International Journal of Community Medicine and Public Health
Osman AM et al. Int J Community Med Public Health. 2025 Mar;12(3):1255-1262
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20250606

Original Research Article

Predictors of anxiety and depression among HIV infected pregnant mothers on antiretroviral therapy attending antenatal clinics at leading teaching and referral hospitals in Kenya

Abdihakim M. Osman[1]*, David Gitonga Nyamu[1], Beatrice Kagai Amugune[2]

[1]Department of Pharmacology, Clinical Pharmacy and Pharmacy Practice, Faculty of Health Sciences, University of Nairobi, Nairobi, Kenya
[2]Department of Pharmaceutical Chemistry, Pharmaceutics and Pharmacognosy, Faculty of Health Sciences, University of Nairobi, Nairobi, Kenya

Received: 06 December 2024
Revised: 10 February 2025
Accepted: 14 February 2025

***Correspondence:**
Dr. Abdihakim M. Osman,
E-mail: inashaafi@gmail.com

ABSTRACT

Background: Poor maternal psychological health in pregnancy has a detrimental effect on the socio-emotional development of the unborn child and should therefore be assessed and mitigated. The study aimed at establishing the level of anxiety and depression among mothers on antiretroviral therapy attending antenatal clinics at Mbagathi and Kenyatta National Hospitals.
Methods: A descriptive cross-sectional study among 70 HIV infected mothers attending antenatal clinics. Anxiety and depression were determined using the Generalized Anxiety Disorder-7 and Patient Health Questionnaire-9 tools, respectively. Statistical analysis was done using IBM Statistical Package for Social Sciences version 23 with $p<0.05$ considered statistically significant. Binary logistic regression was done to find out independent predictors of anxiety and depression among the participants.
Results: The mean age of the study participants was 32.3 (SD 5.78) years. Most participants attained at least a secondary school education level (47.1%) and were married (75.7%). The overall prevalence of anxiety was 23.8% with minimal, mild, moderate and severe anxiety at 52.9%, 34.3%, 4.3% and 8.6%, respectively. The overall depression rate was 22.6% with minimal, mild, moderate, moderately severe and severe depression at 42.9%, 32.9%, 15.7%, 2.9% and 5.7% respectively. There was statistically significant association between anxiety and depression ($p= 0.025$) but no statistically significant association between sociodemographic variables and anxiety or depression.
Conclusions: There was a considerable level of anxiety and depression among the mothers. Anxiety and depression were positively related. Therefore, counselling, psychosocial education and multidisciplinary team management should be integrated into the management of HIV infected mothers.

Keywords: Antenatal clinic, Antiretroviral therapy, Anxiety, Depression, HIV infected pregnant mothers

INTRODUCTION

Pregnancy is associated with profound changes in the body that can mistakenly be diagnosed as pathological though physiological in pregnancy sense.[1] The changes can lead to depression and anxiety in some women.[2] It has been established that poor maternal psychological health (anxiety and depression) in pregnancy has a detrimental effect on the socio-emotional development of the unborn child and should therefore be assessed and mitigated.[3] It has been proposed that addressing the aforementioned psychosocial factors is associated with improved adherence to antiretroviral therapy (ART) and subsequent reduction in vertical transmission rate among

mothers attending antenatal clinics (ANCs).[4] This is because non-adherence is associated with sub-optimal drug plasma concentration, poor treatment outcome and increased resistance to the antiretrovirals (ARVs).[5]

The global prevalence of anxiety in pregnancy is estimated at 12%.[6] HIV/AIDS further elevates the anxiety due to the lethality of the disease and the stigma associated with its diagnosis. Studies have reported anxiety prevalence of 23.5% among the seropositive ANC mothers.[7] Anxiety in pregnancy is associated with poor pregnancy outcome, preterm labor, behavioral and cognitive problems in the newborn, increased cost of social and healthcare, delayed developmental milestones, loss of productivity, increased infant mortality and heightened need for special education.[8]

Stressors causing anxiety among HIV positive ANC mothers include fear of confidentiality breach regarding their status, advanced disease stage, weakened physical condition, fear of infecting the unborn baby and concerns regarding the baby's future. Additionally, lack of social support, stigma, rejection and isolation further heighten the anxiety.[9]

