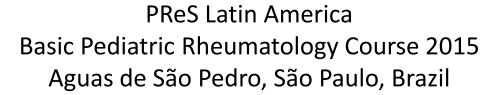


Joint involment in orthopedic diseases







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Prevalence of musculoskeletal pain in children

Population-based studies

11,5% (Netherlands) Pediatrics 2006; 117:412-416.

>30% (Germany) *Pediatrics* 2005; 115:152-162.

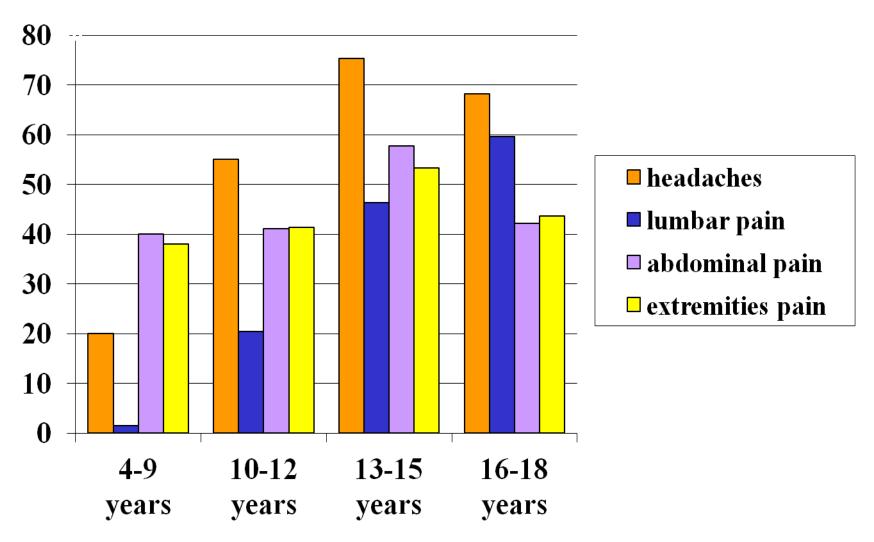
22% (Argentina) *Arch.argent.pediatr* 2001; 99:105-110.

Health primary care:

6,1% (number of visits, Spain) Arch Dis Child 2004; 89 (5):431-434.

20% (survey in the waiting room of a pediatric outpatient clinic, Argentina) *Arch.argent.pediatr* 2009; 107(6):515-521.

Relative prevalence of pain in children and adolescents



Roth-Isigkeit A, et al. Pediatrics 2005; 115(2):e152-e162. Perquin C, et al. Pain 2000; 87:51-58.

Four stories

Pedro is 3 years old, yesterday he woke up with a limp, he refused to bear weight on his right leg. He had low grade fever and a cold a few days ago.

Nicolás is 13 years old, since 2 months ago, he complains of pain in both knees, mainly in the left, when he runs and jumps.

Juan is 12 years old, recently he has suffered a fracture in his right arm. He is being having pain in his back, hips and feet since last year. He does not practice any sports, he prefers quiet activities.

Julia is 11 years old, last year she began complaining of pain in her knees. The pain is worse at the end of the day, mainly when she comes back from gymnastics class.

What condition Pedro has?

He is 3 years old, yesterday he woke up with a limp, he refused to bear weight on his right leg. He had low grade fever and a cold a few days ago.

He did not look ill, but he referred pain in his groin and knee. The child looked comfortable when the right hip was on flexion, abduction and external rotation. Assessing range of motion: pain with flexion and internal rotation.

An ultrasound revealed small effusion in his right hip.

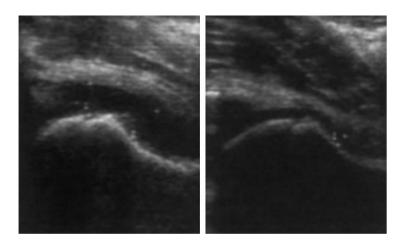
He became well after 4 days of rest and ibuprofen.



Transient synovitis of the hip

Transient synovitis of the hip

- More prevalent in boys aged 3-8 years (2:1)
- Increased chance of relapse
- Bilateral involvement (1-4%)
- Etiology: viral infection
- Ultrasound:
 - hip effusion in a child: 5mm between femoral neck and outer capsule
 - pathologic effusion: 2 mm> compared with the asymptomatic hip



◆ Transient synovitis of the hip: differential diagnosis

	Transient Synovitis	Septic Hip	Legg-Calvé-Perthes Disease		
Trauma	rauma Mild at beginning of Mild at beginning of symptoms symptoms		Less likely. May be some distance from onset of symptoms		
Onset	t Several days (3–5) Several days (3–5)		Weeks/months/ intermittent		
Fever	No. Sometimes low grade <38	Yes >38.5	No		
Appears ill	No	Yes	No		
Gait	Limp (sometimes not weight bearing)	Not weight bearing (sometimes limp)	Limp to normal gait		
Pain	Mild to severe Moderate to		Mild to moderate		
Range of Pain at the end of motion motion arc		Severe pain throughout motion arc	Guarding, with pain on flexion and internal rotation		

What condition Nicolás has?

