Does generalised ligamentous laxity increase seasonal incidence of injuries in male first division club rugby players?

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Objectives: To investigate if ligamentous laxity increases seasonal incidence of injury in male first division club rugby players, and to determine if strength protects against injury in hypermobile and tight players.

Methods: Fifty one male first division club rugby players were examined for ligamentous laxity using the Beighton-Horan assessment and graded with an overall laxity score ranging from 0 (tight) to 9 (hyperlax). Each participant was classified into a group determined by their laxity score: tight (0–3), hypermobile (4–6), or excessively hypermobile (7–9). The incidence of joint injuries was recorded prospectively throughout the rugby season and correlated with laxity score. Differences between the groups were analysed.

Results: The overall prevalence of generalised joint hypermobility was 24% (12/51). The incidence of injuries was significantly higher in hypermobile (116.7 per 1000 hours) than tight (43.6 per 1000 hours) players (p = 0.034). There were no significant differences in peak strength between the hypermobile and tight groups.

Conclusions: The laxity of the players may explain the differences in injury rates between these groups. Peak strength does not protect the hypermobile joint against injury. It appears that hypermobility may cause an increase in the injury rate of male first division club rugby players.
- passive opposition of the thumb to the flexor aspect of the forearm (1 point per hand)
- passive hyperextension of the 5th metacarpal phalangeal joint beyond 90° (1 point per hand)
- hyperextension of the elbows by 15° or more (1 point per arm)
- hyperextension of the knees (1 point per leg)
- forward flexion of the trunk with knees extended and palms flat on floor (1 point)

All elements are added together to give an overall ligamentous laxity score ranging from 0 (tight) to 9 (hyperlax). An “injury allowance point” was also used, whereby participants who tested positive for only one side of a bilateral test, but had a history of a significant injury to the contralateral joint, were presumed to be lax before that injury and were awarded an injury allowance point. Elbow and knee joint angles were measured using a Jamar goniometer.

Injury incidence

The incidence of shoulder, hip, knee, ankle, and wrist and hand joint injuries was recorded prospectively over the entire season by the teams’ physiotherapists. These data were then analysed to determine if injury rate correlated with hypermobility status.

An injury was defined as any condition limiting function that resulted in an athlete seeking medical treatment from a doctor or physiotherapist, regardless of whether athletic participation had been missed. Only new injuries incurred during that season were considered, and any aggravations or reinjuries suffered during the season were not included.

Strength testing

All players classed as hypermobile were recruited to undergo strength testing on the Biodex System 2 Multi-Joint Testing System Shirley, New York, USA, to determine the relative strength of the hamstrings and quadriceps at two speeds. The nine players were matched with another nine players from the tight group according to position, height, weight, level, and game time. The other three hypermobile players could not participate in the strength testing because of injury. Biodex strength testing was also performed on the non-lax players as matched controls. Each participant was instructed to follow the same warm up procedure before testing; this consisted of light resistant pedalling at a cadence of 50 rev/min on a Monark cycle ergometer for five minutes. Five practice repetitions on each leg were performed at each of the two test speeds before data collection to allow the subject to become familiar with the equipment. At a speed setting of 180°/s, five maximal repetitions were performed. The subject then rested for two minutes before testing the leg at a speed of 60°/s. A three minute rest period was given between test bouts, before testing of the opposite leg. Consistent verbal encouragement was given throughout the maximal effort repetitions. Values for peak torque strength were obtained, and hamstring to quadriceps ratios as well as percentage strength deficits were calculated for each knee motion of each limb.

Statistical analysis

Descriptive statistics were used to determine mean values of genetic orientation (age, height, and weight). The Kruskal-Wallis (non-parametric analysis of variance) and Mann-Whitney U tests were used to determine if there were significant differences between incidence of injury for the tight, hypermobile, and extremely hypermobile athletes. Simple analysis of variance was used to compare strength values between the lax and non-lax players.

RESULTS

Laxity results

Twelve of the 51 subjects (24%) were above the 4/9 criterion for hypermobility. Only 8% (4/51) of subjects scored 7, 8, or 9 (fig 1). The overall mean (SD) laxity score for this study was 2.0 (2.4) (range 0–9).

Injury surveillance

Twenty three athletes sustained a total of 31 injuries over the entire season; 19 reported a single injury and four suffered two or more injuries. Figure 2 illustrates the incidence and distribution of injuries sustained over the entire rugby season. There were no significant differences (p < 0.05) in injury rates between the three laxity groups. However, analysis of the injury data by hypermobility status alone did show a significant increase in injuries in the hypermobile (116.7/1000 hours) group (p = 0.035; fig 3).

