

A REVIEW ON A MIRACLE DRUG “DOLUTEGRAVIR” IN A RURAL TERTIARY HOSPITAL

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Article Info:

Received: 12 July 2026,

Revised: 01 August 2026,

Accepted: 22 August 2026

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DOI: <https://doi.org/10.5281/zenodo.22211602>



Citation:

¹*Dr. Kosuri Naga Venkata Lakshmi Durga, ²Dr. Koneru Gangadhararao, ³Dr. Paladugu Dharma Pal. (2026). A Review On A Miracle Drug “Dolutegravir” In A Rural Tertiary Hospital. International Journal of Clinical and Pharmaceutical Innovations, 1(6), 82-86.

ABSTRACT

Background: Antiretroviral therapy (ART) has fundamentally changed human immunodeficiency virus (HIV) infection from a fatal diagnosis to a manageable chronic illness. The integration of second-generation integrase strand transfer inhibitors (INSTIs), specifically Dolutegravir (DTG), has redefined frontline regimens due to rapid virological suppression and an exceptionally high genetic barrier to resistance. **Objective:** This review evaluates the clinical efficacy, safety profile, and real-world outcomes of Dolutegravir-based regimens within a rural tertiary care hospital setting in Andhra Pradesh, India. **Methods:** Visual telemetry data and patient clinical markers (CD4+ T-lymphocyte counts and HIV viral load) were analyzed longitudinally from an institutional antiretroviral therapy center registry. The standard of care evaluated was the fixed-dose combination of Tenofovir, Lamivudine, and Dolutegravir (TLD). **Results:** Institutional registry records show 2,556 cumulative registrations. Real-world observations demonstrated that even with suboptimal adherence (~80%), a high proportion of patients achieved a status of target not detected (TND). In HIV-1 cohorts, the initiation of DTG correlated with precipitous drops in viral copy numbers to zero, alongside stable immune reconstitution manifested by elevated CD4 counts. HIV-2 cohorts maintained long-term immunological stability. Minor adverse events included anemia, joint pains, and symptoms of osteoporosis. Opportunistic infections such as Toxoplasmosis and Pneumocystis pneumonia (PCP) were rare, though extra-pulmonary tuberculosis (TB) remains a notable clinical co-morbidity. **Conclusion:** Dolutegravir-based first-line therapy yields highly robust clinical and immunological outcomes in rural populations. Early diagnostic strategies, combined with persistent therapeutic monitoring every six to twelve months, remain essential to meeting global UNAIDS 95-95-95 suppression benchmarks.

KEYWORDS: Dolutegravir, Antiretroviral Therapy, HIV-1, HIV-2, Viral Load, CD4+ T-Lymphocyte Count.

INTRODUCTION

The human immunodeficiency virus (HIV) epidemic remains a major global public health challenge, with approximately **39 to 40 million individuals** living with HIV (PLHIV) worldwide. While global initiatives have successfully reduced HIV-related mortality by nearly 70% since its peak in 2004, regional disparities in disease burden and healthcare access persist. Sub-Saharan Africa bears the highest global burden. **India maintains the second-largest population** of PLHIV globally, estimated at 2.5 million individuals, necessitating highly scalable, effective, and well-tolerated therapeutic options.

The epidemiological landscape of HIV in India is dynamically shaped by socioeconomic factors, migratory labor patterns, and specific high-risk sub-populations, including young adults, women, adolescent girls, truck drivers, and migrant workers. Notably, these migratory patterns have facilitated the emergence of combined HIV-1 and HIV-2 infections, which comprise roughly 0.2% to 2% of domestic cases and present unique challenges for traditional antiretroviral regimens.

To systematically address the epidemic, the Joint United Nations Programme on HIV/AIDS (UNAIDS) established the **95-95-95 targets**. These seek to ensure that 95% of people living with HIV know their status, 95% of those diagnosed receive sustained antiretroviral therapy (ART), and 95% of those receiving ART achieve viral suppression by the year 2030. Achieving these thresholds requires the deployment of optimized first-line antiretroviral agents that combine potent efficacy with low pill burdens and high safety profiles.

