Research Article

MOTOR VARIABLES AS PREDICTOR OF ROWING PERFORMANCE

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ARTICLE INFO	ABSTRACT

The purpose of the study was to determine the relationship between motor variables and performance of rowers. Ninety rowers (forty five males and forty five females) were the subjects of this study who had participated in All India Inter University Rowing Championship held at Sukhna Lake, Chandigarh their age ranged between 18 to 25 years. The Standing Broad Jump, shuttle run, 4 second dash, upper back strength, lower back strength, bend and reach test were used to measure the power, agility, speed, strength and flexibility of the rowers. The result of present study indicates that there was significant relationship between motor variables and the performance of rowers.

INTRODUCTION

Rowing is primarily a strength-endurance sport demanding high levels of both aerobic and anaerobic capacities for successful performance. Rowers need physical strength to achieve high power per stroke, endurance to sustain this power, as well as speci c motor and tactical skills (Secher 1993; Steinacker *et al*. 1986). Some recent studies have clearly demonstrated the importance of muscle strength, muscle power production, and anaerobic capacity for successful rowing performance. At the beginning of each rowing competition, a great amount of muscular strength is required by each individual in the boat to successfully accelerate from a standstill and propel the shell forward. Once the shell has been accelerated to "race pace" maintenance of the shell's speed during an entire race requires rowers to utilize large amounts of oxygen. Rosner, SR. (2001), stated that **"**Musculature utilized by athletes during rowing competition should be comprised of both high strength and endurance characteristics. Optimal performance in either 2K or 6K rowing competitions is limited by a rower's maximum strength, starting power and muscular endurance". Rowing is an activity that involves both the upper and lower body, making it a total body exercise. In the drive phase of the rowing cycle, rowers sequentially push with their legs then pull with their arms and lower back (Secher NH.1990) requiring both muscular strength and endurance. Numerous researches show that rowing speed is also an important factor during rowing Korner and Schwanitz, 1987

stated that "Success in competitive rowing is achieved by taking the shortest time to complete a 2000 m course. This time is mathematically linked to the average speed of the boat. Thus, factors that affect boat speed are important determinants of rowing performance and should form the basis of feedback to rowers and their coaches. Factors that rowers can manipulate are the magnitude and timing of forces on the oar handles, seat and stretcher and the coordination of body segment motion. The oar handle force, in turn, affects the pin force through the lever and hydrodynamic system of the oar. Overall performance then depends on the rower's fitness and their motor abilities. Hence, we can say that many physical parameters affect the performance of rowers during rowing.

REVIEW OF LITERATURE

Goran Oreb, Maurizio Zović and Nenad Marelić (2002), selected 266 boys and 170 girls aged 11 to 14. The testees were examined by the tests for evaluation of motor abilities as follows: the speed of movement frequency (MTR), initial burst of strength (MSD), coordination (MTR), repetitive strength (MPT15s), flexibility (MPR), static strength (MIV) and also by the test for evaluation of specific abilities when the rowing ergometer Concept II was used at the distance of 500 meters simulating perfectly the conditions of rowing on water. It was confirmed that explosive strength, flexibility and coordination were the most important factors predicting the success of the boys when using the ergometer at a distance of 500 meters,

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while for the girls, the most important factors were flexibility, explosive strength, speed and repetitive strength.

Cosgrove MJ, Wilson J, Watt D, Grant SF (1999)., investigated the relationship between selected motor variables of rowers and rowing performance as determined by a 2000 m time-trial . The participants were 13 male club standard oarsmen. Their mean (+/- s) age, body mass and height were 19.9+/-0.6 years, 73.1+/-6.6 kg and 180.5+/-4.6 cm respectively. The participants were tested on the rowing ergometer to determine their maximal oxygen uptake (VO2max), rowing economy, predicted velocity at VO2max, velocity and VO2 at the lactate threshold, and their velocity and VO2 at a blood lactate concentration of 4 mmol x l(-1). Percent body fat was estimated using the skinfold method. The velocity for the 2000 m performance test and the predicted velocities at the lactate threshold, at a blood lactate concentration of 4 mmol x l(-1) and at VO2max were 4.7+/-0.2, 3.9+/-0.2, 4.2+/-0.2 and 4.6+/-0.2 m x s(-1) respectively. A repeated-measures analysis of variance showed that the three predicted velocities were all significantly different from each other (P<0.05).

Objectives of the Study

- To assess the relationship between motor variables & sports performance of male rowers.
- To assess the relationship between motor variables & sports performance of female rowers.

Hypothesis of Study

- There will be no statistically significant relationship between motor variables & sports performance of male rowers
- There will be no statistically significant relationship between motor variables & sports performance of female rowers.

METHODOLOGY

Subjects

Forty five male and forty five female rowers were the subjects of this study who had participated in All India Inter University Rowing Championship held at Sukhna Lake, Chandigarh.

