

## Effect of Mode of Delivery & Method of Feeding on Risk of Mother to Child Transmission (MTCT) of HIV in Pregnant Women Registered Under the PPTCT Programme

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### Abstract

**Introduction:** Mother-to-child transmission of HIV is a major route of new infections in children. MTCT is multifactorial and are affected by various factors including both virus and host factors. Identifying factors associated with MTCT of HIV will have paramount importance in eliminating new HIV infections among children. This study focuses on mode of delivery and method of feeding obtained by HIV positive mother and we will review how these 2 factors influence the risk of MTCT.

**Method:** This was a retrospective observational study. For the study, analysis of data of pregnant women registered under the PPTCT programme from 2014 onwards upto their delivery and follow up of their babies upto 18 months post-delivery was done. Throughout the study period confidentiality was maintained.

**Results:** This study showed that mode of delivery is not related to MTCT (p value- 0.348) while method of feeding significantly associated with risk of MTCT (p value- <0.0001). Among 103 HIV positive newborns, 78.6% HIV positive newborns delivered vaginally while 21.3% HIV positive delivered by caesarean section, and 90.2% HIV positive newborns were given mixed feed, 3.7% HIV positive newborns were on breast feed while 5.8% HIV positive newborns were given replacement feed.

**Conclusion:** This study concluded that optimally managed HIV positive pregnant women can continue labor and deliver by vaginal route. C-section should be performed for obstetric indications only. Ideal method of feeding is replacement feed as it has no possibility of MTCT. In resource poor countries, exclusive breastfeeding is the best option. Mixed feeding should strictly be avoided.

**Keywords:** HIV-human immunodeficiency virus, MTCT–mother to child transmission, PPTCT- prevention of parent to child transmission

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### Introduction

Acquired immunodeficiency syndrome (AIDS) is currently one of the worst global

pandemics. The human immunodeficiency virus (HIV) causes HIV infection and over time AIDS.

Passage of a disease-causing agent from mother to child during the period immediately before and after birth is called vertical transmission or mother to child transmission (MTCT). Mother-to-child transmission of HIV is a major route of new infections in children. HIV prevalence among adult population in India has declined consistently over last one decade from 0.4% in the year 2000 to 0.27% in 2011. [1]

To give a HIV free generation, The National AIDS control programme (NACP) launched prevention to parent to child transmission (PPTCT) of HIV in the year 2001-2002 [2] which aims at preventing the transmission of HIV infection from mother to child during antenatal, intranatal as well as postnatal period.

Vertical transmission or MTCT is multifactorial and are affected by various factors including both virus and host factors, not all of which have been fully elucidated. Identifying factors associated with MTCT of HIV will have paramount importance in eliminating new HIV infections among children. This study mainly focuses on mode of delivery and method of feeding obtained by HIV positive mother affecting risk of MTCT. Specifically, study will review how these 2 factors influence the likelihood of MTCT. This study will not discuss viral factors; such as viral phenotype and viral load, socioeconomic and demographic factor, maternal factor; such as maternal immunological status, nutritional status, clinical factors, infant factors such as birth weight, nevirapine prophylaxis received by infant.

Thus, the findings from this study are expected to reflect the effect of method of feeding and mode of delivery on risk of

MTCT in terms of newborn outcome in pregnant women infected with HIV.

### **Methods and Materials**

This was a retrospective observational study, done after approval by the institutional ethical committee. All antenatal case and status of their babies from 2014 onwards, who were registered under PPTCT programme in ART center of NSCB medical college Jabalpur were taken for study. Antenatal cases delivered till January 2019 were included and their newborns were followed up till July 2020. For the study, analysis of data of mothers registered under the PPTCT programme up to their delivery and follow up of their babies upto 18 months postdelivery was done. The data and Antenatal history including mode of delivery and mode of delivery was collected from ART center and PPTCT unit of NSCB medical college Jabalpur. Babies were followed up by HIV testing done at 6 weeks, 6 months, and 12 months. The testing was done by the dried blood smear on blot paper and then sent to the reference laboratory. Final diagnosis of babies was made by confirmatory antibody test done at 18 months of age.

