

Headache in childhood and adolescence

Headache is a common complaint in childhood and adolescence. Although the headaches are generally infrequent and rarely life-threatening, young people frequently present, with their parents, to doctors seeking reassurance that this symptom does not have a serious cause. When headache becomes chronic, it may impact significantly on wellbeing, and effective management may present a challenge.

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In the recent Australian Institute of Health and Welfare 1999 report, *Australia's young people: their health and well being*, headache was the most frequent reported recent illness for young people aged 10 to 24 years.¹ Epidemiological studies show that the incidence of headache increases with age. By 7 years of age, 40% of children will have experienced one or more episodes of headache. This increases to 75% by 15 years of age.² Here, we examine the common causes of headache in the paediatric and adolescent population and provide an approach to diagnosis and management.

What causes head pain?

Headache (head pain) may arise from intra- and extracranial structures. Intracranial structures sensitive to pain include larger arteries, veins, venous sinuses, dura and the basal meninges. Extracranial structures from which pain can arise include extracranial vessels, muscles, subcutaneous tissues, skin and mucous membranes. The brain, the cranium and most of the meninges are not pain-sensitive.

There are currently two prevailing theories for the development of migraine:

- the vascular theory – vasoconstriction occurs during the initial phase, producing the aura and focal neurological signs; vasodilation follows, associated with a sterile inflammation due to the focal ischaemia, causing the throbbing pain.
- the neurogenic theory – afferent inputs to the brainstem result in a spreading wave of neuronal depression culminating in neurogenic inflammation and vascular reactivity projected back to the cortex; many neuropeptides, including serotonin (5HT), are implicated in this process.

Approach to diagnosis

What types of headache are there?

A practical and useful way of classifying headache is according to its pattern over time³ – that is, acute, acute recurrent, chronic nonprogressive and chronic progressive (Figure 1). Table 1 expands on this classification of headache.

IN SUMMARY

- Identifying a specific headache syndrome is the key to diagnosis and management of headache in children and adolescents.
- A headache diary is helpful in identifying trigger factors, and in determining the frequency and severity of the headache and its temporal profile.
- Psychosocial factors play an important role in recurrent and chronic headaches.
- Successful management of headache in children and adolescents includes a combined pharmacological and nonpharmacological (behavioural) approach.

Acute (single) headache

An acute headache is a single event.

The most common causes of an acute isolated headache in the emergency department are pharyngitis and sinusitis. Other causes include systemic illness, central nervous system infection, intracranial haemorrhage, hypertension, temporomandibular joint dysfunction, dental causes and, uncommonly, refractive error.

Acute recurrent headache

Acute recurrent headaches are headaches that occur periodically.

Migraine is the key example of acute episodes of headache separated by pain-free periods.

Chronic nonprogressive headache

Chronic nonprogressive headaches do not change significantly over time despite occurring on a daily or weekly basis.

In the absence of neurological signs, these headaches are often nonorganic. Tension-type headache and headache due to muscular contraction fall into this category.

Chronic progressive headache

Chronic progressive headaches increase in severity and frequency.

Signs and symptoms of raised intracranial pressure such as vomiting, visual loss and ataxia may occur, leading to suspicion of a brain tumour or hydrocephalus. A more common cause of raised intracranial pressure in adolescents is benign intracranial hypertension (pseudotumour cerebri).

Clues from the history

A detailed history of the headache/s is important to obtain from both the patient and his or her parents. Important questions are summarised in the box on page 21 and should address age of onset, the course of the headaches, details of a typical episode, frequency, trigger factors, family history, treatment modalities used and the patient's response to them, and the existence of any other chronic illnesses. The possibility of raised intracranial pressure and the role of psychosocial factors should also be considered (see below).

When dealing with adolescents it is important to conduct part of the interview separately from their parents to create an opportunity to raise and

Headache in children

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Headache is common in childhood and adolescence. Although it may be due to serious underlying pathology, most headache in the young is due to tension-type headache and, as depicted here, migraine.

