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## Original article

# Idiopathic musculoskeletal pain in Indian children—Prevalence and impact on daily routine



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### ABSTRACT

**Objectives:** To study the prevalence of idiopathic musculoskeletal pain (IMSP) in school going children and its impact on daily life.

**Methods:** One thousand eighteen apparently healthy school children aged 5–16 years were assessed and analysed for IMSP and its associated problems. Standard tests for significance were applied.

**Results:** One hundred and sixty-five (16.2%) children mostly males (55.2%) reported IMSP. Lower limbs (52.1%) were the most common location of pain. More than 1 year of pain history was present in 15%. Thirty-seven percent children complained of discomfort during walking, 30.9%, had pain during physical exercise, 29.2% had difficulty attending lessons and 4.2% had interference in pursuing hobbies. The children were also further sub grouped into preadolescents and adolescents. There was significant difference in pain duration and duration of each pain episode in the two groups ( $p = 0.01$ ). A significant number of children (21.2%) with IMSP reported school absenteeism ( $p < 0.001$ ). A significant number of adolescents had history positive for contact sports ( $p = 0.001$ ). Sleep disturbances were also reported to be higher in children with IMSP (29% vs. 5.7%,  $p = 0.001$ ). Other associated problems in children with IMSP found were day time tiredness (51.1%), headache (47.3%) and abdominal pain (24.8%).

**Conclusions:** Prevalence of IMSP in school children aged 5–16 yrs was found to be 16.2% and a significant percentage of these children experience interference with daily activities including school absenteeism.

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## Prevalência e impacto nas atividades diárias da dor musculoesquelética idiopática em crianças da Índia

### R E S U M O

#### Palavras-chave:

Dor musculoesquelética idiopática  
Prevalência  
Impacto

**Objetivos:** Estudar a prevalência de dor musculoesquelética idiopática (DMEI) em crianças em idade escolar e seu impacto nas atividades diárias.

**Métodos:** Foram avaliadas e analisadas 1.018 crianças em idade escolar aparentemente saudáveis entre cinco e 16 anos quanto à presença de DMEI e seus problemas associados. Foram aplicados os testes de significância padrão.

**Resultados:** Relataram DMEI 165 (16,2%) crianças, em sua maior parte do sexo masculino (55,2%). Os membros inferiores (52,1%) foram a localização mais comum da dor. A história de dor presente havia mais de um ano foi encontrada em 15% das crianças; 37% delas queixaram-se de desconforto durante a caminhada, 30,9%, tinham dor durante o exercício físico, 29,2% tinham dificuldade de frequentar as aulas e 4,2% sofriam interferência na participação em passatempos. As crianças foram ainda subgrupadas em pré-adolescentes e adolescentes. Houve diferença estatisticamente significativa na duração da dor e na duração de cada episódio de dor nos dois grupos ( $p=0,01$ ). Uma quantidade significativa de crianças com DMEI (21,2%) relatou absentismo escolar ( $p<0,001$ ). Uma quantidade significativa de adolescentes tinha história positiva de prática de esportes de contato ( $p=0,001$ ). Os distúrbios do sono também foram relatados como maiores em crianças com DMEI (29% vs. 5,7%,  $p=0,001$ ). Outros problemas associados encontrados em crianças com DMEI foram o cansaço durante o dia (51,1%), a cefaleia (47,3%) e a dor abdominal (24,8%).

**Conclusões:** A prevalência de DMEI encontrada em crianças entre cinco e 16 anos foi de 16,2%. Uma percentagem significativa dessas crianças relata interferência nas atividades diárias, incluindo absentismo escolar.

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## Introduction

Amongst children presenting with chronic musculoskeletal pain (MSP), pain without any identifiable cause in appendicular or axial locations of the body constitute a significant proportion of these cases (5–15%) and is called as idiopathic musculoskeletal pain (IMSP).<sup>1</sup> A variable duration (<6 weeks to 3 months) and frequency (once/week to 3 times/week) have been taken to define IMSP by various authors.<sup>2,3</sup>

Though considered benign, in literature mostly from west, IMSP has been reported to have significant effect on daily activity; psychosocial functioning and health related quality of life.<sup>4-8</sup>

IMSP has been a neglected area of research in India and there is paucity of data on its various aspects including prevalence.

We conducted this study with, a primary objective of finding out the prevalence of idiopathic musculoskeletal pain in school children and a secondary objective to find its impact on daily lives of these children.

## Materials and methods

### Study design

Cross sectional Study.

