

## Prevalence and characteristics of macrosomia in the first and subsequent pregnancy: a multi-center retrospective study

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*To the Editor:* Macrosomia is of growing prevalence and concern worldwide. In China, there has been a marked increase in the prevalence of macrosomia over the past few decades as a result of economic development and improvements in living standards. The increased prevalence of macrosomia has caused a huge burden at both the population and individual levels for China. In addition, the number of multiparas increased significantly especially after the “two-child policy” and “three-child policy” were put into effect and it was usually thought that the birthweight is higher and women are more likely to deliver macrosomia in the subsequent pregnancy than the first pregnancy. However, large studies on the prevalence and characteristics of macrosomia in both the first and subsequent pregnancy in China are limited. Therefore, we aim to explore the prevalence and characteristics of macrosomia in both the first and subsequent pregnancy in a multicenter retrospective study in China.

A multicenter retrospective study was conducted in 18 medical centers of 12 provinces in China. Women of reproductive age who had two consecutive deliveries in the same hospital and their second infants were delivered during January 2018 to October 2018 were included in this study. Exclusion criteria were women whose status of macrosomia in the first or subsequent pregnancy was unknown.

Information of maternal age, height, pre-pregnancy weight, weight gain during pregnancy, complications of pregnancy, gestational age at delivery, delivery mode, birthweight and pregnancy outcomes in the first and subsequent pregnancy, history of disease, as well as inter-pregnancy interval and inter-pregnancy weight change of the participants were collected by consulting medical records. Macrosomia was defined as birth weight  $\geq 4000$  g.

The procedures of the study have been approved by the Institutional Review Board of Peking University First Hospital, Beijing, China, and the study was conducted in accordance with the *Declaration of Helsinki*.

Access this article online	
Quick Response Code: 	Website: www.cmj.org
	DOI: 10.1097/CM9.0000000000002077

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Chinese Medical Journal 2022;135(12)

Received: 23-12-2021; Online: 21-07-2022 Edited by: Yanjie Yin

Characteristics of the study population were presented as mean ± standard deviation for continuous variables and categorical variables were summarized as numbers (percentages). Paired-samples *T* test, or  $\chi^2$  test was used to compare the differences between the first and subsequent pregnancy for continuous variables, and categorical variables, respectively. All statistical analysis was performed using SPSS 20.0 statistical software (SPSS Inc., Chicago, IL, USA). A two-sided *P* value <0.05 indicated significance.

A total of 6200 women who had two consecutive deliveries in the same hospital from 18 medical centers of 12 provinces in China were included in our study. Overall, 7.2% (445/6200) and 7.6% (470/6200) delivered macrosomia in the first and subsequent pregnancy, respectively. The recurrence rate of macrosomia in multipara with a history of macrosomia was 27.2% (121/445). The rate of macrosomia in multipara without a history of macrosomia was 6.1% (349/5755).

The characteristics of the study population according to the first and subsequent pregnancy were shown in Table 1. The maternal age, pre-pregnancy body mass index, rates of pre-pregnancy overweight and obesity, rates of adequate and inadequate weight gain during pregnancy, gestational diabetes mellitus, macrosomia, and birthweight were significantly higher in the subsequent pregnancy than the first pregnancy (*P* < 0.001). However, weight gain during pregnancy, rates of pre-pregnancy underweight and normal weight, rates of excessive weight gain during pregnancy, gestational hypertension, pre-eclampsia, as well as gestational age at delivery were lower in the subsequent pregnancy (*P* < 0.001).

In this multicenter retrospective study, we demonstrated that 7.2% (445/6200) and 7.6% (470/6200) delivered macrosomia in the first and subsequent pregnancy, respectively.

The recurrence rate of macrosomia in multipara with a history of macrosomia was 27.2% (121/445) and the rate of macrosomia in multipara without a history of macrosomia was 6.1% (349/5755).