Globally, concealment of the status from the partner has been reported as the chief cause of anxiety among the seropositive mothers.[10] However, regional studies have documented lifetime experience of violence, relationship status and HIV shame as the main influencers. Single mothers had 3.6 times higher odds of developing anxiety compared to their married counterparts. Additionally, mothers with history of lifetime violence were 2.3 times more prone to anxiety compared to those who did not experience violence.[7] In Kenya, age and employment status had the highest association. Mothers aged (24-35 years) and those with part time employment reported the highest anxiety burden.[3]

Depression is defined by loss of interest, feeling of low self-esteem, restlessness, regrets, fatigue and poor concentration.[11] It is the commonest psychiatric condition in pregnancy.[12] In seropositive mothers, depression is triggered by stigma, stress, side effects of the ARV drugs and difficult life events.[13] Low perceived social support and structural barriers to health care further aggravate the depression.[14]

The global prevalence of depression among seropositive ANC mothers ranges from 12-30%.[15] In Africa the prevalence rate is at 23.4% whilst in Kenya it is at 32.9%.[16,17] Depression reduces quality of life, increases mortality rate and further worsens the disease burden.[18] A meta-analysis done to compare depression rate among HIV positive and HIV negative ANC mothers has reported a depression rate of 36% and 26%, respectively.[16] Maternal depression is positively associated with impaired socio-economic, behavioral, psychomotor and cognitive development of the child.[19]

Several factors have been documented to impact on depression among the seropositive ANC mothers. Globally, low CD4 count was positively associated with heightened depression.[20] However, single mothers and those with previous history of depression recorded higher level of depression as per the regional studies.[7,15] Kenyan studies have demonstrated that mother with tertiary level of education were less depressed compared to their counterparts with lower academic achievements.[3]

There are few studies on the predictors of the psychosocial states among the HIV infected pregnant mothers. The present study therefore sought to assess the predictors of anxiety and depression among HIV infected pregnant mothers on antiretroviral therapy attending antenatal clinics at leading teaching and referral hospitals in Kenya.

METHODS

Study area and site

The study was conducted in Nairobi County, Kenya between the months of April and July 2023. It was a hospital-based study at Kenyatta National Hospital (KNH) and Mbagathi County Hospital. Kenyatta National Hospital is the largest teaching and referral hospital in Kenya. It is situated in the capital city, Nairobi and serves as the teaching hospital for the University of Nairobi and Kenya Medical Training College (KMTC) health science students. Mbagathi County Hospital is a level 5 hospital in Nairobi, Kenya and is approximately 1.7 km away from KNH. It is also a teaching hospital for the University and diploma health science students. The close proximity and busy nature of the hospitals suggest that patients overflow from either institution. The study was carried out at the ANCs of the said hospitals. There were 70 HIV infected mothers attending the ANCs of the selected hospitals with 36 in KNH while Mbagathi County Hospital had 34. The two institutions are major public referral hospitals in Kenya. Antenatal clinics are specialized clinics that provides distinct services and care to pregnant mothers.

Study population

Antenatal clinic mothers with HIV infection who were on ARVs were targeted. This included all adult mothers (>18 years) in the reproductive age bracket. All pregnant mothers were included regardless of the trimester provided they had been on ART for at least a month. It takes about a month for the patient to stabilize and adapt to the treatment, hence the choice of a month's duration of ART. Pregnant mothers aged less than 18 years were excluded. This is because mothers under the age of 18 years are minors and, in most cases, school going children. Pregnancy at this age is unwanted, stigmatized and can trigger psychosocial illnesses. If considered in the study, they would record an exceedingly high level of anxiety and depression hence the exclusion. Expectant

mothers with confirmed diagnosis of HIV/AIDS but who were not on ART and those on ART for less than a month were also excluded.

Sample magnitude and selection method

The major study outcomes were anxiety and depression as measured by the Generalized Anxiety Disorder 7 (GAD-7) and the Patient Health Questionnaire-9 (PHQ-9) respectively. The total target population in the 2 hospitals was less than 100, therefore, participants were sampled based on universal sampling technique. Eligible participants were invited to participate as they came for their clinic appointments. A sample of 36 participants from KNH and 34 participants were recruited from Mbagathi County Hospital based on the total respective population in the 2 hospitals.

