FACTORS INFLUENCING HAART NONADHERENCE AMONG HIV PATIENTS ATTENDING PUBLIC AND PRIVATE HOSPITALS IN DAR ES SALAAM, TANZANIA

BY

PROTAS OSCAR JOHN NDAYANGA, MD (DAR)

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CERTIFICATION

The undersigned certify that he has read and hereby recommend for acceptance by the University of Dar Es Salaam a dissertation entitled: "***Factors influencing HAART Non-adherence among HIV patients on ARVs attending public and private hospitals in Dar es Salaam, Tanzania 2004".*** Presented for partial fulfillment of the requirements for the degree of Master of Public Health.

SUPERVISOR'S SIGNATURE: ----------

Dr. G. Kwesigabo MD, MEd, MSc, PhD

Date 25/10/2004

DECLARATION

I hereby solemnly declare that this dissertation is my original work and has not been accepted for any diploma or degree in any other university.

Candidate's signature: ----------

Protas Ndayanga, MD

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DEDICATION

I dedicate this work to my wife Annette whose moral support was vital for me to accomplish this work, and my son Reuben who was born in the middle of my studies; this added water to the meaning of my work.

ABSTRACT

HIV/AIDS remains to be one of the most gravious tragedies of human kind. Sub-Saharan Africa, the part of the world with the most crippled economy, suffers most from this pandemic.

The use of HAART since mid 1990s has showed a significant improvement in morbidity and mortality from HIV/AIDS in the developed world.

High level of HAART adherence (>95%) is required for a patient to have a significant decrease in viral load. HAART nonadherence has been associated with higher risk of drug interactions and development of HIV strains resistant to ARVs.

In Tanzania, treatment of patients using HAART was still in its infancy as only few physicians were competent to initiate and monitor patients properly. In the past two years, however, a good number of HIV patients have been started on HAART; some under suboptimal "care".

A cross sectional study was conducted among 304 (females 201(66.1%), males 103(33.9%), mean age; 38.5 years, range; 18-66 years) HIV patients on HAART

attending at public and private clinics in Dar es Salaam from June to August 2004, to establish the extent of nonadherence and point out the associated factors.

The consecutive attendees at the two clinics who were on HAART were interviewed to obtain sociodemographic characteristics and other behavioral factors after an informed consent. Ethical clearance was obtained from the ethical committee of Muhimbili University College of Health Sciences. Data were analyzed using EPI info version 6.04.

Taking nonadherence was found among 18.4% of the study patients, while 12.8% had timing nonadherence. Taking alcohol, use of alternative treatment, lack of knowledge on consequences of nonadherence and a pill count of less than one were highly associated with HAART noadherence. Sociodermographic characteristics were not significantly associated with HAART nonadherence and therefore they are not predictive.

It is recommended that interventions to improve adherence should target everyone on HAART, and the provider, to ensure proper preparation of the patient before initiation of the treatment.

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ACRONYMS/ABREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
ARVs	Antiretroviral
AZT	Azidothymidine
CID	Clinic for Infections Diseases
DOT	Direct Observed Therapy
EFV	Efavirenz
GoT	Government of Tanzania
HAART	Highly Active Antiretroviral Therapy
HIV	Human Immunodeficiency Virus
MNH	Muhimbili National Hospital
MPH	Master in Public Health
MUCHS	Muhimbili University College of Health Sciences
NACP	National AIDS Control Program
NNRTI	Non-Nucleoside Reverse Transcriptase Inhibitor
NRTI	Nucleoside Reverse Transcriptase Inhibitor
NVP	Niverapine
PI	Protease inhibitor
RMC	Regency Medical Centre

USA	United States of America
3TC	3'- thiacytidine
d4T	Dideoxythymidine
ddI	Dideoxyinosine

CHAPTER ONE

1.0 Introduction

1.1 Background

AIDS was first described as a disease entity in 1981. In retrospect, however, isolated cases occurred during 1970's in the USA and several other areas of the world including Africa. Worldwide it was estimated that by the year 2003, about 40 million people would have been infected by HIV, over 70% found in Africa South of Sahara.

In Tanzania the first AIDS case was reported in Kagera region in 1983, but again patients presenting with such symptoms were described earlier in the villages along the Uganda border. As time went by, an epidemic was certain in Kagera region and other regions became increasingly affected. By 1990 there was no area in the country that was spared by the epidemic [Kilewo et al. 1990]. The prevalence of HIV among antenatal women in 17 sentinel sites in Tanzania (1998-2002) ranged between 5.5% - 23% [Ministry of Health, GoT report of NACP. 1998 - 2002].

The reduction in AIDS incidence and deaths in North America since mid 1990's is largely attributed to more effective Antiretroviral (ARV) therapy, although prevention efforts and the natural evolution of the epidemic have played some role. The immense disparity in access to ARVs between developed and developing countries is illustrated by the decrease in annual AIDS deaths in all developed countries since mid 1990's, compared with the steeply rising annual AIDS deaths in most developing countries with high prevalence, like Tanzania.

Since the advent of Highly Active Antiretroviral Therapy (HAART) in 1996, the overall morbidity and mortality in HIV infected people with access to ARV has markedly decreased [Palella et al. 1998]. In Tanzania the availability and use of antiretroviral can be traced back to late 1990s, however this was among rich patients most of whom had connections abroad or were in contact with local enthusiastic physicians. From the year 2000, the availability of ARVs in the local market increased coupled with decrease in price and uncontrolled prescriptions. Although the Ministry of Health developed the first guideline of HIV/AIDS treatment (2002), there were no concrete plans on access and quality control of ARV. Still in progress is the national HIV Treatment Plan which will ensure comprehensive care of HIV/AIDS patients.

