Approach to Primary Headache in Children and Adolescents: Short Review

Dr. Shubhankar Mishra*

Post Doctoral Senior Resident, Department of Neurology, S.C.B Medical College, Cuttack, Odisha, India

*Corresponding Author: Dr. Shubhankar Mishra, Post Doctoral Senior Resident, Department of Neurology, S.C.B Medical College, Cuttack, Odisha, India.

Received: March 03, 2020; Published: April 25, 2020

Abstract

Childhood headache is a very common disease in regular neurology practice. The incidence is extremely high in school going children and adolescents. There are varied causes of this. The spectrum of etiologies includes primary headaches as well as secondary including organic, functional and behavioral causes. Primary headaches are common disorders among children and adolescents; tension type headaches (TTH) and migraine being the most frequent types. Primary headaches can have a substantial effect on the life of the child, as well as their family, leading to lost school days and withdrawal from social interactions. Early recognition and better diagnosis can lead to successful treatment, improved outcome, and reduced disability. The pain experience holds bio-psychosocial components to it, therefore treatment strategies should be formulated according to the patient’s age, headache diagnosis, family structure, culture and beliefs, and according to the disability the headache imposes on the patient’s daily living. A simultaneous and multifaceted treatment, that includes counselling, education and reassurance combined with pharmacological and non-pharmacological therapy, was found to be the effective strategy to alleviate the symptoms of primary headaches in children and adolescents.

Keywords: Primary Headaches; Migraine; Tension Type Headache; School Absenteeism

Introduction

Headaches are among the top five health problems in childhood. Headaches can be a primary problem or occur as a symptom of another disorder, representing a secondary problem. One person faces three experiences of severe headaches at some stage of life. Though less common than adults, there are large number of children affected by primary headache disorders [1]. Using the International Classification of Headache Disorders, 2nd edition (ICHD II) criteria, which may in fact be overly strict for the pediatric population, according to a study the prevalence of headache in children up to 20 years of age is at approximately 58% with a 1.5/1 female to male ratio. They further state the incidence of migraine headaches in this population at 7.7%; 9.7% in females, and 6.0% in males throughout the age range. It has been well documented previously that in the younger children, boys tend to have more migraines than girls, but that this reverses at puberty [2]. Headaches can be a primary problem or occur as a symptom of another disorder, representing a secondary problem. Recognizing this difference is essential for choosing the appropriate evaluation and treatment to ensure successful management of the headache. Primary headaches are most often recurrent, episodic headaches and for most children are sporadic in their presentation [3].

Pathophysiology

Citation: Dr. Shubhankar Mishra. “Approach to Primary Headache in Children and Adolescents: Short Review”. EC Neurology SI.02 (2020): 12-19.
Headache in children and adolescents must be evaluated very carefully. Undue jump into diagnosis without proper evaluation must be avoided. Secondary causes as well as psychological benefit due to headache should be ruled out before approaching a case of primary headache.

Approach to headache in children

<table>
<thead>
<tr>
<th>Classification of headache (ICHD-3 Beta Code Diagnosis) [4]</th>
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<tbody>
<tr>
<td>Primary Headaches</td>
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<tr>
<td>1. Migraine</td>
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<tr>
<td>2. Tension-type headache (TTH)</td>
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<tr>
<td>3. Trigeminal autonomic cephalalgias (TACS)</td>
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<td>4. Other primary headache disorders</td>
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<tr>
<td>Secondary Headaches</td>
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<tr>
<td>5. Headache attributed to trauma or injury to the head and/or neck</td>
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<td>6. Headache attributed to cranial or cervical vascular disorder</td>
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<td>7. Headache attributed to nonvascular intracranial disorder</td>
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<td>8. Headache attributed to a substance or its withdrawal</td>
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<td>9. Headache attributed to infection</td>
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<td>10. Headache attributed to disorder of homeostasis</td>
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<tr>
<td>11. Headache or facial pain attributed to disorder of the cranium, neck, eyes, ears, nose</td>
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<tr>
<td>12. Sinuses, teeth, mouth, or other facial or cervical structure</td>
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<tr>
<td>13. Headache attributed to psychiatric disorder</td>
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<tr>
<td>14. Painful cranial neuropathies and other facial pains</td>
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</tbody>
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Table 1: Classification of headache.
# Approach to Primary Headache in Children and Adolescents: Short Review

