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Outcome of Prevention of Mother to Child Transmission (PMTCT) of HIV Services at the University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt, Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Background: Mother to Child Transmission (MTCT) of HIV causes over 90% of Paediatric HIV and its prevention must be targeted to curb this scourge.
Objective: To determine the associated risk factors and outcome (HIV status) of HIV-exposed babies at the University of Port Harcourt Teaching Hospital (UPTH).
Methodology: This was a prospective study carried out at the Paediatric HIV clinic of UPTH. Information on sociodemographic data of the babies, age at referral, when the mother's HIV status was diagnosed, HAART use status of the mother, place of ANC and delivery, method of delivery, feeding option, duration of breast feeding and HIV status of the babies were obtained. Obtained data was analysed and a p- value of < 0.05 was considered significant at 95% confidence interval.
Result: A total of two hundred and sixty HIV exposed children were seen over the study period, with a male: female ratio of 1.4:1. The overall MTCT rate was 6.2%. Among the mothers that had the complete PMTCT intervention, an MTCT rate of 1.1% was observed, while it was 28.6% among mothers who had no form of PMTCT. Identified statistically significant risk factors to MTCT include; lack of use of HAART (χ^2 =116.2, p=0.0001); No infant ARV prophylaxis (p=0.0001); Mixed feeding

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(p=0.0001); Prolonged breast feeding (χ^2 = 7.09, P= 0.0287); TBA supervised pregnancy (χ^2 =31.9, P= 0.0001) and delivery (χ^2 =61.47, P= 0.0001).
Conclusion: PMTCT interventions in the control of MTCT of HIV is effective. To eliminate MTCT of HIV, promoting PMTCT services must be encouraged.

Keywords: Outcome; PMTCT services; HIV; UPTH.

1. INTRODUCTION

One of the challenges of HIV pandemia in children is Mother to child Transmission (MTCT), this is mainly because 90% or more of Paediatric HIV infection is from Mother to Child [1]. MTCT (also called vertical transmission) of HIV is the spread of HIV from a woman living with HIV to her child during pregnancy, childbirth (labour and delivery) or breastfeeding (through breastmilk). [2] Prevention of mother to child transmission (PMTCT) of HIV is a global interventional program initiated by the United Nations Organization and adapted to local needs to protect the children of the world from the scourge of the HIV pandemic [3]. The Nigerian National guideline on PMTCT specify a four-pronged approach to women and infants. These include prevention of HIV infections among women of child bearing age (15–49 years), prevention of unwanted pregnancies among women living with HIV, Prevention of Mother to child transmission (PMTCT) of HIV by providing women living with HIV and their infants with Highly Active anti-retroviral therapy (HAART) to maintain their health and prevent transmission during pregnancy, labour and breastfeeding and Care and support services to the HIV-infected women and members of the families [4,5].

For the PMTCT interventions, the National guidelines, [4] recommends that all pregnant women should be tested for HIV during their first antenatal clinic visit and that a repeat test should be offered to initially HIV negative women during the third trimester. Mothers would be placed on life-long highly active antiretroviral therapy (HAART) if found to be HIV positive and not already on treatment and delivery to be attended by skilled personnel either by spontaneous vaginal delivery (SVD) or elective caesarean section depending on their viral load and patients decision after counselling. It also includes, commencement of antiretroviral drugs (Post exposure prophylaxis using nevirapine) within 72hours of delivery and up to 6weeks to all HIV-exposed infants (children born to HIV positive mothers) and initiation of appropriate feeding (exclusive breastfeeding) or exclusive breastfeeding substitute if the mother opts for this for the first 6 months, then complimentary feed up till 2 years or beyond and then referral of these newborn infants to specialists as early as possible for continued care and follow up till 18 Months. Early Infant Diagnosis (EID) of HIV using Dried blood spot (DBS) specimen for DNA PCR is done at 6 weeks or as early as possible while a final antibody screening test using rapid diagnostic test (RDT) is carried out to ascertain the HIV status of the children [4,5].

