自転車ペダリング運動における運動意識の違いが動作，回転踏力，生理応答および機械的効率に及ぼす影響 ： 単一事例による検証

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キーワード：股関節こぎ，膝関節こぎ，荷重，クランクトルク，呼気ガス

【要 旨】

自転車競技の熟練者1名を対象に，2種類の運動意識（AとB）でペダリングを行った際の，動作，回転踏力，生理的応答，および機械的効率の違いについて比較検討した．運動意識 A はペダル荷重をしながら股関節主動でこぐもの，B はサドル荷重をしながら膝関節主動でこぐもので，後者は自転車競技の未熟練者に多くみられるこぎ方である．A と B とで多段階のペダリング運動を行った結果，A の方がオールアウト時間が 36 秒(4%)長かった．A は B と比べて，負荷の増加に伴い骨盤を前傾させており，足部や大腿部の動作範囲は小さく，効率に優れる動作と考えられた．また，ロード競技の代表的な速度とされる 35km/h に相当する運動強度（250W）での回転踏力を分析したところ，A は B よりも変動が小さく，クランクに対してより有効に踏力を与えていると考えられた．酸素摂取量は A の方が各負荷において約8%（1MET 相当）低く，機械的効率は A が 24.5%，B が 22.7%で，A の方が 1.9%高値を示した．以上のことから，運動意識 A はバイオメカニクス的にも生理的にも効率に優れ，特にロード競技においてはこの意識を活用することで高いパフォーマンスを発揮できると考えられた．

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Influence of the bicyclist's movement awareness when pedaling on motion, pedaling power, physical response, and mechanical efficiency: Examination with one bicyclist.

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Key words: pedaling load on hip joint, pedaling load on knee joint, load, crank torque, oxygen intake

【Abstract】

The present study examined differences in motion, pedaling power, physical response, and mechanical efficiency when pedaling when the bicyclist used one of two kinds of movement awareness. The participant was an expert bicycling racer. In movement awareness A, he put the pedaling load on his hip joint, whereas in movement awareness B, he kept his knee joint active while putting the load on the saddle. The latter movement is the typical pedaling method of bicycling beginners. After the participant performed various stages of pedaling motion, movement awareness A was found to have a 36-second longer all-out time (4%). In movement awareness A, compared to movement awareness B, his pelvis was bent farther forward, the range of movement of his legs and femoral region was smaller, and his motion efficiency was considered to be higher. An analysis of pedaling power at the motion intensity of 250 W, corresponding to 35 km/hr, showed that the variability of movement awareness A was smaller than that of movement awareness B, which indicated that power was transferred more effectively to the crank.

The participant's oxygen intake in movement awareness A was 8% (equivalent to 1MET) lower at each load. His mechanical efficiency was 24.5% in movement awareness A, and 22.7% in movement awareness B, i.e., his mechanical efficiency was 1.9% higher in movement awareness A. These results suggest that movement awareness A may be superior to movement awareness B biomechanically and physically, and might produce higher performance in road racing..