## Type of primary headache

<table>
<thead>
<tr>
<th>Migraine</th>
<th>Subtypes</th>
<th>Diagnosis</th>
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| Typical throbbing or pounding unilateral (hemicrania) headache lasts 1-72 hrs/2-72 hrs. If the child falls asleep in that time the sleep time is included in the migraine episode. In younger children it can be bilateral. For a typical aura, the aura needs to be visual, sensory, or dysphasic, lasting longer than 5 min and less than 60 min with the headache starting within 60 min. Most common type of visual aura in children and adolescents is photopsia. | Migraine Without Aura | A. At least 5 attacks fulfilling criteria B to D  
B. Headache attacks lasting 4-72 hr (untreated or unsuccessfully treated)  
C. Headache has at least 2 of the following 4 characteristics:  
1. Unilateral location  
2. Pulsating quality  
3. Moderate or severe pain intensity  
4. Aggravation by or causing avoidance of routine physical activity (e.g., walking or climbing stairs)  
D. During headache at least 1 of the following:  
1. Nausea and/or vomiting  
2. Photophobia and phonophobia  
E. Not better accounted for by another ICHD-3 diagnosis |
| Migraine with Typical Aura | A. At least 2 attacks fulfilling criteria B and C  
B. Aura consisting of visual, sensory and/or speech/language symptoms, each fully reversible, but no motor, brainstem or retinal symptoms  
C. At least 2 of the following 4 characteristics:  
1. At least 1 aura symptom spreads gradually over 5 or more minutes, and/or 2 or more symptoms occur in succession  
2. Each individual aura symptom lasts 5-60 minutes  
3. At least 1 aura symptom is unilateral  
4. The aura is accompanied, or followed within 60 minutes, by headache  
D. Not better accounted for by another ICHD-3 diagnosis, and transient ischemic attack (TIA) has been excluded |

## Acute phase management

### Paracetamol (15 mg/kg)

| Tryptans: Almotriptan (12-17 yr).  
RizatRIPTAN 1-6 yr  
Zolmitriptan >12yr  
Other tryptans not FDA approved | Vestibular Migraine with Vertigo | A. At least 2 attacks fulfilling criteria B to D  
B. Aura consisting of visual, sensory and/or speech/language symptoms, each fully reversible, but no motor or retinal symptoms  
C. At least 2 of the following brainstem symptoms:  
1. Dysarthria 2. Vertigo 3. Tinnitus  
7. Decreased level of consciousness  
D. At least 2 of the following 4 characteristics:  
1. At least 1 aura symptom spreads gradually over 5 or more minutes, and/or 2 or more symptoms occur in succession  
2. Each individual aura symptom lasts 5-60 minutes  
3. At least 1 aura symptom is unilateral  
4. The aura is accompanied, or followed within 60 minutes, by headache  
E. Not better accounted for by another ICHD-3 diagnosis, and transient ischemic attack (TIA) has been excluded |

### Prophylaxis [3]:

- Calcium Channel Blockers: Flunarizine 5 mg hs  
  - Anticonvulsants: Valproic acid 20 mg/kg/24 hr  
  Topiramate 100-200 mg  
  Levetiracetam 20-60 mg/kg  
  Gabapentin 900-1800 mg  
  - Antidepressants: Amitriptyline 1 mg/kg  
  Antihistamines: Cypromidine 0.2-0.4 mg/kg  
  Hyptertensive: Propranolol 10-20 mg tid  
  - Others: Coenzyme Q10 1-3 mg/kg/day  
  Riboflavin 50-400 mg daily  
  Magnesium 9 mg/kg divided tid  
  OnabotulinumtoxinA 100 units (age 11-17 yr) | Chronic Migraine | A. Headache (tension-type-like and/or migraine-like) on 15 or more days per month for more than 3 mo and fulfilling criteria B and C  
B. Occurring in a patient who has had at least 5 attacks fulfilling criteria B to D for Migraine without aura and/or criteria B and C for Migraine with aura  
C. On 8 or more days per month for more than 3 mo, fulfilling any of the following:  
1. Criteria C and D for Migraine without aura  
2. Criteria B and C for Migraine with aura  
3. Believed by the patient to be migraine at onset and relieved by a triptan or ergot derivative  
D. Not better accounted for by another ICHD-3 diagnosis  
E. Not better accounted for by another ICHD-3 diagnosis |

### Hemiplegic migraine (sporadic or familial types 1, 2, 3, or other genetic loci)

- Familial hemiplegic migraine (FHM) is a rare autosomal dominant subtype of migraine with aura in which, in the context of otherwise typical migraine attacks, patients experience hemiplegia.  
  - Thus far, three genes for FHM have been identified: CACNA1A, ATP1A2, and SCA12A.  
  - The motor weakness is usually associated with another aura symptom and may progress slowly over 20-30 min first with visual and then followed in sequence by sensory, motor, aphasis, and then basilar auras  
  - Headache is present in more than 95% of patients and usually begins during the aura; headache may be unilateral or bilateral and may have no relationship to the motor weakness.  

