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KNOWLEDGE, ATTITUDE AND PRACTICE ON PERINATAL HIV TRANSMISSION AND PREVENTIVE MEASURES AMONG ANTENATAL MOTHERS AT KENYATTA NATIONAL HOSPITAL

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Abstract

Background; Perinatal Human immunodeficiency virus (HIV) transmission has been shown to be a major route of HIV transmission in children and it accounts for over 90% of HIV infection in children in Kenya. Prevention of perinatal HIV transmission is a major goal in the care of HIV pregnant women. High awareness (90%) on perinatal HIV transmission has been shown previously but this has not translated into decrease in pediatrics HIV infection from perinatal HIV transmission thus there seems to be a gap. These gaps could be identified by knowing Knowledge, attitude and practice (KAP) on Perinatal HIV transmission and preventive measures so as to allow effective interventions to be adopted to reduce pediatric HIV infection.

Objective: To determine the knowledge, attitude and practice on perinatal HIV transmission and preventive measures among antenatal mothers at Kenyatta National Hospital.

Study design; A cross-sectional survey.

Results; HIV sero- prevalence was 11 %(25/220) in the study population. 87% (195/220) of the antenatal clients had correct knowledge on perinatal HIV transmission. On prevention of perinatal HIV transmission, 81%(178/220/ had correct knowledge on breast feeding in HIV context while 88%(193/220) of the clients had negative cultural beliefs and practices as regards to infant feeding practices like prolong breastfeeding and mixed feeding that promote Perinatal HIV transmission The correct knowledge, attitude and practice(KAP) on antiretroviral(ARV) drugs prophylaxis for prevention of mother to child transmission of HIV(PMTCT) was 88%(194/220),76%(167/220) and 85%(187/220) respectively. On elective caesarian section, correct knowledge attitude and practice was 28%(7/25),36%(9/25) and 36%(9/25) respectively among the HIV positive women,

Conclusion; The sero-prevalence of HIV was similar to that found in the national surveys on HIV. The correct knowledge on perinatal HIV transmission was over 80% but this did not translate into similarly high correct attitudes and practice on a PMTCT intervention like safe infant feeding where the cultural beliefs and practices favored prolong breastfeeding and mixed feeding which promotes perinatal HIV transmission. However the high knowledge on PMTCT ARV prophylaxis correlated with better attitude and practices. The low knowledge on elective c/s also correlated with low attitude and practice among the HIV positive mothers. HIV positive mothers need to be provided with more information on role of elective cesarean section in PMTCT where it is feasible. The influence of culture on safe infant feeding practices in HIV context needs to be explored in more detail as there seems to more complex issues that might even involve stigma in the community so that despite the high knowledge, it does influence the attitudes and practices. J. Obstetric. Gynaecol. East. Cent. Afr.2005; 18:X-X

Key words; Knowledge, attitude, practice, perinatal HIV transmission

Introduction

Worldwide heterosexual transmission is responsible for most infections with the human immunodeficiency virus (HIV) which causes Acquired Immunodeficiency Syndrome (AIDS) [1]. In sub-Sahara African ,up to 80% of all HIV infection can be accounted for by heterosexual transmission, In Kenya it is 90%[2,3]. Globally, approximately 2 million HIV infected women give birth each year to about 600,000 infected infants, this makes infected babies be the single largest source of new infections with HIV[4]. The world Health organization estimates that a total of 5-10 million have become infected with HIV through perinatal transmission [5]. Mother to child HIV transmission rates are very high in the developing world and this is due to the high HIV prevalence[1].

In Africa the sero-prevalence of HIV infection in pregnant women exceeds 20% in many areas. Perinatal HIV transmission rates have been reported to be 20-42% [3]. In Kenya urban sentinel sites in 1998 showed that the HIV prevalence among antenatal women ranged between 4-10% in low sero-prevalence sites to 20-35% in high seroprevalence sites [3]. HIV sero-prevalence rates in pregnant women range from 0.3-1% in North America, 1-5% in South America, 10% in Caribbean Countries while in Europe rates are less than 1% [4].In Kenya in 1999 children under 5 years of age constituted 10% of reported AIDS cases. 90% of HIV infection in children are due to perinatal transmission. This occur in utero, during labor/delivery and through breastfeeding[3]

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Prevention of perinatal HIV transmission is a major goal in the care of HIV pregnant women [6]. This is achieved by anti-retroviral therapy ,cesarean section delivery, safe infant feeding practices and modification of routine care during delivery like avoiding the following :-Early rapture of membranes, episiotomy, instrumental delivery, scalp electrodes, repeated vaginal examinations and routine nasopharyngeal suction. Vaginal cleansing with Hibitane may also reduce perinatal HIV transmission as well as early treatment of sexually transmitted infections. Good nutrition, mineral and vitamins supplementation has also been shown to have preventive role.

