

**PREVALENCE OF HYPERGLYCEMIA IN HIV PATIENTS ON DOLUTEGRAVIR ART REGIMEN RECEIVING CARE AT JINJA REGIONAL REFERRAL HOSPITAL. A CROSS-SECTIONAL STUDY.**

*Annet Mugoya\*, Ivan Awach Ogwal  
St Francis School of Health Sciences*

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**Abstract****Background**

Emerging evidence suggests a possible association between hyperglycemia and dolutegravir (DTG), preferred first-line antiretroviral agents in sub-Saharan Africa (SSA). In Zambia, DTG DTG-based ART was associated with more double risk of developing metabolic syndrome among HIV patients with metabolic syndrome including hyperglycemia. The study aims to determine the Prevalence of hyperglycemia in HIV patients on a Dolutegravir ART regimen. receiving care at Jinja Regional Referral Hospital.

**Methodology**

A cross-sectional study was designed at Jinja Regional Referral Hospital located in Jinja City, Eastern Uganda with a total of 96 respondents. It included all adult PLWHIV initiated on a Dolutegravir-based ART regimen attending the ART clinic at JRRH.

**Results**

The prevalence of hyperglycemia was 19.8% among adult HIV patients on the Dolutegravir ART regimen receiving care at Jinja Regional Referral Hospital. 19/96 (19.8%) participants had high blood sugar levels above the normal henceforth and 77/96 (80.2%) of the participants had normal fasting blood sugar. majority 45(46.9%) of the respondents were in the age group of 46-60years with hyperglycaemia prevalence of 9(47.4%). majority of the respondents 53(55.2%) were males with 11(57.9%) prevalence and the minority 43(44.8%) were females with hyperglycaemia prevalence of 8(42.1%). majority 46(47.9%) of the respondents attended secondary school education with a prevalence of 8(42.1%),

**Conclusion**

Hyperglycemia is prevalent in Retroviral infection patients on a Dolutegravir-containing ART regimen and the drug is associated with weight changes.

**Recommendation**

Patients on Dolutegravir should be sensitized and monitored for weight changes and symptoms of hyperglycemia for early diagnosis and treatment for hyperglycemia and other metabolic derangements.

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**Keywords:** *Hyperglycemia., HIV patients on dolutegravir, Art Regimen Receiving Care, Jinja Regional Referral Hospital*

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**Corresponding Author:** *Annet Mugoya\**  
*St Francis Schools of Health Sciences*

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**Background of the study**

HIV patients are faced with an increased risk of chronic non-communicable diseases (NCD) like diabetes mellitus (DM) and cardiovascular diseases. (Cheza, Tlou, and Thou DT, 2021) The use of ART has shown an increased risk of some NCDS like protease inhibitors that have shown to increase the risk of DM. Emerging evidence suggests a possible association between hyperglycemia and dolutegravir (DTG), a preferred first-line antiretroviral agent in sub-Saharan Africa (SSA) (Namara et al, 2022).

In Zambia when DTG was compared to NNRTIs, DTG-based ART was associated with a more double risk of developing metabolic syndrome among HIV patients with the metabolic syndrome including hyperglycemia (Hamooya et al, 2021). In Uganda, DTG is being widely

rolled out but there is an increasingly high burden of NCD among HIV patients and the general population and there is a paucity of information on the association between the use of DTG based on ART and hyperglycemia (Cheza A et al, 2021). Those who develop hyperglycemia following the use of DTG-based ART may need to be considered for alternative ART regimens such as NNRTI which is better tolerant in this regard (MOH, Uganda, 2020). Therefore, the study aims to determine the Prevalence of hyperglycemia in HIV patients on Dolutegravir ART regimen receiving care at Jinja Regional Referral Hospital.

**Methodology**

The methodology described is similar to the one published by (Mugoya & Ogwal, 2024).

### **Study Design.**

A hospital-based cross-sectional study design was conducted because it was easier to use i.e., the researcher was able to manipulate numerous variables at once. The study design was selected because it could also manipulate both the independent and dependent study variables and does not allow follow-up of study participants.

### **Study area.**

The study was conducted at Jinja Regional Referral Hospital located in Jinja City, Eastern Uganda.

### **Study population.**

The study population included all adult PLWHIV initiated on a Dolutegravir-based ART regimen attending the ART clinic at JRRH.