Recruitment of participants occurred between 0800 hours to 1300 hours every day excluding the weekends. This continued until the seropositive ANC attendees in the 2 hospitals were exhausted.

Study methods

Approval to undertake the study was sought and obtained from Kenyatta National Hospital /University of Nairobi Ethics and Review Committee (KNH/U.o.N-ERC) vide reference P856/11/2022 as well as National Commission for Science and Technology (NACOSTI) (through NACOSTI/P/23/24868). Permission to conduct the study was further sought and granted by Nairobi City County (Ref NCCG/DHS/REC/365). The study was also approved by Kenyatta National Hospital (Ref RH/535/2023) as well as Mbagathi County Hospital (Ref NCCG/DHS/REC/365).

Structured interviewer administered questionnaire which was tested and standardized before the main study was used as the formal tool for data collection. The questionnaire was organized in sections capturing demographic data including age, trimester of pregnancy, religion, level of education, marital status, employment status, history of alcohol consumption and history of smoking. The second part of the questionnaire focused on assessing the level of anxiety using the Generalized Anxiety Disorder 7 (GAD-7) and the third part was on determining depression among the mothers using the Patient Health Questionnaire 9 (PHQ-9). The aforementioned tools have been validated, are widely accepted and used globally.

The GAD-7 tool is comprised of 7 items for assessing the level of anxiety. The response for each question was rated 0-3. The total score was summed up. A score of 0-4 was classified as minimal anxiety. A score 5-9 as mild, 10-14 as moderate and 15-21 as severe anxiety. The PHQ-9 tool contained 9 questions for assessing depression level based on the Diagnostic and Statistical Manual 5th edition (DSM-V). There were 4 possible responses for each question with allocated score of 0-3. Once completed, the score was summed up. Scores of <5, 5, 10, 15, 20 represent cut points for minimal, mild, moderate, moderately severe and severe depression, respectively.

Interested participants who fulfilled the inclusion criteria were issued with consent forms and taken through the consent process. Any question or clarification thereof was addressed. Upon getting satisfied and giving the consent to participate, the participant was enrolled into the study. This was done in seclusion in a separate room.

Data management and statistical analysis

The questionnaires were coded to ensure privacy. The filled questionnaires were verified again by the principal investigator to ensure correct data entry and proper coding. Data was then entered into IBM Statistical Package for Social Sciences (SPSS) Chicago Illinois version 23 and cleaned. The verification and cleaning helped in removing erroneous entries. Analysis was done using IBM SPSS version 23. Summary statistics was done with continuous variables such as age summarized using mean and standard deviation while categorical variables such as employment status and level of education presented by calculating proportions. Prevalence and severity of anxiety and depression was computed and presented as percentages. Inferential data analysis was then done with association between the sociodemographic, anxiety and depression determined by use of chi squared test or Fischer's exact test of association. The outcome variables (anxiety and depression) were dichotomized into low and high and binary logistic regression analysis was used to determine the independent predictors of anxiety and depression. Odds ratios (ORs) and p values were used to determine the strength of association between the variables investigated. The confidence level of 95% was set throughout the data analysis. Result was presented in figures and tables where appropriate.

RESULTS

The mean age of the study population was 32.3 (SD 5.78) years. Majority were aged between 18-35 years at 67.1%, followed by 36-50 years (32.9%). The participants were mainly Christians (94.3%). Most participants had attained at least a secondary school education level at 47.1%, were employed (64.3%) and married at 75.7%. None of the participants had a history of smoking but 10% had a history of alcohol consumption. Only 1.4% had an anxiety diagnosis history while 5.7% had a history of depression diagnosis (Table 1).

The prevalence of anxiety was 23.8% with a mean anxiety score of 5.0 (SD=4.8). Minimal anxiety (52.9%) was most prevalent followed by mild anxiety (34.3%), moderate anxiety (4.3%) and severe anxiety at 8.6%. The study recorded depression rate of 22.6% with mean depression score of 6.1 (SD= 5.8). The prevalence of the levels of depression were minimal (42.9%), mild (32.9%), moderate (15.7%), moderately severe (2.9%) and severe depression at 5.7% (Figure 1 and 2).

