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Social disparity affects the incidence of placental abruption among multiparous but not nulliparous women: a register-based analysis of 1,162,126 singleton births

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ABSTRACT

Objectives: To identify risk factors for placental abruption and to evaluate associations between adverse perinatal outcomes and placental abruption stratified by parity among women with singleton births from 1991 to 2010 in Finland.
Study design: A retrospective population-based case–control study of singleton births in Finland from 1991 to 2010 (n = 1,162,126 from the Finnish Medical Birth Register). We modelled the group-specific risk factors for placental abruption in unadjusted and adjusted models.
Results: In total 3.5 and 3.7 per 1000 nulliparous and multiparous women, respectively, were affected by placental abruption. The recurrence rate was 8.6 per 1000 births. The adjusted risk for placental abruption increased in pregnancies characterised by advanced maternal age, low birth weight, smoking, major congenital anomaly, preeclampsia and male foetal sex in both parity groups. In vitro fertilisation increased the risk only in nulliparae whereas anaemia, a prior caesarean section and the lowest socioeconomic status increased the risk in multiparae. Births affected by placental abruption were associated with an increased admission for neonatal intensive care, preterm birth, low birth weight (<2500 g), small for gestational age infants, low Apgar scores, and low newborn umbilical vein pH (<7.15). Placental abruption resulted in increased risks of stillbirth and early neonatal death in both parity groups.
Conclusions: The burden of placental abruption is equal in nulliparae and multiparae, but risk factors vary substantially. Social disparity only affects the incidence of placental abruption among multiparous women, indicating that factors related to lifestyle and health behaviour have different effects on the parity groups.

1. Introduction

Placental abruption is defined as the complete or partial separation of a normally implanted placenta before delivery. It is a serious pregnancy complication that occurs in 0.4–1.0% of pregnancies [1,2]. Placental abruption is associated with several adverse maternal outcomes caused by haemorrhage, such as the need for blood transfusion, hysterectomy, disseminated intravascular coagulation, maternal death, and adverse perinatal outcomes such as low birth weight (LBW), congenital malformations and foetal death [3–7]. Although the aetiology of placental abruption is not fully known, investigators have identified numerous risk factors such as multiparity, advanced maternal age, preeclampsia, chronic hypertension, prior placental abruption, prior caesarean section (CS), stillbirth, chorioamnionitis, premature rupture of the membranes, multiple pregnancies, male foetal sex, small for gestational age (SGA), velamentous umbilical cord insertion,

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trauma, anaemia, smoking and alcohol use, as reviewed by Tikkanen et al. and Ananth et al. [1,8]. Further, previous studies have documented socioeconomic disparity, with women of lower socioeconomic status (SES) tending to be at higher risk of adverse perinatal outcomes such as LBW, SGA, preterm birth [9] and placental abruption [4]. SES is often defined in terms of education, occupation, income, family background, early-life experiences, health behaviour, place of residence and neighbourhood [9]. The contribution of social disparity to risks of placental abruption, however, has been less well studied and analyses have been rarely stratified by parity although multiparity is a documented risk factor [1]. Therefore, the aim of the present study was to identify risk factors for placental abruption and to evaluate associations between adverse perinatal outcomes and placental abruption stratified by parity among women with singleton births from 1991 to 2010 in Finland with around 5.5 million residents and mainly publicly funded health services.

2. Materials and methods

2.1. Data and population

The data used in the present study comprise delivery characteristics and background information on all live births or stillbirths (n = 1,162,126) of babies delivered after the 22nd gestational week or weighing 500 g or more during the first postnatal week gathered from the Finnish Medical Birth Register (MBR) for the years 1991 to 2010. Multiple pregnancies were excluded because they carry a higher risk of complications. The coverage of the data is guaranteed by active collaboration between delivery units and the register controller (currently the National Institute for Health and Welfare; THL). Information on less than 0.1% of infants is missing and the data are complemented by the Population Register Centre and Statistics Finland. Furthermore, numerous clinical studies have validated the data used in the present study [10,11]. Information on placental abruption has been collected by check box since October 1990.

