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Original Research Article

Feto-maternal outcome in human immunodeficiency virus seropositive mothers in co-relation with CD4 count

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ABSTRACT

Background: To study the effect of human immunodeficiency virus (HIV) infection on pregnancy outcomes and new born as mother to child transmission of HIV is a major route on new infections in children and compare it with HIV uninfected pregnancies.

Methods: Prospective comparative study conducted on 40 HIV seropositive and 40 HIV seronegative pregnant women attending ANC and delivering in the department of obstetrics and gynecology, S. M. S. Medical College, Jaipur, Rajasthan, India.

Results: CD4 count had no effect on birth weight of baby or term of delivery. HIV seropositive pregnancies were more prone to IUD, still birth and preterm birth ($p=0.029$). Mother to child transmission was 2.7%.

Conclusions: HIV infection increases the risk of adverse foetal outcome in terms of intrauterine demise, still birth and preterm labour.

Keywords: Adverse foetal outcomes, CD4 count, Human immunodeficiency virus, Mother to child transmission

INTRODUCTION

The human immunodeficiency virus (HIV) is a lentivirus (a subgroup of retrovirus) that causes HIV infection; later acquired immunodeficiency syndrome (AIDS) in which progressive failure of immune system allows life threatening opportunistic infections and cancers. Without treatment average survival time after infection with HIV is 9-11 years.

HIV is a parenterally transmitted infection and occurs by contact with or transfer of blood, pre-ejaculate, semen and vaginal fluids. Nonsexual transmission can occur from an infected mother to her infant through breast milk or during pregnancy or childbirth due to exposure to her blood or vaginal fluid.

According to WHO, since the beginning of epidemic, 75 million people have been infected with HIV virus and about 32 million people have died of HIV.¹ India had the 3rd

largest pool of HIV cases in the world. As per the recently released, India HIV Estimation 2017 report, National adult (15-49 years) HIV prevalence in India is estimated at 0.22% (0.16%-0.30%) in 2017 with a prevalence of 0.25% (0.18-0.34) among males and 0.19% (0.14-0.25) among females.

The adult HIV prevalence at national level has continued its steady decline from an estimated peak of 0.38% in 2001-03 to 0.22% in 2017. Estimated number of people living with HIV/AIDS in India is 2.11 million with 0.29% being antenatal clinic attendees. India is estimated to have had 22.67 (10.92-40.60) thousand HIV positive women who gave birth in 2017.²⁻⁴

METHODS

This was comparative study, designed prospectively with the study population of HIV seropositive and HIV seronegative pregnant women attending ANC and

delivering in our hospital. A total 40 women in each HIV seropositive and HIV seronegative group were included.

Inclusion criteria

- Women delivering in our hospital with regular ANC visits (both HIV positive and negative)
- Patients giving consent for study and willing for follow up of mother and child
- HIV positive females (both on ART/ not on ART)
- Patients with period of gestation (POG) >28 weeks.

Exclusion criteria

- Individuals refusing for HIV testing
- Other immunodeficiency disorder
- IUGR for other causes
- Severe anaemia, HDP, thyroid disorders.

Pregnant females attending ANC for regular check-up were evaluated after written informed consent. HIV testing done. Inclusion and exclusion criteria were applied and the patients were divided into two groups:

- Group A: Seronegative pregnant females.

- Group B: Seropositive pregnant females.

Detailed history (including obstetric history-present and past; menstrual history; family history; marital history) were taken. Physical examination (general, systemic and local) was done. Baby parameters (weight, Apgar, etc.) were taken. Biochemical investigations were done for both mother and baby; and, complications, if any encountered were analysed, worked upon and followed up.

Statistical analysis

A pre structured proforma was used to collect information from patients. Data analysis was done using unpaired t test, chi square test and fisher exact test. MEDCALC software was used for all statistical analysis.

RESULTS

As shown in Table 1, in the seropositive mother group/cases, 8 babies (20%) born of 40 had weight <2.5 kg i.e. LBW (low birth weight) while in the seronegative mother group/control, 9 babies (22.7%) born of 40 were LBW. The differences were not found to be statistically significant (p=0.486).

Table 1: New born birth weight among study groups.

Birth weight (kg)	Case		Control		Total	
	N	%	N	%	N	%
<2.5 kg	8	20	9	22.5	17	21.25
≥2.5 kg	32	80	31	77.5	63	78.75
Total	40	100	40	100	80	100
Mean±SD	2.73±0.09 kg		2.81±0.47 kg			

Chi-square = 0.000 with 1 degree of freedom; p = 1.000 (NS), t = -0.699 with 78 degrees of freedom; p=0.486 (NS).

Table 2: New born birth weight in relation to CD4 count among HIV seropositive patients.

Birth weight (kg)	CD4 < 200		CD4 > 200		Total	
	N	%	N	%	N	%
<2.5 kg	0	0	8	22.2	8	20
≥2.5 kg	4	100	28	77.8	32	80
Total	4	100	36	100	40	100

Fisher exact test - p = 0.515 (NS).

