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HIV MTCT TRANSMISSION-AN INDIAN BASED EXPERIENCE

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ABSTRACT

Introduction: India one-third of infants born to HIV-positive mothers contract HIV through mother-to-child transmission, and becomes infected during their mothers' pregnancy, childbirth or breastfeeding. In 2011, 80,000 children under the age of 15 contracted HIV, over 90 percent of them through mother-to-child transmission of HIV (MTCT). Between 15 and 25% of children born to HIV-infected mothers get infected with HIV during pregnancy or delivery, while about 15% of the children get infected through breastfeeding (NACO). The article aims to explain the prevalence of HIV-MTCT transmission

Materials and Methods: The prospective and retrospective secondary data was obtained from ART centre's in Karnataka state from 2009-2010. Concomitant laboratory parameters and demographic history were obtained from patients white cards .ARV Prophylaxis at the onset of pregnancy, infant delivery were systematically documented with greater accuracy and less error. The propounded parameters were analyzed by using SPSS-16.50 Version software.

Results: A total of 100 patients' retrospective and prospective data were obtained from ART centre of Karnataka state, as per the study Mother-to-child HIV cumulative transmission rate was 21.30%, Rate of infection with breast feeding was (8.16%), with actual predicted sensitivity (66.66%), specificity (51.13%) and NPV 91.83% respectively. 73 patients has received ARV-Prophylaxis out of which, only one baby get infected not receiving ARV-Prophylaxis four babies have infected.

Conclusions: Combination highly active antiretroviral therapy can also be used for preventing mother-to-child transmission in those women who do not yet need to receive ongoing treatment.

KEYWORDS: ARV Prophylaxis, HIV, NPV, HAART, MTCT

INTRODUCTION

Background

Mother-to-child transmission is when an HIV positive woman passes the virus to her new born baby. This can occur during pregnancy, labor and delivery, or breastfeeding. There is a 5%-20% that those children will be infected while being breastfeed. 15-30% of new born babies delivered by HIV positive women will become infected[1]. In 2010, around 700,000 children less than 15 years of age became infected with HIV, mainly through mother-to-child transmission. The high prevalence of HIV infection in many developing countries has given rise to increasing concern about the risk of transmitting the virus through breastfeeding. In a recent review breast feeding is recognized as an important cause of mother to child transmission (MTCT) and accounts for 7-14% of the overall transmission rate. However, so far there have been no changes to policies which advocate that 'breast is best' in the health profession, even where HIV infection rates are known to be high. Continued adherence to the status quo is undoubtedly, due to the many perceived physiological and

psycho-social advantages of breast-feeding compared to feeding with infant formula milks, as well as awareness of the risks of diarrohea and associated mortality (which are even more pronounced in emergency situations), where formula feeds are used[2]. Yet there is unease amongst some health professionals and policy makers about this subject, as in areas where HIV infection is highly prevalent[3], there is a significant risk that breast milk will be the medium through which the deadly virus is passed[1]. India's one-third of infants born to HIV-positive mothers contract HIV through mother-to-child transmission, and becomes infected during their mothers' pregnancy, childbirth or breastfeeding. In 2011, 80,000 children under the age of 15 contracted HIV, over 90 percent of them through mother-to-child transmission of HIV (MTCT). Between 15 and 25% of children born to HIV-infected mothers get infected with HIV during pregnancy or delivery, while about 15% of the children get infected through breastfeeding (NACO) [10]. The article aims to explain the prevalence of HIV-MTCT transmission rate.

MATERIALS AND METHODS

The prospective and retrospective secondary data was obtained from ART centres in Karnataka state from 2009-2010. Structured questionnaires were used to obtain the primary information on physical, psychological, level of independence and environmental factors influence on mother's, who are exposed to breast feeding in infants. The laboratory parameters like baseline CD4 count at the time of inception HAART, successive serials CD4 counts viz at 6 months, one year, 24 months etc., are documented. WHO clinical stage anthropometric parameter, Status of Gravida, clinical history, adverse drug reactions and treatment failure, ARV Prophylaxis at the onset of pregnancy, infant delivery were systematically documented with at the greater accuracy and less error. The propounded parameters were analyzed by using SPSS-16.50 Version software. The chi-square 2x2 contingency, specificity and sensitivity test was employed to find out the actual predicted prevalence rate of MTCT through breast feeding.