Nicolás is 13 years old, since 2 months ago, he complains of pain in both knees, mainly in the left, when he runs and jumps. He is a soccer player and he is very concerned because the pain gets worse every time he plays.

Findings on physical exam of the left knee: mild swelling and prominence over the tibial tubercle, and moderate tenderness.

X-ray of both knees: fragmentation of the tibial tubercle of the left knee.



Osgood-Schlatter osteochondrosis





Osteochondrosis

Atanda A, et al. Am Family Physician 2011; 83(3):286-291

Most common causes of pain in growing bones

Etiology? vascular abnormalities, repetitive trauma, and overuse of the growth plate and surrounding ossification centers

Boys>girls

Osteochondrosis≠ osteochondritis dissecans (inflammatory)

Areas:

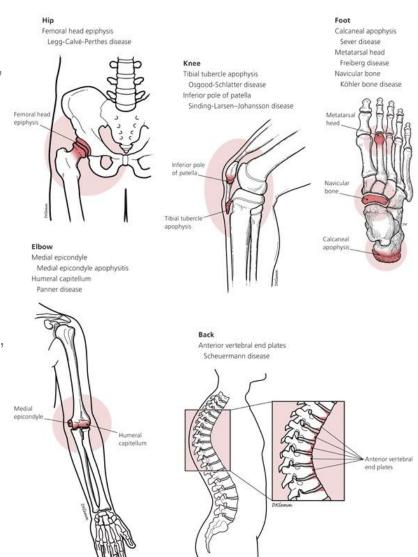
Hip: Legg-Calvé-Perthes (femoral head epiphysis)

Knee: Osgood-Schlatter (tibial tubercle apophysis), Sinding-Larsen-Johansson (inferior pole of patella)

Foot: Sever (calcaneal apophysis), Freiberg (metatarsal head), Köhler (navicular bone)

Elbow: medial epicondyle apophysitis and Panner disease (humeral capitelum)

Back: Scheuermann disease (anterior vertebral end plates)



Soccer-related overuse injuries

Suzue N, et al. J Med Invest 2014; 61:369-373

- •Localization: lower parts of the body (knees, ankles, heels and feet), in mechanically weak points
- •In adults: tendons, muscles, and ligaments
- •In children and adolescents: osteochondral region

Table 2. Result of Physical Examination

	n	%
Total	494	
Positive Findings (+)	394	79.8
Lumbar	20	4.0
Hip	26	5.3
Knee	198	40.1
Lower leg	31	6.3
Ankle	117	23.7
Foot	90	18.2
Heel	226	45.7
Other	132	26.7
Positive Findings (-)	100	20.2

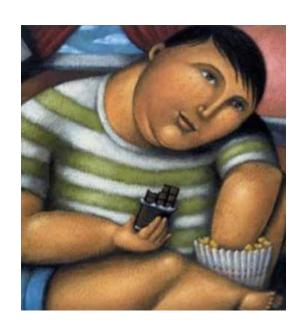
Table 3. Results of Radiographic and/or Ultrasonic Examination

	n
Sever's disease	49
Osgood-Schlatter disease	13
Bipartite patella	12
Sinding-Larsen-Johansson disease	10
Spondylolysis	3
Symptomatic accessory navicular	3
Van-Neck disease	1
Osteochondritis dissecans of distal femur	1
Arthritis of knee	12
Achilles tendinitis	11
Arthritis of ankle	9
Jumper's knee	3
Shin splint	3



Biomechanical factors and musculoskeletal pain

Why does Juan's body hurts?



Juan is 12 years old, recently he has suffered a fracture in his right arm. He is being having pain in his back, hips and feet since last year. He does not practice any sports, he prefers quiet activities (TV, video games, computer).

Physical exam: body mass index of 34 (kg/m^2).

Musculoskeletal pain in obese children and adolescents

Stovitz S, et al. Acta Paediatrica 2008; 97:489-493

- 61% complained of at least one joint hurting more than once per month.
- Localization: back pain (39%), feet (26%), knees (24%).
- For each one unit increase in BMI, there was a 3% (OR= 1,03, 95% CI:1,01-1,05) increase in the odds of having joint pain.
- Obese children exhibit biomechanical changes in their lower extremities as compared to their normal weight peers. These changes may result in pain due to excessive forces on lower extremity joints.
- Due to changes in balance, obesity may be a risk factor for injuries, and increased risk of upper extremities fractures.





