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Effectiveness of dolutegravir-based treatment among HIV/AIDS patients in Nkembo Outpatient Treatment Center, Gabon

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Abstract

Background HIV/AIDS therapy continues to make an enormous contribution to improving the well-being of HIV/AIDS patients globally. In Gabon, dolutegravir is administered to HIV/AIDS patients from first-line treatment. This study aimed to determine the effectiveness rate of dolutegravir-based treatment among HIV/AIDS patients.

Methods A retrospective observational study was conducted among HIV/AIDS patients who started antiretroviral treatment since 48 weeks of follow-up.

Results The effectiveness rate of dolutegravir-based treatment was 85.1%. HIV/AIDS patients with a CD4 + count below 200 cel/mm^3, singles, and HIV/AIDS patients whose treatment duration exceeded 12 months were at risk and likely to have an active infection (*P* = *0.0001*).

Conclusion Dolutegravir-based treatment remains effective among HIV/AIDS patients treated at the Nkembo Outpatient Treatment Center.

Keywords HIV/AIDS patients, Treatment effectiveness, Dolutegravir, Gabon

Introduction

HIV continues to plague the world and remains a burden for HIV/AIDS patients, whether on treatment or not. HIV/AIDS patients face many difficulties related to care, especially in countries with limited resources. HIV/AIDS remains a major global health threat with continued transmission in countries around the world, some of which are reporting an upward trend in new infections from previously declining rates 1.

HIV infection cannot currently be cured. However, according to the World Health Organization (WHO), thanks to access to effective prevention, diagnosis, and treatment, HIV infection has become a chronic disease

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that can be managed with the possibility of living a long and healthy life 2.

In sub-Saharan Africa, HIV/AIDS continues to have devastating effects 3. The care of HIV/AIDS patients in sub-Saharan countries requires improvement in access to diagnosis and therapy for better optimization of strategies related to the care of HIV/AIDS patients. The supply of reagents for measuring HIV viral load and of drugs against HIV remains a real concern for effective care, allowing the improvement of the state of health of the people infected with HIV in these countries 4. However, the WHO recommends the introduction of dolutegravir as a first-line treatment for all people infected with HIV. This treatment regimen is as effective in treatment-naive infected people as in treated people and even in people infected but who have failed treatment with raltegravir or elvitegravir 5.

Data on DTG from some sub-Saharan African countries, including Cameroon and Côte d'Ivoire, highlight the value of using DTG-based antiretroviral therapy due to its notable efficacy in PLHIV on first-, second- or third-line DTG-based treatment. Its presence in ART potentially leads to notable viral suppression. Despite its use in first-, second- and third-line (according to WHO), DTG still has good efficacy in antiretroviral therapy 67.

In Gabon, HIV/AIDS is endemic, with a prevalence of 3.7% [8]. The introduction of dolutegravir in first-line treatment recommended by the WHO since 2018 in resource-limited countries has been effective in Gabon since 2019. However, several limitations negatively impact the effectiveness of treatment, in particular, drug shortages, shortages of reagents for measuring viral load and counting CD4 + counts, and compliance with treatment constitute the various difficulties observed especially in countries with limited resources, particularly in countries with limited resources in Gabon. These difficulties do not encourage optimization of the care of HIV/AIDS patients in Gabon 9.

Early initiation of dolutegravir-based treatment once an HIV diagnosis has been established has a significant impact on reducing mortality and morbidity in the HIV/AIDS patients population 10. This argues for a high rate of treatment effectiveness and reduction of active infection. The effectiveness rate of treatment and the prevalence of active infection are poorly documented in the country. This is why this study aims to determine the effectiveness rate of dolutegravir-based treatment among HIV/AIDS patients under antiretroviral treatment to provide more shed light on the effectiveness of dolutegravir on virological suppression.

Materials and methods

A retrospective observational study was carried out among HIV/AIDS patients under antiretroviral between 2023 and 2024 in Nkembo Outpatient Treatment Center. All patients were on dolutegravir (TDF + 3TC + DTG). Data were collected at 24 weeks post-treatment and at 48 weeks of treatment. Viral load values and CD4 + were obtained during the first sample at 24 weeks after treatment and 48 weeks.

Clarification of concepts "active infection" and "effectiveness rate"

Active infection is manifested by the fighting effect, in which the infecting virus attempts to use the host's resources to multiply for its benefit. In the case of HIV, active infection is manifested by significant viral replication in the cells of infected individuals. This replication is accompanied by a high viral load (greater than or equal to 1000 copies/ml). This active infection can be observed in the absence or presence of treatment (in the event of poor compliance or ineffective treatment) [11, 12]. The effectiveness rate is expressed as a decrease in plasma HIV viral load (less than 50 copies/ml) and an optimal CD4 + count (greater than or equal to 200 cel/mm^3) during a 24-week, 48-week, and/or 96-week antiretroviral treatment period. However, our study evaluated the efficacy rate up to 48 weeks of antiretroviral treatment. This method of assessment allows monitoring the evolution of viral load and CD4 + count in two consecutive measurements of viral load and CD4 + in HIV/AIDS patients under treatment 13.

