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Papers

Temporal trends in multiple births after in vitro fertilisation in Sweden, 1982-2001: a register study

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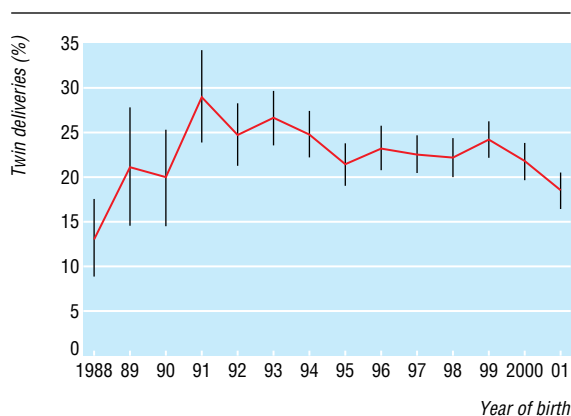
During the 20 years since the first child was born in Sweden after in vitro fertilisation, clinical policy has changed. During the early 1990s, the clinics performing in vitro fertilisation and the National Board of Health and Welfare agreed to reduce the number of embryos transferred to the uterus during in vitro fertilisation from three to two. Here, we describe the changes in multiple birth rates that have resulted from this change and their impact on the rate of preterm birth. In future papers we intend to describe maternal and child characteristics in greater detail.

Participants, methods, and results

In Sweden 17 hospitals or private clinics perform in vitro fertilisation. The National Board of Health and Welfare requested information from these laboratories on all women who had undergone in vitro fertilisation and who had had a baby or whose pregnancy outcome was not known. By linking these data with the Swedish medical birth register, we identified infants born from 1982 to 2001.^{1 2} This register covers nearly all deliveries in Sweden and is based on copies of medical documents from the antenatal care, the delivery, and the paediatric examination of newborn infants.

We compared the infants born after in vitro fertilisation and identified in the registry with all infants born in Sweden and recorded in that registry (2 039 943 during 1982-2001). We performed statistical analyses using the Mantel-Haenszel technique, with adjustment for various putative confounders. We expressed risks as odds ratios and calculated 95% confidence intervals with a test-based method (according to Miettinen).

We studied a total of 13 261 births after in vitro fertilisation, which resulted in 16 280 infants registered. The figure shows the



Changes in percentage of deliveries after in vitro fertilisation that resulted in birth of twins, by year of birth (vertical bars are 95% confidence intervals)

What is already known on this topic

Pregnancies occurring after in vitro fertilisation are characterised by high rates of multiple births and, as a consequence, high rates of preterm births

During the 1990s Swedish fertility clinics agreed to reduce from three to two the number of embryos transferred to the uterus during in vitro fertilisation

What this study adds

The rate of multiple births after in vitro fertilisation increased to a maximum of 29% in 1991 but fell to 18.5% by 2001, resulting in a 70% reduction of preterm births

changes in percentage of twin deliveries according to year of birth, with the first seven years added because of low numbers. The twinning rate increased to a maximum of 29% in 1991 and then decreased steadily to 18.5% in 2001. The annual number of triplet deliveries after in vitro fertilisation varied between 11 and 32 during 1992-6, and between three and seven after 1997. All seven sets of quadruplets were born before 1994.

The impact of the reduction of multiple births on the rate of preterm births is marked. In 1991, the crude odds ratio for preterm birth was 9.41 (95% confidence interval 7.58 to 11.67) and the odds ratio adjusted for maternal age (in 5 year groups, <20, 20-24, etc), parity (1- \geq 4), smoking (none, <10, \geq 10 cigarettes/day), and years of involuntary childlessness was 4.63 (3.62 to 5.92). The corresponding odds ratios in 2001 were 2.15 (1.76 to 2.62) and 1.33 (1.12 to 1.57). The risk for preterm birth after in vitro fertilisation was thus reduced by 77% (crude odds ratio) and 72% (adjusted odds ratio).

Comment

The rate of high order multiple births after in vitro fertilisation declined markedly during the 1991-2001, and the twinning rate decreased by about 40% from a maximum of 29% in 1991 to 18.5% in 2001. At the same time, the population twinning rate increased. The European twinning rate after in vitro fertilisation was 24.4% in 2000.³ The declining rate of multiple births affected the risk of preterm infants, which declined by over 70%, and improved neonatal outcome.

The change in clinical policy in the early 1990s that initiated these changes was reducing from three to two the number of embryos transferred to the uterus during in vitro fertilisation. At present, the number of embryos transferred is being reduced

further, from two to one, and a further reduction in multiple births is to be expected whereas the pregnancy rate seems to be little affected.^{4 5}

Contributors: BK planned the study, analysed the data, and wrote the first manuscript draft. OF and KGN planned the study, helped in interpreting the data, and helped finalise the manuscript. POO planned the study, collected data, helped in interpreting the data, and helped finalise the manuscript. BK is guarantor for the study.

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Competing interests: None declared.

Ethical approval: Not required.

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