Maternal factors associated with fetal macrosomia

Chia-Hao Liu[a,b,c], Szu-Ting Yang[a,b,c], Peng-Hui Wang[a,b,c,*]

[a]Department of Obstetrics and Gynecology, Taipei Veterans General Hospital, Taipei, Taiwan, ROC; [b]Institute of Clinical Medicine, National Yang Ming Chiao Tung University, Taipei, Taiwan, ROC; [c]Female Cancer Foundation, Taipei, Taiwan, ROC

Fetal macrosomia is an obstetric condition that can lead to serious perinatal complications. According to the definition from the *American College of Obstetrics and Gynecology* (*ACOG*), excessive fetal growth is referred to as large for gestational age (LGA) or macrosomia.[1] LGA is typically representative of a birth weight ≥ the 90th percentile for a given gestational age.[1] In the Asian population, fetal macrosomia is usually defined as an estimated fetal weight or birth weight >4000 g.[2] Women with macrosomia are more likely to have cesarean deliveries (CD) and other obstetric and perinatal complications. As a birth weight increases, the risk of shoulder dystocia, birth-related trauma, and long-term birth-related injuries is increased. To raise awareness about this critical issue and prevent maternal and fetal adverse outcomes resulting from fetal macrosomia, we highlight a recent article published in the 2023 *Journal of the Chinese Medical Association* (*JCMA*), entitled "Association between maternal factors and fetal macrosomia in full-term singleton births," which attempted to identify maternal factors related to fetal macrosomia in a Taiwanese population.[3]

Chen et al[3] retrospectively analyzed data from 4262 full-term singleton infants delivered at Taipei Veterans General Hospital between January 2013 and June 2016. They found that the prevalence of macrosomia was 1.8% and the following risk factors, including gestational diabetes mellitus (GDM), 6-month gestational weight gain (6m GWG), and maternal body mass index (BMI) were significantly associated with neonatal macrosomia in term singleton births. The odds ratio (OR) of macrosomia was 3.1 in neonates born to mothers with a 6m GWG of ≥15 kg, 6.3 in those born to mothers with GDM, and 4.1 in those born to mothers with a BMI of ≥30 kg/m^2, respectively.[3] Therefore, the authors suggested the importance of maternal counseling for weight management before and during pregnancy. The study is noteworthy and worthy of further discussion.

First, we have noticed that taller maternal height (≥164 cm) is associated with an increased risk of macrosomia (p = 0.008) in multivariate analysis, suggesting that this risk factor is independent after adjusting other cofounders, such as BMI. Additionally, maternal height is inversely correlated with maternal BMI.[4] According to this study's results, should taller mothers be aware of the risk of macrosomia? It is interesting to know why the authors have neglected the aforementioned finding and no further discussion or evaluation is provided.

Second, the authors enrolled all singleton pregnancies delivered at a gestational age of ≥37 weeks in their analysis and defined these newborns were "full-term," which is at high risk or possibility to misuse this description.[5,6] The proper terminology is "term" pregnancies, referring to pregnancies that have reached 37 to 42 weeks of gestation, in place of the original form "full-term" which may be limited to gestational weeks between 39 + 0 weeks and 40 + 6 weeks.[7]

Third, since the current study aimed to identify the risk factors of neonatal macrosomia, neonates born with low birth weight (<2500 g) should have been excluded from the data analysis to ensure accurate statistical results. Therefore, it would be beneficial not to separate the enrolled patients into 3 groups so that the essential baseline characteristics of macrocosmic vs normal groups can be compared directly. It is also unclear why the authors included patients with preeclampsia in the analysis, as placental dysfunction, a core etiology for the development of preeclampsia, could drastically impact fetal growth and lead to intrauterine growth restriction (IUGR), resulting in significant confounding in the data analysis.

It should be noted that both one- and two-step approaches were used to screen for GDM during the data collection. Despite more diagnoses (higher prevalence) of GDM with the one-step approach than with the two-step approach, there were no significant between-group differences in the risks of the primary outcomes relating to perinatal and maternal complications, according to a recent randomized controlled study.[8] However, the authors stated that the GDM diagnosis was based on the one-step 75 g OGTT might be unlikely. Furthermore, the authors stated that maternal complications in patients with macrosomia group include a high risk of hemorrhage during delivery and uterine rupture.[9–11] However, this statement is not supported by the data presented in the study. It is commonly known that CD has a higher predicted surgical blood loss than normal spontaneous vaginal delivery, which is why the definition of post-partum hemorrhage (PPH) differs between the two delivery methods.[11] There is a direct causal relationship between a higher CD rate and increased blood loss in patients with fetal macrosomia. Additionally, this study does not present any data regarding the risk of uterine rupture. It is unclear whether the authors discovered these findings elsewhere.