Table 1: Sociodemographic characteristics of the study participants.

Sociodemographic characteristic	Category	Frequency (n=70)	Percentage (%)
Age (years)	18-35	47	67.1
Mean (SD) 32.33 (5.775)	36-50	23	32.9
Trimester	1st	12	17.1
	2nd	27	38.6
	3rd	31	44.3
Religion	Christian	66	94.3
	Muslim	4	5.7
Level of education	Primary	9	12.9
	Secondary	33	47.1
	Tertiary	28	40.0
Marital status	Married	53	75.7
	Not married	17	24.3
Employment status	Employed	45	64.3
	Unemployed	25	35.7
History of alcohol consumption	No	63	90.0
	Yes	7	10.0
History of smoking	No	70	100
Anxiety diagnosis	No	69	98.6
	Yes	1	1.4
History of anxiety treatment	No	70	100
Depression diagnosis	No	66	94.3
	Yes	4	5.7
History of depression treatment	No	70	100

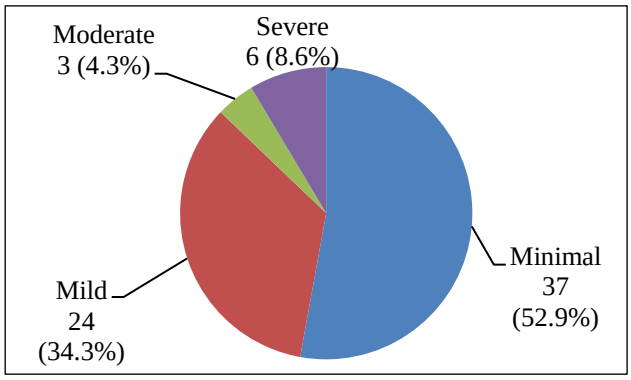

Figure 1: Anxiety among the mothers.

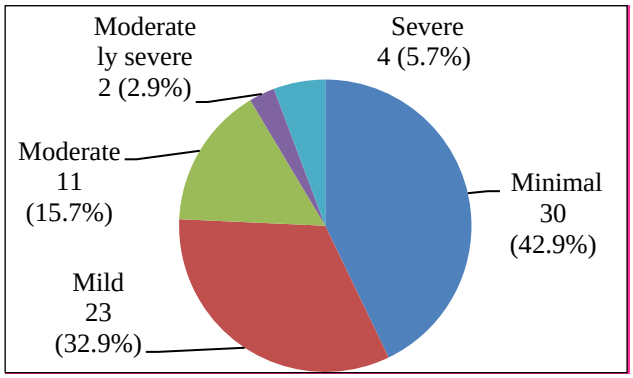

Figure 2: Depression among the mothers.

There was no statistically significant association between anxiety and the sociodemographic and clinical characteristics of the study participants. However, patients with negative history of anxiety and depression had 8 times more likelihood of having reduced anxiety compared to their counterparts with positive history (OR= 8.625, 95%CI= 4.496-16.547, p= 0.129) and (OR= 8.429, 95%CI= 1.021-69.574, p= 0.078) respectively (Table 2).

There was no statistically significant association between depression and the sociodemographic and clinical characteristics of the study participants. However, participants who were in employment were twice more likely of having reduced depression (OR= 1.909, 95%CI= 0.355-10.258, p= 1.000). Additionally, negative history of depression diagnosis was associated with 4 times more likelihood of having reduced depression (OR= 4.067, 95%CI= 0.354 – 46.653, p= 0.307) (Table 3).

There was a statistically significant association between anxiety and depression (p= 0.002) (Table 4).

Anxiety and depression were independently associated with each other. Decreased anxiety was associated with decreased depression and vice versa (aOR= 0.099, 95%CI: 0.012-0.797, p= 0.03) and (aOR=0.100, 95%CI: 0.014-0.707, p= 0.021) respectively (Table 5 and 6).

Table 2: Association between sociodemographic characteristics and anxiety among seropositive pregnant mothers.

