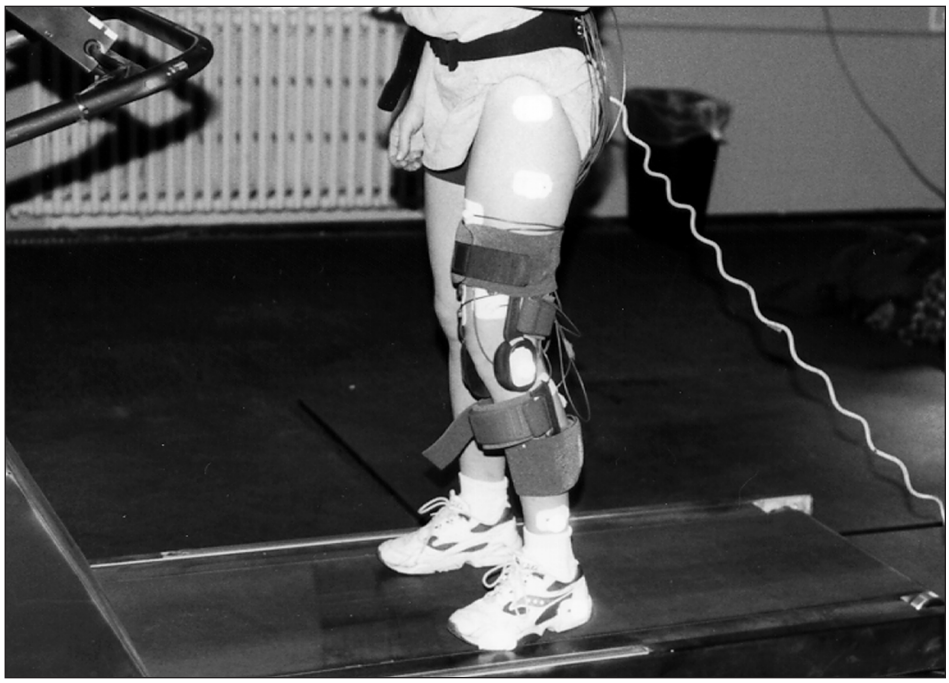
NATA RESEARCH & EDUCATION FOUNDATION

Grant Information Summary:

Effect of Physical Activity on Knee Migration and EMG Activity of the Leg

Practical Implications

The data provided by this study shows that knee brace movement can be minimized with the application of a custom fitted brace. This is significant as the mechanical function of these braces in reducing various forces at the knee is not altered. Another important finding to this study is that custom knee brace applications do not seem to affect the activity of the muscles in which the brace is applied over; thereby, not varying the neurological and mechanical function of the muscle.

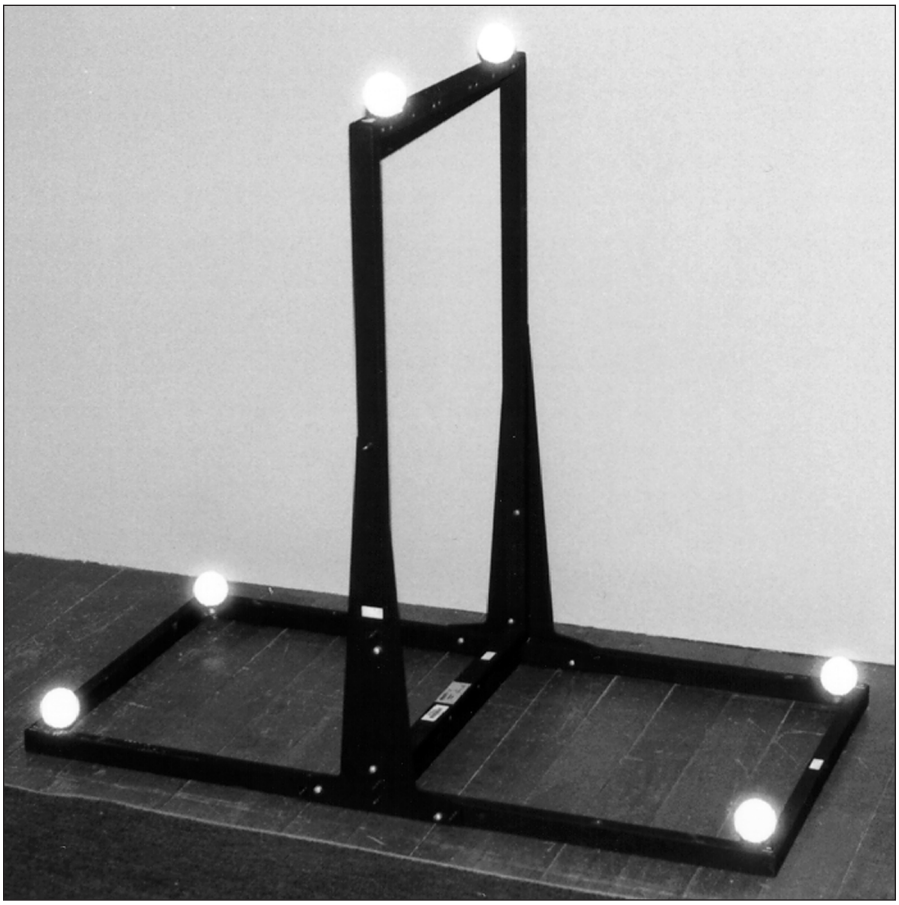


Background

Prophylactic and functional braces are routinely used during physical activity. Although commonly used, the efficacy of such braces has been questioned, and consequently, not established. A major issue surrounding these braces concerns their inability to maintain proper position during activity due to inadequate fit. Proponents of functional bracing argue that these braces do not move as much because they are custom fitted, therefore offering a greater amount of mechanical support. Another issue concerning knee bracing questions whether or not such bracing affects electrical activity of the leg muscles involved? Thus, the purposes of this study were to evaluate the amount of movement associated with functional braces in relation to leg girth; and to determine if these types of braces alter the electrical activity of selected leg musculature.

Research Results

No differences in brace migration were found between the hard shell and strap design functional braces. Additionally, there were no significant differences in brace migration between the different forms of physical activity. It was also found that thigh and calf circumference does not significantly predict the amount of



movement present in the hard shell or strap design brace. With respect to muscle activity, bracing did not affect the amplitude of muscle activity and specific muscle fiber recruitment patterns of the vastus medialis, vastus lateralis, rectus femoris, biceps femoris, semimembranosus and gastrocnemius. Overall, these data suggest that proper application of a custom functional knee brace should not result in movement from it's intended position. Furthermore, leg shape is not a significant factor to consider regarding brace fit. In addition, it appears that electrical activity of selected muscles of the leg remained unaltered with both braces.

In-Depth Analysis

Ten healthy female college hockey players with no history of knee pathology participated in the study. Each subject had their dominant leg custom fitted with a hard shell and strap design functional knee brace. In order to measure brace movement, retroflective markers were placed over the greater trochanter of the dominant leg, and the hinge of the knee brace. Silver-silver chloride surface electrodes were placed on the vastus medialis, vastus lateralis, rectus femoris, biceps femoris, semimembranosus and gastrocnemius to measure electrical activity of the muscles. All subjects performed three different types of activities (treadmill run, side step, obstacle course) under both knee brace conditions in a random order on three separate days. A repeated measures analysis of variance (ANOVA) was used to determine differences in brace migration, for brace condition and type of activity. Multiple regression procedures were used to determine if brace migration could be predicted from thigh and calf girth. A repeated measures ANOVA was also used to evaluate differences in electrical muscle activity between the braces and types of activities. All statistical tests were done at the $P < 0.05$ level of significance. ■

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