FREQUENCY OF HIV INFECTION IN PREGNANT WOMEN ATTENDING THE ANTENATAL ROOM OF GYNAECOLOGY WARD B AT MEDICAL TEACHING INSTITUTION–HAYATABAD MEDICAL COMPLEX, PESHAWAR

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ABSTRACT

Objective: To determine the frequency of HIV infection in pregnant women attending the antenatal room of Gynae B Ward at MTI-Hayatabad Medical Complex, Peshawar.

Methods: This descriptive cross-sectional study was conducted from 02 July, 2024 to 02 Jan, 2025 at Gynae B Ward, MTI-Hayatabad Medical Complex, Peshawar. A total of 161 pregnant women aged 18–45 years were included using consecutive non-probability sampling. Data was collected through comprehensive clinical history and laboratory testing for HIV infection using real-time RT-PCR. Relevant demographic and clinical variables, including age, residence, parity, husband's occupation, educational status, social class, family history, and gestational age, were recorded. Data were analyzed using SPSS version 23.0, with stratification and post-stratification chi-square tests applied to identify effect modifiers.

Results: The mean age of participants was 31.04 ± 7.956 years, with a mean gestational age of 33.88 ± 3.768 weeks and a mean BMI of 21.196 ± 1.7358 kg/m². HIV infection was observed in 1.9% of the study population. Stratification revealed that HIV infection was more frequent among participants aged >30 years (2.4%), urban residents (3.7%), primiparous women (3.7%), and those with a family history of HIV infection (5.9%). Among social classes, the rich had a higher frequency (5.0%).

Conclusions: The frequency of HIV infection in pregnant women at MTI-Hayatabad Medical Complex was low (1.9%), with notable associations with age, urban residence, parity, social class, and family history. These findings underscore the importance of targeted screening and preventive measures in high-risk groups to mitigate vertical HIV transmission.

Keywords: HIV Infections; Pregnancy; Prenatal Care; Prevalence; Vertical Transmission of Infectious Disease

INTRODUCTION

The study of HIV during pregnancy holds great significance because many women are first diagnosed with HIV during pregnancy. Similarly, it is equally important in cases where one or both partners are HIV positive and wish to conceive.

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During the recent years, universal HIV prenatal testing, antiretroviral therapy (ART), scheduled cesarean delivery for HIV positive women with elevated viral loads, appropriate ART for infants and avoidance of breastfeeding have shown encouraging results, and the Centers for Disease Control and Prevention now aims to eliminate HIV transmission from mother to child by reducing its incidence to <1 infection per 100,000 live births. [1,2,3]

HIV disease in humans can be caused by infection with either HIV-1 or HIV-2. HIV-1 is more prevalent of the two, has higher infectivity, virulence, and greater spread through heterosexual sex. The transmission rate of HIV from mother to child (vertical transmission) is 20% to 25% for HIV-1 versus about 5% for HIV-2. Vertical transmission of HIV is possible not only throughout pregnancy but also during childbirth and breastfeeding. Together this is termed as the perinatal transmission of HIV. [4,5]

According to one estimate, around 5,000 HIV positive women give birth in the United States every year. Following current recommendations regarding HIV and pregnancy, both the United States and Europe have witnessed a steep decline in perinatal HIV transmission to 1% or less. In the United States, black infants have 5 times increased incidence of perinatal HIV compared to white infants. According to a report by the Centers for Disease Control and Prevention, only 44 HIV positive infants were born in the United States in the year 2016, with the incidence of perinatal HIV transmission being as low as 1.1 out of 100,000 live births. Globally, with the increasing availability of ART to pregnant women, the number of new HIV cases among children has decreased by 47% since 2010 according to the Joint United Nations Programme on HIV/AIDS (UNAIDS). [6,7,8,9]

In the absence of any treatment, the risk of vertical transmission of HIV during pregnancy, delivery, or breastfeeding is as high as 25 to 30%. However, with rigorous testing, preconception counseling, good ART adherence, scheduled cesarean delivery, and infant prophylaxis, the rate of vertical transmission is as low as <1 to 2% in the US. [10,11]

Twenty-three studies involving 72728 pregnant women were included. Ten studies were of high quality and the remaining were of moderate quality. Twenty-one studies used two or more diagnostic tests to identify women living with HIV. Overall pooled prevalence of HIV among pregnant women was 7.22% (95% CI 5.64 to 9.21). [12]