Social demographic	Category	Anxiety		OR (C.I)	P value
		High no. (%)	Low no. (%)		
Age (years)	18-35	6 (66.7)	41 (67.2)	1.024 (0.232-4.527)	1.000
	36-50	3 (33.3)	20 (32.8)	Ref	
Trimester	1st	2 (22.2)	10 (16.4)	Ref	
	2nd	3 (33.3)	24 (39.3)	1.600 (0.231-11.082)	0.634
	3rd	4 (44.4)	27 (44.3)	1.350 (0.213-8.551)	0.750
Religion	Christian	9 (100.0)	57 (93.4)	1.158 (1.052-1.274)	1.000
	Muslim	0 (0.0)	4 (6.6)	Ref	
Level of education	Primary	1 (11.1)	8 (13.1)	Ref	
	Secondary	5 (55.6)	28 (45.9)	0.700 (0.071-6.887)	0.760
	Tertiary	3 (33.3)	25 (41.0)	1.042 (0.095-11.472)	0.973
Marital status	Not married	3 (33.3)	14 (23.0)	Ref	
	Married	6 (66.7)	47 (77.0)	1.679 (0.371-7.590)	0.678
Employment status	Not employed	3 (33.3)	22 (36.1)	Ref	
	Employed	6 (66.7)	39 (63.9)	0.886 (0.202-3.898)	1.000
History of alcohol consumption	Yes	1 (11.1)	6 (9.8)	Ref	
	No	8 (88.9)	55 (90.2)	1.146 (0.122-10.797)	1.000
History of smoking	Yes	0 (0.0)	0 (0.0)	-	
	No	9 (100.0)	61 (100.0)	-	-
Anxiety diagnosis	Yes	1 (11.1)	0 (0.0)	-	
	No	8 (88.9)	61 (100.0)	8.625 (4.496-16.547)	0.129
Depression diagnosis	Yes	2 (22.2)	2 (3.3)	Ref	
	No	7 (77.8)	59 (96.7)	8.429 (1.021-69.574)	0.078

Table 3: Association between sociodemographic characteristics and depression among seropositive ANC mothers.

Social demographic	Category	Depression		OR (C.I)	P value
		High no. (%)	Low no. (%)		
Age (years)	18-35	4 (66.7)	43 (67.2)	1.024 (0.173-6.045)	1.000
	36-50	2 (33.3)	21 (32.8)	Ref	
Trimester	1st	2 (33.3)	10 (15.6)	Ref	
	2nd	1 (16.7)	26 (40.6)	5.200 (0.423-63.909)	0.198
	3rd	3 (50.0)	28 (43.8)	1.867 (0.271-12.853)	0.526
Religion	Christian	6 (100.0)	60 (93.8)	1.100 (1.019-1.187)	1.000
	Muslim	0 (0.0)	4 (6.2)	Ref	
Level of education	Primary	1 (16.7)	8 (12.5)	Ref	
	Secondary	3 (50.0)	30 (46.9)	1.250 (0.114-13.694)	0.855
	Tertiary	2 (33.3)	26 (40.6)	1.625 (0.130-20.356)	0.707
Marital status	Not married	2 (33.3)	15 (23.4)	Ref	
	Married	4 (66.7)	49 (76.6)	1.633 (0.272-9.814)	0.678
Employment status	Not employed	3 (50.0)	22 (34.4)	Ref	
	Employed	3 (50.0)	42 (65.6)	1.909 (0.355-10.258)	1.000
History of alcohol consumption	Yes	0 (0.0)	7 (10.9)		
	No	6 (100.0)	57 (89.1)	1.105 (1.020-1.197)	1.000
History of smoking	Yes	0 (0.0)	0 (0.0)		
	No	6 (100.0)	64 (100.0)	-	-
Anxiety diagnosis	Yes	0 (0.0)	1 (1.6)	Ref	
	No	6 (100.0)	63 (98.4)	1.095 (1.018-1.178)	1.000
Depression diagnosis	Yes	1 (16.7)	3 (4.7)	Ref	
	No	5 (83.3)	61 (95.3)	4.067 (0.354-46.653)	0.307

Table 4: Association between anxiety and depression.

