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Effectiveness of prevention of mother to child transmission of HIV in Bowen University Teaching Hospital, Oyo State, Nigeria

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Abstract

Mother-to-child transmission (MTCT) of Human Immunodeficiency Virus (HIV) is the most significant route of HIV infection in children. Over 90% of HIV infections in children are acquired through the mother-to-child transmission route. This study aimed to evaluate the effectiveness of prevention of mother to child transmission (PMTCT) of HIV interventions. It employed a retrospective approach. Records of HIV positive pregnant women who registered and received ANC between January 1st 2015 to December 31st 2018 and HIV exposed infants followed-up for 6 weeks until HIV status was determined by DNA polymerase chain reaction techniques were collected and analysed. 87 pregnant women were HIV positive during the 4 years period, among these group, only 80 had their babies followed up till 6 weeks to determine HIV status by DNA polymerase chain reaction. There were three set of twins making a total of 83 exposed infants. The overall MTCT rate was 4.8%, maternal and infant ART was found to have significant influence on mother to child transmission of HIV with $\chi^2=41.41$, $P<0.001$ and $\chi^2=34.554$, $P<0.001$ respectively. Mode of delivery and infant feeding practice were statistically not significantly related to mother to child transmission of HIV with $\chi^2=3.92$, $P=0.41$ and $\chi^2=1.859$, $P=0.173$ respectively. Though this facility achieved the goal of reducing the rate of HIV mother to child transmission down to less than 5%, there is still need to strengthen service provision and follow up to conform to global plan for the elimination of new HIV infections among children.

Keywords: Antiretroviral therapy; Effectiveness; Human Immunodeficiency Virus; Mother to child transmission; Prevention of mother to child transmission

1. Introduction

Human Immunodeficiency Virus (HIV) is a global public health crisis with sub Saharan Africa having a disproportionately high burden of the epidemic [1]. According to UNAIDS, there were 37.9 million People living with HIV/AIDS across the globe in 2018. Of these, 36.2 million were adults and 1.7 million were children (<15 years old). An estimated 1.7 million individuals worldwide became newly infected with HIV in 2018 of these are 160, 000 infections among children ages 0-14 [2]. Nigeria has the second largest HIV epidemic in the world [3]. An estimate of 1.9 million people in Nigeria were living with HIV in 2018. Recent drops in prevalence estimates for the country has been attributed to better surveillance [4].

Mother-to-child transmission (MTCT) of Human Immunodeficiency Virus (HIV) is the most significant route of HIV infection in children. Over 90% of HIV infections in children are acquired through the mother-to-child transmission (MTCT) route [5]. A woman with HIV who had no prevention of mother to child transmission (PMTCT) intervention has

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a 30-45% chance of passing the virus to her baby during pregnancy, labour, delivery as well as during breast feeding [6]. Nigeria contributes over a quarter (26.9%) of all cases of mother-to-child transmission (MTCT) of HIV in the world [7].

To achieve the goal of United Nations of elimination of new HIV infections, a program of prevention of mother-to-child transmission (PMTCT) was launched. With appropriate interventions which include use of antiretroviral (ARV) drugs, obstetric interventions and modification of infant feeding, MTCT rates have been reduced to <2% in some countries [8][9]. This has significantly reduced the incidence of paediatric HIV/AIDS and associated morbidity and mortality in those countries. The rate of mother to child transmission in Nigeria has remained high with an estimate of 22% in 2016 [10][11]. As such, reducing mother-to-child transmission remains a major target area.

The national PMTCT programme in Nigeria commenced in 2002 with supports from WHO and UNICEF [12]. The applicability and efficacy of PMTCT programs in Bowen University Teaching Hospital is scarcely known hence this study is instituted to determine the effectiveness of Prevention of Mother to Child Transmission of HIV in Bowen University Teaching Hospital, Ogbomoso, Oyo State.

1.1. Study Objectives

The broad objective is to evaluate the effectiveness of prevention of mother to child transmission (PMTCT) of HIV interventions.

1.2. Specific objectives include

- To determine the rate of mother to child transmission of HIV
- To determine the effect of ART (maternal and infant) on MTCT of HIV
- To determine the effect of delivery mode on MTCT of HIV
- The determine the effect of infant feeding type on MTCT of HIV

2. Material and methods

2.1. Research Design

This study was a retrospective longitudinal study targeting mother-infant pair seeking care at Bowen University Teaching Hospital.

2.2. Study Population

The study covered HIV positive pregnant women who registered and received ANC between January 1st 2015 and December 31st 2018 in Bowen University Teaching Hospital, Ogbomosho and infants followed-up for 6 weeks until HIV status was determined.