Without any intervention, the risk of acquisition of HIV in utero or at birth is 15 to 30% and this increases to 20 to 45% with breastfeeding [6,7]. However, these interventions can reduce the risk of MTCT to below 5% [8] and studies have shown that it can reduce the risk of MTCT of HIV to less than 1% in developed countries, [5,9] however, this is much less so in developing countries despite positive strides [10]. Presently, there is global call for “elimination” of Paediatric HIV [5], defined as 90% reduction of new infant infections and a decrease of MTCT to <5% [11, 12,13]. However, global coverage of PMTCT services remains below what is required to meet this goal [7]. Measuring impact of PMTCT programs is necessary to track achievements towards this goal. The study sought to determine the outcome (HIV status) of HIV-exposed babies who were followed up at the Paediatric HIV clinic of the University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria, a low resource-setting. Effects of risk factors like lack of Highly Active Anti Retroviral Therapy (HAART) use of the mothers in pregnancy, Place of ANC and delivery, mode of delivery, breastfeeding and its duration, and lack of post exposure prophylaxis (nevirapine) use of the children on the rate of vertical transmission of HIV among these children were also examined.

2. METHODOLOGY

This was a prospective study carried out over three years from January 2016 to December 2018 at the Paediatric HIV clinic of the University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt. Information on all babies and mothers who were referred from the Obstetrics and Gynaecology department of UPTH and babies

delivered outside the hospital were recorded into a questionnaire. Also recorded were information on sociodemographic data of the babies, age at referral, HAART use status of the mother and when HAART was commenced, Place of ANC and delivery, method of delivery, feeding option and duration of breast feeding and HIV status of the babies. Use of HAART was classified in terms of use before pregnancy or first trimester, after first trimester or not at all. It was difficult to ascertain the viral loads of the mothers in pregnancy as this study was carried out post-delivery and so this was not considered in the final analysis. Children whose mothers received HAART before or early in pregnancy, who had ANC and delivered in a health facility, who did not practice mixed feeding, and whose children received the recommended 6 weeks of post exposure prophylaxis using nevirapine were classified as having had the full PMTCT intervention while those who had none of these were termed as not received any PMTCT intervention. Those who had incomplete intervention were discussed as such. Early Infant Diagnosis (EID) of HIV was determined at 6 weeks or at the earliest opportunity by DNA PCR using Dried blood spot (DBS) sample while subsequently an antibody test using two positive rapid diagnostic test (RDTs) at 18 months was performed to determine the final HIV status of the babies. Babies who were being breastfed at the time of collection of the DBS sample who had a negative DNA PCR result, had a second DBS sample collection from them at least 6 weeks after complete cessation of breastfeeding. These children were categorized based on their HIV status using their HIV DNA PCR results or results of the RDTs done at 18 Months. Those found to be HIV positive at any point were commenced on ART while those who were HIV negative were followed up till 18 Months and subsequently discharged from the clinic after the RDT at 18 Months is negative Obtained data was entered into an excel sheet and analysed using epi info version 6.04 and presented in prose, frequency tables, pie and bar charts. The test of statistical significance was done using chi square while a p- value of < 0.05 was considered significant and 95% confidence interval.

3. RESULTS

3.1 Demographic Distribution /HIV Status of the Children

A total of two hundred and sixty HIV exposed children were seen over the study period, 150 (57.7%) were males and 110 (42.3%) were females giving a male: female ratio of 1.4 :1. The age of the children at first visit ranged from 2-61weeks with a mean age of 11.4±10.7 weeks. Of the 260 children seen, 244 (93.8%) were HIV negative while sixteen were HIV positive, giving an overall MTCT rate of 6.2%. (Fig. 1). One hundred and sixty one (61.9%) mothers had the complete PMTCT intervention and delivered in UPTH and all their children were found to be HIV negative, however, two children whose mothers had ANC and delivery at UPTH did not receive HAART in pregnancy and their children were found to be HIV positive giving an MTCT rate of 1.2% in UPTH. Four 4 (1.1%) of the 36 mothers who had the complete PMTCT program and delivered in a private hospital or Health centre were found to be positive, while the MTCT rate among the children whose mothers had no form of PMTCT was 28.6% (Table 1).

