Antenatal Care Uptake and Observance of Prophylactic Antiretroviral Therapy among HIV-Positive Pregnant Mothers in Nyahururu County Referal Hospital, Kenya

Lodeke L.S. [1*], Karanja S.K. and Lihana R.W.[3]

[1]College of Health Sciences, School of Public Health, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya; [3]Centre for Virus Research, Kenya Medical Research Institute, Nairobi, Kenya.

*Corresponding author: Lodeke L. Silas, College of Health Sciences, School of Public Health, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya. Email: silaslodeke@gmail.com. Orcid Number: 0000-0001-5611-2544

Summary

BACKGROUND

Prevention of Mother-To-Child Transmission (PMTCT) of Human Immunodeficiency Virus (HIV) infection has been a fundamental advancement in the Acquired Immunodeficiency Syndrome (AIDS) response for the past decade. Although Kenya introduced the antiretroviral therapy programme as early as 2011, babies are still born with HIV. This study aimed at assessing the uptake of Antenatal Care Services (ACS) and the level of observance of prophylactic antiretroviral therapy among HIV-positive pregnant mothers attending antenatal clinics in Nyahururu Referral County hospital, Laikipia County, Kenya.

MATERIALS AND METHODS

We conducted an institutional-based prospective cohort study in a hospital. Our participants were 180 pregnant HIV-positive women enrolled through systematic random sampling from the PMTCT department. We followed and monitored them prospectively for nine months. In addition, were commenced on prophylactic antiretroviral therapy. We used descriptive statistical methods, correlations, bivariate analysis and multivariable logistic regression analyses to make sense of the collected data. A p-value of less than 0.05 was considered significant.

RESULTS

There was a significant response rate of 91%. Social support from partners accounted for 69.3%. In addition, 69.3% of the mothers had visited antenatal care more than four times. The majority of participants had undetectable viral load 97.5% and 89.0% had a cluster of differentiation above 250/ml).

CONCLUSIONS

Adequate follow-up, counselling, monitoring, social support and adherence to antiretroviral therapy can increase the chances of the HIV infected mothers delivering HIV-negative babies. It is also a prediction that majority of the infants will turn out HIV negative.

Keywords: Uptake, Antenatal Care, Adherence, Prophylactic, Anti-Retroviral, HIV, Pregnant Mothers.

Introduction

The introduction of antiretroviral medications has significantly reduced deaths attributable to Acquired Immunodeficiency Syndrome (AIDS) as well as vertical and horizontal transmissions of the Human Immunodeficiency Virus (HIV) (9, 3, 29), especially in Sub-Saharan Africa (6). Despite this progress, non-adherence to antiretroviral

therapy (ART) remains a barrier to achieving its maximum benefits, especially that of elimination of mother-to-child transmission of HIV (19, 10).

High levels of sustained adherence have been demonstrated to be directly associated with a decline in the babies' HIV acquisition risk (32), viral load suppression (22) and increased life expectancy of the mother (7). On the other hand, poor adherence to ART has been associated with poor treatment outcomes, the emergence of resistance, increased healthcare expenditure, and avoidable deaths (19,22,18,3,14). Despite the evidence showing that pregnant women have the highest level of adherence to ART, a low level of adherence has been reported in some settings among pregnant women (30).

The adherence rate among pregnant women varies across different settings (within and across countries) from 35% to 93.5% (11). Low adherence levels were observed in Kwazulu Natal, South Africa (30); while, a high level of adherence (90%) was reported in Kenya (27). Interestingly, an adherence level of 73% was reported during pregnancy in Malawi but dropped to 66% three months postpartum (16). A similar trend was observed in the USA where adherence levels of 75% were reported during pregnancy but reduced to 65% six weeks postpartum (5).

Previously reported barriers to antiretroviral (ARV) medication adherence include: ART side effects, social stigma, depression, non-disclosure of HIV status, unemployment, food insecurity, alcohol/substance abuse, alternative forms of therapy, inadequate follow-ups, stockouts, work and family responsibilities, low self-efficacy, low treatment satisfaction and distance to clinics (31,4,2,21,10). The factors associated with non-adherence also vary contextually. For instance, knowledge was linked to non-adherence in Israel (31), while younger age, rural residence and substance use were important in Kenya (27).

