

## THE EFFECTS OF A MARATHON RACE ON RUNNING ECONOMY AND LEG MUSCULAR STRENGTH AND POWER

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**KEY WORDS:** marathon race, running economy, muscular strength & power

**INTRODUCTION:** Previous studies have reported that running economy as well as leg muscular strength and power decrease after a marathon race (Nicol et al., 1991; Chevrolet et al. 1993). However, the relationship between the change in running economy and the change in muscular strength and power is still unclear. Therefore, the purpose of this study was to examine the effects of a marathon race on running economy, as well as leg muscular strength and power. Relationships among race performance, decrease in running economy and decrease in leg muscular strength and power were also investigated.

**METHODS:** Thirteen healthy males performed treadmill running (200 m/min., 3 min.), isometric knee extension (3s), counter-movement-jump and 5-series-jumps 3-1 day(s) before (PRE) and immediately after (POST) participating in either the 1996 or 1997 "Tsukuba marathon race (42.195 km)".

**RESULTS:** 1) Mean race time of the marathon was 2 hours 57 minutes 39 seconds. Average running speed during the latter half of the race was significantly lower than the former half ( $p < 0.05$ ).

2) In comparison to PRE, oxygen consumption during treadmill running in POST increased significantly while maximal strength of isometric knee extension, jumping height of counter-movement-jump and jumping height of 5-series-jumps decreased significantly ( $p < 0.05$ ).

3) There were no relationships between percent change ( $((\text{Post}-\text{Pre})/\text{Pre} \times 100)$ ) in oxygen consumption during treadmill running and percent change in leg muscular strength and power.

4) There was a significant correlation between percent change ( $((\text{Latter}-\text{Former})/\text{Former} \times 100)$ ) in running speed during the race and percent change in jumping height of counter-movement-jump ( $r = 0.541$ ,  $p < 0.05$ ). However, no significant relationship was observed between percent change in running speed and percent change in running economy.

**CONCLUSION:** Running a marathon race decreases both running economy and muscular strength and power but these seem to be caused by different mechanisms. The decrease in leg muscular strength and power during the marathon race seems have been an influence on the decrease in running speed during the latter half of the race.

### REFERENCES

- Chevrolet et al. (1993). *Med. Sci. Sports Exerc.* **25**, 501-507.  
Nicol et al. (1991). *Scand. J. Sports Med.* **1**, 195-204.