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Correlates of Adherence among Rural Indian Women Living with HIV/AIDS

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Abstract

In this prospective, randomized clinical trial, correlates of adherence to antiretroviral therapy (ART) were assessed using a baseline questionnaire among 68 rural women living with AIDS (WLA) in India. Unadjusted analyses revealed positive relationships of ART adherence with Hindu religion, and support from spouses and parents, whereas negative associations were found with depression, poor quality of life, and having ten or more HIV symptoms. Multiple linear regression analysis also revealed that WLA who were Hindu, not depressed, had ART support from spouses and parents, and perceived some benefit from ART were more adherent to ART than their respective counterparts. This study reveals the unique challenges which rural WLA experience and the need to mitigate these challenges early in ART treatment. Further, the findings enable the refinement of an intervention program which will focus on strengthening ART adherence among rural WLA.

Keywords

Adherence to ART; rural women living with AIDS in India; depression; social support

The nation of India is one of the major the epicenters of the Human Immunodeficiency Virus (HIV) and the Acquired Immune Deficiency Syndrome (AIDS) pandemics, with 2.47 to 5.2 million people affected (National AIDS Control Organization [NACO], 2008; Radhakrishna, Reddy, & Krishna, 2007; Ramchandani et al., 2007). As in many other nations, reported statistics on HIV infection in India suggest that the epidemic has disproportionately affected female sex workers (FSW), truck drivers, migrant workers, men who have sex with men (MSM), and injection drug users (IDU) (Brahmam et al., 2008; Dandona et al., 2005a; Dandona et al., 2005b; Dandona et al., 2005c; Talukdar, Khandokar, Bandopadhyay, & Detels, 2007).

Since the development of antiretroviral therapy (ART), HIV/AIDS symptomatology has decreased, there have been improved survival rates, and in effect, those afflicted have experienced an enhanced quality of life (Savini, James, & DiGuglielmo, 2003). Adherence to ART decreases plasma HIV RNA levels and improves CD4 counts and HIV-associated mortality rates (Battaglioli-DeNero, 2007; Piacenti, 2006); however, the availability of ART medication does not necessarily translate into medication adherence (Grant, Logie, Masura, Gorman, & Murray, 2008). Unfortunately, suboptimal adherence leads to regimen failure, increase in morbidity and mortality and emergent strains of the virus (Nischal, Khopkar, & Saple, 2005).

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While urban women living with AIDS (WLA) in India face significant challenges when trying to adhere to treatment regimens (Sinha, Peters & Bollinger, 2009), more than 70% of India's population who live in villages, and especially rural women, experience even greater challenges in adhering to treatment (Country Progress Report, 2010). This study aims to determine the correlates of adherence to ART among rural WLA in India to assist health care providers and policy makers to understand the factors that are associated with such adherence and increase support for this vulnerable population.

Correlates of Adherence to ART

The literature suggests that a number of factors are related to ART adherence. Of particular importance are personal and mental health factors; social factors, such as communication; and resource factors, such as financial and transportation constraints, which ultimately impact taking prescribed medications (Kumarasamy et al., 2005; Nyamathi et al., 2011). Globally, HIV/AIDS stigma has also been found to have affected adherence to ART medication regimens, health care decision-making, and caregiver attitudes (Messer et al., 2010; Spaar et al., 2010).

Kumarasamy and colleagues (2005) conducted a qualitative study on the barriers to and facilitators of ART adherence among 60 HIV positive men and women in Chennai, India. The data suggest that better HIV management, better overall health, living longer and gaining weight were all facilitators of adherence among this sample. Depression has been shown to be an independent predictor of non-adherence to ART (Harries, Nyangulu, Hargraves, Kaluwa & Salaniponi, 2001; Nemes, Carvalho & Souza, 2004; Paterson et al., 2000). In fact, among HIV- positive patients in urban Pune and New Delhi, India, severe depression placed patients at four times greater risk for non-adherence than minimal depression (Sarna et al., 2008).

In the social realm, good physician-patient communication and access to care predicted HIV/AIDS medication adherence. In particular, lack of trust between clinician and patient predicted inadequate adherence (Nischal et al., 2005). Logistical barriers (Kagee et al., 2010) and limited access to healthcare services (Pence, 2009; Sabin et al., 2008) have also been cited. Finally, experiencing moderate-to-severe side effects and taking four or more medications have been shown to place patients at risk for non-adherence to ART (Sarna et al., 2008).

