

スラップスケートが生理学的パラメータと 競技成績とに及ぼす影響

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Effect of the Slapskate on Physiological Variables and Athletic Performance in Speed-skating

by

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ABSTRACT

Recently designed ice skate "the Slapskate" should allow one to slap an extra plantar flexion at the end of the push-off, then appeared to improve skating performance. The purpose of this study was to compare 1) the physiological variables and 2) muscle deoxygenation by near infrared spectroscopy (NIRS) during 1500 m skating-test between conventional skaters (CS) and slapskaters (SS) and 3) to elucidate the effect of the Slapskate on athletic performance in speed-skating. Two groups of matched junior speed skater; CS and SS were compared

while skating on a 400 m rink at submaximal and maximal intensities. The following results were obtained ;

1) All physiological variables (oxygen uptake, heart rate and blood lactate) were lower in SS than CS (NS) and this might led improved endurance capability (skating velocity at 6 mM blood lactate ; $V@6$ mM HLa) in SS.

2) Deoxygenation of m. vastus lateralis during 1500 m skating-test were slightly higher (NS) in SS as compared to those in CS, but showed almost constant values in spite of increasing skating velocities both in SS and CS.

3) The patterns of muscle deoxygenation of m. gluteus maximus at maximal intensity might reflect an increased oxygen utilization rather than oxygen delivery, which in turn might suggest the importance of the power output of hip joint for accelerating the skating velocity in SS.

4) Similarity of the muscle deoxygenation of lower extremity in SS to the Slaproller (SR) and the Slide board (SB) could be an indication of the usefulness of SR and SB during dry-land training.

5) Significant correlation was only noted between peak blood lactate measured after time-trial and mean velocity in sprinting event (500 m). On the other hand, there were significant correlations between skating velocities at 10 mM blood lactate ($V@v$ Lac) and performances in 1500 m and 3000 m.

These results might suggest the importance of specificity of exercise modality and energy delivery system during training for improving athletic performance in SS. Furthermore, more detailed research should be done to know about not only the physiological but also the biomechanical characteristics of SS, and whether the SS would add a new dimension to the art of speed-skating.

要 旨

本研究では、「スラップスケート (SS)」速度漸増滑走中の生理学的パラメータの動態を「ノーマルスケート (CS)」と比較するとともに、「SS」滑走中の下肢筋群の筋酸素動態を夏季トレーニング手段としての「スラップローラー (SR)」および「スライドボード (SB)」と比較することを目的とした。さらには、「SS」滑走直後の血中乳酸濃度と競技成績との関連について明らかにすることによって、「SS」の競技力向上に資するトレーニングプログラム立案の基礎資料を得ることを目

的とした。

その結果、1)「SS」滑走中の生理学的パラメータは「CS」に比較して低値を示し、持久性能力を高める効果が示唆された。また、下肢筋群の筋酸素動態の比較から、2)「SS」の競技力向上のトレーニングにおける動作特異性の重要性が明らかにされた。さらには、生理学的パラメータと競技成績との関係から、3)「SS」競技力向上に対するエネルギー獲得機構の特異性が示唆された。