Historically, first-line ART relied heavily on non-nucleoside reverse transcriptase inhibitors (NNRTIs) like Efavirenz. However, issues regarding neuro-psychiatric side effects and a relatively low genetic barrier to resistance limited their long-term sustainability. The introduction of **Dolutegravir (DTG)**, a second-generation integrase strand transfer inhibitor (INSTI), marked a significant shift in HIV care. By blocking the viral integrase enzyme, DTG prevents the insertion of viral HIV DNA into the host CD4 cell genomic architecture, halting viral replication at a crucial phase.

Clinical data from international multi-center trials (such as GEMINI and TANGO) have confirmed DTG's superiority or non-inferiority to legacy drugs, demonstrating a **93% to 99% viral efficacy rate at 48 weeks** alongside an extremely low rate of treatment-emergent resistance (<0.1%). Consequently, the World Health Organization (WHO) and India's National AIDS Control Organization (NACO) have prioritized the standardized fixed-dose combination of **Tenofovir (300mg), Lamivudine (300mg), and Dolutegravir (50mg)**—collectively known as the TLD regimen—as the preferred first-line protocol.

While clinical trials provide foundational data, assessing these regimens within rural, tertiary-level healthcare systems is vital for understanding practical challenges like late diagnosis, variable adherence, and localized co-infections (such as tuberculosis). This review presents clinical observations and registry data from the NRI General Hospital ART Centre in Chinakakani, Andhra Pradesh, evaluating the practical impact of Dolutegravir in a rural Indian setting.



Global Epidemiology of HIV

According to global estimates, approximately 39–40 million people are living with HIV (PLHIV), with around 1.3 million new infections annually. Out of this 0.2%-2% are HIV-2 cases and most of them are combined (HIV1&2) cases which are due to migration of truck drivers and workers. HIV-related deaths have declined by nearly 70% since their peak in 2004, with an estimated 40 million cumulative deaths worldwide.^[1]

Sub-Saharan Africa remains the most affected region, accounting for nearly two-thirds of global cases. India has the second-largest burden globally, with approximately 2.5 million PLHIV.^[2]

Epidemiological trends indicate declining incidence in Africa and South Asia, while increasing trends are observed in Eastern Europe, Central Asia, and parts of the Middle East.^[1]

High-risk populations include young adults (25–29 years), women and adolescent girls, and key populations such as men who have sex with men (MSM), people who inject drugs (PWID), and transgender individuals.^[1]

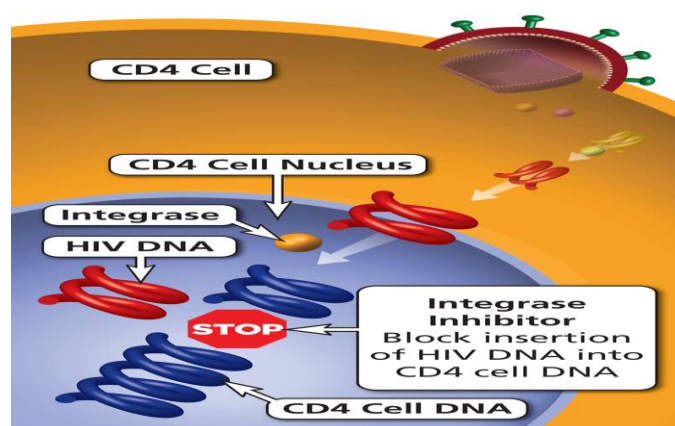
The **UNAIDS 95-95-95 targets** aim to end the AIDS epidemic by 2030.^[1]

Dolutegravir: Mechanism and Clinical Role

Dolutegravir (DTG) is a second-generation integrase strand transfer inhibitor (INSTI) used in the treatment of HIV infection.^[3] It inhibits the integration of viral DNA into the host genome, thereby preventing viral replication.^[3]

Clinical studies have demonstrated that dolutegravir is **non-inferior or superior** to other antiretroviral regimens in both treatment-naïve and treatment-experienced patients, including those with prior INSTI exposure.^[4]

Its advantages include rapid viral suppression, high genetic barrier to resistance, excellent tolerability, and minimal drug–drug interactions.^[3]



