



The prevalence and determinants of depression among HIV-positive perinatal women receiving antiretroviral therapy in India

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Received: 11 May 2018 / Accepted: 9 August 2018 / Published online: 23 August 2018
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Abstract

To assess the prevalence and correlates of perinatal depression, 200 HIV-positive pregnant/post-partum women receiving antiretroviral therapy (ART) were interviewed at eight government ART centers in four states across India. 52.5% (105) participants had depressive symptomology (Edinburgh Postnatal Depression Scale score > 13) while 23% of the participants reported thoughts of self-harm; there was no difference between pregnant and postpartum participants. Poor illness perception was associated with depression (AOR, 1.09; 95%CI, 1.05, 1.14); there was no association between adherence and depression in this population.

Keywords HIV · Depression · Perinatal depression · Antiretroviral therapy · Illness perceptions · Adherence to ART

Background

Perinatal depression is a clinical syndrome, defined by the Diagnostic and Statistical Manual of Mental Disorders 5th edition as an episode of moderate or severe depression that can begin during pregnancy or within 4 weeks of giving birth that can have profound adverse effects on maternal and child health outcomes (American Psychological Association 2013; Patel et al. 2003; Kapetanovic et al. 2014). Its consequences are particularly dire for mothers who are also living with HIV because it impairs their ability to manage their illness effectively. Studies have repeatedly shown that in addition to impaired daily functioning, depression is a robust predictor of poor care seeking and retention in care, non-adherence to HIV medications, and HIV disease progression

(Kapetanovic et al. 2014). A meta-analysis of 49 studies that examined antiretroviral therapy (ART) adherence during and after pregnancy found only 74% of women during pregnancy and 53% during the postnatal period had adherence > 80% (Nachega et al. 2012).

In India, studies from across the country, report a varying prevalence of perinatal depression, ranging from 9.2 to 31.4% in the perinatal period (Ajinkya et al. 2013; Nyamathi et al. 2011; Shivalli and Gururaj 2015). There is, however, no information on the prevalence of depression among HIV-positive pregnant or postpartum women in India and to what extent depression influences adherence to ART. The Government of India (GOI) rolled out the Prevention-of-Parent-to-Child-Transmission (PPTCT) program in 2002 with a free single-dose nevirapine (SD-NVP) provided to women during labor and to the exposed infant. In 2013, the government piloted and in 2014 rolled out the highly efficacious option B+ treatment regimen, wherein all pregnant HIV-positive women receive triple-drug ART for life; it is essential for the national PPTCT program to know the prevalence of perinatal depression and its correlates in this population. In this paper, we report the prevalence of peripartum depression among HIV-positive women receiving antiretroviral therapy in India. This study provides important insights into the association between depression, illness perceptions, adherence to treatment, and health status.

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Methods

A quantitative survey was conducted with HIV-positive pregnant or postpartum women at eight government ART centers in four states of India: Belgaum and Hubli in Karnataka; Vashi, Ulhasnagar, and Thane in Maharashtra; Meerut and Lucknow in Uttar Pradesh; and Ambedkar Hospital in Delhi. All women who test HIV-positive during antenatal care (ANC) visits at government health facilities are referred to ART centers for free ART under the PPTCT program; private health facilities also refer HIV-positive clients who cannot or do not want to pay for treatment to these centers; thus clinic clients are representative of the city population accessing public health facilities.

The sample size was set at 200 participants (50 participants per state) to obtain a preliminary estimate of the prevalence of depression in this population. The sample size was powered to be able to detect a minimum prevalence of 30% (Shivalli and Gururaj 2015) with 95% confidence and accounting for a 15% refusal rate. All HIV-positive women who were pregnant or within 14 weeks after their delivery and receiving ART from participating centers were invited to participate in the survey, when they visited the clinic for their monthly follow-up visit. ART counselors informed eligible women about the study and obtained verbal consent to participate. The counselors then introduced the participants to research staff to complete informed consent procedures. Interviews were conducted in local language by trained research interviewers. A semi-structured questionnaire was used to collect data on the women's socio-demographic profile, current pregnancy, number of children, HIV-testing history, disclosure to partners, depressive symptoms, ART adherence, and illness perceptions.

