JOINT HYPERMOBILITY IN PATIENTS WITH CHONDROMALACIA PATELLAE

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SUMMARY

The relationship between joint mobility and chondromalacia patellae was reported in a prospective study. A total of 115 patients with chondromalacia patellae were compared with 110 healthy individuals without chondromalacia patellae, matched for age and sex, who served as a control group. The degree of joint mobility was scored on a scale of 0–9. The number of individuals with hypermobile joints and the total mobility scores were significantly higher in patients with chondromalacia patellae when compared to the control group ($P < 0.001$). There were more hypermobile knees among knee joints with chondromalacia patellae when compared with the knees of the control group ($P < 0.01$). Chondromalacia patellae were bilateral in 57% of our patients. It occurred more frequently in the longer leg and was associated with quadriceps muscle wasting in 50% of patients. Flat feet and backache were reported significantly more often in patients compared with the control group ($P < 0.05$). It is concluded that hypermobility of the knee joint may be a contributing factor in the pathogenesis of chondromalacia patellae.

KEY WORDS: Hypermobility, Chondromalacia patellae.

The first clinical description of joint hypermobility was attributed to Hippocrates in the 4th century BC [1]. In 1967, Kirk et al. [2] reported the association between hypermobility syndrome and musculoskeletal complaint. Most authors feel that hypermobility syndrome is a benign disorder which has been implicated in the pathogenesis of ligamentous rupture [3], knee effusion [4], low back pain [5], osteoarthritis [6] and chondrocalcinosis [7]. The association between hypermobility syndrome and mitral valve prolapse [8], genital prolapse in women [9] and rectal prolapse [10] raises the possibility that hypermobility syndrome may be part of a more generalized connective tissue disorder.

The term 'chondromalacia patellae' was introduced by König [11] and Aleman [12] for pain of the knee cap felt when the knee functions under load in flexion. It affects adolescents and young adults; girls outnumber boys in a ratio of 3:2 [13]. Most patients recover spontaneously and there is little evidence to suggest that it might predispose to early osteoarthritis [13]. We aimed to study the association between hypermobility syndrome and chondromalacia patellae.

PATIENTS AND METHODS

The study population comprised 115 male and female patients attending the rheumatology clinic in the Medical City Teaching Hospital, complaining of anterior knee pain graded from 1 to 5 as follows: 1 = none; 2 = slight on walking; 3 = marked on walking; 4 = mild at rest; 5 = severe at rest. Patients were diagnosed as chondromalacia patellae on clinical grounds according to the criteria described by Wiles et al. [14] and Robinson and Darracott [15]. All patients fulfilling these criteria were included in the study.

Patients who showed signs of inflammatory arthropathy, dancers, pregnant females and patients with heritable connective tissue disorders were excluded from the study.

Patients were assessed for any history of trauma to the knees, body weight, height, leg length, signs of joint inflammation, knee deformities, thigh girth 5 cm above the upper patellar border, presence of flat feet and also for other joint involvement or backache. The joint mobility was evaluated by another observer (blind) using the Carter and Wilkinson score [16] as modified by Beighton et al. [17].

All patients were investigated radiologically for the knees (AP, lateral and sky-line view) and haematologically (erythrocyte sedimentation rate, serum uric acid and latex fixation test).

Statistical analysis was by $\chi^2$ for number of individuals and $t$-test for scores of mobility.

RESULTS

A total of 115 patients and 110 control individuals were studied. The two groups were matched for number, sex, age, body weight and height as shown in Table I.

Females (77.4%) were affected more frequently than males (22.6%) in a ratio of 3:4:1. The left knee alone was affected in 26 (22.5%) patients, the right knee alone in 23 (20%) and both knees in 66 (57.4%) patients.

The number of patients with hypermobile joints and the total mobility scores were higher in the
chondromalacia group \( (P < 0.001) \) when compared with the control group, as shown in Table II.

Hypermobile knees were more common among knee joints with chondromalacia patellae when compared with the knees of the control group \( (P < 0.01) \), as shown in Table III. The frequency distribution of mobility scores in the two groups is shown in Fig. 1.

A leg length difference of \( \frac{1}{2} - 1 \) cm was found in 44 (38.2\%) patients and in 36 (32.7\%) of the control group, the left leg being longer in 77.3 and 75\% of the patients and control group, respectively. The relationship of the dominant side and leg length in patients and control group is shown in Table IV.

The number of patients showing limb inequality was 44. Seven (15.9\%) of them had chondromalacia patellae in the shorter leg and 12 (27.3\%) of them had chondromalacia patellae in the longer leg \( (P > 0.05) \) and it was bilateral in 25 patients.

Quadriceps muscle wasting of \( \frac{1}{2} - 2 \) cm was seen in \( \approx 50\% \) of the patients when one knee was affected, as shown in Table V.

The number of patients with hypermobile joints and the total mobility scores were significantly higher in patients with flat feet, as shown in Table VI.

The duration of symptoms ranged from 1 week to 3 yr with a mean of 11.2 months. A history of trauma in the form of a hit on the knee or twisting force was noticed in 21 patients (18.3\%), but no effusion was detected in any patient.