### Study duration

From March 2010 to December 2011.

### Sample size calculation

Sample size was calculated taking mean prevalence of IMSP as 10%, with an  $\alpha$  error of 2% and confidence interval of 95, it was required to include 864 subjects for the study.

### Enrolment and data collection

For the purpose of this study, any appendicular/axial musculoskeletal pain of  $\geq 6$  weeks, and frequency of at least once/week, without any identifiable cause on detailed history and examination were considered as IMSP.

After selecting two co-ed schools (one public and one private) from the list of school within 5 km of hospital, by lottery, children from class 1 to 10 (aged 5–16 years) were given invitation and consent form. All children who agreed to participate were inquired in detail for the presence of musculoskeletal pain. When present, detailed information including location of pain, duration of pain, pain frequency, character and description of pain in each episode was obtained. The intensity of pain was graded using the visual analogue scale of 1–10. A score of 1–4 was taken as mild pain, 4–7 moderate pain and 8–10 severe pain. History regarding associated complaints like headache, abdominal pain, feeling sad (by asking if the child felt sad or miserable due to pain at any given point of time), day time tiredness, sleep disturbances (difficulty in

**Table 1 – Profile of children with and without IMSP.**

	No IMSP (n = 853)			IMSP (n = 165)			p-Value
	Mean ± SD	Min–Max	95% CI	Mean ± SD	Min–Max	95% CI	
Age (yrs)	11.43 ± 3.177	5–16	11.21–11.64	11.04 ± 3.013	5–16	10.57–11.50	0.389
Height (cm)	140.95 ± 18.072	96–187	139.7–142.17	140.61 ± 16.068	112–173	138.1–143.0	0.805
Weight (kg)	39.83 ± 13.540	16–66	38.92–40.74	35.72 ± 12.477	17–68	33.80–37.63	<0.001
BMI (kg/sq. m)	19.37 ± 3.22	10.2–31.72	19.15–19.58	17.55 ± 3.37	9.36–31.22	17.03–18.07	<0.001

falling asleep, waking up during night due to pain) and school absenteeism (defined as more than 10 percent absenteeism of total school days) was taken. The information obtained was verified from the parents.

Sleep disturbances were assessed using sleep disturbance scale for children.<sup>9,10</sup> All children were inquired about indulgence in contact sports like football, wrestling, kabaddi, martial arts, etc. If yes, then the type and frequency of the game played was obtained. Other information recorded for each case were; parental education, parental occupation, socioeconomic status,<sup>11</sup> family history of MSP, age (years), sex, height (cm), and weight (kg) and hypermobility of joints as per Beightons criteria.<sup>12</sup>

Clinical examination was done to find out specific causes like arthritis, myositis, growing pains, fibromyalgia, reflex muscular dystrophy, trauma, connective tissue disorders, osteochondritis. Children suspected of suffering from any of these known causes were referred for further evaluation and excluded from analysis. Children with musculoskeletal pain, who had clinical evidence of chronic systemic diseases like tuberculosis, heart disease, kidney disease, malabsorption, etc., and those who had taken vitamin D, calcium supplements, steroids or anticonvulsants in last 6 months, were also excluded.

The study was approved by the Institutional Ethics Committee.

### Statistical analysis

Continuous variables were presented as mean ± SD, and categorical variables were presented as absolute numbers and percentage. The comparison of normally distributed continuous variables between the groups was performed using Student's t-test. Nominal categorical data between the groups were compared using Chi-squared test or Fisher's exact test as appropriate. For all statistical tests, *p*-value ≤ 0.05 was considered to be statistically significant. Statistical analysis was performed by the SPSS program for Windows, version 17.0 (SPSS, Chicago, Illinois).

## Results

A total of 1026 school going children aged 5–16 years were evaluated for MSP. Of these eight were excluded (one each of arthritis, myositis, osteochondritis and five of MSP less than 6 weeks duration). Rest 1018 school children were included for final analysis. Of these 165 (16.2%) had IMSP, with mean age of 11.04 (±3.01) years. Ninety-one (55.2%) were boys and

74 (44.8%) were girls. Mean age, weight, height and BMI of children with and without IMSP are depicted in Table 1.

Most (38.2%) cases were aged 13–16 years, 33.9% were 9–12 years old, and 27.9% were between 5 and 8 years of age.

Lower limbs were the most common site of IMSP (52.1%) followed by upper limb (31.5%), neck (29.1%), lower back (26.7%), chest (17.6%), and upper back (10.9%). Pain at multiple sites (54.5%) was more common than at single site (45.5%).

