INTRODUCTION

Peak iliotibial band (ITB) flexibility and peak abductor strength were measured prospectively in a population of runners training for marathons. These two measures are considered strong indicators of lower limb flexibility and strength for marathon runners. It is hypothesized that increased ITB flexibility and abductor strength reduces injury rates while also increasing completion rates for marathon training.

METHODS

Runners were recruited from two marathon training programs. Each team engaged in a 5-month training schedule. The teams had similar schedules with respect to total mileage and total number of runs. The two teams differed with respect to their warm-up and cool-down regimens. Team A (initially N=21) was coached to warm-up and stretch together prior to runs and to jog cool-down laps after their runs while team B (initially N=20) did not. Inclusion in the study was based on the following criteria:

Mileage – Initially <20 mi./wk
Injuries - no reported surgeries or significant soft-tissue injuries of the lower limbs
Experience - < 3 marathons

Early on in their training (~1 month) and again later in their training (~4.5 month) two measures were acquired from each runner.

Measure 1 - runners were asked to perform the standing ITB stretch 4 times (Fig. 1). Each stretch (4 trials) was held for 30 sec. (data collected over last 5 sec.) followed by rest (<1min.). Kinematics and kinetics of the stretch were analyzed using 7 retro-reflective markers, a four-camera system, and a force plate. Inverse dynamics were applied to determine hip abduction moments during the stretch.

It was assumed that increased adduction moments result in higher forces in the ITB. Increased forces in the ITB results in greater tissue relaxation and thus flexibility (Taylor et al. 1997).

Measure 2 - Abductor strength measures were acquired with a dynamometer contacting the runner just proximal to the lateral malleolus. The test stand was adjusted to 20° of abduction for each runner. (Fig. 1). Each test (4 trials) included 3 sec. of isometric force development, followed by rest (20 sec.).

![Figure 1](image.png)

The runners were not coached during the tests. The forces were multiplied by the moment arm measured from the greater trochanter to the lateral malleolus to get hip abduction moments. These moments were
then normalized by body weight and height (%BW*HT).

Pair-wise two-sided t-tests were used for all analyses between an individual's earlier measurements early and their later measures.

RESULTS

Both teams had no differences in peak normalized abductor strength or flexibility ~1 month into their training (p>0.05). However, just prior to race day team A had significant higher peak ITB flexibility (p<0.05) and peak abductor strength (p<0.0001) than team B (Figs. 2 & 3).

DISCUSSION

A training regimen incorporating stretching, warm-up and cool-down periods is implicated in increasing completion rates of marathon training and also implicated in reducing the potential for injury.

Unlike an interventional studies on recreational runners (e.g. Van Mechelen et al. 1993), this study chose marathon runners whose mileage was greatly increasing during the training. Increasing mileage is agreed upon as a major injury risk factor and may result in increasing the sensitivity to these training variables (Fredericson, 1998). Other coaching variables may also play a role in training success.

SUMMARY

Marathon training that includes an active component of warm-up, cool-down and stretching is implicated in a significant improvement of ITB flexibility and abductor strength. The subsequent physiological benefit decreases injury and/or drop-out rates occurring in marathon training.

REFERENCES


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