Table 3: Term of delivery among study groups.

Term of delivery	Case		Control		Total	
	N	%	N	%	N	%
Term	36	90	39	97.5	75	93.75
Preterm	4	10	1	2.5	5	6.25
Total	40	100	40	100	80	100

Fisher exact test - p = 0.359 (NS).

Table 2 depicts the relationship of new born birthweight with CD4 count in HIV seropositive patients. In the

group with CD4 count <200 cells, of the 4 babies born none were LBW. While in the other group with CD4

count >200, 8 babies (22.2%) born of 40 were LBW. This difference in birth weight with respect to CD4 count was not found to be statistically significant (p=0.515).

As per Table 3, among the seropositive group, 4 patients (10%) had preterm delivery i.e. <37 weeks while in the control group, 1 patient (2.5%) had preterm delivery. Though the difference in the two group are evident but the results are not statistically significant (p=0.359).

In Table 4, among 4 patients with CD4 count <200, 1 patient (25%) was found to have preterm delivery while the rest 3(75%) were delivered at term. On the other hand, in group with CD4 count >200, out of 36 patients, 3 (8.3%) had preterm delivery. The differences were not found to be statistically significant (p=0.355).

Table 5 compares adverse foetal outcomes in terms of IUD, still birth and preterm birth in the two study groups. Of the 40 seropositive cases, 8 (20%) foetal outcomes

were adverse while in the seronegative control group, 1 (2.5%) of 40 foetal outcomes was adverse. The result was found to be statistically significant with p value <0.05 (p=0.029).

In Table 6, amongst seropositive cases, 13 patients (32.5%) underwent caesarean section while 27 patients (67.5%) had vaginal delivery. While in the control group i.e. seronegative group, 12 patients (30%) had caesarean section and 28 patients (70%) were delivered vaginally. The result was not found to be statistically significant (p=1.000).

Table 7 shows the relationship of foetal seroconversion with respect to the mode of delivery. Of the 13 caesarean sections performed, (100%) all the babies were seronegative. Of the remaining babies (27) born by vaginal route, 1(3.7%) was found to be seropositive and rest 26(96.3%) were found to be seronegative after 6-month follow-up testing of baby. The result was not found to be statistically significant (p=1.000).

Table 4: Term of delivery in relation to CD4 count among HIV seropositive patients.

Term of delivery	CD4 <200		CD4 >200		Total	
	N	%	N	%	N	%
Preterm	1	25	3	8.3	4	10
Term	3	75	33	91.7	46	115
Total	4	100	36	100	40	100

Fisher exact test - p=0.355 (NS).

Table 5: Adverse foetal outcome among study groups.

Foetal outcome	Case		Control		Total	
	N	%	N	%	N	%
Favourable	32	80	39	97.5	71	88.75
Adverse	8	20	1	2.5	9	11.25
Total	40	100	40	100	80	100

Fisher exact test - p=0.029 (S).

Table 6: Mode of delivery among study groups.

Mode of delivery	Case		Control		Total	
	N	%	N	%	N	%
Caesarean	13	32.5	12	30	25	31.25
Vaginal	27	67.5	28	70	35	43.75
Total	40	100	40	100	80	100

Chi-square = 0.000 with 1 degree of freedom; p=1.000 (NS).

Table 7: Foetal seroconversion in relation to mode of delivery among HIV seropositive patients.

Mode of delivery	New born HIV seropositive		New born HIV seronegative		Total	
	N	%	N	%	N	%
Caesarean	0	0	13	100	13	100
Vaginal	1	3.7	26	96.3	27	100
Total	1	2.5	39	97.5	40	100

Fisher exact test - p=1.000 (NS).

Table 8: New born seropositivity in relation to type of feeding.

New born HIV status	Breast feeding		Top feeding		Total	
	N	%	N	%	N	%
New born HIV seropositive	1	3.2	0	0	1	2.8
New born HIV seronegative	30	96.8	5	100	35	97.2
Total	31	100	5	100	36	100

*4 subjects were excluded because of IUD/still birth, Fisher Exact Test - $p=1.000$ (NS).

Table 8 depicts the relationship of new born seropositivity with respect to the type of feeding given to the baby. Among 36 babies born of seropositive mothers (4 being excluded in view of 3 IUD + 1 Still birth); 1 baby (3.2%) was seropositive over a period of follow up of 6 months and that baby belonged to the breast-fed group. Rest of the babies were seronegative at the end of 6 months. The difference in result were not found to be statistically significant ($p = 1.000$).

