Original Article

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Perinatal Outcomes in HIV-Positive Pregnant Women: A Multicentric Study

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ABSTRACT

Purpose: To evaluate perinatal outcomes and maternal human immunodeficiency virus (HIV) disease progression in pregnant women

Methods: Retrospective multicentric review of a cohort of 34 HIV-positive pregnant women delivering at four Turkish hospitals (2009-2021). Data included obstetric/neonatal parameters and serial laboratory values.

Results: Mean maternal age was 30.8±3.3 years and 52.9% were diagnosed during pregnancy. HIV viral load remained suppressed [median 254 copies/mL interquartile range (IQR: 50-1200) in first trimester and 211 copies/mL (IQR: 40-900) at delivery]. Mean birth weight was 2351.8±727.0 g. Pregnancy complications included premature rupture of membranes (29.4%), preterm labor (23.5%), and placental abruption (5.9%). Among 32 infants followed-up, none acquired HIV (0% mother-to-child transmission but two lost to follow-up). No maternal disease progression occurred.

Conclusion: Antiretroviral therapy and cesarean delivery resulted in 0% mother-to-child HIV transmission in tested infants in this cohort. High obstetric complication rates and frequent late diagnosis underscored the need for enhanced prenatal screening and individualized delivery planning. Neonatal outcome data were limited to parameters with complete and consistent documentation.

Keywords: HIV, pregnancy, perinatal outcomes, antiretroviral therapy, maternal health, neonatal health

INTRODUCTION

Global human immunodeficiency virus (HIV) prevalence remains significant, with approximately 39 million affected individuals in 2024.[1] In Türkiye, HIV incidence has risen steadily, with an estimated 32,000 current cases.[2] Antiretroviral therapy (ART) has transformed HIV into a chronic condition, increasing pregnancies among HIV-positive women.[3] While ART reduces mother-to-child transmission (MTCT) to less than 2% in high-resource settings,[4] pregnancy complications remain poorly characterized in Turkish cohorts. This study evaluated perinatal outcomes and HIV progression in pregnant Turkish women receiving ART.

METHODS

Study Design and Population

A retrospective cohort study was conducted, including all HIV-positive pregnant women who delivered at four referral hospitals in Türkiye between August 2009 and January 2021. Inclusion criteria were: singleton pregnancy; delivery at or beyond 20 weeks of gestation; and confirmed HIV diagnosis. Exclusion criteria were: incomplete ART adherence; chronic hepatitis B virus or hepatitis C virus coinfection, major pre-existing conditions such as diabetes mellitus or renal insufficiency; and early pregnancy loss (<20 weeks). All hospitals adhered

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to the same national HIV treatment protocols throughout the study period, which helped minimize inter-center variability and ensured consistency in patient care. The study was approved by Selçuk University Local Ethics Committee (No: 2021/54, dated: 10.02.2021) and conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants.

Clinical Protocols

All participating centers followed standardized national protocols for prevention of MTCT (PMTCT) of HIV, which included:

- Maternal combination ART consisting of nucleoside reverse transcriptase inhibitors + protease inhibitor
- Elective cesarean delivery scheduled at 38 weeks of gestation
- Intrapartum intravenous zidovudine (ZDV) until cord clamping
- Neonatal nevirapine prophylaxis for 12 weeks
- Exclusive formula feeding

Data Collection

Data were extracted from medical records and included:

- Maternal characteristics: age, gravidity, parity, gestational age at delivery, mode of delivery, comorbidities, timing of HIV diagnosis, ART regimen and duration, and pregnancy complications [gestational diabetes, hypertensive disorders, preterm labor, premature rupture of membranes (PROM), placental abruption].
- Neonatal parameters: birth weight, Apgar scores at 1 and 5 minutes, and HIV status (determined by PCR at 18 months of age).
- Laboratory findings: HIV viral load (copies/mL), CD4+ T-lymphocyte count (cells/μL), hemoglobin (g/dL), white blood cell count (x10^3/L), and platelet count (x10^3/L) measured during the first trimester and at delivery.
- Maternal disease progression was defined as a ≥25% decline in CD4+ count from baseline, development of an opportunistic infection, or worsening of World Health Organization (WHO) clinical staging during pregnancy or within six weeks postpartum.

Statistical Analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS), version 21.0 (IBM Corp., Armonk, NY, USA). Normality of continuous variables was assessed using the Kolmogorov-Smirnov test. Normally distributed continuous variables are expressed as mean ± standard deviation, non-normally distributed variables as median [interquartile range, (IQR)], and categorical variables as frequencies and percentages. Changes in laboratory parameters between the first trimester and delivery were analyzed using paired t-tests (normally distributed) or Wilcoxon signed-rank tests (non-normally distributed). A p-value <0.05 was considered statistically significant.

