Concomitant herbal medicine and Antiretroviral Therapy (ART) use among HIV patients in Western Uganda: A cross-sectional analysis of magnitude and patterns of use, associated factors and impact on ART adherence

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Concomitant herbal medicine and Antiretroviral Therapy (ART) use among HIV patients in Western Uganda: A cross-sectional analysis of magnitude and patterns of use, associated factors and impact on ART adherence

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Use of herbal medicines among patients receiving Anti-retroviral Therapy (ART) remains by far an uncharacterised phenomenon in Africa and Uganda specifically. We evaluated the use of herbal medicines among patients on ART at the HIV clinic of Mbarara Regional Referral Hospital (MRRH), examined factors associated with their concomitant use and their impact on ART adherence. This was a cross-sectional study among 334 systematically sampled patients receiving ART at the HIV clinic of MRRH from February to April 2010. We collected data on patient demographics, clinical characteristics, perceptions of quality of care received, self-perceived health status, information on ART received, herbal medicines use and ART adherence. Study outcomes were concomitant herbal medicine and ART use, and ART adherence. Descriptive analysis and logistic regression were conducted using Stata10.0. Close to half, 155 (46.4%) reported concomitant herbal medicines and ART use, with 133 (39.8%) using herbal medicines at least once daily. Most (71.6%) used herbal medicines to treat HIV-related symptoms. A majority (92.3%) reported that the doctors were unaware of their use of herbal medicines, 68.5% citing its minimal importance to the attending physician. Most frequently used herbs were *Aloe vera* (25%) and *Vernonia amygdalina* (21%). Time since start of ART (OR 1.14 95% CI: 1.01–1.28, for each one year increase), number of ART side effects reported (≥3 vs. ≤1, OR 2.20 95% CI 1.13–4.26) and self-perceived health status (Good vs. Poor, OR 0.31 95% CI 0.12–0.79) were independently associated with concomitant herbal medicine and ART use. Concomitant herbal medicine and ART use was not associated with poor ART adherence (OR 0.85 95% CI 0.47–1.53). There is widespread concomitant herbal medicines and ART use among our patients, with no association to poor ART adherence. Patients appear to use these therapies to complement as opposed to substituting ART.

Keywords: herbal medicine; Antiretroviral Therapy; adherence; Uganda

Introduction

Ethnobotanical surveys have documented use of herbal medicines to treat HIV/AIDS and opportunistic infections, and manage side effects of Anti-Retroviral Therapy (ART) (Chinsembu & Hedimbi, 2010; Lamorde et al., 2010). Laboratory-based studies show that some plant-derived compounds demonstrate anti-HIV activity and may be potential sources of antiretrovirals (Chen et al., 2003; Gao et al., 2007). Some plant-derived compounds may be used to treat ART side effects (Mehendale et al., 2007).

Prior to increased access to ART in Uganda, 63.5% of patients used herbal medicines (Langlois-Klassen, Kipp, Jhangri, & Rubaale, 2007) possibly because modern HIV care and treatment was often costly and inaccessible to patients in rural areas. Traditional Medicine (TM) is also more acceptable in developing countries because it is embedded within wider belief systems. UNAIDS recommends collaboration with TM practitioners in HIV/AIDS care and prevention (World Health Organization, 2002). However, challenges to collaboration include lack scientific evidence on efficacy, safety and quality of herbal medicines (Liu, Manheimer, & Yang, 2005), limited data on pharmacokinetic and pharmacodynamic interactions between herbal medicines and ART and their clinical significance (Lee, Andrade, & Flexner, 2006), and potential to promote non-adherence to ART (Jernewall, Zea, Reisen, & Poppen, 2005; Owen-Smith, Diclemente, & Wingood, 2007).

In June 2004, Uganda began to offer free ART with support from WHO, World Bank Multi-country AIDS Program, Global Fund to Fight AIDS, Tuberculosis and Malaria, USAID and the United States President's Emergency Plan for AIDS Relief. The number of People Living with HIV/AIDS

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(PLHAs) in Uganda accessing ART has almost tripled, from 67,525 in 2005–200,213 by September 2009 (Uganda AIDS Commission & UNAIDS, 2010). Little is known about the extent and impact of herbal medicines use among PLHAs on ART in Uganda in this era of increased access to treatment. It is possible that even more PLHAs use herbal medicines to manage the disease.

