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Obesity and stillbirth

Andrea M.F. Woolner, MBChB, BScMedSci, Doctor [a, *], Siladitya Bhattacharya, MD, FRCOG, Professor [b, 1]

[a] Obstetrics & Gynaecology, Division of Applied Health Sciences, School of Medicine and Dentistry, University of Aberdeen, Aberdeen Maternity Hospital, Cornhill Road, Aberdeen AB25 2ZL, UK
[b] Head of Division of Applied Health Sciences, School of Medicine and Dentistry, University of Aberdeen, Polwarth Building, Foresterhill, Aberdeen AB25 2ZD, UK

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Recent years have witnessed a rise in maternal obesity, which is independently associated with an increased risk of stillbirth. The pathophysiology is unclear, but it is likely related to abnormal placental function, and inflammatory, metabolic and hormonal imbalances in the mother. Obesity is associated with conditions such as diabetes, which can also cause stillbirth. In order to reduce the risk of obesity-associated stillbirth, women of reproductive age should be actively encouraged to optimise their pre-pregnancy weight as the safety of weight loss interventions during pregnancy is unproven. Obese and extremely obese women should be treated as high-risk obstetric patients, with increased antenatal surveillance and specialist input. The postnatal period may be a useful time to provide weight management advice to women to prevent interpregnancy weight gain and reduce the risk of stillbirth in subsequent pregnancies.

Introduction

Stillbirth or delivery of an infant after 22–24 weeks of gestation with no signs of life is unexpected and devastating. In 2009, 2.6 million stillbirths were reported worldwide [1]. Even in high-income countries where pregnancy outcomes have improved substantially, stillbirth continues to be

* Corresponding author. Tel.: +44 (0) 1224 438435; Fax: +44 (0) 1224 438486.
E-mail addresses: a.woolner@abdn.ac.uk (A.M.F. Woolner), s.bhattacharya@abdn.ac.uk (S. Bhattacharya).
[1] Tel.: +44 (0) 1224 437975; Fax: +44 (0) 1224 438486.

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common with a rate of one per 200 births [2–4]. Along with a number of other adverse foetal outcomes, in utero foetal death is more common in overweight (body mass index (BMI) >25 kg/m^2) and obese mothers (BMI > 30 kg/m^2) [4–12]. Obesity continues to be a global health epidemic affecting nearly 300 million women worldwide [13,14]. With >30% of women of reproductive age (aged 20–39 years) obese, and >55% overweight [15], this is a very real problem in contemporary obstetrics.

Epidemiology

Obesity in pregnancy is rising. Between 1990 and 2002/2004, obesity (BMI > 30 kg/m^2) in Scottish pregnant women doubled from 9.4% to 18.9% [16] and women were 60% more likely to be overweight or obese at antenatal booking (adjusted odds ratio (aOR) 1.62 (95% confidence interval (CI) 1.04–2.53)) [16]. Data from the United States show a similar trend with maternal weight at booking increasing by 20% between 1980 and 1999 [17]. With increasing levels of maternal obesity, it is likely that adverse obstetric and perinatal outcomes associated with obesity will also escalate. A study published in 2014 suggests that 20% of stillbirths and, in particular, one in four term stillbirths are associated with maternal obesity [9].

Obesity as an independent risk factor for stillbirth

Obesity is a significant yet modifiable risk factor for stillbirth. A systematic review of observational studies found that mothers who were overweight (aOR 1.2 (95% CI 1.09–1.38) for BMI 25–30 kg/m^2) or obese (aOR 1.6 (95% CI 1.35–1.95) for BMI > 30 kg/m^2) were at a greater risk of stillbirth than those with a normal BMI [4]. A systematic review published in 2014 revealed that women with a BMI of 40 were at twice the risk of stillbirth compared to women with a BMI of 20 (relative risk of 2.19 (2.03–2.36)) [18]. Large observational studies agree that overweight and obese mothers are 40% more at a risk of stillbirth [10,19]. A study in Aberdeen found that stillbirth was more common in obese women [20], while a large cohort study in England reported foetal death to be two to three times more common in obese, but not overweight women [21]. There is a considerable body of evidence from large observational studies reporting a positive association between obesity and stillbirth [4,7–10,12,18–23]. It is unclear if the potential insult of obesity is greater at different reproductive time points.

Pre-pregnancy weight

Pre-pregnancy weight appears to affect the risk of stillbirth. A meta-analysis of nine observational studies revealed women who were overweight (OR 1.47 (95% CI 1.08–1.94)) or obese (OR 2.07 (95% CI 1.59–2.74)) before pregnancy were at a greater risk of stillbirth than normal-weight women [7]. In a large Danish cohort study, Kristensen et al. [23] found that women who were obese (BMI > 30) pre-pregnancy were at a significantly increased risk of stillbirth (stillborn at ≥28 weeks of gestation) compared to normal-weight women (aOR 3.1 (95% CI 1.6–5.9)). Another large cohort study found that the risk of stillbirth was significantly higher for women with a pre-pregnancy BMI ≥30 kg/m^2 (aOR 2.7 (95% CI 1.8–4.1)) [12]. Nohr et al. [24] found that obese (BMI ≥ 30 kg/m^2) women were at a greater risk of intrauterine foetal death from 14 to >40 weeks of gestation (adjusted hazard ratio (aHR) 1.7 (95% CI 1.1–2.1)) but most marked after 28 weeks. A Swedish observational study [19] suggests that if women with a BMI >25 kg/m^2 optimised their BMI prior to pregnancy it would lead to a 13% reduction in stillbirths [19]. Overall, being overweight or obese at the time of conception may increase the risk of stillbirth. However, as these women are likely to remain overweight during pregnancy, it is unclear whether being overweight at conception or whether continuing to be overweight during pregnancy or both are associated with stillbirth.

Weight gain during pregnancy

The American College of Obstetricians and Gynecologists recommendations indicate that weight gain in pregnancy should be approximately 1 lb. per gestational week for normal-weight women (total weight gain of 25–35 lb.), and approximately 0.5–0.6 lb. per week for overweight and obese women