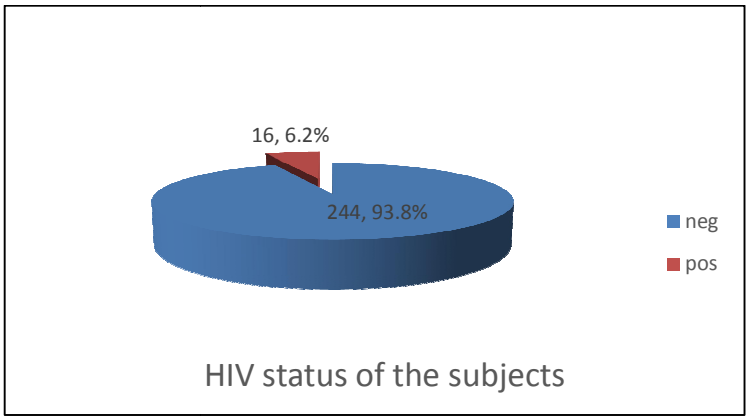

Fig. 1. HIV status of the subjects

Table 1. PMTCT interventions and the HIV status of the Baby

Mother received HAART	Children received Nevirapine	Children breast feed (without mixed feeding)	Place of ANC	Place of delivery	No of children tested	No of children positive	Percentage positive
Yes	Yes	Yes	UPTH	UPTH	161	0	0.0
Yes	Yes	Yes	PH/HC	PH/HC*	36	4	1.1
No	No	No	TBA	TBA**	28	8	28.6

** PH/HC : Private Hospital/Health centre*
*** TBA: Traditional Birth Attendant*

3.2 HIV Status of the Children and Mothers HAART

The mothers of two hundred and twenty four children commenced HAART before conception or in the first trimester while that of twenty five children commenced HAART after the first trimester. Of the twenty five children whose mothers commenced HAART after first trimester, 9(36.0%) were HIV positive while none of the children whose mothers commenced HAART before conception or during the first trimester were positive. Seven (63.6%) of the children whose mothers did not receive HAART were HIV positive. There was a statistically significant relationship between the mothers ART status and HIV status of the children (X^2 =116.2, p=0.0001) Table 2.

3.3 HIV Status and Place of Delivery and Ante-Natal Care (ANC)

Fig. 2 shows that out of the twenty eight children delivered at the home of a Traditional birth attendant (TBA), 11 (39.3%) were found to be HIV positive while 2 (1.1%) and 3 (6.4%) were found to be HIV positive among the 185 and 47 children delivered at the University of Port Harcourt Teaching Hospital (UPTH) and in private hospitals/Health centres respectively. There was a statistically significant relationship between the place of delivery and the HIV status of the children (X^2 =61.47, P= 0.0001). Fig. 2 also shows that Two (1.1%) children out of the one hundred and eighty seven whose mothers had ante natal care at UPTH were found to be HIV positive while 6 (15.4%) and 8 (23.5%) children among those whose mothers had ANC in private hospital/Health centre and in TBA were found to be HIV positive Table 3. There was a statistically significant relationship between the HIV status of the children and the place their mother's pregnancy was supervised (X^2 =31.9, P= 0.0001.

3.4 HIV status of the Children and Mode of Delivery

Table 3 shows that of the two hundred and three children delivered by Spontaneous vaginal delivery (SVD), 15 (7.4%) were HIV positive while 1 (1.7%) of the children delivered by Caesarean section (CS) was HIV positive. However, this difference was not statistically significant (X^2 =2.44, p =0.1177). Children delivered by SVD constituted (93.8%) of all the children found to be positive to HIV.

3.5 HIV Status of the Children and Nevirapine Use

Of the 238 children who received Nevirapine 9 (3.8%) were found to be HIV positive, while 7 (31.8%) out of the twenty two children who did not receive nevirapine were found to be positive to HIV. This difference between the HIV status of the children and nevirapine intake was found to be statistically significant (p=0.0001) (Table 4).

Table 2. HIV status of the children and mothers ART in pregnancy

HIV results	HAART after 1st Trimester	HAART before conception or in 1st trimester	No ART	Chi-square (p-value)
Negative	16 (64.0)	224 (100.0)	4 (36.4)	116.2
Positive	9 (36.0)	0 (0.0)	7 (63.6)	(0.0001)*
Total	25 (100.0)	224 (100.0)	11 (100.0)	

**difference is statistically significant (p<0.05)*

Table 3. HIV status of the children and mode of delivery

HIV result	CS	SVD	Chi-square (p-value)
Negative	56 (98.3)	188 (92.6)	2.44 (0.1177)**
Positive	1 (1.7)	15 (7.4)	
Total	57 (100.0)	203 (100.0)	

***difference is not statistically significant(p>0.05); CS- Ceaserean section; SVD- Spontaneous vaginal delivery*

Table 4. HIV status of the children and Nevirapine use

HIV results	Nevirapine Yes	Nevirapine No	Chi-square (p-value)
Negative	229 (96.2)	15 (68.2)	27.4 (0.0001)*
Positive	9 (3.8)	7 (31.8)	
Total	238 (100.0)	22 (100.0)	

