

Review Article

Assessment and Management of Chronic Musculoskeletal Pain Syndrome in Children: A Review

SHAHANA AKHTER RAHMAN¹, MUJAMMEL HAQUE², MOHAMMED MAHBUBUL ISLAM³

Abstract

Musculoskeletal pain is a frequent complaint of children, is the most common presenting problem of children referred to pediatric rheumatology clinics. Chronic musculoskeletal (MSK) pain in children is responsible for substantial personal impacts and societal costs, but it has not been intensively or systematically researched. The majority of musculoskeletal pain complaints in children are benign in nature and attributable to trauma, overuse, and normal variations in skeletal growth. There is a subset of children in whom chronic pain complaints develop that persist in the absence of physical and laboratory abnormalities including growing Pain, juvenile fibromyalgia, complex regional pain syndrome. During recent years studies of the epidemiology, etiology and rehabilitation of pain and pain-associated disability in children have revealed a large prevalence of clinically relevant pain, and have emphasized the need for early recognition and intervention.

Keywords: Chronic Musculoskeletal Pain syndrome, Growing Pain, Juvenile Fibromyalgia, Complex Regional Pain Syndrome.

Introduction

Pediatricians, particularly paediatric rheumatologists come across a large number of children who have a wide variety of musculoskeletal pains. Many of these patients do not have easily recognizable inflammatory or other obvious disease processes that can help us understand and explain the causes of pain.¹

Research by the World Health Organization has brought the enormous global burden of musculoskeletal (MSK) pain into focus. Low back pain (LBP), neck pain and other musculoskeletal disorders ranked one, four and ten respectively, among all health conditions for years lived with disability.²

Although the epidemiology, burden and treatment of MSK pain in adults has been the subject of considerable research effort, this picture is not true for children. The lack of research into MSK pain in children is of concern for a variety of reasons. There

is emerging evidence that children who report persistent pain, are at increased risk of chronic pain as adults.³

There is a question regarding the extent to which research conducted in adults can be generalized to children. Pain, in particular chronic pain syndrome is currently conceptualized within a biopsychosocial model.⁴ Thus the experience of pain is influenced by physical factors e.g. anatomical pathology and physiological process; psychological factors e.g. mood, cognitions and beliefs; and social factors e.g. relationships, social environment and culture. Balancing the competing needs of early identification and appropriate management of those who need care, and reassurance and avoidance of 'medicalization' of transient aches and pains is a difficult task. Yet it is critical; over-investigation and over-treatment of MSK pain results in a large burden on overloaded healthcare systems, and can also negatively impact individual patient outcomes.⁵ In this article, epidemiology, etiology, impact of chronic pain syndrome, the clinical features of common pain presentations and their relevance to diagnosis and treatment planning are discussed.

Childhood musculoskeletal pain conditions

The most common chronic pain syndromes reviewed in pediatric rheumatology settings include growing

1. Professor and Chairman, Department of Pediatrics, Bangabandhu Sheikh Mujib Medical University.

2. Specialist, Department of Pediatrics, Square Hospital, Dhaka.

3. Assistant Professor, Department of Pediatrics, Bangabandhu Sheikh Mujib Medical University.

Correspondence: Dr. Shahana Akhter Rahman, Professor and Chairman, Department of Pediatrics, Bangabandhu Sheikh Mujib Medical University. E-mail: shahana2pd@yahoo.com

pain, diffuse idiopathic musculoskeletal pain (Juvenile fibromyalgia), chronic pain related to childhood hyper mobility, complex regional pain syndromes (CRPS) and chronic back pain.⁶