Variable	Category	Depression (n=70)					P value
		Minimal (n=30) (%)	Mild (n=23) (%)	Moderate (n=14) (%)	Moderately (n=2) (%)	Severe (n=4) (%)	
Anxiety	Minimal	20 (66.7)	11 (47.8)	4 (36.4)	1 (50.0)	1 (25.0)	0.002
	Mild	9 (30.0)	8 (34.8)	6 (54.5)	1 (50.0)	0 (0.0)	
	Moderate	1 (3.3)	2 (8.7)	0 (0.0)	0 (0.0)	0 (0.0)	
	Severe	0 (0.0)	2 (8.7)	1 (9.1)	0 (0.0)	3 (75.0)	

Table 5: Independent predictors of anxiety among the seropositive ANC mothers.

Social demographic	Category	Bivariate	P value	Multivariate	P value
		COR (95% C.I)		AOR (95% C.I)	
Age (years)	18-35	1.024 (0.232-4.527)	1.000	0.776 (0.127-4.741)	0.784
	36-50	Ref		Ref	
Trimester	1st	Ref		Ref	
	2nd	1.600 (0.231-11.082)	0.634	1.188 (0.129-10.900)	0.879
	3rd	1.350 (0.213-8.551)	0.750	0.638 (0.072-5.628)	0.686
Level of education	Primary	Ref		Ref	
	Secondary	0.700 (0.071-6.887)	0.760	7.284 (0.103-514.024)	0.361
	Tertiary	1.042 (0.095-11.472)	0.973	4.884(0.058-409.087)	0.483
Marital status	Not married	Ref		Ref	
	Married	1.679 (0.371-7.590)	0.678	0.817 (0.098-6.822)	0.852
Employment status	Not employed	Ref		Ref	
	Employed	0.886 (0.202-3.898)	1.000	1.306 (0.169-10.074)	0.798
History of alcohol consumption	Yes	Ref		Ref	
	No	1.146 (0.122-10.797)	1.000	0.788 (0.030-20.961)	0.887
Depression diagnosis	Yes	Ref		Ref	
	No	8.429 (1.021-69.574)	0.078	0.049 (0.002-1.339)	0.074
Depression score	High	Ref		Ref	
	Low	9.667 (1.586-58.927)	0.025	0.099 (0.012-0.797)	0.030

Table 6: independent predictors of depression among the study participants.

Social demographic	Category	Bivariate	P value	Multivariate	P value
		COR (95% C.I)		AOR (95% C.I)	
Age (years)	18-35	1.024 (0.173-6.045)	1.000	1.078 (0.129-9.010)	0.944
	36-50	Ref		Ref	
Trimester	1st	Ref		Ref	
	2nd	5.200 (0.423-63.909)	0.198	0.175 (0.011-2.736)	0.214
	3rd	1.867 (0.271-12.853)	0.526	0.511 (0.056-4.691)	0.553
Level of education	Primary	Ref		Ref	
	Secondary	1.250 (0.114-13.694)	0.855	1.230 (0.055-27.279)	0.896
	Tertiary	1.625 (0.130-20.356)	0.707	1.100 (0.046-26.095)	0.953
Marital status	Not married	Ref		Ref	
	Married	1.633 (0.272-9.814)	0.678	0.825 (0.094-7.267)	0.863
Employment status	Not employed	Ref		Ref	
	Employed	1.909 (0.355-10.258)	1.000	0.416 (0.049-3.545)	0.422
Anxiety score	High	Ref		Ref	
	Low	9.667 (1.586-58.927)	0.025	0.100 (0.014-0.707)	0.021

DISCUSSION

The present study characterizes the level of anxiety and depression among HIV infected pregnant mothers attending ANCs of two leading hospitals in Kenya. The hospitals are situated around Nairobi, the capital city of Kenya. The study demonstrated low levels of general anxiety at 23.8% (low anxiety) which corroborates a prevalence of 23.5% reported in Kilimanjaro region, Tanzania.[7]

The overall prevalence of depression was 22.6%. This low level is in tandem with a study conducted in Zimbabwe to determine depression among HIV positive pregnant women using the Edinburgh Postnatal Depression Scale (EPDS) which cited depression rates of 12-30%.[15] Additionally, a systemic review and meta-analysis on prevalence of perinatal depression among HIV positive women cited antenatal depression rate of 23.4% among the seropositive mothers.[16]

In contrast to the present study, higher levels of antenatal depression among HIV infected mothers have been reported elsewhere in the world. For instance, a higher prevalence rate of 35.0% has been reported in Kibera south, Nairobi in an effort to determine the association between depression using EPDS and non- adherence to ART among pregnant women living with HIV.[21] The contrast in the findings could be attributed to the differences in the population characteristics. The Kibera study encompassed slum dwellers only.