Anti-retroviral (ARV's) administered to the mother have been shown to significantly reduce mother to child transmission of HIV infection thus reducing the cost of caring for HIV positive infants to the health care system and the family structure [3]. The choice of anti retroviral regimes depends on the time point when clients presents for care as there are those who attend antenatal clinic early, there are late attendees, non-attendees who present to the health care system in labor with unknown HIV status and those who deliver before arrival to labor ward and may not have attended antenatal clinic
HIV counseling and testing should be offered in all the scenarios ie in the antenatal, intrapartum, and the immediate postpartum within 72 hours so as to offer appropriate ARV's

The risk of vertical transmission is 25% on the average but with the following regimes, the risk is reduced accordingly; Zidovudine (AZT) short courses 300mg twice daily from 36 weeks (WHO currently recommends commencement from 28 weeks) and then 300mg orally every 3 hours during labor reduces the risk of perinatal HIV transmission by 50% in non-breast feeding and 38% in breast feeding but this is improved further by addition of single dose Nevirapine in the intrapartum,. AZT given in long course regime of 100mg orally twice daily from 14-34 weeks then 2mg/kg intravenously for the first hour then 1mg/kg/hr during delivery followed by 2mg/kg AZT syrup for six weeks to the baby reduces vertical transmission in non breast feeding by 68%.Nevirapine given as single dose at the onset of labor and 2mg/kg single dose in the first 72 hours to infant reduces perinatal HIV transmission by 46% [3]. Other combination of drugs therapies are also available like in the PETRA regime - AZT+3TC-twice daily beginning at 36 weeks gestation and AZT 600mg and 3TC 150mg orally at onset of labor, then AZT 300mg orally every 3hrs and 3TC 150mg every 12 hr, and postpartum to the infant and mother and this reduces transmission by approximately 50%. For mother's who don't receive any ARV's during pregnancy and delivery, the infants are given post exposure prophylaxis consisting of single dose Nevirapine within 72 hours and the AZT for one week. Patients who are already on anti-retroviral treatment before pregnancy should continue with the same drugs she has been using(use safe regimes in pregnancy) and the patients who are severely immunosuppresed (CD4 <200 or WHO stage 4) should be on anti retroviral treatment with 3 drugs (Zidovudine/stavudine, lamuvidine and Nevirapine) with infants receiving single dose Nevirapine within 72 hours. These guidelines are currently being updated by world Health Organization (WHO).

Cesarean delivery performed before rapture of membranes or initiation of contractions may alter 2 different potential exposures; it may negate exposure to genital tract virus, reduce transplacental transfer of cellular material that significantly increases with labor or both[3].A series of observational studies reported variable results with regards to the protective effect of cesarean delivery, a meta-analysis of 8533 mother-infant pairs from 20 European and North American centers showed that in those women who were not taking anti-retroviral agents during pregnancy, the transmission rate for those who under went C-section was 10% compared with a rate of 19% in those with vaginal delivery. In women who had received anti-retroviral during pregnancy, the rate of HIV transmission to the infant was 2% in women undergoing elective C-section, versus 7.3% in those who delivered vaginally.

On the uptake of PMTCT interventions, UNICEF findings presented on the 3rd conference on global strategies for the prevention of HIV transmission from mothers to infants held in Kampala, Uganda in September 2001 showed that in Kenya, uptake of HIV testing in PMTCT was 52%, PMTCT antiretroviral drugs 43% and replacement feeding was 33%.

This low uptake of PMTCT interventions could be influenced by poor knowledge, attitudes and practices including cultural beliefs. This study was thus designed to determine this as no such study had been done at Kenyatta National Hospital.