**difference is statistically significant (p<0.05)*

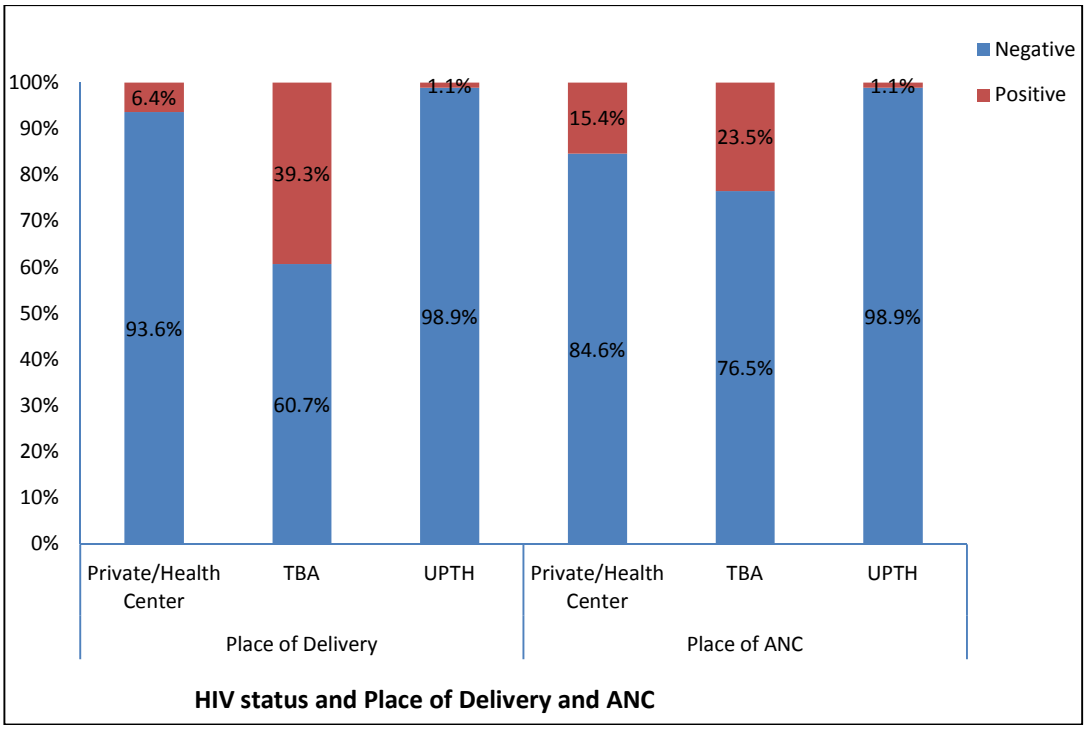

Fig. 2. HIV status and place of delivery and ANC
TBA- Traditional birth attendant
UPTH- University of Port Harcourt Teaching Hospital

3.6 HIV Status of the Children and Breastfeeding

Two hundred and thirty four (90%) of the 260 children in this study were breastfed, 4 (1.7%) out of them were mixed fed while 230 (98.3%) were exclusively breastfed (EBF). All 4 (100%) of the children who were mixed fed were found to be HIV positive while 10(4.3%) of those who were EBF were HIV positive and this difference was statistically significant (p=0.0001). Two (7.7%) of the twenty six children who were not breast fed were also found to be HIV positive. Table 5 shows the duration of the breastfeeding among the children and their HIV status. Among the sixty who were exclusively breast feed for six months only, 2 (3.3%) were positive to HIV while 10 (6.0%) of the one hundred and sixty seven who breast feed for 6-12 Months were HIV positive. There was a statistically significant relationship between the duration of breastfeeding and the HIV status of the children.

3.7 HIV status and Age at presentation to the Paediatric Clinic

Only 4 children presented to the Paediatric clinic at 2 weeks and they were all HIV negative, 4 (3.4%) of the 119 that presented from three to six weeks were HIV positive while 12 (8.8%) out of the 137 that presented after 6weeks were found to be HIV positive. There was a direct proportional relationship between increasing age at presentation and the HIV positive status of the children, however, this was not statistically significant (X^2 =3.49, P=0.1756).