In this study, we evaluate the use of herbal medicines among patients on ART attending the free HIV clinic at Mbarara Regional Referral Hospital in Western Uganda. Our objectives were to determine the magnitude and patterns of use of herbal medicines; whether patients disclose their concomitant use to health care providers; examine factors associated with herbal medicines use and assess the impact of their concurrent use on ART adherence.

Methods

Subjects and settings

We conducted a cross-sectional survey and reviewed patients' medical records at the HIV clinic of Mbarara Regional Referral Hospital, Western Uganda over a period of three months from February to April 2010. The clinic provides free ART through four treatment programmes: Joint Clinical Research Centre (JCRC), Family Treatment Fund (FTF), Ministry of Health (MoH) and Mbarara-Mulago Joint AIDS Programme (MJAP). The MoH, MJAP and JCRC each treat approximately 2000 patients, while FTF serves about 100 patients. Subjects were included in the study if they were on ART, above 18 years of age, and gave consent to participate in the study. Those who were very sick, unable or did not consent to the study were excluded. Based on previous studies conducted in Uganda (Langlois-Klassen et al., 2007), we expected the prevalence of concomitant herbal medicine and ART use to be 70%. To estimate this prevalence and its 95% CI, with a $\pm 5\%$ precision, we calculated a minimum sample size of 322 patients. We increased our sample size a priori to at least 330 to cater for those unable or unwilling to complete the interview, or those who chose to withdraw from the study. On each study day, every 20th patient at the clinic who met the inclusion criteria was invited to participate in the study.

Procedures

A semi-structured questionnaire with four sections was used in this study. The first section collected data on sociodemographics and perception of quality of care at the clinic. The second collected clinical information on the patients' diseases, drugs and self-perceived health status. The third section collected information on herbal medicine use including patterns, sources and conditions treated. Herbal medicines in our study were defined as plant-derived material or preparations, which contain either raw or processed ingredients from one or more plants (World Health Organization, 2005). The fourth section was an adherence assessment using the Centre for Adherence Support Evaluation (CASE) adherence index (Mannheimer et al., 2006), composed of three simple questions addressing three different aspects of ART adherence: difficulty taking ART medication on time (score 1–4 depending on response), frequency of missed ART doses and time since most recent missed ART dose (score 1–6 for each question depending on response). Patients with a composite score of greater than 10 have good adherence while those with less than or equal to 10 have poor adherence. The index has been shown to correlate strongly with the three-day recall method, and to predict virologic and immunologic response (Mannheimer et al., 2006). A draft questionnaire was reviewed by two epidemiologists and one ethnopharmacologist, and modified. The final questionnaire was translated into the local language (Runyankore) of the area and back translated to English to ensure information was not lost. One week prior to data collection, the questionnaire was pre-tested in six patients from The AIDS Support Organization clinic in Mbarara. Our final questionnaire has 43 items. Trained research assistants administered the questionnaire after obtaining signed informed consent. Additional data on CD4 counts, clinical stage, ART regimen and other regular medicines were abstracted from patients' treatment records.

Analytical strategy

A list of local names of herbs cited by our patients was forwarded to a local Botanist with experience in TM of Western Uganda to determine scientific names.

Our primary outcome measure was concomitant herbal medicines and ART use. The secondary outcome measure was ART adherence. Continuous variables were summarised as medians and interquartile range (IQR) and categorical variables as proportions. Factors associated with herbal medicine use were evaluated using bivariate and multivariate logistic regression analyses with the following independent variables: age, time since start of ART, gender, daily income, level of education, perceived quality of service at the clinic, ART regimen, number of attributes of ART informed about, number of

ART side effects reported and self-perceived health status. Independent variables with *p* values of 0.10 or less in bivariate analyses were entered into the multivariate regression model, as were the person-level variables, age and gender. Variables with a *p* value of less than 0.05 were manually selected as significant in the final model. Bivariate and multivariate logistic regression analyses were conducted to examine the relationship between ART adherence and age, time in years since start of ART, concomitant herbal medicine and ART use and self-perceived health status. Analyses were performed using Stata 10.0 (Stata Corporation, USA).

Ethical considerations

Ethical approval was obtained from the Faculty of Medicine Research and Ethics Committee of Mbarara University of Science and Technology, and the HIV clinic at Mbarara Regional Referral Hospital. Signed informed consent was obtained from each study participant prior to the interview. All procedures were consistent with the Declaration of Helsinki.

