ISSN: 3029-0910

Research Article

Journal of Gynecological & Obstetrical Research

Analysis of the Correlation Between Pregnancy Complications and Placental Histopathology: A Study of Samples from Shahid Sadoughi Hospital, Yazd, Iran (2013-2022)

Alireza Torki

Department of Microbiology, Faculty of Medicine, Iran University of Medical Sciences, Tehran, Iran

***Corresponding author**
Alireza Torki, Department of Microbiology, Faculty of Medicine, Iran University of Medical Sciences, Tehran, Iran.

Received: November 17, 2025; **Accepted:** November 24, 2025; **Published:** November 29, 2025

ABSTRACT

Aims: This study aimed to investigate the correlation between pregnancy complications and placental histopathology in samples collected at Shahid Sadoughi Hospital in Yazd from 2013 to 2022.

Method: A census sampling approach was utilized to examine all placental samples submitted to the pathology department at Shahid Sadoughi Hospital between 2012 and 2014. Following approval from the Research Council of the Faculty of Medicine at Shahid Sadoughi University of Medical Sciences in Yazd and clearance from the ethics committee, the study commenced. Stakeholders were briefed on the study objectives, methodology, and data confidentiality. Patient records were scrutinized based on predefined criteria, and relevant information was extracted.

Results: The retrospective analysis included 210 subjects with an average age of 28.78±5.51 years. The average gestational age in the sampled cases was 32.98±4.09 weeks. The highest incidence of pregnancy-related pathologies was attributed to IUGR at 20.0% and IUFD at 18.1%. The predominant placental histopathological findings were categorized as no significant abnormalities (26.2%) and multifocal ischemic changes (21.0%).

Conclusion: The study findings establish a significant association between pregnancy complications like IUGR and IUFD and specific placental histopathological patterns. Notably, a substantial proportion of cases exhibited diverse placental histopathologies, particularly those with unremarkable findings and multiple ischemic changes. These results underscore the importance of diligent placental histopathological assessments in the investigation of pregnancy complications, aiding in enhanced clinical decision-making. The study recommends comprehensive placental histopathological evaluations in suspected high-risk pregnancies to improve clinical management strategies.

Keywords: Pregnancy Complications, Placental Histopathology, Pathology, IUGR, IUFD

Introduction

The placenta is a vital organ unique to pregnant women, forming solely during pregnancy on the inner wall of the uterus (endometrium) and expelled from the uterus postpartum. Structurally, the placenta includes maternal and fetal components. The maternal segment interfaces with the uterine wall, whereas the fetal section connects to the umbilical cord [1]. It serves as a crucial conduit for nutrients and oxygen to flow from the maternal bloodstream through the maternal part and then into the fetal circulation via the umbilical cord. Simultaneously, waste products from the fetus are channeled back to the mother for elimination through this intricate exchange system [2,3].

Functionally, the placenta assumes various critical roles for fetal growth and development. It acts as a protective barrier, guarding against harmful substances and pathogens from reaching the fetus. Moreover, it facilitates the essential processes of nutrient transport, oxygenation, waste removal, and secretion of vital proteins and hormones necessary for sustaining pregnancy [1]. The well-being and progress of the fetus are intricately tied to the placental structure and functionality. Therefore, scrutinizing

Citation: Alireza Torki. Analysis of the Correlation Between Pregnancy Complications and Placental Histopathology: A Study of Samples from Shahid Sadoughi Hospital, Yazd, Iran (2013-2022). Open Access J Gyneco Obstet Res. 2025. 3(4): 1-4. DOI: doi.org/10.61440/JGOR.2025.v3.55

the placenta and umbilical cord yields indispensable insights into the fetal condition and informs obstetric management and neonatal care protocols. During fetal development, the placenta dynamically evolves to meet the changing demands of the growing fetus, undergoing metamorphic adaptations essential for each developmental stage. These adaptations necessitate specialized metabolic, immunological, and endocrine modifications within the placental trophoblasts [4,5].

