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Research article

## Cardiorespiratory Responses to Stationary Running in Water and on Land

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### ABSTRACT

The aim of the study was to compare maximal and submaximal cardiorespiratory responses between progressive tests on a treadmill on land (TRE), and stationary running on land (SRL) and in water (SRW), while also comparing two methods of determining the second turn point (ST) (ventilatory curve and heart rate deflection point). The study sample consisted of nine active women ( $23 \pm 1.94$  years) that performed three maximal protocols in separate days. Heart rate (HR) and oxygen uptake ( $VO_2$ ) were measured in all sessions. The data were analyzed using repeated-measures ANOVA and two-way repeated measures ANOVA with post-hoc Bonferroni test. Greater values of maximal HR ( $HR_{max}$ ) and HR at ST ( $HR_{ST}$ ) were observed during exercise performed on TRE and during the SRL, compared to the SRW ( $p < 0.05$ ). The results for maximal  $VO_2$  ( $VO_{2max}$ ) and  $VO_2$  at ST ( $VO_{2ST}$ ) showed greater and significant values on TRE compared to STL and STW ( $p < 0.05$ ). Furthermore, the HR and  $VO_2$  corresponding to the ST showed similar values between the two methods. Thus, the main conclusion of the present study was that the HR deflection point seems to be a simple and practical alternative method for determining the ST in all protocols analyzed.

**Key words:** Ventilatory curve, deflection point, second turn point, heart rate, oxygen uptake, water-based exercise

### Key Points

- The maximal and submaximal (second turn point) oxygen uptake were influenced by the type of exercise, as these responses were similar in both water-based and land-based stationary running protocols and different from those obtained during the treadmill running, that presented greater values compared with both stationary running protocols.
- The heart rate deflection point can be used for determining the second turn point during stationary running test in aquatic environment.
- Caution is necessary in the interpretation of the application of the heart rate deflection point in water aerobics exercises because we analyzed only young women performing one water-based exercise.

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