History of pain of more than 1 year and 6 months to 1 year was present in 15% of children each, 28.5% for past 3–6 months and 41.2% for 6 weeks to 3 months. The history of duration of pain was similar in girls and boys (*p* = 0.436).

Forty percent (40%) cases had pain episodes lasting for >30 min while 60% had pain lasting for <30 min. There was no significant difference in the duration of pain episodes between boys and girls and also between preadolescents and adolescents (*p* = 0.430 and 0.130).

Almost daily pain episodes, 2–4 episodes per week, 1–3 episodes per week and once a week were found in 28.4%, 23.1%, 25.4% and 23.1%, respectively. Difference between frequency of pain among boys and girls was not significant (*p* = 0.869).

We divided the children with IMSP into two groups for further analysis—children less than 10 years age (preadolescent) and more than 10 years of age (adolescent). Adolescents had a longer duration of pain history. Most of the adolescents had a history of pain duration of more than three months whereas most preadolescents had pain duration of less than 3 months. Similarly the frequency of pain was higher in adolescents though the difference was not statistically significant. Pain episodes tended to last longer in adolescents as compared to preadolescents and significantly higher number of adolescents complained of severe pain as compared to preadolescents (13.7% vs. 1.3%, *p* < 0.01) (Table 2).

Lower limbs were the most common site of pain in adolescents (44.3%) as compared to preadolescents (29.9%).

A good proportion of children with IMSP had reported difficulties in daily activities like walking, exercise and sitting during lessons due to pain. However there was no difference when the difficulties were compared between preadolescents and adolescents (Table 3).

Sleep disturbances, headache, abdominal pain, day time tiredness and feeling sad were observed in statistically significant number of children with IMSP as compared to those without IMSP. However the comparison of occurrence of these associated complaints between preadolescents and adolescents did not show any statistical difference (Table 4).

**Table 2 – Description of pain in children & adolescents.**

Pain description	Total	<10 years n = 77	>10 years n = 88	p-Value
<b>Pain duration</b>				
>1 year	25 (15.1)	6 (7.8)	19 (21.6)	0.010
6 months to 1 year	25 (15.1)	9 (11.7)	16 (18.1)	0.010
3–6 months	44 (26.6)	20 (26)	24 (27.3)	0.004
3 months–6 weeks	71 (43.2)	42 (54.5)	29 (33)	0.017
<b>Pain frequency</b>				
Almost daily	47 (28.4)	22 (28.6)	25 (28.4)	0.303
Once per week	38 (23.1)	15 (19.5)	23 (26.2)	0.300
1–2 per week	42 (25.4)	24 (31.2)	18 (20.4)	0.308
2–4 per week	38 (23.1)	16 (20.7)	22 (25)	0.101
<b>Duration of pain</b>				
<30 min	100 (60)	45 (58.4)	55 (62.5)	0.011
>30 min	65 (40)	32 (41.6)	33 (37.5)	0.061
<b>Description of pain</b>				
Mild	90 (54.6)	53 (68.8)	37 (42)	0.053
Moderate	62 (37.6)	23 (29.9)	39 (44.3)	0.071
Severe	13 (7.8)	1 (1.3)	12 (13.7)	0.001

**Table 3 – Impact of IMSP on routine activity between adolescents (>10 yrs) and preadolescents (<10 yrs).**

Activity n (%)	Children with IMSP		p-Value
	<10 yrs	>10 yrs	
Difficulty while sitting during lessons 49 (29.2)	22 (28.6)	27 (30.7)	0.767
Pain during walking 66 (37.5)	34 (44.2)	32 (36.4)	0.308
Pain during Physical exercise 51 (30.9)	20 (29.9)	31 (35.2)	0.464
Interference with hobbies 7 (4.2)	2 (2.6)	5 (5.7)	0.451