Results

Patient characteristics

Three hundred and thirty-four patients were recruited into the study and completed the interview. Their characteristics are shown in Table 1. Median (IQR) age and time since start of ART were 38(32,45) and 3(2, 5) years, respectively. Majority were female (213, 63.8%). Three hundred and nineteen (95.5%) were on a first-line ART regimen as defined in the Uganda National ART Guidelines for Adults and Adolescents, for 2009 (Katabira, Kamya, Kalyesubula, & Namale, 2009).

Use of herbal medicines

Three hundred and sixteen (94.6%) participants reported that they had used herbal medicines prior

Table 1. Participant characteristics, HIV Clinic, Mbarara Regional Referral Hospital, February–April 2010 (*N* = 334).

Characteristic	Value, *n* (%)
Age in years, median (IQR)	38 (32, 45)
15–24	12 (3.6)
25–34	103 (30.8)
>35	219 (65.6)
Time in years since start of ART, median (IQR)	3 (2, 5)

Table 1 (*Continued*)

Characteristic	Value, *n* (%)
Gender	
Male	121 (36.2)
Female	213 (63.8)
Tribe	
Munyankole	224 (73.1)
Others[a]	90 (26.9)
Religion	
Anglican	160 (47.9)
Roman Catholic	103 (30.8)
Muslim	38 (11.4)
Other	33 (9.9)
Marital status	
Single	16 (4.8)
Married/cohabiting	191 (57.2)
Divorced/separated	53 (15.9)
Widowed	74 (22.1)
Employment status	
Unemployed	21 (6.3)
Informal	241 (72.1)
Formal	72 (21.6)
Income US$/day	
≤2.5	252 (75.4)
>2.5	82 (24.6)
Level of education	
None	43 (12.9)
Primary	170 (50.9)
Secondary	108 (32.3)
Tertiary	13 (3.9)
Perceived quality of service at clinic	
Good	250 (74.8)
Poor	84 (25.2)
ART Regimen[b]	
First line	319 (95.5)
Second line	15 (4.5)
Number of attributes of ART informed about[c]	
≤1	15 (4.5)
2	38 (11.4)
≥3	281 (84.1)
Number of ART side effects reported	
≤1	62 (18.5)
2	50 (15.0)
≥3	222 (66.5)
Self-perceived health status	
Poor	28 (12.9)
Fair	86 (50.9)
Good	220 (32.3)

IQR, interquartile range; USD, United States Dollars.
[a]Includes Muganda, Mukiga, Mutooro, Munyarwanda, Mukonjo, Mufumbira, Mutagwenda, Murundi, Muchotara, Mugisu and Muhaya.
[b]Defined by the Uganda National ART guidelines for Adults and Adolescents, 2009.
[c]Attributes included information on medication components, reasons for taking medications, ART side effects, drug interactions, use of herbal medicines while on ART.

to enrolment in to the clinic. One hundred and fifty-five (46.4%) were using herbal medicines in addition to their conventional ART regimen. One hundred and thirty-three (39.8%) took herbal medicine at least once daily and 22 (6.6%) took them only when required. Our participants provided local names for seventy-nine different plants. The Botanist provided scientific names for forty-five. The most frequently cited herbs were *Aloe vera* ("Rukaka") used for managing fevers, malaria, diabetes, stomach aches, skin diseases, diarrhoea and to improve immunity and *Vernonia amagdalina* ("Omubirizi") for malaria, fevers, as a dewormer, and for stomach pains (Figure 1).

Clinical indications for use of herbal medicines are summarised in Figure 2. Most patients ($n = 111$, 71.6%) used herbals to treat HIV-related symptoms. A majority ($n = 99$; 63.9%) of patients used home-made concoctions and 45 (29.1%) obtained their medicines from herbalists/traditional healers. Only 8 (5.2%) obtained herbal medicines from licensed pharmacies and/or drug shops and 3 (1.9%) obtained them from non-licensed herbal medicine outlets. Most participants ($n = 93$, 60%) did not spend any money on herbal medicines.

Disclosure of herbal medicines use to medical doctors

One hundred and forty-three (92.3%) patients reported that their physicians were unaware of their herbal medicine use. Of these, 98 (68.5%) felt that it was not important for the doctor to know, 79 (55.2%) reported that the doctor had never inquired about

their herbal medicine use and 69 (48.3%) thought it was none of the doctor's business.

