The effects of mouthpiece use on gas exchange parameters during steady-state exercise in college-aged men and women

Dena P. Garner, PhD[1]

Wesley D. Dudgeon, PhD[2]

Timothy P. Scheett, PhD[3]

Erica J. McDivitt, MS[4]

[1]Dr. Garner is an associate professor, Department of Health, Exercise and Sports Science, The Citadel, 171 Moultrie St., Charleston, S.C. 29409
[2]Dr. Dudgeon is an assistant professor, Department of Health, Exercise and Sports Science, The Citadel, Charleston, S.C.
[3]Dr. Scheett is an assistant professor, Department of Health and Human Performance, College of Charleston, Charleston, S.C.
[4]Ms. McDivitt is a research assistant, Department of Health, Exercise and Sports Science, The Citadel, Charleston, S.C.

ABSTRACT

Background

The authors conducted a study to assess the effects of custom-fitted mouthpieces on gas exchange parameters, including voluntary oxygen consumption (VO_2), voluntary oxygen consumption per kilogram of body weight (VO_2/kg) and voluntary carbon dioxide production (VCO_2).

Methods

Sixteen physically fit college students aged 18 through 21 years performed two 10-minute treadmill runs (6.5 miles per hour, 0 percent grade) for each of three treatment conditions (mouthpiece, no mouthpiece and nose breathing). The authors assigned the conditions randomly for each participant and for each session. They assessed gas exchange parameters by using a metabolic measurement system.

Results

The authors used analysis of variance to compare all variables. They set the significance level at $\alpha = .05$ and used a Tukey post hoc analysis of treatment means to identify differences between groups. The results showed significant improvements ($P < .05$) in VO_2 VO_2/kg and VCO_2 in the mouthpiece condition.

Conclusions

The study findings show that use of a custom-fitted mouthpiece resulted in improved specific gas exchange parameters. The authors are pursuing further studies to explain the mechanisms involved in the improved endurance performance exhibited with mouthpiece use.

Clinical Implications

Dental care professionals have an obligation to understand the increasing research evidence in support of mouthpiece use during exercise and athletic activity and to educate their patients.

Disclosure. Dr. Garner and Ms. McDivitt received honoraria from Bite Tech, Minneapolis.

The authors thank Michael Engel, DDS (Charleston, S.C.), for making the models of the mouthpiece and Bite Tech Laboratories (Dania Beach, Fla.) for supplying the custom-fitted mouthpieces to each participant.