

Temporal Trends of Increasing Adiposity are Associated with Diminished Exercise Capacity in Children with Repaired Congenital Heart Disease

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Introduction: Children with repaired congenital heart disease are often less physically active than their healthy peers and, hence, at risk for obesity. We sought to determine the trends over time in adiposity and its association with exercise capacity.

Methods: n=725 patients were included in this study and 4,153 height and weight measurements were available for analysis (average 6±5 measurements per patient); 193 (27%) patients were followed for longer than 10 years. Underlying cardiac diagnoses included ASD 18%, VSD 21%, AVSD 16%, TGA 21%, TOF/DORV 18% and Fontan 10%. All analyses were performed using regression models adjusted for age, gender, repair status and repeated measures through an autoregressive covariance structure. Body mass index (BMI) and height z-scores could be calculated only for children >2 years old.

Results: Weight z-score at diagnosis was -1.1 (5th/95th percentile: -3.6; +1.1) and increased over time (+0.103 (0.007) SD/year, p<0.001). At the age of 2 years old, BMI z-score was -0.2 (-2.6; +1.9) and increased over time (+0.042 (0.007) SD/year, p<0.001) while height z-score was -0.3 (-2.7; +1.4) and did not change over time (-0.007 (0.006) SD/year, p=0.18). A total of 45% of patients had at least one BMI measurement above percentile cut-points for overweight (28%) or obesity (17%). The proportion of overweight and obese children increased over time (OR: 1.09 (1.01-1.17) per 3 years, p=0.02). A total of 153 exercise tests in 101 (14%) patients were reviewed. Overweight or obese patients had lower percent predicted maximum VO₂ (-15.5 (2.4)%, p<0.001), higher peak systolic blood pressure (+11 (4)mmHg, p=0.002) and higher systolic blood pressure response (+7 (3)mmHg, p=0.01) than those patients with BMI below the 85th percentile (normal weight). Overweight/obesity was not associated with percent predicted maximum heart rate (EST: +2 (2)%, p=0.35).

Conclusions: Children with repaired congenital heart disease have an important risk of overweight and obesity, with a trend towards increasing adiposity with age, and an association with lower exercise capacity and higher blood pressure. Programs and counseling aimed at achieving healthy lifestyles and a reduction in adiposity are necessary.