Standard Treatment Regimen

The recommended first-line regimen is

- Standard First Line Regimen (TLD) Tenofovir 300mg Lamivudine 300mg Dolutegravir 50mg once daily.
- 50 mg second dose of Dolutegravir is added to main TLD regimen in cases of TB(with rapamycin), EPILEPSY, resistant cases.^[1]

Why Dolutegravir is Superior

Dolutegravir offers several advantages:

- Rapid viral suppression (U=U principle)
- High genetic barrier to resistance
- Once-daily dosing improves adherence
- Effective at high viral loads (even >1 to 5 lakhs copies)
- Effective in TB co-infection
- Long-term durability (5-10+ years)

These properties have led to its recommendation as a preferred first-line agent by WHO.^[1]

The efficacy of DTG-based regimens is estimated to be 93–99% at 48 weeks and a lower risk of discontinuation due to adverse effects when compared to previously

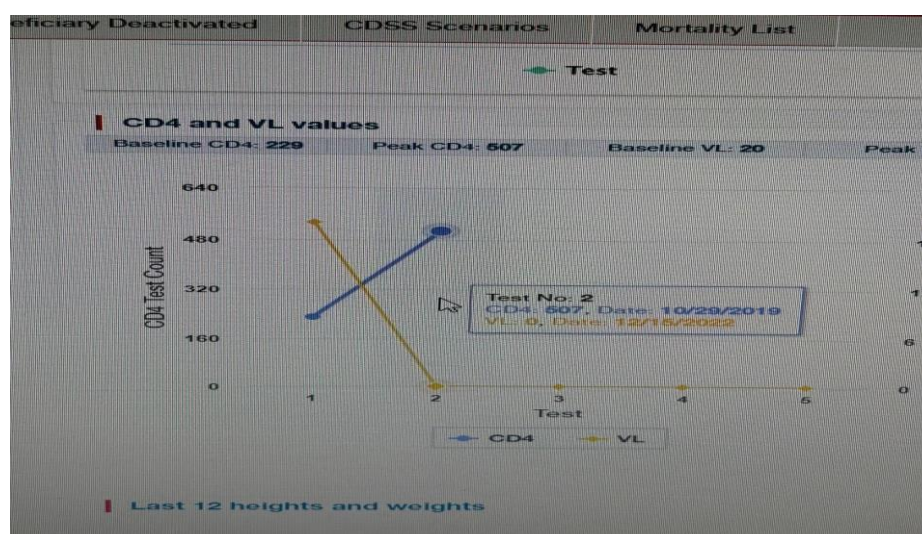
prevalent ART regimens (e.g., efavirenz, atazanavir/ritonavir, darunavir/ritonavir, and raltegravir).^[8]

When comparing our drug resistance outcomes to other studies, data are similarly reassuring for a very low prevalence or even absence of treatment-emergent resistance to DTG among individuals who transitioned to TLD from NNRTI-containing regimens.^[9]

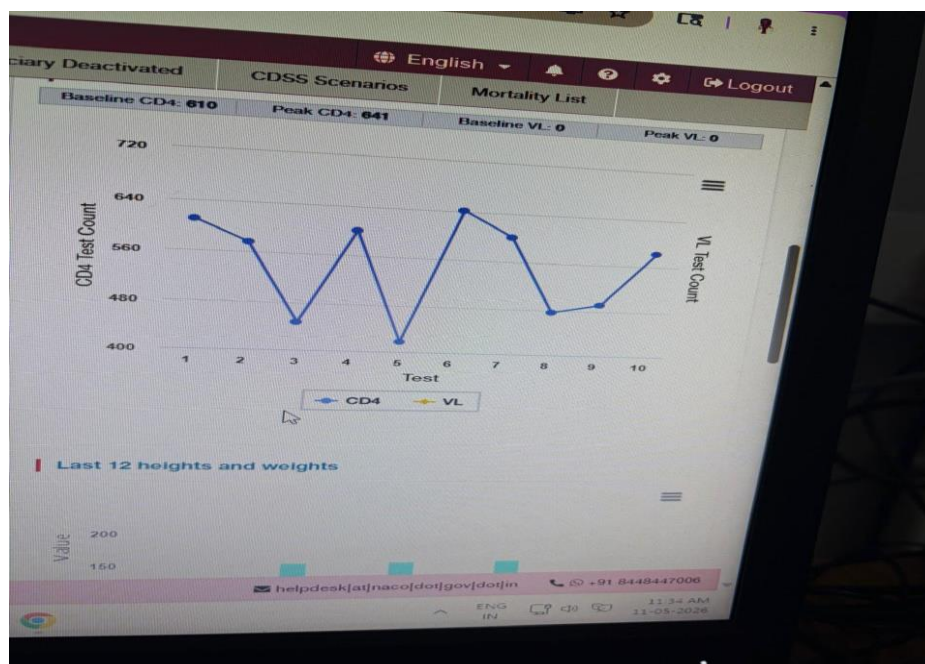
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A case of hiv-1 on treatment showing viral load and CD4 count.