Familial support by parents is another important predictor of ART adherence (Kumarasamy et al., 2005). In this study, approximately 58% of participants undergoing ART disclosed that family members encouraged adherence by providing medication reminders, giving medications directly, and offering financial assistance. Similarly, spousal support was important: 32% of participants indicated that their spouse helped them to adhere to medications by providing reminders and giving them pills.

> There is a dearth of literature describing the impact of religion on ART adherence in India. However, one study indicates that there are gender differences mediated by spirituality. Specifically, Chandra and colleagues studied quality of life among 109 HIV-positive men and women in Bangalore, India. When compared with men, women reported higher scores on spirituality and personal beliefs (Chandra, Satyanarayana, Satishchandra, Satish, & Kumar, 2009).

Finally, financial strain and lack of transportation (Nyamathi et al., 2011), as well as poor health literacy and gender inequalities (Kagee et al., 2010), are additional factors shown to impact ART adherence.

Benefits of ART

The literature suggests that there are a plethora of ART benefits. These benefits include improvement in quality of life, suppression of viral load, prevention of vertical HIV transmission, increase in survival, reduction in HIV-related morbidity and preservation of immunologic function (Moir et al., 2010). However, often patient perceptions of benefits differ from clinical benefits.

Perceived Benefits of Adherence to Antiretroviral Medications

Perceived benefits of adherence to ART, as reported by adult patients with AIDS in Chennai include: a) controlling the virus; b) decreasing viral load; c) maintaining CD4 levels; d) not spreading HIV to others; e) keeping the immune system robust; and f) living longer to witness a cure (Kumarasamy et al., 2005). The aim of this study was to understand correlates of ART adherence among rural WLA in India in an effort to tailor provision of services for this hard-to-reach population.

Methods

Design

This cross-sectional study presents the findings of a baseline questionnaire administered to 68 women living with AIDS in rural India. These women participated in a prospective, randomized clinical trial intervention designed to determine the impact of having HIV-trained lay village women, (Accredited Social Health Activist (ASHA), interact with health care providers and support women living with AIDS compared to usual care group. Human Subjects Protection Committee clearances were obtained both by the US Institutional Review Board and in India, by the ethical committees of the Indian Council for Medical Research, and the Health Ministry Screening Committee 2008.

Sample and Setting

Inclusion criteria for the study were: a) women living with AIDS between the ages of 18–45; b) screened as receiving ART, with CD4 cells < 100; and c) not a participant of an earlier qualitative study. Two high prevalence HIV/AIDS villages in rural Andhra Pradesh that were demographically alike and served by a Public Health Center (PHC) were selected. One randomly-selected village engaged the intervention group, while the second engaged the usual care group.

Procedure

The study was announced by means of flyers posted in the PHC of the selected villages where the study was conducted. A full description of the study was provided by the research team to interested WLA in a private setting in the PHC. After all questions were answered, interested WLA signed the first informed consent. Subsequently, the research staff administered a brief two-minute structured questionnaire which inquired about age, education and other socio-demographic and case-mix characteristics, including HIV and ART status; these questions determined eligibility for the proposed pilot study and provided basic sociodemographic information on refusals. Moreover, blood was drawn to assess CD4 levels. Research staff stationed at the designated site four days later provided test results. All respondents were paid $5 for completion of these screening procedures. Individuals with self-reported or visibly apparent health problems were referred to the local clinic. WLA who met eligibility criteria and wished to participate then underwent another informed consent procedure and were enrolled in the study. The administration of the baseline questionnaire then followed.

Measures

Socio-Demographic information, collected by a structured questionnaire, included age, birthday, education, employment status, marital status and number of children. Health care access and utilization were also addressed.

Health History—We collected self-reported information on HIV-related physical symptoms, and side effects of ART. Sum scores of symptoms and side effects were calculated; due to non-normal distributions, both measures were dichotomized at the mean in the analyses.

Knowledge about HIV—A modified 13-item version of the 21-item CDC knowledge questionnaire was used to measure HIV/AIDS knowledge (NCHS, 1989). Modifications to the CDC instrument have been detailed elsewhere (Leake, Nyamathi, & Gelberg, 1997). A sum scale with a range of 0-13 was formed by adding the number of correct responses to the items.