Methods and materials

This was a descriptive cross-sectional survey done from November 2002 to January 2003 at the antenatal clinic at Kenyatta National Hospital (KNH), Kenya. Most of the patients seen in the antenatal clinic are from Nairobi and its surrounding. The first patient was selected by simple random sampling method then every third consenting pregnant women attending antenatal clinic in their first visit was selected. A structured questionnaire containing open and closed ended questions was administered. The interviews were done in private, after the patient had been attended to at the antenatal clinic. The study excluded; those women attending antenatal clinic for the first time but were too ill, all antenatal mothers who have been previously tested for HIV and all those clients who declined to give consent for participation. SPSS version 11 was used to analyze the data, the level of significance was at 95% confidence interval ($P<0.05$ was statistically significant).

Correct knowledge on what HIV is includes , killer disease, virus infection, STI with no cure, acquired human Immuno Deficiency Syndrome. Correct knowledge on route of HIV transmission is sex, mother to child, parentral (blood transfusion, needles, injuries) .

On knowledge on effect of Breast Feeding and Perinatal HIV transmission, correct knowledge is categorized as "Increased transmission. On attitude on breast feeding, correct attitude is categorized as those who think that HIV mothers should breast feed exclusively for 6months or formulae feed.On practice on Breast feeding, correct practice is categorized as exclusive breastfeeding for 6months or no breastfeeding for HIV positive mothers. The cultural beliefs on breast-feeding and Perinatal HIV transmission were categorized as those that increases transmission like prolong breastfeeding and mixed feeding. On knowledge of availability of Antiretroviral (ARV) drugs that reduce Perinatal HIV transmission, correct knowledge is categorized as yes . On knowledge of the names of ARV drugs available that reduce Perinatal HIV transmission, correct knowledge is categorized as AZT/Nevirapine. On attitude on putting all HIV positive mothers on ARV prophylaxis, correct attitude is categorized as those who think that all HIV positive mothers should be put on ARV drugs . On practice on taking ARV drugs by HIV positive mothers to reduce Perinatal HIV transmission, correct practice is categorized as those who would take the drugs if they tested HIV positive.

On knowledge on use of condoms in prevention of Perinatal HIV transmission 'yes' is categorized as correct knowledge and 'No' as incorrect knowledge. Correct attitude are those who think that all pregnant women whose spouse test HIV positive should use condoms while incorrect attitude are those who do not think so. Correct practice is categorized as those who will encourage spouse to use condoms if they tested positive while incorrect practice are those who will not .

The KNH ethics and research committee approved the study.

Results

A total of 220 antenatal clients were recruited into the study of which 25 were HIV positive and 195 were HIV negative giving an HIV prevalence of 11.4%. Most of the clients interviewed were in the age group of 21-28years forming 63.6% of the study population followed by the group of 29-35 years forming 26.8%. Majority of the clients

were from Nairobi forming 85.5% and 90.5% were married. They were mostly Christians with 66.4% being protestants. 84.5% had attained an education level of at least secondary level with 43.1% having gone to the university/college. 25.5% were unemployed with 74.5% having some form of employment like domestic servant 7.7%, business 20.5%, professional 45% and 92% had history of 0-2 viable pregnancies while 98% had 0-2 abortions.

General knowledge on HIV

99.5 %(219/220) of clients had heard about HIV with only 0.5 %(1/220) having not heard.. 99.5% (194/195) of HIV negative and 96% (24/25) of HIV positive had correct knowledge about what HIV is, p=0.230.

81.6%(159/195) of HIV negative and 88% (22/25) of HIV positive had correct knowledge on route of HIV transmission i.e. sex, mother to child, parentral (blood transfusion, needles, injuries) .

The main source of information on HIV knowledge and awareness was from a combination of media, medical staff, and friends/spouse (52%). Media only was 30%(66), medical staff only 14%(31) and friends and spouse only 4 %(9). 100% of HIV positive and 87% of HIV negative had correct knowledge on Perinatal HIV transmission, p=0.120. Table 1 summarizes the results of the knowledge about HIV and the transmission routes

Table 1. Comparison of knowledge on HIV and HIV serostatus

Variable	HIV Negative N = 195 n %	HIV Positive N = 25 n %
What HIV is		
Don't know	1 (0.01)	1 (4)
Killer disease	33 (17)	5 (20)
Virus infection	94 (48.4)	7 (28)
STI with no cure	53 (27.3)	7 (28)
Acquired Human Immune deficiency Syndrome	14 (7.3)	6 (20)
Transmission of HIV infection		
Sex only	32 (16.4)	2 (12)
Mother to child (birth, Breast-feeding transplacental) only	0 (0)	0 (0)
Parentral (blood transfusion, needles, injuries) only	4 (2)	0 (0)
Combination of the above	159(81.6)	22 (88)
Don't know	0 (0)	0 (0)

Perinatal HIV Transmission; Breast feeding and ARV prophylaxis

81% 178/220 had correct knowledge on breastfeeding in HIV context .