### Retinal migraine

- Attacks fulfilling criteria for Migraine with aura and criterion B below  
  - Aura characterized by both of the following:  
 1. No visual field examination  
2. The patient’s drawing of a monocular field defect (made after clear instruction)  
D. at least two of the following:  
1. No visual field examination  
2. Symptoms lasting 3-60 minutes  
3. Accompanied, or followed within 60 minutes, by headache |

### Status migrainosus

- A. Headache attack fulfilling criteria B and C |

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| Complications of migraine | B. Occurring in a patient with Migraine without aura and/or Migraine with aura, and typical of previous attacks except for its duration and severity  
  C. Both of the following characteristics  
  D. unremitting for >72 hours  
  E. Pain and/or associated symptoms are debilitating |
<table>
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<tbody>
<tr>
<td>Persistent aura without infarction</td>
<td>Aura Occurring in a patient with Migraine with aura and typical of previous aura attacks except that one or more aura symptoms persist for ≥1 week &amp; Neuroimaging shows no evidence of infarction</td>
</tr>
</tbody>
</table>
| Migrainous infarction | A migraine attack fulfilling following criteria  
  - Occurring in a patient with Migraine with aura and typical of previous attacks except that one or more aura symptoms persist for >60 minutes  
  - Neuroimaging demonstrates ischaemic infarction in a relevant area  
  - A seizure fulfilling diagnostic criteria for one type of epileptic attack, and criterion below |
| Migraine aura-triggered seizure | - Occurring in a patient with Migraine with aura, and during or within 1 hour after an attack of migraine with aura  
  - Not better accounted for by another ICHD-3 diagnosis |
| Episodic Syndromes That May Be Associated with Migraine | Recurrent gastrointestinal disturbance (Cyclical vomiting syndrome)  
  A. At least five attacks of intense nausea and vomiting, fulfilling criteria B and C  
  B. Stereotypical in the individual patient and recurring with predictable periodicity  
  C. All of the following:  
  - Nausea and vomiting occur at least four times per hour  
  - Attacks last for ≥1 hour, up to 10 days  
  - Attacks occur ≥1 week apart |
| Benign vertigo | Probable tension-type headaches  
  A. At least five attacks of abdominal pain, fulfilling criteria B-D  
  B. Pain has at least two of the following three characteristics:  
  - Midline location, periumbilical or poorly localized/dull or “just sore” quality/mild or moderate intensity |
| Benign torticollis | Recurrent gastrointestinal disturbance (Abdominal migraine)  
  A. At least five attacks of abdominal pain, fulfilling criteria B-D  
  B. Pain has at least two of the following three characteristics:  
  - Midline location, periumbilical or poorly localized/dull or “just sore” quality/mild or moderate intensity |
| Tension-type headache (TTH) | Infrequent episodic tension-type headache associated with or without pericranial tenderness  
  Frequent episodic tension-type headache associated with or without pericranial tenderness  
  Chronic tension-type headache associated with or without pericranial tenderness  
  Probable tension-type headaches  
  Rx aspirin, acetaminophen, or NSAID for acute therapy  
  Prophylactic drug is possibly amitriptyline. |
| Trigeminal autonomic cephalalgias (TAC) | Cluster headache (episodic or cluster)  
  Acute (Symptomatic) Therapy: Oxygen, subcutaneous sumatriptan, Transient Prephylaxis short-term use of corticosteroids  
  Maintenance prophylaxis The calcium channel blockers  
  Paroxysmal hemicrania (episodic or cluster) (PH)  
  Rx Indomethacin  
  SUNCT  
  Rx lamotrigine Topiramate, carbamazepine, and gabapentin  
  Rx Both SUNCT and SUNA respond to trigeminal nerve microvascular decompression |

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Diagnosis and management

The current standard for diagnosis of headaches is the International Classification of Headache Disorders 3rd edition (beta version) [4]. As the criteria are designed to be a tool by which scientific studies of headaches can be advanced, it holds standardized criteria that

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balance specificity and sensitivity for diagnosis of headache (Table 1 and 2). But in many instances it’s difficult to differentiate between several primary headache disorders. When taking the history, we need to know family history [6]. The Pediatric Migraine Disability Assessment Score- PedMIDAS scoring holds good for estimation of disease burden in migraine [7]. When treating adolescents, one must additionally consider the child’s cognitive developmental stage. Whether at home or in school, teens should be allowed to ask for immediate medication when a headache hits. Healthy habits that include regular sleep, exercise, fluids, and meals become a cornerstone of treatment. Interviewing the adolescent with headaches can be tricky.