2.3. Method of data collection

Records of HIV positive pregnant women who registered and had antenatal care (ANC) in the period January 1st, 2015 to December 31st, 2018, delivered in or outside hospital and whose HIV-exposed babies were followed-up to 6 weeks of age when HIV status was determined by DNA polymerase chain reaction techniques were collected and analyse. Mother-infant pair data was extracted from PMTCT registers and patients' medical files.

The variables collected include total number of HIV positive pregnant women registered in the 4 years of the study, maternal age, employment status, type of ARV regimen, time of commencement, mode of delivery, infant feeding practice and infant HIV status.

2.4. Method of Data Analysis

Data was entered and processed using SPSS version 21. Descriptive statistics using frequency and percentages were also used, effect of various interventions on MTCT of HIV was determined using Pearson chi square test of significance.

2.5. Ethical consideration

Ethical approval for the study was obtained from Ethical review committee of Bowen University Teaching Hospital.

2.6. Confidentiality of Data

Confidentiality of information gotten was maintained as clients' names and personal details were excluded. Data collected was used for research purpose only.

2.7. Non-Maleficence to Participants

This study was not detrimental to the clients in any way.

3. Results

Table 1 Socio demographic characteristics of study population.

Variable	Frequency	Percentage
Age (years)		
20-24	2	2.5
25-29	7	8.75
≥30	71	88.75
	Mean 2.86	
Tribe		
Yoruba	74	92.5
Hausa	1	1.25
Ibo	1	1.25
Others	4	5.0
Occupation		
Civil servant	22	27.5
Trading	40	50
Unemployed	12	15
Others	6	7.5
Education		
Primary or less	18	22.5
Secondary	40	50.0
Tertiary	22	27.5
Religion		
Christianity	69	86.25
Islam	10	12.5
Traditional	1	1.25
Marriage setting		
Monogamy	73	91.25
Polygamy	6	7.5
Single parent	1	1.25
Parity		
0	12	15.0
1-2	33	41.25
>2	35	43.75

Table 1 revealed that majority were 30 years and above with mean age of 2.86, were Yoruba with 92.5%. Half of the population were traders with secondary level of education. More than three quarter were Christians and in monogamy setting.

Table 2 Rate of mother to child transmission of HIV

MTCT	Frequency	Percentage
Negative	79	87.78
Positive	4	4.44
Not followed up	7	7.78
Total	90	100

Table 2 above shows that of the total 90 infants only 83 were followed up till 6 weeks until HIV status was determined by DNA PCR. Of the 83, only 4 were HIV positive with MTCT rate of 4.82%

Table 3 Effect of ART (MATERNAL) on MTCT of HIV

Maternal ART		Infant HIV Status		Total	Pearson chi square
		Negative	Positive		
	ART Before pregnancy	28	0	28	41.41
	ART during pregnancy	41	1(25%)	42	p<0.001
	ART during delivery	0	1(25%)	1	
	ART during pregnancy/delivery	5	0	5	
	ART after delivery	0	1(25%)	1	
	No ART	2	1(25%)	3	
Total		76	4	80	

The table above shows the effect of maternal ART on the rate of mother to child transmission of HIV. None of the infant of mothers who started ART before pregnancy and those who had ART during pregnancy and delivery was positive. One each of mothers who started ART during pregnancy, started ART during delivery, started ART after delivery and mothers who didn't take ART at all was positive. Mothers who were on ART were statistically less likely to have HIV infected infants ($\chi^2=41.41$, $P<0.001$)

Table 4 Effect of INFANT ART on MTCT of HIV

Infant ART		Infant HIV Status		Total	Pearson Chi Square
		Negative	Positive		
Infant ART		74	0(0%)	74	34.554
No Infant ART		5	4(100%)	9	p<0.001
Total		79	4	83	

The table above shows that only infants who did not receive ART prophylaxis were positive. Hence, infants who were on ART were statistically less likely to be HIV positive ($\chi^2=34.554$, $P<0.001$).

Table 5 Effect of Delivery mode on MTCT of HIV

Delivery mode	Infant HIV Status		Total	Pearson Chi Square
	Negative	Positive		
EMC/S	3	1(25%)	4	3.923
ELC/S	10	0(0%)	10	P=0.141
SVD	63	3(75%)	66	
Total	76	4	80	

Table 5 above shows that none of the infants of mothers who had elective caesarean section was HIV positive, 25% of those whose mother had emergency caesarean section and 75% whose mothers had spontaneous vagina delivery were positive. Mode of delivery was statistically not significantly related to mother to child transmission of HIV ($\chi^2=3.92$, $P=0.41$)

Table 6 Effect of Infant Feeding option on MTCT of HIV

Infant Feeding	Infant HIV Status		Total	Pearson Chi Square
	Negative	Positive		
Exclusive	71	3(75%)	74	1.859
Formula	5	1(25%)	6	P=0.173
Mixed feeding	0	0	0	
Total	76	4	80	

The table above shows that of the 80 women, only 74 practiced exclusive breastfeeding and out of these 3 (75%) of their infants were HIV positive. Of the 6 women that practice formula feeding in the first six month of birth, only 1(25%) of their infant was HIV positive. None of the women practiced mixed feeding. Statistical analysis shows that infant feeding practice has no effect on mother to child transmission of HIV ($\chi^2=1.859$, $P=0.173$).