The Edinburgh Postnatal Depression Scale, a 10-item tool adapted to and validated in the Indian socio-cultural context, was used to assess depression (Cox et al. 1987; Patel et al. 2003). Scores of 13 or more were considered indicative of psychological distress or high probability of experiencing depression (Cronbach alpha, 0.87). Adherence was assessed in two ways: through self-reported 4-day recall of missed doses, used widely and validated in AIDS Clinical Trial Group studies, and as treatment interruptions. Self-reported adherence was dichotomized at 95% for analyses. Treatment interruption was defined as discontinuation of ART for ≥ 7 days without medical indication. Perceptions about their illness were assessed using the 9-item validated Brief Illness Perception tool (Broadbent et al. 2006, Robbins et al. 2016) designed to rapidly assess the cognitive and emotional representations of illness with scores ranging from 0 to 80; higher scores indicated more health concerns and poorer perception of health (Cronbach alpha, 0.61–0.75 in Broadbent et al. 2006, 0.6 overall in our population). To assess the health

status of study participants, the most recent CD4 cell counts were recorded from their medical records (green books).

Ethical approval was obtained from the Ethics Committee of the National AIDS Control Organization in India and the Institutional Review Board of the Population Council in New York. All participants provided written informed consent.

Data analysis

All analyses were conducted using STATA version 10.0 (College Station, TX). Unpaired Student's *t* test compared continuous variables with normal distributions, and chi-square test was used to compare categorical variables of pregnant and postpartum HIV-positive participants. Binary logistic regression was used to determine correlates of prevalent depression (EPDS score ≥ 13). Variables associated on bivariate analysis ($p < 0.05$) were included in the multivariate analysis; the model was controlled for age, education, and marital status.

Results

Between November 2015 and April 2016, 110 HIV-positive pregnant and 90 postpartum women were interviewed as they came in for services across participating centers in the four states; there was only one refusal in Hubli (the client was admitted into hospital). Table 1 details the socio-demographic profile, depression and illness perception scores, and HIV-related characteristics of the participants. The mean age of study participants was 25.8 years and 98% were currently married. At the time of the interview, the mean duration of pregnancy was 26.4 weeks (SD, 12.1) and of the postpartum period was 9.5 weeks (SD, 6.6). For 54% ($n = 108$) of the participants, this was their second/third pregnancy and for 14% ($n = 28$) it was the fourth or higher order pregnancy. Twenty-two participants (11%) had at least one HIV-positive child. Sixty-eight participants (34%) had HIV-negative spouses, and eight women reported partners of unknown HIV status. Disclosure of HIV status to family/friends was higher among postpartum participants (77.7% vs. 66.4%; $p = 0.05$).

The mean EPDS score for the study population was 12.69 (SD, 7.01). One hundred and five participants (52.5%) had scores suggestive of depressive symptomology requiring further clinical assessment (EPDS > 13) and 23% of the participants reported thoughts of self-harm; there was no difference between pregnant and postpartum participants. Pregnant participants were more likely to be ART experienced than postpartum participants (43.6% vs. 28.2%; $p = 0.02$). Mean duration on ART was 15.3 months (SD, 21.3). Mean last-4-day adherence was 91.7% (SD, 26.2); 19% of the participants

Table 1 Background characteristics of HIV-positive women (2016)

	Total (<i>n</i> = 200) <i>n</i> (%)	Pregnant (<i>n</i> = 110) <i>n</i> (%)	Postpartum (<i>n</i> = 90) <i>n</i> (%)	<i>p</i> value
Age (mean, SD) ¹	25.88 (4.47)	25.73 (4.01)	26.05 (4.99)	0.617
Education ²				
No formal education	38 (19)	18 (16.36)	20 (22.22)	0.313
Primary education	35 (17.5)	17 (15.45)	18 (20)	
Secondary or higher education	127 (63.5)	75 (68.18)	52 (57.77)	
Marital status ^{2,3}				
Currently married	196 (98)	110 (100)	86 (95.55)	0.040
Separated/divorced/widowed	4 (2)	0 (0)	4 (4.44)	
Employment status ²				
Not working	164 (82)	86 (78.18)	78 (86.66)	0.085
Currently working	36 (18)	24 (21.81)	12 (13.33)	
Number of months knowing HIV status (mean, SD) ¹	23.77 (25.53) ²	25.87 (27.4)	21.21 (22.93)	0.202
Disclosure ²				
To none	57 (28.5)	37 (33.63)	20 (22.22)	0.052
To family or friends	143 (71.5)	73 (66.36)	70 (77.77)	
Partner's HIV status ²				
HIV Positive	123 (61.5)	67 (60.9)	56 (62.22)	0.483
HIV Negative	68 (34)	37(33.6)	31 (34.4)	
Untested/do not know	8 (4)	6 (5.45)	2 (2.2)	
Number of pregnancies ²				0.242
First	64 (32)	38 (34.5)	26 (28.88)	
Second	61 (30.5)	31 (28.2)	30 (33.3)	
Third	47 (23.5)	26 (23.6)	21 (23.3)	
Fourth or higher	28 (14)	15 (13.6)	13 (14.4)	
Positive child ²				
Have at least one positive child	22 (11)	13 (11.81)	9 (10)	0.430
No other child/negative child (ren)	178 (89)	97 (88.18)	81 (90)	
ART naïve or experienced ²				
ART naïve	126 (63)	62 (56.36)	64 (71.11)	0.022
ART experienced	74 (37)	48 (43.63)	26 (28.88)	
Adherence to ART in the last 4 days ²				
95% or more	175 (89.28)	95 (87.96)	80 (90.9)	0.336
Less than 95%	21 (10.71)	13 (12.03)	8 (9.09)	
Mean illness perception score ¹	41.23 (11.56)	41.13 (11.05)	41.34 (12.19)	0.904
Mean EPDS score ¹	12.69 (7.01)	12.89 (6.81)	12.45 (7.28)	0.664
EPDS ²				
Score less than 13	95 (47.5)	51 (46.36)	44 (48.88)	0.415
Score 13 or higher	105 (52.5)	59 (53.63)	46 (51.11)	
Treatment interruption ²				
Never	156 (78)	81 (73.63)	75 (83.33)	0.087
At least once	38 (19)	25 (22.72)	13 (14.44)	
CD4 count (mean, SD) ¹	472.92 (233.96)	483.7 (214.24)	459.51 (257.05)	0.477

