

# Cardiac Evaluation of Exercise Testing in a Contemporary Population of Preschool Children: A New Approach Providing Reference Values

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## Abstract

The objective of this study was to evaluate cardiac autonomic function at rest, during maximal exercise, and in post-exercise recovery, to determine sex-specific and age-specific differences in resting heart rate (RHR), linear and spectral parameters of Heart Rate Variability (HRV), HRpeak, and heart rate recovery (HRR) after one and five minutes, in preschool children. This study involved a cohort of 167 healthy children (79 girls) aged 3 to 6 years that were selected from several schools in southern Spain. A 10 × 20 m test was conducted, and the cardiovascular response was recorded. No significant differences were found in all variables between the sexes. However, a significant reduction in RHR and an increase in HRR were found from age 4 to age 6. HRV parameters at rest were higher in older children. No associations between 10 × 20 m performance, weight status, and cardiac parameters were found. Simple linear regression analysis revealed that heart rate reserve (HRr), HRR5 min, RMSSD, and HF were the variables that showed association with all HR parameters. There was also a significant correlation between HRr and HRR5 min. In conclusion, cardiovascular autonomic function during rest, exercise, and recovery in Spanish preschool children was not influenced by sex, although older children showed greater cardiovascular modulation. Cardiorespiratory fitness status was not associated with HR response. © 2022 by the authors. Licensee MDPI, Basel, Switzerland.

## Author keywords

exercise; gender; health care; physical activity; sport physiology