Evaluation of the Prevalence of Insulin Dependent Diabetes Mellitus in HIV/AIDS Patients in Muhimbili National Hospital

Kabati, C. I. A.,1* Maurice, H. B.,2 Mselle, T.3 and Magdalena Urio4

1Department of Pharmaceutics, School of Pharmacy, Muhimbili University of Health and Allied Sciences.
2Department of Medicinal and Pharmaceutical Chemistry, School of Pharmacy, St John’s University of Tanzania.
3Department of Biochemistry, School of Medicine, Muhimbili University of Health and Allied Sciences.
4Bugando Medical Centre, Mwanza

ABSTRACT

Research findings in America have shown that HIV/AIDS patients are prone to the development of not only opportunistic infections but also endocrine disorders such as diabetes mellitus (DM). Several abnormalities of lipid and glucose metabolism have been reported in HIV patients receiving ARV drugs¹; however, the above study has not been reported in literature. In this research, a retrospective/prospective study was conducted to determine the prevalence of Insulin dependent diabetes mellitus in patients with and without HIV/AIDS in Muhimbili National hospital. A total number of 768 patient case files were evaluated. Of these, 384 patients had HIV/AIDS and were on treatment with ARV’s. In addition 95 (24.7 %) of this group had diabetes, 49 (51.5%) males and 46 (48.5%) females. Non Insulin dependent diabetes mellitus (NIDDM) accounted for 92.6% while Insulin dependent diabetes mellitus (IDDM) was 7.4%. The study also included the remaining 384 patients who had diabetes only, hence this acted as the control group with 209 (54.4%) males and 175 (45.6%) females. One sixty seven (43.4%) of the males had NIDDM while 42 (10.9%) had IDDM. Of the females 132 (34.3%) had NIDDM, 29 (7.6%) had IDDM and 14 (3.6%) had Gestational diabetes mellitus (GDM). The study further showed that the most commonly used hypoglycaemic agents were Daonil (52.0%) and Glucophage (25.5%). Other drugs used included diuretics (32.8%), antihypertensives,

* To whom correspondence may be addressed: kabaticia@yahoo.co.uk
antibiotics (43.2%) and first line antiretrovirals. The most commonly used antihypertensive was Captopril (41.2%).

The study also revealed that the occurrence of IDDM in patients on ARV’s was found to be very low, only 2%, too little to be associated with HIV/AIDS or ARV therapy. Nonetheless, the date of first diagnosis (DoFD) of HIV confirmed that none of the patients in the ARV arm had diabetes. Therefore the occurrence of NIDDM can be associated with the HIV infection or the ARV therapy. However, this is surprising because none of the HIV/AIDS patients were on PI’s.

Keywords: HIV, Diabetes Mellitus, ARV, Prevalence.
INTRODUCTION

In Tanzania, the first three AIDS cases were diagnosed and reported in 1983 in Kagera region. The three cases were followed by a rapid spread of the virus so that in 1986 all the regions of Tanzania Mainland had reported AIDS cases.

Between 1st January and 31st December 2004, a total of 16,430 cases were reported to the National AIDS Control Program (NACP) from the 21 regions of Tanzania Mainland. This resulted in a cumulative total of 192,532 cases since 1983. The number of cases reported in 2004 (16,430) were fewer than those reported in 2003 (18,929). 540 (5%) of the AIDS cases with known age and sex reported in 2004 were below 15 years of age. Most of these are likely to have acquired the infection through mother to child transmission. The age group 20 – 49 years which is the time of maximum sexual activity remained the most affected for both sexes, an observation that has remained consistent for several years since the beginning of the epidemic. It is evident that there were more female AIDS cases than males in the age group 20 – 39. The preponderance of female cases was particularly striking for age groups 20 – 24 and 25 – 29 where female cases were almost twice as many as for males.2

In Tanzania HIV is now affecting people of all walks of life and decimating most of the productive segment of the population. Manifestations of the epidemic include lower life expectancy, increase in dependency ratio, and reduced growth in the Gross Domestic Product (GDP), reduced productivity, increasing poverty and rising Infant and Child Mortality Rate and growing number of orphans.

Voluntary counselling and testing coupled with the use of ARV drugs is an effective strategy that is expected to alter the observed high level of AIDS cases in the country despite the implementation of the National Care and Treatment Plan which started in 2004 because it is too early to see any impact of ARV on the incidence of AIDS in the country. As the treatment program scales up to cover the whole country, the trend of occurrence of AIDS cases will be used as one of the impact indicators to monitor the ARV treatment program2.