Table 5. HIV status of the children and duration of breastfeeding

HIV result	Duration of breastfeeding				Chi-square (p-value)
	6 months	7-12 months	>12 months	Total	
Negative	58 (96.7)	157 (94.0)	5 (71.4)	220 (94.0)	7.09
Positive	2 (3.3)	10 (6.0)	2 (28.6)	14(6.0)	(0.0287)*
Total	60 (100.0)	167 (100.0)	7 (100.0)	234 (100.0)	

**difference is statistically significant (p<0.05)*

4. DISCUSSION

This study found an overall MTCT rate of 6.2% among all the children and 1.2% among the children whose mothers had ANC and delivery at UPTH. The MTCT rate was zero percent and 1.1% among the children who had the complete PMTCT interventions and delivered in UPTH and private hospital/health centres respectively, while a rate of 28.6% was observed among the children who had no form of PMTCT intervention.

The overall MTCT rate observed in this study is similar to the findings of Moges, et al. [14] who found a prevalence of 5.9% in East and West Gojjam zones, Ethiopia. It also fell within the range of 4.16-15.7% found by Kassa [15] in a systematic review of MTCT and its associated factors in Ethiopia. It is however lower than the findings of Koye, et al. [16] and Berhan, et al. [17] who found a MTCT rate of 10% and 10.1% respectively. These differences in the MTCT rates may be due to the varying coverage rate of the PMTCT program in these communities.

The low MTCT rate of 1.2% and 1.1% among the children whose mothers had ANC and delivery at the UPTH and in private hospital/Health centres respectively reinforces the fact that the PMTCT interventions is successful when implemented. The two mothers whose children were HIV positive refused to commence HAART in pregnancy because they were in denial of their HIV status despite counselling and in one of the children nevirapine which is the recommended ART for exposed infants in our National program was not administered to the child by the mother for same reason of denial. This observed rate meets the global elimination standard of reduction of MTCT rate to <5% and compares with findings in many countries that have been certified as having eliminated MTCT [18]. Scaling up the PMTCT program for better coverage within the communities in the sub region is advocated. The observed MTCT rate of 28.6% in children of mothers who had no form of PMTCT intervention compares favourable to Previous findings [6,7] and further strengthens the need for Improved PMTCT programs in other to achieve the elimination of MTCT of HIV.

Use of Highly Active Anti Retroviral Therapy (HAART) in pregnancy have been shown to reduce MTCT of HIV [19] as was found in this study. This is especially so when it is commenced early in pregnancy as it has been shown that it takes at least 13 weeks of HAART to cause remarkable viral suppression to undetectable levels, [19] and mothers who received ART for less than four weeks had a five-fold increased risk of HIV transmission to their babies [19]. In this study it was difficult to determine the mothers viral load but one can extrapolate that there was a good viral load suppression among the mothers who commenced HAART before pregnancy or in the first trimester of pregnancy as none of their children was found to be HIV infected. This finding supports the advocacy for early ANC, early HIV screening and early commencement of HAART to reduce MTCT as HIV-infected expectant mothers who are diagnosed as HIV-positive during early pregnancy can receive a long enough course of HAART to ensure that the number of viral copies in their blood becomes undetectable by their due date, posing a negligible risk of transmission of the virus during labor and delivery, and allowing them to have a normal vaginal birth [20].

This study did not find a statistically significant association between the HIV status of the children and the mode of delivery, however, more of the children delivered by SVD (7.4%) compared to those who had CS (1.7%) were HIV positive. Siobhan, et al. [21] showed that in virally suppressed women, neither elective CS nor SVD increased the risk of MTCT. They also found that in these virally suppressed mothers prolonged rupture of membranes for more than 4 hours, a contributory factor to increased MTCT in SVD did not increase MTCT among mothers who had SVD. Initiation of ART early in pregnancy and ensuring viral suppression is a very strong determinant of the viral status of the babies. The mode of delivery, especially vaginal delivery, becomes a contributor to the infants' HIV status in mothers with high viral load at term.

In this study significantly more children (31.8%) who did not receive nevirapine were found to be HIV positive as opposed to the 3.8% who received nevirapine. As was found in this study, evidence show that not initiating ARV prophylaxis to the infant is a risk factor for MTCT of HIV [22, 23]. Without ARV drugs, a potential effect of HIV transcription, replication and fusion increase in the human body and this increases the risk of MTCT [24]. Other studies have shown that HIV-exposed infants who did not receive ARV prophylaxis and whose mother did not receive HAART in pregnancy and who breastfeed were nearly six times more likely to get HIV infection [25-27].