### **Results**

#### **Maternal characteristics**

There were 458 antenatal cases registered under PPTCT programme and their babies were included in this study. Most of the cases 356 (77.7%) were between 20-30 years age. Majority of women 315 (68.7%) were unbooked. In the study, majority of women 369 (80.5%) were in clinical stage 1 followed by stage 2 (16.6%). There were 372 (81.2%) women were on TLE regimen and 86 (18.78%) were on ZLN regimen. Among all the cases, 341 (74.45%) were delivered by vaginal delivery and 117 (25.55%) were delivered by caesarean section.

**Table 1: Maternal Characteristics**

Characteristics	Number	Percentage
<b>Age</b>		
<=19 years	2	0.44
20-30 years	356	77.73
>30 years	102	22.27
Total	458	100.0
<b>Booking Status</b>		
Booked	143	31.2
Unbooked	315	68.7
Total	458	100.0
<b>WHO Clinical Staging</b>		
Stage 1	369	80.5
Stage 2	76	16.6
Stage 3	13	2.84
Total	458	100.0
<b>ART Regimen</b>		
TLE	372	81.22
ZLN	86	18.78
Total	458	100.0
<b>Mode of Delivery</b>		
Cesarean section	117	25.55
Vaginal delivery	341	74.45
Total	458	100.0

**Infant characteristics**

As shown in table no 2, Neonates, who were followed in this study, majority of them 295 (64.41%) were on replacement feeding, 125 (27.29%) were given mixed feeding and 38 (8.30%) were given breast feeds. There were 458 live births, 344

(75.11%) neonates were normal, 93 (20.31%) neonates were low birth weight, 20( 4.3%) were very low birth weight born. 366 (79.91%) neonates were able to achieve the milestones as per age while 91( 19.87%) neonates were not able to achieve the milestones according to age.

**Table 2: Infant Characteristics**

Characteristics	Number	Percentage
<b>Method of feeding</b>		
Mixed	125	27.29
Breastfeed	38	8.30
Replacement	295	64.41
Total	458	100.0
<b>Neonatal Outcome</b>		
Normal birth weight	344	75.11
LBW	93	20.31
VLBW	20	4.37
Death	1	0.22
Total	458	100.0
<b>Milestone Achieved as per Age</b>		
Died	1	0.22

No	91	19.87
Yes	366	79.91
Total	458	100.0

**Effect of Mode of Delivery:** Out of 103 HIV positive newborns, 78.6% HIV positive newborns delivered vaginally while 21.3% HIV positive delivered by caesarean section.

