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Comparison of Mean Newborn Weight in Lateral and Fundal Located Placenta in Pregnant Women

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Author`s Contribution

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ABSTRACT

Objective: To compare mean newborn weights between pregnancies with lateral and fundal placental locations to determine if placental position affects birth weight.

Methodology: A descriptive analysis is conducted on 120 pregnant women from May, 2020 to November, 2020 utilizing convenient sampling technique. Pregnant females with lateral or fundal placenta position at FGPC hospital Islamabad were taken up for the research. A t test of mean newborn weights between the two groups with level of significance ≤ 0.05 was used.

Results: The results of this study were that we checked if newborn weight varies with the placental location: lateral compared to fundal. There were 120 singleton pregnancy cases in the research. Results showed a significant difference in the average newborn weight between side (2.57 + 0.33 SD) and fundal placental (2.36 + 0.34 SD) location (p-value = 0.001), where central placental location was associated with lower birth weights. Lower birth weight was correlated with central placentation; further research to verify these findings and suggest appropriate fetal monitoring strategies is needed. These results could help to inform guidelines of gynecologists and healthcare practitioners for these pregnancies in order to reduce neonatal morbidity. The results demonstrated not only large mean newborn weight variability between pregnancies with lateral and fundal placenta site, but also provided evidence for possible placental position - newborn weight association.

Conclusion: This study demonstrated that placental location might be an important factor in fetal growth and birth outcome. These results call for additional study in the field to identify the underlying mechanisms and their potential therapeutic ramifications.

Keywords: Pregnancy, Placenta, Fundal, Lateral, Fetus.

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Introduction

There is an enormous amount of research about the vital role of placenta during a pregnancy, where scientists are trying to understand their impact on mother and fetus. Generally, the determinants of pregnancy outcomes include placental location, in particular, lateral and fundal positions towards the uterine wall, which have been found to affect the newborn weight. Placenta has to spatially orient itself within the uterine cavity in such a way that nutrient exchange, hormone secretion and blood flow are optimal for the growing fetus hence affecting its growth and development.

In pregnancy, the placenta is a sophisticated, essential organ, which has different functions playing a critical role in the fetus's development and well-being.[1] However, it is involved first in embryo implantation into the uterus and first priming of hormonal processes that prolong corpus luteum lifespan, resulting in prolongation of the corpus luteum lifespan, thereby continuing the ovarian cycle; the mechanism for inducing maternal

recognition of pregnancy varies widely across species, from secretion of oestrogen by pig embryos to production of interferon inhibiting prostaglandin F2α synthesis in ruminant embryos. Chorionic gonadotrophin also triggers progesterone production in primates and horses and placental lactogens in rodents in order to bring about the luteal phase following pseudopregnancy.[2]

Once implaced, the focus of the placenta switches to nutrient transfer from mother to fetus, which is an important step in fetal development. Placental villous structure and placental circulation supply umbilical cord work together to facilitate this process. Passive or active nutrient exchange is responsible.

The placenta actively regulates maternal physiology in order to benefit the fetus with respect to nutrient uptake. At the implantation site, the invasive trophoblasts secrete several angiogenic factors, as well as vasodilators, to promote the blood flow of both the placentas and the host.[3]

In various species, the placenta releases different hormones that increase the production of blood cells from the maternal body, and promote a pregnant body volume expansion. The metabolic hormones such as placental lactogens and growth hormones control insulin levels and insulin resistance in tissues to increase glucose supply to the fetus. In addition, the hormones produced by the placenta (e.g., leptin and ghrelin) affect maternal appetite and food intake. In addition to facilitating nutrient transport, the placenta exerts significantly broader influence through its many imperative hormone regulations that are required to sustain pregnancy and fetal growth and development.[4]

The integration of the placenta and maternal physiology reveal the importance and importance of placenta for ensuring optimum conditions for fetal nutrition and general gestational health. Placental placement plays also have significance in pregnancy success such as lateral placentation is found to be associated with 2.7 time higher risk for suffer from intrauterine growth restriction or preeclampsia.[5] This is suggesting that placental location can affect maternal and fetal health outcomes. Additionally, studies have found a specific correlation related to lateral placental location and adverse pregnancy outcomes, with a higher rate of complication pregnancy[6] and perhaps, specifically, with adverse neonatal morbidity.