This study found that the rate of MTCT was higher among mothers whose pregnancy and delivery was attended to by a TBA (23.5% and 39.3%) than in a private hospital/health centre (15.4% and 6.4%) or tertiary (1.2%) hospital. The low MTCT rate of 1.2% among children whose mothers had ANC and delivery at the UPTH is in tandem with the study of Maria, et al. [28] who found a lower risk of MTCT among children whose mothers had ANC at University hospital. It is also comparable to what obtains in many industralised [5,9] cities and validates the importance and effectiveness of PMTCT services at the centre. However, this is not a true reflection of what obtains at the community as this is a referral centre. In many of these health centres and private clinics there is no proper PMTCT programs and this may explain the higher rate of MTCT observed in these centre. The high rate of MTCT in children whose mother's pregnancy and delivery was attended to in TBA homes is a true reflection of what obtains at the community and supports the finding that infants delivered at home were nearly three times more likely to acquire HIV infection compared to those delivered at health institutions [29,30]. This may be due to the fact that home deliveries are froth with lots of harmful traditional practices that promote MTCT of HIV such as cord-cutting with shared razor blade, delivery without use of hand gloves, placental blood contamination, uvulectomy, unplanned circumcision and breast feeding from unexamined nipples [31]. The lack of implementation of PMTCT programs as is obtained in some health facilities in the country and the fact that a large proportion of MTCT occur during pregnancy and child birth are also strong contributory factors to home deliveries.

This study showed a high breastfeeding rate of 90% with an EBF rate of 98.3% among the women who breast fed. Umeobieri, et al. [32] also found a breast feeding rate of 75% among HIV positive women in South East, Nigeria. While we didn't explore the reason for this high breastfeeding rate, Umeobieri, et al. [32] found reasons that included personal choice, cultural norms, fear of HIV status being disclosed and pressure from family members. The high EBF rate among HIV positive mothers found in this study is highly commendable and probably sterns from the knowledge among mothers that mixed feeding increases the risk of MTCT. Breast feeding in the context of HIV has been dynamic; Prior to now, replacement feed was recommended while breastfeeding was discouraged among HIV positive mother and this gradually evolved to short duration of breast feeding and a quick transition to other feeds. However, increasing evidence is showing that the feared risk of MTCT among breastfeeding mothers is low especially with the advent of effective HAART in pregnancy, women and so many mothers with HIV are increasingly breastfeeding their children with good outcome. This is translational research and the power of evidence-based practice. In this study, all the children who were mixed fed had MTCT of HIV, while the rate of MTCT was 4.3% and 7.7% among the children who had EBF and exclusive breastmilk substitute respectively. Also, the proportion of HIV seropositivity among the children increased with increased duration of breast feeding and this finding was found to be statistically significant. Mixed feeding have been identified as a strong predictor of high rate of MTCT of HIV. Studies have shown that infants who were mixed fed were seven times more likely to acquire HIV compared to those who were exclusively breastfed [33,34]. Mixed feeding is said to be associated with local gastrointestinal inflammation and small sites of damage from pathogens and dietary antigens in formula. Once the integrity of the baby's gut has been compromised, there is increased gut permeability of the virus across the intestinal mucosa. On the other hand, protective components in mother's milk, for example epidermal growth factor, can help intestinal epithelial barrier to mature, thus helping to protect against infection with HIV.

The current Nigerian National policy recommends that Mothers who are HIV positive can breastfeed for 2 years and beyond without the feared risk of increased HIV transmission, this study found an increasing transmission rate with increased duration of breastfeeding. This may have been due to fewer representation of children who breastfed for more than 12months and requires more investigation.

Mothers who presented early to the Paediatricians for follow up had lower rates of MTCT of HIV compared to those who presented later though the observed difference was not statistically significant. The PMTCT program recommends that within 2 weeks of delivery, HIV exposed infants should be reviewed by a specialist. During this first review, mothers and infants adherence to HAART and nevirapine, infant feeding practice, breast care of the mother and oral hygiene of the infant and general concern and challenges faced by the mothers

are discussed and solutions proffered. It is therefore not surprising that mothers who present early had lower risk of MTCT.

5. CONCLUSION

This study has shown the effectiveness of the PMTCT interventions in the control of MTCT of HIV and the high risk of HIV pandemia associated with the lack of it. To achieve the global target of elimination of MTCT of HIV, efforts geared at ensuring that all pregnant women are registered for antenatal care, screened for HIV in pregnancy and referred to centres where PMTCT services are offered must be intensified. Therefore, expanding the PMTCT programs until all women of child bearing age are reached must be top government priority.

CONSENT AND ETHICAL APPROVAL

Ethical approval for the study was obtained from the ethics and research committee of the UPTH. Informed verbal consent was obtained from the mothers.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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