Introduction

Musculoskeletal pain is a common complaint with which children are brought by parents to their family or primary physicians. Majority of children who present with musculoskeletal complaints have a benign etiology like joint hypermobility syndrome, growing pain, recent trauma, or carrying heavy school bags.[1-4] Sometimes they can be the manifestation of a systemic disease like infection, immunodeficiency, inflammatory bowel disease, lymphoreticular malignancies, or juvenile idiopathic arthritis (JIA).[5-8] Early detection and prompt treatment of inflammatory arthritis can prevent disability and deformities in children with these diseases.[9] This early detection maybe achieved by pGALS (pediatric Gait Arms Legs Spine) assessment which has been found to be a quick, evidence-based approach to musculoskeletal examination in children. [10,11] It is easy to administer and has been found to be acceptable by parents and children.[12,13] Beighton’s scoring on the other hand has been used for measuring generalized hypermobility in children.[14]

Abstract

Background and Aim: pGALS (pediatric Gait Arms Legs Spine) is a useful screening tool in identifying musculoskeletal problems in children. Although musculoskeletal problems are common in children, only a small fraction of them have an underlying serious pathology. There is limited data on this subject from north India but none from south India. Our aim was to identify the prevalence of musculoskeletal problems in school going boys in the local community. Methods: We conducted a prospective cross-sectional study among school boys 7–17 years of age from September 2017 to July 2019, in Chennai. The parents or the boys were asked pGALS screening questions and this was followed by the extended pGALS examination including Beighton’s scoring for hypermobility. If abnormalities in the screening tool were found, the subjects were then referred to a pediatric rheumatologist for further evaluation. Results: A total of 1543 boys were included in this study. Of these 37% of the study group were found to be hypermobile. According to our study, the prevalence of growing pains was 4.6%. Of 2 boys with suspected pathology 1 boy had enthesitis-related arthritis and another had slipped upper femoral epiphysis (SUFE). The estimated prevalence of juvenile idiopathic arthritis (JIA) was 65/100000. According to our study 12.3% of the children were obese. Conclusion: pGALS is a useful tool to screen for musculoskeletal problems in school going boys. The estimated prevalence of JIA was 65/100000. Of them, 37% of the children had hypermobility. Obese children were more likely to complain of musculoskeletal pain (P value 0.00).

Keywords: Hypermobility, juvenile arthritis, musculoskeletal problems, pGALS, school going boys

Identification of musculoskeletal problems using pGALS examination in school going boys in Chennai, India

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Statistics regarding incidence and prevalence of JIA is available mainly from the western world. Indian data is limited to two studies, one from Lucknow involving 2059 children and another from west Bengal involving 3463 children. The aim of our study was to identify musculoskeletal abnormalities and hypermobility using pGALS as a screening tool and Beighton’s scoring in school going boys in Chennai, South India.

Materials and Methods

We conducted a school-based prospective cross-sectional study over a period of 24 months from September 2017 to July 2019 in school going boys between 7 and 17 years. Five schools were selected of which four of them were located within the Chennai city limits and one school on the outskirts. Approval from the institutional ethical committee of Sri Ramachandra Institute of Higher Education and Research was obtained before the start of the study (REF: CSP‑MED/17/SEP/38/117). Prior approval was obtained from the school authorities to conduct the study.

Parents of the boys included in the study of 7–17 years (class 3 to class 10, +2) were provided information leaflets in Tamil and English a month ahead of the study. Parents were given the option of being present at the time of examination of their children, if they wished. For children between 7 and 11 years, parental consent was obtained. Verbal assent and parental consent were taken for children above the age of 11 years. Children with a history of recent trauma and/or fracture, disability due to congenital defects, and learning difficulties with neurological impairment were excluded from the study. pGALS examination was done in the school premises under the supervision of a primary investigator and the class teacher.

Children were explained about pGALS in their classrooms before the examination. They were also shown pGALS videos through electronic hand held device to allay any anxiety.