Results: A total of 100 patients' retrospective and prospective data were obtained from ART centre of Karnataka state, demographic, clinical profile and ADV, SDV drug reaction data were extracted from white cards and patients green books, follow up CD4 count at six months and 12 months were recorded in separate master chart.

RESULTS

Table 1: Demographic Features of HIV Infected Pregnant Mothers N=100

Sl.No	Variables	N (%)	CI-95%	P-Value
I	**Age(yrs)**			
	18-25	**85**	**80.01-87.22**	P<0.05
	26-32	**15**	**14.02-16.88**	P>0.05
II	**Marital Status**			
	Married	**87**	**83.25-88.92**	P<0.05
	Unmarried	**3.00**	**0.80-4.26**	P>0.05
	Discordant couple	**8.0**	**5.06-9.22**	P>0.05
	Unknown	**2.0**	**0.96-3.08**	P>0.05
III	**Educational Status**			
	Literate	**45**	**44.22-46.99**	P<0.05
	Illiterate	**56**	**53.62-58.20**	P<0.05
	Unknown			
Iv	**Economic Status**			
	Low income	**55**	**53.26-56.21**	P<0.05
	Medium income	**35**	**32.66-36.78**	P<0.05
	High income	**10**	**9.01-11.23**	P>0.05

Table 1: Contd.,

V	**Risk Factors**			
	Heterosexuality	**74**	**73.26-75.61**	P<0.05
	IDU's	**03**	**0.86-4.21**	P>0.05
	Unknown	**23**	**22.66-24.26**	P>0.05
VI	**Status of Spouse HIV Status**			
	+Ve	**65**	**63.26-68.76**	P<0.05
	-Ve	**18**	**17.28-19.03**	P<0.05
	Not attended	**06**	**4.02-7.88**	P>0.05
	Unknown	**11**	**10.01-12.56**	P>0.05
VII	**Gravida**			
	Primy Gravida	**66**	**64.23-67.56**	P<0.05
	Gravida-II	**23**	**21.02-24.56**	P<0.05
	Gravida-III	**07**	**6.23-8.11**	P>0.05
	Gravida-IV	**04**	**3.41-4.56**	P>0.05
VIII	**Types of Delivery**			
	Caesarian	**28**	**27.63-29.22**	P<0.05
	LSCS	**03**	**2.01-4.28**	P>0.05
	MTP	**01**	**0.12-1.56**	P>0.05
	Normal	**68**	**65.22-69.87**	P<0.05
X	**Place of Delivery**			
	Govt tertiary care Centre	**85**	**84.55-87.26**	P<0.05
	Pvt hospitals	**10**	**8.01-11.63**	P>0.05
	Resident	**05**	**3.01-6.58**	P>0.05