A study conducted in Romania found that ART side effects, low self-efficacy, low treatment efficacy, low treatment satisfaction and emotional distress are the main barriers to ART adherence (11). In Malawi, lack of emotional and financial support from husbands, inadequate counselling and internal migration was the reported reasons for non-adherence to ART (15). In contrast, the review of reasons for non-adherence to ART in sub-Saharan Africa indicates that giving birth at home, quality and timing of HIV testing and counselling, fear of stigma, lack of male involvement, non-sero-status disclosure, young age and lack of education are linked to low adherence (11).

A study conducted on caregivers' perspectives on non-adherence shows that insufficient patient education and social support, patient dissatisfaction with healthcare services, socioeconomic factors, and tension between ART and alternative medicine are the main reasons for non-adherence (1). The goal of PMTCT programmes was to maximize the health of the HIV-positive woman and decrease the chances of mother-to-child transmission of HIV (MTCT), by decreasing the viral load (VL) and increasing the CD4 count, whilst maintaining the maximum level of health throughout pregnancy.

Proper strengthening and implementation of these PMTCT services could reduce the incidence of Mother to Child Transmission and improve the quality of these services (33). Effective follow-up of mother-infant pairs is critical for ensuring the success of PMTCT programs. In the absence of such follow-up, the ultimate health outcomes of the infant, as well as the mother, will be suboptimal. Antenatal care services are an ultimate opportunity to build strong relationships and education for clients (26).

In September 2015 WHO released guidelines recommending that all pregnant women living with HIV be immediately provided with lifelong treatment, regardless of CD4 count (which indicates the level of HIV

in the body). This approach is called Option B+. By 2015, the implementation of Option B+ had resulted in 91% of 1.1 million women receiving antiretroviral (ARV) drugs as part of PMTCT services offered lifelong (33).

Low levels of service uptake among HIV-positive pregnant women attending antenatal care (ANC) are a critical bottleneck in PMTCT intervention as these integrated services are a primary entry point for comprehensive PMTCT services. For instance, in 2015, only 34% of pregnant women accessed lifelong antiretroviral treatment. Some countries also reported a decrease in PMTCT service utilization between 2012 and 2013.

Prevention of Mother to Child Transmission service uptake was uneven due to differences between health systems and fragile due to social factors. Limited utilization has important implications given the fact that PMTCT is at the centre of health improvement among the most vulnerable segments of the population, notably women and children (30). This study sought to determine the uptake of antenatal care services among HIV-positive pregnant mothers and the level of observance of prophylactic antiretroviral therapy.

Materials and methods

We conducted a health institution-based prospective cohort study at Nyahururu county referral hospital from February 2000 to December 2000 Participants for this study included HIV-positive pregnant mothers who tested HIV positive during routine testing at the first antenatal visit. Only mothers enrolled in the PMTCT program and consent to participate were enlisted in the study.

We included HIV-positive pregnant mothers attending the ANC clinic from second-trimester gestation. All were assessed and antenatal screening commenced including testing for viral load and CD4 counts. Adherence Counselling was done on prophylactic antiretroviral therapy and

cotrimoxazole and follow-up visits were initiated. Slovin's formula was used to select a sample size of 180 participants.

Data on demographic characteristics, adherence to antiretroviral therapy, and counselling were collected using structured questionnaires. The questionnaire adopted information from the standard antenatal booklet.

All the enumerators were orientated on how to complete the structured data collection sheet. To ensure the quality of the data, the following measures were taken: pre-testing of the questionnaire, cross-checking of completed questionnaires before data entry, supervision of data entry and errors and consistency in checking procedures for the data were controlled during analysis.

The data extracted from the questionnaires were checked for completeness and consistency. Data entry and analysis were carried out using SPSS version 25. Descriptive statistical methods, correlations, bivariate analysis and multivariable logistic regression analysis were used. The odds ratio with its corresponding 95% confidence interval was used as the measure of the degrees of association with infant HIV positivity. A p-value of less than 0.05 was considered significant.

Results

The overall response rate was 91 % (n=180). Nine (9 %) of the participant did not complete the study. Table 1 presents the demographic characteristics of the participants.