Worldwide, the prevalence of macrosomia has increased over the past several decades in many countries.<sup>[1]</sup> A rapid increase in the rate of macrosomia has also been reported in China. Data from Perinatal Health Care Surveillance System in 12 cities and counties in southeast China showed that the prevalence of macrosomia has risen from 6.0% in 1994 to 7.8% in 2005.<sup>[2]</sup> Shan *et al*<sup>[3]</sup> found that the proportions of macrosomia increased from 6.6% in 1996 to 7.0% in 2010 in two major obstetrics and gynecology hospitals in urban districts of Beijing. In 2011, a hospital-based, cross-sectional study conducted in 14 provinces in China reported that the total prevalence of macrosomia was 7.3%,<sup>[4]</sup> which was similar to our study. It was usually thought that multiparas are more likely to deliver macrosomia. In this study, we found that 7.2% and 7.6% delivered macrosomia in the first and subsequent pregnancy, respectively. The prevalence of macrosomia was slightly higher in the subsequent pregnancy than the first pregnancy. This is probably because that the study sites in our multicenter study paid more attention to healthcare during pregnancy, lifestyle guidance, and intervention during pregnancy in recent years, therefore the risk of macrosomia in the subsequent pregnancy is not that high in the current study. However, more high-quality prospective studies and randomized controlled trials are needed in the future.

Women with a history of macrosomia were at significantly increased risk of delivering another macrosomia in the subsequent pregnancy.<sup>[5]</sup> According to a study conducted by Mahony *et al*<sup>[6]</sup> approximately one-third of women who delivered a first macrosomia delivered a second macrosomia. Fang *et al*<sup>[7]</sup> reported that women who had delivered macrosomia in the first pregnancy had a higher risk of delivering another macrosomia in the subsequent pregnancy with a recurrence rate of 23.2%. In accordance

**Table 1: Characteristics of the study population according to the first and subsequent pregnancy.**

Characteristics	First pregnancy	Subsequent pregnancy	t/ $\chi^2$	<i>P</i> value
Maternal age (years)	28.37 ± 3.22	31.91 ± 3.40	197.05	<0.001
Pre-pregnancy body mass index (kg/m <sup>2</sup> )	21.59 ± 3.10	22.24 ± 3.23	-19.93	<0.001
Underweight: <18.5	730 (14.1)	495 (9.6)	3805.77	<0.001
Normal weight: 18.5–23.9	3431 (66.3)	3326 (64.7)		
Overweight: 24.0–27.9	831 (16.1)	1036 (20.2)		
Obesity: ≥28.0	183 (3.5)	280 (5.5)		
Weight gain during pregnancy (kg)	15.08 ± 5.47	13.53 ± 4.90	-20.85	<0.001
Inadequate	280 (5.5)	326 (7.2)	599.37	<0.001
Adequate	1959 (38.5)	2161 (47.6)		
Excessive	2846 (56.0)	2057 (45.2)		
Gestational diabetes mellitus	1001 (16.1)	1327 (21.4)	609.35	<0.001
Gestational hypertension	164 (2.6)	149 (2.4)	366.73	<0.001
Pre-eclampsia	111 (1.8)	61 (1.0)	411.62	<0.001
Macrosomia	445 (7.2)	470 (7.6)	259.37	<0.001
Gestational age at delivery (weeks)	39.09 ± 1.55	38.66 ± 1.41	19.57	<0.001
Birthweight (g)	3341.73 ± 467.82	3371.64 ± 453.27	5.06	<0.001

Data are presented as *n* (%) or mean ± standard deviation.

with previous study, the recurrence rate of macrosomia in multipara with a history of macrosomia was as high as 27.2% in our study, which was significantly higher than women without a history of macrosomia.

Therefore, macrosomia recurrence becomes a more important problem under the “two-child policy” and “third-child policy” in China. Though the recurrence rate of macrosomia in multipara with a history of macrosomia was high, most of the multipara were without a history of macrosomia (92.8%) in the current study and the rate of macrosomia in the subsequent pregnancy in multipara without a history of macrosomia was even lower than first pregnancy (6.1% *vs.* 7.2%). Therefore, Healthcare education and consultation should be conducted for women of reproductive age in order to prevent macrosomia from the first pregnancy and this is of great importance for avoiding macrosomia in multipara under the “two-child policy” and “three-child policy” in China.

### Conflicts of interest

None.

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**How to cite this article:** Juan J, Yang H, Wei Y, Song G, Su R, Chen X, Shan R, Yan J, Xiao M, Li Y, Cui S, Zhao X, Fan S, Feng L, Zhang M, Ma Y, You Z, Meng H, Liu H, Sun J, Cai Y, Hu K. Prevalence and characteristics of macrosomia in the first and subsequent pregnancy: a multi-center retrospective study. *Chin Med J* 2022;135:1492–1494. doi: 10.1097/CM9.0000000000002077