***Significant P≤0.05**

Four focus group, eight direct and two in-depth interviews were conducted with written consent, collected numerical data were transformed in to Epi- info software and analyzed by suitable test statistics. As per the analysis the mean age of the patients was 24.58±1.50, CI-95%; 22.99-26.52 p<0.05. Age group were classified base on mean±0.5SD and mean±1SD. Table 1 showed that 18-25 years (85.0%)p<0.05, 26-32(15.0%), p>0.05, Marital status; Married 87% CI 95%-83.25-88.92, P<0.05, Unmarried 3.00%, CI 95% 0.80-4.26 P>0.05, Discordant couple 8.0% CI 95%-5.06-9.22 P>0.05, Unknown 2.0% CI 95% 0.96-3.08, P>0.05. Educational status; Literate 45.0% CI 95% 44.22-46.99, P<0.05, Illiterate 55% CI 95% 53.62-58.20, P<0.05. Economic status; Low income 55.0% CI 95% 53.26-56.21 P<0.05, Medium income 35% CI 95% 32.66-36.78 P<0.05, High income 10% CI 95% 9.01 -11.23 P>0.05. Risk factors of each patients documented and it was expressed Heterosexuality 74% CI 95 % 73.26-75.61 P<0.05, IDU's 3.0% CI 95% 0.86-4.21 P>0.05, Unknown origin 23.0% CI 95% 22.66-24.26 p>0.05;Status of spouse HIV reactive 65.0% CI 95% 63.26-68.76 P<0.05, Non reactive 18 .0% CI 95% 17.28-19.03 P>0.05, not attended 6.0% CI 95% 4.02-7.88 P>0.05 and unknown 11% CI 95% 10.01-12.56 P>0.05;Primygravida 66% CI 95% 64.23-67.56 P<0.05,Gravida II 23.0% CI 95% 21.02-24.56 P<0.05, Gravida III 7.00% CI 95% 6.23-8.11 P>0.05 and gravid IV 4.0% CI 95% 3.41-4.56 P>0.05;Mode of delivery Caesarian 28.0% CI 95% 27.63-29.22 P<0.05, LSCS 3.0% 2.01-4.28 p>0.05, MTP 1.0% 0.12-1.56 P>0.05 and normal delivery 68.0% CI 95% 65.22-69.87 P<0.05.we have documented the place of delivery based on geographical location and it was Govt tertiary care Centre 85.0% CI 95% 84.55-87.26,p<0.05, Pvt hospitals 10.0% CI 95% 8.01-11.63p>0.05 and own Resident 5.0% CI 95% 3.01-6.58 P>0.05

Table 2: Rate of Infection with or without Breast Feeding

Sl no	Variables	Baby HIV Infected	Baby HIV not Infected	Total
01.	With breast feeding	8(a)	43(b)	51 (a+b)
02.	Without breast feeding	04(c)	45(d)	49 (c+d)
	Total	12 (a+c)	88 (b+d)	100 N

Chi square value-5.69

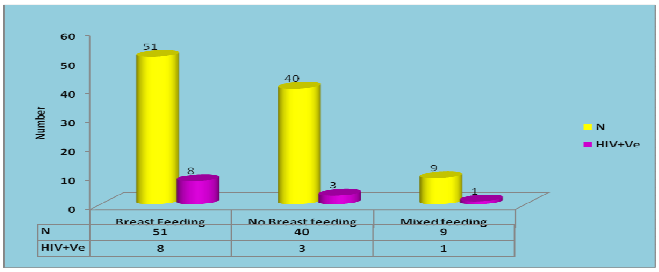

Figure 1: HIV-Status of Baby by Different Types of Feeding

A total of 100 HIV infected mothers were prospectively recruited for the study, out of which 51, and 9 HIV infected mothers were exposed to breast feeding and both. 8 children's were infected in breast feeding exposed mothers, 3 and 1 children were infected not exposed breast feeding and practiced both (Figure 1).

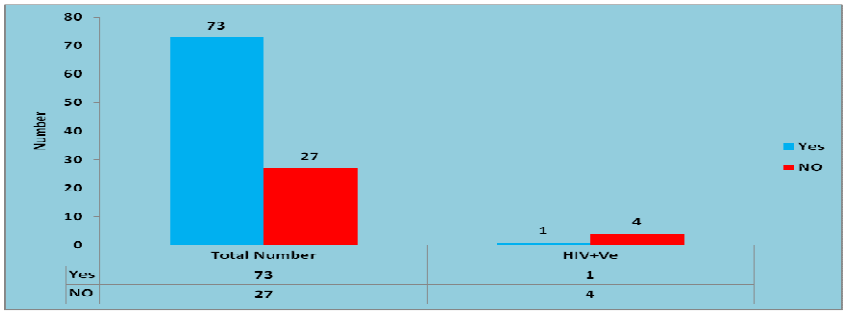

Figure 2: HIV-Status of Baby for ARV Prophylaxis Received at Onset of Birth

Figure (2) determined that transmission rate was measured in terms of definable charectistics of with or without ARV-Prophylaxis were given to mother and baby at the time of before and onset of delivery (within six hours), present study drawn to expressed 73 patients have received ARV and only (1) baby get infected not receiving ARV-Prophylaxis (4) babies have infected.