HIV/AIDS is now a worldwide pandemic. It is estimated that by 2010, 45 million people will be infected. The Sub – Saharan African is the region that has been most affected by the disease with an estimated 28.5 million people now living with the virus.3

The World Health Organization says that by the year 2010, there will be 240 million diabetics, with the majority in developing nations. HIV/AIDS and diabetes are increasingly growing problems in developing countries4

Evidence exists for a link between prior enterovirus infection and the onset of type I diabetes. The enterovirus most often implicated is Coxsackie B4. The retrovirus (which converts itself from RNA to DNA after penetrating host cells and inserting itself into genes). The virus produces a protein known as ‘superantigen’ (SAG), which activates the entire tribes of autoreactive T- cells to destroy insulin producing cells.7 It appears that Coxsackie B4 virus causes the development of type I diabetes.9

Until recently, there was a paucity of data on the epidemiology of diabetes mellitus in Africa. Over the past decade, information on the prevalence of type 2 diabetes has increased, albeit a lack of adequate data on type 1 diabetes in sub-Saharan Africa (SSA). For type II diabetes, the prevalence is low in some rural populations, moderate and even higher rates have been reported in other countries. In low diabetes prevalence populations, the moderate to high rates of impaired glucose tolerance is a possible indicator of the early stage of a diabetes epidemic. Diabetes prevalence is higher in urban, migrant and people of African-origin populations living abroad. There is evidence
for a significant association with preventable and modifiable risk factors viz. adiposity, known diabetes, physical activity; but a dearth of data on the impact of dietary and genetic factors. For type I diabetes, the limited available data suggest that in SSA the frequency is low and that the age of onset occurs later than in the western world. There is evidence for the role of genetic and immunological factors in its pathogenesis. The impact of HIV/AIDS on projected estimates for diabetes prevalence in Africa needs to be established.12

MATERIALS AND METHODS
This was a retrospective/prospective study done at Muhimbili National Hospital in order to determine the number of HIV/AIDS patients with diabetes, the number of HIV/AIDS patients with IDDM, the number of IDDM patients without HIV/AIDS, and to compare the prevalence of IDDM patients with HIV/AIDS and that of IDDM patients in non-HIV/AIDS.

The study population consisted of HIV/AIDS patients on ARV’s and those patients with Diabetes only. The sample size was obtained using the formula:

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N = \frac{Z^2 P(1-P)}{D^2}
\]

Where:
N- Is the minimum sample size
P- Prevalence from previous related studies
D- Desired precision (set at 0.05)
Z- Standard normal deviation that correspond to the 95% Confidence Interval (Z=1.96)

For example if we take P=50% (this maximizes N when P from previous studies is ill-understood)
For this reason the number 384.

Data Collection and Procedure
768 patient files were reviewed, of these 384 were on ARV’s. They were assessed to determine who among this group had diabetes and if so which type and the medication used. The remaining 384 were diabetics only. They were then assessed to find out which type of diabetes they had and whether they were on medication or not.

RESULTS AND DISCUSSION

![Fig 1: Distribution of Follow Up Diabetic Patients in Muhimbili National Hospital for Jan - Dec 2007](image)
Figure 1 shows the distribution of the study population based on gender. There were more females patients compared to their male counterparts.

Figure 2 shows the distribution of new diabetic patients during the period of study. It is obvious again that there were more new female diabetic patients than males.

Figure 3 shows the distribution of new HIV/AIDS cases during the time of study. There were more female patients as compared to males.
Figure 4 shows distribution in percentage of HIV/AIDS follow up patients during the study. It shows good compliance.

Figure 5 shows that during this study, the IDDM was not as serious as previously thought.
Figure 6 shows that males are much more affected by diabetes than females whether it is IDDM or NDDM.

