logical or liver abnormalities weight loss, and sensory symptoms. dizziness, and irritability
Antidepressants	Amitriptyline Pizotefen	Reduces headache frequency and severity; sedation major side effect

Table No. 4.

A]Calcium channel blockers and beta blockers:

One of the most often prescribed medications for migraine prevention is a beta blocker.

The AAN, French, and Italian practise guidelines for treating paediatric migraine

Propranolol's adverse effects, which include fatigue, weight gain, insomnia, and depressive symptoms, frequently restrict its use in children as a preventive measure.

Only flunarizine has consistently demonstrated efficacy and safety as a preventative measure for paediatric migraine among calcium channel blockers.

n paediatric migraineurs, a dose of 5 mg/day of flunarizine significantly reduces headache frequency and duration when compared to a placebo, according to the largest placebo-controlled study to date.

According to the American Academy of Neurology's recommendations, flunarizine is not readily available in the US but is likely effective as a prophylactic.

B]Anticonvulsant:

Medicines used to treat acute migraine attacks in children

1] Topiramate

2] Valproate

3] Gabapentin and levetiracetam.

Topiramate is the most recent preventive medication to receive FDA approval; it was granted in 2004.

In general, topiramate is a well-tolerated medication. The initial dosage for migraneur children is 15 mg/day, and over the course of more than eight weeks, the dosage is increased to 2 to 3 mg/kg daily. A 200 mg/day maximum tolerated dose may be the limit.

Treatment with topiramate may result in anorexia, weight loss, gastroenteritis, difficulty concentrating, sleepiness, or even cognitive impairment. Considering the minimal dosage used to treat migraines.

For the paediatric population, topiramate can be a good option because of its effectiveness and low frequency of side effects [13].

Starting valproate treatment involves two daily doses of 10 to 15 mg/kg.

It has been demonstrated that levetiracetam, when taken twice daily at a dose of 125 to 250 mg, is effective in treating migraines. Patients may feel lightheaded, agitated, and sleepy while taking levetiracetam.

C] Antidepressants:

Amitriptyline is still one of the most commonly used medications, despite the fact that its effectiveness in treating paediatric migraine has never been evaluated in randomised controlled trials.

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One may progressively raise bedtime doses of 5–10 mg to 1 mg/(kg day).
Depression and cardiac irregularities are indications against using this medication.

II. CONCLUSION

1] Even though they are thought to be benign self-limited illnesses, migraines in children have been shown to persist into adulthood. With the right therapy approach and awareness of potential triggers, the immigrant child may have a better chance at living a decent life. The quickness and effectiveness of the acute care reduce the amount of time the child spends in pain and discomfort, which lessens the likelihood that it will experience severe psychological stress during attacks.

2] Following a definitive diagnosis, prophylactic treatment is required, but it is imperative to remember the therapeutic agents' contraindications as well as their immediate and comprehensive adverse consequences. An additional crucial element is the fundamental circumstances. of the aggrieved party. They will be carefully taken into account. when suggesting a therapeutic exercise regimen.

3] The psychological support that should be provided to every child suffering from paediatric migraine is a crucial component of the preventive treatment in order to have a compliant patient without any further emotional illnesses that can result from the strain of daily life as well as treatment in addition to the susceptibility and emotional brittleness that describe the aforementioned age groups.

4] When treating a child with migraines, it is important to remember that a multidisciplinary team comprising a paediatric neurologist, paediatrician, psychologist, support groups, and family is necessary.

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