

# “Growing pains” in young children: A study of the profile, experiences and quality of life issues of four to six year old children with recurrent leg pain

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## Abstract

**Background:** Growing pains is a common yet misunderstood condition which presents frequently to health professionals and appears to be significantly under reported. Little is known about the profile of affected versus unaffected children.

**Method:** This research used a validated questionnaire (USAGPQ) for parents of children aged four to six years to explore characteristics such as basic anthropometry, family history, physical activity levels, quality of life (QoL) and the pain experience of affected children. The health professional consulted and resulting treatment or investigations were also surveyed in a systematic random sample of 743 children in South Australia.

**Results:** Based on parental responses: only 35.9% children were seen by health professionals; pain medication was the most common intervention prescribed (17.1%); a family history of growing pains was reported in 69.8% cases. In no reported cases was a muscle stretching program used, despite this measure having best evidence for management. Children experiencing growing pains had significantly greater body weight (approximately 5% greater), same activity levels and in a minority of cases (5.7%) reduced QoL estimates.

**Conclusions:** This study shows that the management of growing pains is not evidence based and occurs in isolation from health care professionals. The finding of growing pains being associated with increased weight requires further exploration given the concerns of childhood obesity. This prevalent condition affects some young children with considerable frequency and may impact quality of life of these children. This condition is under reported, mismanaged and too often disregarded by health care professionals.

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## 1. Introduction

Growing pains is a common childhood condition associated with frequent health professional visits [1], but despite having been first reported in the medical literature as long ago as 1823 by the French Physician, Duchamp [2] there remains a distinct lack of scientific knowledge about this condition. The aetiology remains uncertain with three different theories purported. The “fatigue theory”, first espoused by Bennie [3] alluded to an overuse response of leg muscles in active children. The “anatomical theory” suggested that factors such as knock-knees or flat-feet induced altered leg muscle work [4]. The “psychological theory” [5] viewed growing pains as part of a wider pain cycle including headache and abdominal pain.

None of these theories have been proven and hence there is a need for better understanding of the pathophysiology of the condition. Such an understanding would facilitate management on the basis of tested rationale, rather than the current anecdotally based approaches. The evidence that exists for the management of growing pains is not substantial, nor widely used. There is preliminary evidence for the efficacy of muscle stretching [6] and suggestion that simple wedges in footwear [7] may assist. Clinicians do not have management answers and hence parents continue to use pain relief techniques based on anecdote and habit. This approach usually consists of rubbing their child’s legs, administering paracetamol and using hot water bottles—all of which mitigate pain in the short term but do not necessarily address the underlying cause.

One of the many problems with research into this puzzling condition has been its lack of definition. There is no conclusive method of diagnosing growing pains and so it continues

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to be diagnosed more by exclusion than inclusion. The best definition has been provided by Petersen [8,9] in an effort to guide clinical practice. The inclusion criteria are: intermittent pains in both legs (non-articular in location) that generally present late in the day or at night-time, often waking the child. The exclusions are: physical signs (swelling, redness, trauma, reduced joint range, limping) and objective findings (blood tests, imaging). Petersen's definition was used in this study.

There are many unanswered questions about 'growing pains' and in particular there is little known about this condition in younger children who have been least discretely studied. However, a recent study has established that as many as 36.9% of young children aged four to six years experience growing pains [10], so the community impact of this condition is clear.

The aim of this study was to gain a better understanding of the characteristics of 'growing pains' in children aged four to six years by performing higher quality than existing research studies. Specifically, to examine this condition with respect to the child's anthropometry and information gathered from parents concerning family history, their child's activity levels, quality of life, apparent pain level and pattern of occurrence. In addition, information concerning the level of involvement of health professionals and types of treatment or investigations was recorded.

The findings of this study will cast light on the relationships between children's anthropometry, quality of life, pain levels and patterns, family history and direct further research into the pathophysiology of this condition. This study, utilizing robust methodology, will also clarify whether prior research findings are valid.

## 2. Methods

The methodology for this study has previously been described in detail [10] and therefore will only be briefly summarized here.

A questionnaire (USAGPQ) was used to collect data [11] from parents of children aged four to six years in both urban and rural South Australia. The questionnaire was validated and demonstrated good reliability (82.4% agreement) and good internal consistency (93% agreement). The questionnaire included sections covering pain experiences, frequency, management, family history, quality of life and basic demographic data. These items were derived from the literature, affected children and their parents in the process of questionnaire construction and validation (triangulation).

### 2.1. Sampling

Classes or groups of children were sampled as clusters following systematic random selection of each school or child-care centre.

Government department statistics were accessed to obtain the population of interest, i.e. children aged four to six years

in South Australia. Allowing for slight annual variations the population was approximated as 78,000 children.

### 2.2. Questionnaire distribution and returns

Children were sourced from all primary schools in South Australia selected at random from two regional rural areas and from urban schools selected at random from geographical quadrants (north, south, east, and west) of the city of Adelaide and surrounding metropolitan areas. The number of schools selected per urban stratum was proportional to the population of four to six year old children within each stratum. As a result, more schools (and hence parents sought to respond to the questionnaire) were selected from some strata.

