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Weight six years after childbirth: A follow-up of obese women in a weight-gain restriction programme

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ABSTRACT

Objective: to compare weight development in an intervention group and a control group, six years after participation in a gestational weight-gain restriction programme.

Design: follow-up of a prospective intervention study.

Settings: antenatal care clinics.

Participants: a total of 129 women (88.4%) from the original intervention group and 166 women (88.8%) from the original control group.

Measurements: the women answered a study specific questionnaire, covering socio-demographic data and health- and weight status.

Findings: after adjusting for socio-demographic factors, the mean weight was lower (4.1 kg) among the women in the intervention group, compared to the controls ($p=0.028$). Furthermore, the mean weight change, e.g. the weight at the six year assessment compared with the weight at the start of the intervention at the first antenatal care visit, was greater in the intervention group than in the control group. The women in the intervention group had a larger mean weight change (−5.2 kg), e.g. weighed less than the women in the control group (−1.9 kg) ($p=0.046$). Mean weight change expressed in 5 kg classes also showed a significant difference between the two groups ($p=0.030$).

Key conclusions: the results indicate that attending a gestational weight-gain-restriction programme can have a positive effect on weight up to six years after the intervention.

Implication for practise: a restrictive gestational weight gain can result in a positive weight development during the first years after childbirth. It might provide both short- and long term medical health benefits for the mother as well as the child.

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Introduction

Obesity poses a high risk for complications during pregnancy and delivery and also for the fetus/infant and an excessive gestational weight gain may further increase the risk (Bodnar et al., 2010; Tsoi et al., 2010; Blomberg and Kallen, 2010; Blomberg, 2011; Tennant et al., 2011). A large weight gain during pregnancy may result in large weight retention post partum and several years later (Rooney and Schauburger, 2002; Linne et al., 2004; Rooney et al., 2005). Linne et al. (2004) showed in a 15-year follow-up study, encompassing 563 participants, that women with high gestational weight gain and high weight retention during the post partum year had a higher body mass index (BMI) 15 years later. Rooney and Schauburger (2002) and Rooney et al. (2005) followed

a cohort of 500 women through pregnancy and reported results from 8-year and 15-year follow-up studies. The average weight gain was slightly more than six kilos and almost ten kilos from pre-pregnancy to the follow-up assessment eight and 15 years later, respectively. Excess gestational weight gain and failure to lose weight after pregnancy have been reported to be important predictors of long-term obesity in women (Rooney and Schauburger, 2002; Rooney et al., 2005). Women who gained more weight than recommended by the Institute of Medicine (IOM), and retained that weight six months post partum weighed 2–4 kg more at the 8-year follow-up, compared with women who gained the recommended amount or less and with women who lost all the weight gained during pregnancy (Institute of Medicine, Subcommittee on Nutritional et al., 1990; Rooney and Schauburger, 2002). The gestational weight gain advice given of Institute of Medicine, 1990 was broad and the range extends from at least 6.8 kg for women with BMI > 29 kg/m² to an upper limit of 18.0 kg for BMI < 19.8 kg/m². In 2009 these guidelines were

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re-examined and the new recommendations were now based on WHO BMI classes and included a specific and relatively narrow range of suggested gestational weight gain for obese women (BMI ≥ 30 kg/m²: 5.0–9.1 kg) and the same upper limit of 18.0 kg for underweight pregnant women as before (Rasmussen et al., 2009).

During the last decade the importance of intervention programmes for obesity and weight-gain prevention have been in focus and several intervention studies have been conducted (Polley et al., 2002; Olson et al., 2004; Kinnunen et al., 2007; Wolff et al., 2008; Shirazian et al., 2010; Quinlivan et al., 2011; Phelan et al., 2011). Four of these studies encompassed obese pregnant women (Wolff et al., 2008; Guelinckx et al., 2010; Shirazian et al., 2010; Quinlivan et al., 2011). The intervention was associated with a reduced gestational weight gain in the studies by Wolff et al. (2008), Quinlivan et al. (2011) and Shirazian et al. (2010), whereas Guelinckx et al. (2010) reported no difference in weight gain. We have shown in a previous study that an intervention programme aiming to minimise the gestational weight gain to less than 7 kg was effective (Claesson et al., 2008). In the 2-year follow-up after the index birth, the women who reached the target i.e. < 7 kg did benefit from the intervention and weighed less compared to the women in the control group (Claesson et al., 2010). The aim of this follow-up study was to assess weight development in the intervention- and control groups six years after participation in a weight-gain-restriction programme.

