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Effects of a gestational weight gain restriction program for obese women: Sibling pairs' weight development during the first five years of life

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ABSTRACT

Objectives: Successful gestational weight gain (GWG) restriction programs for obese (Body Mass Index (BMI) ≥ 30 kg/m^2) pregnant women, have not, so far, shown convincing effects on infant's weight development. An intervention starting during the pregnancy might be too late and a pre-conceptional life style change may be preferable. Thus, the aim of this study was to follow children born to mothers who had participated in a weight gain restriction program during pregnancy, and make comparisons with their younger siblings.

Study design and main outcome measures: An extended analysis of 262 children belonging to an intervention group and a control group. The effects of BMI at five years of age and weight-for-length/height development from two months of age until five years of age were assessed.

Results: In the intervention group there was a difference in BMI at five years of age, between index boys and their younger sisters (p = 0.016). Mean BMI was lower among the boys compared with their younger female siblings. Regarding maternal GWG or the Swedish national reference data there was no difference between the index children and their younger siblings within the intervention or control groups or between younger siblings in the two groups.

Conclusions: Maternal pre-conceptional lifestyle change may have a positive effect on the child's weight development during the five first years of age. However, the effect of participation in an extensive GWG restriction program when it comes to the impact on the offspring's weight development is still unclear and further research is required.

Introduction

There is evidence that maternal obesity and excessive gestational weight gain may lead to childhood obesity [1–3], which in Sweden have been estimated to 3–5% [4]. Intervention studies during pregnancy, aiming to change behavior concerning energy intake and physical activity and thereby restrict the weight gain and decrease adverse outcomes for both mother and child, have been carried out with divergent results [5,6]. Follow-up studies of the effect of a gestational intervention program on the offspring during childhood have also shown conflicting results [7–13]. In recent years, the question of whether it is too late to begin a life style intervention during pregnancy has arisen and the need for a pre-conceptional change has been suggested [14,15].

We have previously shown that a gestational weight gain (GWG) restriction program is effective [16,17] and it seems that the positive effect on the woman's weight development remains up to six years after the intervention [18]. We could not detect any differences in the off-

Abbreviations: BMI, Body Mass Index; GWG, Gestational Weight Gain; WL/H, Weight-for-Length/Height; ANC, Antenatal Care Clinic; CWC, Child Welfare Center; ZWL/H, standard score (z-score) of Weight-for-Length/Height; ZBMI, standard score (z-score) of Body Mass Index

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spring's weight development during the first five years of life, between children whose mothers belonged to the intervention group or the control group [19]. In an extended analysis we investigated the outcome of a GWG restriction program for obese pregnant women on younger siblings of the index children in order to investigate the potential impact of pre-conceptional behavior change. We compared sibling pairs and estimated the effect of BMI at five years of age and weight-for-length/height (WL/H) development from two months of age until five years of age.

Methods

The study groups comprised index children and their younger siblings whose mothers participated in an intervention study during 2004–2006 at the antenatal care clinic (ANC) in Linköping. A control group of obese pregnant women was recruited from the ANCs in two nearby cities. The siblings were born within five years after the "index child" (i.e. the pregnancy when the mother participated in the intervention study). The original study and the follow-up studies are described elsewhere and are summarized briefly below [16–19]. The intervention program consisted of individual weekly visits with a specially trained midwife during pregnancy and every six months during the first two years after childbirth. The purpose of the visits was to change behaviors regarding nutrition and physical activity. The participants were also invited to join aqua aerobic classes especially designed for obese women. A total of 155 women (67.4%) completed the intervention program. The control group consisted of 193(50.1%) pregnant obese women who followed the routine program at the ANCs. All the women were recruited and included in the study in early pregnancy, i.e. before gestational week 15. Follow-up studies concerning the weight development of the women were undertaken two and six years after the index pregnancy. The weight development of all