### **Sample size determination**

The sample size of participants voluntarily involved in the study was determined using the Keish and Leslie (1965) method of sample size determination using the formula.

$$n = Z^2P(1-P)$$

$$d^2$$

Where, n = Sample size required

Z= Constant normal standard variation corresponding to 95% confidence interval

(1.96).

P=Prevalence attribute of hyperglycemia in a recent study. (Estimated prevalence of

50% (0.5) stated by Larmorde M, et al,2020 in a case study)

$$Q=(1-P)$$

d=Error allowed [desired level of precision at a percentage of 10%] =0.1

$$N = (1.96)^2 \frac{0.5(1-0.5)}{(0.1)^2}$$

$$N = 0.9604$$

$$0.01$$

N =96.04 which approximated 96 participants. Therefore 96 participants participated in this research study.

### **Sampling Techniques**

A simple random sampling technique was used. Patients on DTG-based regimens were continuously sampled until the required sample size was reached. Those who fulfilled the eligibility criteria were included in the study.

### **Sampling procedure**

Respondents were given numerical values ranging from one to twenty and the participants to participate in the study were randomly selected from the numerical values and were instructed to fast for at least 8 hours before the glucose tests on the following morning. An FPG test and a 2-hour OGTT were done by trained personnel at the clinic according to the 2021 American Diabetes Association guidelines 23. The fasting glucose capillary blood sample was collected by a needle prick using lancets and immediately Fasting glucose level was determined using a glucometer.

### **Inclusion Criteria**

All adult HIV patients on DTG- a based regimen for at least four months, those who were willing to participate in the study, and those who came after overnight fasting met the Inclusion Criteria

### **Exclusion criteria**

PLWHIV on non-DTG ART regimen, Known DM patients, Patients taking corticosteroids treatment for any reason, and Patients taking chemotherapeutic agents were excluded from the study.

### **Dependent variable**

Prevalence of hyperglycemia

### **Independent variables**

The risk factors of hyperglycemia in HIV patients on a Dolutegravir ART regimen

### **Data collection tools**

The researcher used a questionnaire that consisted of closed-ended and open-ended questions written in the simple English language and filled out by the researcher herself and an assistant. The questionnaire written by the researcher was pre-tested to adjust for any ambiguity or errors and corrections were made accordingly. A lab request form, sample logs, and study register, in addition

to a glucometer, glucose test strips, and stationeries [books, pens, pencils, rulers, Ream of papers] were used.

### **Reliability and validity of the research**

The questionnaire was first approved by the supervisor of my research together with the proposal. The questions were pre-tested on selected clients on the DTG ART regimen to check out any ambiguous questions and errors. Corrections were made accordingly.

### **Data collection procedure**

I obtained data on socio-demographic characteristics, lifestyle, and medical history from individual participants using interviewer-administered questionnaires. I cross-checked information on the medical history, ART regimens, and dates of ART initiation by reviewing participants' clinical records and also when they were Initiated on the DTG ART regimen. A 5ml blood sample was collected from participants to test for Fasting glucose levels.

### **Quality Control**

Pre-tested questionnaires were designed with consultation and guidance of my institute research supervisor, pre-tested in a similar study setting, and corrections made before use in the final data collection.

### **Pilot Study**

Before conducting the study, the designed tools, laboratory investigation forms, and sample logs were subjected to the supervisor and lab to improve the tool, and where applicable changes were made.

### **Data Management**

After data collection, every questionnaire was checked for completeness and any gaps were filled immediately before the clients (participants) left the clinic. The questionnaires were kept under key and lock only accessible to the researcher and my assistant on request after which it was directly entered into Excel Software.

### **Data Analysis**

Data obtained will be entered directly into Excel Software Package data analysis and will be analyzed starting with the demographic information and the other objectives. The analyzed data will be presented in percentages, and frequencies in tables, pie charts, and bar graphs.

### **Ethical Considerations**

My research proposal was submitted to the research and ethical Committee of the school for approval and thereafter introductory letter from the school was taken to the administrators of JRRH to seek authorization for pre-testing of the questionnaires and thereafter the letter was taken to the management of JRRH ART clinic to seek permission and authority for data collection. A consent letter was also provided to clients and was filled voluntarily and total confidentiality was observed. In addition, other ethical considerations like privacy were highly applied and sample codes were availed to avoid display of patients' identities to unauthorized persons.