Factors associated with concomitant herbal medicines and ART use

Factors associated with concomitant herbal medicine and ART use in bivariate analyses included time since start of ART (OR 1.12 95% CI 1.01–1.24, for each one year increase), perceived quality of service at clinic (Poor vs. Good, OR 1.78 95% CI 1.08–2.94), ART regimen (second line versus first line, OR 3.34 95% CI 1.04–10.72), number of attributes of ART informed about (≥ 3 vs. ≤ 1, OR 0.37 95% CI 0.12–1.12), number of ART side effects reported (≥ 3 vs. ≤ 1, OR 2.77 95% CI 1.51–5.10) and self-perceived health status (Good vs. Poor, OR 0.21 95% CI 0.09–0.54) (Table 2). On multivariate analysis (Table 2), time since start of ART (OR 1.14 95% CI 1.01–1.28, for each one year increase), number of attributes of ART informed about (≥ 3 vs. ≤ 1, OR 0.31 95% CI 0.10–0.97), number of ART side effects reported (≥ 3 vs. ≤ 1, OR 2.20 95% CI 1.13–4.26) and self-perceived health status (Good vs. Poor, OR 0.31 95% CI 0.12–0.79) were independently associated with concomitant herbal medicine and ART use.

Impact on ART adherence

Overall, 19.5% ($n = 65$) of our respondents had poor adherence (composite CASE Index score of ≤ 10). Of these, 30 (19.4%) were concomitantly using herbal medicines and ART and 35 (19.6%) were not. Concomitant herbal medicine and ART use was not

Plant parts used were leaves only except for * where only roots were used and # where both leaves and seeds were used
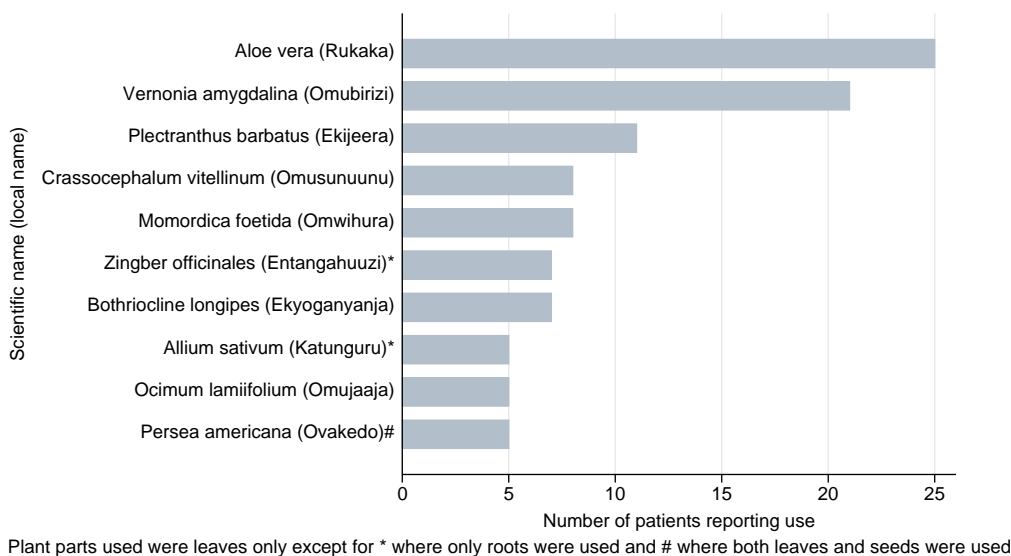
Figure 1. The 10 most frequently cited herbs used at the Mbarara Regional Referral Hospital HIV Clinic, February–April 2010 ($N = 155$).
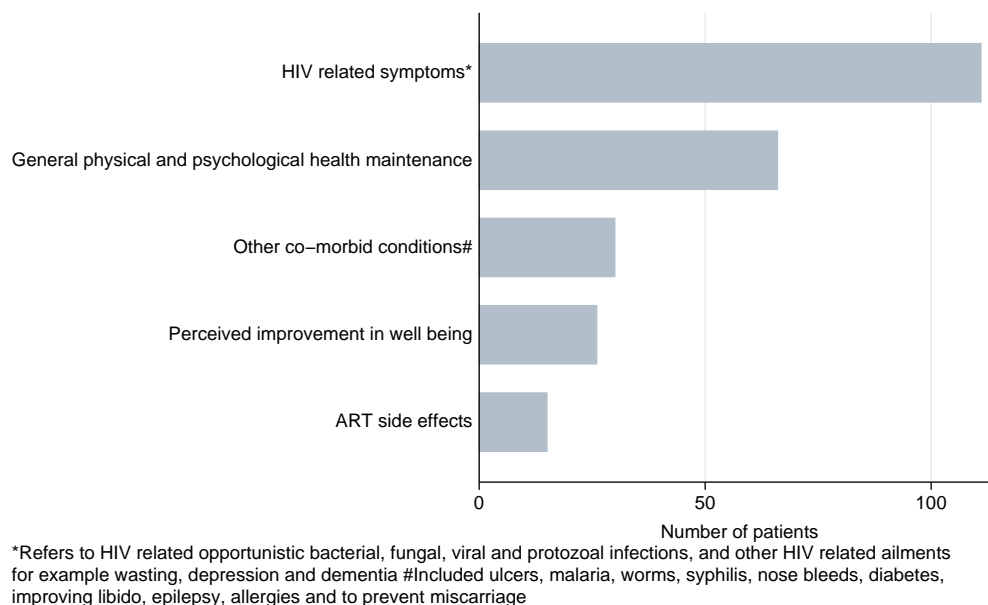
Figure 2. Clinical indications for reported use of herbal medicines at the Mbarara Regional Referral Hospital HIV Clinic, February–April 2010 ($N = 155$).

