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ACCURACY OF THE OPTICAL HEART RATE MONITOR POLAR OH1 AT REST AND DURING EXERCISE [1449]

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INTRODUCTION:

Several options of optical heart rate (HR) measurement devices have been introduced to the market. Previously, it was shown that best feasibility during use was demonstrated when worn on the upper arm in comparison to traditional chest- or wrist-worn devices (Beeler et al, 2018). The aim of the present study was to assess the accuracy of the Polar OH1 optical HR monitor worn on the upper arm at rest and during different exercise modes and intensities.

METHODS:

Twenty volunteers (12 male; 30.1 ±5.7 years; 1.7 ±0.1cm; 69.5 ±8.3kg; VO₂max of 53.9 ±7.4ml/min*kg) performed seven activities from sitting to floorball in a semi structured indoor environment for 10 minutes each with 2-minute breaks in between. The Polar OH1 (1Hz; Polar Electro Oy, Kempele, Finland) was fitted to the non-dominant upper arm and was compared against the criterion measure Polar H10 chest strap (1,000Hz; Gilgen-Ammann et al., under review).

RESULTS:

The Polar H10 and the Polar OH1 reported overall mean ±SD HR values of 111.0 ±34.5bpm and 110.9 ±34.4bpm, respectively, with a strong correlation of $r = .999$ ($p < .001$). The mean absolute percentage error (MAPE) was 0.4%, ranging from 0.1% - 0.9%. The systematic biases ±limits of agreement of the Polar OH1 were -0.4 ±0.7bpm in sitting and reading, 0.7 ±1.5bpm in household chores, 0.0 ±1.0bpm in free walking, -0.1 ±0.5bpm in free jogging, -0.1 ±1.8bpm in a strength training circuit, -0.2bpm ±0.8bpm in cycling on an ergometer and -0.2 ±1.1 in a floorball course. On average in all activities, 94.5% of the mean HR values over 10-second intervals were within ±5% accuracy compared to the Polar H10. The household chores revealed the lowest (85.7%) and the free and self-paced jogging the highest (99.0%) ±5% accuracy.

CONCLUSION:

Compared to the MAPEs of 1% - 9% demonstrated in wrist- and forearm-worn optical HR devices (Stahl et al., 2016; Shcherbina et al., 2017; Wallen et al., 2016), the Polar OH1 (0.4%) was more accurate. Especially, in activities with arm movements the Polar OH1 outperforms other optical HR devices. In conclusion, the Polar OH1 with its placement on the upper arm provides the best wearing comfort and is recommended for precise optical HR measurements at rest and during different exercise modes.

References

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