1.2 Problem Statement

HAART non-adherence has been found to be influenced by a number of factors including HAART regimen related factors, social demographic/economic factors and provider related factors.

Some of the factors, reported in different studies, that contribute to HAART nonadherence include; limited access (economically poor patients), intolerable side effects, high pill burden, frequent dosing, food restrictions, and forgetfulness. In our setting, apart from the above factors, HAART nonadherence can be influenced by cultural beliefs, use of traditional herbs, and high levels of stigma leading to non disclosure of HIV serostatus. However the factors that influence HAART nonadherence in our setting are unknown. In multivariate analysis controlling for

previous HAART experience in USA, longer time since HIV diagnosis, substance abuse, young age, male sex, low level of education and high number of side effects were significantly associated with nonadherence at the first follow up [Senak et al. 1997, Sherer et al. 1998, Sorensen et al. 1998].

1.3 Literature Review

Cumulative experience in clinical settings has shown that strict and sustained adherence to prescribed medications is essential to long term viral load suppression in the individual patient [Boyle et al. 2003] Studies have made it seemingly clear that relatively high level of adherence to HAART, in most studies levels greater than 95% are required for highest likelihood of successful therapy.

Nonadherent patients are significantly less likely to achieve viral load less than 500 copies /ml [Molly et al. 2001]. The importance of high level adherence as a requirement of HAART, not only has impact on therapeutic efficacy, but also the suppression of resistant strains of HIV. Non adherence to HAART is also likely to cause failure to the first regimen, posing a dilemma in places where options are limited.

Intermittent exposure of virus to ARV agent as occurs when medications are taken sporadically, results in development of viral resistant strains and an increased viral replication, usually followed by immunological deterioration. For providers, the serious risk of drug resistance developing as a result of poor adherence creates important responsibilities. Prescribing HAART for a poorly prepared patient can ruin

the patients' current and future treatment options in a brief period and may provide minimal clinical benefits [Trotta et al. 2003].

In addition, increasing or decreasing drug dose, as well as increasing or decreasing dosing interval may have a major impact on drug interactions. The impact can be significant as most interactions are direct functions of drug concentration over time. This is especially true for metabolic inhibition and pharmacodynamic interactions [Celentano et al. 1998].

In a study done in southern Brazil among adults HIV patients on HAART, only 56.9% reported more than or equal to 95% adherence [Pinheiro et al. 2002]. Findings by Gordillo V et al, in Spain showed good adherence (more than 90% consumption of prescribed pills) in 57.6% of patients on HAART [Gordillo et al. 1999].

Many HAART regimen comprise of NRTI backbone (2NRTIs) and either a PI or NNRTI. In a study to compare HAART adherence between PI and NNRTI based regimen, it was shown that rates of nonadherence on PI based and NNRTI based HAART were 50.5% and 37.9% respectively, and the difference was statistically significant (P=0.004) [Strathdee et al. 1998]

Information to the patient about the side effects and control of side effects may contribute to improve adherence to HAART. Combined drugs e.g. combivir and Trizivir, reduce significantly the number of pills to be taken per day, while drugs with sustained/slow release effect e.g. stocrin 600mg reduce both, the pill burden and

dosing frequency. All these advancements in drugs development are desirable and contribute in improving adherence to HAART.

Other possible strategies to improve adherence to regimen include; keeping diaries, calendars, beepers and Directly Observed Therapy (DOT) [Sherer et al. 1998, Sorensen et al. 1998, Mitty et al. 1992, Woodward et al. 1996].

1.4 Rationale

Every individual patient with HIV, who gets information about the benefits of HAART, will always want to start the treatment immediately. The biggest problem in developing countries is access to ARV. Economically poor governments and individuals, and somewhat poor priority setting, coupled with high costs of ARVs, makes access a dream for very few people in developing countries. Patients with a moderate income (including public servants) who are infected with HIV are always eager to start ARV therapy while they can only afford it for few months only. When they are put on ARV, almost always they get stuck due to cost. This creates a big concern about their fate in management. Another important aspect in developing countries is on access to quality care and monitoring of patients on HAART.

The prospects of free ARV in Tanzania in the near future make it of paramount importance to study factors influencing HAART non adherence in this part of the world. This study therefore will provide reasons for non adherence which may be eliminated if we want to promote adherence among patients on HAART as the country prepares for extended use of ARVs. It is timely and important because

provision of free ARV won't be of help if plans to keep HAART adherence high are not in place.

The strategies to achieve high adherence level are not possible if the factors for nonadherence are not clearly studied in our socio-cultural context. The known factors in other parts of the world may not necessarily be the same in our settings. The high influence of the informal health sector (including traditional herbal medicine, spiritual healing, homeopathy, Chinese herbal medicine) may play a role to HAART nonadherence. Knowledge of these factors will help to propose interventions to decrease nonadherence.

1.5.0 Study hypotheses

1.5.1 There is no association between socio-demographic characteristics of patients on HAART and non adherence.

1.5.2 There is no association between HAART non adherence and substance use, serostatus non disclosure, high number of pills, using alternative medicine or lack of knowledge on effects of HAART non adherence.

CHAPTER TWO

2.0 Study objectives

2.1 Broad objectives:

To explore the factors which influence HAART nonadherence among HIV patients on antiretroviral therapy.

2.2.0 Specific objectives:

2.2.1 To determine the level of HAART nonadherence among study patients.

2.2.2 To determine the influence of different socio-demographic characteristic on HAART nonadherence among study patients.

