

Prevalence and Factors Associated with HIV Infection among Teenage Mothers Delivered at Mulago Hospital—A Cross-Sectional Study

Aniku Dan Elly*, Sekikubo Musa, Baragaine Justus Kafunjo

Department of Obstetrics and Gynecology, Makerere College of Health Sciences, Makerere University, Kampala, Uganda
Email: *anikudan@gmail.com

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Abstract

Background: HIV infection during pregnancy is still a grave problem, especially in developing countries; this is especially true for teenage pregnancy. We here attempted to determine the prevalence of HIV among teenage mothers and the factors associated with acquiring HIV infection amongst them. **Methods:** A cross-sectional study was conducted at a tertiary institute in Uganda from November 2016 to January 2017. We interviewed a total of 395 teenage pregnant women. Bivariate and multivariate analyses were made, with the results presented by odds ratios (OR) with a 95% confidence interval (CI). **Results:** Of 395, 34 (8.6%) were HIV positive. Of the 34, ten were born when infected and 4 had HIV following defilement. All the mothers were on anti-HIV treatment at the time of the study. The factors associated with HIV infection were: age (AOR = 2.8, CI = 1.50 - 5.33), age at sexual debut (0.6, 0.43 - 0.94), the age difference between couples (1.1, 1.02 - 1.18), and living in a polygamous relationship (10, 2.56 - 17.85). **Conclusion:** High percentage of teenage pregnant women showed HIV positive. Age of the mother, age at sexual debut, the age difference between the couple, and living in a polygamous relationship was associated with HIV infection in this fraction.

Keywords

Teenage Pregnancy, Sexual Debut, Vertical Transmission

1. Introduction

Teenage pregnancy is a pregnancy occurring in females aged 13 to 19 years [1]. Teenage HIV is a global problem. Adolescent girls and young women account for one in four new HIV infections in sub-Saharan Africa [2]. Globally 22% of all new HIV infections were attributed to infections among young women, with

sub-Saharan Africa bearing the greatest burden at 31% [3]. Earlier studies have associated the Level of education, income levels, and socio-economic background with acquiring HIV infection among teenage mothers in Uganda [4] [5]. Young women are particularly at higher risk due to cervical ectopy associated with the hormonal surge in puberty which facilitates greater exposure of target cells to trauma and pathogens in the vagina [6]. HIV, when not treated early, leads to AIDS compromising the mother's immunity which impacts the overall outcome of the pregnancy for the mother and the baby.

Literature in a South African study showed that the risk of contracting HIV is higher during pregnancy than in the general population [7]. High levels of estrogen and progesterone during pregnancy cause changes in the structure of the genital mucosa and immunological changes which are associated with HIV infection [7].

Uganda's demographic health survey of 2011 showed that urban women were more likely to engage in riskier sexual behaviors like having more sexual partners than those in a rural setting. Hence we measured the prevalence of teenage HIV in an urban setting like Mulago against the national average. The study also assessed factors associated with HIV infection among teenage mothers at Mulago.

2. Methods

The design for this study was cross-sectional with both descriptive and analytical components.

We conducted the study at Mulago National Referral Hospital, Kawempe Campus. Mulago national referral hospital is located in Kawempe south division of Kampala, the Capital City of Uganda. Most of the patients were residents of the five divisions of Kampala. The hospital also receives patients from neighboring districts of Wakiso, Luwero, Nakaseke, Buikwe, Mukono, and Mpigi.

In January 2016, of 1775 mothers that delivered at Mulago, 257 (15%) were teenagers. We targeted all Teenage mothers delivered at Mulago National referral hospital and our study population consisted of Teenage mothers who were delivered at the facility between November 2016 and January 2017.

All mothers 13 to 19 years who delivered at Mulago were included. We excluded all teenage mothers who were very sick, and at the analysis point for factors associated with HIV infection, we also excluded mothers who were infected through vertical transmission by their parents since they had a known risk. The Dependent variable was; the HIV status of mothers recorded on either ANC card or the HIV test results obtained at admission after carrying out a blood test. Independent variables were categorized into demographic, safe motherhood, sexual reproductive characteristics, and socio-economic factors.

Using Kish & Leslie's (1965) formula and considering a 10% nonresponse rate a total of 424 participants were sampled but were only able to achieve 395 completed questionnaires.

