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Preliminary Trial of Aloe Vera Gruel on HIV Infection

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Abstract

Background: Ten (10) young women diagnosed with human immunodeficiency virus (HIV) infection in the Wesley Guild Hospital Ilesa, a unit of Obafemi Awolowo University Teaching Hospital, Ile Ife, Osun State, Nigeria who did not meet the national criteria for the use of antiretroviral drugs were managed with 30–40 mL of aloe vera (*Aloe barbadensis miller)* gruel daily.
Methods: Their CD4 counts, general improvement, and physical well-being (including weight gain) were monitored over a 1-year period. The findings were compared with those of 20 age- matched controls who were on antiretroviral drugs. One (1) patient who reacted badly to antiretroviral drug switched over to aloe vera.
Results: The average weight gain among those on aloe vera was 4.7 kg compared to 4.8 kg by those on antiretroviral drug ($p = 0.916$). The average rise in CD4 count among them was 153.7 cells/μL compared to 238.85 cells/μL among the controls ($p = 0.087$). There was no significant side effect(s) in either group except in the 1 patient who switched over from antiretroviral drugs to aloe vera gruel.
Conclusions: These preliminary data suggest that consumption of aloe vera may be of help to HIV-infected individuals in the tropics, given its availability and inexpensiveness.

Introduction

Human immunodeficiency virus (HIV) infection is caused by an RNA virus, a retrovirus that belongs to the lentivirus family. Infections with lentiviruses typically have a chronic course of disease with a long period of clinical latency and persistent viral replication.[1] There are two types, namely: HIV types 1 and 2. Both have been documented as causative agents of acquired immunodeficiency syndrome (AIDS), which is the end stage of the spectrum of disease state caused by HIV infections.[1] Currently, more than 40 million people (about 6%–7% of the world population) live with HIV infection.[2] The disease has rapidly spread to become a world pandemic, and about 80% of those infected lives in sub-Saharan Africa.[2] In Nigeria where the authors reside, about 4 million (3% of the country's 120 million population with a seroprevalence of 4.5%) are estimated to live with this virus.[2] The high burden of the disease, with its associated morbidity and mortality despite concerted efforts by international and local partners to combat it, continues to be a major public health concern for the world. The predominant mode of acquisition of HIV infection by children is through mother-to-child transmission.[1] According to the guideline for the use of antiretroviral drugs in Nigeria, CD4 count of 200 cells/μL and below is the eligibility criteria for the initiation of highly active antiretroviral treatment (HAART) and due to poor access to the drugs, only 17% of those eligible are on treatment.[2] This national benchmark for initiation of HAART is far below the 350 cells/μL recommended by the World Health Organization.[3]

Aloe vera (*Aloe barbadensis miller*) plants readily grow in abundance in many parts of the world, including sub-Saharan Africa where the authors reside and the bulk of HIV infections occur. Over 300 aloe species have been identified by polymerase chain reaction.[4] A few examples include aloe barbadensis (also known as aloe vera), aloe andogensis, aloe ferox, and aloe Africana, which grow readily in sub-Saharan Africa. Aloe plants have two main parts: the pericyclic cells, which are found just below the skin, rich in anthraquinones and confer the bitter taste,[5,6] and the inner central area (the gel), which is very rich in polysaccharides, minerals, trace elements, and vitamins.[7,8] Aloe plants are rich in both essential and nonessential amino acids.[6,9] Aloe has also been found to have glutathione peroxidase and superoxide dismutase activity,[10] immune modulatory activity,[7,11–13] and *in vitro* antiviral properties against HIV.[14] Its oral consumption has also been found to be safe.[15–17] It has a wide volume of distribution, with accumulation of its metabolites in the kidney and liver after oral intake.[18] Since the effect of HIV infection is primarily on the immune system and these

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effects are aggravated by the deficiency of most ingredients present in aloe vera plants, it is conceivable that aloe vera consumption may be beneficial to patients with HIV/AIDS. It is ubiquitous and inexpensive compared to antiretroviral agents that are largely imported. It was decided to try patients with HIV infection on aloe vera gruel after obtaining their consent.

Materials and Methods

Ten (10) HIV-infected women, who were mothers of children being managed for HIV infection in our unit, were recruited for the study. These women did not meet the national criteria for commencing them on HAART except the 1st patient (Table 1), who was initially on HAART but stopped taking the drugs barely 4 weeks into treatment due to some side-effects (extreme weakness, vomiting, dizziness, and diarrhea), which she termed unbearable and she refused to recommence HAART despite repeated counseling and persuasions. She then decided to give aloe vera a trial. They were given 30–40 mL of blended aloe vera gruel daily after obtaining their consent; the administration was at no cost to them. The aloe vera tongues were harvested from its plantation in the house of the fifth author (OAO). The plants were then identified at the herbarium of the faculty of pharmacy OAU Ile Ife.