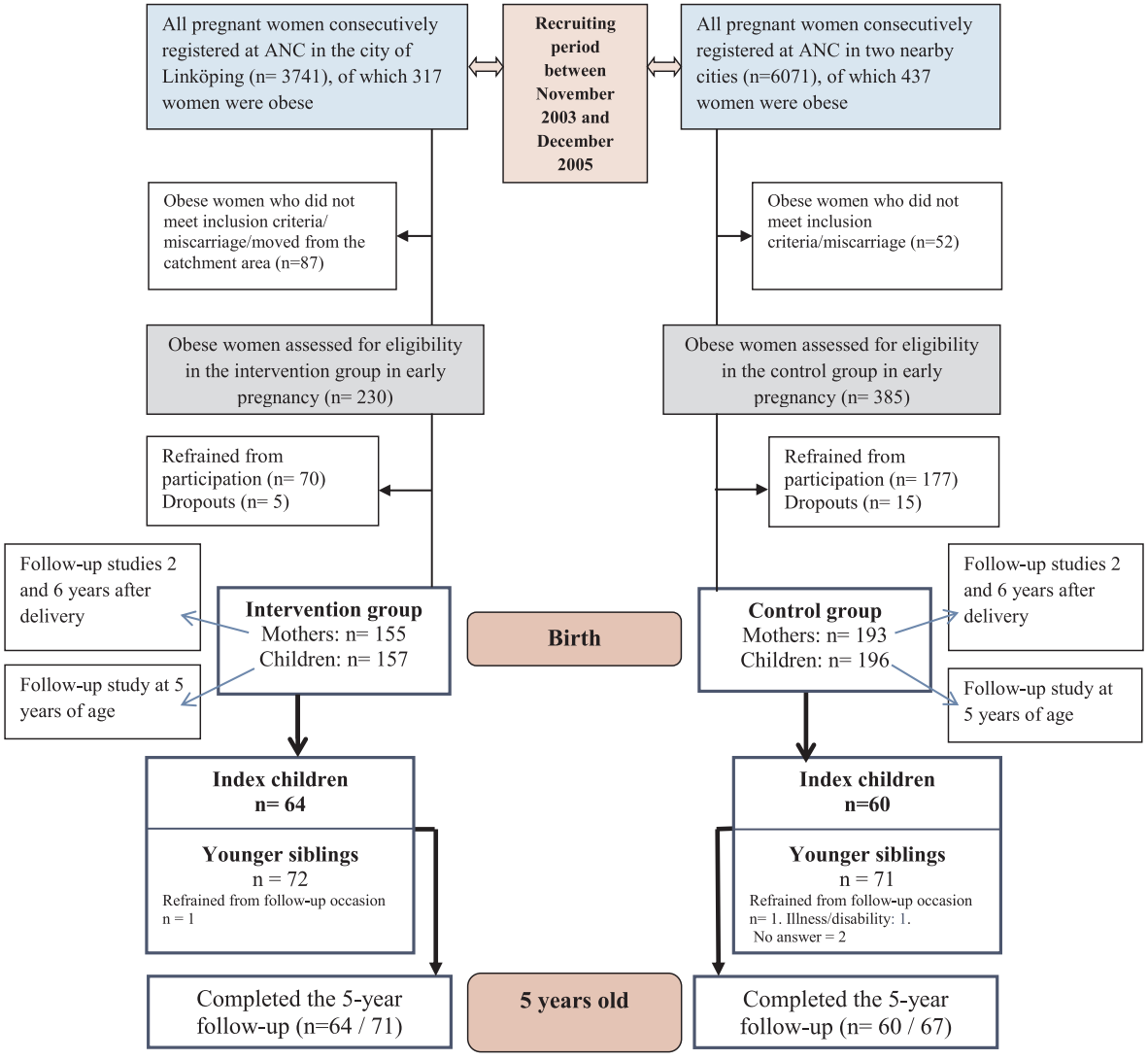

Fig. 1. Description of the population in the original- and follow-up studies.