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**ORIGINAL ARTICLE**

# Neonatal Outcomes in Infants Born to Mothers with Chronic Pediatric Gynecological Disorders: A Clinicopathological Evaluation

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## ABSTRACT

**Background:** Chronic pediatric gynecological disorders (CPGDs) such as congenital uterine anomalies, ovarian dysfunction, chronic pelvic inflammatory disease, and endometriosis often persist into adulthood, complicating reproductive outcomes. These conditions may adversely affect neonatal health by impairing placental development and intrauterine growth, yet data remain limited, especially in low- and middle-income countries.

**Objective:** To evaluate neonatal outcomes in infants born to mothers with chronic pediatric gynecological disorders and to assess associated placental pathology.

**Methods:** This prospective clinicopathological study was conducted at the Department of Obstetrics and Gynecology, Unit I, Sandeman Provincial Hospital/Bolan Medical College Hospital (SPHQ/BMCH), Quetta, and Faisal Masood Teaching Hospital, Sargodha, Pakistan, from March 2022 to April 2023. A total of 120 mother–infant pairs were included, with 60 in the study group (mothers with CPGDs) and 60 in the control group (mothers without CPGDs). Neonatal outcomes assessed included gestational age, birth weight, APGAR scores, NICU admissions, congenital anomalies, and perinatal mortality. Placental samples were examined histopathologically. Statistical analysis was performed using SPSS version 26.0, with significance set at $p<0.05$.

**Results:** Neonates of mothers with CPGDs had higher rates of preterm birth (31.7% vs. 15.0%, $p<0.05$), low birth weight (36.7% vs. 18.3%, $p<0.01$), APGAR scores <7 at 5 minutes (20.0% vs. 8.3%, $p<0.05$), and NICU admissions (25.0% vs. 11.7%, $p<0.05$). Congenital anomalies were more frequent in the study group (6.7% vs. 1.7%, $p<0.05$). Perinatal mortality was also higher (8.3% vs. 3.3%, $p<0.05$). Placental pathology revealed increased chorioamnionitis (13.3% vs. 5.0%), villous immaturity (10.0% vs. 3.3%), and focal infarction (8.3% vs. 3.3%).

**Conclusion:** Chronic pediatric gynecological disorders are associated with adverse neonatal outcomes, including prematurity, low birth weight, NICU admissions, congenital anomalies, and increased perinatal mortality. Placental abnormalities suggest impaired intrauterine environments as a major contributor. Early risk stratification, preconception counseling, and multidisciplinary care are essential to optimize outcomes in this high-risk group.

**Keywords:** Pediatric gynecological disorders, neonatal outcomes, prematurity, placental pathology, congenital anomalies, perinatal mortality

## INTRODUCTION

Chronic pediatric gynecological disorders (CPGDs) represent a heterogeneous group of conditions diagnosed in childhood or adolescence that frequently extend into the reproductive years[1]. These disorders include congenital anomalies of the reproductive tract (such as Müllerian anomalies), chronic pelvic inflammatory disease, endometriosis, ovarian dysfunction, and persistent hormonal disturbances. Although traditionally managed in pediatric and adolescent populations, their long-term consequences often emerge during adulthood, particularly in relation to fertility, obstetric complications, and neonatal health[2,3].

The transition from adolescence to reproductive age in women with CPGDs is often complicated by altered hormonal regulation, impaired endometrial receptivity, chronic pelvic inflammation, and abnormal uterine or ovarian architecture[4]. These physiological disturbances can interfere with implantation, placentation, and fetal development. As a result, pregnancies in women with a history of CPGDs are frequently categorized as high risk, with reported associations with miscarriage, preterm labor, intrauterine growth restriction (IUGR), hypertensive disorders of pregnancy, and higher rates of cesarean delivery[5].

From a neonatal perspective, the infants of mothers affected by CPGDs are vulnerable to a spectrum of adverse outcomes. These include low birth weight, prematurity, poor APGAR scores, higher frequency of neonatal intensive care unit (NICU) admissions, congenital anomalies, and, in severe cases, perinatal mortality[6]. These outcomes may be mediated not only by maternal systemic health and obstetric complications but also by placental insufficiency, as chronic inflammation, impaired vascularization, and abnormal trophoblastic invasion are common in such pregnancies[7].