Stigma—Stigma scales developed by Ekstrand and her team (Ekstrand et al. 2011, Steward et al., 2008; 2011) provided four constructs: a) Heard Stigma; b) Felt Stigma; c) Enacted Stigma; and d) Internalized Stigma. Scale items were based on previous research (Berg & Arnsten, 2006; Berger, Ferrans, & Lashley, 2001; Chesney, 2006; Herek, Capitanio, & Widaman, 2002; Simoni et al., 2006) and were subsequently modified based on qualitative interviews in India (Aggelton, Bharat, & Tyler, 2001, Steward et al., 2008) to ensure that the content was relevant and appropriate. The process of developing these scales has been described in detail by Steward et al. (2008).

Heard Stigma—Ten items from the scales described above were used to measure whether participants had heard stories about other people living with HIV/AIDS and being mistreated because of their infection. A sample item is: "How often have you heard stories about people being refused medical care or denied hospital services because of their HIV?" Each item has a four-point response set that ranges from (1) never to (4) frequently. Internal consistency reliability, as measured by Cronbach's alpha, was .85 for the scale in this sample. One item was dropped from the scale since its item-total correlation was below .3.

Felt Stigma—This 10-item scale measures perceived levels of stigma in one's community, such as the attitudes that people living with HIV/AIDS deserve their infections or have brought shame on their families. A sample item in Felt Stigma is: "In your community, how many people think that HIV-infected people have brought shame on their families?" Items were measured on a four-point scale ranging from (1) no one to (4) most. One item was dropped due to low item-total correlation. Cronbach's alpha for the remaining nine items in this sample was .84.

Enacted Stigma—Assesses whether participants have experienced specific discriminatory acts due to their HIV infection, such as being asked not to share utensils or plates with other family members. Ten items in this scale measured enacted stigma using a yes/no format. An example of an item in this scale is: "Have you been told not to share your food or utensils with your family because of your HIV?". Reliability for the scale was .90.

Internalized Stigma—This 10-item scale parallels the Felt Stigma scale, but assesses the extent to which respondents believe that, as HIV-infected people, they deserved to be stigmatized. Each item has a four-point response format varying from (1) not at all to (4) a great deal. For example, an item is: "How much do you feel that you deserve to have HIV?" Reliability in this sample was .89.

Avoidant Coping—An established eight-item scale was utilized to assess coping responses to HIV stigma which assesses the frequency with which participants use various coping strategies to avoid disclosing that they have HIV. Examples of avoidant coping were based on qualitative research (Steward et al., 2008) and included coping strategies such as hiding one's HIV medications and describing one's illness as TB, rather than HIV. A sample item from this scale is: "How often have you described your illness as tuberculosis instead of HIV?" Responses vary from (1) never to (4) often. Cronbach's alpha for this scale was .90. Mean-item scale scores were constructed for heard, felt, and internalized stigma and stigma coping; for enacted stigma, scale scores were constructed by summing the individual items. The ranges obtained were: heard stigma (2–4), felt stigma (2.4–4), internalized stigma (1.5–4), enacted stigma (0–10.) and stigma coping (1.0–4).

Depressive Symptomatology—The CES-D is a 20-item scale that measures frequency of depressive symptoms on a 4-point continuum. The CES-D has well-established reliability and validity. Scores on the CES-D range from 0-60, with higher scores representing greater depressive symptomatology. A score of 16 or greater suggests a need for psychiatric evaluation of depression (Radloff, 1977). Internal consistency for this scale in this sample was .94.

Adherence Support—An 8-item roster was used to measure support provided by persons who may have reminded the WLA to take her HIV medication; possible persons included spouse, siblings, parents, children, etc. Participants were asked to respond "yes" or "no" as to whether each type of person helped remind them to take their HIV medications.

Perceived ART Benefits—Fifteen items with "yes"/"no" responses were used to ask participants whether they had experienced each particular benefit. Items included "You have a better appetite", "You don't get sick as often" and "You enjoy your social life more". This measure was dichotomized as "Any" vs. "None".