2.2.3 To determine the association between HAART nonadherence and alcohol taking among study patients.

2.2.4 To determine the effect of disclosing serostatus on HAART adherence among study patients.

2.2.5 To explore different reasons for patients to miss a dose or doses of HAART in the previous one month.

2.2.6. To determine the influence of knowing the effects of intermittent dosing on HAART adherence among study patients.

2.2.7 To study the effect of using alternative treatments on HAART adherence among study patients.

2.2.8 To determine the effect of high pill burden on HAART adherence among study patients.

CHAPTER THREE

3.0 Methodology

3.1 Study Area

This study was conducted in Dar es Salaam city. This is the largest city in Tanzania and is the main business centre in the country. It is situated at the eastern coast of Tanzania along the Indian Ocean, bordered by the Coastal Region on the west and north, and Lindi Region on the south.

Dar es Salaam is the second largest harbor along the eastern border of the Indian Ocean, after Durban, South Africa. The city has the most modern airport in the country, but guests can also access the city through the main roads namely Kilwa, Morogoro, and Bagamoyo.

Its population is estimated to be around 2.5 million (census 2002). The city is harbored by a mixture of people mainly being Tanzanians originating from different tribes, but also by many Tanzanians of Indian and Arabic origins as well as other foreigners.

This makes the city to have a dynamic population, mixed cultures, many unemployed people, and higher rate of crimes including prostitution. Dar es Salaam, therefore, is one of most hit regions by HIV/AIDS in the country.

The prevalence of HIV infections among blood donors in 2001 was estimated at 18.8%. It was reported the case rate in Dar es Salaam was 122/100,000 population.

This was the second highest rate in the country following Mbeya region (156/100,000) [Ministry of Health GoT report of NACP. 2001).

Health care delivery system in Dar es Salaam comprises of popular (self medication and treatment decided by family, friends, etc), professional as well as folks sectors. The professional health care can further be divided into government and private facilities. Government facilities range from the National Hospital (Muhimbili), specialized Hospitals (Muhimbili Orthopaedic Institute, Ocean Road Cancer Institute), Municipal Hospitals (Temeke, Amana, Mwanayamala), Health centres and Dispensaries. There is one military hospital (Lugalo) which also serves the general population. The private facilities range from hospitals to dispensaries but also there are a good number of private diagnostic centres.

There are numerous pharmaceutical companies working along with the National Medical Store Department in importation and drugs procurement. Medicines can be obtained from hospitals, pharmacies and small medical stores.

In the city there are found many alternative medicine practitioners. These include herbalists (traditional and Chinese), spiritualists, homeopathy and water therapists.

3.2. Study design:

A cross sectional study design was used to examine the factors associated with nonadherence to HAART in patients seen at HIV clinics in Dar es Salaam.

3.3 Study population:

The study population consisted of HIV infected individuals who were on HAART who were being followed up at the Clinic of Infectious Diseases (CID) within Muhimbili National Hospital (public) and Regency Medical Centre (private). At these clinics a significant number of patients on HAART were under care of competent physicians and a proper follow up was in place. At the time of this study all patients (from private and public clinic) included were incurring the costs of ARVs themselves.

3.4.0 Inclusion criteria

3.4.1 HIV patient on HAART for three consecutive months or more.

3.4.2 Adult (age greater or equal to 18 years).

3.5.0 Exclusion Criteria:

3.5.1 Patient with Karnofsky scale score of less than 60%.

3.5.2 Children, under 18 years.

3.5.3 HIV patient on HAART for less than three months

3.6 Sample size and sampling technique

A total of 304 patients from the two clinics were enrolled for this study. The study started in June 2004 and was concluded in August 2004. On, either, the recruitment or follow up clinic, consecutive attendees were checked whether they were on HAART or not. Those on HAART were checked for eligibility (considering the inclusion and exclusion criteria). Out of those who were found eligible, only those who gave consent were included.

Sample size was calculated using the formula,

$n = z^2pq/\varepsilon^2$ where:

n = expected minimum sample size

z = standard value which corresponds to 1.96 (at 95% CI)

p = non adherence rate (34.4%) [Mohammed et al. 2004]

q = 1- p

ε = maximum likely error (0.05 = 5%)

Therefore,

$n = 1.96^2*0.344(1-0.0.344)/0.05^2$

n = 346 (only 304 patients studied).

3.7 Data collection:

Data were collected through face-to-face interview using a structured standard questionnaire, with open and close-ended questions. Data obtained included sociodemographic information, history of substance use, serostatus disclosure, and

knowledge about effects of nonadherence. The information on HAART regimen the patient was using and levels of CD4 counts before starting HAART were obtained from the patient's records. The patients were interviewed after signing a written informed consent.

3.8.0 Variables:

3.8.1.0 Explanatory (Independent) variables

3.8.1.1 Sociodemographic characteristics: age, sex, marital status, occupation, education level and average monthly income.

3.8.1.2 Other patients' characteristics: taking alcohol, using alternative treatments, duration on HAART, serostatus disclosure, HAART regimen, and CD4 level before HAART, knowledge of side effects, and preparation of patient before HAART. (Knowledge on effects of intermittent dosing).

3.8.2.0 Outcome (Dependent) variables

3.8.2.1 Taking adherence: missing or not missing a dose in the previous months

3.8.2.2 Timing adherence: taking or not taking a dose within one hour of prescribed time in the past 24 hours.

3.9 Data Management and Analysis:

Questionnaires were checked for completeness and errors were rectified before being processed. Data was then entered in a computer using EPI Info Version 6.04 followed by data cleaning. Univariate analysis was used to explore and describe the sociodemographic variables using frequencies and measures of central tendency.

Bivariate analyses examined the association and strength of relationship between the explanatory variables and the outcome variables using Chi-square test. Ninety five percent confidence interval around proportions were set using the Fleiss quadratic approximation formula.

3.10.0 Limitation:

3.10.1 Self-reporting technique used in this study may be associated with higher chances of recall bias. This was minimized by using different recall periods including 24 hours and monthly recall. Monthly recall was used to asses missed doses while the 24 hours recall was used to asses timing of dosing.

