Measurement the “Q” angle through the application of direct method and indirect method

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Abstract

Introduction: The “Q” angle is used to measure global alignment of the kneecap, representing the kneecap normal alignment. The average of 15 degrees in ordinary people is accepted as “Q” angle value, 14 degrees for men and 17 degrees for women. Anatomic changes caused by variants produces converging kneecaps or lateral deviation of the tibial tuberosity, changing the “Q” angle value and causing pathologies. Objective: Measure the “Q” angle of asymptomatic people, comparing obtained results. Materials and Methods: The “Q” angle measurement was taken from 12 subjects (6 males and 6 females), with ages from 18 to 35, at the Physiotherapy Clinic of José do Rosário Vellano College, in Alfenas, MG. Results: After evaluating the 12 subjects following ANOVA test, using p ≤ 0.05, no significant statistic difference could be observed among examiners, gender or right and left limbs, considering both direct and indirect methods. Conclusion: Data obtained in this research allows us suggest that there is no difference between “Q” angle values among genders, direct and indirect methods and lateral symmetry.

Keywords: “Q” angle, photogrammetry, goniometry.

1 Introduction

The aim of this work was to measure the Q angle of asymptomatic subjects by comparing the values obtained among female and male genders, the right and left sides and the measurements taken by two different examiners, all related to the direct and indirect measurement, to verify the applicability of both methods.

The knee joint is the largest synovial joint of the human body, allowing the movements of a ginglymus joint type (flexion and extension) and also allows a certain degree of rotation. (DÂNGELO and FATTINI, 1998). Inflammatory diseases such as infectious arthritis, rheumatoid arthritis, synovial diseases ranging from nonspecific synovitis, which can have numerous causes, including viral, until synovial tumors (synovial sarcoma, for example), passing through specific synovitis (pigmented villonodular synovitis, for example), chondrocalcinosis (pseudo gout limestone) are the cause of biomechanical changes of the knee joint, which suggests a directed change at Q angle. (HEBERT, XAVIER, PARDINI et al., 1998).

The so-called “pathological Q angle” is an indication of medial transposition of the tibial tuberosity. But different Q angles depend on the position in which the knee is measured (extension or inflection), also if the position of the patient is supine or upright, if the quadriceps muscle is relaxed or contracted as well as the patient’s gender. Clinical findings and Q angle measurements only in extension position may be elusive in many cases. Researches show that there is no correlation between the Q angle measurement in full extension and the position of the patella in the trochlea. (BIEDERT and WARNKE, 2001).

Complications of lateral displacement occur more often in women and may be due to the slight increase in lateral traction exerted by the quadriceps mechanism. Dysfunction of the oblique vastus medialis is, tense lateral structures, including the iliotibial band, patellar retinaculum and the greater subtalar pronation that results in increased Q angle value are responsible for lateral patellar displacement. (ANDREWS, HARRELSON and WILK., 2000).

The angle Q is an overall patellar alignment measurement, representing the normal alignment of the patella. This is the angle between a line extending from the anterosuperior iliac spine to the center of the patella and a line extending from there to the center of the tibial tuberosity. The average of 15 degrees is accepted as “Q” angle value in ordinary people, 14 degrees for men and 17 degrees for women. (REIDER, 2001).

Anatomical changes caused by variants produce convergent patella or lateral deviation of the tibial tuberosity, increasing this angle measurement. Patellofemoral pain may be associated with this increase. (REIDER, 2001). Cases arising from genu valgus, high patella, pronated feet, wide pelvis, increased femoral antversion and external tibial torsion also correlate with the increase that angle. (KISNER and COLBY, 1998). Some knee joint pathologies, as mentioned above, explain why some people with high Q angle value at rest show little difference when the quadriceps is isometric ally activated and others with the normal Q angle value at rest show a considerable loss of such angle. (LATHINGHOUSE and TRIMBLE, 2000).

Evidences indicate that young adult women have a good Q angle value compared to men, with differences in magnitude from 2.7 to 5.8 and 3.4 degrees to 4.9 degrees when measured with the quadriceps relaxed in supine position and standing,
Table 1. Demonstration of the average values found in the measurement using the indirect method.

<table>
<thead>
<tr>
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<th>FEMALE LEFT KNEE</th>
<th>MALE LEFT KNEE</th>
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<th>MALE RIGHT KNEE</th>
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</thead>
<tbody>
<tr>
<td>Examiner 1</td>
<td>16.59°</td>
<td>13.98°</td>
<td>16.40°</td>
<td>13.80°</td>
</tr>
<tr>
<td>Examiner 2</td>
<td>16.54°</td>
<td>14.05°</td>
<td>17.29°</td>
<td>13.81°</td>
</tr>
</tbody>
</table>

Table 2. Demonstration of the average values found in the measurement using the direct method.

<table>
<thead>
<tr>
<th></th>
<th>FEMALE LEFT KNEE</th>
<th>MALE LEFT KNEE</th>
<th>FEMALE RIGHT KNEE</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Examiner 1</td>
<td>17.83°</td>
<td>15.66°</td>
<td>17.00°</td>
<td>14.33°</td>
</tr>
<tr>
<td>Examiner 2</td>
<td>16.66°</td>
<td>15.66°</td>
<td>16.66°</td>
<td>14.00°</td>
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</table>
Masuyama and Folha (2008) showed a bigger average of Q angle in female when compared to male subjects. According to Carvalho, Mazzer and Barbieri (2012) it was observed both in the photogrammetric and in the goniometer, in general, a significant correlation among groups and methods, indicating that proportionally, the measurements vary in a similar way, they have relationship with each other and they are simultaneously reliable, thereby ensuring reproducible data. This work showed similar results regarding this relationship.

In this study, goniometry when compared to photogrammetry, showed reliable results for Q angle. However, the results found in 2007 by Sacco, Alibert, Queiroz et al. (2007), showed reliability of these methods for all angles, except for Q angle.

Evaluating the range of movement (ROM) of the elbow joint in 2011, Silva, Coelho, Vale et al. (2011) did not observe a good correlation between fleximetry and radiologic goniometry, denoting that the procedural difference between these two methods of ROM hindered such correlation, or suggesting that this factor might hinder any correlation between such technique so evaluative instruments that distinct. It contradicts this work, where no significant statistic difference between the goniometry and the photogrammetry were found, even though being different methods.

We observed that the examiners found similar results in all applied methods. It was also stated in 2011 by Santos, Oliveira, Silveira at al. (2011) where the application of different tests to measure the same parameter lead to comparable and consistent results, ensuring increased quality of communication between different professionals and contributing to the scientific basis of practical clinic.

5 Conclusion

Therefore, data obtained on this study allow us to suggest that there are no differences between Q angle measurement values: among genders, direct and indirect methods, lateral symmetry and between different examiners.

References


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