Methods

The original study was conducted at the antenatal care clinic (ANC) in Linköping and at ANCs in two nearby cities from November 2003 to December 2005. This study is described elsewhere and summarised briefly below (Claesson et al., 2008). All obese (BMI ≥ 30 kg/m², $n=317$) pregnant women who registered in early pregnancy at the ANC in the city of Linköping and surroundings were offered the chance to participate in an intervention study with the aim to minimise the gestational weight gain to less than 7 kg. The exclusion criteria were inability to understand Swedish, a diagnosis of pre-pregnant diabetes, thyroid dysfunction or a psychiatric disease treated with neuroleptic drugs; and 45 women were therefore excluded from participation. Twenty women moved out of the area during pregnancy and 13 women who had early spontaneous or legal abortion were also excluded. Of the 230 remaining women, 70 women chose not to participate and five dropped out during pregnancy. Finally, 155 women (67.4%) completed the study. The women were offered extra visits – 30 minutes every week – with a specially trained midwife with the aim of motivating them to change behaviours regarding nutrition and physical activity. They were also invited to join aqua aerobic classes once or twice a week, classes especially designed for obese women. As controls for these women all obese pregnant women ($n=437$) in two nearby cities were offered the chance to participate in the study. The inclusion- and exclusion criteria were the same as for the intervention women. Forty-two women did not meet the inclusion criteria and were therefore excluded from participation. Ten women had a miscarriage or legal abortion. Finally, 385 women were eligible and invited to participate. Of this a total, 177 women refrained from participation and 15 women dropped out. One hundred ninety-three women (50.1%) completed the participation.

The intervention programme was effective. The women belonging to the intervention group gained 8.7 kg during their pregnancies, compared with the women in the control group who gained 11.3 kg ($p < 0.001$). The sub-group of the women who gained < 7 kg was greater in the intervention group (35.7%), than in the

control group (20.5%) ($p=0.003$). At the postnatal check-up there was still a significant difference between the groups. The women in the intervention group weighed 2.2 kg less than the weight in early pregnancy, whereas the corresponding figure in the control group was 0.8 kg ($p < 0.001$) (Claesson et al., 2008). At the 2-year follow-up there was a remaining weight difference among the women who gained < 7 kg during their pregnancies. The women belonging to the intervention group weighed 13.5 kg less than the women in the control group ($p=0.018$) (Claesson et al., 2010).

Subjects in this study

All women from the original study were asked to participate in this follow-up study, six years after the index pregnancy. The study was approved by the Regional Ethical Review Board in Linköping (reference number 2010/400-31) and all subjects gave informed consent.

A study specific questionnaire was constructed by the authors and included information about parity, marital status, occupation status, education level, smoking habits, health status and current weight status, were sent by post to 347 women. Each woman's personal identity number was used to obtain her current address. All the women were found. One woman had protected personal data and it was therefore not possible to reach her. A reminder was sent after four weeks.

Concerning current weight status the women were asked to note if the weight given was newly measured or estimated and regarding health status each was asked to specify if she suffered from a chronic or serious illness.

Answers were received from 147 women in the intervention group. A total of nine women were excluded because of on-going pregnancy, postnatal period (e.g. < 12 months after giving birth) or illness. Nine women refrained from participation. One hundred twenty nine women (88.4%) took part in the follow-up study. A total of 187 women belonging to the control group answered the questionnaire. Because of on-going pregnancy, postnatal period or illness six women were excluded and 15 women chose not to participate, thus 166 women (88.8%) participated in the follow-up. The description of the population in the original and follow-up studies is displayed in Fig. 1.

Statistics

All analyses were performed using the IBM SPSS programme, version 19.0 (IBM Corp., Armonk, NY, USA). Statistical significance was defined as (two-sided) $p \leq 0.05$. Before analysing the weight changes, the assumption of these variables being normally distributed was validated using the Kolmogorov–Smirnov test. Since this assumption was confirmed, an ordinary Student's *t*-test was used as method of analysis for detecting weight change differences between intervention and control women six years after index pregnancy. In general, group differences were estimated by using the χ^2 test on categorical variables and the Student's *t* test on continuous, normally distributed variables. Furthermore, to make a more comprehensive assessment of group differences, linear regressions were performed with the weight as dependent variables. The grouping variable has been adjusted for socio-demographic characteristics (age, parity, tobacco user).

Findings

The average time of the follow-up among the women in the intervention- and control group was six years. The socio-demographic data at the time for follow-up are displayed in

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