Despite increasing global recognition of these issues, there is limited research from low- and middle-income countries, including Pakistan, where the burden of untreated or poorly managed pediatric gynecological disorders remains high due to delayed diagnosis, sociocultural barriers, and limited access to specialized care. Moreover, there is a lack of clinicopathological correlation that could provide insights into the mechanisms underlying adverse neonatal outcomes in this population[8,9].

Therefore, this study was undertaken to evaluate neonatal outcomes in infants born to mothers with chronic pediatric gynecological disorders. By combining clinical observations with placental histopathology, we aimed to establish a clearer understanding of how maternal gynecological conditions influence neonatal health. Such evidence is essential for risk stratification, early intervention, and improved multidisciplinary care strategies to optimize both maternal and neonatal outcomes[10].

## MATERIALS AND METHODS

**Study Design and Setting:** This prospective clinicopathological evaluation was conducted from March 2022 to April 2023 in the Department of Obstetrics and Gynecology, Unit I, Sandeman Provincial Hospital/Bolan Medical College Hospital (SPHQ/BMCH), Quetta, and at Faisal Masood Teaching Hospital, Sargodha, Pakistan. Both centers serve as tertiary referral hospitals, managing a wide range of obstetric cases, thereby providing an adequate sample of patients for comparative evaluation.

**Sample Size and Grouping:** The study population consisted of 120 mother–infant pairs. Among these, 60 infants were born to

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mothers with a documented history of chronic pediatric gynecological disorders, which formed the study group, while 60 infants born to mothers without any known gynecological disorders served as the control group. The two groups were matched for maternal age, parity, and socioeconomic status to minimize confounding.

**Inclusion and Exclusion Criteria:** Eligible participants included women aged between 18 and 40 years with singleton pregnancies. The study group comprised women with confirmed diagnoses of chronic pediatric gynecological disorders such as congenital uterine anomalies, chronic pelvic inflammatory disease, ovarian dysfunction, or endometriosis. Women with systemic comorbidities including diabetes mellitus, chronic hypertension, autoimmune disease, or renal disorders were excluded from both groups. Pregnancies with multiple gestations or those complicated by acute infections or trauma were also excluded from the study.

**Data Collection:** Data were obtained through direct maternal interviews, antenatal records, and neonatal assessments at birth. Maternal demographic characteristics, obstetric history, and antenatal complications were recorded. Neonatal outcomes were carefully assessed and included gestational age at delivery, categorized as preterm, term, or post-term, along with birth weight, which was stratified into low birth weight below 2.5 kg and normal birth weight above 2.5 kg. The APGAR score was determined at one and five minutes after delivery. The need for neonatal intensive care unit (NICU) admission and the duration of stay were documented, and infants were screened for congenital anomalies either clinically or through ultrasonography where indicated. Perinatal mortality, including stillbirths and neonatal deaths within the first seven days of life, was also noted.

**Placental Examination:** Placentas were collected immediately after delivery and preserved in 10% buffered formalin. Histopathological examination was performed using hematoxylin and eosin staining. Each specimen was evaluated for signs of chorioamnionitis, villous immaturity, focal infarction, and vascular abnormalities to establish clinicopathological correlations with neonatal outcomes.

**Ethical Considerations:** Ethical approval was obtained from the institutional review boards of both participating hospitals. Written informed consent was obtained from all enrolled mothers. All participants were assured of confidentiality, and data were anonymized prior to analysis.

**Statistical Analysis:** Data entry and analysis were performed using SPSS version 26.0. Descriptive statistics were expressed as mean ± standard deviation for continuous variables and as percentages for categorical variables. Comparisons between the study and control groups were carried out using the Chi-square test for categorical variables and the independent t-test for continuous variables. A p-value less than 0.05 was considered statistically significant.