88% 193/220) of both HIV positive and HIV Negative had cultural beliefs and practices about infant feeding that increases Perinatal HIV transmission like prolong breastfeeding and mixed feeding. The correct knowledge, attitude and practice (KAP) on antiretroviral(ARV) drugs prophylaxis for prevention of mother to child transmission of HIV(PMTCT) was 88%(194/220),76%9(167/220) and 85%(187/220) respectively .The KAP on PMTCT ARV's was not statistically significant between the HIV positive and negative. Table 2 summerizes KAP on perinatal HIV transmission, breastfeeding and PMTCT ARV prophylaxis.

Table 2: KAP on perinatal HIV transmission, Breastfeeding and ARVs

Breast feeding variable	HIV Positive		HIV negative		P value
	N = 25	%	N = 195	%	
1. Type of knowledge					0.14
Correct knowledge	18	72	162	86	
Incorrect knowledge	7	28	28	14	
2. Type of attitude					0.99
Correct attitude	22	88	167	86	
Incorrect attitude	3	12	28	14	
3. Type of cultural belief and practices					0.78
Increases Perinatal HIV transmission	22	88	171	88	
Decreases Perinatal HIV transmission	3	12	24	12	
ARV variable					
1. Knowledge on availability of cure for HIV					
Correct knowledge	23	92	171	88	0.76
Incorrect knowledge	2	8	24	12	
2. Knowledge on availability of ARV drugs that reduce Perinatal HIV transmission					0.46
Correct knowledge	17	68	150	77	
Incorrect knowledge	8	32	45	23	
3. Knowledge on names of ARV drugs that reduce Perinatal HIV transmission					0.96
Correct Knowledge	16	64	120	62	
Incorrect knowledge	9	36	75	38	
4. Attitude on use of ARV to prevent Perinatal HIV transmission					0.32
Correct Knowledge	18	72	161	83	
Incorrect knowledge	7	28	34	17	
5. Practice on taking ARV drugs to reduce Perinatal HIV transmission					0.88
Correct practice	21	84	166	85	
Incorrect practice	4	16	29	15	

Caesarian Section and Perinatal HIV Transmission

On elective caesarian section, correct knowledge attitude and practice was 28%(7/25),36%(9/25) and 36%(9/25) respectively among the HIV positive women,

The results are summarized in table 3.

Table 3: Caesarian Section and Perinatal HIV transmission

Caesarian section Variable	HIV Positive		HIV negative		P value
	N = 25	%	N = 195	%	
1. Knowledge on role of caesarian section in prevention of Perinatal HIV transmission					0.300
Correct knowledge	7	28	80	41	
Incorrect knowledge	18	72	115	59	
2. Attitude on offering elective caesarian section to HIV positive mothers					0.300
Correct attitude	9	36	95	49	
Incorrect attitude	16	64	100	51	
3. Practice on elective caesarian section to HIV positive mothers					0.045
Correct practice	9	36	113	58	
Incorrect practice	16	64	82	42	

Other Preventive measures and Perinatal HIV transmission

Use of Condoms

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The KAP on PMTCT and condom use was not statistically significant between the HIV positive and negative. The knowledge on safe obstetric practices, STI and PMTCT was not statistically significant between the HIV positive and Negative clients. Table 4 summarizes the results on other preventive measures and Perinatal HIV transmission.

