

Recent changes in the pre- and postnatal growth trajectories of Offspring from Gestational Diabetic Mothers



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Introduction and objectives

Increased risk of short and long-term metabolic complications among Offspring of gestational diabetic mothers (OGDM)^{1,2}

Changing diagnostic criteria and subsequent more intensive management of gestational diabetes mellitus (GDM)³

Some recent studies suggest that birth size of OGDM may be normalising^{4,5}

Objectives

- To explore the growth trajectories of 'recent' and 'earlier' OGDM in Cambridge Baby Growth Study (CBGS; UK population)
- To investigate whether 'recent' OGDM still exhibit a classical phenotype, with macrosomia and higher adiposity

Methods

GDM Criteria
GDM was defined using the same IADPSG criteria on pregnancy OGTT³:
• >5.1 mmol/L at 0 minutes, or
• ≥10.0 mmol/L at 60 minutes, or
• ≥8.5 mmol/L at 120 minutes

Groups

- Controls (N=876) born in 2001-2009, recruited antenatally
- 'Earlier' OGDM (N=122) born in 2001-2009, recruited antenatally
- 'Recent' OGDM (N=98) born in 2011-2015, recruited postnatally

All from single maternity unit. GDM criteria were retrospectively applied.

- Visits: 0, 3, 12, 24 months
- Anthropometry outcomes: weight, length, and skinfolds thicknesses (reflecting adiposity)

Same study design

Results

Table 1. Maternal demographics

	Controls (Total N=876)	'Recent' OGDM (Total N=122)	'Earlier' OGDM (Total N=98)
Age at birth (years)	33.4 ± 4.2	33.6 ± 5.1	33.4 ± 4.4
Caucasian ethnicity	96%	76%*	98%
Index of multiple deprivation (IMD)	8.9 ± 3.3	11.3 ± 6.8**	9.1 ± 3.6
Primiparous pregnancy	48%	52%	37%*
Height (cm)	166.1 ± 7.2	162.7 ± 6.8**	165.8 ± 6.9
Pre-pregnancy BMI (kg/m ²)	24.0 ± 4.4	27.0 ± 6.3**	26.6 ± 5.6**
Fasting venous glucose (mmol/l)	4.2 ± 0.3	4.8 ± 0.8**	5.3 ± 1.1**
60 minutes venous glucose (mmol/l)	6.5 ± 1.4	10.6 ± 1.5**	9.2 ± 2.1**
Smoking during pregnancy	3.8%	9.4%*	8.2%*

Table 2. Birth characteristics

	Controls (Total N=874)	'Recent' OGDM (Total N=122)	'Earlier' OGDM (Total N=98)
Gestational age (weeks)	40.0 ± 1.3	38.9 ± 0.9**	39.5 ± 1.4**
Caesarean delivery	28%	42%**	40%*
Male infant sex	52%	54%	53%
Weight (kg)	3.523 ± 0.481	3.303 ± 0.472**	3.632 ± 0.588
Weight SDS	0.07 ± 0.93	0.10 ± 1.01	0.55 ± 1.13**
Length (cm)	51.5 ± 2.4	50.0 ± 2.0**	51.3 ± 2.7
Length SDS	-0.05 ± 0.93	-0.07 ± 0.94	0.22 ± 0.97*
Ponderal Index (kg/m ³)	25.9 ± 3.2	26.3 ± 2.7	26.7 ± 3.2
Sum skinfolds thicknesses (mm)	24.6 ± 6.0	20.0 ± 3.6**	26.0 ± 6.3
Mean skinfolds SDS	0.03 ± 0.86	-0.41 ± 0.61**	0.31 ± 0.85*
Macrosomia (birth weight > 4.0 kg)	15%	7%*	27%**
SGA (birth weight ≤ -1.5 SDS)	5%	4%	2%

Values are mean ± SD, or %

SDS, standard deviation score (for weight and length are calculated using the UK 1990 reference, for skinfolds using internal references)

SGA, small for gestational age

*p<0.05 vs. control group

**p<0.005 vs. control group

Weight-, length-, and mean skinfolds-SDS values are adjusted for gestational age, sex and postnatal age at measurement

Note: in control population, number of subjects for length and skinfolds measurements is 573