The researchers and the research assistants enrolled eligible participants, collected blood samples, obtained blood samples were tested and we followed standard HIV testing guidelines using all three HIV test kits, *i.e.* determine, starter pack, and unigold as the tiebreaker.

Data analysis was done using STATA, we described socio-demographic characteristics of the participants and we also compared Social demographic factors, socioeconomic status, and reproductive health factors among teenage mothers to their HIV status using the Pearson Chi-Square test we obtained Bivariate analysis data, and all factors that had P-Value < 0.2 were considered to be significant and Then performed logistic regression to compare relationships between the dependent variable (HIV status) and the independent variables.

3. Results

We found the prevalence of HIV among teenage mothers delivered at Mulago to be 8.61%. We also found out that the prevalence of HIV excluding the 10 mothers who contracted HIV vertically from their parents is 6.23%.

In **Table 1** below, we found the mean age of study participants was 18.1 years (SD = ± 1.1) meanwhile the average age for their spouses was 24.3 years (SD = 4.7). Age at sexual debut was 16.4 (± 1.4), most of the study participants had attained an education level more than in secondary education 190 (48.1%), and most of the participants had one sexual partner (SD = 1.1) at the time of the study. meanwhile, their lifetime number of sexual partners was 1.5 (SD = 0.8). most of the teenagers who lived with a caretaker with no gainful employment were 330 (83.5%). The age difference between the teenage mothers and their spouses was 6.2 years with SD = ± 4.7 , majority of teenagers were either married or cohabiting with their spouses 255 (64.5%). knowledge of contraception was 264 (52.9), and only 161 (40.8%) ever used condoms. The majority of the participants were Baganda 248 (62.8%), followed by Banyankole 54 (13.7%) and the rest were from other tribes of Uganda.

In the Bivariate **Table 2** below, age of the subject, age of spouse, age at sexual debut, previous sexual relationships, history of having STIs, alcohol consumption by the participants, caretaker's occupation, living in a polygamous relationship, the age difference between couples, living with the partner, lifetime number of sexual partners and the number of other sexual relationships currently were associated with HIV status of the participants. However, there was no association, between levels of education, income levels of participants, and condom use. The factors in bivariate analysis that had P-value < 0.2 were run in a logistical regression model to eliminate confounding in the association.

Multivariate analysis in **Table 3** below, shows for every one-year increase in age at sexual debut, the risk of HIV infection reduces by 40% (AOR = 0.6, CI = 0.43 - 0.94). We found out that for every one-year increase in the age of the participant the risk of HIV infection increases by 2.8 times (AOR = 2.8, CI = 1.50 - 5.33). Teenagers who live in a polygamous relationship are ten times at risk of

Table 1. Descriptive analysis of the demographic, sexual reproductive, and socioeconomic factors of participants.

Variable	N	SD %
Age of Teenage Mother (mean, sd)	18.1	1.1
Age of Mother		
13 - 14	4	1.04
15 - 17	90	23.37
18 - 19	286	75.59
Education		
None	31	8.1
Primary	168	43.6
Secondary and More	186	48.3
Caretaker Occupation		
Unemployed	324	84.2
Employed	61	15.8
Weath Index		
Poor	224	58.2
Rich	161	41.8
Previous Zexual Relationship		
Yes	230	59.7
No	155	40.3
Alcohol		
Yes	53	13.8
No	332	86.2
Living with Sexual Partner		
Yes	253	65.7
No	132	34.3
Partner Has Other Sexual Relationships		
Yes	58	15.1
No	327	84.9
Condom Use		
Yes	159	41.3
No	226	58.7
Knowledge on Contraception		
Yes	258	67
No	127	33
History of STDs		
Yes	204	53
No	181	47

Table 2. Bivariate analysis of the factors associated with HIV infection.