The patients' CD4 counts, weight in kilograms, liver function test, electrolyte, urea, and creatinine, hemogram (i.e., full blood count) as well as their physical well-being were monitored.

The results so obtained were compared with similar findings in 20 age-matched controls (HIV-positive women) who were being managed with HAART in our clinic. The study was carried out between October 2008 and October 2009.

The data were analyzed using SPSS version 14.0 for Windows. Simple proportion, percentages, means, and *p*-values were determined where applicable.

Results

The results obtained are as shown in Tables 1, 2, and 3.

As shown in Table 2, the range of increase in CD4 count in the HAART group was between 68 and 642 cells/μL with an average of 239 cells/μL, while the range of increase in weight was between 1 and 7 kg, with an average of 4.8 kg.

Also, the range of increase in CD4 count in the aloe vera group was between 94 and 300 cells/μL, with an average of 154 cells/μL, while the range of increase in weight was between 3 and 7 kg, with an average of 4.7 kg. These are shown in Table 1.

As shown in Table 3, independent-samples *t*-test comparison of the increase in CD4 count and weight between the two groups was not statistically significant ($p = 0.087$ and 0.916, respectively).

Discussion

It is very difficult to do ideal clinical case–control studies for aloe vera administration. It would be unethical to put patients who need to use HAART on aloe vera gel; the only patient who switched over from HAART to aloe vera did so because of an intolerable reaction to HAART. It is also difficult to administer an inert plant that can be used as a placebo in lieu of aloe vera.

Also, using patients who are on HAART as positive control is not ideal since the patients had lower CD4 count and they were less physically fit when compared to those who were treated with aloe vera gel. However, in spite of the limitations of the study, some useful facts did emerge on the usefulness of aloe vera in managing patients with HIV infection.

As shown in Tables 1 and 2, all the patients showed a steady increase in their CD4 count following oral administration of HAART and aloe vera gruel on daily basis. For

Table 1. Patients Treated with Aloe Vera

Patient no.	*Age (yrs)*	*Parameters*	*0 month*	*6 months*	*1 year*	*Increase*	*% Increase*	*Side-effect(s)*
1[a]	30	CD4 count (cells/μL)	175	280	450	127	157	Transient diarrhea
		Weight (kg)	40	43	45	5	12.5	
2	27	CD4 count (cells/μL)	450	650	750	300	37.1	None
		Weight (kg)	53	55	57	4	7.5	
3	30	CD4 count (cells/μL)	350	420	550	200	28.6	None
		Weight (kg)	50	52	53	3	6	
4	25	CD4 count (cells/μL)	300	360	402	102	34	None
		Weight (kg)	48	52	54	6	12.5	
5	28	CD4 count (cells/μL)	250	280	350	100	400	None
		Weight (kg)	43	44	47	4	9.3	
6	32	CD4 count (cells/μL)	306	350	400	94	30.7	None
		Weight (kg)	49	52	54	5	10.2	
7	28	CD4 count (cells/μL)	489	720	750	261	53	None
		Weight (kg)	52	58	59	7	13.4	
8	40	CD4 count (cells/μL)	625	680	780	155	24.8	None
		Weight (kg)	67	67	70	3	4.4	
9	26	CD4 count (cells/μL)	400	440	502	102	25.5	None
		Weight (kg)	46	47	50	4	8.6	
10	29	CD4 count (cells/μL)	404	444	500	96	24	None
		Weight (kg)	43	46	49	6	13.95	

[a]Patient who was previously treated with highly active antiretroviral treatment.