The treatment principles [8] of headache is same to every type of primary headache in children, whether a patient has migraine or chronic daily headache treatments:

1. Incorporate healthy habits to include eating breakfast, getting consistent sleep, exercise, and hydration.
2. Employ methods to cope with stress.
3. Treat attacks early to prevent chronic headache.
4. Treat attacks with high doses to combat gastroparesis.
5. Insist on school attendance.
6. Allow patient to participate in his/her care.
7. For patients with chronic headache and migraine spikes, treat the migraine spikes with migraine specific medication.
8. For those who require chronic medication, start slow and increase dose until either desired effect is achieved or there are troublesome side effects.
9. Pick a prevention medication that addresses comorbidity.
10. Realistic expectations dictate that change that will happen over months, not days.

**Treatments:** The American Academy of Neurology established useful practice Guidelines for the management of migraine as follows [3]:

1. Reduction of headache frequency, severity, duration, and disability
2. Reduction of reliance on poorly tolerated, ineffective, or unwanted acute pharmacotherapies
3. Improvement in quality of life
4. Avoidance of acute headache medication escalation
5. Education and enabling of patients to manage their disease to enhance personal control of their migraine
6. Reduction of headache-related distress and psychologic symptoms.

To accomplish these goals, 3 components need to be incorporated into the treatment plan [3]:

1. An acute treatment strategy should be developed for stopping a headache attack on a consistent basis with return to function as soon as possible with the goal being 2 hr maximum.
2. A preventive treatment strategy should be considered when the headaches are frequent (1 or more per week) and disabling.
3. Biobehavioral therapy should be started, including a discussion of adherence, elimination of barriers to treatment, and healthy habit management.

Migraine responds to almost any pain medicine when caught early. Evidence for the use of ibuprofen and acetaminophen in childhood exists. Triptans have been used safely for years in pediatrics [9] but only Rizatryptan and amlotryptan have FDA approval. Other treatment policies as well as doses are described in the table 2. Gastroparesis often complicates therapy, delaying absorption of therapeutic agents. Nausea is a very common complication in many patients. Anxiety may either be resultant to the misery being suffered or may be a pre-existing comorbidity. Promotility agents, antiemetics, and anxioyltics may be necessary. Promethazine, chlorpromazine, metoclopramide, and metoclopramide have been shown to relieve the nausea, while also showing therapeutic effect against the migraine itself [9].

Pediatric Migraine Disability Assessment Score (PedMIDAS) or persistent school absence, prevention in the form of medications and/or complementary methods should be employed [10]. All the chronic preventive therapies are discussed in the table 2. Multiple preventive medications have been utilized for migraine prophylaxis in children. But according to good clinical practice experiences [3] Flunarizine (a calcium channel blocking agent), demonstrated a level of effectiveness viewed as substantial. Flunarizine is typically dosed at 5 mg orally daily and increased after 1 mo to 10 mg orally daily, with a month off of the drug every 4 - 6 mo. Neutraceuticals have proved effective in chronic headaches. Those consist of coenzyme Q, riboflavin etc [11-13]. Combinations of ginko, coenzyme Q10, riboflavin, and magnesium have been studied in children and adolescents with positive outcomes [14]. Biobehavioral evaluation and therapy is essential for effective migraine management [3]. This includes identification of behavioral barriers and stressors for treatment. Its also mandatory to know the potential triggers for frequent migraines (skipping meals, dehydration, decreased or altered sleep) are related to a child’s daily routine, a discussion of healthy habits must be done with the parents. Maintaining healthy habits should include adequate fluid intake without caffeine, regular exercise, not skipping meals and making healthy food choices, and adequate (8-9 hr) sleep on a regular basis [15]. Destruction of sleep architecture has been one of the explanations for worsening headaches during the school year in general and at the beginning of the school year and week. Biofeedback-assisted relaxation and cognitive behavioural therapy (usually in combination with amitriptyline) are effective for both acute and preventive therapy and may be incorporated into this multiple treatment strategy.

Conclusion

Headache in children is always a multifactorial issue. Primary headache is very common in childhood and most of the headaches continue to the adult population. It has direct effect on the psychosocial development of the child. Early diagnosis and effective management can help avoidance of poor quality lifestyle and school absenteeism in these children.

Bibliography


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