Out of 355 HIV negative newborns, 73.5% HIV negative newborns were delivered

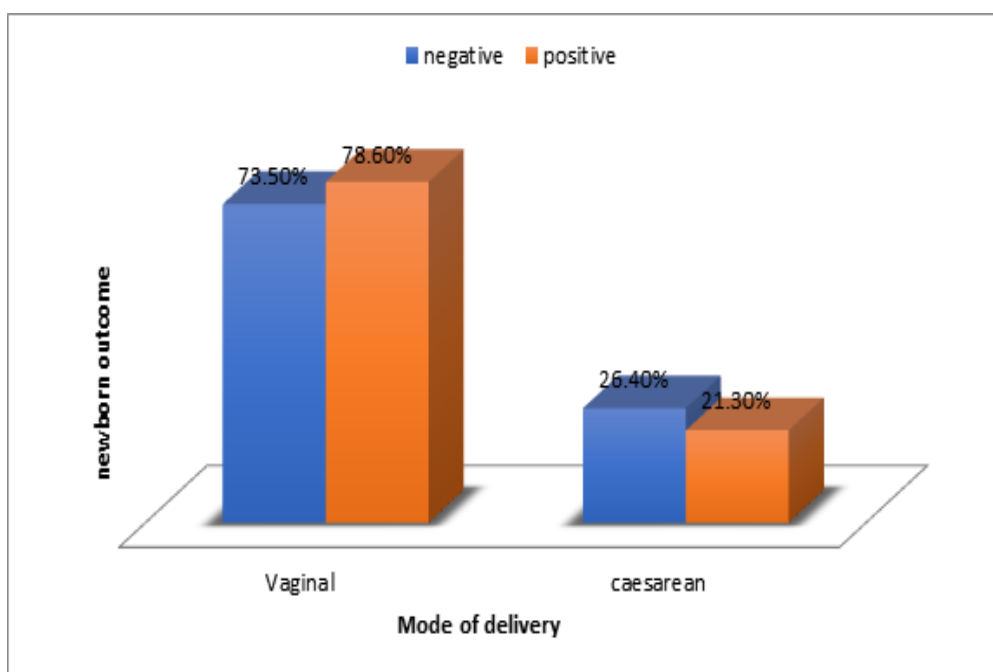
vaginally while 26.4% HIV negative newborns delivered by caesarean section.

There was no statistically significant association seen between mode of delivery and their newborn outcome (p=0.348) as a result of MTCT of HIV. Thus, study showing that the MTCT of HIV is not dependent on the mode of delivery.

**Table 3: Association between mode of delivery and newborn outcome resulting from MTCT of HIV**

Mode of delivery	Newborn outcome			
	Negative		Positive	
	N	%	N	%
Vaginal	261	73.5	81	78.6
Caesarean	94	26.4	22	21.3

Chi square – 0.881 p value- 0.348



**Figure 1: association between mode of delivery and newborn outcome resulting from MTCT**

**Effect of method of feeding**

Out of 103 HIV positive newborns resulting from MTCT of HIV, 90.2% HIV positive newborns were given mixed feed, 3.7% HIV positive newborns were on breast feed

while 5.8% HIV positive newborns were given replacement feed.

Out of 355 HIV negative newborns, 9.1% HIV negative newborns were given mixed feed, 9.7% HIV negative newborns were on

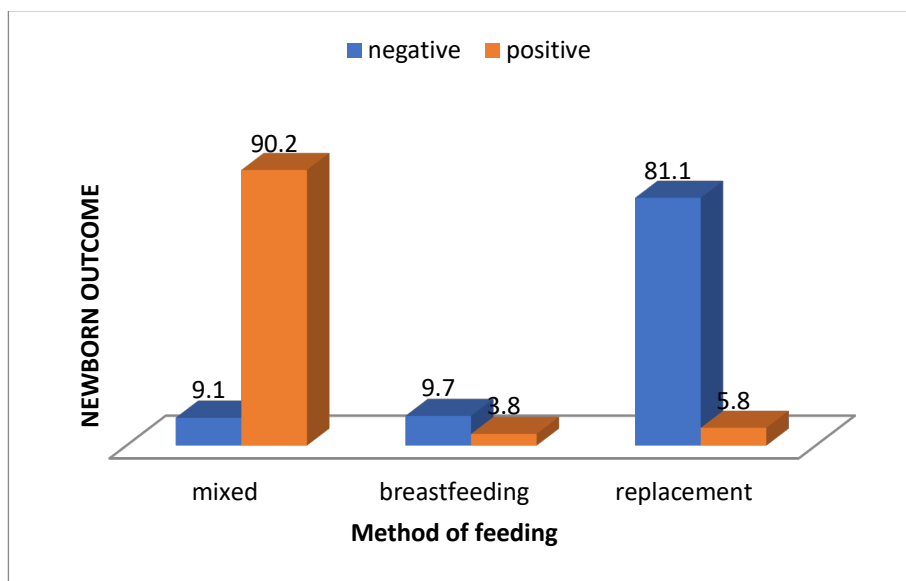
breastfeed while 81.1% HIV negative newborns were given replacement feed.