Table 4: Other Preventive measures and Perinatal HIV transmission

	HIV positive		HIV negative		P value
	N = 25	%	N = 195	%	
Use of condoms					
1.Type of knowledge Correct Knowledge Incorrect knowledge	17 8	68 32	115 8	59 41	0.52
2. Type of attitude Correct Incorrect	20 5	80 20	143 5	73 27	0.64
3. Type of Practice Correct Incorrect	21 4	84 16	148 47	76 24	0.51
Obstetric practice and type of knowledge					
(a) Episiotomies Correct knowledge Incorrect knowledge	14 11	56 44	121 74	62 38	0.71
(b) Repeated vaginal examinations Correct knowledge Incorrect knowledge	13 12	52 48	100 95	51 49	0.88
c) Early rupture of membranes Correct knowledge Incorrect knowledge	20 5	80 20	110 85	56 44	0.066
Knowledge on Sexually transmitted Infections					
(a) Multiple sexual intercourse during pregnancy Correct knowledge Incorrect knowledge	23 2	92 8	142 53	73 27	0.04
(b) Avoiding sex when having vaginal discharge Correct knowledge Incorrect knowledge	19 6	76 24	133 68	68 32	0.57
(c) Early treatment of vaginal discharge Correct Knowledge Incorrect knowledge	20 5	80 20	138 57	71 29	0.47

HIV Counseling and Testing (CT) and Prevention of Perinatal HIV Transmission:

The attitude and practice on HIV counseling and testing for PMTCT between HIV positive and negative clients was not statistically significant. The results are summarized in table 5.

Table 5: HIV counseling and testing and Perinatal HIV transmission

CT attitude and practice	HIV Positive		HIV negative		P value
	N=25	%	N=195	%	
1. Attitude on testing all pregnant mothers					0.16
Correct attitude	22	88	188	96	
Incorrect attitude	3	12	7	4	
2. Attitude on all mothers disclosing HIV status to:					
(a) Health workers					0.46
Correct attitude	19	76	164	84	
Incorrect attitude	6	24	31	16	
(b) Spouse					0.57
Correct attitude	24	96	176	90	
Incorrect attitude	1	4	19	10	
3. Practice- would inform health care providers if they tested HIV positive					0.67
Correct practice	24	96	178	91	
Incorrect practice	1	4	17	9	
4. Practice- would inform spouse if they tests HIV positive					0.98
Correct practice	24	96	183	94	
Incorrect practice	1	4	12	6	
5. Practice – would encourage spouse to be tested if they tests HIV positive					
Correct practice	24	96	192	98	0.94
Incorrect practice	1	4	3	2	

DISCUSSION

In this study, 25 antenatal mothers were HIV positive and 195 were HIV negative giving an HIV prevalence of 11.4% which is within the range of Nairobi region (10-20%) -Kenya Demographic and Health survey 2003.

The study population was of relatively low risk, with 90.5% in stable marriages. 99.4% of the clients were aware of HIV/AIDS. 99.5% of HIV negative and 96% of HIV positive had correct knowledge about what HIV is with 81.6% of HIV negative and 88% of HIV positive having correct knowledge on routes of HIV transmission. However HIV sero-status had no significance on the type of knowledge regarding route of transmission, p=0.230. The Kenya demographic and Health survey (KDHS) of 1998 reported also this high level of awareness (99% of men and 95.5% of women with the sexual route known to 96% of men and 95% of women). KDHS of 2003 has also confirmed the same high awareness. A study done in the same clinic had also showed high awareness of 90.3% [7].

The current finding therefore shows a higher level of awareness. The main source of information on HIV knowledge and awareness has been a combination of media, medical staff, friends and spouse . The many ways of channeling information, education and communication (IEC) on HIV/AIDS the country has adopted seems to have yielded a positive result on HIV awareness/knowledge. Knowledge on HIV transmission was also high with 100% of HIV positive and 87% of HIV negative having correct knowledge on the transmission through the sexual route, 76% of both HIV positive and HIV negative had correct knowledge on effect of sexual intercourse with HIV positive partner on Perinatal HIV transmission while 52% of HIV positive and 64% of HIV negative had correct knowledge on STI effects on MTCT of HIV. In all the instances HIV serostatus had no significance on the type of knowledge, $p>0.05$. The knowledge on Perinatal HIV transmission is higher than that of a recent study in the same clinic [7] which was 72.8% while Amoth[1] found 90% awareness at Aga Khan Hospital Nairobi. These reflect probably the impact of health education talks clients receive.