RESULTS

Cohort Characteristics

Thirty-four HIV-positive pregnant women were included. The mean maternal age was 30.8±3.3 years. Most women were married (70.6%) and 52.9% were employed. Low socioeconomic status was reported in 47.1% of cases, and 41.2% smoked during pregnancy. Regarding HIV diagnosis, 52.9% were diagnosed during the current pregnancy, 23.5% were aware of their status before conception, and the remaining 23.6% were diagnosed at delivery or had undocumented timing. All women were classified as WHO stage 1 at enrollment (Table 1).

Laboratory Findings

Median HIV viral load was 254 copies/mL (IQR: 50-1200) in the first trimester and 211 copies/mL (IQR: 40-900) at delivery (p=0.08). Median CD4+ count at delivery was 512 cells/μL (IQR: 320-780). Significant hematological changes were observed from the first trimester to delivery: white blood cell count increased from 5382.4±2727.2 to 8223.5±3885.0 x10^3/L (p<0.01), hemoglobin decreased from 9.8±1.2 to 8.7±1.3 g/dL (p<0.01), and platelet count decreased from 220,411.8±56,265.7 to 204,353.0±54,586.0 x10^3/L (p=0.03) (Table 2).

Obstetric and Neonatal Outcomes

All women delivered by cesarean section at a mean gestational age of 35.4±2.1 weeks. The mean birth weight was 2351.8±727.0 g. Median Apgar scores were 7 (range: 5-9) at 1 minute and 8 (range: 5-10) at 5 minutes. Pregnancy complications occurred in 58.8% of women, including PROM (29.4%), preterm labor (23.5%), and placental abruption (5.9%). No cases of gestational diabetes or hypertensive disorders were reported. Among 34 newborns, 32 (94.1%) were tested for HIV at 18 months and all were negative. Two infants (5.9%) were lost to follow-up before HIV status could be confirmed (Table 3).

DISCUSSION

This multicentric study from Türkiye demonstrates two key findings: (1) a 0% MTCT rate among infants with confirmed maternal HIV status, achieved through combination ART and cesarean delivery; and (2) high rates of pregnancy complications, particularly PROM (29.4%) and preterm labor (23.5%). Although the overall transmission rate appears to be 5.9%, this is due to two cases lost to follow-up. Among the 32 tested infants, the MTCT rate was 0%, consistent with international benchmarks.

The absence of MTCT in the 32 tested infants aligns with global benchmarks for PMTCT success in settings with comprehensive ART programs.[4,5] Our findings support the effectiveness of the Turkish national PMTCT protocol, which includes combination ART, elective cesarean delivery, intrapartum ZDV, and infant nevirapine prophylaxis. However, the universal use of cesarean delivery in our cohort, despite all

Table 1. Maternal characteristics of HIV-positive pregnant women (n=34)		
Parameter	**Value**	**Percentage (%)**
Demographic characteristics		
Age [years, mean ± SD (range)]	30.8±3.3 (25-37)	-
Gravida [median (range)]	2 (1-5)	-
Parity [median (range)]	1 (0-4)	-
Marital status, n (%)		
Single	8	23.5
Married	24	70.6
Other	2	5.9
Educational status, n (%)		
Illiterate	12	35.3
Primary education	12	35.3
High school	6	17.6
Higher education	4	11.8
Occupation, n (%)		
Employed	18	52.9
Unemployed	16	47.1
Socioeconomic status, n (%)		
Low	16	47.1
Medium	14	41.2
High	4	11.8
Ethnicity, n (%)		
Turkish	16	47.1
Asian	10	29.4
African	6	17.6
European	2	5.9
Clinical characteristics		
Smoking, n (%)		
No	20	58.8
Yes	14	41.2
Alcohol use, n (%)		
No	18	52.9
Yes	16	47.1
HIV diagnosis, n (%)		
Before conception	8	23.5
During pregnancy	18	52.9
At birth	8	23.5
Other STDs, n (%)		
No	28	82.4
Syphilis	6	17.6
Antiretroviral therapy status, n (%)		
Started before pregnancy	14	41.2
Started during pregnancy	20	58.8
Never	0	0.0

Data are presented as mean ± standard deviation (range), median (range), or n (%)
Syphilis was the only reported STD in this study
STDs: Sexually transmitted diseases, HIV: Human immunodeficiency virus, SD: Standard deviation

Table 2. Hematological parameters in HIV-positive pregnant women

Parameter	First trimester	Birth	*p*-value*
HIV viral load (copies/mL), median [IQR]	254 (50-1200)	211 (40-900)	0.08
HIV viral load distribution, n (%)			
≤1000	30 (88.2%)	34 (100.0%)	0.04**
>1000	4 (11.8%)	0 (0.0%)	
CD4+ (cells/μL), mean ± SD	410.0±161.6	456.2±208.0	0.12
CD4+ distribution, n (%)			
≤200	4 (11.8%)	6 (17.6%)	0.50**
>200	30 (88.2%)	28 (82.4%)	
CD8+ (cells/μL), mean ± SD	553.6±199.5	550.0±177.8	0.89
CD4+/CD8+ Ratio, mean ± SD	0.80±0.2	0.86±0.4	0.34
WBC (x10⁹/L), mean ± SD	5382.4±2727.2	8223.5±3885.0	<0.01
Hemoglobin (g/dL), mean ± SD	9.8±1.2	8.7±1.3	<0.01
Platelets (x10⁹/L), mean ± SD	220411.8±56265.7	204353.0±54586.0	0.03

