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ORIGINAL ARTICLE

Risk of stillbirth in pregnant women with obesity in the United Kingdom



L. Jacob^a, K. Kostev^{b,*}, M. Kalder^c

^a Department of Biology, École Normale Supérieure de Lyon, 69007 Lyon, France

^b IMS HEALTH, 60598 Frankfurt, Germany

^c Department of Gynecology and Obstetrics, Philipps-Universität Marburg, 35043, Germany

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KEYWORDS

Stillbirth;
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BMI

Summary

Background: The stillbirth rate in the United Kingdom (UK) is approximately 3.5–4 per 1000 births. The country has one of the highest stillbirth rates in Europe, constituting a substantial portion of the UK perinatal death rate, which was estimated in 2013 at 6.7 deaths per 1000 births.

Aim: To analyse the risk of stillbirth in pregnant women with and without increased BMI in the United Kingdom (UK).

Design and setting: Retrospective study based on Disease Analyzer database (IMS Health).

Method: A total of 44,060 pregnant women with or without an increased BMI who gave birth to a single child were examined using a Disease Analyzer database that included 102 general practices. Selected patients were observed for a period of at least 10 months between January 1994 and December 2013. Standard BMI ranges were considered: 18.5–24.9 (normal weight), 25–29.9 (overweight), 30–39.9 (class I and class II obese), 40–49.9 (class III) and over 50 (class IV). Multivariate logistic models were used to estimate the relationship between increasing BMI and the rate of stillbirth adjusted for demographic data and co-morbidities.

Results: BMI increase was associated with an increase in stillbirth OR, from 1.37 (95% CI: 1.02–1.85) in the overweight group to 5.04 (95% CI: 1.79–14.07) in the group of pregnant women with a BMI higher than or equal to 50.

Conclusions: Pregnant women with obesity and even moderate overweight exhibit an increased risk of stillbirth in UK primary care practices over 20 years.

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* Corresponding author at: IMS HEALTH, Epidemiology, Darmstädter Landstraße 108, 60598 Frankfurt am Main, Germany. Tel.: +49 069 66 04 4878; fax: +49 069 66 04 5878.

E-mail address: kkostev@de.imshealth.com (K. Kostev).

Introduction

The stillbirth rate in the United Kingdom (UK) is approximately 3.5–4 per 1000 births [1]. The country has one of the highest stillbirth rates in Europe, constituting a substantial portion of the UK perinatal death rate, which was estimated in 2013 at 6.7 deaths per 1000 births [2].

The association of an increased BMI with a higher stillbirth rate has been debated regularly over the last two decades. The intriguing relationship between maternal BMI and this severe adverse outcome of pregnancy and delivery was first observed in 1998 [3], when Cnattingius et al. stated in the Swedish Medical Birth Register that higher maternal BMI increased the risk of late foetal death. These results were further confirmed and extrapolated to stillbirth, perinatal and infant deaths in the Danish Birth Cohort, which included 54,505 pregnant women [4]. This second study also showed that the stillbirth Hazard Ratio (HR) increased with gestational age in obese women. These conclusions have also been confirmed in further, more recent publications [5–7] and it is now accepted that the risk of stillbirth is increased 2- to 5-fold in obese pregnant women as compared with pregnant women with a normal BMI [4,8]. Salihu and his colleagues subsequently showed a 1.5-fold increase in the risk of stillbirth in pregnant women between obesity classes III and I ($40 \leq \text{BMI}$ and $30 \leq \text{BMI} \leq 34.9 \text{ kg/m}^2$, respectively) [9,10]. Finally, Aune et al. analysed 38 cohort studies (44 publications) and demonstrated that even a modest increase in BMI (overweight) was associated with an increased risk of stillbirth and other adverse outcomes during delivery: the RR per 5-unit increase in maternal BMI was 1.24, (CI, 1.18–1.30) [11]. Conversely, several authors have shown that there is no association between BMI and stillbirth, which partially refutes these previous findings [12–15].

The aim of this study was to analyse the association between increasing BMI and the risk of stillbirth in women over the last 20 years in the UK.

Patients and methods

This was a retrospective cohort study including 44,060 women with a singleton delivery from the UK.

The Disease Analyzer database (IMS HEALTH) compiles drug prescriptions, diagnoses, basic medical and demographic data obtained directly in anonymous format from computer systems used in the practices of general practitioners (GP) [16]. Diagnoses (ICD-10), prescriptions (Anatomical

Therapeutic Chemical (ATC) Classification System) and the quality of reported data have been monitored by IMS based on a number of criteria (e.g., completeness of documentation, linkage between diagnoses and prescriptions). In the UK, the sampling methods used for the selection of physicians' practices were appropriate to obtain a representative database of pregnant women with and without increased BMI [16]. The age groups for given diagnoses in the Disease Analyzer also related well to those in corresponding disease registries [16].

Pregnant women with and without increased BMI were identified by 102 general practitioners (GP) in the IMS Disease Analyzer database. BMI was documented for each study participant in the database in the time period 0–6 months prior to pregnancy diagnosis. Documentation on live birth and stillbirth was available for each subject. Pregnant women were selected if they gave birth to a single child, and excluded in the case of multiple births. Selected patients were observed for a minimum of 10 months between January 1994 and December 2013. A total of 44,060 subjects were available for analysis.

The main outcome measure was stillbirth (ICD 10: P95.0, Z37.1, O36.4). All possible ICD-10 codes (O80.0–O83.9, Z37.0–Z38.2, O36.4 and P95.0) associated with delivery were included in the analysis. The proportion of pregnant women with stillbirth was estimated for women with normal weight and increased BMI. BMI is defined as the ratio of the maternal weight in kilograms during pregnancy to the square of the height in metres. The five BMI classes defined in the WHO classification were considered: 18.5–24.9 kg/m² (normal weight), 25.0–29.9 kg/m² (overweight), 30.0–39.9 kg/m² (class I and II obese), 40.0–49.9 kg/m² (class III) and over 50.0 kg/m² (class IV).

Demographic data included age, weight, height and smoking. Five complications related to overweight and obesity were determined based on primary care diagnoses (ICD-10 codes): pre-gestational diabetes (E10–E11), chronic hypertension (I10), assisted fertility (Z31) gestational diabetes (O24) and gestational hypertension (O13, O14).

Descriptive analyses were obtained for all demographic variables and mean \pm SD calculated for normally distributed variables. Smoking, pre-gestational diabetes mellitus, chronic hypertension, assisted fertility, gestational diabetes and hypertension proportions were determined for each subgroup of women. Multivariate logistic models (dependent variable: incidence of stillbirth) were used to adjust for increased BMI levels. *p*-Values <0.05 were considered statistically significant.

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