RESPONSE OF THE AUTHOR

Reply to “letter to the editor: Is obesity related to postexercise cardiac autonomic recovery?”

Authors' Reply:

We thank Dr. Lopes and colleagues (Lopes, Matos, & Porto, 2017) for their valuable comments on our recent study titled “Heart Rate Variability Analysis During Immediate Recovery From Exercise in Overweight/Obese Healthy Young Adult Females.” (El Agaty, Kirmani, & Labban, 2016). We have taken these comments into serious consideration and would like to give our response.

First, these authors raised the issue that “Using the conventional frequency domain approach to perform spectral analysis of the postexercise recovery curve will result in inconsistent values, therefore, the spectral analysis of the whole recovery time in the postexercise period has been discouraged.”

In our study the recovery measurements (heart rate recovery [HRR]; normalized high frequency power recovery [nu HFR]; and normalized sympathovagal balance recovery [nu LF/HFR]) were estimated from short term HRV recording (3 min) at resting condition and during the first 3 min of inactive recovery after cession of exercise. We chose the frequency domain parameters in our recovery measurements because they should be preferred to the time domain parameters when short-term recordings are investigated (TaskForce, 1996).

Certainly, autonomic modulation during recovery has been assessed previously (Dupuy et al., 2012; Barak et al., 2010; Gladwell, Sandercock, & Birch, 2010; Ng, Sundaram, Kadish, & Goldberger, 2009) by studying the dynamics of HRV; both time domain and frequency domain (estimated by Fast Fourier Transform technique) parameters—similar to our study. The heart rate recovery (the absolute difference between heart rate immediately at the end of exercise and after 60 s) and the nu HF were found to represent the most reliable parameters in assessment of the postexercise cardiac parasympathetic reactivation after submaximal and maximal exercises (Dupuy et al., 2012). Barak et al. measured the HRV during 5 min of recovery after submaximal cycling exercise in three different body positions and they reported that postexercise delay in restoration of vagal activity was demonstrated through time domain HRV parameters and the HF component as well (Barak et al., 2010). Gladwell et al. also determined HF recovery in the supine position 15 min after moderate exercise intensity and 30 min after hard and severe intensities (Gladwell et al., 2010). Additionally, high frequency power of vagal modulation has been proven to indicate the changes in vagal activity during immediate recovery after exercise (Ng et al., 2009).

Second, they announced that the RMSSD data, in our study, was not different between the recovery period and baseline in neither groups. The inadequacy of RMSSD to reach statistical significance between the recovery period and baseline in both groups, might be

explained by the short term HRV recording used in our study, as time domain parameters were favored when long-term recordings (e.g., 24 hr) are investigated (TaskForce, 1996). However, there was a clear significant delay in HRR, nu HFR and nu LF/HFR in overweight/obese compared to normal group. Our results also showed an evident significant negative correlation between body mass index and both HRR and nu HFR.

Third, Dr. Lopes et al. (2017), stated that we used a submaximal intensity step test but the intensity reached in each group was not mentioned, and the high value of heart rate observed in the overweight group after exercise could be attributed to the high exercise intensity reached in this group. We agree that we did not measure the exercise intensity, however, females were required to step up and down a portable 12-inch bench for 3 min at a rate of 24 steps per minute, which was kept constant with the help of a metronome under strict supervision. The stepping rate, the step height, and the duration of the test were certainly constant in both groups in our study. The step test has been proven to be a valid, and highly reliable submaximal exercise test that is useful for assessing physical fitness in clinical practice and epidemiologic studies (Marcora, Casanova, Fortes, & Maddison, 2007). Moreover, submaximal (Dupuy et al., 2012; Barak et al., 2010) and even low intensity (Parekh & Lee, 2005) exercises were found to induce changes in the frequency domain parameters during recovery period—similar to our results. Obviously, the exercise protocol in our study induced autonomic modulation, as manifested by the significant increase in nu LF/HF and decrease in nu HF that remained higher than baseline values till the end of 3 min of recovery in both normal weight and overweight/obese groups. Such reduced vagal activity, enhanced the heart rate significantly in both groups compared to their baseline values. Upon comparing the recovery measurements between groups, the delay of the parasympathetic reactivation was clearly significant in the overweight/obese females.

In conclusion, we thank Lopes et al. for this discussion. Scientific debate is paramount to progress. Yet, after careful consideration of all of the issues raised by these authors, we remain convinced of the final conclusion of our article.

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