Several studies show that the spatial orientation of the placenta in the uterine cavity has an effect on blood flow dynamics in the placenta. Another study stated that central placental location may have low resistance in both uterine arteries, increasing blood flow and nutrient transfer to the fetus.[7]

Meanwhile, the lateral placental placement may restrict blood flow to the placenta, inducing uteroplacental insufficiency and low birth weight.[8] Where researcher focused was on the consequences of placental positioning on fetal growth, reporting that newborns from lateral placental locations weigh in at lower point than those from fundal positions.[9] Thus, it seems that the placenta and newborn weight are closely related, calling for further study to validate. A study conducted in a tertiary care centre in USA also showed a fourfold increase in the chances of lateral placentation in pregnancies of intrauterine growth restriction. [10]

Additionally, research on the risk of stillbirth due to placenta location has also provided insights. A statistically significant correlation between the incidence of stillbirth and a higher probability of placental position posteriorly was discovered in a case control study, indicating that placental location may have an impact on unfavorable pregnancy outcomes. [11]

Methodology

The researchers used descriptive case series designs to investigate the connection between placental position and newborn birth weight. This study took place at the Obstetrics and Gynecology Unit of FGPC Hospital in Islamabad between May 6, 2020 and November 7, 2020. The study included 120 participants who were selected according to calculations from the World Health Organization (WHO) sample size calculator. Researchers used a 95% confidence level together with a 12.6% expected population proportion to determine an absolute precision of 6% while calculating sample size. The study used non-probability convenient sampling method to find suitable participants. The study enrolled pregnant women carrying one infant who had reached term pregnancy status (≥37 weeks gestation) with age between 15 to 45 years together with ultrasound-verified fundal and lateral placental positions. Women with placenta previa diagnostic results from sonography and people with hypertension, diabetes, preeclampsia, eclampsia or placental abruption and babies carrying major birth defects or chromosomal conditions did not participate.

The research began with hospital ethical approval from their review board letter no. FGPC.1/12/2019/ followed by consent acquisition from all test subjects. Research

participants gave written consent after the investigators explained the study goals. There was patient recruitment throughout the Outpatient Department (OPD) and the emergency department. A thorough maternal assessment generated results that led to placental location tests using operational ultrasound. The research subjects who had placentas located laterally or fundally received monitoring through childbirth. The first weight measurement of newborns occurred precisely after birth by using an electronic weight scale with calibration features. Both investigations and all analyses of neonatal weights were carried out by sonologists and pathologists and nurses who maintained three years of experience working within their professions. The researchers followed the exclusion criteria tightly to prevent bias along with confounding factors. A structured proforma provided the method to document all collected data systematically.

The research analysis was performed through SPSS version 21 while continuous variables such as maternal age, gravidity, gestational age, and neonatal birth weight were presented as mean ± standard deviation (SD). The researchers presented categorical data points as frequencies and percentages. The independent t-test determined whether the birth weight means differed between neonates from placentas positioned anteriorly and those from placentas positioned posteriorly. Tests were conducted using post-stratification analysis to determine how maternal age along with parity levels could affect birth weight of newborns. The research adopted a p-value threshold of 0.05 as its statistical significance marker. The study findings appeared as simple tables and visual charts to facilitate easy understanding of research findings.

Results

A total of 120 pregnant women with singleton pregnancies were followed in the study. Among them, 35% were primiparous (42 women) while 65% were multiparous (78 women).

The study included age ranged from 15 up to 45 years. Average age was 27.26 years + 6.55SD. (Table 1). The patients' age distribution showed that most women (55%) were in the age range of 21-30 years, followed by 24.2% in the age range of 31-40 years, and only 3.3% were above 40 years old.

The study included women aged between 15 to 45 years, with an average age of 27.26 years with a standard deviation of 6.55.

Table I: Age wise distribution of Pregnant females.

Age in years	Frequency	Percent	Mean±SD
<= 20.00	21	17.5	
21.00 - 30.00	66	55.0	
31.00 - 40.00	29	24.2	27.26 years ± 6.55
41.00+	4	3.3	

In terms of newborn weight based on placental location, the average newborn weight in lateral placenta cases was 2.57 kg with a standard deviation of 0.33, compared to 2.36 kg with a standard deviation of 0.34 in central placenta cases. This difference in newborn weight between lateral and central placenta cases was statistically significant with a p-value of 0.001.

The distribution of newborn weight based on maternal age did not show a significant impact on the mean newborn weight post-pregnancy (p-value=0.138). However, lower age groups tended to have more low-weight babies compared to older age groups.(Table II)

Parity-wise distribution of newborn weight did not show a significant difference either, with a p-value of 0.258.

Table II: Age and parity-wise Distribution of Newborn Weight.