The purpose of this study is to determine the frequency of HIV infection in pregnant women attending antenatal room of Gynae B Ward at MTI-Hayatabad Medical Complex Peshawar as it is essential for improving maternal and child health outcomes, preventing HIV transmission, informing public health strategies, and fulfilling international commitments. This research will pave the way for targeted interventions and policies that address the unique challenges posed by HIV in the context of pregnancy and childbirth in our community. Moreover, identifying pregnant women who are HIV-positive is crucial for providing appropriate medical care and interventions. Antiretroviral therapy (ART) has been shown to significantly reduce the risk of mother-to-child transmission of HIV. By determining the frequency of HIV infection, healthcare providers can ensure that infected pregnant women receive the necessary interventions to prevent transmission and manage their own health.

MATERIALS AND METHODS

This descriptive cross-sectional study was conducted in the Department of Obstetrics & Gynaecology, Medical Teaching Institution–Hayatabad Medical Complex (MTI-HMC), Peshawar, Pakistan, from 02 July 2024 to 02 January 2025. After informed consent, eligible pregnant women presenting to the antenatal clinic were enrolled using non-probability consecutive sampling. A total of 161 participants were enrolled and screened for HIV infection; this number represents the total sample screened during the study period (not the number of HIV-positive cases). Ethical approval was obtained from the Hospital Ethical Committee, MTI-HMC Peshawar (Ref No. 1586).

Sample size (n=161) was calculated using the WHO sample size calculator/formula for a single proportion, taking an anticipated prevalence of 7.22%[12], a 95% confidence level, and an absolute precision of 4%.

Pregnant women aged 18–45 years, at any gestational age, were included. Women with a previously known diagnosis of HIV infection and those who did not consent were excluded. Baseline information (age, gestational age, parity, residence, educational status, occupation, and relevant obstetric history) was recorded on a predesigned proforma.

For HIV testing, venous blood samples were collected under aseptic measures and processed in the hospital laboratory. HIV testing was performed using a real-time reverse transcription polymerase chain reaction (RT-PCR)–based assay on the Abbott Alinity m platform (Alinity m HIV-1 assay), and results were reviewed/validated by a consultant pathologist according to laboratory standard operating procedures. HIV infection (outcome variable) was operationally defined as detection of HIV-1 RNA on RT-PCR (positive/negative).

Data were analysed using SPSS Statistics version 23.0. Quantitative variables (e.g., age and gestational age) were summarised as mean ± SD, while qualitative variables were presented as frequencies and percentages. Effect modifiers were controlled by stratification (e.g., age groups, gestational age groups, parity, residence, and education), and post-stratification comparisons were assessed using the chi-square test (or Fisher's exact test where appropriate). A p-value ≤0.05 was considered statistically significant.

RESULTS

A total of 161 pregnant women were enrolled and screened for HIV infection. The mean age was 31.04 ± 7.96 years, mean gestational age was 33.88 ± 3.77 weeks, and mean body mass index was 21.20 ± 1.74 kg/m²; baseline characteristics are shown in Table 1. Overall, 3 (1.9%) women tested positive for HIV and 158 (98.1%) tested negative Table 1.

On stratified analysis, HIV positivity was higher among women aged >30 years, 2 (2.4%), compared to <30 years, 1 (1.3%), p=0.597. All HIV-positive cases were among urban residents, 3 (3.7%), whereas none were detected among rural residents, 0 (0.0%), p=0.082. Similarly, HIV positivity was observed only in primiparous women, 3 (3.7%), compared with multiparous women, 0 (0.0%), p=0.083. Participants with a family history of HIV had HIV positivity of 1 (5.9%) compared with 2 (1.4%) among those without a family history, p=0.195. By socioeconomic class, HIV positivity was highest in the rich class, 2 (5.0%), followed by poor, 1 (2.4%), and middle class, 0 (0.0%), p=0.154. All HIV-positive cases occurred among women with gestational age >30 weeks, 3 (2.5%), compared with <30 weeks, 0 (0.0%), p=0.323; stratified results are presented in Table 2.

No statistically significant association was observed between HIV status and the studied effect modifiers, as all p-values were >0.05 Table 2.

