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Reference values and Z scores for right ventricle diameters in caucasian children.

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INTRODUCTION: quantitative measurements of the right ventricle (RV) is needed in order to detect abnormal RV dimensions in children with congenital heart disease (CHD). RV diameters represent an easy, fast and reproducible way to determine its size. Data relating RV normalized diameters is scant in pediatric population. Reference values and Z scores of RV diameters are provided.

METHODS: 641 healthy children (0 days to 18 years old) were enrolled. RV end-diastolic diameters (basal, midcavity and longitudinal) were measured in a 4-chamber focused view and indexed using body surface area (Haycock formula)[1]. Z scores were computed according to literature requirements[2].

RESULTS: RV diameters increased from neonates to adolescents in a nonlinear way. Exponential and square root regression models resulted in the best fit with R^2 of 0.81, 0.82 and 0.9 respectively. They all satisfied the assumption of homoscedasticidy and normality of residuals (Bresch-Pagan and Saphiro-Wilk tests performed). Confounders as gender and inter/intraobserver variability were considered. Predicted Z scores of basal, midcavity and longitudinal diameters plus plots of standardized residuals against BSA are presented. For basal, midcavity and longitudinal diameters and $0.1m^2$ BSA ±2 Z-score were 8 and 14.7, 6 and 10.6 and 14.7 and 22.8mm respectively. For BSA $0.5m^2$: 12.7 and 23, 12 and 22, 31.7 and 49mm. For BSA $1m^2$: 18 and 32.5, 16.6 and 30, 43.3 and 69mm. For BSA $1.5m^2$: 23 and 42, 20 and 36.5, 53.8 and 83.5mm.

CONCLUSIONS: echocardiographic reference values for RV diameters are provided, derived from a large population of healthy children using a rigorous statistical design. These data cover a gap in actual echocardiographic assessment and represent a valid diagnostic tool for RV quantification in children. Determination of RV internal parameters in children with CHDs and its comparison with normal Z scores could provide a new insight in follow up and decision making in CHD.