The impact of birth weight on lung function at the age of 21 - Role of pregnancy and birth factors; Evidence from a Prospective Birth Cohort Study

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Background & Rationale:
While some studies suggest that poor fetal growth rate, as indicated by lower birth weight, is associated with poor respiratory function in childhood, findings among adults remain inconsistent. A longitudinal cohort study provides the opportunity to study the pregnancy related early life factors influencing adult lung function and to determine the association between birthweight and adult respiratory function.

Methods:
Data from a 21-year follow-up of mothers and their children recruited into the Mater-University of Queensland Study of Pregnancy, a longitudinal birth cohort, recruited in early gestation. Prospective data were available from 2368 young adults (1187 males and 1181 females) who measured respiratory function when 21 years old. A Spirobank G spirometer system was used to measure forced vital capacity (FVC), forced expiratory volume in 1 s (FEV1) and forced expiratory flow between 25% and 75% of FVC (FEF25-75). Pregnancy and birth related variables collected were: birthweight, placental weight, maternal and paternal height, maternal educational status, smoking history in pregnancy, history of alcohol consumption, history of tea and coffee consumption during pregnancy. The impact of birthweight on adult lung function using univariate and multivariate analysis of these factors were performed. Impact of drugs exposure during pregnancy and during childhood on lung function was analysed. The role of smoking in childhood on adult lung function was also analysed.

Results:
For every 100gm increase in birthweight the FVC [CI] at 21 years, increased by 24 mls [15-32] in males and 20 mls [13-27] in females. The increase in FEV1 [CI] was 22 mls [15-30] in males and 16 mls [11-22] in females. The increase in FEF25-75 [CI] was 25 [13-37] in males and 19 [9-29] in females. Similar increase was noted when corrected for pregnancy related factors and parental height. Correcting for height at the age of 21 retained the statistically significant association between lung function and FEV1 and FEF 25-75 but not with FVC. Amongst smokers the age of smoking onset was negatively associated with maximal lung function achieved at 21 years. No clear association was noted with exposure to recreational drugs in pregnancy or adolescence.

Conclusion:
Our longitudinal cohort study provides evidence of robust links between birthweight and adult lung function at the age of 21 years. This effect is independent from other pregnancy-associated factors and maternal factors. The role of childhood factors such as respiratory illnesses, asthma and growth in childhood on adult lung function need to be explored further.