EFFECTS OF WATER AND NON-WATER SOLUBLE PRE-TAPE ADHESIVE SPRAYS ON SUBTALAR JOINT PRONATION

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INTRODUCTION

Most athletes involved in very strenuous sports such as basketball, football, hockey and track and field take various precautions prior to competition in order to prevent injuries. These precautions are manifested in stretching exercises and in many cases athletic taping is applied to the athletes by an athletic trainer. These precautions occur at all levels of competition not just the professional level. The purpose of athletic taping is to provide longer and stronger support to the joint which is taped. In general, it is the ankle joint which is taped most often. There are a variety of taping techniques utilized by athletic trainers, each with unique characteristics. Many researchers have studied the effects of athletic taping but none have discussed the function of pre-tape adhesive sprays (Bunch et al., 1985; Emerick, 1978; Garrick and Requa, 1973). To insure the integrity of the taping technique used, athletic trainers use a pre-tape spray. This pre-tape spray is applied to the area of the foot/ankle just prior to being taped. The sprays utilized by most of the athletic trainers from interscholastic to professional are of a water soluble base. The purpose of this investigation was to examine the effects of water soluble and non-water soluble pre-tape sprays on lower extremity function during a 40 minute, five mile run. In order to accomplish this task rearfoot motion is to be examined. The most important dependent variable gleaned from rearfoot motion data is maximum subtalar joint pronation. This variable has been cited as an important descriptor of rearfoot motion in the research literature (Bates et al., 1978; Clarke et al., 1983).

METHODOLOGY

Kinematic data were collected and analyzed on eight healthy collegiate middle distance runners who volunteered to participate in this study. Informed consent documents were signed in accordance with the rules of the Biomechanics Laboratory.

High speed video film data recorded the eight subjects running on the treadmill using the Quasar VM705 VHS camcorder. The video camcorder was leveled at a height 1.2 m and was positioned so that the optical axis of the camcorder was in a direct line with the line of action of the runner. This camcorder position captured a rear view of the treadmill running. In order to analyze the rearfoot motion of the runners, four markers constructed from 3M reflective tape were placed on the rear part of the lower leg and heel counter of the right shoe. Two markers were placed on the calf of the right leg of each subject so that together they determined a line representing the longitudinal axis of the lower leg. The other two markers were placed on the heel counter of the right shoe of each subject. These markers estimated the longitudinal axis of the heel of the right foot (Clarke et al., 1983). These markers enabled the researcher to generate the rear foot motion variables of maximum subtalar joint pronation (MP) and time to maximum subtalar joint pronation (TMP). The video film record was then stored for later analysis utilizing the PEAK Technologies 2D Motion Measurement System. This system includes a SONY 1390 video monitor interfaced with a Panasonic AG 6300 Video recorder/

player. Both the video monitor and the video recorder/player were interfaced to an IBM 386 microcomputer.

Three right footfalls were manually digitized using the PEAK Performance video analysis system. The data elicited from the videotape records included the X and Y coordinates for a two segment rear view model of the walking gait pattern of the lower extremity. The rear view X and Y coordinates were then filtered using a Butterworth digital filter, and then further processed in order to calculate the rearfoot variables of MP and TMP. Stick figures were then generated to visually examine the lower extremities for similarities and differences between the water soluble and non-water soluble pre-tape spray conditions. A t-test to measure differences between independent group means was used to determine if differences existed between the groups for each of the dependent variables.

RESULTS AND DISCUSSION

Table 1 presents a summary of the means and standard deviations for all the subjects for the statistically significant dependent measures in this investigation at eight minute intervals including the start of the run.

Table 1. Means (sd) for all subjects at each time interval at each condition.