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Consultant's comment

There is a widely held misunderstanding among health professionals, parents, children and adolescents that headache is rare in children. As Dr Yeo and her colleagues indicate, headache is a common complaint in childhood and adolescence. Further, although headaches in the young often result in significant morbidity, they are rarely due to a serious cause. Obtaining a careful history is far more important than reflexly writing a request form for a CT of the brain.

This article provides a straightforward approach to diagnosis and the nature of headaches that require further investigation, and presents a management plan that incorporates both pharmacological and nonpharmacological approaches.

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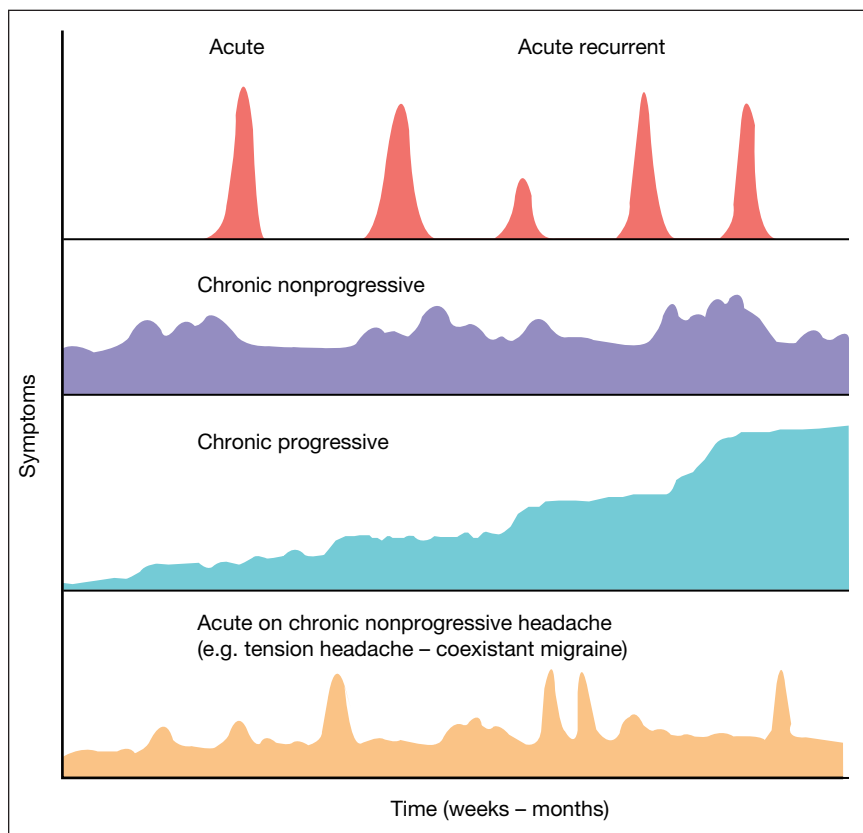


Figure 1. The temporal pattern of headache syndromes. Adapted from reference 4.

discuss issues they may not want their parents to know about. Some adolescents do not know the doctor is obligated to maintain confidentiality: explaining this obligation to the young patient will help to provide reassurance and establish rapport.

Raised intracranial pressure

Symptoms and signs of raised intracranial pressure should be sought specifically. Typically the headache is a nonpulsatile, deep pain which changes in severity with posture, straining and coughing. It may be associated with nausea, vomiting (especially in the early morning), visual disturbance, ataxia, weakness and personality change.

Psychosocial factors

Psychosocial factors are often associated with recurrent headaches. Psychological

distress correlates closely with the frequency of headaches. It is therefore important to identify stressors in the child or teenager's life. The HEADSS screen is a useful tool in taking a psychosocial history in adolescents (Table 2).

Marital discord, or recent moves to a new home or school, may have an underestimated, large impact on a child or a teenager's life. Enquiring about the amount of school missed, grades attained, exposure to bullying and peer relationships may provide insight into the cause of the headaches and their effect on the patient. Adolescents, in particular, may have difficulty in keeping up with the hectic lifestyle of attending school, doing their homework, holding down a part-time job and maintaining a busy social life. Lack of rest and irregular meals may also contribute to headache.

