Does the change in Q angle magnitude in unilateral stance differ when comparing asymptomatic individuals to those with patellofemoral pain?

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Introduction

Q angle is frequently cited as a possible predictor of knee pathology and lower limb injury (1). Abnormally high Q angles in excess of 15° for males and 20° for females are regarded as an anatomical risk factor in the aetiology of overuse injuries of the knee such as patellofemoral joint pain (1,2). In spite of this, there is currently an inability among health professionals to conclude what should be considered as a ‘normal’ angle (3). Subsequent to this questions have arisen as to the validity of linking excessive Q angles with the occurrence of knee pathologies and other lower limb injuries, resulting in doubts concerning the diagnostic value of the Q angle (4). These findings could be somewhat explained by the methods used for the measurement of Q angle (3). One of the reasons for this might be because these studies are assessing Q angle in bilateral stance. It would appear more logical to assess the affect of unilateral stance on Q angle, which may give functional validity to this measure. The objective of the study was to determine if Q angle changes in magnitude from bilateral stance when compared to unilateral stance and then how this change related to the presence of patellofemoral joint pain.

Method

Participants were 60 asymptomatic females (mean age 21.9+/-.1 years) and 12 female patients with patellofemoral pain (mean age 24+/-.32 years) forming the symptomatic comparison group. Both groups had their Q angles measured in bilateral and unilateral stance from images taken using digital photography and then calculated from the “Image J” computer programme. Statistical analysis of all data was carried out using SPSS version 13.0 for windows. Paired samples T-tests were conducted to compare stance positions and linear regressions used to formulate predictive equations for Q angles.

Results

Statistical analysis (paired t-tests) revealed significant differences between bilateral positions and unilateral stance positions Q angles (P< 0.005) for asymptomatic subjects. Unilateral stance causes a significant reduction in Q angle. The linear regressions equations generated from the asymptomatic subjects showed predictive equations and positive correlations for unilateral and bilateral stance Q angles (r=0.81-0.89, p<0.001). The equations generated were used to predict unilateral Q angle from bilateral Q angle measurements in 12 patients with patellofemoral joint pain. The actual unilateral Q angle measurement of the symptomatic knee was significantly greater than that predicted for each individual (p=0.01), whilst the asymptomatic knee showed no significant difference (p= 0.16) between predicted and actual Q angle.

Discussion

This study showed a strong positive relationship between bilateral and unilateral stance Q angles in asymptomatic female subjects, which could be represented in a positive linear regression equation. The linear regression equation was then used to predict the effect on the Q angle of moving from a bilateral to a unilateral stance. It has been found previously that patients with patellofemoral joint pain on loading the limb in unilateral stance in activities such as walking and stair descent have increased knee valgus angle (5). The current study supports those findings indicating that when taking up unilateral stance patients with patellofemoral joint pain demonstrate a significantly greater than expected increase in Q angle which could increase loading on the patellofemoral joint.

References

1. Rauh M et al 2007 JOSPT 37:725-733