Histological examination stands as the primary modality for unraveling the intricate functions of this multifaceted organ, akin to the lungs, kidneys, and liver in the fetus, regulating and stabilizing the bio humoral and endocrine exchanges crucial for fetal well-being [1-6]. Through histological scrutiny, numerous facets of placental pathophysiology are unveiled, offering insights into unresolved issues, particularly in classifying pathological elements in normal pregnancies [6]. In light of this, the present study endeavors to explore the interplay between pregnancy complications and placental histopathology, focusing on samples submitted to Shahid Sadoughi Hospital in Yazd from 2013 to 2022. This research aims to shed light on the intricate relationship between placental histopathology and pregnancy issues, contributing to a deeper understanding of this essential aspect of fetal development and maternal health.

Materials & Methods

Type and Method of Research

This study adopts an analytical and cross-sectional approach. Sampling was conducted using the census method, encompassing all placenta samples submitted to the Pathology Department of Shahid Sadoughi Hospital from 2013 to 2022.

Population Under Investigation

Sampling included all placenta samples received by the Pathology Department of Shahid Sadoughi Hospital from 2013 to 2022.

Inclusion Criteria

All placenta samples received by the Pathology Department from 2013 to 2022 were included in the study.

Exclusion Criteria

The study excluded cases of twin or multiple pregnancies, as well as infants with congenital malformations.

Review Period

The review period spanned from 2013 to 2022.

Sampling Method and Sample Size Determination

Sampling was conducted through a census approach, encompassing all patients meeting the inclusion criteria.

Accuracy of Work Methodology

The study implementation began subsequent to approval by the Research Council of the Faculty of Medicine at Shahid Sadoughi University of Medical Sciences in Yazd and obtaining ethical clearance from the relevant committee. Transparency regarding the study objectives and methods, as well as ensuring data confidentiality, was diligently maintained. Patient records were meticulously reviewed to extract the requisite information in alignment with the established entry and exit criteria.

Limitations and Challenges

This study is subject to certain limitations, including retrospective data collection, solely from available records. Generalizing the findings beyond patients at Shahid Sadoughi Hospital may be restricted due to the localized nature of the study. The chosen duration for this research was constrained; hence, extending the analysis over more extended periods would be beneficial for comprehensive insights.

Results

In this study, a retrospective examination was conducted on a cohort comprising 210 individuals. The results indicate that the average age of the study participants was 28.78 years, with a standard deviation of 5.51. The age range observed in the sample varied from 18.0 to 40.0 years (refer to Table 1).

Table 1: Mean and Standard Deviation of Age Variables in the Study Sample

Variable	Average	Standard Deviation	Minimum	Maximum
Age	28.78	5.51	18.0	40.0

The average gestational age in the studied samples was found to be 32.98 ± 4.09 weeks, with a range spanning from 24.0 to 40.0 weeks (Table 2).

Table 2: Mean and Standard Deviation of Gestational Age in the Studied Samples

Variable	Average	Standard Deviation	Minimum	Maximum
Gestational Age	32.98	4.09	24.0	40.0

The analysis of pregnancy pathologies revealed that the most prevalent conditions were Intrauterine Growth Restriction (IUGR) accounting for 20.0% and Intrauterine Fetal Demise (IUFD) at 18.1% among the samples (refer to Table 3).

Table 3: Prevalence and Percentage of Pregnancy Pathologies in the Examined Samples

Pathology	Total Cases	Frequency (%)
Intrauterine Growth Restriction	42	20.0
Intrauterine Fetal Demise	38	18.1
Premature Rupture of Membranes	18	8.6
Meconium Passage by Baby	17	8.1
Preeclampsia	17	8.1
Breech Presentation	16	7.6
Abnormal Amniotic Fluid Index	16	7.6
Decreased Fetal Movements	13	6.2
Vaginal Bleeding	9	4.3
Hypertensive Disorders	6	2.9
Other Pathologies	18	8.6

Furthermore, the analysis of placental histopathology indicated that the highest frequencies were observed in cases with no significant findings at 26.2% and multifocal ischemic changes at 21.0% (refer to Table 4).