Table 1. Headache: a practical classification

Acute

- Systemic infection
- Central nervous system infection (e.g. meningitis, encephalitis)
- Trauma (e.g. post-concussion syndrome, neck injury, subdural haemorrhage)
- Intracranial haemorrhage
- Hypertension
- Sinusitis
- Dental abscess
- Visual problems (e.g. refractive error, astigmatism, strabismus)
- Toxins (e.g. CO, nonmedicinal drugs)

Acute recurrent

- Migraine (common, classical, complicated)

Chronic nonprogressive

- Tension-type (i.e. stress related)
- 'Muscular contraction' type
- Anxiety or depression
- Somatisation

Chronic progressive

- Brain tumours
- Benign intracranial hypertension
- Brain abscess
- Hydrocephalus

Clues from the examination

A complete examination should include a child's growth parameters and head circumference. Growth can be affected by a chronic illness and by hypothalamic-pituitary axis dysfunction. When cranial sutures have not completely fused, raised intracranial pressure may lead to an enlarged head.

On general examination, hypertension must be excluded; fever, neck stiffness and an altered conscious state may point to meningitis or encephalitis.

In the neurological examination,

Table 2. Taking a psychosocial history: the HEADSS approach⁵

Mnemonic	Area	Questions
H	Home	Where do you live? Who do you live with?
E	Education	Are you at school? What year are you in? What are your grades like?
A	Activities	What do you do for fun? What do you do with your friends?
D	Drugs	Many people your age experiment with cigarettes, alcohol and drugs. Have you ever tried using them?
S	Sexuality	Most young people have become interested in sex at your age. Have you ever had a sexual relationship?
S	Suicide/depression	Many people feel sad and down at times. Have you ever thought life not worth living?

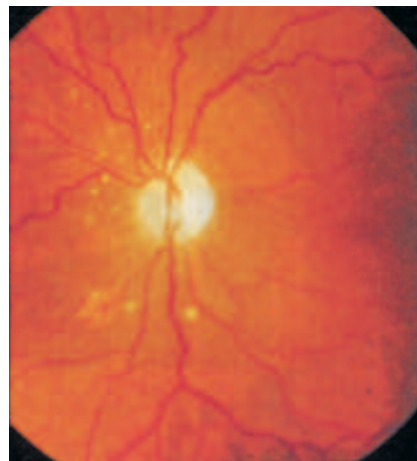
careful attention must be paid to fundoscopy (papilloedema, Figure 2), obtaining visual acuity, listening for cranial bruits and identifying focal neurological signs. Examination of other anatomical structures where pain can arise such as sinuses, teeth and the pericranial muscles can also give useful clues.

What investigations are needed?

Acute headache

In acute headache, if one suspects an intracranial infection and there are no signs of raised intracranial pressure, a lumbar puncture is essential to confirm or exclude the provisional clinical diagnosis. Blood tests of infective markers are important as are blood tests for evaluating a chronic systemic disorder – for example, hypertension from renal impairment.

A CT scan of the brain is indicated if an acute intracranial event, such as an intracerebral haemorrhage, is suspected. A CT scan of the sinuses can be used to confirm a clinical diagnosis of sinusitis.



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Figure 2. Papilloedema.

Other headache

In most patients with acute recurrent and chronic nonprogressive headaches, investigations are unnecessary. However, the decision to perform further investigations may be dictated by the anxiety level of the family and the child, notwithstanding the doctor's reassurance of a benign process.

Chronic progressive headache requires

Taking a history

A detailed history will help to identify the specific headache syndrome being experienced by a child or adolescent.

Doctors should ask about:

- age of onset
- course of the headaches – frequency at onset versus frequency at time of consultation, increasing or decreasing frequency, and the relationship to other activities (e.g. school v. holiday time)
- details of a typical episode – events occurring prior to the headache (e.g. trauma or an aura, such as visual changes or paraesthesiae), time of day, and location
- severity – this can be difficult to gauge in young children but may be inferred from how much the headache interferes with activities or how much school has been missed
- duration and nature of the pain – for example, throbbing; a younger child may draw a picture of the pain or the aura
- exacerbating and relieving factors – for instance, is sleep helpful?
- associated symptoms – such as vomiting, photophobia or phonophobia (intense dislike of noise), pallor, paraesthesiae, weakness, speech or visual changes, and other neurological symptoms
- trigger factors
- a family history of headaches or migraine
- medication or other methods of treatment and the response to treatment
- symptoms and signs of raised intracranial pressure
- any (other) chronic illnesses

neuroimaging. The diagnosis of benign intracranial hypertension relies on the observation of an increased opening pressure of the cerebrospinal fluid during

