# Back pain in children

## History of back pain in children

Traditionally, back pain in children has been considered as being due to a potentially serious condition until proved otherwise. This concern arose because some cases of serious disease were missed in the past.

However, it is now known that benign back pain in children and adolescents is more common than was once thought. The emphasis now is on establishing diagnostic protocols that are accurate, inexpensive and, most importantly, less invasive than those which were thought necessary in the past.[1]

This does not detract from the fact that back pain in children remains a significant clinical challenge.[2]

It is known that despite extensive investigation, the proportion of children who are afforded a diagnosis at the end of the day is small. The majority of cases have a benign and self-limiting cause, yet serious pathology must still be excluded.[3]

## How common is back pain in children? (Epidemiology)

- Nonspecific back pain in children is common but reported prevalence varies. Depending on the population studied and the definition used, prevalence is between 9-66%.[4]
- It increases with age, is more common during times of rapid growth, is associated with electronic device use and mental health problems, and is more common in girls than in boys.[5]

- Back pain is more common in athletes, reportedly occurring in 20-30% of adolescent athletes.[6] It is more common in relation to certain sports, such as gymnastics, dancing, American football, diving, wrestling, rowing and rugby.

## Aetiology[6] [7]

It is important to pursue a diagnosis. It is more usual to make a diagnosis of a specific cause in children and nonspecific back pain is a diagnosis of exclusion. When considering the aetiology and differential diagnosis of back pain, consider:

- Overuse and back strain or musculoligamentous injury.
- Disc herniation.
- Scheuermann's disease (a juvenile osteochondrosis which causes kyphosis.)[8]
- Vertebral fractures.
- Spondylolysis - unilateral fracture of the pars interarticularis, often due to hyperextension of the spine. This is a common cause of back pain in adolescent athletes.
- Spondylolisthesis - bilateral fracture of the pars interarticularis with anterior displacement of the vertebral body or sacrum. Symptoms typically occur at the time of the growth spurt. It usually causes focal pain aggravated by certain activities (particularly spinal extension and, to a lesser degree, rotation). Rest improves pain. Pain is sharp, mild-to-moderate in intensity and can radiate to the buttock.
- Inflammation: juvenile arthritis, ankylosing spondylitis.
- Infection - usually in those aged under 10 years:
    - Discitis.
    - Osteomyelitis.
    - Pyelonephritis.
    - Retroperitoneal infection.
    - Tuberculosis.

- Bone tumours - primary osseous neoplasms are rare. The most common are Ewing's sarcoma, aneurysmal bone cyst, osteoblastoma (considered benign but can be locally aggressive), osteoid osteoma and primary lymphoma.
- Tumours of the spinal cord - eg, ependymoma.
- Referred pain: appendicitis, pelvic inflammatory disease, abdominal or pelvic tumours.
- Congenital disorders of the spine - eg, scoliosis.
- Systemic disease - eg, sickle cell disease.

## Symptoms of back pain in children (presentation) [3]

- Good clinical assessment will diagnose most causes of pain.
- The younger the child and the longer the history, the more likely it is that a serious underlying condition is responsible for the symptoms.

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### History

It is essential to take a careful history. This should incorporate:

- Characteristics of pain, including duration, severity, radiation of pain, disturbance of sleep and activities and associated and exacerbating factors.
- Accompanying symptoms - eg, fever, weight loss, neurological symptoms (weakness, numbness, gait disturbance, bowel and bladder dysfunction).
- Past medical history - eg, previous episodes of neck or back pain, arthritis, trauma.
- Family history - eg, arthritis, scoliosis.
- Psychological history - eg, depression aggravating back pain or back pain causing depression. See the separate Depression in Children and Adolescents article.

- Social history - eg, carrying school bags, school activities, sports activities (especially contact sports, gymnastics, diving, bowling in cricket).