4. Discussion

A total number of 87 pregnant HIV positive women presented during this period, three of the women had twin gestation and only 80 followed up their infant until 6 weeks post-delivery when HIV status was determined by DNA PCR. This study revealed a mother to child transmission rate of 4.8% from January 2015 to December 2018. This rate is quite higher to what was reported by Agboghroma, Audu, Iregbu [13]. In a similar study in Abuja where the rate was 2.4% and 3.2% in another study [14]. The rate from this study is lower than what was reported in a study in Angola with of MTCT of HIV been 13.89% [15] and 7.7% MTCT rate in a study in Ethiopia [16]. This could be due to the promotion of PMTCT options in the hospital, increased level of awareness via media and increased in the number of facilities rendering PMTCT services in the country.

Maternal and infant ART has significant influence on mother to child transmission of HIV with $\chi^2=41.41$, $P<0.001$ and $\chi^2=34.554$, $P<0.001$ respectively. None of the infant of mothers who started ART before pregnancy and those who had ART during pregnancy and delivery was positive. Only one each of mothers who started ART during pregnancy, started ART during delivery, started ART after delivery and mothers who didn't take ART at all was positive and only infants who did not receive ART prophylaxis were positive. This is comparable to result of a study carried out in North Central Nigeria [17], where mothers who were on ART were statistically less likely to have HIV-infected infants ($\chi^2=54.71$, $P<0.001$). According to the report of a study in Nigeria [18], the prevalence of MTCT reduces when both mother and baby received a form of chemoprophylaxis for PMTCT. This indicates the importance of identifying HIV status before pregnancy or early in pregnancy so that prompt intervention can be put in place

Mode of delivery was statistically not significantly related to mother to child transmission of HIV ($\chi^2=3.92$, $P=0.41$), though none of the women who had elective caesarean section was HIV positive. This is similar with findings in Abuja Nigeria [19], where women who were delivered by CS had lowered MTCT compared with those who had a vaginal delivery. Elective CS was however associated with lower MTCT transmission rates compared with emergency CS. Also similar to this, is the report of a study in Guangdong province [20], where it was concluded that delivery mode might not be relative to HIV MTCT. This is in contrast to what was reported in a study in Nigeria [21], where the mode of delivery (caesarean section vs SVD) was statistically significant ($P<0.00$)

Of the 80 HIV positive women from this study, only 74 practiced exclusive breastfeeding and out of these 3 (75%) of their infants were HIV positive. Of the 6 women that practice formula feeding in the first six month of birth, only 1(25%) of their infant was HIV positive. None of the women claimed to have practiced mixed feeding. This corresponds to World Health Organisation guidelines which recommend the national authorities to promote one infant practice among mothers with HIV, either exclusive breastfeeding while ARV drugs are provided or avoiding all breast milk [22][23]. This reveals a good understanding of the risk of mixed feeding. Statistical analysis shows that infant feeding practice has no effect on mother to child transmission of HIV ($\chi^2=3.92$, $P=0.41$). The breastfeeding rate (92.5%) in this study was higher than findings from other African studies [24]. This reflects cultural practices supporting breastfeeding in Nigeria. However, with the higher rate of MTCT of HIV associated with exclusive breastfeeding, there is possibility that some of the mothers practiced mixed feeding. There is need to increase level of awareness of mothers on the concept of exclusive breastfeeding.

5. Conclusion

The rate of mother to child transmission of HIV in Bowen University Teaching Hospital Ogbomosho from January 2015 to December 2018 is 4.8%. All the infant who were positive were those who did not receive prophylaxis ART, hence it is important to strengthen the implementation of PMTCT program to increase the availability and acceptability of interventions. Although, this facility achieve the expectant goal of reducing the rate of HIV MTCT down to less than 5% with PMTCT interventions in place, there is still need to strengthen service provision and follow up to conform to global plan for the elimination of new HIV infections among children and keeping their mothers alive.

Compliance with ethical standards

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Disclosure of conflict of interest

There are no potential conflicts of interest in this study

Statement of informed consent

Since the study was a retrospective study, no informed consent was taken

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