Characteristics	HIV Negative (%)	HIV Positive	Totals (%)	OR (95% CI)	P-Val
Education					
None	30 (8.3)	1 (4.2)	31 (8.1)		
Primary	157 (43.5)	11 (45.8)	168 (43.6)	2.1 (0.026 - 16.89)	0.49
Secondary and more	174 (48.2)	12 (50)	186 (48.3)	2.1 (0.26 - 16.50)	
Caretaker Occupation					
Unemployed	307 (85)	17 (20.8)	324 (84.2)	2.3 (0.93 - 5.91)	0.07
Employed	54 (15)	7 (29.2)	61 (15.8)		
Weath Index					
Poor			224 (58.2)	0.6 (0.36 - 1.55)	0.98
Rich			161 (41.8)		
Previous Zexual Relationship					
Yes			230 (59.7)	0.5 (0.25 - 1.03)	0.06
No			155 (40.3)		
Alcohol					
Yes	45 (12.5)	8 (33.3)	53 (13.8)	3.6 (1.42 - 8.70)	<0.01
No	316 (87.5)	16 (66.7)	332 (86.2)		
Living with Sexual Partner					
Yes	234 (64.80)	19 (79.2)	253 (65.7)	0.5 (0.18 - 1.33)	0.16
No	127 (35.2)	5 (20.8)	132 (34.3)		
Partner Has Other Sexual Relationships					
Yes	47 (13)	11 (45.8)	58 (15.1)	5 (2.3 - 14.28)	<0.01
No	314 (87)	13 (54.2)	327 (84.9)		
Condom Use					
Yes	147 (40.7)	12 (50)	159 (41.3)	0.7 (0.30 - 1.57)	0.37
No	214 (59.3)	12 (50)	226 (58.7)		
Knowledge on Contraception					
Yes	238 (65.9)	20 (83.3)	258 (67)	0.4 (0.13 - 1.16)	0.09
No	123 (34.1)	4 (16.7)	127 (33)		
History of STDs					
Yes	188 (52.1)	16 (66.7)	204 (53)	0.5 (0.23 - 1.30)	0.17
No	173 (47.9)	8 (33.3)	181 (47)		
Age of Participants				1.6 (0.99 - 2.70)	0.05
Age of Spouse				1.1 (1.02 - 1.16)	0.01
Mean Age Difference				1.1 (1.01 - 1.15)	0.02
Age at Sexual Debut				0.7 (0.54 - 0.95)	0.02

Table 3. Showing multivariate analysis of factors independently associated with HIV infection.

Characteristics	AOR	P-VALUE
Age at Sexual Debut	0.6 (0.43 - 0.84)	0.024
Polygamous Relationship	10 (2.56 - 17.85)	<0.001
Age of Subject Mean Age	2.8 (1.50 - 5.33)	0.001
Mean Age Difference	1.1 (1.02 - 1.18)	0.008

HIV infection than those whose partners do not have other sexual relationships (AOR = 10, CI = 2.56 - 17.85). We also found that age difference between couples contributes to an increased risk of HIV infection by 1.1 times (AOR = 1.1, CI = 1.02 - 1.18). Meanwhile, the age of spouse, previous sexual relationships, not living with the partner, and lifetime number of sexual partners were not independently associated with HIV infections among participants.

4. Discussions

The prevalence of HIV among teenage mothers delivered at Mulago hospital was 8.61%. Sexual debut, age of the subjects, the age difference between the couples, and living in a polygamous relationship was significantly associated with HIV infection among the mothers.

4.1. Prevalence of HIV among Teenage Mothers Delivered at Mulago Hospital

The prevalence of HIV among teenage mothers delivered at Mulago hospital was 8.61%. whereas this is way above the current national average of 7.3%, it is much lower than the 20% prevalence rate of HIV prevalence among teenage mothers in South Africa [8].

The biological explanation for high HIV risk in these teenagers is due to cervical ectopy due to estrogen surge during puberty [6]. Pieces of literature also report local trauma, especially amongst teenagers who were coerced into an early sexual relationship [9]. The 8.6% prevalence we obtained amongst these teenage mothers is higher than the reported 3.02% prevalence of HIV found in adolescents in Uganda [10]. The higher prevalence could be explained by the generally higher HIV prevalence in the general population as seen in urban settings such as Kampala, and Wakiso where most clients and patients for Mulago come from [11]. The risk of HIV acquisition is high in pregnancy [7]. It could be possible that some of the teenagers could have acquired HIV during pregnancy, although in this study we were unable to measure the incidence of HIV infection during pregnancy amongst teenage mothers.

We also analyzed the prevalence of HIV among teenage mothers excluding 10 mothers who contracted HIV vertically from their mothers, the prevalence of HIV was found to be 6.2% lower than the overall prevalence. Implying Elimination of mother-to-child transmission (EMTCT) can help to reduce HIV preva-

lence in the population.