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Table 3. Neuroimaging: indications

- Headache increasing in severity and frequency
- Sudden onset of new, severe headache
- Recurrent early morning headache or frequent awakening due to headache
- Increased pain with straining, coughing and lying
- Abnormal neurological examination
- Reduced visual acuity
- Drop off in growth rate
- Recent behavioural change

a lumbar puncture; it is essential that neuroimaging be carried out prior to this procedure. Indications for neuroimaging in a child or adolescent with headache are listed in Table 3.

Which imaging modality should be used? CT and magnetic resonance imaging (MRI) are both rapid and safe modalities for evaluating headache that suggests possible intracranial pathology.⁶ CT



Figure 3. Investigating childhood headache: a noncontrast CT scan showing a large ependymoma with calcification, oedema and marked midline shift.

scans can demonstrate most structural causes of headache (Figure 3). Hypothalamo-pituitary lesions and subtle vascular abnormalities may require the use of MRI in specialty practice but are not recommended for primary care evaluation (Figure 4).

Approach to management

Diagnosis of a specific headache syndrome is the key to management – the use of a headache diary may assist this process.

The headache diary

A headache diary can identify trigger factors, establish the true frequency and severity of headache (by asking the child or adolescent to grade headache according to a scale) and highlight any correlation with specific activities (Figure 5).

A headache diary will also help to tease out the different patterns that reflect specific headache syndromes, so that appropriate management approaches can be introduced accordingly. It is not uncommon for migraine and tension-type headache to occur in the same individual, and older children and adolescents

can learn to recognise their various types of headache and seek the appropriate form of relief.

Managing migraine

Migraine affects approximately 5% of children by 15 years of age. The incidence in males and females is roughly equal. After puberty, however, the disorder is more common in females. There is a positive family history in 70 to 80% of cases.

Reassurance and education of the parents and their child are important in lessening the family’s anxiety. Trigger factors should be identified and eliminated if possible. Successful treatment includes both pharmacological and nonpharmacological means.

Types and characteristics

The criteria for the diagnosis of migraine are listed in the box on page 25.

A variety of factors may trigger migraine. Common precipitants include fatigue and lack of sleep, stress, various foods and food additives, hunger, exercise, medication and menstrual periods. Emotional stress commonly increases the frequency of migraine attacks. Migraine attacks typically last from a few hours to a few days and tend to occur in clusters. The three most common types of migraine that are experienced in childhood and adolescence are classical, common and complicated.

Classical migraine

Classical migraine is characterised by the presence of an aura. This is usually visual and may manifest as a central scotoma, flashing lights, blurred vision or distorted images. Perioral paraesthesiae and tingling in the limbs may also occur. The aura may last for up to 30 minutes.

Common migraine

Common migraine is the most frequent form of migraine in childhood. In common migraine, the aura is not present.

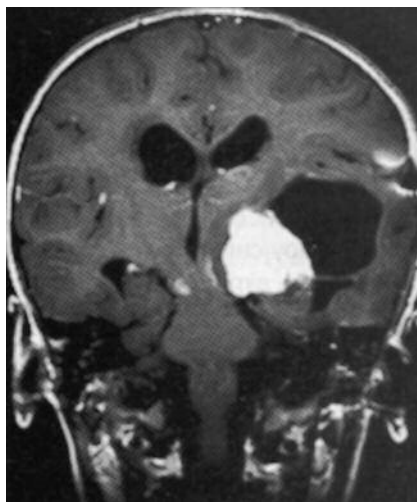


Figure 4. Investigating childhood headache: a coronal T1-weighted postcontrast MRI scan showing a large thalamic, partly solid, partly cystic tumour with midbrain compression and hydrocephalus.

