The evaluation and management of paediatric headaches

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The management of patients with headaches is a major component of every paediatric practice. In a nationally representative sample of Canadian adolescents, it was found that 26.6% of those 12 to 13 years of age and 31.2% of those 14 to 15 years of age reported that they experienced headaches at least once per week.

The diagnosis of headaches in children and adolescents is established through a headache history in the vast majority of patients. Specific questions can identify those at most risk for headaches secondary to underlying pathology. Similarly, the examination should be tailored to identify those who require further investigation. Investigations are not routinely indicated for paediatric headache, but neuroimaging should be considered in children whose headaches do not meet the criteria for one of the primary headache syndromes and in those with an abnormal neurological examination.

The optimal treatment of primary headaches should begin with nonpharmacological methods. Preventive pharmacological therapy should be considered when headaches significantly impair the patient's quality of life. Flunarizine may be valuable in paediatric headache prevention, and ibuprofen, acetaminophen and nasal sumatriptan may be effective in the acute management of headaches.

Key Words: *Headaches; Ibuprofen; Migraine*

L'évaluation et la prise en charge des céphalées pédiatriques

La prise en charge des patients qui ont des céphalées est un aspect important de toute pratique pédiatrique. Dans un échantillon représentatif national d'adolescents canadiens, on a découvert que 26,6 % de ceux de 12 à 13 ans et 31,2 % de ceux de 14 à 15 ans déclaraient souffrir de céphalées au moins une fois par semaine.

Pour poser un diagnostic de céphalée chez les enfants et les adolescents, il faut obtenir les antécédents de céphalées chez la majorité des patients. Des questions précises permettent de déterminer ceux qui risquent le plus de souffrir de céphalées imputables à une pathologie sous-jacente. De même, il faut adapter l'examen pour repérer ceux qui ont besoin d'explorations plus approfondies. On ne demande pas des explorations d'emblée en cas de céphalée pédiatrique, mais il faut envisager une neuro-imagerie chez les enfants dont les céphalées ne respectent pas les critères de l'un des syndromes de céphalées primaires ou dont l'examen neurologique est anormal.

Pour prodiguer un traitement optimal des céphalées primaires, il faut commencer par des méthodes non pharmacologiques. Il faut envisager la thérapie pharmacologique préventive seulement si les céphalées nuisent considérablement à la qualité de vie du patient.

La flunarizine peut être utile pour prévenir les céphalées pédiatriques, et l'ibuprofène, l'acétaminophène et le sumatriptan nasal peuvent être efficaces pour leur prise en charge aiguë.

Headaches are among the top five health problems in childhood (1). In 1962, Bille (2) reported a prevalence of 40% for childhood headaches by seven years of age and 75% by 15 years of age. Sillanpäa and Antilla (3) found an increase in the prevalence of headaches from 14% in 1974, to 52% in 1996, among seven-year-old Finnish schoolchildren. Among Canadian adolescents, it was found that 26.6% of 12- to 13-year-olds and 31.2% of 14- to 15-year-olds reported headaches at least once per week (4).

Prevalence estimates for migraines vary from 1% to 3% for children seven years of age, and 4% to 11% for children eight to 15 years of age (2,5,6). In a Canadian population-based study (7), a prevalence for migraine of 2.4% for 12- to 14-year-olds and 5.0% for 15- to 19-year-olds was reported (7).

Paediatricians must have an approach to the management of children with headaches. In a 20-year follow-up study (8), headaches were found to persist into adulthood in 73% of children who presented with headaches. Teaching appropriate management (refer to the 'Management' section of the present paper) may, therefore, have lifelong benefits.

THE HEADACHE HISTORY

The headache history is key to making the diagnosis. In a prospective study (9) of 500 paediatric neurology patients, the role of the history (through letter of referral and at the time of assessment), the physical examination and investigations in both diagnosing and managing a variety of conditions were evaluated. Among 150 children with headaches, the history provided the correct diagnosis and management in 100% (9).

The patient must provide the history. Parents can be allowed to add their comments when the child has completed his or her account. Many children suffer from more than one type of headache, and it is essential to establish a detailed history for each type. The goal is to establish whether the headaches are primary or secondary to underlying pathology. If a secondary cause is excluded, one should categorize the specific primary headache disorder.