MD Communication and Clinic Appointment—An 11-item scale in which the first 7 items assessed the degree to which WLA were comfortable in communicating with their HIV physician, the extent to which they perceived him/her to be knowledgeable, and the extent to which the physician provided assistance. The responses were measured on a 4-point Likert scale ranging from 0 "never" to 3 "every time". Example items included "Do you ask questions about your medical condition", "Do you feel your doctor is knowledgeable about your medical condition?, and 'Do you get help from your doctor in solving any problems in taking your HIV medication?". In addition, four additional items inquired about potential barriers to attending the clinic or seeing the doctor by asking how often they were able to "get transportation to the clinic", "find someone to watch your children while you're gone", "get time off from work or duties" and "have to wait for a long time in the clinic waiting area", using the same 4-point scale. Cronbach's alpha for the scale in this sample was .90. The average score of these 11-items was used in the analysis.

Barriers to HIV Medication Adherence—Eighteen items inquiring about factors that sometimes cause people to miss taking their HIV medications. Sample items included "You were away from home: "You simply forgot" and "You felt the HIV pills were harmful." The responses were measured on a 4-point Likert scale that ranged from 0 "never" to 3 "most of the time. The 18 items formed a scale with a reliability of .95. A mean-item scale was constructed for analysis.

Quality of Life—Eleven items including "health", "mood", and "family relationships" asked how satisfied the participants were with their quality of life. All responses were

measured on a 4-point Likert scale ranging from 1 "very satisfied" to 4 "very unsatisfied" A mean-item scale was formed and a value of 3 or above was used to dichotomize the variable as 'poor quality of life'. The coefficient alpha was found to be 0.90.

Adherence—Observation by pill count was used to measure adherence by the interviewer who visited the home of each client during the three-day baseline procedure period. Adherence was calculated based on the number of pills consumed during the baseline month divided by the number of pills prescribed per month.

Data Analysis

Descriptive statistics elucidated the WLA's sociodemographic and case-mix characteristics. Continuous variables were assessed for normality and those that were not normally distributed were dichotomized for analysis. Unadjusted relationships between ART adherence and potential correlates were examined by t-tests for dichotomous potential correlates and Pearson correlations for continuous potential correlates. The Comprehensive Health Seeking and Coping Paradigm guided selection of potential correlates (Nyamathi, 1989).Variables that were associated with adherence at the 0.05 level was then used as predictors in a stepwise multiple linear regression analysis. Covariates that were significant at the .05 level were retained in the final model. Multicollinearity was assessed and not found to be a problem. The R^2 for the final model was 0.60. Finally, because none of the stigma measures were in the model, despite the importance of stigma in the literature, we used hierachical regression modeling to try to understand the specific variables that may have mediated or counteracted the effects of stigma. All statistical analyses were conducted using SAS, version 9.1.

Results

Sociodemographic Factors

A total of 68 WLA were enrolled in the current study. As a pilot study, the sample size of 68 was determined as it would detect moderately large mean differences of .7 SD between the 2 programs with power of .80. Most of these women had little or no knowledge about HIV/ AIDS (mean=3.0 out of a possible 13). The mean age was 31.2 (SD=5.3) and most women reported 1.6 children (SD=1.0) (Table 1). Approximately 94 percent had less than a high school education and most of these women were working (77%). The majority of WLAs reported that they were Hindu (66%), followed by Christian (25%), and Muslim (9%). Interestingly, 77% of WLAs lived with their children, while less than half lived with their spouse (44%).

Stigma and Coping

Almost half of the sample (43%) was unsatisfied with their overall quality of life, while 54% were experiencing depression. Most of these women reported experiencing stigma at least "sometimes" (The mean scores for heard stigma, felt stigma, internalized stigma, and enacted stigma were 3.3, 3.6, 3.4, and 7.1, respectively), and they frequently used various coping strategies to avoid disclosure of having HIV (mean=3.2).

Healthcare visits and types of providers seen

The mean number of medical visits was 7.5 times in the past 3 months. While data are not shown, all WLAs sought care from a government hospital; only 16% sought care from an HIV clinic. WLAs also visited other healthcare providers, such as pharmacists (68%), medical assistants (52%), private hospitals (46%) and private practitioners (40%).

Length of Time on ART therapy, perceived benefits and common side effects

The average time taking ART was about 2 years. However, only about half of the sample was compliant with ART at baseline. About half of the sample reported that they were unable to be adherent because they "ran out of HIV medication," "wanted to avoid side effects," "were asleep when you were supposed to take your HIV medication" and "felt sick".

