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Original article

The age group most affected by hyperglycemia in HIV patients on the 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

Abstract

Background

The emergence of noncommunicable diseases among people receiving ART has raised concerns as to whether demographic characteristics like Age can increase the chances of developing hyperglycemia among HIV patients on effective ART regimens. This study aims to determine the age group most affected by Hyperglycaemia in HIV patients on DTG-based ART regimens.

Methodology

A cross-sectional hospital-based study. The study population included all adult PLWHIV initiated on a Dolutegravir-based ART regimen attending the ART clinic at JRRH in Eastern Uganda. The total number of respondents was 96. Both males and females were included

Results

The most affected age group was 46-60 years with a hyperglycemia prevalence of 47.4%. majority 45(46.9%) of the respondents were in the age group of 46-60years with hyperglycaemia prevalence of 9(47.4%). 31-45years were 30(31.2%) with hyperglycaemia prevalence of 4(21.0%). 18-30years were 18(18.8%) with their prevalence of hyperglycaemia being 3(15.8%) and the minority of the respondents 3(3.1%) were above 60years with hyperglycaemia prevalence of 3(15.8%). 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.

Conclusion

Older age showed a slightly higher risk of developing hyperglycemia among PLWH with younger age groups showing a slightly lower prevalence of hyperglycemia.

Recommendation

Hyperglycaemia screening and monitoring should be done for patients taking Dolutegravir as well as sensitizing all age groups about healthy living to reduce chances of developing hyperglycemia and other non-communicable diseases among PLWH.

Keywords: *Effective ART regimens, Noncommunicable diseases among PLWH, Hyperglycaemia screening.*
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Corresponding Author: Annet Mugoya*
St Francis School of Health Sciences

Background of the study

The emergence of noncommunicable diseases among people receiving ART has raised concerns as to whether demographic characteristics like Age can increase the chances of developing hyperglycemia among HIV patients on effective ART regimens. In Northern Ethiopia, a 48-year-old male, a 49-year-old female, and a 46-year-old female diagnosed with HIV infection and were on ART for ten years, ten years, and 11 years, respectively, and recently switched to DTG-based ART regimen developed severe hyperglycemia seven months, 12 months, and one month after starting DTG based ART regimen (Hailu W, Tesfayo T and Tadesse, 2021). In Uganda, it has been suggested that 8 of 16 (50%) cases with hyperglycemia diagnoses were older than 50 years. (Larmorde M, et al, 2020).

A 46-year-old male Caucasian, a 39-year-old female African, and a 57-year-old male Caucasian, all cases had optimal viro-immunological parameters with Hypertension and dyslipidemia as the common comorbidities in all 3 cases where Two of the three instances took protease inhibitor-based regimens (PI) before switching to DTG based regimen developed hyperglycemia four months, eight months and nine months after switching to DTG. Two of the three cases had weight loss during the diagnosis of DM. No studies have shown conclusive results of the age group most affected by hyperglycemia in HIV patients on a Dolutegravir ART regimen. This study aims to determine the age group most affected by Hyperglycemia in HIV patients on DTG-based ART regimens attending the ART clinic at JRRH.

Methodology

This methodology described here is similar to the one published by (Mugoya & Ogwal, 2024) who documented the prevalence of hyperglycemia in HIV patients on dolutegravir art regimen receiving care at Jinja Regional Referral Hospital.

Study Design
A hospital-based cross-sectional study design was conducted because it was easier to use i.e., the researcher could 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.

$$n = \frac{Z^2P(1-P)}{d^2}$$

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

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

$$N = \frac{0.9604}{0.01}$$

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 a DTG-based regimen 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 participated 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 will consist of closed-ended and open-ended questions written in simple English language and filled 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.