Boys, thus, included were initially asked four screening question. (3 questions related to pGALS & 1 to night pain) The screening included the following: (1) Do you have any pain or stiffness in your joints, muscles, or back? (2) Do you have any difficulty getting yourself dressed without any help? (3) Do you have any problem going up and down the stairs? (4) Do you have any night pain? History and general examination were recorded in the screening proforma and anthropometrical measures were also recorded. Students are explained that they could say yes to the above questions if they had experienced pain during one of the above incidents in the past 6 weeks at two or more instances.

The principal investigator screened five boys at a time and demonstrated the pGALS maneuvers followed by Beighton’s scoring maneuvers and the children were asked to copy them. Boys were examined from the front, back, and from the sides. Rashes and deformity were noted, if present. Boys with positive findings during screening were further subjected to complete history-taking and clinical examination. All the examination findings were recorded. Anthropometric measurements were recorded. Any child found to have abnormal examination was referred to the pediatric rheumatology department of Sri Ramachandra Institute of Higher Education and Research, Chennai. These children were then examined by a pediatric rheumatologist and further investigations were done, if needed.

Data analysis was done by routine descriptive statistics and all outcomes were analyzed by Statistical Package for the Social Sciences (SPSS) version 20.0 (IBM Corporation, Armonk, NY). Continuous variables are expressed as mean ± SD. Categorical variables are expressed as percentage or as number of cases and compared using Chi-square test. Statistical significance are considered at P values < 0.05.

Results

Of the 1568 boys that were initially enrolled in the study 25 were excluded. About 8 boys had recent fractures, parents of 12 boys did not consent, and 5 did not want to participate on the day of the examination. About 1543 boys were included in our study of whom: 379 were 7–9 years, 440 were 10–12 years, 407 were 13–14 years, and 317 were 15–17 years. Of them 1234 (80%) were studying in schools within the city limits and the remaining were from a school in the suburb. Of these 147 (9.5%) were thin, 1206 (78.1%) were within the normal weight range, and 190 (12.3%) were obese.

The range of findings are summarized in Table 1. The most common musculoskeletal abnormality according to our study was hypermobility followed by musculoskeletal pain and growing pain.

To the first screening question, 94 boys (6.1%) answered that they had pain or stiffness in joints/muscles or back, on two occasions in the past 6 weeks not related to an identifiable event. Around 27 boys each in the age group of 7–9 and 10–12 years and 20 each in the 13–14 and 15–17 age group complained of pain or stiffness in joints/muscles or back. Only three boys had difficulty in going up or down the stairs. None of them reported any difficulty in getting dressed up themselves.

About 71 (4.6%) boys experienced night symptoms suggestive of growing pains. Of these 20 were in the 7–9 age group, 32 in the 10–12 age group, and 19 in the 13–14 age group. No boys in the 15–17 age group complained of night pain. None of these boys had daytime pain or features suggestive of systemic disease and were thriving well. The prevalence of growing pains according to our study was 4.6% (71) of children (95% CI 3.6–5.8).

A Beighton score >4 was taken as hypermobility in our study. Around 37% of the study groups were found to be hypermobile of which a maximum number of children with hypermobility were in the 7–9 age group. Of them, 191/379 (50%) of children in this group were hypermobile, 147/440 (33.4%) in the 10–12 age group, 132/407 (32.4%) in the 13–14 age group, and 101/317 (31.8%) in the 15–17 age group were found to have hypermobility.
Children with centiles >95% for weight were considered obese. About 31/190 (16.3%) children with obesity complained of musculoskeletal pain compared to 63/1353 (4.7%) of non-obese children (P value 0.00).