Number of Antenatal Visits

Out of 163 HIV-positive pregnant women, 3.7% visited the antenatal clinic once during pregnancy, 4.3% twice, 18.6% thrice, 69.3% four times; while 14.1% visited five times. Table 5 shows that the Somers'd of Linear-by-Linear Association were statistically significant since the p- values were all under 0.05.

Table 1:
Demographic Characteristics of HIV Pregnant Mothers

Characteristic		No. Of Respondents
Age (Yrs)	11-20	11(6.7%)
	21-30	60(36.8%)
	31-40	84(51.5%)
	41-50	8(5.0%)
Marital Status	Married	109(66.9%)
	Single	45(27.6%)
	Divorced	9(5.5%)
Educational Level	None	6(3.7%)
	Primary	63(38.7%)
	Secondary	70(42.9%)
	Post-secondary	24(14.7%)
Parity	First	30(23.4%)
	Second	51(31.3%)
	Third	48(29.4%)
	More than three	20(16.0%)
Social support	Partner	100(61.3%)
	Family/relative	50(30.7%)
	Friend	1(0.6%)
	Alone	12.7.4%)

Table 2:
Viral load among HIV-Positive Women

Characteristic	Results
Below 1000 copies	1(0.6%)
Undetectable	159(97.5%)
Not Done	3(1.8%)

Table 3:
Cluster of Differentiation (CD4) Count

Characteristic	Results
Below 1000 copies	1(0.6%)
Undetectable	159(97.5%)
Not Done	3(1.8%)

Table 4:
Knowledge on whether the Partner is on Antiretroviral Therapy

Characteristic	No.of respondents
Yes	111(68.1%)
No	48(29.4%)
No response	4(2.5%)

Table 6 indicates percentages which support that there was a linear association between parity and the education level of the respondents. The F-statistics had a value of 7.449 and the p-value was 0.007. The p-value of less than 0.05 indicates a significant relationship between parity and education level among HIV-positive mothers in Laikipia County

.

Table 5:
Directional Measures the Directional Measures Testing the level of Association between the Age of HIV-Positive Pregnant Mothers and the Education Level

Directional Measures			Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Somers'd	Symmetric	-.192	.069	-2.757	.006
		age (Binned) Dependent	-.184	.067	-2.757	.006
		level education Dependent	-.200	.072	-2.757	.006

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 6:
Parity * Level Education Cross Tabulation

Parity * level education Cross tabulation			Level education				Total
			None	Primary	Secondary	Tertiary other (s) specify	
Parity	1st pregnancy	Count	$0_{a, b}$	7_b	17_a	14_c	38
		% within parity	0.0%	18.4%	44.7%	36.8%	100.0%
	2nd pregnancy	Count	$1_{a, b}$	14_b	29_a	$7_{a, b}$	51
		% within parity	2.0%	27.5%	56.9%	13.7%	100.0%
	3rd pregnancy	Count	$2_{a, b}$	25_b	$19_{a, b}$	2_a	48
		% within parity	4.2%	52.1%	39.6%	4.2%	100.0%
	More than 3	Count	3_a	17_a	5_b	1_b	26
		% within parity	11.5%	65.4%	19.2%	3.8%	100.0%
Total		Count	6	63	70	24	163
		% within parity	3.7%	38.7%	42.9%	14.7%	100.0%

Table 7:
Analysis of Variance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	36.132	1	36.132	44.650	.000[b]
	Residual	130.285	161	.809		
	Total	166.417	162			

a. Dependent Variable: parity
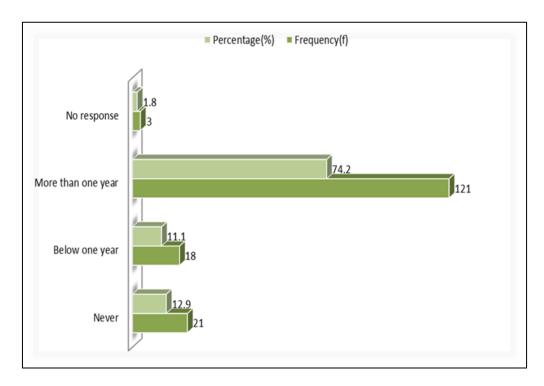b. Predictors: (Constant), level of education

