

Recurrent limb pain in schoolchildren

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Abstract

Objectives—To determine the prevalence, causes and clinical features of short lasting recurrent limb pain (recurrent limb pain) in children.

Design—Population-based study in two stages, with an initial screening questionnaire followed by clinical interviews and physical examination of symptomatic children.

Setting—67 primary and secondary schools in the city of Aberdeen.

Subjects—2165 children representing a random 10% sample of all schoolchildren aged between 5-15 years.

Main outcome measures—(a) The causes of limb pain in children, (b) the prevalence of recurrent limb pain in schoolchildren, (c) the relationship of recurrent limb pain to childhood migraine.

Results—Sports and playground injuries were the most common cause of limb pain, affecting 9% of all children. The prevalence rate of recurrent limb pain was 2.6% (95% confidence interval 1.9 to 3.4). Episodes of recurrent limb pain had similar trigger factors, associated symptoms, and relieving factors to episodes of headache in children with migraine.

Conclusions—Recurrent limb pain is a common cause of limb pain, with a prevalence rate of 2.6%. The close clinical and epidemiological similarities between recurrent limb pain and childhood migraine suggest a common pathogenesis.

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Keywords: epidemiology, recurrent limb pain, migraine.

Limb pain is common in children. It is a frequent cause of referral to general paediatric,¹ orthopaedic,² paediatric rheumatology,^{3,4} and even psychiatric outpatient clinics. The common causes of chronic or recurrent limb pain in children include accidental injuries, joint hypermobility, viral infections, and reactive arthritis (table 1).

In a large group of children, limb pain may occur in short episodes lasting for less than 72 hours and followed by complete remission between attacks. Such recurrent limb pain is often localised deeply in the arms or the legs and is severe enough to cause interruption of normal daily activities.¹ The pain is non-articular in origin and is associated with normal clinical findings on physical examination, with no tenderness, redness, localised swelling, or limitation of movement. The pain is neither provoked by walking nor associated with abnormal gait, and due to the absence of

any identifiable underlying organic cause and its benign self limiting course, it has often referred to as 'growing pains' in the lay and sometimes the medical literature,^{1,5} or as psychogenic limb pain. Similar episodes of recurrent brief limb pain have also been reported in association with episodes of migraine in adult patients,⁶ and with increased prevalence among children with migraine.⁷

The reported prevalence rates of short lasting episodic limb pain in children (table 2) have ranged between 4.2% and 33.6%. Such a wide range reflects the diversity in the methods and diagnostic criteria used in the different studies. However, epidemiological data seem to suggest that boys and girls are almost equally affected,¹ or that there is a slight preponderance in girls⁵ (a ratio of 3:2). The incidence peaks between the ages of 8 and 12 years,¹⁰ with boys typically presenting at a younger age of onset (5 years) than girls (11 years). Around two thirds of affected children have limb pain as their only symptom, but one third also complain of abdominal pain and headache.¹¹ The close association between these three complaints suggested a common factor.¹¹

In this study we report on the epidemiology and causes of limb pain in the general childhood population, by applying a screening questionnaire followed by clinical interview and examination of children with at least two episodes of limb pain during the previous year. We also report on the impact of recurrent limb pain on the children's school attendance, and on the relation to other recurrent painful conditions.

Methods

POPULATION

We studied the prevalence and causes of limb pain as part of a wider study of painful conditions in the defined population of Aberdeen schoolchildren. We have reported previously

Table 1 Causes of recurrent/chronic limb pain in children

Trauma	Accidents and sports injuries
Systemic disorders	Reactive arthralgia
	Reactive myalgia
	Sickle cell disease
	Familial mediterranean fever
Invasive infections	Septic arthritis
	Osteomyelitis
Joint disorders	Joint hypermobility
	Perthes' disease
	Slipped femoral epiphysis
	Irritable hip
	Juvenile chronic arthritis
	Seronegative enthesopathy
Neurovascular disorders	Reflex neurovascular dystrophy
Malignancy	Skeletal sarcomas
	Leukaemia
Unknown aetiology	Idiopathic musculoskeletal pain
	Fibromyalgia
	Psychogenic pain

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Table 2 Population based studies of recurrent limb pain

Author	Year	Country	Age (years)	Number of children	Prevalence, number (%)
Hawksley ⁸	1939	England	4-14	505	170 (33.6)
Naish and Apley ¹	1951	England	4-15	721	30 (4.2)
Brenning ⁹	1960	Sweden	6-7	257	35 (13.6)
			10-11	419	83 (19.8)
Cullen and MacDonald ¹⁰	1963	Australia	4-15	3440	155 (4.5)
Oster and Nielsen ⁵	1972	Denmark	6-19	2178	337 (15.5)

on the prevalence and causes of headache,¹² recurrent abdominal pain and abdominal migraine,¹³ cyclical vomiting syndrome,¹⁴ and paroxysmal vertigo.¹⁵ For the present study of recurrent limb pain, identical methods of data collection were applied to the same childhood population. The study was approved by the local medical ethics committee, the Department of Education, and the Community Child Health Service (School Health Service).

