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Research Article

Prevalence and Risk Factors of HIV Infection among Children Born from HIV Positive Women Musanze District, Rwanda

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Abstract

In Rwanda the prevalence of mother-to-child HIV transmission is 1.5%; the prevalence was found to be higher in rural area. The purpose of this study was to determine the Prevalence and Risk Factors of HIV Infection among Children born from HIV Positive Women in Musanze District. The study findings help to decrease the rate of HIV infection among children born from mother HIV positive to zero. This study was conducted in Musanze District, Northern Province in Rwanda. The study targeted 420 HIV positive mothers who delivery in different health facilities located in Musanze district from January 2019 to December 2020 and their children. SPSS version 22 was used for analysis. Of 420 children born from HIV positive mothers 91.7% were aged between 18-24 months, 55.2% were female. The majority of HIV positive mothers 80.2% who participated in the study were married. The prevalence of HIV infection among children born from HIV positive women was 2.9%. Children whose mother had poor adherence to ART were 1.5 times more likely to get HIV at birth compared to those whose mother had good adherence (AOR = 1.5; 95% CI: (1.12-2.21)). Children born from mothers in WHO stage II were more likely to get HIV from their mother (AOR = 1.24; 95% CI: (1.32-2.207)). Children born from HIV positive mother with one ANC visit were 2.5 times more likely to get HIV from their mothers (AOR = 1.56; 95% CI: (2.31-5.17)).

Keywords:
HIV; Children born from HIV positive mother; Ruhengeli referral Hospital; Rwanda

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Background

The transmission of HIV from an HIV-positive mother to her child during pregnancy, labour, delivery or breastfeeding is called mother-to-child transmission. In the absence of any intervention, transmission rates range from 15% to 45%. This rate can be reduced to below 5% with effective interventions during the periods of pregnancy, labour, delivery and breastfeeding [1].

Worldwide, Acquired Immunodeficiency Syndrome (AIDS) accounts for three per cent of deaths in children under five years of age, and six per cent of those in sub-Saharan Africa, where AIDS has become one of the major killers of young children. At least 1600 infants are infected with Human Immunodeficiency Virus (HIV) every day and more than 600,000 infants are infected by the virus annually. About 90% of these infections occur in developing countries, mainly Sub-Saharan Africa [2].

The primary intervention to reduce MTCT of HIV is antiretroviral treatment for the mother and a short course of antiretroviral drugs for the baby. They also include measures to prevent HIV acquisition in the pregnant woman and appropriate breastfeeding practices. The new Sustainable Development Goals place heightened emphasis on prevention of mother-to-child transmission (PMTCT) in the context of better health for mothers and their children [1].

Most HIV infected children were from sub-Saharan Africa and mother-to-child transmission during pregnancy, on delivery and during breastfeeding were the major route of infection. It is believed that about two thirds are infected during pregnancy and around the time of delivery, and about one third are infected through breastfeeding. Interventions have reduced MTCT of HIV to less than 2% in high income countries but this rate remains high in resource poor countries ranging between 20% and 45% [3].

In Rwanda, according to the data from Rwanda Biomedical Center, the prevalence of HIV transmission from mother to child is 1.56%. The child is infected during in utero (Trans placenta route) 5-10% due to free virus, infected cell or micro transfusion. It is also infected during delivery 10-20% by ingestion of vaginal secretion and contact with maternal blood. Then the child is infected during breastfeeding on 5-20% [4].

From 2014 up to 2017 the health facilities of Musanze District received 698 pregnant women HIV positive. Among these women, 14 children were infected with HIV infection [5]. The use of Antiretroviral (ARV) drugs is one of the interventions available to prevent transmission of HIV from mother to child during pregnancy, labor and delivery and breastfeeding. ARV prophylaxis, elective caesarean section (CS) and avoidance of breastfeeding reduced risk of MTCT to less than 2 % [6].

The international recommendations on infant and young child feeding in the context of HIV had been last revised by the World Health Organization [7]. Rwanda national protocol of HIV prevention when an HIV pregnant woman is well followed and was shown good adherence on HIV treatment with Viral Lord suppression, she is supposed at 100% to have a child free from HIV infection [8].

It is recommended that when the pregnant women have been tested HIV positive, she should immediately start the ART. However some women still resisting on starting ART or poor adherence to HIV drugs due to different factors such as negative health seeking behavior, lower education level, socio economic condition and cultural aspects [8]. Therefore, there was a need to assess prevalence and risk factors of HIV infection among children born from HIV positive women in Musanze district of Rwanda.

Methods

Research Design

The study was retrospective quantitative method was used because this study determined prevalence of HIV infection among children born from mother HIV positive. Retrospective assessed subjects' histories of exposures and outcomes over a specified time period. The study was examined the medical files of both children and women HIV positive in PMTCT period. 15 health centers of Musanze District were included in this study.