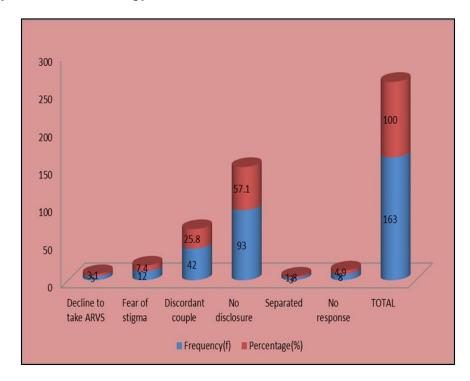*Figure 1:*
Duration of Antiretroviral Therapy

Figure 2:
Reasons for Non-adherence to Antiretroviral Therapy

Discussion

The overall response rate among HIV pregnant women attending PMTCT clinics in Laikipia County was significantly high. This support that the role of counselling, social support, follow-up from community health volunteers, quality and timely free services and a friendly environment can encourage HIV-positive pregnant women to seek services (12).

This study showed that the majority of HIV pregnant women were at their average age of 30-40 years. This age is usually the peak age of fertility and sexual activity, which could have contributed to the increased number of pregnancies. Moreover, the majority of the women were married, which goes to support that partner support forms an integral part of the comprehensive care program (12).

A great majority of the women had completed high school-level education. This is a significant contributory factor which shows that a majority of these women had enough knowledge and could make informed decisions on their health status. In addition, this cohort fully utilized counselling, follow-up and proper communication channels, hence making the follow-up program run efficiently.

The average number of pregnancies per every HIV pregnant woman in Laikipia County was two. This could have been contributed by the higher education level, empowering the women with enhanced knowledge, acceptance, accessibility and utilization of family planning services.

The findings show that the average number of visits to the antenatal care clinic was at least four times which is acceptable by the World Health Organization. The regular attendance also points to the higher educational level of these women, constant follow-up and social support from their partners (12)

Thankfully the study found that a majority of the mothers had an undetectable viral load. This is an achievement for the PMTCT program. Attainment of viral load suppression by such a majority could have been contributed mainly by adherence to treatment and the availability of machines in all referral hospitals in the country. Moreover, close follow-up and social support may have also been very instrumental in viral suppression to undetectable levels (9).

The majority of the respondents who attended the clinic did show evidence of a high Cluster of Differentiation (CD4). This also could have been contributed mainly by adherence to treatment and the availability of machines in all referral hospitals in the country. Close follow-up and social support are also important contributors.

The results also show an encouragingly high level of uptake and adherence to ARVs. This has definitely been the significant reason for good health among these women. The women seem to know the effects of failing to take the antiretroviral medication probably because of the social support, counselling and consistency in follow-up. Education level could also be an influencer in their adherence to ARVs (20). Moreover, cooperation among the women, health providers, community health volunteers, adherence counsellors and partners could also have been big contributors

A majority of the mothers had an initial zero status during antenatal clinic visits. This was influenced by the policy of mandatory antenatal profiles where all pregnant women must undergo an HIV test as part of routine antenatal care. Most of them had also been on antiretroviral therapy for more than one year. This indicates that they either had the infection before conception or during their previous deliveries (33).

The majority of the partners of the HIV-positive pregnant women were on prophylactic ARVs. This was because they were counselled and had informed decisions and they were also knowledgeable and well

informed on the effect of non-adherence to ARVs.

Study Limitations

This study was conducted during the very initial stages of Covid-19 and follow-up was a big challenge. Loss to follow-up was evidenced as not all pregnant mothers completed the study. Loss of follow-up was also contributed by stigma, transfer to another facility and some may have died or delivered in other health facilities.

Conclusions

Adequate follow-up, counselling, monitoring, social support and adherence to antiretroviral therapy can increase the chances of the HIV infected mothers delivering HIV-negative babies. It is also a prediction that majority of the infants will turn out HIV negative.

There is a need for active monitoring of uptake of antenatal care and prophylactic antiretroviral medication programs to encourage pregnant women who are infected with HIV to attend the clinics to minimize the rate of transmission of the infection to the unborn babies hence making the program successful.