Results

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

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%)
Total		**96**	**100**	**19(100%)**	**77(100%)**
Gender	Female	43	44.8	8(42.6%)	35(45.5%)
	Male	53	55.2	11(57.9%)	42(54.5%)
Total		**96**	**100**	**19(100%)**	**77(100%)**
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%)
Total		**96**	**100**	**19(100%)**	**77(100%)**
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%)
Total		**96**	**100**	**19(100%)**	**77(100%)**

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 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, the 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 was 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 the age group most affected by hyperglycaemia among HIV patients on DTG

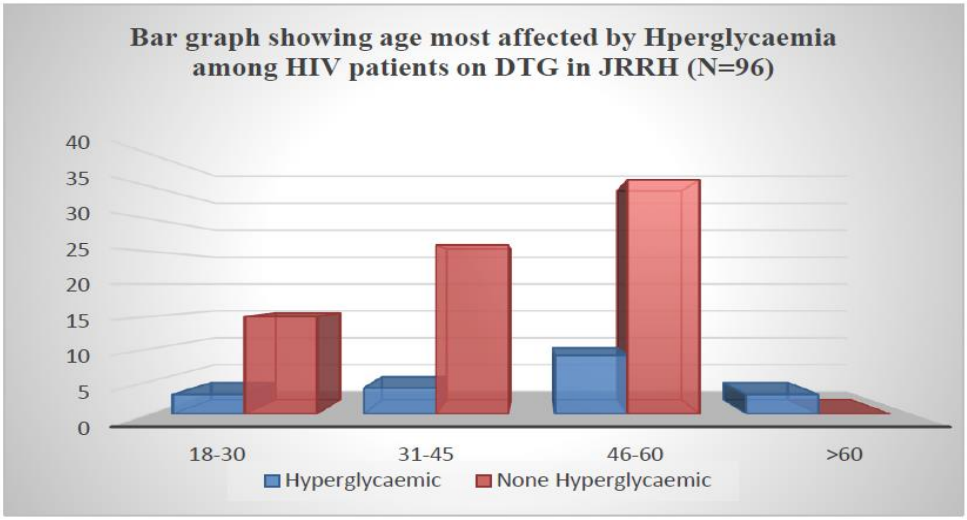

Figure 1 shows, the results obtained showed that the majority 45(46.9%) of the respondents were in the age group of 46-60years with hyperglycemia prevalence of 9(47.4%) followed by the age group of 31-45years were 30(31.2%) with hyperglycemia prevalence of 4(21.0%). The age group of 18-30years that were 18(18.8%) with a prevalence of hyperglycemia being 3(15.8%) and the minority of the respondents 3(3.1%) were in the age category of above 60years with a hyperglycemia prevalence of 3(15.8%) henceforth according to the results obtained the most affected age group by hyperglycemia in this study was 46-60years. followed by the age group of 18-30years that were 18(18.8%) with prevalence of hyperglycaemia being 3(15.8%) and the minority of the respondents 3(3.1%) were in the age category of above 60years with hyperglycaemia 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, the 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.

Discussion

Figure 1 indicated that the respondents between the age group of 46-60 years were mostly affected by hyperglycemia. Out of the 96 participants 45/96 were in the age category of 46-60 years and had a hyperglycaemia prevalence rate of 47.4% making this age group the most affected age group. The study findings were slightly in correspondence with a case-control study conducted in Uganda where 8 of 16 (50%) cases of hyperglycemia were diagnosed among respondents older than 50 years. (Larmorde M et al.,2020). However, the study findings show contradictions with the study by Hailu W, Tesfayo, and Tadesse.,2021 Where the ages of 11 years, 46 years, and 48 years had equal prevalence attributes of developing hyperglycemia after initiation of the Dolutegravir-containing ART regimen (Hailu W, Tesfayo and Tadesse.,2021).

Conclusion

Older age showed a slightly higher risk of developing hyperglycemia among PLWH with younger age groups showing a slightly lower prevalence of hyperglycemia.

Recommendation

Hyperglycaemia screening and monitoring should be done for patients taking Dolutegravir as well as sensitizing all age groups about healthy living to reduce chances of developing hyperglycemia and other non-communicable diseases among PLWH.

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
PLWH- People Living With HIV

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Conflict of interest

No conflict of interest

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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