QUESTIONNAIRE

The selected children were given a screening questionnaire with a covering letter about the aims and nature of the study, and were asked to complete the questionnaire at home with the assistance of their parents. The questionnaire recorded the children's date of birth, sex, address, and the date of completing the questionnaire. The questions related to recurrent limb pain are given in table 3. Children who did not return the completed questionnaire within two weeks were sent a reminder by post to their home addresses.

INTERVIEWS

Symptomatic children and their parents were invited to attend for clinical interview and examination at the school medical rooms if their answers showed that they had had at least two episodes of limb pain severe enough to interfere with normal activities over the past year, and that the episodes of pain were not attributed to an infectious illness, trauma, or a specific disease. Detailed present and past clinical history and family history were obtained, and a full systematic physical examination was performed. Children fulfilling the criteria for the diagnosis of recurrent limb pain (table 3) were compared to the children reported previously from the same population with migraine, and to a group of healthy

Table 3 Questionnaire and diagnostic criteria for recurrent limb pain (RLP)

(a) Questions relating to limb pain
Has your child had limb pain over the past year?
If yes, were any of these severe enough to stop normal activities?
If yes, how many times has he/she had severe limb pain in the past year?
Was there a cause for each of these severe limb pains?
If yes, what was the cause for each?
(b) Criteria for the diagnosis of RLP of unknown aetiology.
1. At least two episodes of limb pain over one year period.
2. Pain is not due to trauma, infection, or other specific illness.
3. Absence of local tenderness, swelling, limitation of joint movement, or joint hyperextensibility.
4. Each episode lasting for no more than 72 hours.
5. Complete resolution of symptoms between episodes.

control children, matched individually for age and sex.¹²

DIAGNOSIS AND STATISTICAL ANALYSIS

The diagnosis of recurrent limb pain of unknown aetiology was based on criteria detailed in table 3. Questionnaire and interview data were collected on a coded checklist and entered in SPSS for Windows.¹⁶ Confidence interval (CI) analysis¹⁷ was also used.

Results

QUESTIONNAIRE

Completed questionnaires were returned by 1754 children (81%), of whom 153 (7%) responded after a reminder. There were 888 boys (50.6%) and 866 girls (49.4%), with a mean age of 10.2 (SD 3.0) years. The parents of 30 children declined to participate.

Among the 582 children (33%) who had had at least one episode of limb pain over the past year, the pain was severe enough to interfere with normal activities in 275 (16%); 126 children had had at least two episodes of severe limb pain during the past year (prevalence rate 7.2%, 95% CI: 6.0 to 8.5). The most frequent cause to which parents attributed limb pain was injury (55 children; 44%), unknown cause (35 children; 28%), 'growing pains' (18; 14%), specific illness (13; 10%), and infectious illness in five children (4%).

INTERVIEWS

Fifty three children with severe recurrent limb pain attributed to 'growing pains' or to unknown causes, were invited to attend for clinical interviews and examination. Fifty children (94%) attended; the parents of 40 children either attended the interviews (33) or gave interviews over the telephone (7) as they were unable to attend.

CHILDREN WITH RECURRENT LIMB PAIN OF UNKNOWN AETIOLOGY

Forty five children (mean age 10.2 years; SD 3.2), 20 boys and 25 girls, fulfilled the criteria for the diagnosis of recurrent limb pain, giving a prevalence rate of 2.6% (95% CI: 1.9 to 3.4). The prevalence rate was 2.9% for girls and 2.3% for boys. There were little variations in the prevalence rates according to the age of children ranging from 1.2% to 4.5%, with no specific trends. Symptoms were reported to have started from the age of 2 years, with a mean age of onset of 7.8 years (SD 3.6).

In all the children identified in this study the limb pain was exclusive to the lower limbs. It was centred on the major joints in 17 children (38%), at the back of one or both lower legs in 16 (36%), involved the whole of one or both legs in five (11%), and one or both thighs in five children (11%). Only two children (4%) were unable to identify the precise site of pain. The quality of the pain was described as 'just sore' or dull by 25 children (56%), cramps by

11 (24%), stabbing or sharp by five (11%), tight by three (7%), and throbbing by one child (2%). Pain was severe enough to inhibit all or most normal daily activities in 15 children (33%), but permitted some activity in the remaining 30 (67%). Physical examination showed no evidence of local tenderness, swelling, redness, restriction of joint movement, or joint hypermobility.

Episodes of limb pain occurred on an average of 12 times per year (median 7; range 2 to 50, SD 12) and each episode lasted for an average of 10 hours (median 2; range 1 to 48; SD 16). In 13 children (29%) the onset of limb pain was consistently after 5 pm, but in 27 (60%) the limb pain occurred at any time of the day with no fixed pattern.