Information on diagnosed major congenital anomalies in the infants up to one year of age was gathered from the Congenital Malformations Register (CMR), which was established in 1963 and is now maintained by the THL. Information on placental abruption was supplemented with data gathered from the Hospital Discharge Register (HDR), but information on prior placental abruption, preeclampsia and gestational diabetes was gathered solely from the HDR. The HDR was established in 1969 and contains information on all aspects of inpatient care and outpatient visits in Finnish hospitals. Placental abruption, preeclampsia and maternal gestational diabetes were defined using ICD-9 and ICD-10 codes: placental abruption ICD-9 code 641.2 and ICD-10 code O45; preeclampsia (including eclampsia) ICD-9 642.4, 642.5, 642.6 and ICD-10 codes O14 and O15; gestational diabetes ICD-9 648.8 and ICD-10 O24.4 and O24.9. The MBR, CMR and HDR data were linked using women's encrypted unique personal identification numbers.

Authorisation to use the data was provided by the THL as required by national data protection legislation in Finland (Reference number 1749/5.05.00/2011).

2.2. Variables and definitions

SES determined by maternal occupation at the time of birth was grouped into five categories: upper white-collar workers such as physicians and teachers, lower white-collar workers such as secretaries and nurses, blue-collar workers such as cleaners and cooks, others and missing information, as described elsewhere [11]. The category 'others' included 23.8% (n = 276,577) of all cases and comprised entrepreneurs, students, retired or unemployed women, housewives and all unclassifiable cases, whereas 'missing SES information' included 13.3% (n = 154,575) of all the cases. Maternal smoking habits were categorised with regard to self-reported smoking habits as non-smoking, quit smoking during the first trimester or continued smoking after the first trimester (designated smoking). Information on the number of cigarettes smoked per day was not recorded in the MBR. Parity was recorded as either nulliparous or multiparous based on prior births. The gestational age defined as preterm if gestational age less than 37+0 weeks was estimated based on the first- or second-trimester ultrasonography measurements or estimated from the date of the last menstrual period. Infant weight was considered SGA or large for gestational age when sex- and parity-specific birth weights were more than two standard deviations below or above the mean weight for gestational age, respectively [12]. Infant weight was considered to be low (low birthweight, LBW) when an infant's weight was less than 2500 g. One- and five-minutes Apgar scores < 7 were considered to be low and newborn umbilical vein pH was considered to be low if < 7.15. Early neonatal death was defined as death occurring in the first seven postnatal days. Maternal anaemia was defined as haemoglobin levels below 100 g/L during pregnancy. Marital status was dichotomised and recorded as married/cohabiting or single. Information on in vitro fertilisation (IVF) included intracytoplasmic sperm injection and frozen embryo transfers. The time period was divided into four periods (1991–1995, 1996–2000, 2001–2005 and 2006–2010) to study secular trends.

2.3. Statistical analysis

The significance of differences between women with and without placental abruption was evaluated by bivariable analyses: chi square tests for dichotomous or categorical variables and Mann–Whitney U tests for continuous variables. Multivariable logistic regression analyses were performed to identify risk factors of placental abruption and to evaluate their association with adverse perinatal outcomes (admission to a neonatal intensive care unit, stillbirth, early neonatal death, preterm birth, LBW, SGA, low Apgar score at one and five minutes and newborn umbilical vein pH < 7.15). Possible independent risk factors were selected based on background information and bivariable analyses ($p < 0.1$). Women with placenta praevia were excluded from the multivariable analyses. If a woman was affected by several adverse perinatal outcomes each one was considered an independent outcome and her pregnancy was included in all categories. Differences between the groups were deemed to be significant if $p < 0.05$. Confidence intervals (CI) of 95% were also calculated. The data were analysed using SPSS for Windows 19.0 (Chicago, IL, USA).

3. Results

Of the nulliparous women with singleton births 3.5 per 1000 (1688 of 476,012) were affected by placental abruption whereas 3.8 per 1000 (2574 of 683,076) and 8.6 per 1000 (26 of 3038) of the multiparous women without and with a prior placental abruption were affected by placental abruption, respectively. Women with placental abruption were more often older, smokers, gave birth before term by CS, or to an infant that was male, SGA or had major congenital anomalies, and more often had reproductive risk factors such as amniocentesis, placenta praevia and preeclampsia than women without placental abruption in both parity groups. Further, pregnancies in nulliparous women with placental abruption were more often achieved by IVF and complicated by gestational diabetes and advanced maternal age than pregnancies in nulliparous women without placental abruption. In addition, multiparous