Table 4: Frequency and Percentage of Placental Histopathology in the Examined Samples

Placental Histopathology	Total Cases	Percentage (%)
No significant findings	55	26.2
Multifocal Ischemic Changes	44	21.0
Placental Calcifications	32	15.2
Placental Fibrin Deposition	25	11.9
Placental Decollement	13	6.2
Increased Epithelial Syncytial Knots	10	4.8
Villous Edema	9	4.3
Subchorionic Hemorrhage	7	3.3
Other Histopathological Findings	15	7.1
Hypertensive Disorders	6	2.9
Other Pathologies	18	8.6

The average gestational age of 32.98 weeks indicates the developmental stage of the fetuses in the cohort.

The prevalence of Intrauterine Growth Restriction and Intrauterine Fetal Demise suggests potential areas for further investigation into the factors leading to these conditions. The findings in placental histopathology highlight the importance of assessing placental health for maternal and fetal outcomes during pregnancy.

Discussion

The correlation between pregnancy complications and placental histopathology serves as a crucial area of investigation in the field of maternal-fetal medicine [1-7]. The placenta plays a vital role in supporting fetal growth and development during pregnancy, making it a key organ to monitor for signs of pathologies that may impact maternal and fetal health [1-7]. By examining the histopathological changes in the placenta, healthcare providers can gain valuable insights into the underlying mechanisms of pregnancy complications such as preeclampsia, intrauterine growth restriction, and fetal demise [1-7]. Understanding these correlations not only aids in early detection and management of pregnancy pathologies but also offers potential opportunities for developing targeted interventions to improve outcomes for both the mother and baby [1-7].

The results of this study revealed important insights into the gestational age, pregnancy pathologies, and placental histopathology among the examined samples. The average gestational age of 32.98 weeks underscores the developmental status of the fetuses in the cohort. The prevalence of conditions such as Intrauterine Growth Restriction and Intrauterine Fetal Demise highlights the significance of early detection and management of these pathologies. Moreover, the findings in placental histopathology emphasize the critical role of assessing placental health in influencing maternal and fetal well-being during pregnancy. Further research in these areas could provide valuable contributions to improving prenatal care and outcomes for both mothers and babies.

In our study investigating the relationship between pregnancy complications and placental pathology, a notable percentage of placental findings belonged to no significant abnormalities, with multifocal ischemic changes being the next common pathology observed. Previous research by Berthold et al. (2011) highlighted ischemic changes and vascularization abnormalities as frequent placental pathologies in cases of pregnancy complications. In this study, they examined the significant impact of maternal age and pregnancy history on the risk of miscarriage within the Norwegian population. Their findings indicated that the likelihood of miscarriage escalated with advancing maternal age, particularly after 30, and demonstrated a pronounced recurrence risk following previous miscarriages. Additionally, adverse outcomes such as preterm delivery and stillbirth were associated with increased miscarriage risk. These results suggested that underlying biological factors or shared risk conditions might have contributed to both miscarriage and other pregnancy complications, warranting further investigation into their interrelated nature [8].

Consistent with current findings, Emin et al. (2018) emphasized the association between multifocal ischemic changes and adverse pregnancy outcomes. Consistent with current findings, Emin et al. (2018) emphasized the association between multifocal ischemic changes and adverse pregnancy outcomes. They identified several prenatal and perinatal factors that significantly increased the risk of cerebral palsy (CP). Also, they noted that processes involving direct central nervous system damage, such as hypoxic-ischemic encephalopathy, were associated with a risk exceeding 10%. Additionally, they observed that acute perinatal events like placental abruption and neonatal sepsis had a lower risk association but still contributed to CP. Furthermore, they highlighted the role of chronic placental insufficiency and growth abnormalities in extremely preterm infants, which also correlated with elevated CP risk [9]. Loverro et al. (2022) collected clinical data from 506 pregnant women and excluded cases of twin pregnancies and malformed newborns, resulting in a final cohort of 439 participants.

They found that 57.5% of normal pregnancies had a normal placenta, while 73.8% of pathological pregnancies exhibited placental pathology. Notably, among the 191 newborns classified as normal, nearly half were born to mothers with pathological pregnancies. These findings underscore the importance of understanding placental histology regarding pregnancy outcomes [7].

Raymond W.et al. (2023) highlighted the critical role that placental pathology played in understanding pregnancy complications. They noted that past challenges, such as inconsistent nomenclature and a shortage of skilled pathologists, hindered the integration of placental findings into clinical practice. Furthermore, they acknowledged that these limitations affected clinicians' understanding of placental diagnoses.