Epidemiology

There is a historical lack of data on the prevalence and incidence of pain in children, and on the prevalence of pain-associated suffering due to heterogeneity with respect to prevalence period and age of the child. One study showed that 83% of the school-aged children had experienced an episode of pain during the preceding 3 months.⁷ Same study showed that, 30.8% of the children had the pain for more than 6 months. Musculoskeletal pains accounted for 64% of all the pains that were reported in that study.⁷ Palermo TM. also supported the finding.⁸ Looking across studies, a number of features are clear: a) girls experience more pain than boys b) children living in low-educated and low-income families have an 1.4-fold increase in the odds of having pain.⁹ The incidence of chronic musculoskeletal pain peaks at the age of 14 years¹⁰. A recent large cohort study showed that multiple common symptoms in childhood are associated with a moderately increased risk of chronic widespread pain in adulthood.¹⁰

Clinical manifestation

All chronic musculoskeletal pain syndromes involve pain complaints of at least three months duration in the absence of objective abnormalities on physical

examination and laboratory screening. Additionally, children and adolescents with musculoskeletal pain syndromes often complain of persistent pain despite previous treatment with non steroidal anti-inflammatory drugs and analgesic agents. The location varies, with pain complaints either localized to a single extremity or more diffuse and involving multiple extremities.¹¹

The pain complaints of children and adolescents with musculoskeletal pain syndromes are commonly accompanied by psychologic distress, sleep difficulties, and functional impairment

throughout home, school, and peer domains.¹¹ In some circumstances pain has a direct effect on other systems, leading to symptoms that can be as disabling as the pain itself. These include: hypervigilance and hypersensitivity, perceived thermodyregulation, autonomic dysfunction and musculoskeletal disequilibrium.^{1,6} Indicators differentiating benign pain from serious cause of pain are shown in Table I.¹¹

Specific childhood musculoskeletal pain conditions:

Growing pain

Growing pains, also known as benign nocturnal pains of childhood, affect 10-20% of children, with a peak age incidence between four and eight year. The most common cause of recurrent musculoskeletal pain in children, growing pains are intermittent and bilateral, predominantly affecting the anterior thigh and calf but not joints. Physical findings are normal, and gait is not impaired (Table II).¹² A recent study done in Bangladesh shows the prevalence of growing pain as 19% among the school children.¹³ Growing pains are

Table I
Potential Indicators of Benign VS Serious Causes of Musculoskeletal pain¹¹

Clinical Finding	Benign Cause	Serious Cause
Effects of rest vs activity on pain	Relieved by rest and worsened by activity	Relieved by activity and present at rest
Time of day pain occurs	End of the day and nights	Morning
Objective joint swelling	No	Yes
Joint characteristics	Hypermobility/normal	Stiffness, limited range of motion
Bony tenderness	No	Yes
Muscle strength	Normal	Diminished
Growth	Normal growth pattern or weight gain	Poor growth and/or weight loss
Constitutional symptoms (e.g., fever, malaise)	Fatigue without other constitutional symptoms	Yes
Laboratory findings	Normal CBC, ESR, CRP	Abnormal CBC, raised ESR and CRP
Radiographic findings	Normal	Effusion, osteopenia, radiolucent metaphyseal lines, joint space loss, bony destruction

Table II
Diagnostic Criteria for Growing Pain¹²

Characteristics of pain	Inclusion criteria	Exclusion criteria
Frequency and duration	Intermittent pains once or twice per week, rarely daily, totally pain free in between the episodes; individual episodes lasting for 30 mins to 2 hours .	Pain, that is persisting or increasing in severity
Site	Usually in the muscles of calf, sometimes anterior thigh muscles, shins and popliteal fossa and affect both limbs.	Pain involving joints and occurring in one limb
Time	In the evening and night	Daytime pain and nocturnal pain hat persists till next morning
Physical examination	Normal	Signs of inflammation

generally considered a benign, time-limited condition; however, there is increasing evidence suggesting that growing pains represent a pain amplification syndrome. Indeed, growing pains persist in a significant percentage of children, with some children developing other pain syndromes such as abdominal pain and headaches. Recent studies suggest that growing pains are more likely to persist in children with a parent who has a history of a pain syndrome and in children who have lower pain thresholds. Treatment focuses on reassurance, education, and healthy sleep hygiene.¹¹

