

Abstract of Doctoral Thesis

Title : Applicability of 20-m shuttle run test performance and training indices for developing prediction equation of marathon race time in recreational runners

Doctoral Program in Sport and Health Science
Graduate School of Sport and Health Science
Ritsumeikan University

タカオ ケンジ
TAKAO Kenji

Introduction

The present study aimed to elucidate the applicability of 20-m shuttle run test (20mSRT) performance and training indices for developing the prediction equation of marathon race time in recreational runners. To this end, this study examined the availability of 20mSRT performance for evaluating the aerobic capacity of recreational runners (Study 1), the validity of the prediction equation of marathon race time, being developed using 20mSRT performance and training indices as independent variables (Study 2), and the utility of the prediction equation developed in the Study 2 for setting running pace in a real marathon race (Study 3).

Methods

In the Study 1, maximal heart rate (HR_{max}) and oxygen consumption ($\dot{V}O_{2max}$) of 30 recreational runners (16 males and 14 females) were estimated by using 20mSRT and their associations with those obtained by the bike ergometer test (BET) were examined. Moreover, 5000-m time trial (5000mTT) was conducted to assess running performance. In the Study 2, 100 male and 111 female recreational runners performed 20mSRT and answered questionnaires about marathon

race time and training variables (years of experience of running training, frequency of training, and monthly running distance). In the Study 3, the utility of the prediction equation developed in the Study 2 for setting running pace in a marathon race was examined in a real marathon race situation of one female recreational runner as a case study.

Results & Discussion

In the Study 1, the HRmax and $\dot{V}O_{2\max}$ estimated from 20mSRT performance significantly correlated with those obtained by BET, respectively $\{r = 0.77 (P < 0.01)$ for HRmax and $r = 0.85 (P < 0.01)$ for $\dot{V}O_{2\max}\}$. The time of 5000mTT significantly correlated with $\dot{V}O_{2\max}$ estimated from 20mSRT performance ($r = -0.90, P < 0.01$) and that obtained by BET ($r = -0.85, P < 0.01$). Thus, the results of the Study 1 indicated that the 20mSRT would be available for evaluating the aerobic capacity in recreational runners. In the Study 2, multiple regression analysis provided a prediction equation for marathon race time in recreational runners, involving 20mSRT performance, years of experience of running training, and monthly running distance as independent variables ($R^2 = 0.586$ for males, $R^2 = 0.640$ for females). In an examination concerning the validity of the developed prediction equation, the predicted marathon race time significantly correlated with the race time of the real marathon race. In the Study3, the running pace setting in a real marathon race, derived from the marathon race time predicted using the prediction equation developed in the Study 2, enabled the female recreational runner to achieve the personal best time. These results indicated that the developed prediction equation will be useful for predicting marathon race time and setting running pace during real marathon race in recreational runners.

Conclusion

20mSRT is an available for evaluating the aerobic capacity and the combination of the 20mSRT performance and running training indices can be significant contributor for predicting marathon race time in recreational runners.