Table 3: Associated Clinical Parameters of HIV Infected Mothers

Sl	Variables	Mean±SD	CI-95%	P-Value
01.	Age(Years)	24.58±**1.50**	22.99-26.52	P<0.05
02	**WHO-Clinical Stage**			
	Stage I	09(9.0%)	8.56-10.33	P>0.05
	Stage II	25(25.0%)	23.56-26.45	P<0.05
	Stage III	54(54.0%)	52.19-55.63	P<0.05
	Stage IV	12(12.0%)	11.58-13.54	P<0.05
03.	On HAART	38.00%	36.21-39.15	P<0.05
	While On HAART	62.00%	60.15-63.88	P<0.05
04.	CD4 count @base line	158.90±**98.13**	156.22-161.15	P>0.05

Table 3: Contd.,

	CD4 count at 6Months	296.31±**65.42**	293.44-297.82	P>0.05
	CD4 count @12 Months	365.99±**34.22**	362.01-368.12	P<0.05
05.	**Co Morbidity**			
	Yes	24.00%	22.01-26.09	P>0.05
	No	76.00%	74.20-77.88	P<0.05
06.	Adverse ARV drug reaction	18.02%	17.00-19.14	P>0.05
	Serious adverse ARV drugs reaction	7.63%	6.01-8.11	P>0.05
07.	CD4 count@ time on set of pregnancy	389±**20.02**	376.02-390.10	P<0.05
08.	CD4 count @ time baby delivery	255.10±**56.12**	254.22-257.86	P>0.05

Associated clinical parameters were presented in Table 3, the mean age of the patient's 24.58±1.50yrs CI 95% 22.99-26.52 P<0.05, study showed that younger age group mothers were expressed to transfer HIV to their babies. WHO clinical staging were marked and was explained Stage I0 9(9.0%) CI-95%8.56-10.33 P>0.05, Stage II 25(25.0%) CI-95%23.56-26.45,P<0.05 Stage III54(54.0%) CI-95%52.19-55.63, P<0.05, Stage IV12 (12.0%) CI-95%36.21-39.15, P<0.05 respectively. 38.00% of the patients on HAART with CI 95% 36.21-39.15, P<0.05.The immunological markers measured by CD4 count µ/Dl, Base line CD4 count, CD4 count at 6 months and 12 months readings were recorded and it was expressed in mean or average. The average CD4 count @base line158.90±98.13 CI 95%156.22-61.15P>0.05, CD4 count at 6Months296.31±65.42 CI 95%293.44-297.82 P>0.05 and CD4 count @12 Months365.99±34.22 CI 95%362. 01-368.12,P<0.05 .24.00% of the patients had co morbid condition out of which 7.63% were inflamed by serious adverse reaction Viz., NVP rash, anemia and lactic acidosis. The important immunological biomarkers base line cd4 count were correlated with on set of pregnancy and time of baby delivery .The elevated cd4 count at the time of pregnancy was 389±20.02 µ/Dl.