Author contacts email

Lodeke L. S. - email: silaslodeke@gmail.com
Karanja S. - email: skaranja@jkuat.ac.ke
Lihana R. W. - email: rlihana@gmail.com

Conflict of interests

The authors have no competing interest in this manuscript submitted for publishing.

Availability of data

This data is the original work of the authors. No data has been published in any other journal

References

1. **Adeniyi O, Ajayi A, Selanto-Chairman N, *et al*** (2017) Demographic, clinical and behavioural determinants of HIV serostatus non-disclosure to sex partners among HIV-infected pregnant women in the Eastern Cape, South Africa. *PLoS One.;* 12(8):e0181730.

2. **Ankrah DN, Koster ES, Mantel-Teeuwisse AK, *et al*** (2016) Facilitators and barriers to antiretroviral therapy adherence among adolescents in Ghana. Patient Prefer Adherence.;10:329.

3. Antiretroviral Therapy Cohort Collaboration (2009) Mortality of HIV-infected patients starting potent antiretroviral therapy: comparison with the general population in nine industrialized countries. *Int J Epidemiol.*;38(6):1624.

4. **Azia IN, Mukumbang FC, Van Wyk B**(2016) Barriers to adherence to antiretroviral treatment in a regional hospital in Vredenburg, western cape, South Africa. *Southern Afr J HIV Med.*;17(1):1–8.

5. **Bardeguez AD, Lindsey JC, Shannon M, *et al***(2008).Adherence to antiretrovirals among US women during and after pregnancy. *J Acquir Immune defic Syndr.*;48(4):408.

6. **Bhardwaj S, Treger-Slavin L, Barron P, *et al*** (2014) Elimination of mother-to-child transmission of HIV in South Africa: rapid scale-up using quality improvement: prevention of mother-to-child transmission-progress towards the millennium development goals. *S Afr Med J.* 2014;104(3):239–43.

7. **Bor J, Herbst AJ, and Newell M-L,** *et al.* (2013) Increases in adult life expectancy in rural South Africa: valuing the scale-up of HIV treatment. *Science*.;339(6122):961–5.

8. **Broder S.** (2010) The development of antiretroviral therapy and its impact on the HIV-1/AIDS pandemic. *Antivir Res.* 85(1):1–18.

9. **Centre for Disease control**, (2013). Global HIV/AIDS Retrieved from: http://www.cdc.gov/globalaids/global-hiv-aids-at-cdc/default.html> [accessed on 13/2/2014 at 10.00 a.m.]. 55

10. **Chesney M.** (2003) Adherence to HAART regimens. *AIDS Patient Care STDs*.;17(4):169–77.

11. **Colombini M, Stöckl H, Watts C,** *et al* (2014). Factors affecting adherence to short-course ARV prophylaxis for preventing mother-to-child transmission of HIV in sub-Saharan Africa: a review and lessons for future elimination. *AIDS Care.;* 26(7):914–26.

12. **Deressa, W, Seme, A, Asefa, A, Teshome, G, & Enqusellassie, F.** (2010). Utilization of PMTCT services and associated factors among pregnant women attending antenatal clinics in Addis Ababa, Ethiopia. Addis Ababa: *PMTCT*.

13. **Dima AL, Schweitzer A-M, Diaconiţă R,** *et al* (2013). Adherence to ARV medication in Romanian young adults: self-reported behaviour and psychological barriers. *Psychol health Med.;*18(3):343–54.

14. **Gueorguieva R, Wu R, Krystal JH,** *et al* (2013). Temporal patterns of adherence to medications and behavioral treatment and their relationship to patient characteristics and treatment response. *Addict Behav*.;38(5):2119–27.

15. **Gugsa S, Potter K, Tweya H,** *et al* (2017). Exploring factors associated with ART adherence and retention in care under option B+ strategy in Malawi: a qualitative study. *PLoS One*. ;12(6):e0179838.

16. **Haas AD, Msukwa MT, Egger M,** *et al* (2016). Adherence to antiretroviral therapy during and after pregnancy: cohort study on women receiving care in Malawi's option B+ program. *Clin Infect Dis*.;63(9):1227–35.