While about seven out of ten women (65%) reported a perceived ART benefit, many of them had experienced ART side effects. Fever, dizziness, fatigue, weight changes, tingling and numbness of hands and/or feet were the most common side effects these women experienced (75–84%). The most frequently reported benefits included being energetic, alert, healthier, having a better appetite, and being more able to do house work or take care of children (31–40%). Adherence support was not common as only 10% of the population received support from a spouse and another 10% from parents.

HIV Symptoms and side effects in the past six months

Within the six months prior to baseline, frequently reported symptoms were fevers and fatigue (84% equally); additionally, at least three-quarters of the women reported frequent headaches and changes in body shape. Over half of all WLAs reported nausea (69%), vomiting (62%), stomach pain and diarrhea (60% each), depression/mood swings (53%), skin rashes and difficulty sleeping (59% each). Less than half reported altered sense of taste, i.e., change/loss (47%).

Associations with ART Adherence

Table 2 reports associations with ART adherence rates. Hindu religion was found to be an important correlate of ART adherence. Additional significant, though negative, correlates of ART adherence included depression, poor quality of life, having 10 or more HIV symptoms, and heard and internalized stigma. Positive correlates of ART adherence were obtaining support for ART from spouses and parents and perceiving at least one ART benefit. Being married, reporting a high school education, living with a spouse, living with children, and age were not related to ART adherence. The same was true for current employment, felt stigma and enacted stigma. There was a trend for disclosure avoidance to be negatively related to adherence.

Adjusted Correlates of ART Adherence

Table 3 presents linear regression findings for ART adherence with Hindu religion, adherence support sources, perceived benefits of ART and depressive symptoms. Women who were Hindu, those who received support for ART adherence from spouses and parents, and those who perceived some benefit from ART had higher adherence rates than their respective counterparts. In contrast, those who were depressed had lower adherence than their peers who were not depressed. Finally, those who visited the health clinics more often and communicated better with their physicians were more adherent than their counterparts.

In a separate hierarchical linear regression model for adherence, heard and internalized stigma were used as predictors in the first step; only heard stigma was significant and 26% of the variance in adherence was explained. In the next step, depression was added and the effect of heard stigma was reduced but still significant. In a third step, adherence support from parents was added to the model and the effect of heard stigma was no longer significant.

Discussion

This paper focuses upon correlates of ART adherence. Our findings indicate that adherence of this sample of WLA in rural India was associated with multiple factors. These factors included Hindu religion, perceived ART benefit, and not being depressed. In addition, receiving support in adhering to ART from spouses and parents, and being able to communicate with the physician and visit clinics were also positively correlated with adherence. No differences were noted with respect to enacted, felt, heard and internalized stigma, HIV knowledge, age, education and other socio-demographic characteristics. The findings of this study point to the importance of resources (Hindu religion, perceived some benefits of being on ART, received support from spouses and parents and not being depressed) in enabling WLA to adhere to treatment. Furthermore, the role of physician communication and visiting the clinic, which is an external resource, also suggests the importance of having health care treatment providers who support WLA.

Our study indicated that WLA who were depressed were less adherent than those who were not depressed. Depression can negatively impact an individual's physical health, and among HIV-positive men and women receiving ART in India, severe depression has been found to be strongly associated with lower adherence to ART (Sarna et al., 2008). Grant et al. (2008) have shown that internal factors impacting adherence to ART include the negative emotions of individuals who feel isolated due to self-imposed separation. In their study, the self-imposed separation was related to individuals' shame or desire to spare others of HIV-related difficulties.

Published research supports interventions that provide early identification and management of severe depression to maintain high levels of adherence (Sarna et al., 2008). This study indicates that simply being depressed reduces adherence to medication. Investigation of depression and its correlates in WLA may advance development of culturally-sensitive, tailored interventions that would afford WLAs mental health support to address depressive symptoms early in their treatment and thus reduce the prevalence and severity of depression and improve ART adherence and other health outcomes.

Our findings revealed that WLA who received support from a spouse were more likely to take their ART treatment as compared with WLA who did not. An even stronger association was found between adherence and support from parents. This support requires the disclosure of HIV/AIDS to one or both parents. Our study is among the first to reveal this relationship among WLA in rural India as there is a paucity of published data related to adherence and parental support.

