

**LITERATURE REVIEW**

## **Growing Pains**

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**ABSTRACT**

Growing pains (GP) are common in children due to childhood musculoskeletal pain. The prevalence of growing pain ranges from 3-37% of children. GP have typical clinical characteristics, but the etiology and its development into non-inflammatory pain syndromes remain inconclusive. GP are not associated with serious organic disease and specific laboratory evidences. The most important action to take is to distinguish between benign and severe musculoskeletal pain in children for addressing proper treatment. The most appropriate intervention is to explain the natural course of GP, that are administering long acting analgesic at night under certain circumstances, and applying heating pad, massage and stretching exercise during the day.

**Keywords:** *growing pain, benign musculoskeletal pain, non-inflammatory pain*

**INTRODUCTION**

Children often exhibit difficulties in describing musculoskeletal pain. The pain has to be distinguished from those caused by systemic diseases.<sup>1</sup> The most common cause of musculoskeletal pain in children is the growing pains (GP), in which the extremity pain is prevalent, such as a non-inflammatory pain syndrome.<sup>2,3</sup> Definition of GP are perceived pain that affects lower limbs commonly, such

as the anterior side of thigh, calf and posterior knee. These have tendency to affect both of lower limbs and its nocturnal occurrence causes children to awake and cry.<sup>4</sup>

The prevalence of GP is 3-37% among children. Oster found that for about 15-16% of school age children complain limb pain occasionally.<sup>5,6</sup> In Australia, the prevalence rate of GP in children aged 4-6 years is 37%.<sup>3</sup> In general, GP affect children aged 3-12 years<sup>7</sup>, occurs in the afternoon (56.7%) or evening (43.3%) that will wake them up and make them cry (37%).<sup>4</sup>

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GP have many common clinical features as follows, they are non-articular; 2/3 of children complain pain in the shin, calf, thigh, popliteal fossa; and are almost always bilateral (80%). GP present as mild to moderate pain, which will subside within minutes to hours and disappear in the morning.<sup>7</sup> The frequency of recurrent

pain is 5% daily, 45% weekly, 35% monthly, and 15% trimonthly. Hashkes et al. conducted a study in 44 children and found that 43% of them experience the pain once a week.<sup>8</sup> GP pattern of episodic pain is otherwise has a pain-free interval that may last few days to months, but the daily pain may take place in a severe case. It is predicted that the pain is activity related. The pain rises as physical activity increases. GP are not associated with organic diseases and usually disappear at the end of childhood. Nonetheless, the sequels that interfere daily activities will remain, such as frequent absence, tiredness during the day, limited physical activities, and frequent use of analgesics.<sup>7</sup>

### Etiology

There are many possible causes that contribute the GP as described below paragraphs. First, low pain threshold, is associated with fibromyalgia, as a part of growing pains, the childhood non-inflammatory pain syndrome.<sup>7</sup> It is assessed in tender point counts and measured by dolorimeter.<sup>11</sup> The forty four children with GP have significant lower pain threshold values in comparison to the control group with the same age children.<sup>8</sup>

Second, decrease bone density is reported to be associated with GP because of the probable local overuse or stress syndrome as GP's occurrence in the afternoon in association with high activities during the day.<sup>3,12</sup> The ultrasound examination in 39 children showed decrease in bone speed of sound in children with GP, especially those with tibial pain.<sup>13</sup> Nevertheless, the bone scan results showed indifferent ratio in blood and static phases between the GP and other conditions.<sup>14</sup>

Third, dynamic of perfusion is believed to contribute in GP because they appear in sudden,

intense, and short duration, are possibly due to vascular components.<sup>15</sup> The prevalence of migraine headache is exceeding in children with GP.<sup>16</sup>

Fourth, anatomical or mechanical factor is considered as one of the cause of GP because children with GP often have hypermobility, but have not been assessed by formal criteria of hypermobility in children.<sup>17</sup> Mechanical joint pain is usually acute in onset, and characterized by point tenderness over the involved area, gets worse with overuse or in the afternoon. The mechanical instability can lead to GP in children too. There is a study shows that the benefit of a shoe insert in reducing the frequency and severity of GP in flexible flat feet with hindfoot valgus.<sup>18</sup>

Fifth, family environment affects GP as the onset of GP is influenced by psychological and social factors, as a counterbalance action towards emotional distress in the family.<sup>19</sup> Approximately, 20% of the GP cases show emotional disorders in the family.<sup>4</sup>

Furthermore, GP are rare manifestations of an organic disease. These may evident in restless legs syndrome, especially those with family history.<sup>20</sup>

### Risk Factors

GP are common among pre-school and school age children. Girls are mainly affected. Physical exertion, such as running, climbing or jumping during the day increases the risk of leg pain at night.