*Wilcoxon signed-rank test for continuous variables, **McNemar test for categorical variables
Data are presented as mean ± standard deviation, median [interquartile range], or n (%)
IQR: Interquartile range, SD: Standard deviation, HIV: Human immunodeficiency virus, WBC: White blood cell

Table 3. Obstetric and neonatal outcomes in HIV-positive pregnant women (n=34)

Parameter	Value	Percentage (%)
WHO HIV stage, n (%)		
Stage 1	34	100.0
Antiretroviral therapy (ART), n (%)		
Yes	34	100.0
No	0	0.0
Mode of delivery, n (%)		
Vaginal	0	0.0
Cesarean	34	100.0
Fetal characteristics		
Gestational age (weeks, mean ± SD)	35.4±2.1	-
Birth weight (g, mean ± SD)	2351.8±727.0	-
Apgar score, 1st minute [median (range)]	7 (5-9)	-
Apgar score, 5th minute [median (range)]	8 (5-10)	-
Congenital anomalies, n (%)		
No	34	100.0
Yes	0	0.0
Pregnancy complications, n (%)		
Premature rupture of membranes	10	29.4
Placental abruption	2	5.9
Preterm labor	8	23.5
None	14	41.2
Neonatal HIV diagnosis, n (%)		
No	32	94.1
Yes	2	5.9

Data are presented as mean ± standard deviation, median [range], or n (%)
HIV: Human immunodeficiency virus, SD: Standard deviation, WHO: World Health Organization

women achieving viral suppression (viral load ≤1000 copies/mL) by delivery, warrants scrutiny. Current WHO guidelines support vaginal delivery for women with viral loads below 1000 copies/mL,[6] and a shift toward individualized delivery planning could reduce surgical risks without compromising MTCT prevention.

The high rates of PROM and preterm labor observed in the present study exceed those reported in the general Turkish pregnant population (PROM: 10-12%; preterm labor: 10-15%).[7] These complications may be multifactorial, involving HIV-associated immune dysregulation, ART effects, and high rates of modifiable risk factors, such as smoking (41.2%) and low socioeconomic status (47.1%).[8] The absence of gestational diabetes and hypertensive disorders contrasts with some studies,[9] possibly due to our small sample size or population-specific factors.

Late diagnosis of HIV, with more than half of diagnoses made during the pregnancy studied, remains a critical concern, limiting opportunities for preconception ART optimization. This finding is consistent with reports from other settings[10] and underscores the need for enhanced prenatal HIV screening programs.

Study Limitations

Our study has several limitations: (1) the small sample size (n=34) reflects the low prevalence of HIV in Turkish pregnant women but limits statistical power; (2) the absence of an HIV-negative control group restricts direct comparisons of complication rates; (3) neonatal outcomes such as neonatal intensive care unit admission and congenital anomalies were inconsistently documented and could not be analyzed; (4) the retrospective design introduces potential biases in data collection; and (5) the 11-year study period may encompass evolving clinical practices, although standardized national protocols minimized variability.

CONCLUSION

Effective ART and obstetric management, including cesarean delivery, achieved low MTCT rates in HIV-positive pregnancies. However, high rates of pregnancy complications and late HIV diagnoses underscore the need for enhanced prenatal screening and vigilant obstetric care. Enhanced preconception screening programs and early diagnosis will be important for timely initiation of ART and improved perinatal outcomes. While our findings suggest that ART and cesarean delivery are associated with low perinatal transmission rates, these results should be interpreted cautiously given the lack of a control group. Future research should focus on optimizing delivery methods based on viral load and evaluating long-term outcomes.

Ethics

Ethics Committee Approval: The study was approved by Selçuk University Local Ethics Committee (no: 2021/54, dated: 10.02.2021).

Informed Consent: Written informed consent was obtained from all participants.

Footnotes

Authorship Contributions

Surgical and Medical Practices: N.G.K, A.B., M.K., Concept: N.G.K, F.A., M.K., Design: N.G.K, Ç.Ç., A.K.Ü., M.K., Data Collection or Processing: N.G.K, A.B., F.A., Ç.Ç., A.K.Ü., S.S., N.Ş., Ç.Ç., M.K., Analysis or Interpretation: N.G.K, S.S., M.K., Literature Search: N.G.K, N.Ş., Ç.Ç., M.K., Writing: N.G.K, M.K.

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