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An analysis of the medical indications for preterm birth in an obstetrics and gynaecology teaching hospital in Shanghai, China

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ABSTRACT

Objective: preterm birth is a major cause of perinatal mortality and common cause of death in children under five years old. Although the indications for preterm birth are not fully understood, the preterm birth rate is around 11% worldwide dependent on the regions. China was cited as having a high death rate of children under five years old and one of the leading causes is preterm birth. This study sought to provide some information about preterm birth in China.
Design: retrospective survey of maternal medical records.
Setting: large Obstetrics and Gynaecology university teaching hospital in Shanghai, China.
Participants: all women with live births from 2010 to 2012.
Methods: descriptive analysis with χ^2 test.
Main outcome measurements: whether birth was preterm (<37 weeks gestation), reasons for preterm birth.
Findings: there were 37,443 live births and 2541 preterm births (6.8%, 95%CI 6.5% to 7.0%) in the study period. The preterm birth rate in China is low compared with the worldwide rate. Most preterm births (85.2%) occurred at 33–37 weeks of gestation, with only 0.6% occurring before 28 weeks. Medical indications (49.3%) contributed most to preterm birth, followed by premature rupture of the membranes (39.5%) and spontaneous preterm birth (11.2%). The leading primary medical indications of preterm birth were preeclampsia, fetal distress, multiple pregnancies and placental complications.
Conclusion: our data suggests preterm birth in China is low and medical indications are responsible for the majority of preterm birth.

Introduction

Preterm birth is a major cause of perinatal mortality and contributes to more than half the long-term morbidity (McCormick, 1985). It is the second most common cause of death in children under the age of five years old with 14% of child deaths arising from preterm birth complications in 2010 worldwide including China (Blencowe et al., 2012; Liu et al., 2012). In addition, preterm birth also increases the risk of death in children due to other causes, especially from neonatal infections (Lawn et al., 2005). With a few other countries, China has been suggested to have a high death rate of childhood under five years old (review in Liu et al., 2012).

The incidence of preterm birth was estimated to be 11% of all live births worldwide in 2010 (Blencowe et al., 2012). However the cause(s) of preterm birth in China in many situations still remains elusive. This is because many factors appear to be associated with the causes of preterm birth. Without this information, reducing the incidence of preterm birth is a challenging proposition.

The obstetric causes of preterm birth are mainly classified as maternal or fetal indications (medical indications), spontaneous

Abbreviations: BMI, Body mass index; WHO, World Health Organisation; IVF, In vitro fertilisation; PROM, Premature rupture of the membranes.

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preterm birth and premature rupture of the membranes (PROM). Maternal or fetal indications accounts for about 30–35% of all preterm births, spontaneous preterm birth accounts for 40–45% of all preterm births and PROM accounts for 25–30% of all preterm births (review in Goldenberg et al., 2008). Maternal indications include maternal age, maternal BMI, ethnicity, pregnancy interval and history of spontaneous or surgical abortion, previous preterm birth, short cervical length, in vitro fertilisation (IVF) treatment, multiple pregnancies and complications of pregnancy.

The incidence and the causes of preterm birth have also been suggested to vary depending on the ethnicity of the population and geographical region (Slattery and Morrison, 2002; Ananth and Vintzileos, 2006; Hamilton et al., 2006; Goldenberg et al., 2008; Blencowe et al., 2012; Xiong et al., 2013) (Table 1). Table 1 shows the estimated mean preterm birth rates for Millennium Goal Regions in 2010 (Blencowe et al., 2012), which ranged from 7.2% for Eastern Asia to 13.6% for Southeastern Asia. The estimated rate for China in 2010 was 7.1%, which was considerably lower than rates for Indonesia (15.5%), India (13.0%) and the US (12.0%) and comparable to those of Ireland (6.4%), Australia (7.6%), Canada (7.8%) and the UK (7.8%) (Blencowe et al., 2012). Preterm birth in African American women is four times higher than in Caucasian women in the United States (Xiong et al., 2013). In addition, spontaneous preterm birth is more commonly occurred in Caucasian women, whereas PROM is more common in African American women (Ananth and Vintzileos, 2006). Whether ethnicity is associated with the incidence of preterm birth is not fully understood.