## RESULTS

**Maternal and Obstetric Characteristics:** A total of 120 mother–infant pairs were analyzed, consisting of 60 in the study group (mothers with chronic pediatric gynecological disorders) and 60 in the control group (mothers without gynecological disorders). The mean maternal age was comparable between groups (28.4 ± 4.6 years in the study group vs. 27.9 ± 4.1 years in the control group; $p>0.05$). However, the rate of cesarean delivery was higher among women in the study group, with 56.7% undergoing operative delivery compared to 41.7% in the control group ($p<0.05$). Obstetric complications including preterm labor and antepartum hemorrhage were observed more frequently among women with chronic gynecological disorders, further supporting their classification as a high-risk obstetric population.

**Neonatal Outcomes:** Neonatal parameters showed significant differences between the two groups. The incidence of preterm birth was markedly higher in infants of mothers with chronic pediatric gynecological disorders (31.7%) compared to those in the control group (15.0%) ($p<0.05$). Similarly, low birth weight (<2.5 kg) was recorded in 36.7% of neonates in the study group compared with 18.3% in controls, demonstrating a statistically significant difference ($p<0.01$).

The APGAR score at 5 minutes was <7 in 20.0% of infants in the study group compared with 8.3% in the control group, suggesting delayed neonatal adaptation to extrauterine life. A higher frequency of NICU admissions was also noted among infants born to mothers with chronic disorders, with 25.0% requiring NICU care compared to 11.7% in the control group ($p<0.05$). Congenital anomalies were observed in 6.7% of neonates in the study group versus 1.7% in controls ($p<0.05$). Perinatal mortality, including stillbirths and early neonatal deaths, was significantly higher in the study group at 8.3% compared with 3.3% in the control group ($p<0.05$). These findings are summarized in Table 1.

Table 1: Neonatal outcomes in infants of mothers with chronic pediatric gynecological disorders compared to controls

| Neonatal Outcome | Study Group (n=60) | Control Group (n=60) | p-value |
|---|---|---|---|
| Preterm birth (<37 weeks) | 31.7% | 15.0% | <0.05 |
| Low birth weight (<2.5 kg) | 36.7% | 18.3% | <0.01 |
| APGAR <7 at 5 minutes | 20.0% | 8.3% | <0.05 |
| NICU admissions | 25.0% | 11.7% | <0.05 |
| Congenital anomalies | 6.7% | 1.7% | <0.05 |
| Perinatal mortality | 8.3% | 3.3% | <0.05 |

As shown in Table 1, neonates born to mothers with chronic pediatric gynecological disorders experienced significantly higher risks of adverse outcomes across multiple parameters, including prematurity, low birth weight, poor APGAR scores, NICU admissions, congenital anomalies, and perinatal mortality.

**Placental Pathology:** Histopathological examination of placental samples revealed important differences between the two groups. Chorioamnionitis was identified in 13.3% of placentas from the study group compared with 5.0% from the control group. Villous immaturity was observed in 10.0% of cases in the study group versus 3.3% in the control group. Similarly, focal infarction was detected in 8.3% of placentas in the study group, significantly higher than the 3.3% seen in controls. These findings are detailed in Table 2.

Table 2: Placental histopathological findings in study and control groups

| Placental Findings | Study Group (n=60) | Control Group (n=60) | p-value |
|---|---|---|---|
| Chorioamnionitis | 13.3% | 5.0% | <0.05 |
| Villous immaturity | 10.0% | 3.3% | <0.05 |
| Focal infarction | 8.3% | 3.3% | <0.05 |

As demonstrated in Table 2, placental pathology was more prevalent in the study group, particularly chorioamnionitis and villous immaturity. These abnormalities likely contributed to intrauterine compromise, explaining the higher incidence of adverse neonatal outcomes observed.

## DISCUSSION

This clinicopathological evaluation highlights that infants born to mothers with chronic pediatric gynecological disorders (CPGDs) are at significantly increased risk of adverse neonatal outcomes compared with those born to mothers without such conditions[9]. The findings of higher rates of preterm delivery, low birth weight, poor APGAR scores, and increased NICU admissions in the study group are consistent with previous literature describing the adverse obstetric sequelae of persistent gynecological pathology extending into reproductive years[10].