Rothner (10) has suggested an excellent series of questions as outlined in Table 1. Most children have primary headaches; the International Headache Society criteria for migraine and tension-type headaches are presented in Tables 2 and 3. In 2004, the International Headache Society introduced the revised headache diagnostic criteria, which

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TABLE 1
Helpful questions

1. When did the headache begin?	Chronic headaches are unlikely to reflect intracranial pathology. New onset worsening headaches are more likely to be due to a space-occupying lesion and require neuroimaging.
2. How did the headache begin?	Look for precipitants, such as head injury or social stresses.
3. What is the temporal pattern of the headaches?	Intermittent headaches separated by intervals of well-being are most likely to be migraines. Progressively more severe headaches are more likely to reflect pathology and require further investigations. Tension-type headaches (TTH) are usually chronic and nonprogressive.
4. What is the headache frequency?	Migraines typically occur weekly or less often. TTH occur daily or several times per week. Headache syndromes in childhood, such as cluster headache, may have their own unique pattern, occurring in clusters of two to three per week over a few weeks or months, followed by long periods of headache freedom. Headaches due to increased intracranial pressure (ICP) often occur nightly.
5. How long does the headache typically last?	Migraines are often brief, lasting 30 min to 120 min. Although the International Headache Society criteria define paediatric migraine as lasting up to 72 h, few paediatric patients have regular migraines that last this long. TTH often lasts 'all day'. Cluster headaches are brief.
6. Do the headaches happen at any particular time or circumstance?	Headaches that occur at night or in the early morning are more likely to reflect increased ICP, although as many as 25% of migraine episodes occur at night. Children with TTH may describe waking with their headache, although this is typically after the child arises in contrast with increased ICP, which may waken the child. Occasionally, headaches occur exclusively in one situation or circumstance (eg, school, when hungry or with changes in weather). Children with chronic morning headaches and a history of bruxism should be examined for temporomandibular joint dysfunction.
7. Is there an aura or prodrome?	Children with migraines may be able to describe or draw their aura. If the aura is persistently on the same side, a structural lesion should be excluded. Parents may predict a migraine hours before it occurs because their child may show a prodrome of lethargy, mood change, thirst or food cravings, yawning or pallor.
8. Where is the pain?	Migraine is bifrontal in more than 55%. TTH is usually more diffusely located. The severity of pain is not helpful in identifying serious causes of headaches (15). An inability to describe the quality of the headache is much more likely to distinguish those with brain tumours or ventriculoperitoneal shunt malfunctions; occipital headaches are more likely to occur in children with brain tumours (15). Persistently unilateral headaches should be considered to be suspicious (53).
9. What is the pain like?	Offering choices helps to determine the quality of the pain. Migraines are typically throbbing, but may be described as heavy or pressing. An inability to describe the pain is more significant than the actual choice of adjective. Historical concepts of throbbing equating to migraine and band-like to TTH are probably inaccurate.
10. Are there associated symptoms?	Migraines are usually accompanied by nausea, vomiting, anorexia, photophobia, phonophobia or osmophobia. Vomiting without accompanying nausea is suspicious. Migraine with aura may be associated with aphasia, vertigo, visual, sensory or other associated symptoms. If symptoms persist beyond the headache or if the associated phenomenon is persistent from one headache to the next, thought should be given to possible underlying pathology.
11. What do you do during the headache?	What a child does if a headache begins during play is often more informative than asking what they do if a headache begins at school. Those with migraines will usually interrupt their activity to return home. Children with TTH will often watch television or play video games. In comparison, those with migraines usually seek refuge in a quiet and darkened bedroom.
12. Would I know you had a headache if I saw you?	The child with migraines usually looks ill. Those with TTH usually appear normal.
13. What makes the headache better and worse?	Details on medication use can provide insight into both the headache and the patient/family's preferences for headache management. Many report using large doses of medication despite its lack of benefit. Migraineurs often describe benefit from sleep or simple analgesics taken early in the headache course. Aggravating factors in migraine include activity, light, noise and smells. Those with increased ICP will often find increased discomfort on lying down. Headaches due to low ICP are usually worse on sitting or standing up.
14. Are there symptoms between headaches?	Patients with migraines or TTH are asymptomatic between headaches. Ongoing symptoms, such as forgetfulness, confusion or localizing neurological symptoms suggest a structural lesion. Brain tumours may manifest as lethargy, personality changes or recent school failure. Difficulties with concentration may persist beyond the headaches in those who have suffered a concussion. In the setting of chronic daily headache, comorbid symptoms of depression may be present. Underlying psychosocial factors are common and may relate to learning difficulties, bullying, parental conflict, grieving reactions, and drug or alcohol abuse. In a population-based study (54), school-related factors, lifestyle and mental health were predictive of headaches in adolescence.
15. Are there any other health problems?	Children with chronic illnesses often feel stressed by their prognosis, they need to attend hospital visits and take medications. Those with hypertension may have 'migraine-like' headaches.
16. Are you taking medications?	Headaches may occur as an adverse effect to medications used to treat other conditions or to treat the headaches themselves. It is important to understand the attitudes of the patient and parents toward medication. Quantifying the child's use of nonprescription analgesics will identify those at risk for rebound analgesic headaches. A medication history may also reveal exposure to medications associated with idiopathic intracranial hypertension, such as oral contraceptives, vitamin A, isotretinoin, tetracycline and corticosteroids.
17. Is there a family history of headaches?	Many children with migraine or TTH have first-degree family members with similar headaches. In these families, educational efforts should be directed toward all those in the family with headaches.
18. What do you think is causing the headaches?	This is usually a very valuable question. Some children will identify a particular stressor of which the parents are often unaware. Both children and parents are also afforded the opportunity to discuss their fears of underlying pathology. A number of families will demonstrate a remarkable misunderstanding of the potential causes of their child's headaches. Many believe the headaches are caused by chronic sinusitis. There is no evidence to support chronic headaches as a result of chronic sinusitis.