A study in India determining the prevalence of depression among seropositive ANC mothers reported depressive symptomology of 52.5% among the participants with 23.0% having suicidal ideations.[22] The Indian study used a bigger population from 8 centers across 4 states in India and considered both pregnant and post-partum women hence the difference in the findings.

There was a statistically significant association between anxiety and depression in the study (p=0.002). Regional studies in Kilimanjaro, Tanzania reported such associations, citing the comorbid depression and anxiety among HIV infected expectant mothers at 18.1%.[7] Similarly, a study in KwaZulu Natal, South Africa reported a strong association between anxiety and depression.[23] In Bangalore, India anxiety in pregnancy was found to be positive predictor of prenatal depression.[24] Contrastingly, findings from a similar study done in Kibera slums, Nairobi, Kenya revealed no association between anxiety and depression among HIV infected mothers probably due to differences in study methodologies and population characteristics.[3]

This study has few strengths and limitations. The major limitation of the study was the reliance on self-report of anxiety and depression. This was not ascertained by objective diagnostic review and therefore patients may have over or under reported the factors under study. However, to limit the subjective reporting of mental health burden by the patients, the care giving nurses ensured that patients were comfortable and could confide with their care providers throughout the data collection process. Using universal sampling technique ensured that, all the seropositive mothers at the clinics enrolled in the research thereby increasing power of the study.

CONCLUSION

There was a considerable level of anxiety and depression among the seropositive ANC mothers. Anxiety and depression were positively related. Therefore, counselling, psychosocial education and multidisciplinary team management should be integrated into the management of HIV infected pregnant mothers attending the ANCs. There was no statistically significant association between the anxiety and depression with sociodemographic characteristics of the mothers. Future studies should be aimed at mitigating the anxiety and depression among these patient population.

ACKNOWLEDGEMENTS

We would like to thank the patients at Kenyatta National Hospital and Mbagathi County Hospital for their consent, cooperation and contribution to the study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. El-Reshaid K. Physiological changes during pregnancy: a mimic of medical disease and risk to existing ones. J Drug Deliv Therapeut. 2021;11(3):103-5.
2. McCarthy M, Houghton C, Matvienko-Sikar K. Women's experiences and perceptions of anxiety and stress during the perinatal period: a systematic review and qualitative evidence synthesis. BMC Pregn Childb. 2021;21(1):811.
3. Sijenyi S, Obondo A, Otieno C. Comorbid depression and anxiety disorders among HIV infected mothers and implication on childrens' socio-emotional development in Kibera slums. GSJ. 2018;7(3).
4. Spaan P, van Luenen S, Garnefski N, Kraaij V. Psychosocial interventions enhance HIV medication Adherence: A Systematic Review And Meta-Analysis. J Heal Psychol. 2020;25(10-11):1326-40.
5. Abadiga M, Hasen T, Mosisa G, Abdisa E. Adherence to antiretroviral therapy and associated factors among human immunodeficiency virus positive patients accessing treatment at Nakemte referral hospital, west Ethiopia 2019, PLos one. 2020;15(5):e0232703.