		New-born Weight (Kg)		p-value
		<= 2.50	2.51+	
Age (in years)	<= 20.00	15(71.4%)	6(28.6%)	0.138
	21.00 - 30.00	35(53.0%)	31(47.0%)	
	31.00 - 40.00	11(37.9%)	18(62.1%)	
	41.00+	2(50.0%)	2(50.0%)	
		New-born Weight (kg)		
Parity		<= 2.50	2.51+	
Primi para	25(59.5%)	17(40.5%)	42(100.0%)	0.258
Multipara	38(48.7%)	40(51.3%)	78(100.0%)	

Discussion

The study found that there might be associations between placental location and adverse pregnancy outcomes. Factors such as the shape of the uterine cavity and blood supply variations across different areas of the uterus could play a role in these associations.

Placentas located laterally or fundally might experience decreased blood supply, potentially leading too small for gestational age (SGA) births. Lateral placental location, in particular, was associated with an increased risk of intrauterine growth restriction (IUGR) and preeclampsia in some studies.[12]

Abnormal uterine artery waveforms and inefficient collateral blood supply have been observed in lateral placental locations, potentially contributing to adverse pregnancy outcomes.[13]

Some previous research indicated a higher risk of IUGR in association with lateral placental location. Complications such as preeclampsia were also more common in pregnancies with laterally located placentas.[14]

Differences in study results regarding the relationship between placental location and infant birth weight may stem from factors such as sample size, ethnicity, and study design.

Uterine blood distribution is not uniform, and placental location plays a crucial role in determining placental blood flow. Lateral regions of the uterus may receive less blood supply from the ipsilateral uterine artery compared to the central region.

Several studies have incidentally demonstrated different risks of preeclampsia related to various placental locations.[15] Nevertheless, while some studies found positive correlation between preeclampsia and lateral positions, others did not demonstrate any difference or even decreased incidence with specific placental presentations.

In summary, part of placental location on pregnancy outcomes may be demonstrated, and investigations into such aspects are urged before being considered clinically.[16] The connection with adverse pregnancy results such as preeclampsia and growth restriction may have implications in evaluation of placental location as a possible predictor of these complications.[17] What the study brought us were some new insights regarding the links between placental location and the pregnancy outcome. The findings indicated that pregnancies with lateral placental positions were linked to various complications such as pregnancy-induced hypertension (PIH), gestational diabetes mellitus (GDM), placental abruption, intrauterine growth restriction (IUGR), and intrauterine fetal demise (IUFD) when compared to pregnancies with central placental positions.[18] Additionally, it was noted that lateral placentas were more common in O-positive blood groups, while central placentas were prevalent in A-positive blood groups.

In addition, the study showed that women with central placental locations had a higher risk of premature delivery and, consequently, risked low birth weight in newborns. [19] Thus, it seems to confirm that placental location is very important for pregnancy success and the outcomes. Results indicate that placental position may be an important determiner of pregnancy success overall.

Further investigation is recommended to validate these findings and to determine if pregnancies with anterior placental locations should be enhanced monitored.[20] Given the potential clinical impact of placental location on pregnancy outcomes, healthcare providers should take placental location into account when caring for pregnant patients and considering pregnancy monitoring protocols in order to optimize the maternal and fetal outcomes.

Conclusion

Finally, the study showed the importance of stratifying placental location as a potential predictor of pregnancy complications, or worse. Continued research in this area is crucial to enhance understanding and potentially improve clinical practices for better management and outcomes in pregnancies, particularly regarding high-risk scenarios associated with specific placental positions.

