

Reduced lung function during childhood after fetal growth restriction in discordant identical twins

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Objective

Fetal malnutrition can negatively affect lung development, leading to increased respiratory morbidity and reduced lung function later in life. Yet, studies regarding the impact of fetal growth restriction (FGR) on lung function in singletons are subject to genetic, obstetric, and maternal factors potentially influencing the outcomes. Therefore, we aim to investigate childhood lung function in monochorionic (MC) twins with selective FGR (sFGR) eliminating these confounding factors.

Methods

Spirometry was performed in MC twins with sFGR born in our center between 2002-2017. sFGR was defined as birth weight discordance $\geq 20\%$. Outcome measures consisted of forced expiratory volume in one second (FEV₁), forced vital capacity (FVC), residual volume (RV), total lung capacity (TLC), and transfer factor for carbon monoxide (TLCO). All outcomes were compared between the smaller and larger twin.

Results

We included 39 twin pairs with sFGR who performed spirometry of sufficient quality. The median gestational age at birth was 34.3 (interquartile range (IQR) 32.1-36.0) weeks with median birth weights of 1500 (IQR 1160-1880) grams for the smaller twin and 2178 (IQR 1675-2720) grams for the larger twin. The median age at spirometry was 11 (IQR 10-14) years, with median study heights of 149.4 (IQR 138.0-164.3) cm and 153.3 (IQR 141.1-167.2) cm for the smaller and larger twin, respectively. Smaller twins had significantly lower z-scores for FEV₁ (-0.99 vs. -0.55, $p=0.001$), FVC (-0.61 vs. -0.09, $p<0.0001$) and TLCO (-0.47 vs. 0.18, $p<0.0001$) compared to larger twins. We found no difference in FEV₁%FVC, RV, TLC and RV%TLC.

Conclusion

Although being genetically identical, sFGR in MC twins is associated with a reduction in static lung volume with an equivalent decrease in dynamic lung function, suggesting that adverse growth conditions in utero negatively affect lung development and function. This can contribute to an increase in respiratory morbidities later in life.