4.2. Factors Associated with HIV Infection

Multivariate analysis shows the age of the mother, age at sexual debut, living in a polygamous relationship, and the age difference between couples was independently associated with HIV infection. Age at sexual debut (AOR = 0.6, CI = 0.43 - 0.94), Age of the participant (AOR = 2.8, CI = 1.50 - 5.33), and Teenagers who live in a polygamous relationship (AOR = 10, CI = 2.56 - 17.85) and the age difference between couple contributes to increased risk of HIV infection (AOR = 1.1, CI = 1.02 - 1.18).

A prospective study conducted in Uganda found that HIV acquisition was higher among pregnant women than among either lactating women or non-pregnant and non-lactating women [12]. The study attributed the increased risk to hormonal changes that affect immune responses or the genital tract mucosa. In the same study age difference between the couple and having a higher number of sexual partners, increases the risk of HIV infection. The ages of the subjects were also found to be independently associated with HIV infection. For every one-year increase in age of the participants, the risk of HIV infection is 2.8 times higher. As the teenagers grow older parents assume they are more responsible and can take care of themselves, that way teenagers lack supervision and engage in illicit sexual behavior. This was consistent with a study conducted among urban high school students that showed that young people engage in sex when they are least supervised especially after school. More than half of sexually active youths reported that they had sex at home after school, and, particularly boys.

In our study for every one-year delay of the coital debut, the risk of acquiring HIV reduces by 40% (AOR = 0.6, CI = 0.43 - 0.94) which implies for a teenager who starts sexual activity one year earlier the risk of HIV infection is 1.7 times higher. Similar to the South African study, Women who had early sexual activity were three times at higher risk of acquiring HIV compared to those who had late adolescence pregnancy [13].

In our study, the Adjusted Odds for mothers whose partners had another sexual relationship was 10 times (AOR = 10, CI = 2.56 - 17.85). Compared to a study in KwaZulu natal aimed at investigating the association between HIV and Polygamy. It was also found that couples that lived in polygamous relationships had a higher risk of HIV [14], although many participants thought that it was mainly infidelity, not polygamy responsible for the high risk of HIV. In many African cultures, so many women think polygamy is a normal cultural norm. Our study did not measure the concept of infidelity. In another study, both formal and informal polygamy predispose to HIV infection although the risk is higher in informal polygamy [15].

We found out that age difference between couples is a risk factor for HIV infection among teenage mothers. In our study for every one-year mean difference

between couple's ages, the risk of HIV infection increases by 1.1 times (AOR = 1.1, CI = 1.02 - 1.18) [11]. In a South African study, men aged 25 - 40 are the primary source of HIV acquisition amongst adolescent girls and young women. And many of the spouses in our study were above 25 years.

How age difference between couples increases the risk of HIV infection is not known, but it's probably due to the power relation between the teenagers and their older spouses, where the teenagers may be having less say on the use of contraceptives like condoms. But also older men a likely to have other older women could have been infected.

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Authors' Contributions

ADE was involved in concept development, data collection, analysis, and research report writing. SM was involved in the concept development and review of the research report. BJK was involved in concept development, review of research results, and manuscript development. All authors have read and approved the final version of this manuscript.

Consent for Publication

Not applicable, the manuscript does not contain data from any individual or institution such as pictures.

Availability of Data and Materials

All data generated or analyzed during this study are included in this published article and supplementary information can be obtained on reasonable request from corresponding authors who are in the custody of the files.

Ethics Approval and Consent to Participate

This is to certify that the work presented in this book was done by the authors at Mulago women's hospital, Kawempe campus. And that this dissertation has never been presented in any other journal for publication.

Permission to do the research was sought from the School of Medicine Research and Ethics committee, quote approval reference #REC REF 2016-121 for queries. Informed consent was obtained from all participants. Participants who were younger than 18 years were allowed to provide consent since they were regarded as emancipated minors according to Uganda national council of science and technology 2014 guidelines amongst human subjects. They were explained

that they would get minor trauma during venipuncture. Their HIV serology results are being kept confidential.

The procedures that were being undertaken in this study were explained to each participant and they were also encouraged to ask questions and seek clarification on any item related to the study. Participants' participation and withdrawal from the study were voluntary and there was no compensation and allowances given to participants. All the principles of Ethics were observed in this study.

Conflicts of Interest

All the authors work Mulago National referral/Teaching Hospital at the time of the study.

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