Mwaka E, et al. BMC Reseach Notes 2014;7:222

Schoolbags (backpacks) use

- 30.8% of the pupils carried schoolbags which were more than 10% of their body weight.
- 88.2% of pupils reported body pain especially in the neck, shoulders and upper back.
- 35.4% of the children reported that carrying the schoolbag was the cause of their musculoskeletal pain.
- The prevalence of low back pain was 37.8%.
- There was significant association between low back pain and method of bag carriage (p < 0.0001), long duration of walking (odds ratio 2.67, 95% CI 1.38- 5.16) and the time spent sitting after school (p = 0.02)



Hakala P, et al. BMC Musculoskeletal disorders 2012;13:41

Computer exposure

- 436 Finnish adolescents
- Moderate/severe musculoskeletal pain: neck-shoulder (21%), head (20%)
- Moderate/severe inconvenience of everyday life: head (29%), neck-shoulder (21%), low back (16%)
- Computer use ≥14 hours/week was associated with:
 moderate/severe musculoskeletal pain in all anatomic sites
 moderate/severe inconvenience of everyday life due to low back pain and head

Child labor and musculosketal disorders

Epidemiological survey in Brazil

Population: 3,269 children and teens, aged 10 to 17, of low-income neighborhoods.

Objective: to describe the prevalence of musculoskeletal pain in several anatomic sites, and to investigate the association between work activities and pain.



Table 1. Prevalence of pain in anatomic sites by work activity (N=3,269), Pelotas, Brazil, 1998

Body sites	Percent							
	Not currently working (n=2,816)	Non-domestic services (n=110)	Domestic services (n=90)	Retail (n= 152)	Construction (n=58)	Manufacturing (n=21)	Others (n=17)	Total (n=3,264)°
Neck	21.8	26.4	27.8	18.4	20.7	42.9	23.5	22.1
Shoulder	9.7	17.3	10.0	11.2	8.6	19.0	5.9	10.1
Elbow	3.6	4.5	4.4	2.0	6.9	_	_	3.6
Wrists/hands	16.2	20.0	16.7	17.8	15.5	42.9	11.8	16.6
Upper back	15.2	13.6	18.9	19.7	19.0	23.8	11.8	15.5
Low back	13.3	12.7	11.1	10.5	17.2	9.5	_	13.1
Thigh	9.7	14.5	10.0	11.8	10.3	19.0	_	10.0
Leg	14.5	13.8	18.9	12.5	15.5	14.3	_	14.5
Knee	17.5	22.7	25.6	11.2	12.1	19.0	11.8	17.5
Ankles/feet	9.8	13.6	12.2	7.9	8.6	9.5	17.6	9.9

Julia's joint pains

Julia is 11 years old, and a very active girl. Last year she began complaining of pain in her knees. The pain is worse at the end of the day, mainly when she comes back from her gymnastics class.

Sometimes, the pain makes her interrup her activities until the pain goes away.

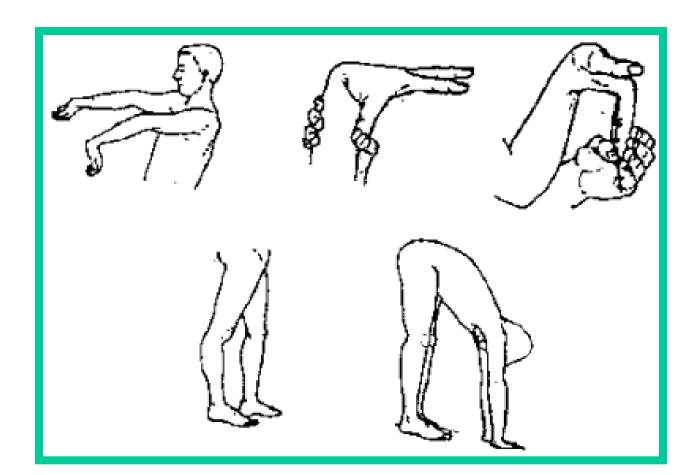
The joint pain is episodic, sometimes 2 to 3 times a week, and lasts for few hours. Two months ago she experienced a subluxation of her right ankle while walking.



Findings on physical exam: joints without swelling, pain or limitation on motion. Hypermobility of knees, elbows, thumbs, and trunk.