**Table 1; Shows socio-demographic factors**

Variable	Category	Frequency (N=96)	Percentage (%)	With Hyperglycaemia	Without Hyperglycaemia
Age (Years)	18-30	18	18.8	3(15.8%)	15(19.5%)
	31-45	30	31.2	4(21.0%)	26(33.8%)
	46-60	45	46.9	9(47.4%)	36(46.7%)
	>60	3	3.1	5(15.8%)	0(0.0%)
<b>Total</b>		<b>96</b>	<b>100</b>	<b>19(100%)</b>	<b>77(100%)</b>
Gender	Female	43	44.8	8(42.6%)	35(45.5%)
	Male	53	55.2	11(57.9%)	42(54.5%)
<b>Total</b>		<b>96</b>	<b>100</b>	<b>19(100%)</b>	<b>77(100%)</b>
Educational Level	Illiterate	6	6.3	2(10.5%)	4(5.2%)
	Elementary school	24	25	8(42.1%)	16(20.8%)
	Secondary school	46	47.9	8(42.1%)	38(49.3%)
	Diploma & above	20	20.8	1(5.3%)	19(24.7%)
<b>Total</b>		<b>96</b>	<b>100</b>	<b>19(100%)</b>	<b>77(100%)</b>
Occupation	Unemployed	25	26	5(26.3%)	20(26.0%)
	Civil Servant	31	32.3	4(21.0%)	27(35.0%)
	Private Business	37	38.5	9(47.4%)	28(36.4%)
	Healthcare Worker	3	3.2	1(5.3%)	2(2.6%)
<b>Total</b>		<b>96</b>	<b>100</b>	<b>19(100%)</b>	<b>77(100%)</b>

**Results**

**Socio-demographic characteristics of respondents receiving care at JRRH ART clinic.**

From Table 1, results obtained showed that the majority 45(46.9%) of the respondents were in the age group of 46-60years with hyperglycemia prevalence of 9(47.4%) followed by the age group of 31-45years were 30(31.2%) with hyperglycemia prevalence of 4(21.0%), followed by the age group of 18-30years that were 18(18.8%) with the prevalence of hyperglycemia being 3(15.8%) and the minority of the respondents 3(3.1%) were in the age category of the above 60years with hyperglycemia prevalence of 3(15.8%).

Regarding gender, majority of the respondents 53(55.2%) were males with 11(57.9%) prevalence and the minority

43(44.8%) were females with hyperglycaemia prevalence of 8(42.1%).

Regarding respondents' educational level, majority 46(47.9%) of the respondents attended secondary school education with a prevalence of 8(42.1%), followed by those who attended elementary school who were 24(25.0%) with a prevalence of 8(42.1%), followed by those who attended diploma and higher education that were 20(20.8%) with a lower prevalence of 1(5.3%), followed by the illiterates who were 6(6.3%) with hyperglycemia prevalence of 2(10.5%).

Concerning respondents' occupation, the majority 37(38.5%) had a private business, followed by civil servants who were 31(32.3%), followed by unemployed who were 25(26.0%) and the minority 3(3.1%) were healthcare workers.

Figure 1; Shows percentage prevalence of Hyperglycaemia among HIV patients on DTG