associated with poor ART adherence on bivariate analysis (OR 0.99 95% CI 0.57–1.70). After adjusting for age, time since start of ART and self-perceived health status, concomitant herbal medicine and ART use was not significantly associated with poor ART adherence (OR 0.85 95% CI 0.47–1.53) with self-perceived health status acting as a confounder (Table 3).

Discussion

In our sample of patients on ART, almost half, 155 (46.6%) were using herbal medicines. This was consistent with findings from studies in North America (Furler, Einarson, Walmsley, Millson, & Bendayan, 2003; Hsiao et al., 2003; Rivera et al., 2005), Europe (Colebunders, Dreezen, Florence, Pelgrom, & Schrooten, 2003; Ladenheim et al., 2008), and Asia (Hasan et al., 2010; Ma et al., 2008; Wiwanitkit, 2003), that documented proportions of herbal medicine users among patients on ART ranging from 12% to 71%. Studies in Africa on herbal medicine use among patients on ART are fewer. Langlois-Klassen et al. (2007), found that 63.5% of AIDS patients ($n = 137$) in the western district of Kabarole, Uganda use herbal medicines and 59.4% ($n = 67$) of those on ART used herbal medicines. Data in this study were collected in 2004 prior to increased access to free ART in Uganda. The observed lower proportion in our study could imply that as access to free ART has increased, fewer patients now use herbal medicines. However, even

in this era of access to free ART, patients are frustrated by the need to take these drugs on a daily basis for life, often with cumbersome side effects. Therefore, herbal remedies remain a popular option. Regular, same day herbal medicine and ART use was reported in 39.8% of our patients. These patients are at risk of unknown herb–ART interactions necessitating increased vigilance and research into herb–ART interactions.

Herbal medicines were mostly used to manage symptoms related to HIV. Although some patients specifically reported using herbal medicines to manage ART side effects, in many instances, these are not distinguishable from common presenting HIV-related symptoms e.g., skin rashes, abdominal pains, diarrhoea and insomnia. This indicates that patients use herbal medicines to supplement their ART medications.

Few participants obtained their herbal medicines from licensed pharmacies/drug shops or non-licensed herbal medicine outlets. Approximately 64% were self-medicating using home-made concoctions. This is in line with our finding that 60% do not spend any money on herbal medicines. Because these patients are poor (approximately 75% earn $2.5 or less a day) they are unable to pay for herbal medicines either from pharmacies or traditional healers and resort to self-prepared concoctions. These patients are out of a potential monitoring loop of pharmacy personnel and/or traditional herbalists. Additionally, it is difficult to assure good preparation and standardisation of home-made concoctions. There is need to ascertain

Table 2. Factors associated with concomitant herbal medicines and ART use, HIV Clinic, Mbarara Regional Referral Hospital, February–April 2010.