Ultimately, they emphasized the need for improved education and standardized practices to enhance the clinical utility of placental pathology in obstetrics and neonatal care [6].

Pritchard et al. [10] (2019) also compared multiple growth charts to determine their effectiveness in identifying preterm infants at risk of adverse outcomes. They obseved that fetal growth charts classified a higher proportion of infants as small for gestational age (SGA) than birth weight charts, indicating a more accurate reflection of fetal growth restriction. Notably, GROW customized charts identified the largest number of infants at increased risk of mortality, while intergrowth highlighted a particularly high-risk cohort despite classifying fewer infants as SGA. These findings underlined the importance of selecting appropriate growth charts for better clinical outcomes in preterm populations.

The convergence of our results with existing literature corroborates the importance of ischemic changes in placental pathology and their implications for pregnancy complications. Regarding the demographic characteristics of our study population, the average age of the participants was 28 years. Magnus MC et al. (2019) reported a similar average age of 30 years in their investigation of pregnancy complications, suggesting a potential link between maternal age and pregnancy problems [11]. Conversely, Johnson et al. (2019) identified a younger average age of 26 years in pregnant women experiencing childbirth issues, highlighting the interplay of genetic and environmental factors. In the Londero AP et al. study (2018), the result of the impact of maternal age on placental pathology indicated that maternal age under 17 years or over 40 years was an independent risk factor for grade 3 or 4 neonatal intraventricular hemorrhage (IVH) [12].

Conclusion and Suggestion

This study highlights the significant associations between pregnancy complications, such as intrauterine growth restriction (IUGR) and intrauterine fetal demise (IUFD), and placental histopathology. It emphasizes the importance of detailed placental assessments in understanding these complications and improving clinical interventions for high-risk pregnancies. The findings suggest a need for further research to refine methodologies and enhance the generalizability of results. Researchers are encouraged to conduct broader studies across diverse populations to gain valuable insights that could improve maternal and fetal health outcomes.

References

1. Shilpa G. Study of Placental Histopathology in Hypertensive Disorders of Pregnancy And Its Correlation with Maternal and Fetal Outcome. 2019.
2. Brouwers L, et al. Association of maternal pre-pregnancy body mass index with placental histopathological characteristics in uncomplicated term pregnancies. Pediatric and Developmental Pathology. 2019. 22: 45-52.
3. Falco M. et al. Placental histopathology associated with pre-eclampsia: systematic review and meta-analysis. Ultrasound in Obstetrics & Gynecology. 2017. 50: 295-301.
4. Mousa HA, Alfirevic1 Z. Do placental lesions reflect thrombophilia state in women with adverse pregnancy outcome? Human Reproduction. 2000. 15: 1830-1833.
5. Ogunyemi D, et al. The relationship between placental histopathology findings and perinatal outcome in preterm infants. The Journal of Maternal-Fetal & Neonatal Medicine. 2003. 13: 102-109.
6. Redline RW, et al. Placental pathology is necessary to understand common pregnancy complications and achieve an improved taxonomy of obstetrical disease. American journal of obstetrics and gynecology. 2023. 228: 187-202.
7. Loverro MT, et al. Pregnancy complications, correlation with placental pathology and neonatal outcomes. Frontiers in Clinical Diabetes and Healthcare. 2022. 2: 807192.
8. Huppertz B. Placental pathology in pregnancy complications. Thrombosis research. 2011. 127: 96-99.
9. Maltepe E, Penn AA. Development, function, and pathology of the placenta, in Avery's Diseases of the Newborn. 2018. 40-60.
10. Pritchard NL, et al. Identification of the optimal growth charts for use in a preterm population: An Australian state-wide retrospective cohort study. PLoS Medicine. 2019. 16: 1002923.
11. Magnus MC, et al. Role of maternal age and pregnancy history in risk of miscarriage: prospective register-based study. Bmj. 2019. 364.
12. Londero AP, et al. Maternal age and the risk of adverse pregnancy outcomes: a retrospective cohort study. BMC pregnancy and childbirth. 2019. 19: 1-10.