Target Population

The study population composed by the HIV positive pregnant women from conception to 24 months after delivery and their children followed in PMTCT service from birth to 24 months with their final HIV test result. The said populations was from 15 health centers of Musanze District and were 420 children who were in follow up in December 2019 [5].

Sample Size

The sample size was 420 children from 15 health centers in Musanze District followed from conception to 24 months after delivery with their final HIV test result. Depending on the objective of this study, all the study population was enrolled in the research to better estimate the prevalence.

Data Collection Procedures and Tools

In collaboration with Nurse working in PMTCT service, medical files of both children in follow up and women HIV positive were founded in service. After finding those files, data collectors were sat together and examined the files of both children and mothers.

Age of the mother, Gestation, marital status, Education, Profession, ART during pregnant period, VL suppression, Adherence, breast abscess, sexual transmitted infections, malnutrition, WHO stage and Antenatal Care were recorded from medical file.

From infant there is age and sex, delivery model, place of delivery, ART prophylaxis, type of nutrition and HIV testing.

Data Analysis Procedures

Raw data from the instrument tool were entered into SPSS version 22 for analysis. Descriptive statistics was used to tabulate and describe data and bivariate analysis to assess the association between independent and dependent variables was carried out using P-value. The strengths of the associations were determined with multivariate logistic regression. Crude and adjusted odd ratios were estimated with 95% confidence interval. Variables with P-value <0.05 were considered statistically significant.

Ethical Consideration

The introduction letter from Mont Kenya University was deposited to Ruhengeri Referral Hospital for approval of data collection in Health Centers in its catchment area. The benefits of the present study were explained to the Hospital and Health Centers staff. On the data collection sheet was not provided the patient name. The Health Centers have been guaranteed that the data presentation will not point the name of health facility and the data will be stored confidentially.

Results

Demographic Characteristic of Mother and their Babies

As shown in the Table 1, the majority of the mothers with HIV infection (52,1%) were aged 30 - 39 years. Of 420 children born from HIV positive mothers 91.7% were aged between 18-24 months, 55.2% were female. The majority of HIV positive mothers 80.2% who participated in the study were married, 85.5% had only primary education, and 86.5% had informal work. Table 2.

Table 1. Socio-demographic characteristics of the mothers and babies

Variable	N=420	%
Age of the mother		
15-19	1	0.2
20-24	35	8.3
25-29	86	20.5
30-39	219	52.1
40-49	79	18.8
Age of the Infant		
<6 weeks	9	2.1
6 weeks -9 months	15	3.6
9-18 months	11	2.6
18 months- 24 months	385	91.7
Sex of the infant		
Male	188	44.8
Female	232	55.2
Marital status of the mother		
Single	45	10.7
Married	337	80.2
Widower	18	4.3
Separate	20	4.8
Education of the mother		
Non education	27	6.4
Primary	359	85.5
Secondary	30	7.1
University	4	1
Profession of the mother		
Informal work	364	86.5

Table 1 (continued)

Variable	N=420	%
Private institution	52	12.4
Public institution	4	1
Gestation of the mother		
Primigravida	85	20.2
Multigravida	335	79.8

The majority of HIV Positive mothers were on ART during pregnancy period 410 (97.6%), 408 (97.1%) were suppressed their viral load, 420 (90.0%) demonstrated good adherence to ART medication, (85.7%) of mothers which correspond to 360 mothers were in WHO stage I. Table 3.

The majority (91.2%) of children under the study were delivered by Spontaneous Delivery Vaginal, 96% were delivered at health facilities. The majority of children (96.2%) received ART Prophylaxis in the First 4 hours after birth, 96% were given cotrimaxazol prophylaxis at 6 weeks post-delivery.

Prevalence of HIV Infection Among Children Born from HIV Positive Mother. Figure 1.

As can be seen in the table above, in 420 infants, (97.1%) tested negative on final HIV test and (2.9%) infants tested positive on final HIV test positive.

Factors associated with HIV Infection among children born from HIV Positive women Musanze district, Rwanda.

The findings of the factors associated with HIV infection among children born from HIV positive mothers are presented in table 4. The results show that children born from mothers who work in private sector had higher risk of HIV infection compared to those born from unemployed mothers (AOR = 1.97; 95% CI: (1.13-3.25)).

Children whose mother had poor adherence to ART were 1.5 times more likely to get HIV at birth compared to those whose mother had good adherence (AOR = 1.5; 95% CI: (1.12-2.21)). Children born from mothers in WHO stage I and II were more likely to get HIV from their mother with odd ratios of (AOR = 1.54; 95% CI: (1.12-2.32)), (AOR = 1.24; 95% CI: (1.32-2.207)) respectively.