On effect of breast feeding and Perinatal HIV transmission, 72% of HIV positive and 86% of HIV negative had correct knowledge, 88%of HIV Positive and 86% of HIV Negative had correct attitude, 84% of HIV positive and 79% of HIV negative had correct practice but in all cases, the HIV serostatus had no significance on type of knowledge, attitude and practice, $p>0.05$. Amoth[1] had almost similar findings at Aga khan hospital in Nairobi with 75% of HIV positive and 73.6% of HIV negative having correct knowledge on HIV Perinatal transmission through breastfeeding. Recent study in the same institution [7] also had similar findings with correct knowledge of the study population being 74.9%.

The correct knowledge on perinatal HIV transmission was over 80% but this did not translate into similarly high correct attitudes and practice on a PMTCT intervention like safe infant feeding. In 88%(193/220) ,the cultural beliefs and practices favored prolong breastfeeding and mixed feeding which promotes perinatal HIV transmission. It is therefore not surprising that a recent survey on the update of PMTCT intervention on pilot projects in Africa (UNICE/UNAIDS PMTCT pilot projects)[8] done by UNICEF found that only 33% of HIV positive would accept replacement feeding in Kenya (Botswana – 90%, cote D'ivore – 72%, Rwanda – 86%, Tanzania 25%, Uganda – 44%, Zambia – 60% Zimbabwe 25%). Since prolong breastfeeding contributes to 30-50% of Perinatal HIV transmission, more health education needs to target the cultural practices and beliefs regarding this practice so that more mothers can accept safe infant feeding practices in order to reduce Perinatal HIV transmission. The influence of culture on safe infant feeding practices in HIV context needs to be explored in more detail as there seems to be more complex issues that might even involve stigma in the community so that despite the high knowledge ,it does not influence the attitudes and practices.

The correct knowledge, attitude and practice(KAP) on antiretroviral(ARV) drugs prophylaxis for prevention of mother to child transmission of HIV(PMTCT) was 88%(194/220),76%9(167/220) and 85%(187/220) respectively.

68% of HIV positive and 77% of HIV negative had correct knowledge, 72%

of HIV positive and 83% of HIV negative had correct attitude while 84% of HIV positive and 85% of HIV negative had correct practice. HIV serostatus had no significance on type of knowledge; attitude and practice, p>0.05. These findings were higher than a recent finding [7] in the same clinic (47.3% awareness) and also at Aga Khan Hospital in Nairobi (25% of HIV positive and 28.7% of HIV negative had correct knowledge). UNICEF[1] found low acceptance rate of ARV drugs intervention on their PMTCT pilot sites in Kenya with only 43.4% of HIV positive accepting ARV drugs[8].
However it is worth noting that the high knowledge on PMTCT ARV prophylaxis correlated with better attitude and practices and this good work must continue during the antenatal care

On elective caesarian section,correct knowledge attitude and practice was very low; 28%(7/25),36%(9/25) and 36%(9/25) respectively among the HIV positive women,
Amoth[1] found recently at Aga khan hospital in Nairobi that 25% of HIV positive and only 15.6% of HIV negative had correct knowledge[1]. The low knowledge on elective c/s also correlated with low attitude and practice among the HIV positive mothers. HIV positive mothers need to be provided with more information on role of elective cesarean section in PMTCT where it is feasible like Kenyatta National Hospital since elective caesarian section can reduce Perinatal HIV transmission.

On other preventive measures (use of condoms, obstetric practices, sexually transmitted infections treatment, voluntary counseling and testing) and Perinatal HIV transmission; 68% of HIV positive and 59% of HIV negative had correct knowledge on use of condoms, 80% of HIV positive and 73% of HIV negative had correct attitude while 84% of HIV positive and 76% of HIV negative had correct practice, p>0.05. These findings are higher than Kamau's previous findings (in 2001) of 60% correct knowledge on use of condoms in the same clinic[7] and may be a reflection on improvement on Health education at the clinic.

This study therefore demonstrates that there is high knowledge in perinatal HIV transmission and only in some preventive measures like in breastfeeding and PMTCT ARV prophylaxis. However the high knowledge only correlates to positive attitude and practices in the area of PMCT ARV prophylaxis but not in breastfeeding. It is therefore necessary to address the cultural attitudes and practices that contributes to the gaps in knowledge and the attitudes/practices in infant feeding in HIV context.
The low knowledge on the role of elective c/s which correlates with low attitude and practice demonstrated in this study shows that more information should be provided to HIV positive mothers for the possible benefit where this is feasible.

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