

Transgenerational effects of maternal obesity and gestational diabetes on child body composition and left ventricle mass –RADIEL study 6 years follow-up

Litwin L. (1,2), Sundholm J.K.M. (1), Rönö K. (3), Koivusalo S.B. (3), Eriksson J.G. (4,5), Sarkola T. (1) Children's Hospital, University of Helsinki and Helsinki University Hospital, Helsinki, Finland (1); Department of Congenital Heart Defects and Pediatric Cardiology, SMDZ in Zabrze, SUM, Katowice, Poland (2); Women's Hospital, University of Helsinki and Helsinki University Hospital, Helsinki, Finland (3); University of Helsinki and Helsinki University Hospital, Helsinki, Finland (4); Folkhälsan Research Center, Helsinki, Finland (5)

Objectives: Maternal obesity and gestational diabetes (GDM) are related to child's early weight gain and long-term cardiovascular risk. Fetal programming has been hypothesized to be the underlying mechanism. We aimed to investigate the influence of maternal adiposity and GDM on child body composition and left ventricle mass (LVM) at 6 years of age.

Methods: The observational follow-up study included 201 mother-child pairs (boys, n=111), a subcohort from the Finnish Gestational Diabetes Prevention Study. GDM was diagnosed in 96 mothers, 36 of whom required medication. Mother and child's anthropometrics, body composition, blood pressure, and offspring echocardiography were performed at the mean of 6,1 years (SD 0,5) from delivery.

Results: Maternal pre-pregnancy BMI (30,5 kg/m²; SD 5,6) correlated with child body fat percentage (BF%; r=0,2; p=0,01) and was reflected in increased child BMI (mean z-score 0,45 kg/m²; SD 0,93). LVM correlated with child and maternal anthropometrics, lean body mass (LBM), fat mass, child's age, sex, and systolic blood pressure (Table 1). In a stepwise linear regression model, LVM was independently predicted only by child LBM (r²=0,434). LVM, left ventricle mass index (LVMI, g/m^{2,09}) and LVM z-score were not associated with pre-pregnancy BMI, GDM exposure, or child BF%. LVMI and LBM were higher (p<0,001; p=0,002), but BF% lower (p<0,001), in boys compared with girls.

Conclusions: LVM at six years of age depends predominantly on child LBM, which is correlated with height, weight, and sex, and influenced by maternal LBM. Maternal pre-gestational adiposity is reflected in child adiposity, increasing future cardiovascular risk, but no association between LVM and child adiposity or evidence of fetal programming related to GDM was found in early childhood.

Table 1. Determinants of LVM

	r	p-value
Age	0,241	0,001
Height	0,629	< 0,001
Weight	0,605	< 0,001
BMI Z-score	0,308	< 0,001
Waist-hip ratio	-0,06	0,41
Lean body mass	0,659	< 0,001
Fat mass	0,435	< 0,001
Body fat %	0,096	0,174
Systolic blood pressure	0,265	< 0,001
Maternal height	0,294	< 0,001
Maternal weight	0,199	0,005
Maternal lean body mass	0,313	< 0,001
Maternal fat mass	0,147	0,04
Maternal body fat %	0,044	0,54
Pre-pregnancy BMI	0,126	0,08