Although some arguments might require clarification, the efforts made by the authors to identify risk factors for fetal macrosomia are greatly appreciated. Further studies focusing

* *Address correspondence. Dr. Peng-Hui Wang, Department of Obstetrics and Gynecology, Taipei Veterans General Hospital, 201, Section 2, Shi-Pai Road, Taipei 112, Taiwan, ROC. E-mail address: phwang@vghtpe.gov.tw; pongpongwang@gmail.com (P.-H. Wang).*

Conflicts of interest: Dr. Peng-Hui Wang, an editorial board member at the Journal of the Chinese Medical Association, had no role in the peer review process of or decision to publish this article. The other authors declare no conflicts of interest related to the subject matter or materials discussed in this article.

Journal of Chinese Medical Association. (2023) 86: 455-456.

Received January 29, 2023; accepted January 31, 2023.

doi: 10.1097/JCMA.0000000000000894.

on increasing the accuracy of estimating fetal weight and preventing the adverse outcome of neonatal macrosomia remain a priority task for obstetricians.[12–14] This could lead to a decrease in the rate of planned cesarean sections and inappropriate labor inductions.[5,6,15] Efforts should also include close counseling and follow-up of women throughout pregnancy to provide advice on avoiding weight gain that exceeds guidelines for gestational weight gain. This is of paramount importance.

ACKNOWLEDGMENTS

This article was supported by grants from the Taiwan Ministry of Science and Technology, Executive Yuan, Taiwan (MOST 110-2314-B-075-016-MY3 and MOST 111-2314-B-075-045), and Taipei Veterans General Hospital (V112C-154 and V112D64-001-MY2-1).

The authors appreciate the support from Female Cancer Foundation, Taipei, Taiwan.

REFERENCES

1. Macrosomia: ACOG Practice Bulletin, Number 216. *Obstet Gynecol* 2020;**135**:e18–35.
2. Harvey L, van Elburg R, van der Beek EM. Macrosomia and large for gestational age in Asia: one size does not fit all. *J Obstet Gynaecol Res* 2021;**47**:1929–45.
3. Chen YH, Chen WY, Chang CY, Cho CY, Tang YH, Yeh CC, et al. Association between maternal factors and fetal macrosomia in full-term singleton births. *J Chin Med Assoc* 2023;**86**:324–9.
4. Kuo SC, Lee WL, Wang PH. The effects of maternal body weight and gestational diabetes mellitus on the risk of the delivery of large-for-gestational age babies: synergistic or additive? *Taiwan J Obstet Gynecol* 2022;**61**:413–4.
5. Chang WH, Yang ST, Wang PH. Trial of labor after cesarean section. *Taiwan J Obstet Gynecol* 2022;**61**:739–40.
6. Lee FK, Liu CH, Wang PH. Timing for induction of labor (IOL). *Taiwan J Obstet Gynecol* 2022;**61**:925–6.
7. Cunningham F, Leveno KJ, Bloom SL, Dashe JS, Hoffman BL, Casey BM, et al. *Williams obstetrics*. 25th ed. New York: McGraw Hill; 2018.
8. Hillier TA, Pedula KL, Ogasawara KK, Vesco KK, Oshiro CES, Lubarsky SL, et al. A pragmatic, randomized clinical trial of gestational diabetes screening. *N Engl J Med* 2021;**384**:895–904.
9. Chao WT, Ke HH, Shen SH, Yeh CC, Wang PH, Ho CM, et al. A theoretical analysis of prophylactic common iliac arterial occlusion for potential massive bleeding during cesarean delivery: decision-making considerations - A 2-year retrospective study. *Taiwan J Obstet Gynecol* 2022;**61**:282–9.
10. Lee FK, Yang ST, Wang PH. No-fault compensation systems of childbirth accidents in Taiwan. *Taiwan J Obstet Gynecol* 2022;**61**:409–10.
11. Li YT, Chang WH, Wang PH. Postpartum hemorrhage. *Taiwan J Obstet Gynecol* 2022;**61**:5–7.
12. Horng HC, Lee WL, Wang PH. Maternal weight gain and birth weight. *J Chin Med Assoc* 2021;**84**:741–2.
13. Horng HC, Huang BS, Lu YF, Chang WH, Chiou JS, Chang PL, et al. Avoiding excessive pregnancy weight gain to obtain better pregnancy outcomes in Taiwan. *Medicine (Baltimore)* 2018;**97**:e9711.
14. Chen HM, Wu CF, Hsieh CJ, Kuo FC, Sun CW, Wang SL, et al. Relationship of maternal body weight and gestational diabetes mellitus with large-for-gestational-age babies at birth in Taiwan: The TMICS cohort. *Taiwan J Obstet Gynecol* 2022;**61**:234–42.
15. Chang WH, Liu CH, Wang PH. Cesarean wound healing. *Taiwan J Obstet Gynecol* 2022;**61**:911–2.