Ethical approval for the study was received from the Human Research and Ethics committee at the University of South Australia. Once selected, the school principals/child-care centre directors were approached to seek agreement for participation in the study. All schools agreed to participate and were sent an explanatory letter. Two schools withdrew due to organizational issues. An incentive package was designed to optimize response rates/class group as previously described [10].

### 2.3. Data management

All data were entered into a Microsoft Excel 2000 (Microsoft Inc, Seattle, WA) spreadsheet. The data set was cleaned to correct for missing values and eliminate any ineligible responses.

The excel data sets were exported to SPSS version 11 (SPSS Inc, Chicago IL) for construction of an overall data set and subsequent statistical analyses. Descriptive statistics were used to explore the sample characteristics (means for age/weight/height). Frequency statistics were used for analyses with particular inquiry (anthropometric, quality of life) being addressed with independent sample *t*-test (continuous data) and chi-square (categorical data) statistics, respectively.

## 3. Results

Using a sample size calculator [12] yielded a sample size requirement of 2321 children for this population with 95% confidence intervals set at  $\pm 2\%$  estimated prevalence. This sample size represented approximately 3% of the population of children in this age group in South Australia.

In total, 2456 questionnaires were distributed to parents of children aged four to six years across both rural and urban South Australia. There was quite a difference in response rates for rural (approximately 90%) versus metropolitan (approximately 60%) regions. Once ineligible returns were eliminated, 1445 responses remained for analysis (approximately 2% of the population of four to six year old children).

Descriptive analysis of demographic data revealed that the mean age of subjects was 5.3 years and that the gender

Table 1

Health professional seen and treatment or investigations ( $n = 287$ , >80% response rate)

	<i>n</i>	%
Health professional seen		
No one	184	64.1
Doctor	77	26.8
Specialist	9	3.1
Chiropractor	14	4.9
Podiatrist	11	3.8
Physiotherapist	3	1.0
Nurse	4	1.4
Treatment or investigation		
None	195	68.2
Pain medication	49	17.1
X-ray	8	2.8
Foot orthotics	5	1.7
Blood test	4	1.4

ratios were fairly even with 47:53%—male:female. The average weight and height estimates were 21.4 kg and 116.8 cm, respectively.

Only responses from parents of children from school or kindergarten groups where 80% or more of the children's parents in the class responded to the survey were included for further analysis. This was necessary to reduce the possibility of respondent bias, with more returns likely from parents of children who are symptomatic. This stringency reduced the sample size to 743 or approximately 1% of the population.

Initial analysis of the data revealed that 38.3% of 743 children fulfilled the definition of growing pains as defined by Peterson [8,9].

Approximately one-third of parents sought professional advice concerning their child's condition (35.9%). Of those who did the majority consulted a doctor (26.8%). Other health professionals consulted were: chiropractor (4.9%); podiatrist (3.8%); medical specialist (3.1%) (Table 1). Given the limited number of children taken to consult a health professional it is not surprising that only 5% of cases were investigated or treated. Pain medication was the most common treatment administered in this study (17.1%).

In 69.8% of reported cases a positive family history of growing pains was also reported. The most common family members affected were either a parent or sibling.

Those children who were declared symptomatic were found to be significantly heavier than those for whom no pain was reported ( $\chi^2$ ,  $p = 0.039$ ). However there was no significant difference in height between the two groups. Children with growing pains did not show significantly different activity levels as reported by their parents, when compared with those without growing pains.

Parents were asked to estimate the quality of life (QoL) of their children. Some 5.7% of reported cases of growing pains indicated that parents agreed that their child's quality of life had been reduced as a result of their growing pains ( $n = 16$ ). It should be noted that some parents were uncertain when assessing this relationship ( $n = 42$ ).

Table 2

Summary of leg pain experience, frequency, parental actions during episodes and cited associations with leg pains ( $n = 743$ ; >80% responses)

	<i>n</i>	%
a. Experience of leg pains ( $n = 287$ )		
Night	206	71.8
Well	206	71.8
Both legs	141	49.1
Wakes	119	41.5
Crying	108	37.6
b. Frequency of leg pain ( $n = 287$ )		
Daily	9	3.1
Weekly	45	15.7
Monthly	76	26.5
3-monthly	74	25.8
6-monthly	53	18.5
c. Parental action ( $n = 287$ )		
Rubbed legs	246	85.7
Paracetamol	125	43.6
Hot water bottle	83	28.9
d. Associations ( $n = 287$ )		
Increased activity	108	37.8
Rapid growth	103	35.9
After sport	40	13.9
Flat feet	21	7.3
Not wearing shoes	8	2.8
Family history	194	69.8

As shown in Table 2, parents reported that their children's growing pains occurred at night (71.8%) with the pain occurring in both legs (49.1%), that the children woke (41.5%) and cried (37.6%). The children were reported to be otherwise well (71.8%). Most pain episodes were reported to occur at between one (26.5%) and three (25.8%) monthly intervals. When asked about any therapeutic measures they used the majority of parents (85.7%) reported that they rubbed their child's legs to try to alleviate pain; others (43.6%) administered paracetamol and the application of hot water bottles was also quite common (28.9%). Increased activity and sport were collectively associated in half of the cases reported (37.8% and 13.9%, respectively) and rapid growth was associated (35.9%) more than flat feet (7.3%) (Table 2).