Diffuse idiopathic pain syndromes (Juvenile fibromyalgia syndrome)

Juvenile primary fibromyalgia syndrome (JPFS) is a common pediatric musculoskeletal pain syndrome. Although specific diagnostic criteria for JPFS have not been determined, all children and adolescents with JPFS have diffuse musculoskeletal pain in at least 3 areas of the body that persists for at least three months in the absence of an underlying condition. Results of laboratory tests are normal, and physical examination reveals at least 5 well-defined tender points.¹¹

Complex regional pain syndrome

Complex regional pain syndrome (CRPS) is characterized by ongoing burning limb pain that is subsequent to an injury, immobilization, or another noxious event affecting the extremity. Key associated features are pain disproportionate to the inciting event, persisting **allodynia** (a heightened pain response to

normally non-noxious stimuli), **hyperalgesia** (exaggerated pain reactivity to noxious stimuli), swelling of distal extremities, and indicators of **autonomic dysfunction** (i.e., cyanosis, mottling, and hyperhidrosis). The usual age of onset is between 9 and 15 year and the girls : boys ratio is 6:1. Childhood CRPS differs from the adult form in that lower extremities rather than upper extremities is most commonly affected. The incidence of CRPS in children is unknown, largely because it is often undiagnosed or diagnosed late, with the diagnosis frequently delayed by nearly a year.¹¹

Juvenile hypermobility and pain

There is undoubtedly an association between joint hypermobility in children and diffuse pain; however, the nature of this is poorly understood. Hypermobility or ligamentous laxity of joints is increasingly recognized as an etiological factor in the presentation. Such conditions include recurrent lower-limb arthralgia, anterior knee pain syndromes and back pain. In a recent study, a significant number of these children were shown to suffer recurrent joint sprains, actual subluxation / dislocation of joints, problems with handwriting tasks, limitations of school-based or other physical education activities, and having missed significant periods of schooling because of symptoms.¹¹

Back pain

Low back pain specifically is commonly reported in the adolescent population. In a recent cross-sectional study the prevalence of low back pain that lasted for

at least 1 month was 24%.¹⁴ Often this is thought to be related to lifestyle influences on a developing spine such as postural habit (slouching), load bearing on the back (e.g. school bags) or engagement in sedentary activity (e.g. computer use). There are insufficient data to bring clarity to these arguments.

Childhood disease and chronic pain

Diffuse and localized chronic pains can also complicate almost any other chronic childhood illness including juvenile arthritis, IBD, cerebral palsy, cancer, sickle cell disease, muscular dystrophies and cystic fibrosis. The relationship between juvenile arthritis and chronic pain is well recognized.¹⁵ As with other diseases the degree of disabling pain does not always mirror inflammatory joint activity.

The aetiology of chronic pain in childhood:

Idiopathic pain syndromes, in adolescents, seem to be related (either singularly or in combination) to illness, injury, psychological distress and environmental factors.²

Injury: It is not unusual for a child with a localized chronic pain to recall a sporting injury, operation or other trauma around the onset of chronic pain.¹⁶ Hypermobility has also been associated with falls and subsequent pain problems.

Psychological influences: There is no evidence for purely psychologically generated pain conditions in children. There is evidence for psychosocial influences as complicating factors and as being implicated in the maintenance of pain complaints¹⁷ but not their aetiology.¹⁸

Genetic influences: There is emerging evidence that patients with CRPS may have a genetic predisposition in Caucasian women, but the underlying genomics are far from clear.¹⁹

Environmental influences: There is a lack of study of common environmental risk factors other than social learning. Social history may show that a recent life event (moving house/school, illness or death)¹⁹ has relevance to the presentation.