HIV/AIDS patients included and context

In this study, HIV/AIDS patients included those who had started their antiretroviral treatment for at least 24 weeks and who presented for viral load and CD4 + cell count measurement. All eligible HIV/AIDS patients who presented to the virology department during the study period were invited and consecutively included in the study until the sample size was reached. All HIV/AIDS patients aged 18 years and above, whose plasma HIV-1 RNA and CD4 + values were available at 24 weeks post-treatment up to 48 weeks, were included. Other information, such as sex, age, marital status, and treatment, were required for study design. Therapeutic follow-up was conducted from 24 weeks post-treatment up to 48 weeks.

Statistical analysis of data

Statistical analysis was performed using Stata version 18.0 software. Descriptive statistics were expressed as percentages and frequency for categorical data. The p-value ≤ 0.05 was considered a threshold for statistical significance in the final model. Data were summarized using the adjusted Odds Ratio (aOR) and 95% confidence

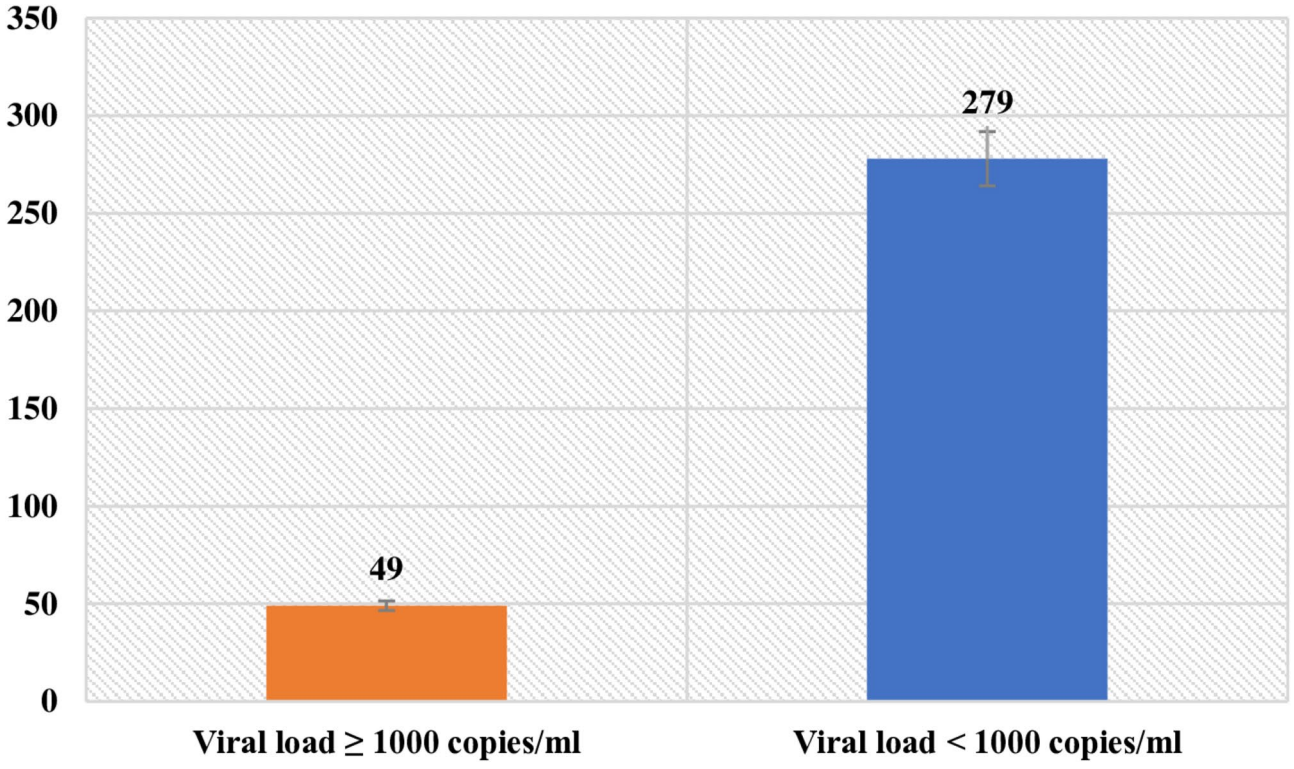

Fig. 1 Effectiveness of DTG-based treatment

Table 1 Factors associated with active infection in HIV/AIDS patients

Variable	Univariate analysis		Multivariate analysis	
	OR (95% CI)	***P*-value**	**aOR (95% CI)**	***P*-value**
Sex	1.1 (0.6–1.9)	0.39	1.1 (0.7–1.7)	0.636
Male	-		-	
Female				
Age group	-	*0.579*	-	*0.569*
18–24	1.5 (0.4–4.9)	*0.487*	1.2 (0.7–1.9)	*0.698*
25–34	1.2 (0.4–3.6)		1.1 (0.70–1.9)	
35–44	-		-	
≥ 45				
Marital status	4.5 (2.1–9.7)	*0.0001*	2.1 (1.4–3.1)	*0.001*
Single	-		-	
Married				
CD4+	3.5 (2-6.1)	*0.0001*	1.9 (1.2–2.8)	*0.001*
< 200 cel/mm^3	-		-	
≥ 200 cel/mm^3				
Duration of treatment	-	*0.0001*	-	*0.0001*
6–12 months	5.1 (2.7–9.4)		2.4 (1.5–3.4)	
>12 months				

OR: Odds Ratio; **aOR**: Adjusted Odds Ratio; **95% CI**: 95% confidence interval

interval. Adjusted Odds Ratio and its 95% confidence interval were used to estimate the association between reported sociodemographic data and active infection.

Results

Effectiveness of dolutegravir-based treatment

The effectiveness rate of DTG-based treatment was 85.1% (279/328). The prevalence of active infection was 15% (49/328) (Fig. 1).

Risk factors associated with active infection

Singles were at risk and likely to have an active infection (aOR = 2.1 95% CI: 1.4–3.1, $P = 0.001$). HIV/AIDS patients with a CD4 + count below 200 cel/mm^3 and HIV/AIDS patients whose treatment duration exceeded 12 months were at risk and likely to have an active infection (aOR = 1.9 95% CI: 1.2–2.8 $P = 0.001$and aOR = 2.4 95% CI: 1.5–3.4 $P = 0.0001$respectively). (Table 1).

Discussion

The introduction of dolutegravir in first-line treatment contributes significantly to improving the health status of people living with HIV/AIDS 14. The objective of this study was to determine the effectiveness rate of DTG-based treatment among HIV/AIDS patients on treatment. Active infection was lower in HIV/AIDS patients receiving dolutegravir-based treatment. This observation could be explained by poor treatment compliance or by the ineffectiveness of the treatment probably due to the resistance of HIV-1 strains, thus promoting a virological rebound. Some studies conducted around the world, particularly in countries with limited resources, have also obtained similar results showing a recurrent situation of the presence of active infection even in HIV/AIDS patients receiving dolutegravir-based ART1517.