There was a statistically significant association seen between different method of feeding received by newborn and their outcome(p=0.0001).

**Table 4: Association Between Method of Feeding and Neonatal Outcome resulting from MTCT**

Infant feeding	Newborn outcome			
	Negative		Positive	
	N	%	N	%
<b>Mixed</b>	32	9.1	93	90.2
<b>Breastfeed</b>	35	9.7	4	3.7
<b>Replacement</b>	288	81.1	6	5.8

Chi square-269.451 P value- <0.0001



**Figure 2: Association Between Method Of Feeding And Neonatal Outcome.**

**Discussion:**

This observational study entitled “Effect of mode of delivery & method of feeding on risk of mother to child transmission (MTCT) of HIV in pregnant women registered under the PPTCT programme” was conducted in the department of Obstetrics and Gynaecology, NSCB Medical College, Jabalpur, Madhya Pradesh. All HIV positive pregnant women fulfilling the inclusion criteria and registered in the ART center of our institution under the PPTCT programme were included in the study.

Various factors are responsible for MTCT Of HIV and their adequate knowledge can help in reducing the transmission of HIV

from mother to their children. In this study, 2 factors were studied. These are-

**Mode of delivery:**

This study suggests that, in a group of 458 HIV positive pregnant women who gave birth over 6 years, either mode of delivery (vaginal delivery or caesarean section) does not increase the likelihood of MTCT.

We examined the association of mode of delivery and risk of MTCT. We found no statistically significant association between the mode of delivery and the newborn outcome resulting from MTCT (p=0.348), showing that the risk of mother to child transmission is not dependent on the mode of delivery. Previous data showed

marginally less chances of mother child transmission of HIV in newborns delivered by cesarean section. According to these studies, vaginal delivery was associated with a higher incidence of mother to child transmission. In our study caesareans were done only in case of obstetric indication and not for HIV infection.

Similar results were found by the study conducted by Siobhan mark et al [3] who showed that there was no association between mode of delivery and MTCT in the cohort of 210 virally suppressed HIV positive pregnant women.

The study conducted by Ngwende et al [4] found that caesarean section reduces MTCT of HIV though this did not achieve statistical significance. On the contrary, the study conducted by Mahim Mittal et al [5] showed that Normal vaginal delivery is associated with higher rate (16.6%) of transmission as compare to LSCS (9%).

#### **Effect of method of feeding:**

In this study we found statistically significant association between different methods of newborn feeding and the outcome in terms of mother to child transmission to the newborn ( $p=0.0001$ ).

Our study showed that among HIV positive newborn, the proportion of mixed feeding practices was higher compared to exclusive breastfeeding and replacement feeding. So, it seems that the mixed feeding practices is the one factor which was the most likely associated with mother to child transmission of HIV, as compared to exclusive breastfeeding and replacement feeding.

The possible reason for this is that mixed feeding causes breach in the oral mucosa and irritation of immature gastrointestinal tract of infants by additional foods. This might facilitate the entry of HIV viral particles from mother's breast milk to the blood stream of newborn.

Even though formula (replacement) feeding offers the safest option for HIV

prevention, in resource poor settings, it is impossible for families to afford formula feeds or access clean water for its use. In India, 98% of children are breastfed and it is estimated that 54% of all deaths before age of five years are related to malnutrition [6]. The introduction of formula feeding for averting the transmission of HIV imposes an additional handicap to an already malnourished population. Consequently, exclusive breastfeeding should be recommended for infants born to HIV-positive mothers during the first 6 months of life, provided such mothers are on lifelong ART

Our results are in accordance with result found in study conducted by Mahim Mittal, Ashutosh Kumar Mall, Yash Gopal Sharma [5] The study conducted by Jonathan Izud et al, [7] also found that mothers who exclusively breastfed their infants during the first 6 months of life were significantly less likely to transmit HIV compared to those who never exclusively breastfed their infants during the first 6 months of life (UOR = 0.06; 95% CI: 0.03–0.16;  $p < 0.001$ ). exclusive breastfeeding in the first 6 months of life reduced MTCT.