Adapted from reference 10

TABLE 2
Revised International Headache Society diagnostic criteria for paediatric migraine without aura

A. At least five attacks fulfilling criteria B–D (below)
B. Headache attacks lasting 1 h to 72 h
C. Headache has at least two of the following characteristics:
   - Unilateral location, may be bilateral, frontotemporal (not occipital)
   - Pulsating quality
   - Moderate or severe pain intensity
   - Aggravation by or causing avoidance of routine physical activity (eg, walking, climbing stairs)
D. During the headache, at least one of the following:
   - Nausea, vomiting or both
   - Photophobia and phonophobia, which may be inferred from behaviour
E. Not attributed to another disorder

Adapted from reference 14

now recognize unique features of paediatric migraine (Table 2) (11). Paediatric migraineurs commonly report bilateral headaches that resolve within 2 h to 4 h, in contrast with adult migraines. Tension-type headaches and migraines may be part of a spectrum rather than distinct diagnostic entities. A common pathophysiological mechanism may explain the frequent co-occurrence of these headache types and evolution over time from one to the other (8,12).

THE PHYSICAL EXAMINATION

The examination must include both a general examination and a more focused assessment aimed at excluding secondary causes of the headaches.

The general examination should include measuring the vital signs to identify fever or hypertension. Growth parameters may suggest growth failure associated with chronic illness or tumours. The head circumference should be measured to exclude hydrocephalus or macrocephaly; the skin examination may reveal neurocutaneous stigmata. Children with neurofibromatosis type 1 are prone to headaches (13). A thorough ophthalmological assessment is critical to exclude papilledema. Although a frequent parental concern, headaches due to poor visual acuity are easily identified by most patients as induced by reading or watching television. Competent fundoscopy is easily learned by following a simple seven-step approach (14).

Several studies (15-17) have shown that children with headaches due to serious pathology have demonstrable neurological signs on examination. Lewis and Qureshi (15) prospectively analyzed 150 children presenting to the emergency department with headaches, and identified 18% with serious underlying pathology, all of whom had clear neurological signs. Brain tumour headaches are associated with neurological findings in 85% within eight weeks of headache onset and in virtually all cases by 24 weeks (18). The Childhood Brain Tumor Consortium Study (19) showed that 98% had at least one neurological sign at diagnosis. Sobri et al (20) identified three features that showed a strong positive predictive value for intracranial pathology: papilledema, paralysis, and drowsiness, confusion or loss of consciousness.

TABLE 3
Criteria for episodic tension-type headaches

1. At least 10 episodes fulfilling criteria 2 to 4 (below)
2. Headache lasting 30 min to seven days
3. Two or more of the following:
   - Pressing/tightening quality
   - Mild to moderate severity
   - Bilateral
   - Not aggravated by routine activity
4. Both of the following:
   - No nausea or vomiting
   - Phonophobia or photophobia is absent

Adapted from reference 14

THE HEADACHE EXAMINATION

Linder (21) pioneered the formalized headache-specific examination. The examination should focus on the secondary causes given below:

Vascular

Fear of an underlying vascular malformation is common, especially if there is a family history of subarachnoid hemorrhage or arteriovenous malformation. Teasdale et al (22) found no bleeds up to 20 years of age among 8791 relatives of patients with subarachnoid hemorrhage. Cranial auscultation may identify bruits, but it is important to remember that cranial bruits can be heard in 60% of normal four- to five-year-olds and in 10% of 10-year-olds. Most of these benign bruits disappear when the ipsilateral carotid artery is compressed. Bruits secondary to arteriovenous malformations usually have a prominent diastolic component.