**Table 4 – Comparison of associated problems in children with and without IMSP.**

Suffering from	No IMSP (n = 853)	IMSP (n = 165)	p-Value	IMSP (n = 165)		p-Value
	No. (%)	No. (%)		<10 yrs	>10 yrs	
Headache	93 (10.9)	78 (47.3)	<0.0001	31 (40.3)	47 (53.4)	0.091
Abdominal pain	46 (5.4)	41 (24.8)	<0.0001	15 (19.4)	26 (29.5)	0.141
Feeling sad	60 (7)	74 (45)	<0.0001	34 (44.2)	40 (45.5)	0.867
Day time tiredness	75 (9)	85 (51.5)	<0.0001	35 (45.5)	50 (56.8)	0.145
Sleep disturbances	49 (5.7)	48 (29)	<0.0001	12 (15.5)	36 (40.9)	0.002
School absenteeism	17 (2)	35 (21.2)	<0.0001	15 (19.4)	20 (19.3)	0.852
Hypermobility	152 (17.8)	36 (21.8)	0.226	16 (20.7)	26 (29.5)	0.31
Contact Sports	253 (29.7)	91 (55.2)	<0.001	30 (38.9)	61 (69.3)	0.001

Twenty-one percent (21.2%) children with IMSP reported school absenteeism as compared to 2% without IMSP and the difference was significant ( $p \leq 0.0001$ ). However, school absenteeism was found to be similar in preadolescents and adolescents ( $p = 0.852$ ).

History of playing contact sports was present in significant ( $p < 0.001$ ) number of children with IMSP (55.2%) as compared to children without (29.7%). Duration of play reported was 30 min to 1 h. The children used to play these sports for 1-5 days in a week with an average of 3 days per week. There was also significantly higher number of adolescent with history of playing contact sports (69.3% vs. 38.9%,  $p = 0.001$ ). Thirty-three percent of children played football, 20.9% played kabaddi and wrestling each, 14.3% were involved in boxing while 11% learned martial arts. There was no significant difference in the duration of game played in each group (children with IMSP and without IMSP) ( $p = 0.50$ ). However, there was significant difference in the number of days played in a week in these two groups ( $p = 0.007$ ). On further analysis of history of contact sports in preadolescents and adolescents, no significant difference was found between the two groups in duration and frequency of sports played ( $p = 0.165$  and  $0.162$ ).

Sleep disturbances were assessed using sleep disturbance scale for children. There was significant difference in the mean score in the children with and without IMSP (mean  $\pm$  SD (range),  $38.29 \pm 9.61$  (7-56) vs.  $23.18 \pm 7.13$  (8-38),  $p < 0.001$ ). The most common disturbances noted in children with IMSP were disorders of initiating and maintaining sleep and sleep wake transition disorders.

Hypermobility was found in 21.8% of IMSP cases as compared to 17.8% without but the difference was not significant ( $p = 0.226$ ). Also the occurrence of hypermobility in preadolescents and adolescents was not found to be significantly different ( $p = 0.31$ ).

Almost half of (50.2%) children with IMSP belonged to lower socioeconomic class, 31.5% belonged to middle class and 16.7% to upper class. IMSP significantly occurred more in lower socio economic class in comparison to upper and middle class ( $p = 0.032$  and  $0.004$ ).

IMSP was significantly more prevalent in children with lower maternal education (73.3% vs. 26.7%,  $p < 0.0001$ ) while father's education status showed no significant difference (53.3% vs. 46.7%,  $p = 0.226$ ).

In children with IMSP presence of history of body aches in both parents was significantly higher in parents of children with IMSP than that of children without IMSP (father 3% vs. 0.6%,  $p < 0.0001$ , mother 23.6% vs. 3.8%,  $p < 0.004$ ). A significant number of parents of adolescents revealed a history of body aches as compared to preadolescents (43.2% vs. 13%,  $p = 0.001$ ).

## Discussion

Most children with IMSP were in the age group of 13-16 years (38.2%) followed by 9-12 years and 5-8 years age group. On sub grouping the children further into preadolescents and adolescents, 55.3% were adolescents. Previous studies have also shown that the prevalence increase with increasing age

and was most common among the adolescent age group.<sup>4,5</sup> The cause for higher prevalence in adolescents could be increase in activity and stressors with increasing age. Other factors playing a role could be organisation of health services, economy, cultural differences or some other unknown factors.<sup>13,14</sup> However, the exact reason behind such trend is not known.

Children with IMSP had a lower BMI in our study which is contrary to the findings by Stovitz et al.<sup>15</sup> who found pain to be associated more in obese and overweight children. However few studies have found no such association.<sup>16</sup> Why children with low BMI have increased incidence of pain syndromes might be a subject requiring exploration.

A slight male (55.2%) predominance in our study is similar to a study on adolescent American children<sup>17</sup> and contrary to others. This is hypothesised to be due to genetic, hormonal and environmental factors.<sup>7,18,19</sup> However Zapata et al. have reported no sex predilection in their study in adolescents with musculoskeletal pain.<sup>20</sup> The exact reason of gender disparity in cases with IMSP, in different studies has not been elucidated.

