BIOMECHANICAL PROFILE OF THE BALANCE AND MUSCLE PERFORMANCE IN RUGBY ATHLETES

¹ Wênya Palácio Xavier de Melo; ¹ Nahra Santos Rebouças, ¹ Rômulo Lemos e Silva, ¹ Shalimá Figueirêdo Chaves, ² Pedro Olavo de Paula Lima; ²* Rodrigo Ribeiro de Oliveira.

¹ League of Sports Physical Therapy, Federal University of Ceara, Brazil.
² Movement Analysis Laboratory, Federal University of Ceara, Brazil.
* Corresponding Author: rodrigo@ufc.br

SUMMARY

Background: This study aimed to identify the biomechanical profile of balance and muscle performance in rugby athletes. Methods: We analyzed nine athletes from a rugby club that participates in a regional championship (mean±standard deviation: 25.11±3.10 years old, BMI of 29.38±4.94, flexibility of 25.92±5.44 cm and experience time of 28.22±7.03 months). All athletes presented right-leg dominance. Each player was evaluated with an isokinetic dynamometer (Biodex®), an electronic baropodometer (DIASU®) and a sit and reach test. Results: Peak torque at 60°/s for dominant quadriceps muscle was of 275.6±57.5 N.m and 273.5±47.9 N.m for non-dominant. Peak torque at 60°/s for dominant hamstring muscle was of 142.7±43.8 N.m and 129.8±60.8 N.m for non-dominant. Hamstring/Quadriceps strength ratio at 60°/s was of 52.9±18.5% for dominant limb and 46.7±16.3% for non-dominant limb. We found a significant difference in total load of plantar pressure (Table 1). Conclusion: Rugby athletes presented an asymmetry in balance and a symmetric pattern in muscle performance between dominant and non-dominant limbs.

Keywords: biomechanical profile; Rugby; Sports Physical Therapy.

INTRODUCTION

Rugby is a tackling sport that was originated in England and can be played in several modalities, which vary between junior, amateur, semi-professional and professional categories.
joint was aligned with the rotation axis of the dynamometer. We used a protocol with concentric contractions for extension and flexion knee at 60º/s [4].

We used SPSS 17.0 to analyze all data and a t-Student test to determine differences between the legs with a 5% level of significance.

RESULTS AND DISCUSSION

Athletes had a mean age of 25.11±3.10 years, mean weight of 90.55±19.02 kg, mean height of 1.75±0.06 m, BMI of 29.38±4.94 kg/m², flexibility of 25.92±5.44 cm and experience time of 28.22±7.03 months). According to other studies, flexibility < 24 cm is considered bad in male individuals with age between 20 and 24 years and below average in those with age between 25 and 29 years [5].

Extension peak torque was 275.6±57.5 N.m in the dominant limb and 273.5±47.9 N.m in the non-dominant limb. Flexion peak torque was 142.7±43.8 N.m and 129.8±60.8 N.m in the dominant and non-dominant limbs, respectively. Literature determines that a difference between legs of until 15% is considered to be normal [6].

Agonist/antagonist ratio was 52.9±18.5% in the dominant limb and 46.7±16.3% in the non-dominant limb. Authors have indicated that the ideal hamstring/quadriceps ratio at 60º/s is around 60%. Therefore, alterations in this relation may be considered as a risk factor for injuries [7].

Results of the baropodometer tests are available in table 1. We found a significant difference between total loads. In stabilometry, ellipse area of bipedal test was of 164.6±148.9 mm².

CONCLUSIONS

Rugby athletes presented an asymmetry in balance and a symmetric pattern in muscle performance between dominant and non-dominant limbs.

REFERENCES


Table 1. Mean and standard deviation of the baropodometer indices.

<table>
<thead>
<tr>
<th></th>
<th>Dominant Limb</th>
<th>Non-dominant Limb</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forefoot Load (kg)</td>
<td>20.5±2.5</td>
<td>21.1±1.4</td>
<td>0.51</td>
</tr>
<tr>
<td>Rearfoot Load (kg)</td>
<td>27.6±3.9</td>
<td>31.1±5.0</td>
<td>0.18</td>
</tr>
<tr>
<td>Total Load (%)</td>
<td>43.8±8.2</td>
<td>31.1±5.0</td>
<td>0.02*</td>
</tr>
<tr>
<td>Ellipse Area (mm²)</td>
<td>158.5±110.8</td>
<td>213.7±190.7</td>
<td>0.40</td>
</tr>
<tr>
<td>Medial/Lateral Sway (mm)</td>
<td>0.22±0.09</td>
<td>0.26±0.12</td>
<td>0.33</td>
</tr>
<tr>
<td>Anterior/Posterior Sway (mm)</td>
<td>0.28±0.10</td>
<td>0.32±0.14</td>
<td>0.33</td>
</tr>
</tbody>
</table>

* Significant difference (p<0.05).