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Associations between maternal body mass index, gestational weight gain and changes in weight from pregnancy to 12 years postnatally: Insights from Belfast cohort HAPO study

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Pre-pregnancy body mass index (BMI) and excess gestational weight gain (GWG) have been associated with adverse pregnancy outcomes including altering a woman's future weight trajectory. In the UK nearly 50% of women gain excessive gestational weight, with over 70% of women retaining this weight postpartum[(1)]. GWG guidelines developed in the USA by the Institute of Medicine (IOM)[(2)] using data from American populations are widely used, these provide a weight gain range based on pre-pregnancy BMI to optimise birth outcomes. Currently there are no GWG guidelines used routinely in the UK and evidence regarding the association between GWG and weight retention in the long term after pregnancy in the UK are scarce. The aim of this study was to examine the association between maternal pre- pregnancy BMI and (i) GWG (kg/wk) during pregnancy, and (ii) change in maternal weight and BMI following pregnancy up to 12 years postnatally.

Participants were recruited from the Belfast cohort of the Hyperglycaemia and Adverse Pregnancy Outcomes Study (HAPO)[(3)], a prospective observational study examining maternal glycaemia and the risk of adverse pregnancy outcomes. Participants were recruited during pregnancy and mother and child pairs were invited to return for metabolic investigation at 2, 6 and 12 years postnatal, where dietary, anthropometric, and biochemical data were collected.

Data were available for 701 mainly Caucasian women, mean age 30.6 (SD 5.1) years, mean pre-pregnancy weight 66.3 (SD 11.7) kg and mean BMI 23.9 (SD 3.9) kg/m2. Participants returned for metabolic assessment 12 years postnatally, where both maternal weight and BMI had significantly increased from pre-pregnancy to 70.8 (SD 14.4) kg and 26.8 kg/m2 (SD 5.4) kg/m2 respectively, showing a statistically significant 2.6 increase in BMI ($P < 0.001$; 95% CI 2.39–2.91). Pre-pregnancy 32.4% of women in this cohort were overweight or obese, which increased to 55.7% at 12 years postpartum. Approximately half (44.3%) of all women in this study exceeded the IOM GWG guidelines. Women with a normal pre-pregnancy BMI gained more weight during pregnancy than overweight or obese women ($P < 0.001$) and women who gained above the recommended IOM guidelines in pregnancy were heavier at 12 years when compared to those who gained less weight during pregnancy ($P = 0.028$).

These figures endorse the need to provide applicable weight gain guidance in the UK to aid in reducing the risk of obesity in the long term. A limitation to this study, there are no non- pregnant women within this cohort meaning the possible effect of age-related weight gain in the same 12 years cannot be investigated. In conclusion, this observational study shows that excessive weight gained during pregnancy has a strong influence on weight following pregnancy and that all women should be educated on weight management strategies post pregnancy regardless of pre-pregnancy BMI.

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