Scores for hypermobility measurements

Carter 3/5
Beighton 4/9 (bilateral)



Passive apposition of the thumb to the flexor aspect of forearm

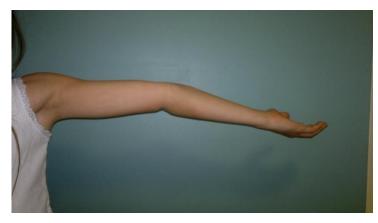
Passive dorsiflexion of the 5th metacarpophalangeal joint to > 90 °











Hyperextension of the elbow >10 $^{\rm o}$

Flexion of the trunk with knees straight and both palms resting on the floor



Relative frequency of joint hypermobility

	Population	n	Age (years)	Hypermobilty (%)
Arroyo I, et al. 1988	schoolchildren	192	5-19	34
De Cunto C, et al. 2000	schoolchildren	359	6-13	37.3
Russek C, et al. 2015	college students	267	17-26	26.7
Sanches SB, et al. 2015	ballet dancers	77	18-40	53

Joint pain in children with hypermobility

Where? lower extremities (90%)

How often? 2 o more days per week (89%)

How long? < 24 hs (60%)

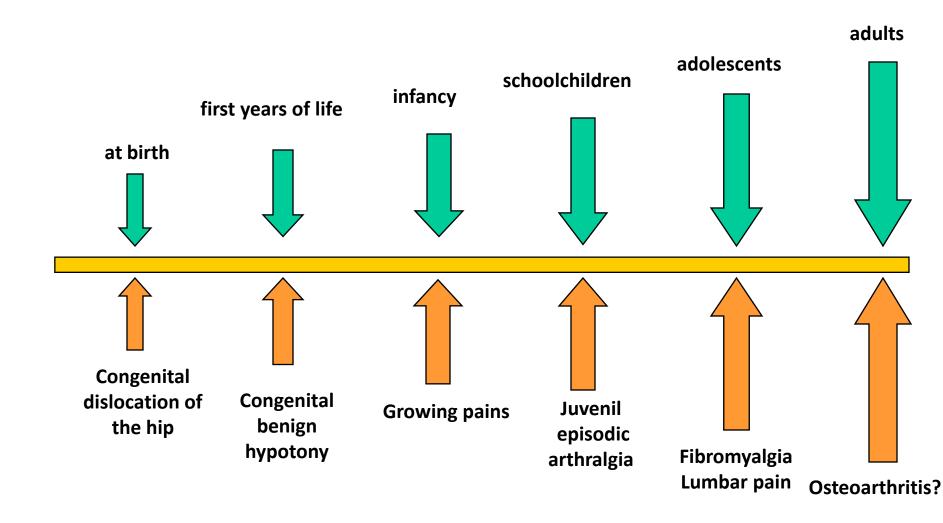
When? evening (90%)

What other joints? temporo-mandibular involvement (30%)

Scoliosis 20%
Sprains and/or subluxations 56%%

"Benign" joint hypermobility syndrome

Adib et al. Rheumatology (Oxford) 2005;44:744-50



Clinical hetorogenicity in children and adolescents with joint hypermobility syndrome

Pacey V, et al. Arch Dis Child 2015;100:8-13

- Group 1: subtype with more pain, fatigue, and lower HRQoL. Higher number of painful joints, recurrent joint instability (≥ 3 subluxations) and orthostatic hypotension (dizziness on standing).
- Group 2: "athletic subtype". Higher scores for motor proficiency, exercise capacity and physical activity participation, better HRQoL, less pain and fatigue.
- Group 3: "systemic subtype", recurrent joint instability, skin and bowel involvement.
- Group 4: soft tissue injuries, reduced muscle length, greater fatigue, lower HRQoL.
- Group 5: higher body mass index (BMI), higher pain.



Julia's joint pains

Look for other signs and symptoms related to joint hypermobility.

Management recommendations:

Protective soft bracing of ankles and knees
Physical therapy: isometric exercises, propioception training, and minimizing streching.

Definition of "benign joint hypermobility syndrome": a child or young person with musculoskeletal pain and clinical signs of joint hypermobility with no other cause found for their symptoms.

Underlying cause of the pain: biomechanical imbalance.

Musculoeskeletal pain Risk factors

Joint hypermobility (controversial)

Intense physical activity (sports, ballet) in a growing skeleton

Biomechanical factors (obesity, weight load, bad postures)

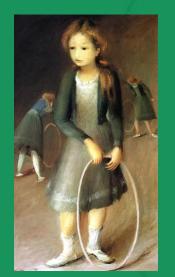
Psychosomatic (headaches, abdominal pain, depression, sleep disorders)

El-Metwally, et al. BMC Musculoeskeletal Disorders 2006;7:3 (Epub) Sohrbeck-Nohr O, et al. BMC Pediatrics 2014; 14:302 Sanches SB, et al. Rheumatol Int 2015; 35(4):741-747











Muito obrigada!