Dolutegravir is used from the start of treatment among HIV/AIDS patients in the country. The effectiveness rate of DTG-based treatment was still very optimal. These data reveal the quality of the treatment linked to the presence of DTG from the initiation of treatment. This situation could be explained by the presence of DTG in triple therapy but also by better compliance with treatment by the majority of HIV/AIDS patients on antiretroviral treatment. This could also be due to a regular supply of antiretroviral drugs among HIV/AIDS patients observed during the study period. Several studies carried out in particularly in countries with limited resources, have shown that DTG still retains its effectiveness even if some resistance mutations are already observable in HIV/AIDS patients on a global scale 1418.

However, DTG remains effective and accessible in the context of limited resources. Single HIV/AIDS patients were at risk and likely to have active infection (aOR = 2.1, $P = 0.001$). Likewise, HIV/AIDS patients with a low CD4 + count (˂200 cel/mm^3) and HIV/AIDS patients whose treatment duration exceeded 12 months were at risk and likely to have an active infection (aOR = 1.9, $P = 0.001$ and aOR = 2.4, $P = 0.0001$ respectively). These factors show the risk of exposure to HIV/AIDS patients to the onset of an active infection. This observation could be explained by the ineffectiveness of the immune system, justified by a drop in CD4 + counts, thus favoring the appearance of active infection. Some studies conducted in other sub-Saharan African countries had obtained results that corroborated with those of the study showing the involvement of risk factors in the appearance of active infection in HIV/AIDS patients 1921.

Conclusion

The treatment with dolutegravir remains effective in the majority of cases. However, this does not exclude a slight loss of effectiveness of treatment based on DTG, hence the need to monitor the evolution of the effectiveness of DTG in antiretroviral treatment among HIV/AIDS patients in the country for better therapeutic monitoring.

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Author contributions

CM conceived and wrote the article. RMI and CMM participated in data collection. AM, SCOM and DMB analyzed the data. CM, RMO, BO and GJL supervised the work. All authors reviewed, read, and accepted the final manuscript.

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Data availability

Datasets used and/or analyzed in this study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

The study was approved by the management of the Outpatient Treatment Center, which also chairs the Institutional Ethics Committee. Number: 00242 DOTC/IEC. Informed consent and written was obtained from each study participant.

Competing interests

The authors declare no competing interests.

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