The higher incidence of prematurity observed in this study (31.7% vs. 15.0%) is in line with reports linking uterine anomalies, endometriosis, and chronic pelvic inflammatory conditions with an increased risk of preterm labor[11]. The proposed mechanisms

include impaired endometrial receptivity, abnormal uteroplacental blood flow, and increased intrauterine inflammation, all of which may predispose to premature contractions and early delivery. This finding emphasizes the importance of close antenatal surveillance and timely intervention for women with a history of pediatric gynecological disorders[12].

Low birth weight was also significantly more common in the study group (36.7% vs. 18.3%), which can be explained by compromised placentation and poor maternal uterine environment[13]. The placental histopathology in our cohort supports this, showing higher rates of villous immaturity, chorioamnionitis, and focal infarction. These pathological abnormalities are known to reduce nutrient and oxygen delivery to the fetus, thereby contributing to intrauterine growth restriction (IUGR) and low birth weight outcomes[14].

The increased frequency of APGAR scores <7 and NICU admissions in the study group reflect poor immediate neonatal adaptation and perinatal compromise[15]. Such findings can be attributed to both prematurity and intrauterine hypoxia, which have been well documented in pregnancies complicated by endometriosis and uterine anomalies. The need for advanced neonatal care in these cases further underscores the burden placed on healthcare systems when high-risk pregnancies are not optimally managed[16].

Of particular concern is the higher prevalence of congenital anomalies (6.7% vs. 1.7%) among infants of mothers with CPGDs. This may be related to underlying developmental abnormalities associated with Müllerian anomalies, chronic endocrine dysfunction, or genetic predispositions linked to gynecological pathologies. While the absolute number of anomalies was small, the statistically significant difference highlights the necessity for thorough antenatal screening and genetic counseling where relevant[17,18].

The perinatal mortality rate in this study was notably higher in the study group (8.3% vs. 3.3%), echoing global findings that pregnancies in women with gynecological pathology remain high risk despite advances in obstetric care[19]. The placental findings of inflammation and infarction provide a plausible biological basis for these outcomes, pointing toward impaired fetal survival due to reduced intrauterine support[20].

These findings have important clinical implications. They reinforce the need for preconception counseling in young women with a history of pediatric gynecological disorders, as well as multidisciplinary management involving obstetricians, neonatologists, and pathologists[21]. Early risk stratification, targeted antenatal interventions, and timely delivery planning could mitigate the observed adverse outcomes. Furthermore, placental examination should be emphasized in such pregnancies, as it provides valuable insights into the pathophysiological processes contributing to neonatal morbidity and mortality[22].

While this study provides valuable clinicopathological correlations, certain limitations must be acknowledged. The sample size, though adequate for statistical analysis, was limited to two tertiary centers, which may restrict generalizability[23]. Additionally, long-term neonatal outcomes such as neurodevelopment and growth trajectories were not assessed, representing an area for future research. Larger multicenter studies incorporating long-term follow-up would provide a more comprehensive understanding of the impact of CPGDs on neonatal health[24,25].

## CONCLUSION

Infants born to mothers with chronic pediatric gynecological disorders are at significantly higher risk of adverse outcomes including prematurity, low birth weight, poor APGAR scores, increased NICU admissions, congenital anomalies, and perinatal mortality. Placental pathology in these pregnancies demonstrates increased rates of chorioamnionitis, villous immaturity, and infarction, underscoring the role of impaired placental function in mediating these outcomes. This study highlights the necessity of early identification and careful management of pregnancies complicated by pediatric gynecological disorders. Comprehensive antenatal care, preconception counseling, and a multidisciplinary approach involving obstetric, neonatal, and pathological expertise are essential to improve maternal and neonatal prognosis. Future studies should explore long-term neonatal outcomes and develop targeted interventions to reduce the burden of adverse perinatal events in this high-risk group.

**Authors' Contributions:** ZB conceived and designed the study. FHA contributed to data collection and patient management. HRH assisted in methodology and statistical analysis. MYM carried out histopathological examinations and contributed to interpretation of findings. SB participated in manuscript drafting and literature review. FS critically reviewed the manuscript and provided final approval of the version to be published. All authors have read and approved the final manuscript.

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