

NO ACUTE EFFECT OF SPECIFIC AND NON-SPECIFIC WARM-UP ON THE RATE OF TORQUE DEVELOPMENT OF KNEE EXTENSORS IN EXPLOSIVE ISOMETRIC CONTRACTION

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Introduction

There is a general agreement in the physical education and coaching communities on the importance of a warm-up prior to any physical performance. Two benefits are attributed to such a preparatory procedure namely: protection from injuries and/or performance enhancement. Nevertheless, the value of warm-up remains controversial among researchers (Fradkin, 2010). The purpose of this study is to examine the influence of three kinds of submaximal warm-up protocols on rate of torque development (RTD) during explosive isometric contraction of the knee extensors.

Methods

Fourteen females and 15 males physical education students were the subjects in the study [means and (SDs): age: 27.5(5.2) and 27.1(4.2) years, weight: 58.9(7.2) and 74.2(9.8) kg, height: 167.2(4.7) and 179.0(9.3) cm, respectively].

The warm-up protocols were: 1. A specific warm-up (SWU) - 3 sets of 10 repetitions of light ("very light" on the Borg 6-20 points scale) knee extension and flexion in a sitting position on a Biodex isokinetic device at 120, 90 and 60 deg/sec respectively. 2. A non-specific warm-up (NSWU) - 3 min of light jogging, 30 sec of two legs hopping, 3 minutes of light jogging, 30 sec of hops from one foot to the other and an additional 3 min of light jogging. 3. A combined warm-up (CWU) - a NSWU followed by a SWU. The effects of the different warm-up modes were assessed throughout eight sessions. In each session, the subject performed a different mode of warm-up. In the first and the last sessions, testing was carried out without any preliminary warm-up (NWU). In sessions 2-7, testing followed one of the three warm-up protocols. Each protocol was administered twice and the order of the protocols was randomized for each subject.

The dependent variable was rate of isometric torque development (RTD) during maximal voluntary contraction of knee extension with the knee angle set at 120 deg (180 deg=full extension) and the hip at 100 deg. The back, thigh and shank were strapped to the seat and arms crossed over the chest. RTD was indexed as the torque magnitude at 50, 100, 150 and 200 milliseconds (ms), from the onset of knee extension.

Results

ANOVA disclosed no significant difference between the means of RTD produced following any of the warm-up as well as the no-warm-up protocols (see Table 1).

	NWU	SWU	NSWU	CWU
50 ms	70.9(22.3)	70.8(24.3)	70.0(22.5)	71.9(24.3)
100 ms	122.3(37.8)	121.9(39.5)	120.3(36.3)	124.4(40.2)
150 ms	154.3(47.4)	153.3(46.5)	151.0(42.0)	157.6(48.4)
200 ms	167.0(52.6)	165.0(47.6)	162.0(42.2)	171.4(51.4)

Table 1: Means (and SDs) of torque values at four temporal phases of the test, at each warm-up protocol

Discussion

Some researchers reported improvement in several coordinative skills following a warm-up while others found warm-up to hinder performance or to produce non-significant effects. The results of the current study indicate that moderate submaximal warm-ups of general, specific or mixed protocols do not enhance single joint RTD. Nevertheless, in certain individuals a clear differential effect was observed leading to the recommendation that coaches should experiment to determine each individual's preferential warm-up protocol in order to maximize her/his performance.

References

Fradkin *et al*, J Strength Cond Res, 24: 140-148, 2010.