	Non-Water Soluble (C1)	Water Soluble (C2)
Time Interval (min)	MP[a]	MP[a]
Start	12.01	12.35
8	12.11	12.69
16	12.15	13.42
24	12.26	13.97
32	12.34	14.35
40	12.57	14.66
Mean	12.24	13.58
SD	(0.19)	(0.93)

[a] t value = 4.3639; significant at $p \leq 0.05$

It was evident that there was a significant difference over the course of the race for all subjects for the dependent variable MP. It can be seen that while the subjects were taped utilizing the non-water soluble pre-tape adhesive spray maximum subtalar joint pronation increased by a total of 0.56° during the 40 minute, five mile run compared to an increase of 2.31° during the same run when the same subjects ran with the water soluble pre-tape adhesive spray applied prior to ankle taping. There were no significant differences for the dependent variable TMP. The inference drawn from this data is that the non-water soluble pre-tape spray increases the integrity of the taping job performed by the athletic trainer.

Figure 1 graphically represents the differences exhibited between the two pre-tape adhesive sprays. The graph depicts the differences that can be seen as a function of time.

CONCLUSIONS

From the results of this study, the following conclusions are warranted:

1. The non-water soluble pre-tape adhesive spray controlled rearfoot movement (MP)

better than the water soluble pre-tape adhesive spray.
2. Rearfoot motion (MP) increased on the average of 0.56° during the 40 minute, five mile run for the non-water soluble pre-tape adhesive spray condition compared to an increase in MP of 2.31° for the water soluble pre-tape adhesive spray condition.
3. The non-water soluble pre-tape adhesive spray condition maintained the integrity of the subtalar joint better over the course of the 40 minute, five mile run compared to the water soluble pre-tape adhesive spray.
4. The above benefits translate into the fact that with the use of a non-water soluble pre-tape adhesive spray, athletes require fewer taping sessions creating, therefore, financial savings as well as time save which frees the athletic trainer to perform other duties.

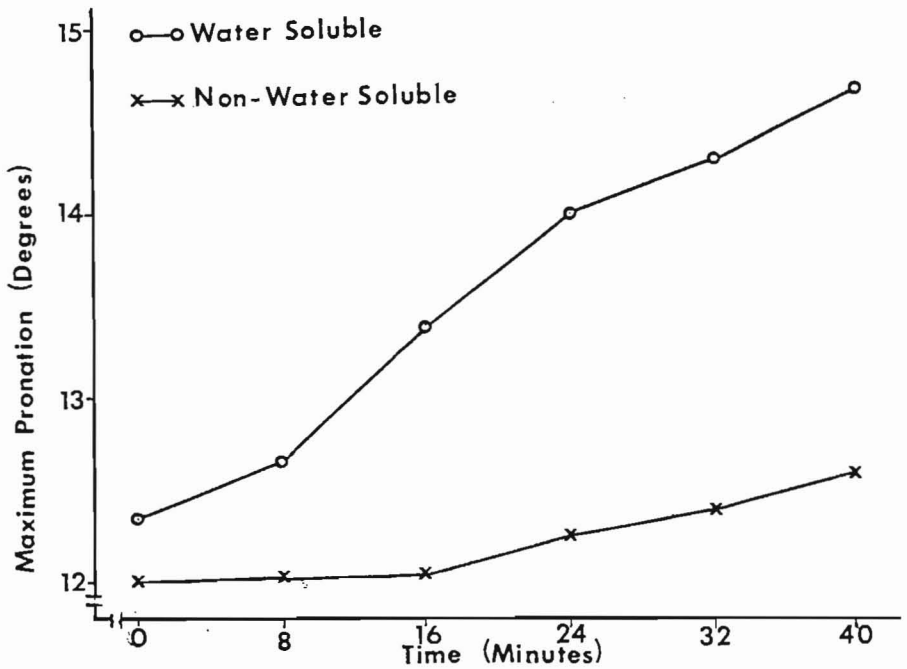

Figure 1. Subtalar joint pronation measured at 8-minute intervals for water and non-water soluble pre-tape adhesive sprays.

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