Infections

Central nervous system infection should be sought by assessing meningeal irritation with passive neck flexion, and Brudzinski and Kernig's signs. Kernig's sign is elicited in the supine patient by flexing the hip and knee, and then passively extending the leg. Resistance by the patient is considered a positive sign. Brudzinski's sign is most commonly performed by passively flexing the neck, while watching for either hip or knee flexion. Measurement of the temperature is important because up to 30% of acute headaches may be secondary to viral infections (16). Burton et al (17) found that viral illness accounted for 39% of headaches in an emergency room in the United States. In the study by Cady and Schreiber (23), sinusitis accounted for 16% of headaches. Note that many 'sinus headaches' are migraines. Linder (21) uses Mueller's manoeuvre to detect increased pressure in the sinuses. This useful technique is performed by getting the child to hold their nose while counting to three. The child then coughs, and the transient increase in sinus pressure aggravates a headache caused by sinusitis. This manoeuvre should not be attempted if there is evidence of increased intracranial pressure (ICP) or during an acute migraine. There is no evidence that chronic sinusitis causes headaches. An examination of the mouth for dental caries may be helpful, although most children can identify dental pain.

Increased ICP

Children whose headaches are secondary to increased ICP may have evidence of papilledema or optic nerve pallor, especially those who have long-standing increased pressure from idiopathic intracranial hypertension. If neither of these findings is present, but one's suspicion is still high, Mueller's manoeuvre while compressing the venous return in the neck might induce discomfort (21).

Trauma

Signs of head trauma suggest a possible concussion. Finding evidence of concussion through the history or examination can be very difficult, as outlined by Gordon (24). Some children with concussions may have very mild ataxia and subtle coordination deficits as the only finding at the time of consultation. Mild ataxia can be demonstrated by having the child pirouette three times. This will detect ataxia, which is not evident on tandem gait testing.

Musculoskeletal

Pain from the cervical spine can result in headache, which may be perceived beyond the expected dermatomal distribution. In these patients, discomfort can usually be elicited by having the child push the head forward against your hand and by checking for the range of lateral movement. When the head is tilted 15°, one can test C1-C2, at 45° one tests C3-C6 and with the neck fully flexed to place the chin on the chest, one can test C7-T1 (21).

Temporomandibular joint

The normal adolescent should be able to open the mouth at least 4.5 cm to 5 cm. One should palpate the joint with the mouth open and then closed. Palpation of the lateral meniscus is achieved with pressure in front of the tragus of the ear, while the medial meniscus is most easily felt with your finger in the child's ear.

The neurological examination is usually normal in children with headache, but it does provide reassurance of the thoroughness of the evaluation, and it helps exclude underlying pathology. A recent retrospective review (25) of paediatric brain tumours identified abnormal neurological signs at diagnosis in 88%. While headache was the most common presenting symptom in this series, all had other symptoms at diagnosis.

INVESTIGATIONS

Diagnostic studies are seldom required unless risk factors are identified. Anxiety about secondary causes abounds, and many families and physicians feel compelled to embark on investigations for children with headaches. Routine neuroimaging is neither effective nor appropriate in alleviating these concerns. Unwarranted investigations may be counterproductive because they can suggest that you did not find (and, therefore, do not know) the cause of the headaches. This can undermine your attempts at reassurance.

The American Academy of Neurology and the Child Neurology Society (USA) have published practice parameters for the appropriate investigations in children with headaches (26). They concluded that there are inadequate data to support routine laboratory studies or lumbar puncture. Unless there are compelling suggestions from the history or examination to suggest a metabolic cause, such as hypoglycemia, laboratory tests are extremely unlikely to be helpful.

If the history or physical examination raises concern about meningitis or encephalitis, a lumbar puncture will be necessary, providing there is no evidence of raised ICP. Typical signs of meningitis may be absent in young children. When in doubt, especially in a young child, a lumbar puncture is warranted. In headaches caused by pseudotumour cerebri, the lumbar puncture may be both diagnostic and therapeutic.