3.10.2 Convenience sampling technique of facilities used in this study may limit the use of findings for inference to the rest of population.

3.10.3 The sample size of 346 (using the formula of calculating sample size which assumes a random selection of study subjects) could not be reached due to time limit

3.10.4 Patients who could not afford consistent monthly doses may not have been found in clinics for interview

3.11 Ethical considerations:

The study was anonymous, but also a written informed consent agreement (Appendix 2) was signed by all study patients. Permission to conduct the study was sought from hospital authorities and finally the ethical clearance was obtained from the university ethical committee of Muhimbili University College of Health Sciences.

3.12.0 Definition of terms:

3.12.1 HAART: Three or more ARVs with at least one NNRTI or PI.

3.12.2 HAART nonadherence: Failure to take ARVs as required. This includes failure to observe dosing intervals and skipping a dose.

3.12.3 Taking adherence: Percentage of days on which all doses were taken

3.12.4 Timing adherence: Percentage of doses taken within 1 hour of time prescribed.

3.12.5 Karnofsky scale: Is a 10-point scale which measures the performance status of a patient's ambulatory nature, from normal activity to total dependence on others for care.

CHAPTER FOUR

4.0. Results

The study involved 304 patients of whom the number of females (66.1%) exceeded that of males (33.9%) by almost 50%. Most of the study patients belonged to the age group 30-39 years (47.7%). The mean age of study patients was 38.5 years with a range from 18 to 66 years. Majority of patients where married (40.5%) followed by single patients (30.6%). More males were in marriage than females (49.5 % vs. 35.8%, $p<0.05$). Females were more widowed (20%) than males (9.7%), $p<0.05$. (Table 1)

Table 1 **Socio-demographic characteristics (age, marital status, average monthly income) by sex.**

Socio-demographic status	Sex		
	Males % N=103	Females% N=201	Total % N=304
Age group (years)			
<20	0	1	0.7
20-29	10.7	8.5	9.2
30-39	37.9	52.7	47.7
40-49	35.9	31.3	32.9
50+	15.5	6.5	9.5
Total	**100**	**100**	**100**
Marital status			
Single	34.9	28.4	30.6
Married	49.6	35.8	40.5
Widowed	9.7	20	16.4
Divorced	5.8	13.4	10.9
Separated	0	0.5	0.3
Cohabiting	0	1.9	1.3
Total	**100**	**100**	**100**
Average monthly income (Tsh)			
Less than 50,000	6.8	6.5	6.5
51,000+ - 100,000	36.9	52.7	47.4
101,000+ - 150,000	42.7	31.3	35.2
151,000+ - 300,000	8.7	7	7.6
More than 300,000	4.9	2.5	3.3
Total	**100**	**100**	**100**

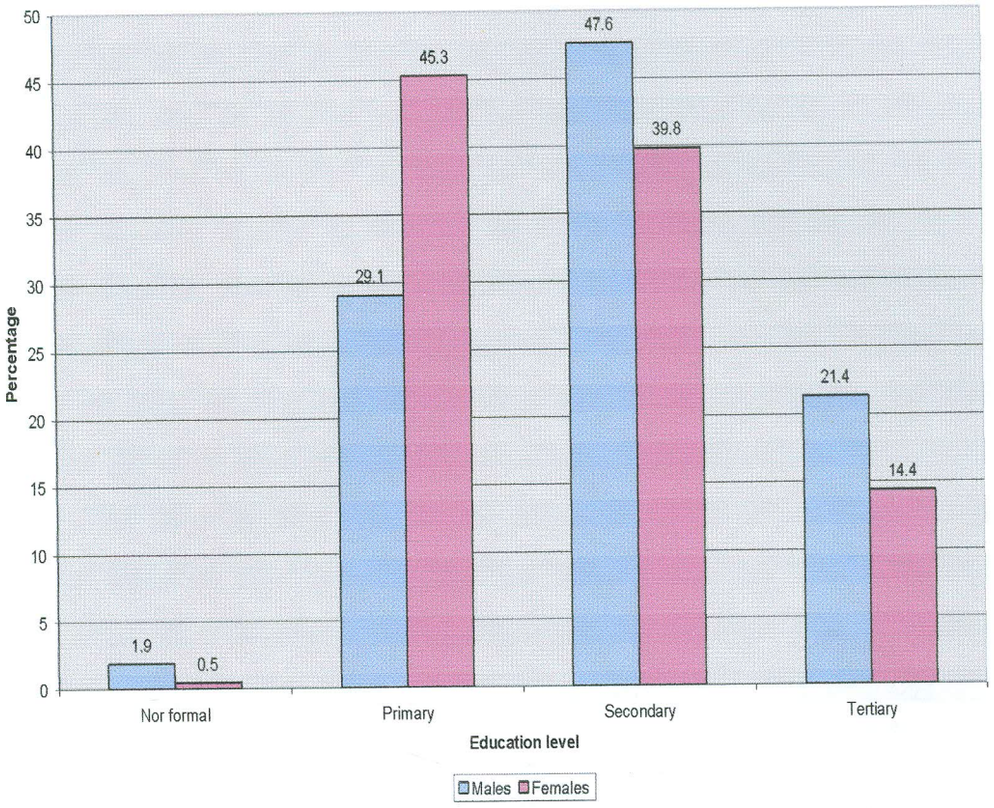


Figure 1: Distribution of education levels among study patients by sex.

