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ORIGINAL ARTICLE

# Pregnancy outcomes of overweight and obese women aged 35 years or older – A registry-based study in Finland



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## KEYWORDS

Pre-pregnancy BMI;  
Registry-based study;  
Pregnancy outcome;  
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## Summary

**Objective:** To compare pregnancy outcomes of overweight and obese pregnant women aged 35 years or older to women aged less than 35 years old.

**Methods:** A registry-based study covering years 2004–2008 including data on women  $\geq 35$  years ( $N=45,718$ ) compared to those  $<35$  years ( $N=203,930$ ) and their pre-pregnancy body mass index (BMI) ( $<25$ ,  $25-29$  and  $\geq 30$ ). In multivariable modelling, the main outcome measures were preterm delivery ( $<28$  weeks,  $28-31$  weeks and  $32-36$  weeks), low Apgar scores at 5 min, small-for-gestational age (SGA), foetal death, asphyxia, Caesarean section, induction, preeclampsia, blood transfusion, admission to a neonatal intensive care unit (NICU), shoulder dystocia, and large for gestational age (LGA).

**Results:** Maternal overweight and obesity along with advanced maternal age (AMA) significantly increased the risks of preterm delivery, preeclampsia, foetal death, LGA and Caesarean as compared to women of average weight aged  $<35$  years. When comparing overweight and obese women aged  $\geq 35$  years to normal weight women

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of the same age, the rates of preeclampsia, preterm delivery <28 weeks, LGA and low Apgar score were significantly increased. When observing overweight and obese women <35 years as a reference group, the risks of preterm delivery and foetal death were significantly increased.

**Conclusions:** The risks were increased by maternal age  $\geq 35$  years and both obesity and overweight. The combined effect of AMA and either overweight or obesity appeared to be a high risk state particularly for stillbirth and preterm delivery.

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## Introduction

Overweight is defined by a BMI of  $\geq 25$  and obesity by a BMI of  $\geq 30$  [1]. Overweight and obesity are associated with several maternal, foetal and neonatal complications. Maternal complications, such as hypertensive disorders, diabetes and venous thromboembolism, are associated with maternal obesity as well as foetal and neonatal complications including miscarriage and stillbirth, foetal anomalies, macrosomia, preterm birth, prolonged pregnancy, Caesarean delivery, postpartum haemorrhage and complications in anaesthesia [2]. Long-term risks for mothers include, for example, the risks of type 2 diabetes, hypertension and atherosclerotic vascular disease. For the foetus, the risks are similar as to mothers, including childhood obesity, insulin resistance, and hyperlipidaemia [3].

In Finland, in 2013, the average pre-pregnancy BMI of parturients was 24.6. Approximately 35% of women giving birth had a BMI of 25 or more, i.e. were overweight, and around 13% were obese with a BMI of 30 or more [4]. Obesity rates increase by age. Obesity during pregnancy is associated with greater use of health care services, including longer hospital stay for delivery. Mostly the increase is explained by the increased rates of Caesarean delivery, gestational diabetes mellitus or pre-existing diabetes and hypertensive disorders, which are more common in obese pregnant women [5].

AMA has usually been defined as the age of 35 years or older at the time of pregnancy [6]. The proportion of advanced aged pregnant women has increased especially in the Western world and in Finland the number of women aged 35 years or older giving birth was 20% in 2013 [4].

The impact of AMA has been linked to increased risks of maternal death and severe maternal outcomes and preterm birth, a growing number of neonatal intensive care admissions, birth asphyxia, miscarriage, preeclampsia, small-for-gestational-age infants and gestational diabetes as well

as stillbirth and large-for-gestational-age infants [7–12].

However, AMA alone in otherwise low risk pregnancies has been associated with nearly as good pregnancy outcomes as in younger women and according to some studies maternal age alone is not a risk factor explaining the adverse outcomes, but associated with other risk factors like hypertension and diabetes may account for the results [13,14]. Co-existing risks accompanied with the ageing process jeopardize the outcome much more than in younger age groups, as we have shown previously in the case of smoking women and women affected by preeclampsia, both having been complicated by advanced age [15,16].

Overweight and obesity during pregnancy is a significant problem globally because of the risks and complications associated with this maternal condition. The relationship between older maternal age accompanied with overweight/obesity and adverse pregnancy outcomes has not been widely studied. The aim of this study was to compare older, over 35-year-old pregnant women to younger ones aged less than 35 years in three different BMI categories (<25, 25–29 and  $\geq 30$ ) to explore the relationship between overweight and obesity and pregnancy outcomes.

## Methods

The data for this study consist of the information from the Medical Birth Register (MBR), the Hospital Discharge Register (HDR), and the Register of Congenital Malformations. The permission for using the data in this study was gained from the National Institute for Health and Welfare in September 2009 (THL/906/5.05.00/2009), as required by the national data protection legislation. The ethical considerations were done by the register authorities. Register-based studies do not need an ethical review board statement in Finland.

The MBR is a population-based registry established in 1987 and is currently maintained by the

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