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OBESITY

Effect of maternal obesity on neonatal outcomes

Two recent population cohort studies provide new insights into the detrimental effects of maternal obesity on offspring health. Analysing data from the Swedish Medical Birth Registry, Cnattingius *et al.* report a dose–response relationship between maternal overweight or obesity and the risk of preterm delivery. Using the same database, Marie Blomberg (Linköping University, Sweden) finds that the adverse effects of maternal morbid obesity on neonates are independent of the mode of delivery.

The initiation of labour, at term and preterm, is associated with an increased inflammatory response. Near term, hormonal factors produced by the developing fetus and increased mechanical stretch represent the inflammatory stimuli that induce labour. In preterm labour, inflammation of the fetal membranes, termed chorioamnionitis, is associated with an intra-amniotic bacterial infection that can increase cytokine levels in the amniotic fluid and induce migration of inflammatory cells, such as macrophages and neutrophils. Thus, the timing of labour is modulated by a delicate balance between hormonal, inflammatory and physical factors in the mother and fetus.

Preterm birth, defined as birth of a live neonate before 37 weeks of gestation, is the leading cause of neonatal morbidity and mortality, and these risks increase with decreasing gestational age. Worldwide, about 15 million babies are born prematurely every year (~11% of all live births). More than 1 million of these babies die because of complications arising from being born prematurely.

The prevalence of overweight or obesity in pregnant women has increased concomitant with the global obesity epidemic. Although the increase in overweight and obesity seem to have levelled off in some countries, 34% of Swedish women and >50% of US women are overweight or obese at their first antenatal visit. Overweight or obesity in mothers increases not only the risk of maternal complications, such as chronic hypertension and gestational diabetes mellitus, before and during pregnancy, but also the risk of adverse neonatal outcomes, including the risk of medically indicated (caesarean delivery before onset of labour or induced onset of labour) and spontaneous (related to preterm contractions or premature rupture of membranes) preterm delivery.

Cnattingius and colleagues analysed the effects of overweight (BMI 25–29.9 kg/m^2) and obesity, according to the three subgroups suggested by the WHO (class I, BMI 30–34.9 kg/m^2; class II, BMI 35–39.9 kg/m^2; class III, BMI >40 kg/m^2), in relation to subgroups of preterm delivery (extreme, 22–27 weeks; very, 28–31 weeks; moderate, 32–36 weeks). "We found that risks of extremely, very, and moderately preterm deliveries increased with BMI, and the risks related to overweight and obesity were highest for extremely preterm delivery," recalls lead investigator Sven Cnattingius (Karolinska University Hospital, Sweden). The risk of spontaneous extremely preterm delivery increased with BMI among women with obesity, whereas the risks of medically indicated extremely, very and moderately preterm deliveries increased with BMI in women with overweight and obesity.

The study by Blomberg further expands these findings to show that the risk of adverse neonatal outcomes rises with increasing maternal BMI regardless of the type of delivery, that is, vaginal delivery, instrumental vaginal delivery, elective caesarean delivery and emergency caesarean delivery. Offspring of women with morbid obesity (that is, obesity class III) had a twofold increased risk of birth injuries to the skeleton and respiratory distress syndrome, a threefold increased risk of bacterial sepsis, convulsions, birth asphyxia and feeding problems, and a fourfold increased risk of birth injuries to the peripheral nervous system and hypoglycaemia.

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"It is well-known that caesarean delivery could be dangerous for the morbidly obese mother herself, but there is still a belief among clinicians that caesarean section in this group would improve the outcome for the baby," says Blomberg on the rationale for her study. Given the results, "there is no evidence for exposing morbidly obese mothers to elective caesarean delivery based on the argument that it is better for the baby."

Both studies highlight the need to identify the pathways through which maternal obesity influences offspring health, in order to specifically target pregnant women and their offspring with the highest risk of adverse outcomes. Moreover, considering the high morbidity and mortality associated with decreasing gestational age in premature neonates, even small absolute differences in risks will have consequences for infant health and survival, say Cnattingius and co-workers. "Our results further underline that obese women, especially women with severe obesity, must be regarded as a risk group in prenatal and obstetric care," adds Cnattingius.

Linda Koch

Original articles Cnattingius, S. *et al.* Maternal obesity and risk of preterm delivery. *JAMA* **309**, 2362–2370 (2013) | Blomberg, M. Maternal obesity, mode of delivery, and neonatal outcome. *Obstet. Gynecol.* **122**, 50–55 (2013)