The distribution of education levels among study patients almost follows the normal distribution with the majority having primary and secondary levels for both males and females. In primary level females (45.3%) are more than males (29.1%), ($p<0.05$) while in secondary level males are more than females (47.6% vs. 39.8%), the difference was not statistically significant ($p>0.05$)

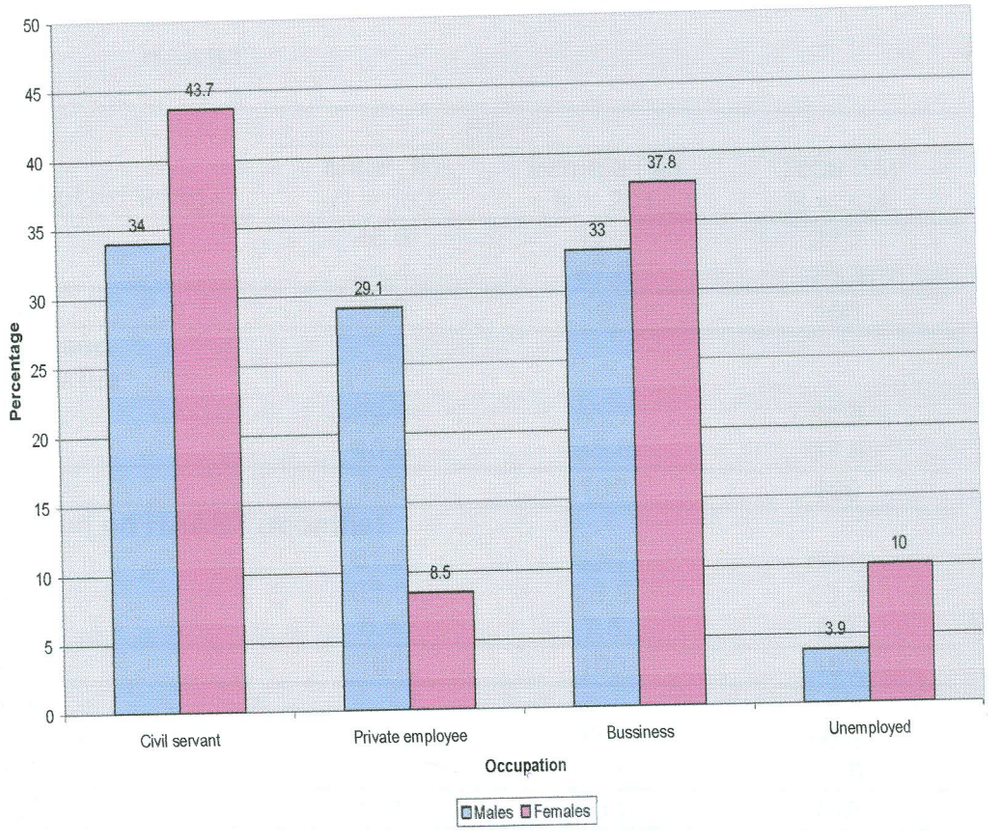


Figure 2: Distribution of occupations among study patients by sex

There was no marked difference in distribution between males and females in civil service, business, and unemployment. A significant difference is noted among private employees (males = 29.1%, females = 8.5 %, $p<0.001$).

Table 2 **Behavioral and other Characteristics of Study Patients on HAART**

	Sex		
Alcohol drinking	Male (%) N = 103	Female (%) N = 201	Total (%) N = 304
Yes	45.6	12.4	23.7
No	54.4	87.6	76.3
Total	**100**	**100**	**100**
Disclosed serostatus			
Yes	59.2	63.7	62.5
No	40.8	35.8	37.5
Total	**100**	**100**	**100**
Duration on HAART (months)			
≤ 6	61.2	63.7	62.8
7 to 12	33.0	28.8	30.3
> 12	5.4	7.5	6.9
Total	**100**	**100**	**100**
Clinic			
CID (MNH)	81.6	88.6	86.2
RMC	18.4	11.4	13.8
Total	**100**	**100**	**100**
Using alternative treatment			
Yes	19.4	15.4	16.8
No	80.6	84.6	83.2
Total	**100**	**100**	**100**
Knowing the effect of intermittent dosing			
Yes	74.8	85.6	81.9
No	25.2	14.4	18.1
Total	**100**	**100**	**100**

Majority of patients were being followed up at Muhimbili National Hospital, HIV clinic (public) (86.2%) and the remaining (13.8%) at Regency Medical Centre (private). Of 304 patients, 72 (23.7%) admitted to have been taking alcohol even after starting HAART. More males (45.6 %) reported taking alcohol than females (12.4%) $p<0.001$ (Table 2)

A significant number of patients 114 = 37.5%) did not share their serostatus with anyone apart from the healthcare providers. Females were more likely to share their serostatus with other people (63.7%) when compared to males (59.2%), although this difference was not statistically significant ($p>0.05$). Majority of patients (93.1%) had been on treatment with HAART for only six months or less. When patients were asked whether they were taking other medicines they considered to treat HIV, 51(16.8%) admitted to have been on other treatment either concurrently with HAART or alternatively (Table 2)

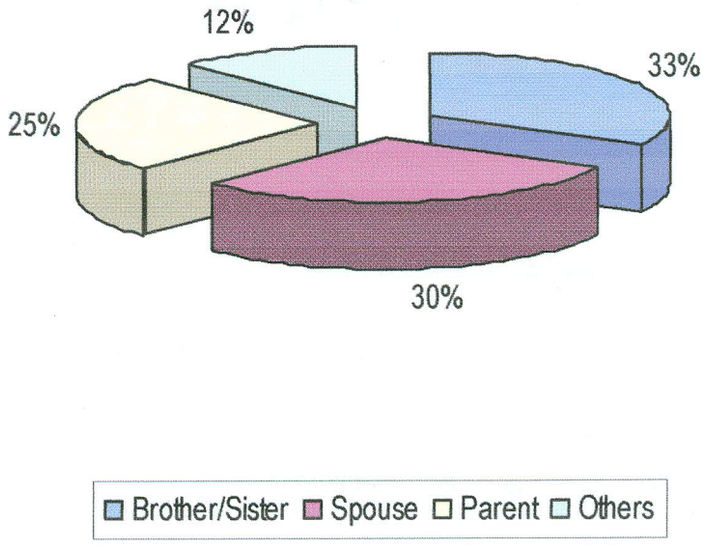


Figure 3: Preference for patients' serostatus disclosure

Patients who were likely to share their HIV serostatus (62.5%) with other people, majority shared with their brother/sister (33.2%) followed by spouse (30.6%). (Figure 3)