Tools Employed

- **Standing Broad jump** (Barrow General Motor Ability Test and Scott Motor Ability Test)
- **Shuttle run** (AAHPER Youth Physical Fitness Test)
- **4 Sec dash** (Scott Motor Ability Test)
- **Strength of lower back muscles** (Kraus-Weber Strength Test)
- **Strength of upper Back Muscle** (Kraus-Weber Strength Test)
- **Trunk flexibility** (Bend and Reach Test)

Statistical Analyses

To find out the relationship between motor variables and rowers performance product movement co-relation method was used. The level of Significance was set at 0.01 level (p < 0.01)

RESULT AND DISCUSSION

Table 1 Relationship between Motor variables and sports performance of male rowers

Sr. No.	Motor fitness tests	Correlation coefficient	Level of significance
1	Standing broad jump	0.939	<.01
2	Shuttle run	-0.88	<.01
3	4 second dash	0.794	<.01
4	Upper back strength	0.961	<.01
5	Lower back strength	0.952	<.01
6	Bend & reach	0.917	<.01

Table 1 indicated that performance of male rowers was significantly related to all the motor fitness variables which the scholar had tested on the male players. These variables were Standing broad jump (r =0.939), Shuttle run (r = -0.88), 4 sec dash (r = 0.794), Upper back strength (r = 0.961), Lower back strength (r = 0.952), Bend and reach (r = 0.917) at. 01 level of significance .It was observed that performance of male rowers was positively influenced by Standing broad jump, 4 sec dash, Upper back strength, Lower back strength and Bend & reach. The negative values shown in case of shuttle run was also found positively related to rowers performance because less the time taken, better the performance is and vice-versa.

Table 2 Relationship between Motor variables and sports performance of female rowers

Sr. No.	Motor fitness tests	Correlation coefficient	Level of significance
1	Standing broad jump	0.896	<.01
2	Shuttle run	-0.937	<.01
3	4 second dash	0.713	<.01
4	Upper back strength	0.847	<.01
5	Lower back strength	0.713	<.01
6	Bend & reach	0.917	<.01

Table2 indicated that performance of female rowers was significantly related to all the motor fitness variables which the scholar had tested on the female players. These variables were Standing broad jump (r =0.896), Shuttle run (r = -0.937), 4 sec dash (r = 0.713), Upper back strength (r = 0.847), Lower back strength (r = 0.713), Bend and reach (r = 0.917) at.01 level of significance .It was observed that performance of female rowers was positively influenced Standing broad jump, 4 sec dash, Upper back strength, Lower back strength and Bend & reach. The negative values shown in case of shuttle run was also found positively related to rowers performance because less the time taken, better the performance is and vice-versa.

DISCUSSION

The findings of this study demonstrate that a significant relationship between motor variables and performance of male and female rowers. Male rowers scored significantly higher than female rowers on standing broad jump, shuttle run , 4 second dash , upper back strength , lower back strength except bend and reach test where they were same. Many studies in literature have investigated performance capacities of rowers and variables which are likely to effect this. The findings of the present study are in line with Ingham and *et al*. (2002) have identified that maximal power variables showed a high correlation with measured performance of rowers (r=0.95. p<0.001). The findings strongly support Russell (1998) and

Riechman (2002) study which revealed significant relationship between the strength test and 2000m rowing ergometer performance. Similarly our findings showed with Chun Jung *et al.* (2007) reported significant relationships between strength values and performance of rowing players. The results of this study support the importance of strength and anaerobic power development in male and female club level rowers. Lawton, TW, Cronin, JB, and McGuigan, MR showed that strength, power, and muscular endurance are strong determinants of success in specific performance measures used to assess elite rowers. On the basis of our findings we can say that male rowers perceive more control over competitive situations than female rowers. Motor abilities are required by rowing players to improve their performance and ultimately excel in their game

CONCLUSION

Thus it is concluded from whole result that male rowers were superior to female rowers in the performance of all motor fitness components except bend and reach (Trunk flexibility) where they were same. There was significant relationship between the motor variables and the performance of male and female rowers.

References

Shephard RJ. Science and medicine of rowing: a review. *J Sports Sci* 1998; 16:603–20.

Secher NH. Rowing. In: Reilly T, Secher N, Snell P,Williams C, editors. *Physiology of sports*. London: E&FN Spon; 1990.

Ingham SA, Whyte GP, Jones K, *et al*. Determinants of 2000m rowing ergometer performance in elite rowers. *Eur J Appl Physiol* 2002; 88:243–6.

Riechman SE, Zoeller RF, Balasekaran G, *et al*. Prediction of 2000 m indoor rowing performance using a 30 s sprint and maximal oxygen uptake. *J Sports Sci* 2002; 20:681–7.

Dawson R, Lockwood R, Wilson J, Freeman G. The rowing cycle: Sources of variance and invariance in ergometer and on-the-water performance. ***J. Motor Behav***. 1998; 30(1): 34-43.

Smith R, Loschner C. Biomechanics feedback for rowing. ***J. Sports Sci***. 2002; 20(10):783-791

Chun-Jung H, Nesser TW, Edwards JE. Strength and Power Determinants of Rowing Performance. JEP Online. 2007; 10(4):43–50.

Russell AP, Le Rossignol PF, Sparrow WA. Prediction of elite schoolboy 2000m rowing ergometer performance from metabolic, anthropometric and strength variables. *J Sports Sci*. 1998 Nov; 16(8):749–754. [PubMed]

Lawton, TW, Cronin, JB, and McGuigan, MR. Strength, power, and muscular endurance exercise and elite rowing ergometer performance. *J Strength Cond Res* 27(7): 1928–1935, 2013.

Goran Oreb, Maurizio Zović and Nenad Marelić , "Evaluation Of The Results Assesing Motor Abilities of Boys And Girls Aged 11-14 During Selection In Rowing" *Journal of sports sciences* ISSN 0264-0414 2002, vol. 20, no10, pp. 783-791 (18 ref.)

M.J. Cosgrove, J. Wilson, D. Watt & S.F. Grant, **"**The relationship between selected physiological variables of rowers and rowing performance as determined by a 2000 m ergometer test" *Journal of Sports Sciences* Volume 17, Issue 11, 1999 pages 845-852

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