¹ *T* test² Chi-square test³ There were no single or unmarried participants

reported at least one treatment interruption since they started ART. We did not find any association between depression and 4-day adherence (OR, 0.974, 95% CI, 0.920, 1.030) or with

treatment interruptions (OR, 0.956; 95% CI, 0.895, 1.022). The mean illness perception score was 41.23; there were no differences between pregnant and postpartum participants.

On multivariate logistic regression analysis, poorer illness perception (higher scores) was the only independent predictor of depression (AOR, 1.09; 95%CI, 1.05, 1.14). Increasing CD4 cell counts, indicating better immune status, was associated with lower risk of depression on bivariate analysis, but the effect was not sustained in the multivariate model (Table 2).

Discussion

In this study, we assessed the prevalence and examined the correlates of perinatal depression in HIV-positive women receiving ART in Northern and Southern India. This is the first study, to the best of our knowledge, to report the prevalence of depressive symptoms in this population. We found that the prevalence of depression in the perinatal period was very high

(52.5%). This finding is consistent with the prevalence of depression among HIV-positive women in other countries (e.g., 39% in Uganda (Kaida et al. 2014) at ART initiation; 27% in the antenatal period and 25% postnatally in Ukraine (Bailey et al. 2016)), but the rates are even higher in India. Further, almost a quarter of the patients reported that they had considered self-harm. A meta-analysis from India (Upadhyay et al. 2017) reports a pooled prevalence of postpartum depression among general women in India (22%; 95% CI, 19–25), higher than in 11 high-income countries (12.9%; 95%CI, 10.6–15.8) and 23 low- and middle-income countries (19.2%; 95%CI, 15.5–23.0), suggesting that postpartum depression is more prevalent in India. It is possible that social factors such as non-disclosure of HIV status to family members (28%) due to stigma and concerns about having a HIV-negative child may have a role in the further raising the prevalence of depression reported in our study population.

Table 2 Factors associated with depression (EPDS score \geq 13)

	Total <i>n</i> (%)	<i>p</i> value	OR (95% CI)	<i>p</i> value	AOR (95% CI)
Age (mean, SD)	25.88 (4.47) ¹	0.965	0.99 (0.93, 1.06)	0.939	1 (0.92, 1.08)
Education					
No formal education	38 (19)			0.416	1
Primary education	35 (17.5)	0.948	0.96 (0.38, 2.45)	0.197	2.11 (0.67, 6.61)
Secondary or higher education	127 (63.5)	0.371	0.71 (0.34, 1.48)	0.307	1.58 (0.65, 3.82)
Marital status					
Currently married	196 (98)				
Cohabiting/single/separated/divorced/widowed	4 (2)	0.999	–	0.999	–
Number of months knowing HIV status	23.77 (25.53) ¹	0.400	0.99 (0.98, 1)	0.770	1 (0.98, 1.01)
Employment status					
Not working	164 (82)				
Currently working	36 (18)	0.153	0.58 (0.28, 1.21)		
Partner's HIV status					
HIV negative/untested/do not know	77 (38.5)				
HIV positive	123 (61.5)	0.319	1.33 (0.75, 2.36)		
Number of pregnancies					
Second or higher	136 (68)				
First	64 (32)	0.903	1.03 (0.57, 1.88)		
ART naïve or experienced					
ART naïve	126 (63)				
ART experienced	74 (37)	0.736	1.1 (0.62, 1.96)		
Disclosure					
To none	57 (28.5)				
To family or friends	143 (71.5)	0.546	1.2 (0.65, 2.23)		
Illness perception score	41.23 (11.56) ¹	<0.001	1.09 (1.05, 1.12)	<0.001	1.09 (1.05, 1.14)
Positive child					
No other child/negative child (ren)	178 (89)				
Have at least one positive child	22 (11)	0.839	1.09 (0.45, 2.66)		
CD4 count	472.92 (233.96) ¹	0.023	0.99 (0.99, 0.99)	0.557	0.99 (0.99, 1)

