Correlation between cardio-pulmonary exercise test variables and health-related quality of life among children with congenital heart diseases


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Introduction: maximal oxygen uptake (VO2max) correlates with health related quality of life (QoL) in adults with heart failure. Cardio-pulmonary exercise test (CPET) with VO2max and VE/VCO2 slope evaluation is recommended in the follow-up of adults with congenital heart diseases (CHD). Few data is available as regards correlation between CPET and QoL among children with CHD.

Method: 201 children with a CHD aged 8 to 18 performed in 2 tertiary care pediatric cardiology centers a maximal CPET including a spirometry. Children were separated into 2 groups depending on the ergometer (treadmill n=96, cycle-ergometer n=105). Common gas exchange measurement device was used. CHD severity was stratified into 4 groups (from Uzark et al.). On the same day, all children and their parents filled out separately the Kidscreen, a validated pediatric generic QoL questionnaire. Informed consent was obtained from all parents.

Results: VO2max, anaerobic threshold (AT), flow-volume loop and ventilatory response during exercise with respiratory equivalent for CO2 (VE/VCO2 slope) and respiratory efficiency (VD/VTmax) were correlated to CHD severity (p<0.05). Physical well-being scores were correlated to VO2max for parents reported QoL (r=0.43, p<0.0001) and children self reported QoL (r=0.27, p<0.0001). Parents reported QoL scores were correlated to AT (r=0.33, p<0.0001), VD/VTmax (r=-0.30, p<0.0001) for physical well-being and to VO2max (r=0.21, p=0.004) for psychological well-being. Self reported QoL scores were correlated to oxygen uptake efficiency slope (OUES : r=-0.26, p=0.017), VE/VCO2 slope (r=0.22, p=0.037) for school environment. Strongest correlations were observed in the treadmill group, especially between VO2max and physical well being for parents (r=0.57, p=0.0001) and self (r=0.36, p=0.0005) reported QoL scores.

Conclusion: VO2max and ventilatory response to exercise correlate with self and parents-reported QoL among CHD children. If QoL and CPET are clinical trials outcomes in CHD children, we suggest to use parents related QoL scores and treadmill.