Children born from HIV positive mother with one ANC visit were 2.5 times more likely to get HIV from their mothers (AOR = 1.56; 95% CI: (2.31-5.17)). Similarly, children born from HIV positive mothers who attended only two ANC were 1.6 times more likely to get HIV from their mothers (AOR = 1.62; 95% CI: (1.10-2.63)).

Discussion

The main objective of this study was to determine the Prevalence and Risk Factors of HIV Infection among Children born from HIV Positive Women in Musanze District. Mother to child transmission of HIV infection occurs when HIV positive women passes the virus to her baby during pregnancy, delivery and breastfeeding period. Of 420 children born from HIV positive mothers, 12 (2.9%) were HIV positive. The prevalence of HIV infections among children born from HIV positive mothers in Musanze District was 2.9%.

In the research conducted by UNAID in 2017 worldwide found that the route of HIV infection from mother to child is during pregnancy period, delivery period and breastfeeding period. It is believed that about 2/3 are infected during pregnancy and around the time of delivery, and about 1/3 are infected through breastfeeding period.

A lower HIV prevalence among children born from HIV mother was observed in Musanze District. In contrast the higher prevalence was reported in the study conducted in Ethiopia. The study conducted in Amhara region, Ethiopia showed that the prevalence of HIV infection among HIV exposed infants was 10.1% [10]. In Ethiopia an estimated 1.2 % of pregnant women are living with HIV. Consequently, one of every 3 (33.3%) children born to these women is being infected with HIV [11].

Table 2. Obstetric and gynecological factors for HIV infection among children born from HIV positive women.

Variable	N=420	%
ART during pregnancy period		
Yes	410	97.6
Non	10	2.4
Viral Load Suppression for the mother		
Yes	408	97.1
Non	12	2.9
Adherence of the mother on ART		
Good	378	90
Bad	42	10
Breast abscess for the mother		
Yes	6	1.4
Non	414	98.6
Sexual transmitted infection		
Yes	4	1
Non	416	99
Malnutrition for the mother		
Yes	8	1.9
Non	412	98.1
WHO stage of the mother		
Stage I	360	85.7
Stage II	40	9.5
Stage III	20	4.8
The quarter the mother started ANC		
Quarter I	363	86.4
Quarter II	25	6
Quarter III	11	2.6
Quarter IV	21	5

Source: Researcher (2021)

Table 3. Children characteristics factors of HIV infection among children born from HIV positive women

Variable	N=420	%
Delivery mode of the infant		
Spontaneous Vaginal Delivery	383	91.2
Caesarian Section	37	8.8
Place of delivery of the infant		
Home	17	4
Health facility	403	96
ART prophylaxis in first 4 hours for the baby		
Yes	404	96.2
Non	16	4.8
Complete prophylaxis for 6 weeks after delivery		
Yes	403	96
Non	17	4
Type of nutrition of the baby		
Exclusive breastfeeding	420	100
Mixed breastfeeding	0	0
Cotrimaxazol at 6 weeks after delivery		
Yes	407	96.9
Non	13	3.1
Weaning at 18 months of the baby		
Yes	387	92.1
Non	33	7.9

Table 4. Factors associated with HIV infection

Variables	Crude OR (95% CI)	Adjusted OR (95% CI)
Mothers occupation		
Informal work	1	1
Working in Private institution	1.00(0.3-1.45)	1.97(1.13-3.25)*
Public servant	0.8(0.45-1.32)	1.56(0.45-2.20)
Age of the infant		
< 6 weeks	1	1

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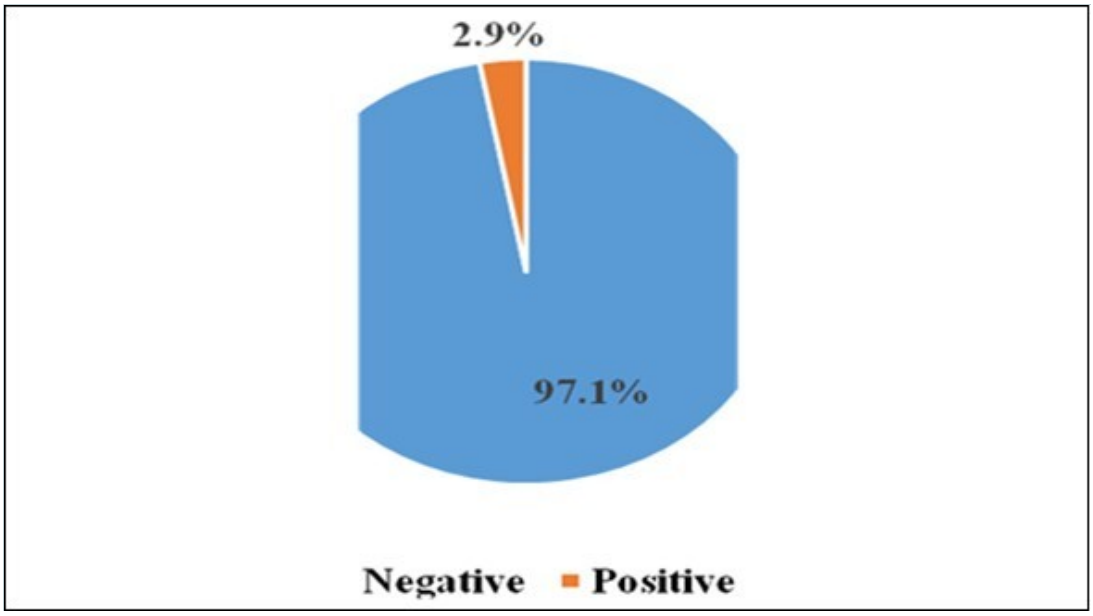