One study investigating ART for both sexes in Uganda using qualitative and quantitative methodology revealed that the men were more than twice as likely to pick their spouse as their "medication companion" as women in the study (Foster et al., 2010). In contrast, married women in the study were more likely to choose a biological child (36%) or "other relative/household member" (27%) as their medication support rather than their spouse (31%) (Amuron, et al., 2007). However, it has been established that caregivers at the family level play an important role in adherence to ART treatment (Bharath-Kumar, Becker-Benton, Lettenmaier, Fehringer & Bertrand, 2009). Although impact on adherence was not measured in the Uganda study, it emphasized that while a treatment companion may be beneficial at the initiation of ART treatment, a supportive home environment may be the best support for adherence (Foster et al., 2010). This supportive environment would include one where everyone in the home knows the HIV status of the individual and provides reminders regarding taking medications.

We also found that Hindu religion was related to ART adherence. Two-thirds of the WLA sample reported being Hindu. Adherence to treatment is also supported by studies investigating spirituality. Spirituality has supported the role of achieving hope and physical well-being (Pargament et al., 2004); further, hope has been attributed to life adjustments that impact adherence (Powell, Shahabi, & Thoresen, 2003). Further investigation is needed to understand why followers of Hindu were more adherent than those who practiced Catholicism and Islam faith in enabling WLA to cope with intermittent HIV-related symptoms and ART side effects while engaged in ART treatment.

The association between perceived ART benefit and adherence may result from length of time on ART. For example, despite reports of significant HIV symptoms within the last six months, the mean length of treatment for these WLA was almost two years. This demonstrates the desire of the WLA to continue treatment with ART, despite HIV-related symptoms including nausea, vomiting, stomach pain, depression, mood swings, difficulty sleeping, and diarrhea reported by a majority of women over the past 6 months. Belief in the efficacy of medications to improve health and continue life is a primary factor influencing adherence (Watt et al., 2009). In a qualitative study of facilitators of adherence among persons on ART, help from others and perceived benefits of ART were also found to be important (Kumarasamy et al., 2005).

Unadjusted findings also indicated that WLA who reported higher levels of heard and internalized stigma were less adherent than those with lower levels of these types of stigma. HIV and AIDS carry a widely-recognized stigma within Indian culture. Research has pointed to the fact that AIDS stigma often increases pre-existing inequalities or social prejudices (Ekstrand et al., 2011). Reduction of adherence to medications due to stigma can be devastating for WLA (Ekstrand et al., 2011). While the duration of treatment in our sample was only 22 months, WLA may have been able to adequately adjust to the stigma they encountered over this time period or they may have been able to develop coping mechanisms to allow them to deal with the stigma. Alternatively, depression may have mediated some of the effects of heard stigma and receipt of support from parents may have counteracted it.

The importance of enabling health care support was also found to be critical. The association of ART adherence with physician communication and clinic visits may be important for several reasons. Significant barriers to treatment completion attributed to poor health care access or lack of utilization, along with poor experience with past or current health care providers, have been previously described (Mehta et al., 2006). Accessing care is a formidable challenge for the residents of Andha Pradesh as two-thirds of residents live in rural areas (NFHS, 2006) and they face significant challenges when seeking medical care due to geographic, time, and cost constraints (Nyamathi et al., 2011). Government ART sites may be hours away from their villages. Further, an individual living in a rural village may spend a week's salary in travel-related expenses to go to a government hospital to receive ART. Financial constraints in seeking health care, even when the ART is available at no cost, have been reported in Ethiopia and Uganda (Gusdal et al., 2009).

Collaboration between patients and health care providers has been attributed to identifying and resolving challenges to enhanced adherence (Gusdal et al., 2009; Watt et al., 2009). Likewise, the need for an affirmative, therapeutic alliance between patients and their providers has been stressed (Gusdal et al., 2009). This type of alliance enhances patient satisfaction and sense of trust in their treatment (Gusdal et al., 2009; Watt et al., 2009).

Limitations

There are some limitations to this study which include being composed of a small number of WLA recruited from two rural villages in south India. This may limit generalizability to all rural WLA. However, Andhra Pradesh is a large rural state with a significant population of HIV-infected women, so the results of this study may be applicable to a large number of rural WLA living in villages. Another limitation is that the cross-sectional design prevents an assumption of causality between variables.