DISCUSSION

Reviews of HIV infection and pregnancy outcome to date have been unable to suggest clearly a relation between maternal HIV infection and common adverse pregnancy outcomes, particularly the risk of premature delivery and of growth retardation.⁵⁻⁸

The mean birth weight in HIV seropositive group was 2.73 ± 0.09 kg and that in HIV seronegative was 2.81 ± 0.47 kg. 20% babies born in HIV seropositive group were LBW (birth weight < 2.5 kg) while in HIV seronegative group 22.7% were LBW. The differences were not statistically significant. Also, there was no significant relationship of CD4 count with birth weight of the baby/LBW. Among seropositive group, 10% patients delivered preterm while in seronegative group preterm deliveries were only 2.5%. The differences were not statistically significant and there was no relationship of preterm delivery with maternal CD4 count. The inference of the above observations may be due to improved infrastructure of health care bringing about earlier detection of HIV disease, awareness among the 'at risk' population, availability of HAART and active government policies to cater the diseased affectively.

Similar results were found in study done by Schulte et al, who reported a decline in the rates of low-birth-weight infants and preterm infants.⁹ On the contrary, in study done by Dadhwal et al, the mean birth weight was lower in new born of HIV infected women.¹⁰ Brocklehurst et al and Xiao PL reported that LBW and PTD were associated with maternal HIV infection.^{11,12} Habib et al, has also shown an association between maternal HIV status and preterm labour.¹³ Preterm deliveries were 1.8% in study by Prameela et al, 4% by Malik et al, 13.1% by Ezechi et al, 19% by Yudin et al and 25% by Dwivedi et al.¹⁴⁻¹⁸ Studies done by Merwe V et al and Kim et al have documented that women with CD4 cell counts < 350

cells/ μ l had an increased risk of having LBW compared to women with higher CD4 cell count.^{19,20}

There was an increased incidence of adverse foetal outcomes in terms of IUD, still birth and preterm birth - 20% in HIV seropositive patients in contrast to 2.5% in HIV seronegative pregnancies. The differences were found to be statistically significant ($p=0.029$).

Kennedy D et al, found a still birth rate of 1.7/1000 births in HIV seropositive population compared to 8.3/1000 in HIV seronegative population.²¹ Kumar et al, from India, matched 160 HIV infected pregnant women with uninfected control and found that HIV infection had a detrimental effect on pregnancy in terms of abortion, prematurity, intrauterine foetal death and maternal and neonatal mortality.²² Similar results were found in various studies done by Ezechi et al, Ellis et al, Brocklehurst et al and Dwivedi et al.^{11,16,18,23} In India, studies done by Gautam S et al, and Prameela et al found still birth rate to be comparatively less 3.1% and 3.9% respectively.^{14,24}

Caesarean section was offered to all the patients, out of which 32.5% opted to be delivered by caesarean section while the rest 67.5% (who refused or came in active labour) delivered vaginally: as we did not know the viral load of patients. According to ACOG 2018 guidelines, pregnant women infected with HIV whose viral loads are > 1000 copies/ml at or near delivery (independent of antepartum anti-retroviral therapy) or whose levels are unknown, should be offered scheduled pre-labour caesarean section at 38 weeks of gestation to reduce mother-to-child-transmission. Also, the patient autonomy in making the decision regarding route of delivery should be respected.

In study done by Dwivedi et al, and Yadav S et al, most of the women delivered vaginally (65%), as LSCS in HIV seropositive patients was done for obstetric indication only.^{18,25} The rate of transmission was marginally less than normal labour. In study done by Azria E et al 55% women delivered by caesarean section while in studies by Gautam et al, Prameela et al and Ezechi et al; 70.8%, 73.7% and 53.1% women delivered by vaginal route respectively.^{14,16,24,26}

A total 86.2% babies of HIV seropositive mothers were exclusively breast fed which is more than that found in

studies by Dwivedi et al (47.06%) and Prameela et al (65.2%).¹⁴ Palombi et al showed a transmission rate of <2% with alternatives to breast feeding without an increase in mortality in non-breastfed group.²⁷ Exclusive breast feeding has been reported to have a lower risk of transmission than mixed feeding.²⁸

Only 1 baby (2.7%) was found to be HIV seropositive at 6 months follow up. This baby was term vaginal delivery with exclusive breast feeding. According to study by Yadav S et al, the maximum transmission of HIV was more in term babies (70%) as compared to preterm babies (30%).²⁵ In this study parent to child transmission rate (2.7%) was less when compared to study done by Dwivedi et al (3.4%) and Kale et al (8.06%); but more when compared to study done by Prameela et al (1.8%) and Ezechi et al (0.97%).^{14,16,18,29}

CONCLUSION

This study illustrates that HIV seropositive status of a woman has adverse effect on pregnancy outcomes in terms intrauterine demise, still birth and preterm birth. These parameters were found more in HIV seropositive women in comparison to HIV seronegative women. HIV status had no effect on birth weight of baby or term of delivery; neither there was any effect of CD4 count on either of the above. Mother to child transmission of HIV was not significantly affected by mode of delivery or type of feeding. Mother to child transmission rate in this study was 2.7%.

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