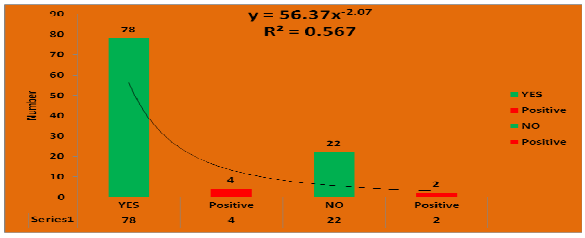

Figure 3: DBS Results at Six Weeks of Baby Age

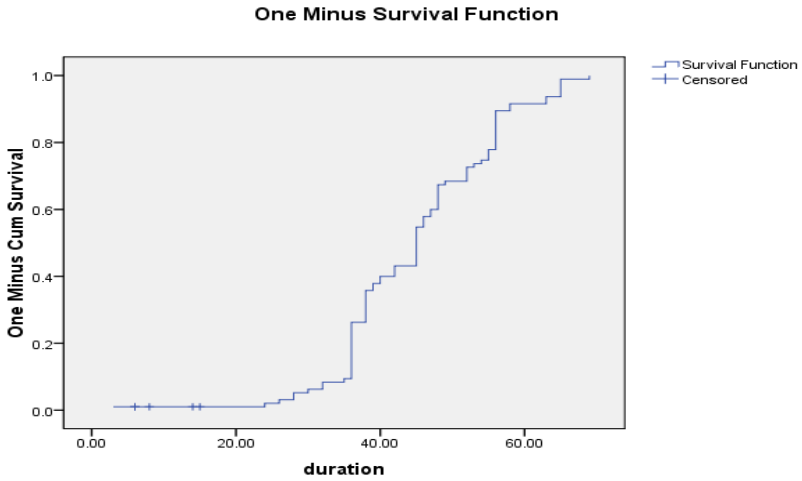

Figure 4: Survival Function of HIV Infected Baby (KPM –Model)

Table 4: Associated Parameters of HIV Infected Neonatal Baby

SL No	Variables	Estimates of Survival Mean±SE	Mean Duration CI 95%		IQR	Omnibus Tests of Model -2Logliklehood	R-Square (%)
			Lower Bound	Upper Bound			
01.	Age of the Baby (Weeks)	45.11±1.18	42.92	47.30	45-55	701.89	0.68
02.	Body weight of neonatal baby (Kgs)	2.79±0.206	2.02	3.16	2.0-3.2	56.28	0.55
03.	Duration of breast feeding(Months)	10.24±0.572	9.12	11.36	8-12	44.66	0.72
04.	Duration of breast feeding of HIV infected baby(Months)	16.25±0.936	12.01	18.66	11-20	86.98	0.77

The KPM model was bound to expressed the duration of breast feeding and HIV infection. Figure (4) determined that, the interval duration of breast feeding was practiced 10-12 months .In case of HIV infected mother have practiced 16.25±0.936 months CI 95% 12.01-18.66, Omnibus Tests of Model -2 Logliklehood 86.98 with co efficient of determination was R^2 0.77 (Table 4) the transmission rate were statistically more significant ($p<0.05$) .Associated paramers were estimated by using KPM model .The average Body weight of neonatal baby 2.79±0.206 CI Kgs, CI 95% 2.02-3.16 Omnibus Tests of Model -2Logliklehood was 56.28 with R2 =0.55

DISCUSSIONS

When infant duration of breast feeding was analyzed in relation to HIV status, there was a significantly higher co efficient of determination (R^2=72.0%) and probability of HIV Trans mission (P = 0.0012, log-rank test of duration was 44.66 (Table 4). Using KPM model to analyze factors associated with mortality in 100 babies (Figure 4), bivariate analysis showed that infant mortality was inversely associated with the duration of breastfeeding (BF) [hazard ratio (HR) = 0.45 per month of BF, 95% confidence interval (CI) 0.45–0.84, P =0.003], There was significant association between infant mortality and maternal, CD4 counts closest to the delivery or maternal marital status. Our finding that any breastfeeding shorter than 6 months was associated with a 3 fold increased risk of mortality.