| Independent variable | Concomitant herbal medicine and ART use | | Unadjusted OR (95% CI) | Adjusted OR (95% CI)[a] |
	Yes, n (%) 155 (46.4%)	No, n (%) 179 (53.6%)		
Age in years				
15–24	8 (66.7)	4 (33.3)	1.00	1.00
25–34	50 (48.5)	53 (51.5)	2.12 (0.60–7.48)	2.13 (0.55–8.29)
>35	121 (55.3)	98 (44.7)	1.62 (0.47–5.54)	1.57 (0.42–5.97)
Time in years since start of ART, median (IQR)	3 (2, 5)	3 (1, 4)	1.12 (1.01–1.24)	1.14 (1.01–1.28)
Gender				
Male	50 (41.3)	71 (58.7)	1.00	1.00
Female	105 (49.3)	108 (50.7)	1.38 (0.88–2.17)	1.16 (0.70–1.95)
Income, US$/day				
≤2.5	116 (46.0)	136 (54.0)	1.00	
>2.5	39 (47.6)	43 (52.4)	1.06 (0.65–1.75)	
Level of education				
None	24 (55.8)	19 (44.2)	1.00	
Primary	79 (46.5)	91 (53.5)	0.69 (0.35–1.35)	
Secondary	47 (43.5)	61 (56.5)	0.61 (0.30–1.24)	
Tertiary	5 (38.5)	8 (61.5)	0.50 (0.14–1.76)	
Perceived quality of service at clinic				
Good	107 (42.8)	143 (57.2)	1.00	1.00
Poor	48 (57.1)	36 (42.9)	1.78 (1.08–2.94)	1.58 (0.92–2.72)
ART regimen				
First line	144 (45.1)	175 (54.9)	1.00	1.00
Second line	11 (73.3)	4 (26.7)	3.34 (1.04–10.72)	2.20 (0.62–7.80)
Number of attributes of ART informed about				
≤1	5 (33.3)	10 (66.7)	1.00	1.00
2	13 (34.2)	25 (65.8)	0.96 (0.27–3.41)	0.72 (0.19–2.70)
≥3	161 (57.3)	120 (42.7)	0.37 (0.12–1.12)	0.31 (0.10–0.97)
Number of ART side effects reported				
≤1	44 (71.0)	18 (29.0)	1.00	1.00
2	31 (62.0)	19 (38.0)	1.50 (0.68–3.31)	1.17 (0.50–2.72)
≥3	104 (46.8)	118 (53.2)	2.77 (1.51–5.10)	2.20 (1.13–4.26)
Self-perceived health status				
Poor	21 (75.0)	7 (25.0)	1.00	1.00
Fair	49 (57.0)	37 (43.0)	0.44 (0.17–1.14)	0.50 (0.19–1.36)
Good	85 (38.6)	135 (61.4)	0.21 (0.09–0.54)	0.31 (0.12–0.79)

OR, odds ratio; CI, confidence interval; IQR, interquartile range.
[a]Adjusted for age; gender; attributes of ART informed about, perceived quality of service at clinic; time since start of ART; ART regimen (first/second line); number of ART side effects reported and self-perceived health status.

the adequacy of methods of preparation, storage and use the common home-made concoctions.

Consistent with previous findings in Uganda (Langlois-Klassen, Kipp, & Rubaale, 2008), and South Africa (Peltzer, Preez, Ramlagan, & Fomundam, 2008), only 7.7% of participants reported to conventional health care providers their use of herbal medicines. In Africa, herbal medicines use in HIV treatment still causes stigma therefore patients are often unwilling to discuss their use with conventional practitioners. Patients are possibly unaware of the

potential risks of combining herbal medicines with ART and believe that herbs are "natural", presuming they are safe. This is reflected in the major views patients identified with such as, "it was none of the doctors business" or "it was not important for the doctor to know". As with previous studies (Langlois-Klassen et al., 2008; Peltzer et al., 2008), about half of our participants did not inform their health care provider because the provider did not ask. Improving patient–provider communication is key to building a trust that would foster disclosure (Langlois-Klassen

Table 3. Factors associated with poor adherence at the HIV Clinic, Mbarara Regional Referral Hospital, February–April 2010.