Developmental influences: Neonatal pain experience may also have a role in long-term alterations in pain processing and development, with a greater tendency to amplified pain behaviour as a child.²⁰

Impact of chronic pain

Despite a view that non-specific MSK pain in children is often of little consequence, the global disability burden is large. Data from the WHO Global Burden of Disease study shows that LBP is responsible for the 2nd most disability for 15-19 year olds of any health condition and neck pain ranks 8th. These are higher than well-recognized adolescent public health problems such as asthma, alcohol and drug use and road injury.²¹

The association between MSK pain and physical activity is difficult to unravel. A systematic review of 8 studies investigating the relationship between LBP and physical activity reported positive, negative and non-existent associations.²²

Persistent or recurrent chronic pain brings persistent and recurrent distress, disability, adult attention and widespread family disruption.⁸ However, a young person with chronic pain typically demands sustained physical, emotional and financial attention.²³ Young people with chronic pain report sleep disturbance, disordered mood, appetite disruption, low feelings (depression is often masked in this population), social isolation and unwelcome dependency on parents. Children with chronic pain are commonly outside of formal education systems, absent from normal schooling.⁷ Psychologic distress can include symptoms of anxiety and depression, such as frequent crying spells, fatigue, sleep disturbance, feelings of worthlessness, poor concentration, and frequent worry. Indeed, a substantial number of children with musculoskeletal pain syndromes display the full range of psychologic symptoms, warranting an additional diagnosis of a co morbid mood or anxiety disorder.²⁴ Peer relationships may be disrupted because of decreased opportunities for social interaction due to pain. Parents also report significant distress from living with a child in persistent pain.²⁴

Assessment of the young person (and family) with chronic pain

While assessing a child with chronic pain it is important to exclude significant disease. History: Table III summarizes the important areas to be covered in a history. For the physician the goal of the history taking is often to exclude serious possible causes, identify key problems, build a trusting relationship with the patient (and family) and, if possible, identify a treatment plan.²⁴

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Table III
Domains of history taking and examples of useful questions²⁴

Onset of pain

When did the pain start?

Was there a preceding infection, trauma or operation?

Did it start gradually or suddenly?

Characteristics of the pain

How would you describe the pain?

Do you suffer pins and needles?

Is the pain constant?

Is there variation in the pain during the day?

Does the pain alter at night? Does it wake you up?

What makes it worse/ better?

Is it painful to lightly touch the area that is painful?

Other symptoms

Is there a fever, rash or weight loss?

Is there altered bowel habit/ menstrual cycle?

Is there any muscle weakness?

Do you have any areas that are numb?

Do you suffer dizziness/ sudden fall?

Do you suffer headaches/migraines/abdominal pain?

Do you feel colder/warmer than previously?

Do you suffer from blurred vision?

Has your mood been affected?

Effect of pain on daily living

Do you find it hard to get to sleep/stay asleep?

How much school have you managed over the past 6 months?

How is your concentration/memory?

How has the pain affected your fitness/hobbies?

Do you need help in areas where you were previously independent?

What do you think is causing this?

Do you have fears about a particular illness?

Past and family history of illness

Have you suffered painful conditions previously?

Have you suffered fatigue, sleeplessness or anxiety previously?

Is there a family history of painful conditions?

Family, emotional and social circumstances

Who currently lives at home?

Can you identify any stressors in school, family or peer groups?

Physical examination

A detailed and thorough examination is essential in evaluation of chronic pain syndrome. The examination may be divided into three phases: observation, functional assessment and formal examination.¹⁵

Functional assessment involves observing the child's activity while undertaking tasks, but, in preparation for this, useful information can be gleaned by watching the child undress, including their dexterity with buttons and laces and how much help they require or are given. Useful observations are those of gait (walk and run), hopping, toe and heel walk, getting up from squatting and cross legged sit, looking up to the ceiling and over shoulders, hands above head, scratching small of back, holding arms out stretched, pronation, supination, 'saying prayers', and flexing fingers. The examination should include growth and general examination and specific examination of locomotor system and central nervous system.¹⁵