Most common site of IMSP was lower limbs (52.1%) followed by upper limb (31.5%). Lower limbs were the most common site in adolescents as well (44.3%). This is in accordance with previous studies on idiopathic musculoskeletal pain by De Inocencio<sup>4</sup> and Paladino et al.<sup>18</sup> On the contrary Zapata et al. have reported the most common site to be lower back in their study on adolescents.<sup>20</sup> The higher incidence of lower limb pain could be due to increase in physical activity with increasing age.

In our study 56.8% children had pain persisting for more than 3 months and 43.2% had pain history of 6 weeks to 3 months. On further analysis of pain in preadolescents and adolescents it was seen that 21.6% adolescents complained of a history of more than year while most of the preadolescents (54.5%) had pain lasting for less than 3 months. Eighty-two percent children with idiopathic musculoskeletal pain had more than one episode of pain per week and the remaining had at least one pain episode per week. This is in accordance with previous studies by Konijnenberg et al.<sup>5</sup> and El-Metwally et al.<sup>7</sup> Daily pain episodes were seen in 28.4% of children (both adolescents and preadolescents) in our study and this is higher than those reported in earlier studies.<sup>18,19</sup>

Pain experienced during walking was the most prevalent associated problems present in 44.2% of preadolescents and 36.4% adolescents. A little more than one third also reported difficulty in sitting during lessons and interference with hobbies, which may affect the attention and concentration span thereby leading to deterioration in school performance.

We also analysed the pain intensity using visual analogue scale for pain. Majority of preadolescents reported mild pain while moderate pain was more common in the adolescents with significant difference between the two age groups. We used self-reporting tools for description of pain as they are appropriate for children above 4 years and provide a reliable and valid approach of measuring pain.<sup>7</sup>

Associations like day time tiredness and sleep disturbances, feeling sad were significantly more common in children with IMSP ( $p \leq 0.001$ ). However when these were



compared between preadolescents and adolescents more of adolescents reported day time tiredness (56.8%) and sleep disturbances (40.9%). The difference was not found to be statistically significant. Such associations may not only decrease the productivity in these young adults but might even affect several areas of life. Earlier studies have also reported similar associations with pain. Conversely mood change and sleep disturbances may influence pain modulations resulting in a viscous cycle of chronic pain.<sup>3,13</sup> Psychological stress can amplify association between pain and sleep. The association with feeling sad, stress and sleep disturbances is likely to be stronger in adolescents who are still developing their ability to regulate emotion, attention and emotional response to stress.<sup>21</sup>

Other pains like headache and abdominal pain were significantly associated with IMSP; however, there was no significant difference between preadolescents and adolescents with IMSP. We did not analyse these associated pain syndromes/stressor in detail in our children, however it is known by previous studies that children with idiopathic pain syndromes have other somatic pains.<sup>3,8</sup>

We found statistically significant higher school absenteeism in all children with IMSP, which is in accordance with previous studies.<sup>2,22</sup> This probably is due to sleep disturbances and difficulty in sitting through lesions due to pain resulting in deterioration in school performance and higher rates of school absenteeism.

Similar to previous studies<sup>23,24</sup> a positive history of contact sports was significantly higher in children with IMSP ( $p < 0.001$ ). Also significantly higher number of adolescents indulged in contact sports ( $p < 0.001$ ). Indulgence in contact sports could increase the chances of subtle injuries and perhaps chances of MSP.

There was no significant association found between IMSP and positive hypermobility test in our study which is in accordance with previous studies,<sup>7,25</sup> whereas a few studies have shown a positive correlation<sup>19,26</sup> This disparity in various studies warrants the need of more larger studies to establish such association.

IMSP in our study was found more prevalent in lower socioeconomic group with lower maternal education and positive family history of body aches, which is in accordance with previous studies.<sup>24,25</sup> The transmission of pain in families could occur through biological and/or psychological factors. Also some families may have a tendency to express feelings through somatic symptoms; thus musculoskeletal pain could be an expression of emotional stress in susceptible children.<sup>20,27</sup>

In our study, since the data was collected by recall, a certain amount of recall bias cannot be ruled out, which could be a limitation.

To conclude, the overall prevalence of IMSP in school children aged 5–16 years was found to be 16% and it had significant interference on daily activities of these children.

## Conflicts of interest

The authors declare no conflicts of interest.

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