The practice parameters noted that "EEG is not recommended in the routine evaluation, as it is unlikely to define or determine an etiology or distinguish migraine from other types of headaches" (26). In children with headaches who have a paroxysmal electroencephalogram, the risk for future seizures is negligible. Therefore, further investigation for epilepsy or treatment aimed at preventing future seizures is not indicated (26). Fortunately, few physicians now order electroencephalograms to be performed on their headache patients.

Neuroimaging on a routine basis is not indicated in children with recurrent headaches and a normal neurological examination. It should be reserved for a selected group of children whose history and/or physical examination suggest serious intracranial pathology. Several studies (27-29) have evaluated the role of neuroimaging for children with headaches. The practice parameters suggest that physicians should consider imaging in children with an abnormal neurological examination or other physical findings that suggest central nervous system disease (26). Magnetic resonance imaging scanning should be considered if the patient has an abnormal neurological examination, associated seizures, a recent onset of severe headaches, and a change in headache type or associated features to suggest neurological dysfunction.

While 25% of schoolchildren will experience chronic headaches, brain tumours are very rare (three to five per 100,000), and only rarely present as isolated headaches (30). Therefore, in excess of 50,000 children with headaches would require neuroimaging to discover one brain tumour presenting without other signs or symptoms. Routine neuroimaging is not a practical screening method. Computed tomography scans entail substantial radiation exposure (31), which may influence families who demand further investigation. For acute situations, the availability of computed tomography scans in most institutions makes it the preferred imaging modality. Magnetic resonance imaging is preferred for evaluating congenital anomalies, sellar masses and craniocervical abnormalities. The routine use of neuroimaging may lead to the discovery of incidental benign abnormalities, which may cause undue alarm, and headaches may be wrongfully attributed to these incidental findings. A recent retrospective study (32) revealed benign

TABLE 4
Pharmacological treatment options for headaches in childhood

Acute abortive medications	Paediatric dosage	Evidence
Ibuprofen	10 mg/kg/dose	Class I
Acetaminophen	10–15 mg/kg/dose	Class I
Nasal sumatriptan	5 or 20 mg dose	Class I
Prophylactic medications	**Paediatric dosage**	**Evidence**
Flunarizine*	5 mg/day	Class I
Propranolol	2–4 mg/kg/day	Class II (conflicting results)
Cyproheptadine	0.25–1.5 mg/kg	Class IV
Amitriptyline	10–25 mg/day at bedtime	Class IV
Topiramate	1–10 mg/kg/day	Class IV
Valproate	20–40 mg/kg/day	Class IV
Gabapentin	10–40 mg/kg/day	Class IV

**Not available in the United States*

neuroimaging abnormalities in 20% of paediatric headache patients who underwent neuroimaging. 'Benign' findings included sinus disease, nonspecific white matter abnormalities, venous angiomas, arachnoid cysts, pineal cysts and mega cisterna magna. Although headaches have been described with each of these findings, they do not generally lead to change in headache management.

MANAGEMENT

Children who are seen because of headaches want to determine the cause of their headaches, find effective treatment and receive reassurance that the headaches are not due to a life-threatening cause (33).

Nonpharmacological approaches remain the first-line approach to all headache management, including chronic daily headache. A headache diary may be remarkably therapeutic. It allows the child and parent to explore the headache patterns and identify precipitating factors. It provides an outlet for the child to express both the headache symptoms and associated triggers. Headache precipitants vary for each child and may include overtiredness, missed meals, changes in physical activity, hormonal changes, bright lights, food and stress (34). Stresses that induce headaches may be either 'good' (excitement, such as a sleepover) or 'bad'. Bad stressors are often relatively minor, and the parents may be unaware of them. Focusing on headache precipitants will also, hopefully, teach the child lifelong strategies for managing headaches (35). The headache diary must be the responsibility of the child and not the parents.

Other nonpharmacological approaches include appropriate sleep hygiene, regular physical activity, limiting caffeine intake, relaxation techniques, biofeedback and self-hypnosis. Elimination diets are seldom beneficial. Behavioural therapies, such as relaxation techniques and biofeedback, have demonstrated efficacy in the treatment of paediatric headache with improvements reaching 80% (36). While most paediatricians refer patients who require these therapies to a psychologist, it is possible for paediatricians to receive training in these areas from the Society of Developmental and Behavioral Pediatrics (USA).

Medications

Few medications have demonstrated effectiveness for childhood headaches, partly because of both a high placebo response rate and the short duration of the typical paediatric migraine attack. The placebo response rate can be as high as 60% to 70%; the average headache is less than 2 h, which has been the standard end point for most studies in adults. Therefore, most randomized controlled trials in children have failed to show positive results for the various medications used to treat adult migraine.