Figure 1. Prevalence of HIV infection among children born from HIV positive mother

Table 4 (continued)

Variables	Crude OR (95% CI)	Adjusted OR (95% CI)
6 weeks – 9 months	1.3(0.78-2.32)	1.02(0.45-1.26)
9 -18 months	0.98(0.52-1.40)	0.63(0.43-1.32)
18 – 24 months	0.13(0.03-0.62)	0.45(0.34-0.82)
Sex of the infant		
Male	1	1
Female	0.68(0.13-0.97)	0.42(0.60-0.78)
Adherence to the ART		
Good (Ref)	1	1
Poor	1.5(1.34-3.21)*	1.5(1.12-2.21)*
HIV WHO stages		
Stage I (Ref)	1	1
Stage II	1.96(1.47-2.56)*	1.54(1.23-2.32)*
Stage III	1.54(1.23-1.87)*	1.24(1.32-2.07)*
Number of ANC visits		
One visit	2.78(2.11-5.91)*	2.56(2.31-5.17)*
Two visits	1.7(1.12-2.75)*	1.62(1.10-2.63)*
Three visits	0.40(0.21-1.43)	0.12(0.10-1.43)
Four visits (Ref)	1	1

Table 4 (continued)

Variables	Crude OR (95% CI)	Adjusted OR (95% CI)
Cotrimoxazol prophylaxis at 6 weeks		
Yes (Ref)	1	1
No	0.5(0.10-1.23)	0.32(0.14-1.17)
Weaning at 18 months		
Yes (Ref)	1	1
No	1.2(1.08-2.34)*	1.14(0.98-1.78)

* *P-value less than 0.05

The higher prevalence was also reported in the study conducted in Zimbabwe where mother-to-child HIV transmission is between 15–25%. In Zimbabwe like any other country in sub-Saharan Africa, breastfeeding is the norm with 97% of children reported as ever breastfed [12]. In Tanzania, a study showed that the overall rate of transmission can go up to 20% if an HIV infected mother breastfeeds for 18–24 months [13]. Similarly to these findings, research conducted by Rwanda Biomedical Center in 2018 revealed that the prevalence of HIV transmission from mother to child is 1.56% [8]. From 2012, the Government of Rwanda has opted for the WHO option in which all HIV positive pregnant women got engaged in ART regardless of the CD4 count. The process excluded breast feeding protected by ART and women continuing ART as a lifelong treatment. Implementation of WHO option resulted in the reduction of MTCT rate at 18 months. Recent data concluded that MTCT rate dropped to 1.8% in a cohort of exposed infants [9].

Factors such as working in private sector, maternal poor adherence to ART, advanced stage of HIV, poor ANC visits were associated with HIV infection among mothers born from HIV positive mothers.

Rwanda Government continue to work together with partners to ensure full implementation of national standards for HIV prevention, care and treatment for pregnant women, mothers and their children; and to develop evidence-based strategies and define baselines and indicators that promote the integration of PMTCT into maternal, newborn and child health services, thus strengthening Rwanda health systems.

Conclusion

The prevalence of HIV infection among children born from HIV positive women in Musanze District was 2.9% this is higher compared to national prevalence (1.5%). Factors such as working in private sector, maternal poor adherence to ART, unsuppressed viral load, and lack of ART drug during PMTCT period, lack of ART prophylaxis for the infant, advanced stage of HIV, poor ANC visits were associated with HIV infection among children born from HIV positive mothers. Effective strategies to promote safe infant feeding practices such as avoidance of mixed feeding beyond 26 weeks among HIV infected mothers are recommended. This study releases some recommendations such as; early introduction of ART for all HIV positive pregnant women; to provide ARVs prophylaxis for all children born from HIV positive women; enhance cancelling on ART treatment in terms of increasing good adherence and encourage HIV positive pregnant women to follow antenatal care program.

Competing Interests

The authors have declared that no competing interests exist.

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