6. Ade – Ojo IP, Dada MU, Adeyanju TB. Comparison of anxiety and depression among HIV positive and HIV negative pregnant women during Covid19 pandemic in Ekiti state, southwest Nigeria. Int J Gen Med. 2022;15:4123-30.
7. Ngocho JS, Watt MH, Minja L, Knettel BA, Mmbaga BT, Williams PP, et al. Depression and anxiety among pregnant women living with HIV in Kilimanjaro region, Tanzania. PLos one. 2019;14(10):e0224515.
8. Ress S, Channon S and Waters CS. The impact of maternal prenatal and postnatal anxiety on children's emotional problems: a systematic review. Eur Child Adolesc Psych. 2019;28(2):257-80.
9. Fauk NK, Merry MS, Mwanri L, Hawke K, Ward PR. Mental health challenges and the associated factors in women living with HIV who have children living with HIV in Indonesia. A qualitative study. Int J Environ Res Public Health. 2022;19(11):6879.
10. Phonphithak S, Hiransuthikul N, Sherer PP, Bureechai S. A qualitative study of the stigmatization and coping mechanisms among pregnant teenagers living with HIV in Thailand. J Health Res. 2022;36(6):1141-8.
11. Desalegn M, Gutama T, Merdassa E, Kejela G and Benti W. Family and social support among patients on antiretroviral therapy in west Wollega zone public hospitals, western Ethiopia: a facility based cross-sectional study HIV/AIDS (Auckl). 2022;14:167-79.
12. Borie YA, Siyoum M, Tsega A, Anbese G. Maternal depression and associated factors among pregnant women attending antenatal care, southern Ethiopia: cross-sectional study. Front Publ Heal. 2022;10:848909.
13. Jeruto E, Mogere DM, Kerochi A, Maureen KJ, Gwandi MP. Risk factors associated with depression among HIV positive women at Mama Lucy Kibaki Hospital in Nairobi County, Kenya. Int J Comm Medi Publ Heal. 2022;9(6):2377-84.
14. Psaros C, Smit JA, Mosery N, Bennett K, Coleman JN, Bangsberg DR, et al. PMTCT adherence in pregnant South African women: The role of depression, social support, stigma and structural barriers to care. Ann Behav Med. 2020;54(9):626-36.
15. Nyamukoho E, Mangezi W, Marimbe B, Verhey R, Chibanda D. Depression among HIV positive pregnant women in Zimbabwe. a primary healthcare based cross-sectional study. BMC Pregn Childb. 2019;19:1-7.
16. Zhu QY, Huang DS, Lv JD, Guan P, Bai XH. Prevalence of perinatal depression among HIV positive women: a systematic review and meta-analysis. BMC Psych. 2019;19(1):330.
17. Hummel AD, Ronen K, Bhat A, Wandika B, Choo EM, Osborn L, et al. Perinatal depression and its impact on infant outcomes and maternal-nurse SMS communication in a cohort of Kenyan women. BMC Pregn Child. 2022;22(1):723.
18. Abate H, Makonnen C and Ferede M. Depression among HIV positive pregnant women at northwest Amhara referral hospital during covid19 pandemic. Risk Manag Health Poli. 2021;14:4897-4905.
19. Mbatha NL, Mokwena KE, Madiba S. Clinical and obstetric risk factors for post-natal depression in HIV positive women: a cross-sectional study in health facilities in rural Kwazulu-Natal. Int J Environ Res Public Health. 2020;17(22):8425.
20. Kapetanovic S, Christensen S, Karim R, Lin F, Mack WJ, Operskalski E, Frederick T, Spencer L, Stek A, Kramer F, Kovacs A. A correlation of perinatal depression in HIV–infected women. AIDS Patient Care STDS. 2009;23(2):101-8.
21. Kogo J, Kumar M and Otieno J. The association between depression and nonadherence to antiretroviral therapy among pregnant women living with HIV. A cross-sectional study at the antenatal clinic of Kibera south health centre, Nairobi U.o.N. 2018.
22. Sarna A, Singh RJ, Duggal M, Chandra P, Reynolds N. The prevalence and determinants of depression among HIV positive perinatal women receiving antiretroviral therapy in India. Arch Women's Ment Health. 2019;22(3):399-404.
23. Truong M, Rane MS, Govere S, Galagan SR, Moosa MY, Stoep AV, et al. Depression and anxiety as barriers to ART initiation, retention in care and treatment outcomes in Kwazulu-Natal, South Africa. E Clin Medi. 2021;31:100621.
24. Sheeba B, Nath A, Metgud CS, Krishna M, Venkatesh S, Vindhya J, et al. Prenatal depression and its associated risk factors among pregnant women in Bangalore: A hospital-based prevalence study. Front Public Health. 2019 ;7:108.

Cite this article as: Osman AM, Nyamu DG, Amugune BK. Predictors of anxiety and depression among HIV infected pregnant mothers on antiretroviral therapy attending antenatal clinics at leading teaching and referral hospitals in Kenya. Int J Community Med Public Health 2025;12:1255-62.