	Adherence			
Independent variable	Poor, *n* (%) 65 (19.5%)	Good, *n* (%) 269 (80.5%)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)[a]
Age in years				
15–24	3 (25.0)	9 (75.0)	1.00	1.00
25–34	30 (29.1)	73 (70.9)	1.23 (0.31–4.87)	1.25 (0.31–5.02)
>35	32 (14.6)	187 (85.4)	0.51 (0.13–2.00)	0.58 (0.14–2.29)
Time in years since start of ART, median (IQR)	2 (1, 4)	3 (2, 5)	0.82 (0.71–0.95)	0.85 (0.73–0.99)
Concomitant herbal medicine/ART use				
No	35 (19.6)	144 (80.4)	1.00	1.00
Yes	30 (19.4)	125 (80.6)	0.99 (0.57–1.70)	0.85 (0.47–1.53)
Self-perceived health status				
Poor	10 (35.7)	18 (64.3)	1.00	1.00
Fair	19 (22.1)	67 (77.9)	0.51 (0.20–1.29)	0.50 (0.19–1.32)
Good	36 (16.4)	184 (83.6)	0.35 (0.15–0.83)	0.32 (0.13–0.79)

Note: "Poor" adherence defined as CASE Adherence Index Score ≤10.
OR, odds ratio; CI, confidence interval; IQR, interquartile range.
[a]Adjusted for age; time since start of ART and self-perceived health status.

et al., 2008). Health care providers should purposely inquire about herbal medicine use as part of a comprehensive medical history (Katabira et al., 2009). Patients should be counselled on the importance of disclosure of herbal medicine use to health workers.

The association between concomitant herbal medicines and ART use, and time since start of ART has previously been demonstrated (Dhalla, Chan, Montaner, & Hogg, 2006). Herbal medicines use was more likely among patients with poor self-perceived health status. These could be explained by the fact that patients are frustrated with chronic and incurable nature of the disease and the non-curative nature of current treatments, and therefore seek alternative treatments. Participants who reported more ART side effects were more likely to use herbal medicines, indicating that patients use them to cope with ART side effects. The more attributes of ART a patient was informed about, the less likely they were to use herbal medicines giving evidence to the need to improve communication between health care providers and patients.

Our results are in keeping with previous studies in Uganda that show high rates of adherence to ART among patients attending rural clinics (Bajunirwe et al., 2009; Weidle et al., 2006). Concomitant herbal medicines and ART use did not have a significant impact on ART adherence. However, a study in South Africa found that patients who took herbal therapies were more likely not to adhere to their ART (Peltzer, Friend-du Preez, Ramlagan, Fomundam, &

Anderson, 2009). Possible explanations are that a much smaller proportion (7.9%, *n* = 519) in that study used herbal therapies in addition to ART and a different measure of ART adherence was employed in our study. Despite high rates of concomitant herbal medicine and ART use, our patients appear to use these therapies to complement as opposed to substituting ART.

This study has a number of limitations. Our study sample had a large proportion of female participants. However, this is typical of rural clinics and similar to earlier studies done in Uganda (Langlois-Klassen et al., 2007) and South Africa (Peltzer et al., 2008). Most participants were from the western region. As cultures vary in different geographical regions of Uganda, these results might not be representative of the entire country. The cross-sectional design meant definitive causal inferences could not be made between concomitant herbal medicine and ART use and the study variables; and concomitant herbal medicines and ART use and ART adherence. As our outcome variables, concomitant herbal medicines and ART use, and ART adherence were based on self-report, we could have imprecise estimates of both. The CASE adherence index has not been validated in African populations. It was validated in highly urbanised settings, among predominantly male participants, with high proportions of Men who have Sex with Men (MSM) and injection drug users. Our study sample, however, was mostly female and obtained from a rural setting. MSM and injection drug use are

not common in our setting. These factors are known to affect adherence and reporting thereof. Patients in our context may have experienced problems with the likert-type responses the questions. These differences could have led to imprecise estimates of adherence in our sample.

Conclusion

Despite increased access to free ART, the frequency of concomitant use of herbal medicines by patients on ART in Uganda is high, with no impact on ART adherence. Patient-level follow-up may elucidate variations in adherence, drug interactions and treatment outcomes. While little is known about the public health impact of concomitant herbal medicines and ART use, it is clear that herbal medicines remain an important part of the daily lives of PLHAs. Integrating traditional and western medicines systems of medicine in HIV care and prevention may improve outcomes for PLHAs (World Health Organization, 2002).

Acknowledgements

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