Figure 1 Distribution of the Beighton-Horan hypermobility scores and frequency of injuries during a season for male first division club rugby players.
Table 1  Mean peak torque (N.m) scores for knee flexion and extension in tight (n = 9) and hypermobile (n = 9) male first division club rugby players

<table>
<thead>
<tr>
<th></th>
<th>Quads Left</th>
<th>Quads Right</th>
<th>Hamstrings Left</th>
<th>Hamstrings Right</th>
<th>H/Q ratio (%)</th>
<th>Testing speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tight</td>
<td>311.8</td>
<td>318.6</td>
<td>172.5</td>
<td>180.7</td>
<td>56</td>
<td>57.2</td>
</tr>
<tr>
<td>Hypermobile</td>
<td>293.5</td>
<td>298.8</td>
<td>163</td>
<td>165.2</td>
<td>56.3</td>
<td>56.5</td>
</tr>
<tr>
<td>Tight</td>
<td>194</td>
<td>202.6</td>
<td>131.2</td>
<td>139.1</td>
<td>68.6</td>
<td>69.4</td>
</tr>
<tr>
<td>Hypermobile</td>
<td>188.2</td>
<td>194.6</td>
<td>124.4</td>
<td>130.8</td>
<td>66.9</td>
<td>68.3</td>
</tr>
<tr>
<td>H/Q, hamstring/quadriceps ratio.</td>
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</tbody>
</table>

**Strength results**

Table 1 shows the mean peak torque scores for the hypermobile and tight groups in knee flexion and extension. Initial observations suggest that the tight group were on average stronger, but there were no significant differences between the hypermobile and tight groups for the mean peak torque generated. Although not significant, the trend does indicate that tight subjects were on average stronger than their hypermobile counterparts. When hypermobility status and strength (classed as either above or below the mean value) were compared with injury rates, no significant differences (p = 0.056) were found between these groups. Also, strength was not found to protect against hypermobility, as no differences were observed in injury rates between hypermobile athletes who were stronger or weaker than the mean torque value (p = 0.07).

Furthermore, we were not able to predict injuries as a result of imbalances between muscle groups and between limbs.

**DISCUSSION**

It is becoming clear that sports injuries result from a complex interaction of identifiable risk factors, only a few of which seem to be identified. This study was conducted to determine if ligamentous laxity increased the seasonal incidence of injuries in male first division club rugby players. Previous research has produced conflicting evidence on whether ligamentous laxity, as no differences were observed in injury rates between hypermobile athletes who were stronger or weaker than the mean torque value (p = 0.07).

Furthermore, we were not able to predict injuries as a result of imbalances between muscle groups and between limbs.

**REFERENCES**


**Take Home Message**

Generalised ligamentous laxity may increase the incidence of injury in male rugby players. The Beighton-Horan assessment may help to identify athletes at increased risk of injury from potentially hazardous sports such as rugby so that they can be steered into more appropriate sports.
To determine if submaximal contractions used in contract-relax proprioceptive neuromuscular facilitation (CRPNF) stretching of the hamstrings yield comparable contract-relax proprioceptive neuromuscular facilitation results with maximal voluntary isometric contractions (MVICs).

**Method:** Randomised controlled trial. A convenience sample of 72 male subjects aged 18–27 was used. Subjects qualified by demonstrating tight hamstrings. A total sample of 72 male subjects aged 18–27 was used. Subjects were randomly assigned to one of three treatment groups: 1, 20% of MVIC; 2, 60% of MVIC; 3, 100% MVIC. Twelve subjects were randomly assigned to a control group (no stretching). Subjects in groups 1–3 performed three separate six second CRPNF stretches at the respective intensity with a 10 second rest between contractions, once a day for five days. Goniometric measurements of hamstring flexibility using a lying passive knee extension test were made before and after the stretching period to determine flexibility changes.

**Results:** Paired t tests showed a significant change in flexibility for all treatment groups. A comparison of LS means showed that there was no difference in flexibility gains between the treatment groups, but all treatment groups had significantly greater flexibility than the control group.

**Conclusion:** CRPNF stretching using submaximal contractions is just as beneficial at improving hamstring flexibility as maximal contractions, and may reduce the risk of injury associated with PNF stretching.