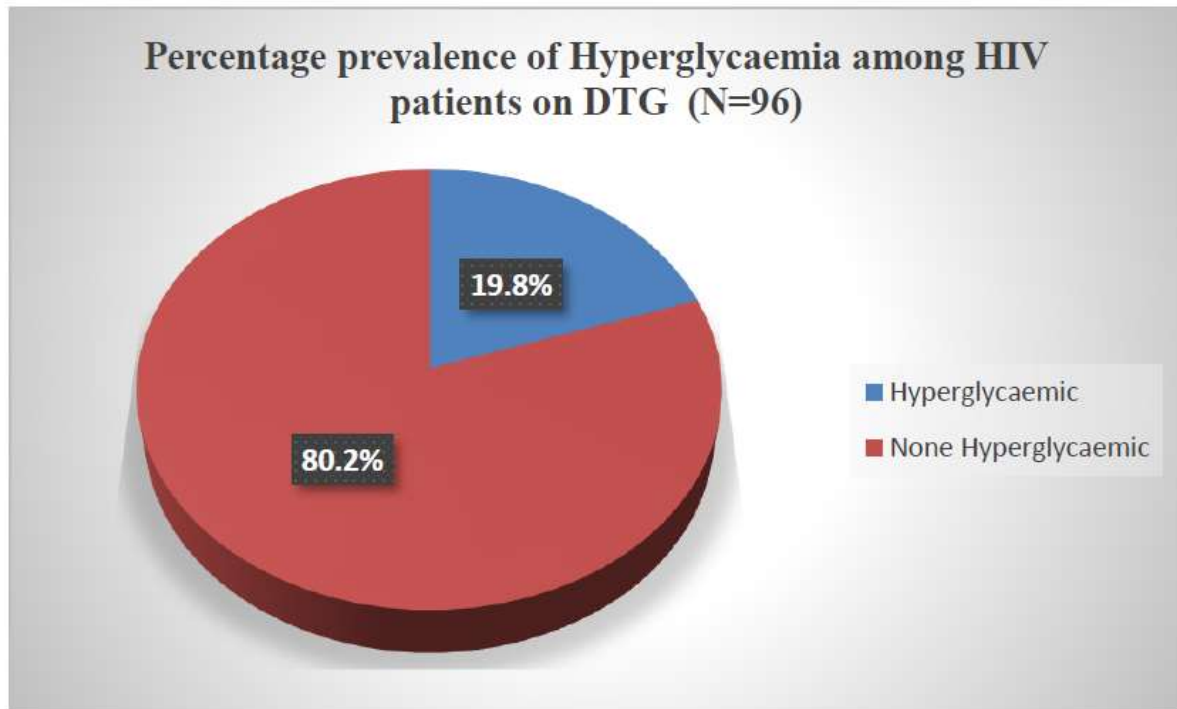


Figure 1 shows that out of the 96 respondents whose fasting blood sugar levels were checked, 19/96 participants had high blood sugar levels above the normal henceforth were hyperglycemic giving the percentage prevalence being 19.8% and 77/96 (80.2%) of the participants had normal fasting blood sugar levels henceforth were nonhyperglycemic.

### Discussion

Analysis and interpretation from Figure 1 showed that out of the 96 respondents who participated in the study 19 of the respondents were diagnosed with hyperglycemia based on the laboratory analysis where these respondents had high FBS levels giving a prevalence of hyperglycaemia among adult HIV patients receiving care at Jinja Regional Referral Hospital of 19.8%. The burden of hyperglycemia was high in the study setting which could have been attributed to the fact that respondents were shifted to a containing ART regimen and with relation to HIV where respondents' immunity has been suppressed by the virus mounting less response to infections that attack hence forth exposing them to these infections.

The study findings showed a relatively high prevalence comparably to a Ugandan cohort study conducted among 3417 PLWHIV on DTG-based ART regimen where 16(0.47%) had hyperglycemia and of this 15/16 (93.7%) developed severe hyperglycemia and required antidiabetic medication (Larmorde M. et al.,2020).

### Conclusion

Hyperglycemia is prevalent in Retroviral infection patients on a Dolutegravir-containing ART regimen and the drug is associated with weight changes hence routine, blood or plasma glucose and body weight monitoring is important in the care of RVI patients on Dolutegravir.

### Study Limitations

The researcher encountered time constraints in the course of the study balancing the research study and other demanding works and to overcome these limitations, the researcher drafted a timetable and a work plan that she strictly followed.

### Recommendation

Patients on Dolutegravir should be alerted to watch for weight changes and symptoms of hyperglycemia to early recognize and seek treatment for hyperglycemia and other metabolic derangements.

### Acknowledgment

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### List of Abbreviations

**ART-** Anti- Retroviral Treatment  
**D.M.-** Diabetes Mellitus  
**DTG-** Dolutegravir  
**FBS-** Fasting blood sugar  
**HIV-** Human Immunodeficiency Virus  
**JRRH-** Jinja Regional Referral Hospital  
**NNRTI-** Non-nucleoside Reverse Transcriptase Inhibitors  
**NRTI-** Nucleoside Reverse Transcriptase Inhibitors  
**PLWH-** People Living With HIV  
**WHO-**World Health Organization

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### Conflict of interest

No conflict of interest

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### Author Biography

Annet Mugoya is a student pursuing a Diploma in Medical Laboratory Technology at St Francis School of Health Sciences.

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