Paediatric migraine: Prensky's diagnostic criteria⁷

According to Prensky, a diagnosis of paediatric migraine requires recurrent episodes of headache separated by symptom-free intervals and at least three of the following:

- hemicranial pain
- pain of a throbbing nature
- associated nausea, vomiting and abdominal pain
- aura – visual, sensory or motor
- relief after rest
- a family history of migraine in a first degree relative.

The child or teenager may experience nonspecific symptoms such as nausea or lethargy prior to the onset of headache.

Complicated migraine

Complicated migraine is characterised by a transient neurological abnormality associated with the headache, which may include visual field deficits, ophthalmoplegia, dysphasia, hemiparesis or hemianaesthesia.

Pharmacological treatment

Pharmacological treatment can be divided into two types: abortive therapy and prophylactic medication. In general, dosage is based on the patient's weight.

Abortive therapy

Simple analgesics such as paracetamol or nonsteroidal anti-inflammatory drugs (NSAIDs) are effective if an adequate dosage is administered at the onset of the attack.

Antiemetics such as metoclopramide (Maxolon, Pramin) may also be effective alone or in combination with simple analgesics in children with recurrent vomiting. However, antiemetics should be used with caution because they can be associated with oculogyric crises.

		AM	PM	Night	Comment
Week 1	Mon	••	••	•	School OK
	Tue	•	• netball practice	TV till 11.30pm	
	Wed	••• came home	•••• panadol	•••• panadol	Had to go to bed
	Thurs	••	••	•	Off school
	Fri	•	•	•	School OK
	Sat	•	•	•	Slept in, TV
	Sun	•	–	•	PM bike ride
Week 2	Mon	••	••	••	Boring
	Tue	•	–	–	Teacher strike
	Wed	–	–	–	School OK
	Thurs	–	•	•	
	Fri	Went to Sydney with mum			
	Sat	Forgot to bring diary (Sorry!)			
	Sun				
Week 3	Mon	•	••	••• panadol	Really bad
	Tue	•• runny nose	•••	••	Went to school
	Wed	••	••	••	Sore throat
	Thurs	••• allowed off	••• panadol	••	Bed early
	Fri	••	••	••	Day off
	Sat	••	••	•	Lisa's party
	Sun	•	•	•	
Week 4	Mon	–	–	–	Cinema
	Tue	–	Dr's office	–	
	Wed	–	–	–	No chocolate
	Thurs	•	•	–	Still no chocolate
	Fri	•	–	–	Got period
	Sat	••	••	•	Day with dad
	Sun	••	•	•	
Week 5	Mon	–	•	•	
	Tue	••• panadol	•••panadol	••• panadol	Mum's a cow
	Wed	••	••	••	Missed school
	Thurs	••	••	••	Back there
	Fri	••	••	••	
	Sat	•	•	•••	No choc or party
	Sun	••	••	••	Quiet day

– No headache • light •• irritating ••• bad •••• unable to tolerate

Figure 5. The headache diary of a 14-year-old girl with chronic recurrent headache. Exacerbating factors seem to be late night time, upper respiratory tract infection, arguing with her mother and, perhaps, spending time with her father. Interestingly, there is no headache on going to Sydney and visiting the doctor.

Sumatriptan (Imigran) is a serotonin (5HT) agonist. It is an effective but expensive treatment for migraine in adults. It can be used orally, subcutaneously and intranasally. The response

of children to oral sumatriptan is less favourable than in adults and the drug, taken orally, was not found to be better than placebo in double-blind trials. Better results have been reported with

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subcutaneous administrations, however, these studies were not controlled. Until the safety and efficacy of sumatriptan can be confirmed in children, it is not recommended for general use under the age of 18 years.⁸ Other serotonin agonists such as naratriptan and zolmitriptan have not yet been adequately studied in children and adolescents for use, currently.⁸

Narcotics should not be used, if possible, as migraine is a recurrent problem.

Other agents such as ergotamine and ergotamine derivatives can be considered for older children and adolescents with severe, intractable migraine. These drugs are contraindicated in hemiplegic migraine and should be used in consultation with a paediatric neurologist.⁸

Prophylactic medication

Prophylactic medication can be used if young people experience frequent attacks of migraine, particularly if this interferes with their ability to function normally. For example, if there has been significant school absence or the child is unable to participate in sporting activities. Often it is necessary to establish (with the help of a headache diary) that migraine occurs frequently enough to warrant taking long term medication twice daily.