A case of HIV-2 showing only CD4 count.

C:\Users\User\Desktop\IMG_7011vl hiv -2.jpeg

Resistance Profile

Dolutegravir has a **high genetic barrier**, with resistance rates <0.1% in first-line therapy.^[3]

Resistance may occur in patients with prior INSTI exposure, particularly with mutations such as Q148 combined with secondary mutations.^[5]

Two-Drug Regimens and Treatment Simplification

Dolutegravir-based dual therapy regimens have demonstrated non-inferiority to triple therapy.

- DTG + Lamivudine (GEMINI, TANGO trials)
- DTG + Rilpivirine (SWORD trials)

These regimens reduce drug exposure while maintaining virological suppression.^[4]

Safety Profile of Dolutegravir

Dolutegravir is generally well tolerated.

➤ Mild increase in serum creatinine due to OCT-2 inhibition (not true renal dysfunction).^[3] This typically occurs within a week of initiation followed by a plateau at an average increase of 11 mmol/L.

- Transaminase elevation in ~5% (higher in hepatitis co-infection)^[3]
- Minimal lipid abnormalities compared to protease inhibitors^[3]
- Rare hypersensitivity reactions (<1%)^[3]

Pharmacokinetic studies show no significant safety concerns even in severe renal impairment.^[6]

ART Principles and Clinical Outcomes

Antiretroviral therapy (ART) aims to achieve:

- Viral suppression
- Immune restoration (↑CD4 count)
- Prevention of transmission (TasP, U=U)^[1]

Treatment interruption leads to viral rebound and resistance.^[1]

Modern ART focuses on:

- High efficacy
- Low pill burden
- Better adherence
- Long-term safety

Clinical outcomes include reduced opportunistic infections, improved quality of life, and decreased mortality.^[1]

Newer and Long-Acting Therapies

Recent advances include:

- Bicitgravir-based regimens
- Dolutegravir + Lamivudine (Dovato)
- Long-acting injectables (Cabotegravir + Rilpivirine)

These improve adherence and quality of life.^[7]

Challenges and Future Directions

Challenges include:

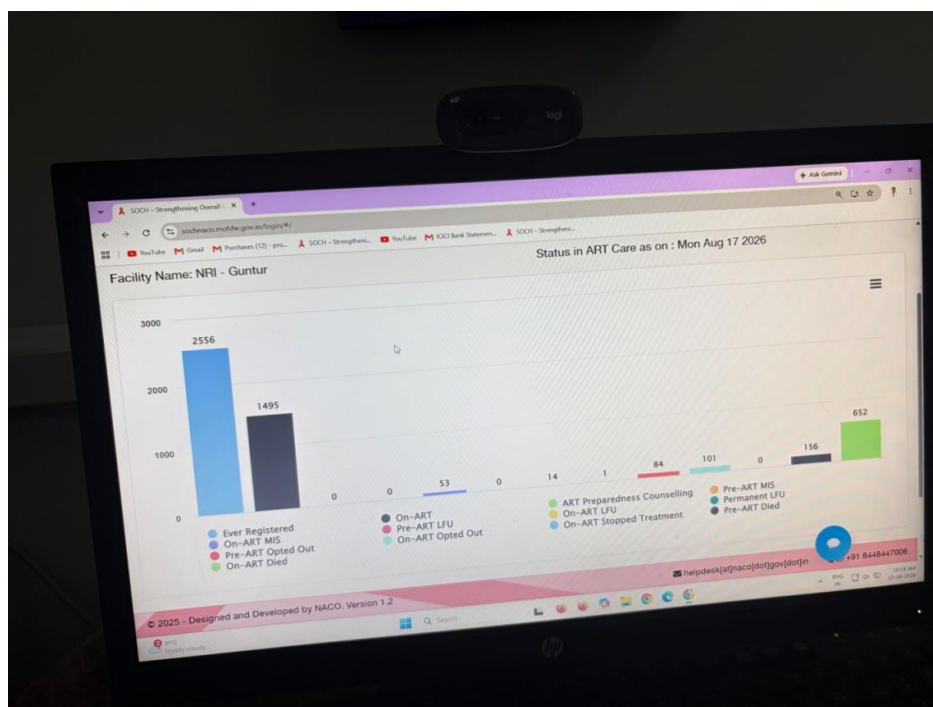
- Late diagnosis
- Poor adherence
- Socioeconomic burden