Figure 7 shows that diabetic patients are much more affected by hypertension, nephropathy and hepatomegaly/retinopathy. Diabetic foot accounted for 6%.
FIG 8  DISTRIBUTION NOF HIV/AIDS DIABETIC PATIENTS BASED ON DISEASE

- Hypertension
- Hepatomegally
- Nephropathy
- Retinopathy
- Malaria
- Anaemia
- Diabetic foot

FIG 9  DISTRIBUTION OF NON HIV/AIDS DIABETES PATIENTS BASED ON AGE
FIG 10  DISTRIBUTION OF HIV/AIDS DIABETIC PATIENTS
BASED ON AGE

Age in years

35 - 39
40 - 44
45 - 49
50 - 54
55 - 59

FIG 11  DISTRIBUTION OF ANTIDIABETIC AGENTS USED IN
DIABETES

Daonil
Glucophage
Diabetes
Insulin Lispro

19.6
32.8
41.2
6.4

Percentag
When the number of patients with insulin dependent diabetes mellitus in the HIV/AIDS patients group was divided by the total number of persons in the group, the prevalence of Insulin dependent diabetes mellitus in the group, the prevalence was found to be only 2% compared to 19.5% in the control group (Diabetic patients without HIV/AIDS).

DISCUSSION

In this study a retrospective/prospective study was conducted to determine the prevalence of insulin dependent diabetes mellitus with HIV/AIDS in Muhimbili national hospital. A total of 768 patient files were evaluated.

Of the 384 HIV/AIDS patient case files all had started ARV therapy. Of all the reviewed files 95 (24.7%) were found to have been diagnosed with diabetes, of whom 49 (51.5%) were males and 46 (48.5%) were females. Eighty-eight 88 (92.6%) were diagnosed with Non Insulin Dependent Diabetes Mellitus (NIDDM) and 7 (7.4%) had Insulin Dependent Diabetes Mellitus (IDDM). Of the 7 IDDM patients 4 were males and 3 were females. The same findings were found by Geralyn in America who found that there is development of hyperglycaemia in patients undergoing ARV therapy.13

Of the 384 diabetic patient case files reviewed (control group), 209 (54.4%) were males and 175 (45.6%) were females. 167 (43.4%) of the males had NIDDM and 42 (10.9%) had IDDM. For females, 132 (34.3%) had NIDDM and 29 (7.6%) had IDDM while 14 (3.6%) had Gestational diabetes mellitus (GDM).10, 11

The study also revealed the various drugs used by the HIV/AIDS diabetic patients and included agents like: hypoglycaemics, antihypertensives, antimicrobials and antiretrovirals. The most used hypoglycaemics was Daonil 52.0%, Glucophage 25.5%, Diabenese 19.6% and Insulin Lispro 6.4%. Antihypertensives used were Captopril 41.2%, Aprinox 25.5%, Isosorbide Mononitrate 22.5%. Ampiclox was the most commonly used antibiotic (43.2%). Others were ciproflaxin 27.2%, Nitrofurantoin 13.5%, Metronidazole 9%, Gentamycin 5% and Clarithromycin 2.1%.

These findings are the similar to those found by Murphy et al.6 The study also showed that in the Non HIV/AIDS diabetic patients, hypertension (34%) was the major problem affecting diabetic patients. Hepatomegaly accounted for 17%, nephropathy 26%, retinopathy 17% and diabetic foot 6%. These diseases were also present in HIV/AIDS diabetic patients with hypertension affecting the majority of these patients (48%). Others were malaria 26%, retinopathy 3%, nephropathy 4%, Anaemia 7% and diabetic foot 3%.
Few studies on the occurrence of diabetes in HIV/AIDS patients have been done and even less on the occurrence of Insulin dependent diabetes mellitus in the HIV/AIDS patients in African countries. The impact of HIV/AIDS on projected estimates for diabetes prevalence needs to be established.

This study was able to establish the prevalence of Insulin dependent diabetes mellitus in HIV/AIDS patients.

CONCLUSION

The study revealed that the prevalence of Insulin Dependent Diabetes Mellitus in HIV/AIDS was 2% and that of Insulin Dependent Mellitus in Diabetic patients was 19%. Females were the group most affected by HIV/AIDS and males were the group most affected by Diabetes. It was indeed very surprising to find the occurrence of diabetes in the HIV/AIDS group because non of them were on PI’s and had no diabetes when they started ARV therapy.

Majority of the diabetic patients suffered from Non Insulin Dependent diabetes mellitus. Of the drugs used for treatment the most used hypoglycaemic was Daonil while the Ampiclox was the most antibiotic used. The magnitude of the two diseases in our community, constitute a major public health problems.

RECOMMENDATIONS

- Public health education campaign to these issues would help in reducing the incidences of transmission of HIV/AIDS.
- There is a need to educate the public about the importance of balance diets and exercises to reduce the incidences of developing diabetes.
- More studies should be done concerning this area of research.

REFERENCES

5. HIV-related Opportunistic Infections, Prevention and Treatment. (www.avert.org/factsheet.hivinf.htm)