References

1. Pozor M. Equine placenta - A clinician's perspective. Part 1: Normal placenta - Physiology and evaluation. Equine Vet Educ. 2016;28:130–7. https://doi.org/10.1111/eve.12499
2. Tanner AR, Kennedy VC, Lynch CS, Hord TK, Winger QA, Rozance PJ, et al. In vivo investigation of ruminant placenta function and physiology - a review. J Anim Sci. 2022;100(2):skac045. https://doi.org/10.1093/jas/skac045
3. Stern C, Schwarz S, Moser G, Cvitic S, Jantscher-Krenn E, Gauster M, et al. Placental endocrine activity: Adaptation and disruption of maternal glucose metabolism in pregnancy and the influence of fetal sex. Int J Mol Sci. 2021;22(23):12722. https://doi.org/10.3390/ijms222312722
4. Burton GJ, Jauniaux E. The human placenta: new perspectives on its formation and function during early pregnancy. Proc Biol Sci. 2023;290(1997):20230191. https://doi.org/10.1098/rspb.2023.0191
5. Jaiswal J, Jaiswal A, Nagaria T, Ramteke A. Prediction of pregnancy induced hypertension by USG guided placental localization. J Evol Med Dent Sci. 2015;4(81):14147–51. https://doi.org/10.14260/jemds/2015/2014
6. Gizzo S, Noventa M, Vitagliano A, Quaranta M, Di Giovanni V, Borgato S, et al. Sonographic assessment of placental location: A mere notional description or an important key to improve both pregnancy and perinatal obstetrical care? A large cohort study. Int J Clin Exp Med. 2015;8(8):14584–92.
7. Tadbiri H, Turan S, Aberdeen G, Kelley B, Stockett A, Harman C, et al. Spiral artery function in different placental locations. Am J Obstet Gynecol. 2022;226(1):S246. https://doi.org/10.1016/j.ajog.2021.11.292
8. Andonotopo W. Placental sono-biopsy. J Obstet Gynaecol Res. 2023;49(1):142–6.
9. Seckin KD, Cakmak B, Karsli MF, Yeral MI, Gultekin IB, Oz M, et al. Is lateral localisation of placenta a risk factor for adverse perinatal outcomes? J Obstet Gynaecol.

2015;35(7):704–8. https://doi.org/10.3109/01443615.2015.1007343
10. Hemachithra D, Sankareswari R, Revwathy S, Mukherjee S. Fetomaternal outcome of teenage pregnancy in a tertiary care hospital: A retrospective study. Int J Pharm Clin Res. 2023;15(3):259–63.
11. Catov JM, Scifres CM, Caritis SN, Bertolet M, Larkin J, Parks WT. Neonatal outcomes following preterm birth classified according to placental features. Am J Obstet Gynecol. 2017;216(4):428.e1–8. https://doi.org/10.1016/j.ajog.2016.12.022
12. Vaiman D, Mondon F, Alexandra GD, Mignot TM, Robert B, Rebourcet R, et al. Hypoxia-activated genes from early placenta are elevated in preeclampsia, but not in intra-uterine growth retardation. BMC Genomics. 2005;6:111. https://doi.org/10.1186/1471-2164-6-111
13. Klein K, Mailath-Pokorny M, Elhenicky M, Schmid M, Zeisler H, Worda C. Mean, lowest, and highest pulsatility index of the uterine artery and adverse pregnancy outcome in twin pregnancies. Am J Obstet Gynecol. 2011;205(6):488.e1–7. https://doi.org/10.1016/j.ajog.2011.06.103
14. Armengaud JB, Yzydorczyk C, Siddeek B, Peyter AC, Simeoni U. Intrauterine growth restriction: Clinical consequences on health and disease at adulthood. Reprod Toxicol. 2021;99:145–58. https://doi.org/10.1016/j.reprotox.2020.10.005
15. Anteby EY, Musalam B, Milwidsky A, Blumenfeld A, Gilis S, Valsky D, et al. Fetal inherited thrombophilias influence the severity of preeclampsia, IUGR and placental abruption. Eur J Obstet Gynecol Reprod Biol. 2004;113(1):45–9. https://doi.org/10.1016/j.ejogrb.2003.05.002
16. A P, RR P. Association of placental position with the development of hypertension in pregnancy. Int J Reprod Contracept Obstet Gynecol. 2018;8(1):202–5. https://doi.org/10.18203/2320-1770.ijrcog20185431
17. Bahrami R, Schwartz DA, Asadian F, Karimi-Zarchi M, Dastgheib SA, Tabatabaie RS, et al. Association of MTHFR 677C>T polymorphism with IUGR and placental abruption risk: A systematic review and meta-analysis. Eur J Obstet Gynecol Reprod Biol. 2021;256:227–35. https://doi.org/10.1016/j.ejogrb.2020.11.016
18. Krause BJ, Carrasco-Wong I, Caniuguir A, Carvajal J, Farías M, Casanello P. Endothelial eNOS/arginase imbalance contributes to vascular dysfunction in IUGR umbilical and placental vessels. Placenta. 2013;34(1):20–8. https://doi.org/10.1016/j.placenta.2012.09.015
19. Warland J, McCutcheon H, Baghurst P. Placental position and late stillbirth: A case-control study. J Clin Nurs. 2009;18(11):1602–8. https://doi.org/10.1111/j.1365-2702.2008.02779.x
20. Couper S, Clark A, Thompson JMD, Flouri D, Aughwane R, David AL, et al. The effects of maternal position, in late gestation pregnancy, on placental blood flow and oxygenation: an MRI study. J Physiol. 2021;599(6):1621–37. https://doi.org/10.1113/JP280569