#### 4. Discussion

The findings of the present study enable further understanding of this common but often under managed and misunderstood childhood condition. Although the results of the questionnaire were by and large consistent with those of previous studies and anecdotal opinion expressed in much of the literature [4,5,7–9,13–15] additional information was revealed. The methodology of this work was more rigorous than many previous studies and the clinical relevance of many of the findings illustrates the value of clinically directed research. The responses to questions regarding experience and frequency of the leg pain episodes (Table 2) support the definition adopted for this study after the work of Peterson [8,9].

The main findings of this research may be regarded as a ‘study of thirds’: one-third of children were reported to have experienced leg pain [10], one-third of these had consultation with a health professional and one-third of these were prescribed treatment or investigated. In slightly more than half of cases, pain episodes were reported to occur at one to three month intervals with weekly (15.7%) and six monthly (18.5%) being less common patterns (Table 2). Despite the prevalence of this condition, the frequency of occurrence and the reported distress and disturbance to children (and hence their parents) at night time, surprisingly few parents considered that the condition had impacted on their child’s quality of life (QoL). However in contrast, when asked they did itemize many QoL issues associated with this ‘benign’ condition. In particular parents whose children were reported to have suffered leg pains weekly, who woke crying and whose activity was reported at lower levels were more likely to report reduced QoL.

Eccleston and Malleon [16] discuss the issue of children with untreated chronic pain progressing to adults who are limited by chronic pain, and the associated social costs. Similar questions are pertinent with respect to young children who have growing pains and the possible effects on their quality of life in both the short and longer terms. Quality of life for young children with growing pains is as yet an under researched area.

Examination of the anthropometric data for children with growing pains versus children without, showed no significant difference in height, but there was a significant difference in weight with the symptomatic children being heavier. Analysis revealed that estimated activity levels were similar in children affected with growing pains or not. No causal relationship can be suggested on the basis of this questionnaire study, but the areas of activity and anthropometry warrant further investigation [17].

Nearly three-quarters of children affected with growing pains were reported by their parents to have a family history of the same condition. The findings of this study perhaps cast some light on the aetiological theories. The strong family history is perhaps suggestive of the psychological theory with an inherited broader pain spectrum. Concurrently the increased weight of children with growing pains may support the anatomical theory, although data concerning anatomical variants such as knock-knees and flat feet did not form part of this study. Clearly more work is required to explore the cause of growing pains in children.

Using implanted micro-transducers within the tibiae of three lambs, investigators have most recently found that some 90% of bone elongation occurred when the lambs were recumbent and that almost no growth occurred during weight bearing [18]. From this observation the authors have hypothesised that similar growth patterns may occur in children which could support the concept of nocturnal growth and even a relationship to growing pains. Clearly such a small study in animal subjects provides at best an idea rather than any real substance to the nocturnal nature of growing pains in children.

Despite having uncovered more information about children aged four to six years reported by their parents to suffer from ‘growing pains’, we are left with a number of remaining questions. Little is known about the aetiology of this neglected condition. This knowledge is fundamental to our understanding and management of any condition. The surprisingly high prevalence and related well-being issues identified in the present study suggest that more work is needed to enable successful treatment and, if possible, prevention. Most cases consulted no health professional whilst some 40% of reported cases with growing pains reported having consulted various health professionals where the doctor predominated. When formalized management or investigation was sought pain medication was the most likely treatment and dominated the low levels of intervention or investigation the latter being reported in some 5% of cases. In most cases, parents literally took management into their own hands with 85% reportedly rubbing their children’s legs when pain episodes occur. These findings demonstrate why this is a largely hidden childhood condition. It is interesting to consider why parents mainly resort to home-based treatment, is it because of familiarity due to their own childhood experience with the condition or is it because health professionals do not take it seriously or perhaps are at a loss for effective measures? The literature is replete with ill-founded and unconfirmed argument much of which disparages the very notion of growing pains [14]. The findings of this study demonstrate that growing pains not only exist but that, semantics aside, based on a clear definition the condition is significantly under reported in South Australia.

## 5. Conclusion

This study examined the profile and experiences of young children with growing pains. A validated questionnaire was used to collect data from in a well-defined sample. The prevalence of the condition and frequency of pain episodes found in this study was surprisingly high. The condition has a consequent impact on the quality of life of some sufferers, particularly those with frequent episodes. These findings support the need for further investigation into etiology in order to develop effective treatment strategies for this common, but under reported condition.

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