¹ Mean (SD)

The association between depression and adherence problems has been widely demonstrated in HIV-infected individuals. Although rates of depression were high and almost a fifth of the study population reported at least one treatment interruption since they started ART, the 4-day adherence was high and we did not find an association between depression and adherence. Other studies from India have reported an association between depression and adherence among non-pregnant women (Nyamathi et al. 2011). It is possible that women had higher adherence during pregnancy and the postpartum period in an effort to have a HIV-negative infant. Longer follow-up studies are needed to explore change in adherence after the immediate postnatal period.

We did find a significant relationship between poorer illness perceptions and depression. This is consistent with the self-regulatory model (Cameron and Leventhal 2003) of HIV self-care as well other studies that have found illness perceptions to be associated with depression (Reynolds et al. 2009). Thus, improving mothers' perceptions of their illness (e.g., enhancing beliefs of personal control over symptoms, reducing the number of perceived symptoms, and associated emotional distress) may be important in increasing the number of mothers seeking services for postpartum depression and improving clinical outcomes. We also found depression to be associated with poorer health status (higher CD4 cell counts were associated with a lower risk of depression on univariate analysis).

Despite the roll out of option B+ and wider pediatric testing, we found that study participants had known their HIV-positive status for around 2 years on average, 11% had a previous positive child and more than half were ART naïve. As option B+ was only scaled-up from 2014, it is likely that women in our study would have received SD-NVP for a previous pregnancy, which is less effective than triple-drug ART. Further, prior to the roll out of the "Test and Treat" policy from April 2017, ART for non-pregnant women was only initiated at CD4 cell counts of 350 cells/ml or less; thus, for women in our study with higher CD4 cell counts, access to ART would be relatively new. For women with a previous positive child, the availability of the highly effective triple-drug ART would have provided an opportunity to have a HIV-negative child and is likely that it would have motivated them to be adherent to treatment.

The study has limitations. This was an exploratory study with a small sample size and findings may not be representative of all HIV-positive peripartum women in India. However, it is noteworthy that in each study site we interviewed all HIV-positive pregnant and postpartum women (≤ 14 weeks) who accessed PPTCT services (the universe) during our study period.

In conclusion, perinatal depression is prevalent among HIV-positive women and suicidal-ideation frequently expressed. Although we did not find an association between

depression and adherence, findings indicate that routine screening for depression should be integrated into antenatal care to identify those currently depressed or at risk of depression to target those needing intervention to optimize both maternal and perinatal health.

Acknowledgements The study was supported by the National Institutes of Mental Health (R21 MH 098667), NIH, USA. We are grateful to Dr B.B Rewari (National Program Officer ART at NACO for his support and guidance through the course of the study. In addition we would like to thank our study partners at participating ART Centres: Dr. P.S Nayyar at Dr. Baba Saheb Ambedkar Hospital, Delhi, Dr. Savita Daruwala at Vittal Sayana General Hospital, Thane, Dr. Keru More at Navi Mumbai Municipal Corporation General Hospital, Vashi, Dr. Sachin Patil at Central Hospital, Ulhasnagar, Dr. Ishwar Hasbi at Karnataka Institute of Medical Sciences, Hubli, Dr. Giridhar Patil at District Hospital, Belgaum, Dr. D. Himanshu at King George's Medical University, Lucknow, and Dr. Tung Vir Singh Arya at Medical College, Meerut.

Funding This paper received financial support from NIH Grant: R21 MH 098667.

Compliance with ethical standards

Ethical approval was obtained from the Ethics Committee of the National AIDS Control Organization in India and the Institutional Review Board of the Population Council in New York. All participants provided written informed consent.

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