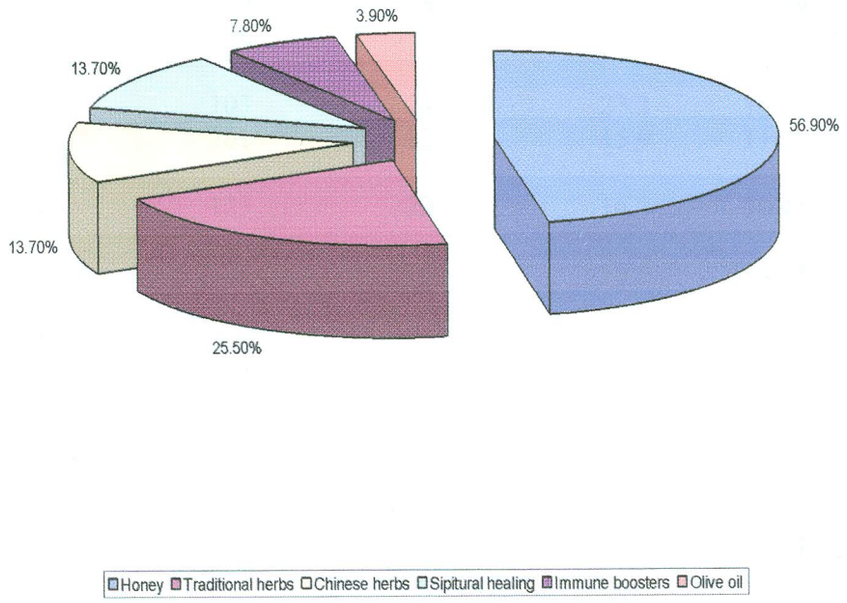


Figure 4: Alternative treatments used by some study patients on HAART

Honey (56.9%) followed by traditional herbs (25.5%) were the most frequent alternative medicine used by study patients who admitted being on other medication either concurrently or alternatively with ARVs. Note that some patients were using more than one alternative. (Figure 4).

Table 3: HAART taking nonadherence by sociodemographic characteristics

Characteristic	N	Nonadherent (number)	Percentage	95%CI
Age group				
<20	2	0	0	-
20-29	28	9	32.1	16.58 - 52.43
30-39	145	23	15.9	10.52 - 23.06
40-49	100	18	18	11.29 - 27.22
50+	29	6	20.7	8.70 - 40.26
Sex				
Males	103	24	23.3	15.77 - 32.86
Females	201	32	15.9	11.29 - 21.88
Marital status				
Currently in marriage	123	20	16.3	10.45 - 24.24
Currently not in marriage	181	36	19.9	14.48 - 26.60
Education level				
Up to primary	124	22	17.7	11.68 - 25.85
Secondary	129	19	14.7	9.32 - 22.29
Tertiary	51	15	29.4	17.91 - 44.02
Occupation				
Civil servant	123	18	14.6	9.13 - 22.41
Private employee/Business	157	36	22.9	16.77 - 30.45
Unemployed	24	2	8.3	1.46 - 28.47
Monthly income				
≤ 100,000 Tsh	164	28	17.1	11.83 - 23.90
> 100,000 Tsh	140	28	20	13.91 - 27.78

The percentage of days on which all doses were taken was calculated using the "past month recall". Fifty six (18.4%) had missed their doses on one or more days during the previous month.

This study showed that the sociodemographic characteristics of patients had no influence on HAART nonadherence; the differences observed were not statistically significant. (Table 3)

Table 4: HAART taking nonadherence by other characteristics

Characteristic	N	Taking nonadherent (number)	Percentage	95%CI
Taking alcohol				
Yes	72	31	43.1	31.62 - 55.23
No	232	25	10.8	7.2 - 15.67
Disclosed serostatus				
Yes	190	32	16.8	11.9 - 23.1
No	114	24	21.1	14.2 - 29.89
Knowing effects of nonadherence				
Yes	249	29	11.6	8.06 - 16.45
No	55	27	49.1	35.5 - 62.77
Using alternative medicine				
Yes	51	26	50.9	36.77 - 65.05
No	253	30	11.9	8.27 - 16.64
Number of pills				
Only one	233	32	13.7	9.72 -18.98
More than one	71	24	33.8	23.27 - 46.10

Among 72 patients who admitted to have been taking alcohol, 31(43.1%) missed dose(s) a month prior to interview. When compared with those did not take alcohol (232) only 10.8% missed a dose(s), this difference is statically significant, 95%CI (31.62 to 55.23 vs. 7.20 to 15.67). (Table 4)

Sharing or not sharing HIV serostatus (disclosure) did not show statistically significant difference on HAART taking nonadherence. On the other hand, patient who did not know the effects of nonadherence to medication were more likely to miss the dose(s) compared to those who knew, (49.1% vs.11.6%) and this difference was significant with 95% CI of 35.5 to 62.77 and 8.06 to 16.45 respectively. Using alternative medication and high number of pills (more than one), both were shown to influence HAART nonadherence. (Table 4)

Table 5: Reasons for missing a dose or doses during the previous month

Reason	Frequency	%
Economic constraints(No money)	13	23.3
Delayed refill (logistic issues)	33	58.9
Traveled	5	8.9
Forgetting	3	5.3
On alternative	2	3.6
Total	**56**	**100**