## Examination [7]

See also the separate Examination of the Spine article. Examination should include:

- Localisation and evaluation of pain.
- Tenderness (site of maximal tenderness).
- Inspection (to detect deformity, wasting, kyphosis and scoliosis).
- Gait. The classic Phalen-Dickson sign (knee-flexed, hip-flexed gait) may occur in spondylolysis, especially if there is associated spondylolisthesis.
- Flexibility: flexion, extension, lateral flexion and lateral rotation.
- To perform the modified Schober test for lumbosacral spinal mobility, mark points 10 cm above and 5 cm below the lumbosacral junction (dimples of Venus) with the patient standing. Repeat the measurements with the patient in full forward flexion with their legs straight. An increase between the two points of less than 6 cm suggests reduced lumbar spinal mobility - eg, due to spondyloarthropathies.
- Ask the patient to stand on one leg. The Trendelenburg sign is positive if the other hip drops (due to weak hip muscles). If there is spondylolysis, bringing the back into lumbar extension elicits pain on the side ipsilateral to the pars interarticularis lesion.
- Neurological examination (including power, tone, reflexes, sensation).
- Abdominal and hip examination for referred pain.
- One study reported that painless hyperextension combined with negative imaging closely correlated with a diagnosis of mechanical back pain. [1]

## Clinical indicators of serious pathology [7]

- Age under 4 years.

- Symptoms persisting for more than four weeks.
- Interference with function.
- Systemic features (fever, weight loss).
- Worsening pain.
- Neurological features.
- Recent onset of scoliosis.
- Stiffness.

## Investigations

Persistent back pain in children can usually be diagnosed by history, examination and relatively simple tests (blood tests, plain radiography, bone scans). [7] In the absence of indications for urgent referral (see 'Referral', below), initial assessment can be performed in general practice. Investigations may include:

- Blood investigations might include FBC, ESR and CRP, rheumatoid factor and other rheumatological autoantibody tests (may be indicated if arthritis is suspected), U&Es, LFTs, amylase.
- Imaging: usually initially X-rays, which pick up fractures, spondylolysis, spondylolisthesis, Scheuermann's disease, and some bony lesions. There is no universal imaging screening protocol, so when to use X-rays can be a difficult decision. [9] Imaging options include plain X-rays, including posterior-anterior (PA) and lateral, CT scanning, MRI scanning and single-photon emission computed tomography scanning (SPECT). [2]

## Treatment of back pain in children

Many adolescent patients will have self-limiting, short-lived pain caused by overuse or strain. Management should incorporate:

- Confirmation of diagnosis and exclusion of serious pathology.
- Simple analgesia - eg, paracetamol or ibuprofen.

- Preventative measures with:
    - Advice and education.
    - Physiotherapy.[10]
    - Exercise.

For those patients more likely to have a serious pathology, early assessment to establish a differential diagnosis and hence urgency of referral is important. All will require referral and subsequent management will vary according to the underlying diagnosis.

**Referral**

Referral should depend on clinical judgement but features that may cause concern might include:[3] [11]

- Worsening pain.
- Constant pain.
- Persistent fever.
- Systemic symptoms: night sweats, weight loss.
- Neurological deficit.
- Pain accompanied by stiffness.

# Complications

- A variety of complications can arise depending on the diagnosis. In general terms complications may be reduced or prevented by timely diagnosis and adopting preventative lifestyle measures.[12]
- Complications include delayed diagnosis (with possible implications for management and prognosis) and psychosocial difficulties, such as exclusion from sport, and depression.[13]

# Prognosis

This is determined by the underlying diagnosis.

# Preventing back pain in children

Posture and psychosocial factors are important in back pain.[14] Back education programmes are effective in reducing risk factors for long-term back pain but whether this benefit is sustained in later life requires further investigation.[15]

- Backpacks can cause back pain if they are too heavy or the weight is carried unevenly (over one shoulder). The following should be advised:[16]
    - Load the minimum weight possible.
    - Carry a school backpack on two shoulders.
    - Correct the belief that school backpack weight does not affect the back.
    - Use of a locker at school.
- Apart from swimming, the evidence supporting the benefits of sport in preventing back pain in children is sparse. Both intense activity and inactivity are associated with back pain.[17]

# Screening for scoliosis

Screening programmes for scoliosis vary among countries but are not currently recommended in the UK.[18] [19]

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## Further reading


- Zernikow B, Rathleff MS; Special Issue: Back Pain in Children and Adolescents. Children (Basel). 2022 May 10;9(5):687. doi: 10.3390/children9050687.
- Kuznia AL, Hernandez AK, Lee LU; Adolescent Idiopathic Scoliosis: Common Questions and Answers. Am Fam Physician. 2020 Jan 1;101(1):19-23.
- Frosch M, Leinwather S, Bielack S, et al; Treatment of Unspecific Back Pain in Children and Adolescents: Results of an Evidence-Based Interdisciplinary Guideline. Children (Basel). 2022 Mar 15;9(3):417. doi: 10.3390/children9030417.

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