

Effects of Cold Packs on Hamstring Flexibility

Penny E. Bolton, SPT, Rachel L. Pittman-Kremmer*, SPT, Sarah N. Stucky, SPT

Department of Physical Therapy, College of Health Professions

Abstract: Different thermal techniques have been used to increase hamstring flexibility with varying results. Research has shown that cold will help increase hamstring flexibility; however, there are limited studies on the use of cold treatments to influence hamstring flexibility. This study tested whether cold packs will impact hamstring flexibility. Subjects were healthy male or female 18-30 year olds. Subjects were excluded based on answers to a medical questionnaire, Body Mass Index >30, and hamstring injury within a year. Of thirty potential subjects, 29 fit the requirements of the study. Subjects marched in place to insure a common pre-test condition. A goniometer was used to measure hamstring flexibility. A passive straight leg raise was done to maximum tension and subject discomfort. Three pre and three post cooling measurements were taken bilaterally. Only one leg was cooled with a 2:1 water to alcohol cold pack. A repeated measures ANOVA and post hoc comparisons with paired t-tests were used to analyze the data. Significant ($p < .05$) differences between the pre and post cooled hamstring measurements were found. No significant differences occurred between pre and post test measurements on the uncooled leg. Observations from this study showed flexibility can be increased by applying a cold pack to the hamstrings. This research based evidence may be used in the practice of physical therapy when considering a plan of care that includes increasing hamstrings flexibility in 18-30 year olds.

1. Introduction:

Flexibility is defined as the range of motion about a joint dependent on the condition of surrounding structures.¹ Without proper hamstring flexibility, individuals will not be able to perform simple daily activities which require extending at the hip or bending at the knee. Flexibility is also an important component of overall physical health. Flexibility training is generally accepted as an important aspect of conditioning for athletic and occupational performance and is widely used as an effective method in the treatment and prevention of injuries. Flexibility exercises are designed to increase tissue elasticity, thereby increasing range of motion of specific joints.² According to the Sports Injury Clinic, most of the time hamstring tightness does not cause a problem, but it can make an individual prone to tears and can limit sporting function.³ Hamstring tightness or tears often occur in athletes who do not stretch before a performance.³ Research has shown that cold will help to increase hamstring flexibility.⁴ However, there are limited studies on the use of cold treatments to influence hamstring flexibility. The purpose of this study was to investigate whether a cold modality will impact hamstring flexibility.

2. Experiment, Results, Discussion, and Significance

The population chosen for this study was 18 to 30 year old males and females. This sample comprised 29 individuals chosen by convenience from students attending Wichita State University. All subjects were asked to wear shorts and a sports top for females and no shirt for males. They were required to have a Body Mass Index (BMI) less than 30, no previous hamstring injury within the last year, or any other general contraindications to hamstring stretching or cold modalities such as high blood pressure, decreased circulation in lower extremities, diabetes, and skin hypersensitivity to cold temperatures. Only subjects who completed a consent form, a medical history questionnaire, and had a BMI determined to be less than 30 were included. No assignment methods were used.

The subject began by giving informed consent; then he filled out a medical history questionnaire. Each questionnaire was evaluated to see if the subject met the project criteria. If no contraindications were found, height and weight were measured. Male subjects wore athletic shorts, no shirt, and no shoes or socks. Female subjects wore sports bras, athletic shorts, and no shoes or socks. A coin was flipped to determine which leg was iced. Heads represented a right leg; tails represented the left leg. The greater trochanter of both femurs was marked with an X to

ensure that each measurement used the same landmark. Each subject marched in place for two minutes to insure all subjects started at equivalent baselines.

Hamstring flexibility was measured by having each subject lie supine on a plinth while one hip was passively flexed by a researcher with the ankle in neutral and the knee in extension. The opposite leg was held flat against the plinth by a different researcher with one hand placed above the knee and one below to stabilize the entire leg during measurement. The stationary arm of the goniometer was in line with the lateral midline of the trunk, the fulcrum at the greater trochanter, and the moveable arm in line with the lateral epicondyle of the femur. A straight leg raise was used to passively flex the hamstrings by one researcher until the subject had discomfort but not pain while another researcher took the hip measurement. Initial hamstring range of motion was measured and recorded three times. The subject then lay supine on the plinth to eliminate any tension on the hamstrings.

Cold packs were placed under one thigh covering the entire hamstring musculature from his ischial tuberosity to the popliteal fossa for 15 minutes. A paper towel was placed between the skin and the cold pack to protect the skin from contact with the cold. The subject was then directed to lower his leg onto the ice packs. Towels were used to prop the non-iced leg to mimic the position of the iced leg during the 15 minute application time. After cooling, final range of motion measurements were repeated exactly as the initial measurements on the subject three times.

Differences in flexibility measurements at six different time periods were analyzed with a univariate approach to repeated measures analysis of variance. Post hoc comparisons were made with paired t-test with Bonferroni correction. The alpha level was set at .05.⁵

Repeated measures ANOVA revealed that there were no significant differences between any of the three sets of measurements (e.g., no significant difference was found between the three pretest measurements on the cooled leg, etc). Because no differences in these values were found, the measurements for each time (pre/post) and each leg (cooled/uncooled) were pooled. A significant change in pre and post hamstring length was found in the cooled leg. No changes were found in the uncooled leg. (Table).

Table

Means and standard deviations (SD) in degrees of motion for straight leg raising in each of the different test situations (n=29)

Leg	Time	Mean	SD
Cooled	Pretest	72.4	14.6
	Posttest	81.2	16.6
Uncooled	Pretest	72.0	14.6
	Posttest	73.2	15.0

3. Conclusion

This study tested the change in hamstring flexibility of 29 subjects between the ages of 18 and 30 with no hamstring injuries within the last year. Subjects’ mean premeasurements were found to be similar in both legs. A significant difference was found between the pre and postmeasurements of the cooled leg. This research based evidence may be used in the practice of physical therapy when considering a plan of care that includes increasing hamstring flexibility in this age group.

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