Similar results were found in the study done by Beyene et al , [8] who found that those infants who were given mixed feed in first 6 month of life, were positively and significantly associated with MTCT of HIV. A case control study conducted by Burusie A et al [9] found similar results and showed that mixed feeding was significantly associated with MTCT ( $p$  value = 0.001). while no significant difference was seen between exclusive breast and replacement feeding about HIV MTCT. [10]

#### **Conclusion:**

In a cohort of 458 HIV pregnant women registered under PPTCT programme, study showed that MTCT was not related with mode of delivery. Allowing optimally managed HIV positive pregnant women to continue labor and deliver by vaginal route

is acceptable. Caesarean sections should not be recommended for prevention of mother-to-child transmission, particularly where women are taking ART for their own health, C-section should be performed for obstetric indications only.

As mixed feeding is associated with the highest probability of transmission, patients need to be educated to absolutely avoid mixed feeding. The ideal would be replacement feeding, which has no possibility of transmission of HIV from the mother to the newborn and should be recommended in all cases where it is affordable, acceptable, feasible and safe. In resource poor countries like India, the best option is to continue with exclusive breastfeeding, with proper education to avoid any mixed feeding in the best interest of the baby.

#### References:

1. [http://naco.gov.in/sites/default/files/National\\_Guidelines\\_for\\_PPTCT.pdf](http://naco.gov.in/sites/default/files/National_Guidelines_for_PPTCT.pdf)
2. <http://naco.gov.in/prevention-parent-child-transmissionpptct>
3. Siobhan Mark, Kellie E. Murphy, Stanley Read, Ari Bitnun, Mark H. Yudin, HIV Mother-to-Child Transmission, Mode of Delivery, and Duration of Rupture of Membranes: Experience in the Current Era, *Infectious Diseases in Obstetrics and Gynecology*, 2012; 5 pages.
4. Ngwende Stella & Gombe Notion & Midzi Stanley & Tshimanga Mufuta & Shambira Gerald & Chadambuka, Addmore. Factors associated with HIV infection among children born to mothers on the prevention of mother to child transmission programme at Chitungwiza Hospital, Zimbabwe, 2008. *BMC public health*. 2013; 13:1181.
5. Mittal M, Mall AK, Sharma YG. Maternal and fetal outcomes in HIV positive pregnant female. *Int J Res Med Sci* 2016;4:5237-40.
6. Arnold F. *Sciences II for P, International M: Nutrition in India*. International Institute for Population Sciences, 2009.
7. Jonathan Izudi, Pontius Apangu, Francis Bajunirwe, Edgar Mulogo, Vincent Batwala, High Baseline CD4 Count and Exclusive Breastfeeding Are Associated with Lower Rates of Mother to Child HIV Transmission in Northwestern Uganda: A Two-Year Retrospective Cohort Study, *Advances in Public Health*. 2018; 8 pages.
8. Peters H, Byrne L, De Ruiten A, Francis K, Harding K, Taylor GP, Tookey PA, Townsend CL. Duration of ruptured membranes and mother-to-child HIV transmission: a prospective population-based surveillance study. *BJOG*. 2016 May;123(6):975-81.
9. Burusie A, Deyessa N. Determinants of Mother to Child HIV Transmission (HIV MTCT); A Case Control Study in Assela, Adama and Bishoftu Hospitals, Oromia Regional State, Ethiopia. *Cell Dev Biol*. 2015; 4: 1000152.
10. Estrada R. E. G., Bohorquez G. D. B., Burgos R. A. O., Mendonça M. J. M. de, Sabando C. M. M., Sabando A. J. M., Reyes J. D. S., & Solano O. A. Impact of bariatric surgery on the sexual health of the morbid obese. *Journal of Medical Research and Health Sciences*. 2022; 5(4): 1866–1875.