Conclusion

This study revealed that WLA who reported a Hindu religious affiliation were more adherent to ART than their counterparts who did not report a Hindu affiliation. Furthermore, WLA who visited their health care clinic more often and communicated better with their physicians, those who perceived a benefit from ART, those who were supported by spouses and parents, and those who were not depressed were more adherent to ART treatment than their respective counterparts. These correlations point to the need for a strong relationship and therapeutic alliance between WLA and their physicians, as well as scheduled visits to the health care clinic and social support at home to encourage adherence to treatment. Finally, depressive symptoms should be addressed early in treatment to avoid negative consequences, including not being adherent with medications (Chandra, Desai, & Ranjan, 2005; Sarna et al., 2008).

Acknowledgments

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Table 1

Sample Characteristics (N=68)

Measure	Mean	(SD)
Age	31.2	(5.3)
Number of Children	1.6	(1.0)
Visits in Past 3 Months	7.5	(3.5)
HIV knowledge	3.0	(3.7)
Heard Stigma	3.3	(0.6)
Felt Stigma	3.6	(0.4)
Internalized Stigma	3.4	(0.6)
Enacted Stigma	7.1	(3.2)
Disclosure Avoidance	3.2	(0.8)
MD Communication and Clinical Appointment	1.7	(0.7)
Time on ART (Months)	22.3	(17.6)
Adherence barriers to HIV medication	0.9	(0.7)
Compliance with ART	46.3	(16.2)
	(Range: 25%–88%)	
Measure	*N*	*%*
Religion		
Hindu	44	65.7
Christian	17	25.4
Muslim	6	9.0
Marital Status		
Married	35	51.5
Widowed	28	41.2
Other	5	7.4
People Living with:		
Children	52	76.5
Spouse	30	44.1
Adherence Support		
Spouse	10	14.7
Parents	10	14.7
Working (Yes)	52	76.5
Quality of Life (Poor)	29	42.7
Number of HIV Symptoms (>=10)	44	64.7
Any Perceived ART Benefit (Yes)	47	69.1
Depression (Yes)	37	54.4

Table 2

Associations with ART Adherence Rate (N=68)

Measure	Means	Std Dev	p value
Married			0.659
No	45.42	16.90	
Yes	47.17	15.62	
Religion			0.039
Other religion	40.88	11.25	
Hindu	49.30	17.71	
Living with Spouse			0.985
No	46.29	16.07	
Yes	46.37	16.56	
Depressed			0.001
No	53.65	16.12	
Yes	40.19	13.60	
Poor Quality of Life[a]			0.033
No	49.90	14.81	
Yes	41.52	16.89	
Number of HIV Symptoms			0.014
<10	52.79	16.56	
>=10	42.80	14.98	
Any Perceived ART benefit			0.001
No	35.76	14.41	
Yes	51.04	14.71	
Adherence Support from Spouse			0.032
No	44.59	16.23	
Yes	56.4	11.97	
Adherence Support from Parents			0.002
No	43.81	15.23	
Yes	60.90	14.27	
Measure	Pearson Correlation Coefficient		p value
Age	−0.16		0.178
HIV knowledge	0.15		0.220
Time on Taking ART (Months)	−0.01		0.950
MD Communication and Clinical			
Appointment Score	0.448		0.000
Heard Stigma	−0.33		0.005
Felt Stigma	−0.14		0.239
Internalized Stigma	−0.23		0.049
Enacted Stigma	−0.08		0.507
Disclosure Avoidance	−0.23		0.056

[a] an average score of 3 or above was used to dichotomize as 'poor quality of life'

Table 3

Adjusted Linear Regression Model for ART Adherence Rate (N=68)

Measure	Coefficient	Std Err	p value
Hindu Religion (vs. other)	7.15	2.78	.010
Depressed (Yes)	−10.75	2.90	.000
Adherence Support from Spouse	10.16	3.83	.010
Adherence Support from Parents	17.92	4.09	<.001
Any Perceived ART Benefit	7.37	3.00	.020
MD Communication & Clinic Appointment Score[a]	5.45	2.00	.001

[a]Average score was used in the analysis