Other joint involvement showed that 60 (52.2\%) patients gave a history of backache compared to 17 (15.51\%) of the control group \( (P < 0.001) \), and two patients had pain in their shoulders, wrists, ankles and elbow joints.

All blood tests were within the normal range and only two females had a positive latex fixation test. X-rays of knee joints were all within the normal range.

**DISCUSSION**

This study showed that there is a significant association between chondromalacia patellae and generalized joint laxity, as well as a significant increase of hypermobile knees among knees with chondromalacia patellae.

This has reinforced the previous impression that hypermobility of the knee may be a contributing factor in the pathogenesis of chondromalacia patellae, which is supported by the evidence of improvement of symptoms of this disabling condition by limitation of hyperextension of the knee joint [18].

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**TABLE I**

Demographic details

<table>
<thead>
<tr>
<th>Group</th>
<th>Sex (no.)</th>
<th>Age range (yr)</th>
<th>Mean body weight (kg)</th>
<th>Mean height (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M  F</td>
<td>10–14 15–19 20–24 25–29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients ( n = 115 )</td>
<td>26 89</td>
<td>5 39 44 27</td>
<td>58.8</td>
<td>162.5</td>
</tr>
<tr>
<td>Controls ( n = 110 )</td>
<td>24 86</td>
<td>3 30 49 28</td>
<td>60.8</td>
<td>163.6</td>
</tr>
</tbody>
</table>

**TABLE II**

Total mobility score of both groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Total mobility score No.</th>
<th>Total mobility score No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Patient group</td>
<td>Control group</td>
</tr>
<tr>
<td>Normal mobility ( (0–3) )</td>
<td>51 101</td>
<td>85 146</td>
</tr>
<tr>
<td>Hypermobility ( (4–9) )</td>
<td>64** 341**</td>
<td>25 113</td>
</tr>
</tbody>
</table>

**TABLE III**

Chondromalacia patellae in relation to hypermobility of the knee joint

<table>
<thead>
<tr>
<th>Group</th>
<th>Total no. of knee joints</th>
<th>No. of knee joints with hypermobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chondromalacia ( n = 115 )</td>
<td>181</td>
<td>93*</td>
</tr>
<tr>
<td>Controls ( n = 110 )</td>
<td>220</td>
<td>28</td>
</tr>
</tbody>
</table>

**TABLE IV**

Dominant side and leg length in both groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Dominant leg length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Longer ( \frac{1}{2} - 1 ) cm</td>
</tr>
<tr>
<td>Patients ( n = 115 )</td>
<td>11</td>
</tr>
<tr>
<td>Controls ( n = 110 )</td>
<td>10</td>
</tr>
</tbody>
</table>

**TABLE V**

Quadriceps muscle wasting

<table>
<thead>
<tr>
<th>Knee with chondromalacia</th>
<th>Number of patients ( n = 115 )</th>
<th>Quadriceps muscle wasting ( \frac{1}{2} - 2 ) cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right</td>
<td>23</td>
<td>12</td>
</tr>
<tr>
<td>Left</td>
<td>26</td>
<td>–</td>
</tr>
<tr>
<td>Both</td>
<td>66</td>
<td>21</td>
</tr>
</tbody>
</table>
We found chondromalacia patellae more frequently in female than in male patients (3.4:1) compared to 3:2 [13], 11:4 [19] and 2:1 [20]. It was bilateral in 57% of our patients.

Limb inequality was found in patients (38.2%) and the control group (32.7%) \((P < 0.05)\), and the left leg was longer in both groups. Chondromalacia patellae was found more often in the long leg than in the short leg, and although the differences were insignificant, this finding is consistent with what is known of long leg arthopathy [21]. This is different from Walker and Schreck’s [18] finding of inequality of leg length in 84% of patients and the involved side was shorter.

Quadriceps muscle wasting was found in 0.50% of the patients with chondromalacia patellae on one side, whilst Leslie and Bentley [20] found that the quadriceps were wasted in 45% of those with chondromalacia compared with 17% of those with no abnormality on arthroscopy. Flat feet were noticed significantly more often among hypermobile patients with chondromalacia patellae. The association between flat feet and joint hypermobility is well documented by another report [22].

Arthralgias in other joints showed that 60 patients had backache and two patients had pain in the shoulders, wrists, ankles and elbow joints, which is in agreement with another report [22] of significantly more joint complaints in hypermobile individuals.

A history of trauma was noticed in 21 (18.3%) patients, whilst Leslie and Bentley [20] found that 26% of the patients with a normal appearance on arthroscopy had a history of trauma, and 37% of those patients with chondromalacia on arthroscopy also gave a history of trauma.

No effusion was detected in any of our patients, whilst Lesley and Bentley [20] found that effusion was present in 22% of those with chondromalacia, but this did not occur in those with normal findings on arthroscopy.

There were no radiological changes among our patients with chondromalacia patellae; this finding is consistent with another study [20], so radiology is not helpful as a diagnostic tool for chondromalacia patellae.

It is concluded that hyperextensibility of the knee joint may be a contributing factor in the pathogenesis of chondromalacia patellae.

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