Psychometric instruments

A number of questionnaire or interview techniques have been used in researching the impact of pain on the lives of children. There are some well validated and commonly used tools, most notably the Varni/Thompson Paediatric Pain Questionnaire focusing on pain, and the Functional Disability Index, focusing on disability.²⁵ Pain intensity in children has long been measured using simple severity measurement tools, such as the visual analogue scale (VAS).²⁶ These give a subjective measure of the pain intensity according to the adolescent and/or that pain perceived by their carer.²⁶

Management

The primary treatment approach to a child with chronic pain is one of symptom management and psychosocial rehabilitation. Most approaches to rehabilitation share common features including education, symptom control, behavioral science and physical therapy.²⁷

a) Education

A critical first step in all rehabilitation is to offer, re-offer and reinforce an understanding of how one's body may be working to maintain pain. Education about pain may be difficult to grasp because there is a dominant cultural view of pain as a warning sign that a disease process or abnormality is present. It can be helpful to show and reinforce to the family the fact

that many childhood pains have no function, or have outlived their usefulness.²⁴

b) Pharmacotherapy

The number of analgesics and interventions used is a sign that there are no well-controlled therapeutic trials in childhood chronic pain. It is becoming widely accepted, however, that any analgesic intervention should be used alongside multidisciplinary therapy.²⁸ Oral treatments that can be used, with variable success, include tricyclic anti-depressants, NSAIDs, opioids, anti-convulsants and glucocorticoids. Sympathetic blockade and botulinum toxin injections have been used in localized muscular pain.²⁹ Gabapentin and pregabalin may have a role in addressing neuropathic pain in CRPS.³⁰ A Cochrane review in 2005 showed that tricyclic anti-depressants

do have a role in modifying aspects of neuropathic pain in some patient.³¹

c) Psychological therapies

A Cochrane systematic review of psychological therapy reported on the effectiveness of psychological treatments for pain control in common chronic pain problems. Brief psychological therapies such as relaxation, habit reversal and attention-based interventions are highly effective for use with persistent and recurrent pain such as headache.³²

d) Physical therapy

In a recent systematic review of conservative interventions for low back pain in children and adolescents, only four randomised trials of treatment and eleven of prevention were identified. The review suggested that supervised exercise has a large effect