Pharmacological approaches to headache treatment include both acute symptomatic and prophylactic medications (Table 4). Nonprescription analgesics are effective for acute headache relief in most patients if they are given early and in appropriate doses. Ibuprofen has been shown to be safe and efficacious in the management of paediatric migraine in two double-blind, placebo-controlled trials (37,38). One study (37) compared the efficacy of 15 mg/kg of acetaminophen with 10 mg/kg of ibuprofen and found no significant differences in outcome. Both ibuprofen and acetaminophen were more effective than the placebo in providing pain relief. Lewis et al (38), however, have shown that the effect of ibuprofen at the primary end point of 2 h was effective in boys only. Among the boys, a response at 2 h was seen in 84% of those treated with ibuprofen compared with 43% of the placebo-treated group. For girls, the numbers were less impressive, with 65% responding to ibuprofen and 67% to the placebo (38). Nonprescription analgesic use should be limited to a maximum of two to three times per week to avoid precipitating rebound analgesic headaches.

Serotonin receptor agonists (triptans) have become the mainstay of treating adult migraine and are an option for children with severe migraine. Three controlled trials (39-41) in adolescents have demonstrated both efficacy and safety of nasal sumatriptan for migraine relief. A randomized controlled trial (42) of sumatriptan nasal spray in adolescents with migraine showed efficacy at 30 min and 2 h, but failed to reach statistical significance for the primary outcome measure of headache relief at 1 h. Oral triptans have not been shown to be effective in class I studies, and

there are inadequate data on the use of subcutaneous sumatriptan in children (26).

In 2004, the American Academy of Neurology and the Child Neurology Society published practice parameters, which recommended ibuprofen and nasal sumatriptan as proven therapies for childhood migraine, and stated that acetaminophen was 'probably effective' (43). Damen et al (44) reviewed 10 trials with a total of 1575 patients four to 18 years of age. They concluded that there was moderate evidence that both acetaminophen and ibuprofen were more effective in the reduction of headache symptoms after 1 h and 2 h than the placebo. Among the nonanalgesics, there was moderate evidence that nasal sumatriptan was more effective than the placebo, but was associated with significantly more side effects. They reported no differences in effect between oral triptans and the placebo (44).

Prophylactic medications should be considered when headaches have an impact on activities and school attendance, and cause functional disability. Tools for evaluating headache-related disability and quality of life may provide better measures of the true impact of headaches.

Medications, which are effective in adults with headache, often fail to demonstrate a significant therapeutic response in children. Three randomized double-blind trials of propranolol for migraines failed to show a consistent therapeutic effect. A single double-blind crossover trial reported a significant prophylactic effect of propranolol, while two others showed no benefit (45-47). Beta-blockers are contraindicated in children with reactive airway disease, diabetes, orthostatic hypotension and cardiac conditions associated with bradycardia. Athletic children may find beta-blockers intolerable because of limitation of physical stamina.

Three reviews have stressed the paucity of proven medications for treating paediatric headache. In a 2003 Cochrane Review of drugs for preventing migraine in children, Victor and Ryan (48) concluded that only propranolol and flunarizine have proven benefit in appropriate randomized controlled trials. The American Academy of Neurology and the Child Neurology Society practice parameters reached similar conclusions, although they pointed out that only one (43) of three trials of propranolol proved statistical superiority over the placebo.

Among the available medications, only flunarizine has been consistently effective in well-designed controlled trials for migraine prevention (49,50). Flunarizine is a calcium-channel blocker with the potential side effects of weight gain and sedation. Unfortunately, it is unavailable in the United States.

A number of other medications have a 'time-honoured' place in the treatment of childhood headaches, without supportive evidence. Cyproheptadine is an antihistamine with calcium-channel blocking and antiserotonergic properties, which is commonly used for paediatric migraine prophylaxis, although there are no controlled trials to support its use (51). The major side effects are weight gain and sedation. Uncontrolled data suggest a possible beneficial effect of topiramate, valproate, lamotrigine and gabapentin in paediatric migraine prevention, but the data are quite limited (26,52).

CONCLUSION

The prevalence of paediatric headaches, their associated morbidity and their tendency to persist into adulthood demand that headache prevention should be a priority for every paediatrician. The use of a headache diary and the ability to subsequently avoid precipitants is an effective approach to headache prevention if the patient rather than the parent assumes responsibility. Although medications can be effective, most children with headaches can be managed with simple analgesics and a headache diary.

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