### Clinical Features

Although the etiology of GP is indeterminate; however, if the child experience persistent pain until the morning dawn, activity restriction,

arthralgia, have association with trauma or exhibit signs of inflammation, and muscle weakness or limping; hence, other contributing factors should be deliberated. In general, the pain will diminish in the morning. Since musculoskeletal disorders have a broad

etiology; therefore, history taking and physical examination are important to help narrowing down the differential diagnosis.<sup>9</sup> Table 1 below describes the clinical findings to differentiate mild and severe musculoskeletal conditions.<sup>10</sup>

**Table 1. Clinical Features Differences between Mild and Severe Musculoskeletal Conditions in Children.<sup>10</sup>**

<b>Mild</b>	<b>Severe</b>
Pain is activity related, relieved by rest	Pain is aggravated by rest, ameliorated by activity
Nocturnal pain	Morning stiffness/ pain
Mild/ non-opioid analgesics and massage eases the nocturnal pain	Mild analgesics are not effective
Objective joint swelling does not manifest	Joint swelling is evident objectively
Joint hypermobility	Joint stiffness
Absence of bone prominence tenderness	Bone prominence tenderness
Normal muscle strength	Lack of muscle strength
No abnormality in growth curve	Decelerated physical growth, and reduced weight
Unspecific symptoms	Fevers, malaise
Normal CBC and ESR*	Abnormal CBC and increased ESR*
No abnormality in radiographic evidence	Radiographic evidences show abnormality, such as edema or soft-tissue swelling, osteopenia, periosteal elevation, cortical destruction (“moth-eaten” lesion)

\*CBC= complete blood count; ESR= erythrocyte sedimentation rate

## DISCUSSION

The diagnosis of GP is usually made based on typical complaints and clinical symptoms. There is no specific laboratory test. However, children often undergo various examinations to rule out other diseases. At least 19% of children with GP have bone scanning to evaluate the pain.<sup>13,21</sup> However, imaging and other examinations are worthless if children have complaints and presented classic clinical signs and symptoms. On the other hand, GP should not be established without evaluating other causes.

There is no specific treatment for GP. The most important action is to explain the pathway of GP.

Fortunately, GP do not cause other problems nor interfere children growth. GP will disappear at the first or second year of onset. Despite of its good prognosis, GP that affect families and especially children, sometime exhibit recurrent nocturnal pain. Approximately, 95% of these cases have good outcome with the application of warm compresses and local massage; and administration of analgesics during the episode of pain. Many children (5%) consume medicine in chronic use, especially acetaminophen and NSAIDs.<sup>7</sup> Hashkes' research shows that 52% of children take medicines to reduce pain.<sup>8</sup> As an alternative, they would take Naproxen, as a long-acting analgesics at night, and perform stretching exercises in the afternoon.

Children with GP who have low bone density indicates relatively low calcium intake.<sup>13</sup> It is believed that high Calcium and Vitamin D diet can improve bone condition and the episodes of pain, however this needs further study.

Children with GP who have low pain threshold values may be advantageous with behavior therapy to suppress their sensitivity towards pain (including cognitive behavioral therapy) and physical activity program to improve fitness. Other interventions, such as the shoe-insert (triplane wedges or ortesa), especially in children with pronated foot posture<sup>18,22</sup> and stretching exercise programs for the quadriceps, hamstring and gastrocnemius muscles, twice a day for 10 minutes, may reduce the episodes of pain.<sup>15,23</sup>

## CONCLUSION

Growing pains are very common and easy to diagnose with their specific clinical symptoms. These complaints will disappear after the first or second year. However, it is yet to be inconclusive whether it may be progressive into non-inflammatory pain syndromes.

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