To date only a few studies have reported the incidence of preterm birth in China. However most of these studies focused on prediction biomarkers of preterm birth (Ren et al., 2007) and perinatal morbidity and mortality (Ma et al., 2009). Reports studying the incidence and causes of preterm birth in China are limited. This prompted us to retrospectively collect detailed data on medical indications for preterm birth in Shanghai, China at an Obstetrics and Gynaecology university teaching hospital. Shanghai is one of the wealthiest cites in China, and thus has a more well-resourced health-care system and a patient population that is more informed about antenatal care and childbirth, making it more comparable to western health-care systems, and thus allowing us to draw associations from ethnicity more than socio-economic status.

Methods

This study was approved by the ethics committee of The Hospital of Obstetrics and Gynaecology, Fudan University, Shanghai, China.

This retrospective analysis of acquired data was based in the Department of Obstetrics, The Hospital of Obstetrics and Gynaecology, Fudan University, Shanghai, which is one of the largest specialised Obstetrics and Gynaecology teaching hospitals in China, serving a diverse urban and rural population. In this study, data on all preterm births in The Hospital of Obstetrics and Gynaecology were collected from January 2010 to December 2012 according to the medical records of mother. Data included clinical characteristics of women with preterm births such as maternal age, gestational week at childbirth, parity, apgar score at five minutes, birth weight, indications for preterm births and mode of childbirth. Fetal anomalies were also included in this study. All women with stillbirth were excluded from this study.

All indications for preterm births were recorded in the medical records of the mother. The indications for preterm births were divided into three categories: (1) maternal or fetal indications (medical indications), (2) spontaneous preterm birth or (3) premature rupture of the membranes (PROM). Maternal or fetal indications were defined as maternal conditions or fetal conditions that could cause preterm births. They included complications of pregnancy such as preeclampsia gestational diabetes, placental previa, or placental abruption, fetal distress and multiple pregnancies. All the multiple pregnancies were included in the category of medical indications and not included in the category of spontaneous preterm birth.

Preterm birth was defined as birth of the fetus at less than 37 completed gestation weeks following the WHO guideline. It was stratified into 33 to less than 37 weeks, 28 to 32 weeks and less than 28 weeks based on gestational age. PROM was defined as spontaneous rupture of the membranes at less than 37 weeks at least one hour before the onset of contractions. Infection was defined from the results of laboratory findings.

Statistical difference in the incidence of preterm births over study period was assessed with a χ^2-test using the Prism software package. *P*-values of < 0.05 were considered significant and 95% confidence intervals were estimated for percentages.

Table 1
The estimated mean preterm birth for Millennium Goal Regions in 2010.

Regions	Estimated mean preterm birth rate (%)
Developed regions	8.6
Eastern Asia	7.2
Latin America	8.4
Northern Africa	7.3
Oceania	7.4
Southeastern Asia	13.6
South Asia	13.3
Sub-Saharan Africa	12.3
Western Asia	10.1
Caribbean	11.2
Caucasus and Central Asia	9.2

From Blencowe et al. (2012).

Findings

During the study period the total number of live births was 37,443. Of these live births, 2541 (6.8%, 95%CI 6.5% to 7.0%) were preterm births. The preterm birth rate was 7.8% (95%CI 7.3% to 8.3%) in 2010, 6.4% (95%CI 5.9% to 6.8%) in 2011 and 6.7% (95%CI 6.3% to 7.1%) in 2012. There was no significant difference in the preterm birth rate between 2011 and 2012 ($p=0.322$), but it significantly decreased in comparison to the preterm birth rate in 2010 ($p=0.001$). The clinical characteristics of women with preterm births ($n=2541$) are summarised in Table 2. The median maternal age of women with preterm births was 29 (range 17–47) years old and the median gestational weeks of preterm births was 35+3 (range 24–36+6). Of those with preterm births, 814 (32.0%) women were induced to deliver whereas 1727 (68.0%) women underwent caesarean sections. Our of all 2541 preterm birth cases, there were 19 perinatal deaths (less than one week of age) and one neonatal death (until four weeks of age). The causes of perinatal or neonatal deaths were preeclampsia ($n=5$), PROM ($n=5$), placental complications ($n=4$) and other reasons such as infection, multiple pregnancies ($n=6$). There were 28 infants whose Apgar score was less than seven at five minutes (Table 2).

During the study period, of 2541 preterm births, 15 (0.6%) women delivered at less than 28 weeks (range 24–27+6 weeks), 362 (14.2%) women delivered at 28–32 weeks and 2164 (85.2%) women delivered at 33–37 weeks. In addition, 220 (8.6%) women with preterm births were over 35 years old and two women with preterm births were under 18 years old. Among women with preterm births, 160 (6.3%) had in vitro fertilisation (IVF), 449 (17.4%) had multiple pregnancies and 497 (19.3%) had infections (Table 2).