Many study showed that nevirapine was able to reduce MTCT by 47%, with only 8.1% of infants exposed to nevirapine acquiring HIV at birth1, Present study the prevalence of NVP exposed children only 5.0% get infected .Canadian study showed that, A total of 1306 mother/infant pairs were randomized to either nevirapine during labour and post-delivery, or multiple doses of AZT/3TC during labour and for one week after delivery to mother and baby. In both treatment arms, about 40% of infants were breast-fed. Eight weeks after birth, there was no significant difference observed between the rate of HIV infection or death across the two treatment arms, with a rate of 14.3% in the simpler nevirapine arm and 12.5% in the more involved and expensive dual therapy arm[3] Antiretroviral prophylaxis for neonates and for women during pregnancy and delivery has been the cornerstone for prevention of MTCT. Antiretroviral prophylaxis reduces perinatal transmission by several mechanisms, Including lowering of maternal prepartum viral load and pre- and post exposure prophylaxis of the infant. Post exposure prophylaxis is provided through administration of ART[3]

Treating HIV positive mothers with a combination antiretroviral regimen or giving infants nevirapine for 28 days after birth both reduced the risk of mother-to-child HIV transmission during breast-feeding, according to findings from the BAN Study reported,one more Study, described in the same issue, found that women with HIV should start antiretroviral

therapy (ART) during pregnancy to have the greatest effect in reducing transmission risk [2].In high-income countries, HIV positive pregnant women are advised to use a complete ART regimen regardless of CD4 cell count and to not breast-feed their infants. In resource-limited countries, pregnant women with higher CD4 cell counts still often receive the ACTG 076 regimen of zidovudine (AZT; Retrovir) during pregnancy and labor, and for the infant for 6 months after birth. A single dose of nevirapine (Viramune) may also be used, though this can promote drug resistance in the mother[2]. Antiretroviral treatment during breast-feeding -- either for the mother or for the baby can help reduce the likelihood of mother-to-child HIV transmission[1]. Study documented in Malawi, 2369 HIV positive mothers in Malawi with a CD4 count of at least 250 cells/mm^3. Women with anemia or pre-existing liver impairment, and those who had previously used antiretroviral drugs during pregnancy, were excluded. All women received oral single-dose nevirapine during labor followed by zidovudine/lamivudine (Combivir) for both mothers from the onset or labor and babies from birth, continuing for 7 days Mothers were counseled to breast-feed exclusively for 6 months, then wean the baby rapidly between 24 and 28 weeks, since studies have shown that mixed feeding of breast milk and alternative foods increases HIV transmission risk[3]. HIV positive pregnant women in Botswana who had a CD4 cell count above 200 cells/mm^3. Starting at 26 to 34 weeks of pregnancy and continuing through infant weaning at 6 months, they were randomly assigned to receive either zidovudine/lamivudine/abacavir (Trizivir combination pill) or else lopinavir/ritonavir plus zidovudine/lamivudine; in addition, 170 women with a CD4 cell count < 200 cells/mm^3 started zidovudine/lamivudine plus nevirapine. All infants received single-dose nevirapine after delivery and zidovudine for 4 weeks risk of transmission was very less[5]. Mother to child HIV transmission occurs late in the pregnancy, and that in the absence of any intervention, between 20 and 45 percent of the infants will become infected from their HIV positive mothers [2]. Major international guidelines on HIV and infant feeding were released in 2001 by an interagency task team on mother to child HIV transmission comprising WHO, UNICEF, UNFPA and UNAIDS [3]. These guidelines promote different infant feeding options for women with differing socio-economic status. In the guidelines, so-called 'formula feeding' is recommended for women for whom replacement feeding is considered 'acceptable, feasible, affordable, sustainable and safe'. In contrast; where formula feeding is not considered to be 'acceptable, feasible, affordable, sustainable and safe', HIV positive women are encouraged to exclusively breastfeed for the first six months of their child's life.

CONCLUSIONS

Mother-to-child HIV cumulative transmission rate is 21.30%, In an HIV context, routine breastfeeding intervention support associated with access to anti-retroviral therapy for women yet requiring treatment for them reduces the practice of mixed feeding and slashes the early mother-to-child HIV transmission rate. Appropriate Prevention of Mother-To-Child Transmission (PMTCT) measures must be made available to HIV-infected women. Detailed studies must be performed to evaluate the feasibility of this approach in resource limited settings. Combination highly active antiretroviral therapy can also be used for preventing mother-to-child transmission in those women who do not yet need to receive ongoing treatment.

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