Obstetrics and gynaecology

Smoking in pregnancy increases fracture risk in infants

Intrauterine exposure to maternal smoking is associated with an increased risk of fractures in the first year of life, a national cohort study from Sweden has found.

The study cohort comprised 1,680,307 live born singletons in Sweden, born between 1 January 1983 and 31 December 2000, followed up until 31 December 2014.

Data were obtained from a number of Swedish national registers. There were complete, though self-reported, data on maternal smoking during pregnancy. Data were also analysed on 1,234,992 siblings to control for confounding by shared familial characteristics.

Maternal smoking during pregnancy was associated with an increased incidence of fractures among offspring during their first year of life. After adjustment for potential confounding factors, the hazard ratio (HR) for maternal smoking compared with not smoking was 1.27 (95% CI: 1.12-1.45) in the whole cohort and HR 1.58 (95% CI: 1.01-2.46) in the sibship analysis.

There was evidence of a dose-dependent relationship between smoking and fracture risk; $P < 0.001$ for trend:

- Smoking 1-9 cigarettes/day HR 1.20 (95% CI: 1.03-1.39)
- Smoking $\geq$10 cigarettes/day HR 1.41 (95% CI: 1.18-1.69)

Although a positive association between maternal smoking and fracture risk was observed in offspring from 5 to 32 years of age, there was no dose-dependent pattern and the association was not seen in sibship analyses.

Maternal smoking during pregnancy is associated with overall fetal growth restriction, and this includes negative effects on skeletal growth. One possible mechanism for this is that smoking during pregnancy compromises fetal bone development by reducing maternal intestinal calcium absorption and the supply of oxygen and nutrients to the developing fetus. An alternative explanation may be that constituents of tobacco smoke such as cadmium might have direct toxic effects on fetal bone growth.

Some studies have suggested that maternal smoking might have long-term effects on skeletal development in children and that mothers who smoke during pregnancy may predispose their offspring to a raised lifetime risk of impaired bone health, though study results have been inconclusive.

The findings from this large cohort study suggest that maternal smoking in pregnancy is associated with an increased risk of fracture in offspring during their first year of life. However, associations between maternal smoking and fracture risk later in childhood up to early adulthood are most likely to represent confounding by shared familial characteristics.

Smoking is known to have a significant negative impact on pregnancy outcomes. This study has shown that, though rare, there appears to be an increased risk of fracture in the first year of life in children whose mothers smoke during pregnancy. However, the study does provide some reassurance that there may be no long-term negative effects on bone health.

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Brand JS, Hiyoshi A, Cao Y et al. Maternal smoking during pregnancy and fractures in offspring: national register based sibling comparison study. *BMJ* 2020; 368:l7057