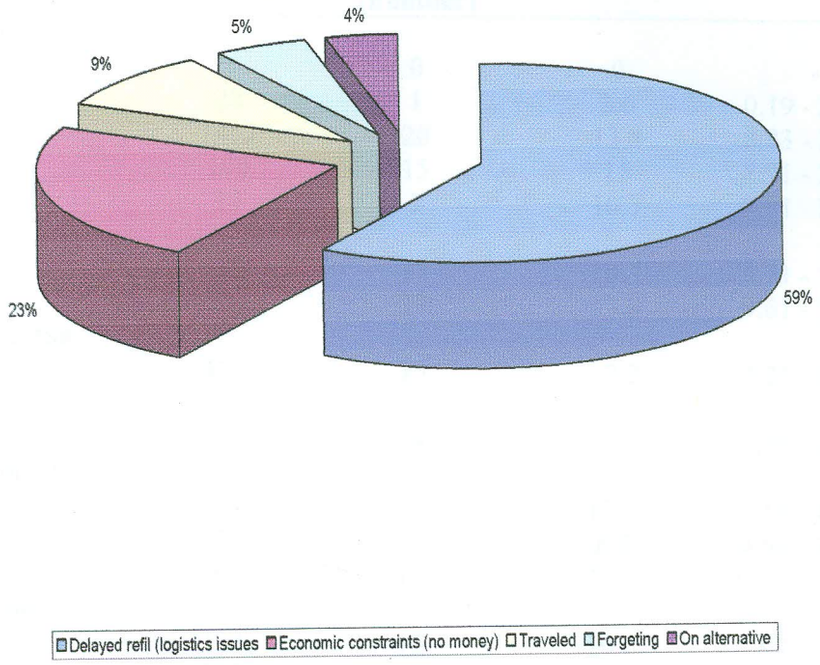


Figure 5: Reasons for missing a dose(s) of HAART in the past one month

When those who missed a dose were asked to give reasons for not taking their medications, most of them (58.9%) reported logistics problems leading to delay in getting the next dose. (Table 5, figure 5)

Table 6 HAART timing nonadherence by socio-demographic characteristics

Characteristic	N	Non adherent (number)	Prevalence	95%CI
Age group				
<20		0	0	-
20-29	28	1	3.6	0.19 - 20.24
30-39	1452	20	13.8	8.83 - 20.74
40-49	100	15	15	8.91 - 23.85
50+	29	3	10.3	2.71 - 28.49
Sex				
Males	103	11	10.7	5.71 - 18.69
Females	201	28	13.9	9.61 - 19.67
Marital status				
Currently in marriage	123	15	12.2	7.21 - 19.62
Other	181	24	13.3	8.85 - 19.28
Education level				
Up to primary	124	15	12.1	7.16 - 19.47
Secondary	129	11	8.5	4.54 - 15.09
Tertiary	51	13	25.5	14.77 - 39.91
Occupation				
Civil servant	123	13	10.6	5.97 - 17.72
Private employee/Business	157	23	14.6	9.70 - 21.38
Unemployed	24	3	12.5	3.28 - 33.46
Monthly income				
≤ 100,000/=	164	22	13.4	8.78 - 19.82
> 100,000/=	140	17	12.1	7.44 - 18.99

The percentage of doses taken within one hour of prescribed time was estimated using the 24 hours recall. All those who missed a dose in the previous 24hours were treated equally to those who had incorrect dosing interval. Thirty nine (12.8%) patients did not observe the prescribed time (not within one hour). There was no significant difference in timing adherence between different age groups, occupations, levels of education, average monthly income, marital status and between sex, (test statistic=95% CI). (Table 6)

Table 7 Timing nonadherence by behavioral and other characteristics of patients on HAART

Characteristics	N	Timing nonadherence(number)	Prevalence	95%CI
Taking alcohol				
Yes	72	18	25	15.87-36.84
No	232	21	9.1	5.82-13.69
Disclosed serostatus				
Yes	190	23	12.1	7.99-17.81
No	114	16	14	8.48-22.09
Knowing effects of non adherence				
Yes	249	21	8.4	5.42-12.78
No	55	18	32.7	21.04-46.82
Using alternative medicine				
Yes	51	16	31.4	19.51-46.03
No	253	23	9.1	5.97-13.50
Number of pills				
Only one	233	10	4.3	2.19-7.99
More than one	71	29	40.8	29.53-53.16

Among 72 patients who admitted to have been taking alcohol, 18(25.0%) did not observe time of taking their medication in 24 hours prior to interview. compared with those did not take alcohol(232) in which only 9.1% did not observe time, the difference was found to be statically significant, 95%CI (15.87 to 36.84 vs. 5.82 to 13.69). (Table 7)

Sharing or not sharing HIV serostatus (disclosure) did not show statistically significant difference on HAART timing nonadherence. Patient who did not know the effects of nonadherence to medication were more likely to be poor on timing the

dose(s) 24 hours prior compared to those who knew, (32.7% vs. 8.4%) and this difference was significant with 95% CI of 21.04 to 46.82 and 5.42 to 12.78 respectively. Using alternative medication and high number of pills (more than one), both were shown to influence timing of HAART nonadherence. (Table 7)

Significant differences in timing adherence were also observed among the different categories of education level, average monthly income, taking alcohol, type of HAART regimen, knowing the effects of non-adherence and number of pills.

CHAPTER FIVE

5.0 DISCUSSION

The treatment of HIV/AIDS using ARVs requires the patient to observe dosing intervals i.e. taking within one hour of prescribed time. It also requires one to take his or her medications every day for the rest of his or her life. Failure to observe the above conditions, even if only periodic, will inevitably lead to the evolution of viral resistance, a loss of future treatment options, and the potential for transmission of multidrug resistant HIV [The Hopkins HIV report. 1998]. HAART adherence is also important for sustained viral load suppression [Molly et al. 2001].