Twenty two children (49%) reported that tiredness was the most common trigger factor. During the attacks of limb pain, nine children (20%) needed parental sympathy and attention, eight (18%) felt generally unwell, eight (18%) looked pale, four (9%) were anorexic, and one (2%) was nauseated. Most children (60%) experienced variable degrees of relief of pain by rest, others (24%) from the use of simple analgesics, and 20% after sleep. One third of the children obtained some relief from either applying hot water bottles or by rubbing the affected limb.

Children with recurrent limb pain lost an average of 5.4 school days per year (range 0 to 36, SD 6.7) from all illnesses, including a mean of 0.2 days per year (range 0 to 2, SD 0.6) because of limb pain, compared to a mean of 3.1 days in control healthy children (range 0 to 20, SD 4.0). The children's personalities, as described by their parents during the interview, were happy, normal in 34 children (76%), moody in seven (16%), shy in four, and sensitive in one, similar to those of the control children.¹²

Twenty children (44%) had at least one first degree relative with migraine, compared to 75 children (47%) with migraine and only 10 (17%) of the matched control children (odds ratio 11.9, 95% CI 5.0 to 28.4). Twelve children (27%) also suffered from atopic diseases (asthma, eczema, or hay fever) and 10 children (22%) suffered from travel sickness.

The mean age of children with recurrent limb pain (10.2 years; SD 3.2) was comparable to those with migraine (11.2 years; SD 2.7),¹³ as was the female to male ratio (1.25:1 and 1.15:1 respectively). Similar patterns of trigger factors, symptoms during attacks, and relieving factors were also noted between children with recurrent limb pain and migraine. Of the 45 children with recurrent limb pain, 24 (53%) had other recurrent painful condition (two had recurrent headache, nine recurrent abdominal pain, three cyclical vomiting, one paroxysmal vertigo, and nine a combination of at least two disorders).

Discussion

Most paediatricians and general practitioners are familiar with a group of children attending their clinics complaining of episodes of short

lasting recurrent limb pain. However, the true prevalence, causes, and the impact of the condition are not yet known and the published data from previous childhood population based studies vary greatly.

In the majority of children with recurrent limb pain, the causes were identified by the parents. Accidental or playground injuries were the most common cause of painful limbs; about 9% of all children had had at least one episode of severe limb pain due to an injury during the previous year, and about 3% had had at least two episodes of injury. The severity of these injuries ranged from minor sprains or bruises to bony fractures. Parents also attributed limb pain in some children to viral or flu-like illnesses in about 1.5% of cases, a symptom that is well recognised in both adults and children. Specific illnesses such as arthritis, osseochondritis, irritable hip, and Perthes' disease were reported in about 1% of all children.

In a second group of children the cause of limb pain was not known, but the condition was consistent with the benign form of recurrent limb pain of unknown aetiology. Such a condition has not been studied before as a separate entity and therefore a definition or criteria for the diagnosis had to be derived from different publications and from our own clinical experience with many patients seen in our outpatient clinics. This definition was carefully designed to include only children with paroxysmal pain that resolved completely between attacks with no symptoms or signs suggestive of an organic cause or an underlying predisposing disorder such as joint hypermobility. By applying a strict definition of recurrent limb pain and employing a two stage method of data collection (an initial screening questionnaire followed by clinical interviews of symptomatic children), we were able to provide the first reliable population based study of recurrent limb pain as a specific entity, and of other causes of limb pain in children. The prevalence rate of recurrent limb pain in children between 5 and 15 years of age found in our population (2.6%) is therefore likely to reflect the true prevalence of the condition; there are no comparable published data available.

Our study has confirmed the possibly increased susceptibility of these children to other pains and aches such as headache and abdominal pain.¹¹ We have also shown that children with recurrent limb pain have lost more school days due to various causes than the control healthy children, suggesting that they might be vulnerable in other ways or have a lower threshold for school absence and special proneness to pain.¹¹

It was interesting to note that girls were at a slightly higher risk for recurrent limb pain than boys, in a pattern similar to the observed female predominance in childhood migraine,¹² abdominal migraine,¹³ and paroxysmal vertigo.¹⁵ It was also of interest to note the similarities between recurrent limb pain and migraine in the factors triggering the attacks, the associated symptoms during attacks, the

relieving factors, the family history of migraine, and the associated recurrent problems. These children also have an increased risk of atopy (12/45) (27%) and travel sickness (22%), similar to children with migraine. Studies of migraine in adults¹⁸ and children¹⁹ have shown that non-specific limb pain is common among migraine patients. Such a relation suggests that both recurrent limb pain and migraine may have a common pathogenesis and aetiology.

However, despite the strong relation between recurrent limb pain and migraine, it is likely that the diagnosis of recurrent limb pain will continue to be based on the exclusion of other disorders, and include investigations such as erythrocyte sedimentation rate, blood cell count, and limb radiographs. Nevertheless, the diagnosis of recurrent limb pain of unknown origin will be supported by the various clinical features reported above, and a positive diagnosis will avoid much unnecessary investigation and treatment.

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