Table 2. Patients on Highly Active Antiretroviral Treatment

Patient no.	*Age (yrs)*	*Parameters*	*0 month*	*6 months*	*1 year*	*Increase*	*% Increase*	*Side-effect(s)*
1	28	CD4 count (cells/μL)	80	174	184	104	130	Transient abnormal LFT
		Weight (kg)	51	53	54	3	5.8	
2	34	CD4 count (cells/μL)	40	193	217	177	442	Transient abnormal
		Weight (kg)	55	56	58	3	5.4	LFT
3	40	CD4 count (cells/μL)	152	192	220	68	44.7	None
		Weight (kg)	44	46	47	3	6.8	
4	28	CD4 count (cells/μL)	37	253	336	299	808	None
		Weight (kg)	57	54	60	3	5.3	
5	20	CD4 count (cells/μL)	170	275	505	335	197	None
		Weight (kg)	37	40	42	5	13.5	
6	25	CD4 count (cells/μL)	200	300	500	300	150	None
		Weight (kg)	55	56	56	1	1.8	
7	40	CD4 count (cells/μL)	65	102	150	85	106	None
		Weight (kg)	43	44	46	3	6.9	
8	28	CD4 count (cells/μL)	80	174	184	104	130	None
		Weight (kg)	51	53	54	3	5.9	
9	30	CD4 count (cells/μL)	200	400	380	180	90	None
		Weight (kg)	45	51	52	7	15	
10	28	CD4 count (cells/μL)	180	304	390	210	116	None
		Weight (kg)	54	57	57	3	5.6	
11	37	CD4 count (cells/μL)	230	239	500	270	117	None
		Weight (kg)	51	53	55	4	7.8	
12	30	CD4 count (cells/μL)	58	200	700	642	1106	None
		Weight (kg)	51	57	59	8	15.7	
13	40	CD4 count (cells/μL)	220	500	650	430	195	None
		Weight (kg)	53	58	60	7	13.2	
14	38	CD4 count (cells/μL)	127	198	300	173	136	None
		Weight (kg)	44	48	50	6	13.6	
15	29	CD4 count (cells/μL)	40	200	350	310	775	None
		Weight (kg)	58	60	65	7	12	
16	35	CD4 count (cells/μL)	200	253	281	81	41	None
		Weight (kg)	54	59	65	11	20	
17	28	CD4 count (cells/μL)	173	250	511	338	195	None
		Weight (kg)	52	53	55	3	5.7	
18	23	CD4 count (cells/μL)	200	297	311	111	55.5	None
		Weight (kg)	43	45	48	5	11.6	
19	32	CD4 count (cells/μL)	200	250	450	250	125.0	None
		Weight (kg)	49	50	50	1	2	
20	28	CD4 count (cells/μL)	40	197	350	310	775	None
		Weight (kg)	46	55	56	10	21.7	

LFT, liver function test.

those treated with HAART, this may be due to the inhibitory effect of antiretroviral drugs on the HIV virus as described in the national guideline[2] and by Ram and Ellen.[1] With regard to the aloe vera group, this may be attributed to the *in vitro* inhibition of HIV by acemannan (an anthraquinone found in aloe vera) as described by Kahlon et al. in 1991[14] or the immune-modulatory effects of aloe vera components as found by various authors.[7,11–13]

Table 3. Independent Samples t-Test to Compare the Increase in CD4 Count and Weight Between the Aloe Vera Group and Highly Active Antiretroviral Treatment Group

	t	df	p-*Value*	*95% confidence interval*
CD4 count	−1.773	28	0.087	−183.529 to 13.229
Weight	−0.107	28	0.916	−2.016 to 1.816

Also, both groups of patients gained weight steadily during the study, suggesting that both HAART and aloe vera are beneficial to patients with HIV infection. Those receiving aloe vera may have also benefited from the highly nutritive ingredients such as vitamins, trace elements, amino acids, and so on present in aloe vera as described by some authors.[5–9] Incidentally, these nutrients are often deficient in patients with HIV infection[1,2]; hence, daily consumption of aloe vera may help replenish these nutrients in HIV-infected individuals, therefore allowing for weight gain as demonstrated by the study group. The observed weight gain in this group may also be attributable to the free radical–scavenging effects of glutathione peroxidase and superoxide dismutase found in aloe vera.[10] This help to prevent tissue destruction, thereby ensuring their physical fitness and weight gain.

The only noticeable side-effect of aloe vera was the transient diarrheal episodes experienced by a client (see Patient Number 1 under Side-Effects in Table 1), which may be attributable to the advanced stage of HIV disease which she had or the cathartic effect of acemannan found in aloe vera as demonstrated by Reynolds[5,6] and Ishii et al.[19] Of interest was the fact that she was initially treated with HAART but could not continue barely 4 weeks into treatment because of some side-effects such as vomiting, extreme weakness, and dizziness, which she termed unbearable and so refused to continue with HAART despite repeated counseling until she was persuaded to give aloe vera a trial. Except for the transient diarrhea she had, the aloe vera was well tolerated by her.

The relative lack of significant side-effect(s) by these patients is noteworthy. For those treated with aloe vera, it may suggest that the amount consumed by the patients was sufficient enough to achieve some clinical response without appreciable toxicities, bearing in mind the acknowledged wide systemic distribution of aloe vera and its metabolites following its consumption.[18]

Of particular interest is the observation that some of the patients treated with aloe vera would have benefited from HAART using the World Health Organization standard guideline as against the stringent eligibility criteria of our country's national guideline for use of antiretroviral drugs,[2] which is tied to the availability of drugs rather than being patient-driven. However, the tremendous response to aloe vera by the study group is encouraging and may suggest that timely use of aloe vera by HIV-infected individuals may reduce the need for HAART.

Conclusions

As shown in Table 3, there was no statistically significant difference between the clinical response of the two groups of patients with respect to weight gain and CD4 count increase. This underscores the usefulness of aloe plant extracts in HIV infection. Now that aloe plants are being grown in many parts of the world for commercial purposes, it may be wise to intensify efforts on further research into the benefits and efficacy of aloe vera in treating HIV infection, since the plant readily grows in many parts of the world where HIV infection is rampant, and it may readily offer an inexpensive, available, and yet indigenous solution to the HIV pandemic.

Disclosure Statement

No financial conflicts exist.

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