17. **Hansana V, Sanchaisuriya P, Durham J,** *et al* (2013). Adherence to antiretroviral therapy (ART) among people living with HIV (PLHIV): a cross-sectional survey to measure in Lao PDR. *BMC Public Health*.;13(1):617.

18. **Hoffmann CJ, Cohn S, Mashabela F,** *et al* (2016). Treatment failure, drug resistance, and CD4 T-cell count decline among postpartum women on antiretroviral therapy in South Africa. *J Acquir Immune Defic Syndr*;71(1):31.

19. **Ickovics JR, Cameron A, Zackin R,** *et al* (2002). Consequences and determinants of adherence to antiretroviral medication: results from adult AIDS Clinical Trials Group protocol 370. *Antivir Ther.;*7(3):185–93.

20. **Kurewa EN, Kandawasvika GQ, Mhlanga F,** *et al.* Realities and challenges of a five year follow up of mother and child Pairs on a PMTCT program in Zimbabwe. *Open AIDS J.* 2011;5:51-58.

21. **Loeliger KB, Niccolai LM, Mtungwa LN,** *et al* (2016). Antiretroviral therapy initiation and adherence in rural South Africa: community health workers' perspectives on barriers and facilitators. *AIDS Care*.;28(8):982–93.

22. **Maggiolo F, Di Filippo E, Comi L,** *et al* (2017). Reduced adherence to antiretroviral therapy is associated with residual low-level viremia. *Pragmat Obs Res.;*8:91.

23. **Mekuria LA, Prins JM, Yalew AW,** *et al* (2016). Which adherence measure–self-report, clinician recorded or pharmacy refill–is best able to predict detectable viral load in a public ART programme without routine plasma viral load monitoring? *Tropical Med Int Health.;*21(7):856–69.

24. **Mills EJ, Nachega JB, Bangsberg DR, *et al*** (2006). Adherence to HAART: a systematic review of developed and developing nation patient-reported barriers and facilitators. *PLoS Med.;*3(11):e438.

25. **Ministry of Health, National AIDS and STI Control Programme (NASCOP).**(2016). Guidelines on use of antiretroviral drugs for treating and preventing HIV infections in Kenya. Nairobi: *NASCOP.*

26. **Mirkuzie AH, Hinderaker SG, Sisay MM, Moland KM, Mørkve O.** Current status of medication adherence and infant follow upin the prevention of mother to child HIV transmissionprogramme in Addis Ababa: a cohort study. *J Int AIDS Soc..*

27. **Mukui IN, Williamson J, Wamicwe JN, *et al***(2012). *Rates and predictors of non-adherence to antiretroviral therapy among HIV-positive individuals in Kenya:* results from the second Kenya AIDS Indicator survey,. *PLoS One.* 2016;11(12):e0167465.

28. **Najjar A, Amro Y, Kitaneh I, *et al* (**2015). Knowledge and adherence to medications among Palestinian geriatrics living with chronic diseases in the West Bank and East Jerusalem. *PLoS One.;*10(6):e0129240.

29. **Ndirangu J, Newell M-L, Tanser F, *et al*** (2010). Decline in early life mortality in a high HIV prevalence rural area of South Africa: evidence of HIV prevention or treatment impact*? AIDS* (London, England).;24(4):593.

30. **Ramlagan S, Alcaide M, Rodriguez V, Peltzer K, Weiss S, Jones D.** (*2016)* Low Adherence to ARV among HIV-Infected Pregnant Women in rural South Africa. *Open Forum Infect Dis.;*3(suppl_1):1499.

31. **Shubber Z, Mills EJ, Nachega JB, *et al*** (2016). *Patient-reported barriers to adherence to antiretroviral therapy: a systematic review and meta-analysis.* PLoS Med.;13(11):e1002183.

32. **Tanser F, Bärnighausen T, Grapsa E, *et al*** (2013). High coverage of ART associated with decline in risk of HIV acquisition in rural KwaZulu-Natal, South Africa. *Science*. 339(6122):966–71.

33. **WHO** (2015).*Guideline on when to start antiretroviral therapy and on pre-exposure prophylaxis for HIV*. Retrieved on 5th May, 2016 from http://www.who.int/hiv pub/guidelines/earlyrelease-arv/en/.