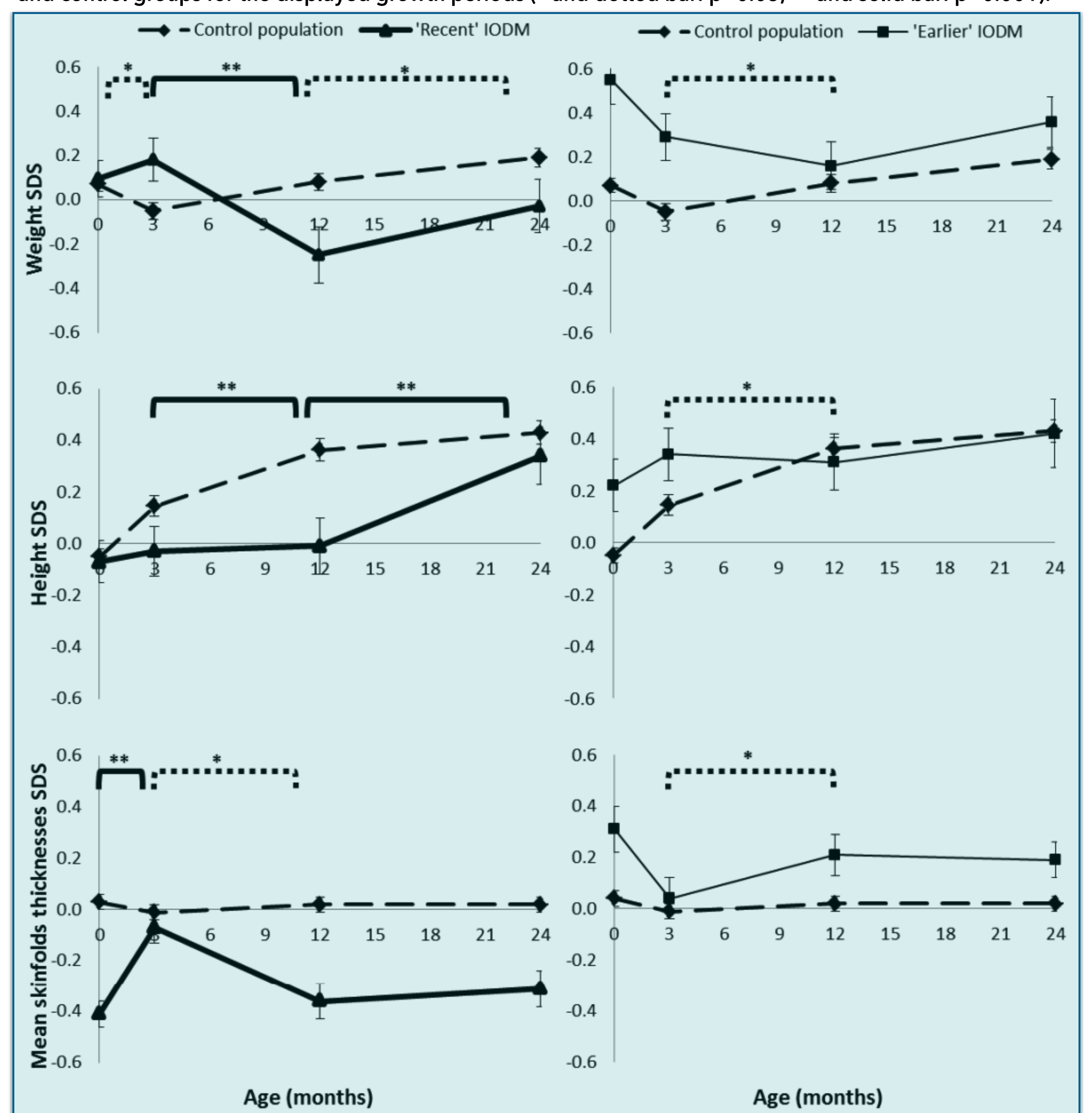
At birth:

- 'Earlier' OGDM had: higher weight-, length-, and mean skinfolds-SDS vs Controls
- 'Recent' OGDM had: similar birth weight- and length- SDS to controls, but lower mean skinfolds SDS

After birth:

- 'Earlier' OGDM had: lower gains in weight and length until 12 months
- 'Recent' OGDM had: higher weight- and skinfolds gains until 3 months, followed by lower gains in those parameters from 3-12 months, compared to controls. At 24 months, 'recent' OGDM remained less adipose than controls. At all time points 'recent' OGDM had lower growth measurements than 'earlier' OGDM.

Figure 1. Weight, length and skinfolds growth trajectories of 'recent' or 'earlier' OGDM compared to controls from birth to 2 years. Plotted values are mean ± SEM, adjusted for sex, gestational age (birth and 3 months only), and age at measurement. Horizontal bars indicate statistically significant differences between OGDM and control groups for the displayed growth periods (* and dotted bar: p<0.05; ** and solid bar: p<0.001).



Conclusions

'Recent' OGDM showed very different growth trajectories to the 'earlier' group: normalisation of weight and reduced adiposity at birth, followed by initial rapid weight gain but subsequent reduced growth postnatally. While avoidance of large size at birth may be advantageous, the longer-term health implications of these changing growth trajectories are uncertain.

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