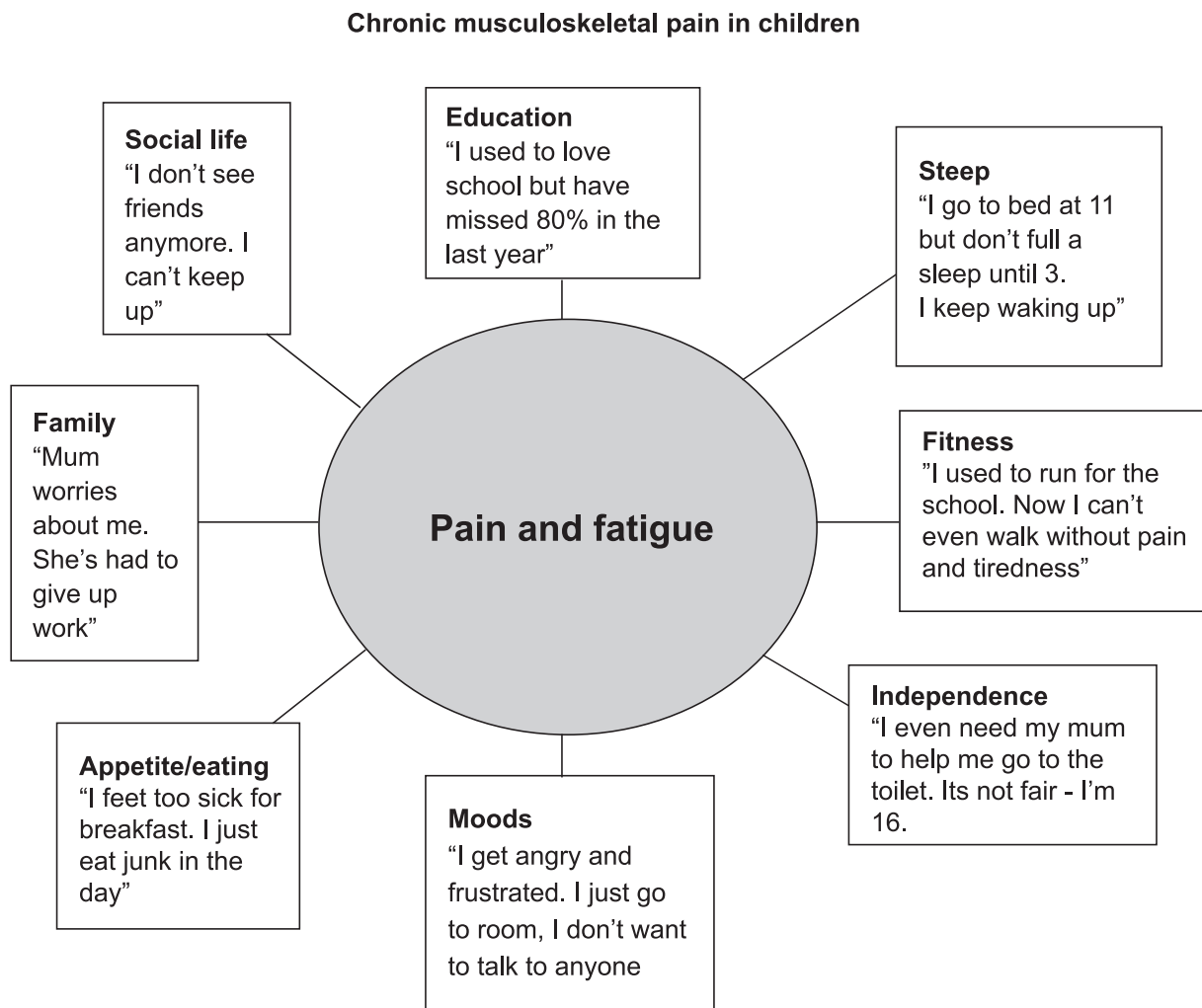


Fig.-1: Diagrammatic representation of the widespread impact of chronic pain²⁴

on pain compared to no treatment, but evidence quality was low, there was not enough good quality information to make conclusions regarding preventative interventions. Exercise is key to the rehabilitation of young people with persistent pain. In some conditions, such as CRPS, early intensive physiotherapy is the treatment of choice.³³

e) Other therapies

More recently there has been interest in deep brain stimulation in severe cases of CRPS where there is significant disability due to dystonia. There are no ongoing studies, as yet, in children. Complementary therapies are commonly utilized by patients with chronic pain.³⁴

Natural history and long-term outcomes

The natural history of chronic musculoskeletal pain in children shows that, in many cases, outcome is improved compared with that in adults. Early, multidisciplinary approaches (including cognitive behavioural therapy) have favourable outcome.³⁵ CRPS in children generally has a favourable prognosis if early physiotherapy is initiated (with psychological support).³⁶ This is improved if the parents are involved in the rehabilitation process. However, a prolonged time to treatment and the presence of marked autonomic changes are not good prognostic indicators in this condition.

Conclusions

Paediatric rheumatologists and other paediatric health care providers should understand the epidemiology of childhood musculoskeletal pain, diagnose pain syndromes in children, rule out common paediatric rheumatic diseases and be willing to initiate appropriate treatment of pain in children and adolescents. Despite concerning data regarding the prevalence, impact and long-term consequences of musculoskeletal pain in children and adolescents, the field has not been subject to a concerted and systematic research effort. As a consequence there are major gaps in our understanding of these conditions, which leaves clinicians charged with treating young people with little empirical evidence to help guide their management decisions.

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