Future strategies focus on **long-acting ART and simplified regimens** to improve retention in care.^[7]

Our experience says more than 95% were prescribed TLD and even 80% adherence pts are getting TND (target not detected). In some of the couple one person shows response to Tenofovir., Lamivudin, Dolutogravir (TLD) and another responds to Zudovidine, Lamivudin, Dolutogravir. Occasionally some may need Azetonovirpi in addition or additional dose (50mg) of DTG. we use additional dose of DTG 50 mg for pts TB WITH HIV. we

usually follow patients with continuous, periodical monitoring. ie once in 6 months, yearly viral loads, cd4 count to be done It is our observation that we must use dual drugs of NRTIS for new borns when viral load is more than 1000 copies among antenatal woman at gestational age 32-36 weeks of pregnancy to prevent hiv from mother to child transmission. Major common problems anaemia, joint pains, other symptoms of

osteoporosis, candidiasis(white discharge). we rarely see other OIS like Toxoplasmosis, pcp pneumonias. and Cryptococcus infections. But we have seen extrapulmonary TB cases.



CONCLUSION

Early diagnosis, prompt initiation of ART, and adherence to therapy are essential to achieve sustained viral suppression and to reduce HIV-related morbidity and mortality.^[1]

□ UPDATED REFERENCES (Vancouver Style)

1. World Health Organization. **HIV/AIDS fact sheet**. Geneva: WHO, 2024.
2. National AIDS Control Organization (NACO). **India HIV Estimates 2024**.
3. Curtis L, Nichols G, Stainsby C, et al. Dolutegravir: clinical and laboratory safety in integrase inhibitor-naïve patients. *HIV Clin Trials*, 2014; 15(5): 199–208.
4. Cahn P, Madero JS, Arribas JR, et al. Dolutegravir plus lamivudine vs triple therapy (GEMINI/DOLAM). *Lancet HIV*, 2021; 8(8): e463–e473.
5. Weller S, Borland J, Chen S, et al. Pharmacokinetics of dolutegravir in HIV-seronegative subjects with severe renal impairment. *Eur J Clin Pharmacol*, 2014 Jan; 70(1): 29–35. doi: 10.1007/s00228-013-1590-9. Epub 2013 Oct 6. PMID: 24096683; PMCID: PMC3889630.
6. Orkin C, et al. Long-acting cabotegravir and rilpivirine for HIV treatment. *N Engl J Med*, 2020; 382: 1124–1135.
7. Alvarado-Bruzual MF, et al. Distribution and efficacy of dolutegravir-based regimens in the main HIV outpatient care in Caracas, Venezuela. *AIDS Res Ther*, 2025 Oct 27; 22(1): 113. doi: 10.1186/s12981-025-00811-y. PMID: 41146304; PMCID: PMC12560526.
8. McCluskey SM, Muyindike WR, et al. Population Effectiveness of Dolutegravir Implementation in Uganda: A Prospective Observational Cohort Study (DISCO), 48-Week Results. *J Infect Dis*, 2024 Sep 23; 230(3): e622–e630. doi: 10.1093/infdis/jiae260. PMID: 38748986; PMCID: PMC11420783.