Table 1: Demographic and Clinical Characteristics of Study Participants (n=161)

Variable	**Value**
Age (Years)	31.04 ± 7.96
Gestational Age (Weeks)	33.88 ± 3.77
BMI (kg/m²)	21.20 ± 1.74
Age Group	
- < 30 Years	78 (48.4%)
- > 30 Years	83 (51.6%)
Residence	
- Rural	80 (49.7%)
- Urban	81 (50.3%)
Self-Occupation	
- Employed	54 (33.5%)
- Housewife	107 (66.5%)
Parity	
- Multiparous	80 (49.7%)
- Primiparous	81 (50.3%)
Husband's Occupation	
- Abroad	33 (20.5%)
- Defense	32 (19.9%)
- Driver	32 (19.9%)
- Labour	32 (19.9%)
- Office Worker	32 (19.9%)
Educational Status	
- Illiterate	54 (33.5%)
- Primary & Above	54 (33.5%)
- Secondary & Above	53 (32.9%)
Social Class	
- Middle Class	80 (49.7%)
- Poor	41 (25.5%)
- Rich	40 (24.8%)
Family History of HIV	
- Yes	17 (10.6%)
- No	144 (89.4%)
HIV Infection	
- Yes	3 (1.9%)
- No	158 (98.1%)

Table 2: Stratification of HIV Infection with Various Effect Modifiers (n = 161)

Category		HIV		Total n (%)	p-value
		Positive n (%)	Negative n (%)		
Age	≤ 30 Years	1 (1.3%)	77 (98.7%)	78 (100.0%)	0.597
	> 30 Years	2 (2.4%)	81 (97.6%)	83 (100.0%)	
Residence	Rural	0 (0.0%)	80 (100.0%)	80 (100.0%)	0.082
	Urban	3 (3.7%)	78 (96.3%)	81 (100.0%)	
Occupation	Employed	1 (1.9%)	53 (98.1%)	54 (100.0%)	0.994
	Housewife	2 (1.9%)	105 (98.1%)	107 (100.0%)	
Parity	Multiparous	0 (0.0%)	80 (100.0%)	80 (100.0%)	0.083
	Primiparous	3 (3.7%)	78 (96.3%)	81 (100.0%)	
Husband Occupation	Abroad	1 (3.0%)	32 (97.0%)	33 (100.0%)	0.732
	Defense	1 (3.1%)	31 (96.9%)	32 (100.0%)	
	Driver	0 (0.0%)	32 (100.0%)	32 (100.0%)	
	Labour	1 (3.1%)	31 (96.9%)	32 (100.0%)	
	Office Worker	0 (0.0%)	32 (100.0%)	32 (100.0%)	
Educational Status	Illiterate	1 (1.9%)	53 (98.1%)	54 (100.0%)	1.000
	Primary & Above	1 (1.9%)	53 (98.1%)	54 (100.0%)	
	Secondary & Above	1 (1.9%)	52 (98.1%)	53 (100.0%)	
Social Class	Middle	0 (0.0%)	80 (100.0%)	80 (100.0%)	0.154
	Poor	1 (2.4%)	40 (97.6%)	41 (100.0%)	
	Rich	2 (5.0%)	38 (95.0%)	40 (100.0%)	
Family History	Yes	1 (5.9%)	16 (94.1%)	17 (100.0%)	0.195
	No	2 (1.4%)	142 (98.6%)	144 (100.0%)	
Gestational Age	≤ 30 Weeks	0 (0.0%)	39 (100.0%)	39 (100.0%)	0.323
	> 30 Weeks	3 (2.5%)	119 (97.5%)	122 (100.0%)	

DISCUSSION

The findings of this study highlight the prevalence of HIV infection in pregnant women attending the antenatal room of Gynae B Ward at MTI-Hayatabad Medical Complex, Peshawar. This study's frequency of 1.9% is considerably lower than the global average reported in some regions, such as Sub-Saharan Africa, where prevalence rates among pregnant women range from 10% to 30% depending on the country and healthcare access. This stark difference can be attributed to variations in socio-economic conditions, awareness levels, cultural practices, and the availability of antiretroviral therapy (ART).[13]

A study by Woldesenbet et al.[10] conducted in South Africa reported a higher prevalence of HIV infection among pregnant women, with significant regional differences depending on urban versus rural settings.[14] Similarly, our study identified a slightly higher frequency of HIV infection among urban residents compared to rural ones (3.7% vs. 0%). This may reflect better access to healthcare services and diagnostic facilities in urban areas, leading to increased detection rates. However, this trend also emphasizes the need to address potential gaps in rural healthcare settings, where undiagnosed cases could remain a hidden burden.

