THE EFFECT OF WARM-UP, STATIC STRETCHING AND DYNAMIC STRETCHING ON HAMSTRING FLEXIBILITY

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INTRODUCTION: Warm-up and stretching may increase flexibility and reduce injury risk, yet there is disagreement on the benefits of stretching and which technique is best (Thacker et al 2004). This study examined the short-term effects of warm-up, static and dynamic stretching on hamstring flexibility in individuals with previous hamstring injury and uninjured controls.

METHOD: A randomised crossover study was performed over 2 days. Hamstring flexibility was assessed in supine using passive knee extension range of motion (PKE ROM). The reliability of assessing PKE ROM using a 'Myrin' goniometer, with a crossbar maintaining the hip at 90° flexion, was examined in a preliminary pilot study (n= 25) and was excellent (ICC = 0.945, SEM 1.84°). 36 individuals (18 injured, 18 controls) participated. Only previously injured subjects who were now painfree, but with a residual reduction of 5° of PKE ROM compared to the other leg were included. On both days, four measurements of PKE ROM were recorded: (1) at baseline; (2) after a 5-minute aerobic warm-up; (3) after stretch (static or dynamic) and (4) after a 15-minute rest. Both stretches were performed for 30 seconds and repeated 3 times for each leg. Participants carried out both static and dynamic stretches, but on different days. Data were analysed using a 1-way repeated measures anova.

RESULTS: Across both groups, there was no interaction effect ($p=0.344$). There was a significant main effect for time ($p<0.001$). PKE ROM significantly increased with warm-up ($p<0.001$). From warm-up, PKE ROM further increased with static stretching ($p=0.04$) but significantly decreased after dynamic stretching ($p=0.013$). The increased flexibility after warm-up and static stretching reduced significantly ($p<0.001$) after 15 minutes of rest, but remained significantly greater than at baseline ($p<0.001$). Between groups, there was no main effect for group ($p=0.462$), with no difference in mean PKE ROM values at any individual stage of the protocol ($p>0.05$). Using ANCOVA to adjust for the non-significant ($p=0.141$) baseline differences, the previously injured group demonstrated a greater response to warm-up and static stretching, which was not statistically significant ($p=0.05$)

DISCUSSION: Warm-up significantly increased hamstring flexibility. Static stretching also increased hamstring flexibility, whereas dynamic did not, in agreement with previous findings on uninjured controls. The greater effect of warm-up and static stretching on flexibility in those with reduced flexibility post-injury is worthy of further study.

CONCLUSION: Further prospective research is required to validate the hypothesis that increased flexibility improves injury or performance outcomes, as this study only examined short-term flexibility. The results contrast with research demonstrating the greater benefits of dynamic stretching on performance measures. There may be a need to consider both forms of stretching during training and rehabilitation, but for different purposes.

REFERENCES:

Thacker, SB, Gilchrist, J, Stroup, DF and Dexter, C (2004) The Impact of Stretching on Sports Injury Risk: A Systematic Review of the Literature. Medicine and Science in Sports and Exercise 36, 371-378.