This study sought to determine the influence of sociodemographic and other behavioral factors on HAART nonadherence with focus on the African context. It used a 24 hour recall as the best estimate for timing adherence and one month recall for determining taking nonadherence. A significant number of patients (12.9%) did not observe prescribed time for HAART dose 24 hours prior. This is lower compared to previous findings in other studies. In a study done in Belgium by Wijngaerden et al 2000, found HAART timing nonadherence of 33.1 %. This is least likely to result from bias since the 24hours recall was used. The best explanation of this difference could be the fact that most of our patients had been on HAART for a shorter period.

A substantial number of patients (18.4%) reported missing one or more HAART dose(s) during the previous one month. The prevalence found is lower than what was found in a comparable study conducted in Louisiana, USA, where HAART nonadherence of 34.4% was reported. The quoted study used a one week recall as compared to this study which used a one month recall to asses taking nonadherence, making it more likely to introduce a recall bias.

The commonest reason for missing a dose (60%) found in this study was delayed refill of drug due to logistics reason. At these clinics patients were given prescriptions for monthly doses, only to get another prescription on the next visit. At times the date for next visit did not synchronize with the ARV refill date.

In this study, males, age group 20-29, not currently in marriage, tertiary education, private employee/businessmen and high monthly income were found with a higher risk of taking and timing nonadherence but the findings were not statistically significant. This indicates that sociodemographic characteristics are not predictive of adherence to HAART. The same was found in other studies [Mohamed et al. 2004, The Hopkins HIV report 1998]. This was contrary to what was found in other studies in which low education, unemployment, and low average monthly income were significantly associated with HAART nonadherence [Senak et al. 1997, Sherer et al. 1998, Escobar et al. 2004].

A number of studies done in Europe and America have shown an association between taking alcohol and nonadherence to HAART [Mohamed et al. 2004, Samet

et al. 2004]. This study suggests a strong evidence of association of taking alcohol with both taking and timing nonadherence.

Good counseling and provision of proper information about HAART is essential for adherence. Findings in this study suggested a high association between not knowing the effect of intermittent dosing and nonadherence. There is a possibility that information given to patients on the effects of nonadherence is not adequate.

The study found that (16.8%) were using alternative treatments including traditional herbs, Chinese herbs, spiritual healing, and honey either concurrently or alternatively with HAART. Honey was the most frequently reported means of alternative treatment used. This was one of the surprising and interesting observations in this study, probably further studies are needed to substantiate the usefulness of this remedy in HIV patients.

The use of alternative treatment was found to be significantly associated with both taking and timing nonadherence. This study explored information on only those who had been on other treatment which they regarded as treatment for HIV after starting HAART. It is a common practice in Tanzania for patients to switch from one form of treatment to another as well as using both. Easy accessibility, acceptability and holistic approach of most of the alternative treatments are some of the reasons which make it popular.

Prospective studies of adherence to HAART [Strathdee et al. 1998, Gordillo et al. 1999] have clearly demonstrated that large number of pills and regimen complexity are much more likely to affect HAART adherence. Number of pills more than one was demonstrated in this study to be significant associated with poor timing as well as missing dose(s). Increased numbers of pills makes the regimen complex and are likely to have more side-effects which lead to low tolerability.

The most striking feature in the study is the lack of significant association between shared serostatus and both timing and taking nonadherence, though those who do not disclose their status to spouse/close relative are likely to have poor adherence. This finding is likely due to the higher percentage (60%) of patients who were unmarried; either living single, separated or divorced therefore not disclosing serostatus may not affect adherence to HAART if she/he takes the drug.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

The barriers to adherence observed in HIV treatment resemble barriers to the successful treatment of chronic diseases: regimen complexity, patient lifestyle factors, and patient-provider relationships. Treatment of HIV infection has shown that patient-provider collaboration can result in the selection of a lifestyle-tailored regimen characterized by convenient dosing, low pill burden and enhanced adherence.

Although the patient is most often the focus of adherence interventions, it is clear that adherence is jointly the responsibility of the patient, the provider, and the system of care. The medical provider has the responsibility to make the regimen as easy as possible and tailor regimens to patients' lifestyles, i.e., "integrate medication into living, not living for medication," It is imperative to ensure that patients know how to take medication and understand the consequences of nonadherence. The most effective method of improving adherence is simplification of the regimen, particularly decreasing the required number of doses per day and number of pills to be taken at once. However, clinicians are sometimes limited by the pharmacokinetics of the medications.

Since the first HAART regimen is so critical, the investment of energy and time should occur at the initiation of the first regimen and not after “failure” has been

identified. No patient should be given prescription for antiretroviral until they have developed the understanding and skills to make this first shot their best one.

The providers fail to give adequate information to their clients, such as educating them on the importance of adherence and consequences of nonadherence. Providers also fail to ensure continuous supply of ARV's to their patients resulting in missing doses while waiting for a new prescription.

It is recommended that the centers taking care of patients on HAART be accredited to ensure qualities needed. Such qualities include well trained and motivated staff, having treatment guidelines and concrete plans of drug procurement.

Alcohol intake contributes to both missing doses and incorrect timing of doses. Patients on HAART should be educated and alcohol taking be discouraged. Patients on HAART who had not disclosed their serostatus to other family members did not show significant association with missing or poor timing. However family support is important to patients on HAART and therefore shared serostatus has to be encouraged.

Use of alternative medicine may be a contributory factor to HAART nonadherence. Health education to the general public is required, but also researches to explore the usefulness of some of them are desirable. There are no demographic variables that consistently predict nonadherence, therefore intervention to improve adherence to HAART should target everyone being started on ARVs.

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