The association of HIV infection with parity observed in this study, where all cases were reported among primiparous women (3.7%), aligns with findings from studies that suggest younger, first-time mothers are at increased risk of HIV infection.[15] This could be due to less awareness and fewer opportunities for HIV screening during initial pregnancies. On the other hand, multiparous women may have undergone testing during prior antenatal visits, leading to early detection and management of HIV in previous pregnancies.

Educational status did not show a strong trend in our study, as the frequency of HIV infection was uniformly distributed among the illiterate, primary-educated, and secondary-educated groups (1.9%). However, this contrasts with studies in low- and middle-income countries where higher education levels are associated with lower HIV prevalence.[16] These discrepancies may stem from differences in study design or cultural and educational systems, indicating that education alone is not a standalone protective factor and must be coupled with targeted interventions to mitigate risk.

Social class analysis revealed a higher frequency of HIV infection among participants from the rich class (5.0%), which contrasts with the common association of HIV with poverty and lower socio-economic groups. This finding may reflect social dynamics specific to the study setting, such as increased exposure to high-risk behaviors in affluent populations. Further studies are needed to explore the underlying socio-cultural factors contributing to this trend.[17]

Family history of HIV infection was another significant factor, with a 5.9% frequency among participants with a positive family history. This association is well-documented in the literature, as family members' exposure to the same risk factors or direct transmission through vertical or horizontal routes increases the likelihood of infection. This finding underscores the importance of family-focused counseling and interventions for HIV prevention.[18]

Husband’s occupation, notably among those working abroad or in defense and labor sectors, showed a modest association with HIV infection. Occupations that involve travel or extended stays away from home have been linked to increased risk of HIV due to potential exposure to high-risk behaviors during separation from families. Similar findings were reported by Duong et al., who observed higher HIV prevalence in families where the male partner engaged in migratory labor.[19]

The stratification of HIV infection by gestational age revealed that all HIV-positive cases were among participants with gestational ages above 30 weeks. While this finding may appear coincidental, it reflects the necessity for comprehensive HIV screening at earlier gestational ages to ensure timely intervention. Early diagnosis during pregnancy is crucial for reducing the risk of mother-to-child transmission, which remains a key challenge globally despite advancements in ART and prevention strategies.[20]

Despite the low prevalence observed in this study, the significance of even a single case of HIV infection in pregnancy cannot be underestimated. The implications of vertical transmission and the potential health consequences for both mother and child necessitate continuous vigilance and the implementation of robust prevention programs. Evidence from countries with comprehensive maternal health policies, such as the United States and some European nations, demonstrates that eliminating vertical transmission is achievable when universal prenatal screening, ART, and appropriate obstetric management are integrated into maternal healthcare services.[21]

This study had several limitations. First, the sample size, although adequate for statistical analysis, may not be representative of the general population due to the consecutive sampling technique used. This limits the generalizability of the findings to other regions or populations. Second, the study relied on self-reported data for some variables, such as socio-economic status and family history of HIV infection, which are prone to reporting bias. Third, the cross-sectional design of the study does not allow for causal inferences, and the temporal relationship between potential risk factors and HIV infection could not be established.

Additionally, the study was conducted in a single healthcare facility, and its findings may not reflect the broader context of HIV prevalence in other settings with different healthcare infrastructure, socio-economic conditions, or cultural practices. Lastly, the study did not explore behavioral risk factors such as sexual practices, substance use, or prior sexually transmitted infections, which could provide deeper insights into the drivers of HIV transmission in this population.[22,23,24]

Future studies should consider a larger and more diverse sample size to enhance the generalizability of findings. Longitudinal studies could help establish causal relationships and assess the effectiveness of interventions over time. Investigating behavioral and contextual factors associated with HIV infection would provide a more comprehensive understanding of the risk profile in pregnant women. Moreover, integrating qualitative research methods to explore perceptions, barriers, and facilitators of HIV prevention and management among pregnant women could inform culturally tailored interventions.

From a public health perspective, there is a need for broader implementation of universal HIV screening programs in antenatal care, particularly in rural and underserved areas. Strengthening community-based awareness campaigns and family-centered prevention strategies can help address the multifaceted challenges of HIV in pregnancy. The findings of this study serve as a foundation for policymakers and healthcare providers to prioritize maternal HIV prevention and management in similar healthcare settings.

CONCLUSION

In conclusion, while the frequency of HIV infection in this study was low, the identification of key risk factors highlights critical areas for targeted intervention. Future efforts should focus on expanding access to screening, addressing socio-cultural determinants of health, and fostering collaboration between healthcare providers and communities to ensure the well-being of mothers and their children.

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