Of the three boys who had difficulty climbing stairs one child had early morning stiffness with back pain and had bilateral sacroiliac tenderness. Modified Schober test was normal but he had back pain when bending forward. Blood tests revealed elevated inflammatory markers with HLAB27 positivity and MRI pelvis showed features of bilateral sacroiliitis. He was initiated on treatment with steroids and sulfasalazine. The second patient, a 14-year-old with obesity, had obvious limping and difficulty in climbing stairs, complained of persistent hip pain for the past 4 months. On examination he had limitation of hip rotation movements. Pelvis radiographs in frog lateral views were suggestive of slipped capital femoral epiphysis and he was referred to orthopedic department for surgical treatment. The third boy who had difficulty in climbing stairs complained of recent onset back pain. His blood tests including ESR were normal, HLAB27 negative, and MRI of SI joints, lumbar spine, and hip joints was normal. At 6 month follow-up his back pain had resolved. The prevalence of JIA according to us was estimated to be 65/100 000 in Indian boys.

Discussion

pGALS is an ideal validated assessment tool with excellent specificity and sensitivity to screen children for musculoskeletal problems. It was devised as a quick musculoskeletal assessment tool aimed at the physicians to whom children are more likely to present and helps differentiate abnormal joints from normal joints in children. Any abnormal finding on this assessment should be further investigated and a prompt specialist referral should be initiated.

We diagnosed one boy with enthesitis-related arthritis who presented with bilateral sacroilitis elevated inflammatory markers and HLA B27 positivity. Abujam et al. in their study also found one boy with enthesitis-related arthritis and gave an estimated prevalence of JIA as 48 per 100000, in Indian children. Sabui et al. used pGALS as a screening method to identify musculoskeletal abnormalities in 3463 children from the eastern Himalayas. This study showed growing pains in 38.86%, hypermobility in 25.54%, mechanical pains in 24.46%, and other problems in 11.14% of children. Asymptomatic hypermobility was more common in general and was common in the younger age of 6–9 years similar to our study.

Our study showed that children with obesity are likely to complain of musculoskeletal compared to non-obese children. Published literature also confirms that obese children were more likely to complain of musculoskeletal pain with the odds increasing by 3% for every unit increase in BMI.

We diagnosed one boy with enthesitis-related arthritis who had a limp of recent origin and hip pain was diagnosed with slipped upper femoral epiphyses (SUFE). Sabui et al. in their study also found non-inflammatory conditions, Legg–Calve–Perthes disease, and Osgood–Schlatter’s disease in one patient each.

The major limitation in our study is that, it is a boys’ only study and the schools which participated had children mainly from the lower socioeconomic class. The results may not reflect the true prevalence in the population, as in children, the onset of diseases such as systemic JIA or oligo JIA happens quite early in childhood, and these children and those with debilitating conditions may not have registered or may have dropped out of school. Also the incidence of oligo JIA and other autoimmune diseases like lupus are more common in girls and they were not part of the study group.

Conclusion

We studied the prevalence of musculoskeletal problems in school going boys using pGALS. This is the first study of this

Table 1: Summary of findings

| Age group (years) | Total | Joint/muscle pain | Growing pain | Hypermobility >4 | Obesity |
|------------------|-------|------------------|--------------|-----------------|--------|
| 7-9              | 379   | 27               | 20           | 191             | 61     |
| 10-12            | 440   | 27               | 32           | 147             | 53     |
| 13-14            | 407   | 20               | 19           | 132             | 42     |
| 15-17            | 317   | 20               | 0            | 101             | 34     |
| Total            | 1543  | 94 (5.8%)        | 71 (4.6%)    | 571 (37%)       | 190 (12.3%) |
kind in south INDIA. Hypermobility was the most common condition identified and a majority of these children were asymptomatic and belonged to the younger age group. Children with obesity were more likely to complain of musculoskeletal pain. Community-based studies on a larger scale including both boys and girls may be needed to get an actual estimate. Our study indicates that children with significant inflammatory and non-inflammatory musculoskeletal conditions may remain undiagnosed in the community and pGALS is an ideal assessment tool to help detect such conditions. General and family physicians need to be aware of and get trained in this simple assessment tool. pGALS should also be included as part of undergraduate curriculum in medical colleges.

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Conflicts of interest
There are no conflicts of interest.

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