Abstract

Objective. To examine the prevalence of articular hypermobility and its relationship to musculoskeletal pain in Icelandic 12-yr-olds, and to obtain baseline data for a prospective study on the subject.

Methods. A total of 267 12-yr-olds were examined for articular hypermobility by the Beighton criteria. The children also answered a questionnaire concerning musculoskeletal pain and injuries, sports and musical activity.

Results. The prevalence of hypermobility (defined as \( \geq 4 \) Beighton criteria) was 40.5\% in girls and 12.9\% in boys. Despite slight trends for hypermobile subjects to be less active in sports and to report more joint pain, no correlation could be found between hypermobility and musculoskeletal symptoms.

Conclusions. An unusually marked sex difference in hypermobility exists among Icelandic 12-yr-olds, but hypermobility does not seem to affect joint symptoms or leisure activities at this age.

Key words: Hypermobility, Children, Musculoskeletal pain, Sports activity.

Articular hypermobility is a graded phenomenon which runs in families and is affected by many factors, including age and sex [1]. The clinical implications of this condition and its relationship to musculoskeletal symptoms are a matter of considerable controversy. Several studies have indicated an association with musculoskeletal pain [2, 3] and sports injuries [4, 5]. Others, however, report no such association [6, 7].

The question of whether some hypermobile subjects are at risk of developing musculoskeletal pain problems and injuries is highly relevant with regard to screening and installation of preventive measures. We present here the baseline results in a prospective study analysing this relationship.

Methods

The participants were 267 schoolchildren, 143 girls and 124 boys, who were due for their 12-yr-old health check-up, carried out at this point in the Icelandic school and health system. A school nurse used a standard questionnaire to record the children’s participation in the school’s physical education, sports (type and frequency) and musical activity, along with musculoskeletal pain, luxations and sprains.

The medical examination was performed by a single observer (AQ) and consisted of assessment of hypermobility according to the Beighton criteria [8]. In addition, the presence or absence of the palmaris longus muscle was examined clinically and the grip width (defined as the maximum distance between the tips of the thumb and fifth finger on a ruler) measured.

Statistics

The \( \chi^2 \) test was used for comparison between groups, and the Spearman rank correlation test (\( R_s \)) for correlation.

The study has been approved by the Icelandic Data Protection Commission.

Results

The prevalence of articular hypermobility (\( \geq 4 \) Beighton criteria) was 40.5\% among the girls and 12.9\% among the boys. Corresponding figures for \( \geq 6 \) criteria were 14 and 4.8\%. The overall prevalence of each criterion varied from 20 to 39\% and all were more common in girls, with the exception of 90° extension in the fifth metacarpal joint, which was similar in the sexes (Fig. 1). Hypermobility was slightly more common on the left
Fig. 1. Prevalence of each Beighton criterion for both sexes.

Discussion

In this study of 267 Icelandic 12-yr-old schoolchildren, the prevalence of articular hypermobility ($\geq 4$ Beighton criteria) was 40.5% among the girls and 12.9% among the boys. Despite a slight tendency towards less sports activity and more reported pain in hypermobile subjects, no evidence was found to suggest that hypermobility affects joint symptoms or leisure activities at this age.

There is an unusually marked sex difference in articular hypermobility in Icelandic children, with the girls registering the highest prevalence in Caucasian populations [6, 7, 9, 10]. This is particularly noteworthy compared to the less pronounced sex difference found in Finnish schoolchildren by Mikkelsson et al. [6], using similar methods. The children in the present study were slightly older (average age 12.4 yr compared with their two groups of 9.8 and 11.8 yr), and it is conceivable that growth and hormonal effects at this age may have some bearing on the sex-related differences, but otherwise the differences between the populations remain unexplained. On the other hand, the two studies are in total agreement with regard to the lack of association with musculoskeletal symptoms, both regional and general, in this age group.

The studies of Larsson and co-workers [11, 12] indicate that hypermobility of peripheral joints and spine could be favourable in occupations requiring frequent movement of affected joints, but unfavourable in less frequently used joint regions where stability may be more important. However, the complex relationship between hypermobility and the development of diverse musculoskeletal pain problems and fibromyalgia [2, 3], sports injuries [4, 5] and the later development of osteoarthritis [13] is insufficiently understood on the basis of current data, which are mainly cross-sectional. Therefore, it seems extremely relevant to follow this group prospectively. We have recently described a subset of hand osteoarthriti with mainly thumb base affection which is related to articular hypermobility in Icelandic females [14]. This has not been described in other populations, although we have found a similar trend in Swedish patients operated on for thumb base osteoarthritis [15]. There is also evidence to suggest that musculoskeletal pain and fibromyalgia have a high prevalence in Iceland [16].

Current evidence suggests that the ‘palms on the floor’ criterion is trainable [5]. It is possible, however, that inactivity may contribute to increased laxity at the other sites, as suggested by increased left side prevalence, a finding previously reported by Beighton and others [8, 17, 18]. This would be in concordance with studies reporting that post-traumatic joint instability can be improved by training [19].

Table 1. Sports, musical activity and musculoskeletal symptoms in relation to articular hypermobility (percentages in parentheses)

<table>
<thead>
<tr>
<th>Beighton criteria</th>
<th>Girls (n = 143)</th>
<th>Boys (n = 124)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation in:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School’s physical education</td>
<td>84 (99)</td>
<td>57 (98)</td>
</tr>
<tr>
<td>Sports activity</td>
<td>58 (68)</td>
<td>37 (64)</td>
</tr>
<tr>
<td>Musical school</td>
<td>34 (40)</td>
<td>23 (40)</td>
</tr>
<tr>
<td>History of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Musculoskeletal pain</td>
<td>37 (44)</td>
<td>31 (53)</td>
</tr>
<tr>
<td>Joint luxation</td>
<td>6 (7)</td>
<td>3 (5)</td>
</tr>
<tr>
<td>Ankle sprain</td>
<td>45 (53)</td>
<td>29 (30)</td>
</tr>
</tbody>
</table>

There was a slight non-significant trend for hypermobile subjects to be less active in sports (64% \(\times\) 69%; Table 1) and to report more musculoskeletal pain (55% \(\times\) 51%). A similar trend was seen for reported pain frequency (\(R_s\) pain frequency vs Beighton score 0.11; \(P = 0.06\)). The ‘palms on the floor’ criterion was more common in those reporting sports activity (48/180 \(\times\) 8/87; \(P < 0.01\)), but otherwise we did not find any associations between particular joints and the clinical data. Thus, hypermobility of hand or knee joints was not associated with pain in these areas. No difference was found with regard to the school’s physical education programme, musical activity, type of sports, luxations or ankle sprains.

Grip width correlated positively with the Beighton score (\(R_s\) 0.23, \(P < 0.001\)), but no association was found between hypermobility and either unilateral (12.3%) or bilateral (11.6%) absence of the palmaris longus muscle.
The palmaris longus muscle was tested as a possible marker of evolution; the hypothesis being that humans are developing increased mobility at the cost of stability. No such association was found, proving that Mother Nature is still wonderfully unpredictable. The grip width measurement is widely used in evaluation of hand surgery. The association found here is a confirmation of recent findings by members of our group [15].

The association between articular hypermobility and subsequent development of musculoskeletal problems appears to be of considerable importance with regard to preventive measures. Should adolescents be guided in their choice of sports or other activities? If we can identify those who are particularly at risk, then screening procedures would be indicated. These questions can only be answered through prospective follow-up and the current study gives us a platform of baseline data for these purposes.

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References