A range of medications can be used including beta blockers, the serotonin antagonist pizotifen (Sandomigran), cyproheptadine (Periactin) and calcium channel blockers. Many of these drugs have not been extensively evaluated for efficacy in children, and paediatric referral, either to a general paediatrician or a paediatric neurologist, is recommended prior to the use of these medications.

Nonpharmacological treatment

Initial management of migraine should include rest in a quiet, darkened room. Other nonpharmacological treatment of migraine includes relaxation therapy, biofeedback, hypnosis and acupuncture. A number of uncontrolled studies and one

prospective controlled study have reported success in teaching self-regulation techniques for pain control. These techniques are more suited to older adolescents (see nonpharmacological treatment of chronic nonprogressive headache on this page).

Managing chronic nonprogressive headache

Chronic nonprogressive headaches are more common in adolescents than in children. They have no known organic aetiology and are thought to be associated with or precipitated by an emotional cause; their pathophysiology is unclear. They include:

- tension-type headaches
- 'muscular contraction'
- 'psychogenic headaches'
- headaches associated with somatisation, anxiety and depression.

As for migraine, successful treatment includes both pharmacological and non-pharmacological means.

Characteristics

Tension-type headache

Tension-type headaches are described as a band-like tightening around the head. Some patients also report throbbing pain. There is no associated aura. Other nonspecific symptoms such as dizziness, fatigue and blurred vision are common; nausea and vomiting are more characteristic of migraine.

Mood, soma and models of pain

Studies show that compared to headache-free controls, children and adolescents with recurrent headache have elevated rates of dysthymia and adjustment disorder with depressed mood. However, unlike adults, they do not have a higher incidence of major depression. Older adolescents with frequent headaches reported greater perceived stress and higher anxiety levels compared to peers without headaches. Other somatic complaints in headache sufferers were also more common.

Models of pain within the family should be explored. Children and adolescents may learn various ways of expressing pain – for example, distress and emotional disturbance may be expressed as somatic symptoms. Maladaptive ways of coping with pain may also be learnt, such as taking on the 'sick' role and developing dependence on medication. Sometimes psychosocial stressors may not be evident at the outset but may reveal themselves gradually through regular monitoring by an interested and concerned GP.

Nonpharmacological treatment

A healthy lifestyle incorporating good nutrition, adequate exercise and sleep routine should be advocated. The GP should provide psychosocial support to the child or adolescent, and education and reassurance as to the benign nature of the illness.

If the headaches do not settle, or there is continued interference with the usual activities of adolescence or significant stressors are identified, a referral to a child and adolescent mental health service may be indicated for further counselling, family therapy and/or behavioural therapy.

Pain management techniques such as relaxation therapy can be taught successfully to children and adolescents although age-appropriate techniques are required – these techniques require practice and motivation on the patient's part.

Other behavioural strategies that emphasise coping and stress management skills have been found to be effective in reducing the frequency of headache.

Pharmacological treatment

Simple analgesia can be used as an adjunct in treatment, but overuse may contribute to a cycle of withdrawal-rebound headache. There is some evidence to suggest that amitriptyline (Endep, Tryptanol) is helpful in patients with chronic headaches with and without depression. Amitriptyline is thought to work via its

opiate and endorphin effects, as well as by its pain inhibitory pathways.

Amitriptyline and other tricyclic antidepressants are dangerous in overdose; they should be used with caution.

Conclusion

Headache is a very common reason for young people to present to general practitioners. It can be due to serious underlying pathology that requires a high index of suspicion, detailed examination and a knowledge of appropriate investigation and referral pathways. However, most headache in young people is due to migraine and tension-type headache.

A thorough history and examination, and continued follow up with particular attention to the temporal pattern of the headache, are important for diagnosis. Psychosocial evaluation is necessary in

every case as psychological factors are important in all forms of headache. The key to successful management is a comprehensive approach that takes both pharmacological and nonpharmacological strategies into account. **MT**

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