Antiretroviral Drug Resistance in HIV-1 Patients on First-Line Therapy or Untreated Across Five Treatment Centers in Yaounde's Centre Region, Cameroon

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Abstract

Antiretroviral therapy (ART) significantly improves HIV survival. However, as ART programs expand in resource-limited

settings like Cameroon towards the UNAIDS 95-95-95 goals, monitoring for drug resistance is critical to maintain treatment effectiveness. This study investigated prevalent HIV-1 subtypes and drug resistance mutations in Yaoundé, Cameroon. Conducted from 2017-2021 across five clinics, the study enrolled 231 HIV-positive individuals. This cohort included both treatment-naïve persons and those currently or previously on ART experiencing suspected virological failure (viral load >1000 copies/mL). Plasma samples were collected, and viral RNA was analyzed by sequencing the reverse transcriptase (RT) and protease (PR) genes to identify HIV subtypes and resistance mutations. The majority of participants (67.5%) were female, predominantly aged 21-35 years. Over half (58.5%) were receiving ART at sampling (median duration 6 months). The high median viral load (536,263 copies/mL) confirmed widespread non-suppression. Genotyping revealed CRF02_AG as the most prevalent HIV-1 subtype (64.5%), followed by A1 (11.7%) and G (6.9%). Drug resistance mutations were prevalent, detected in 18.2% of ART-experienced participants and 13.4% of treatment-naïve individuals, indicating significant acquired and transmitted resistance, respectively. Non-nucleoside reverse transcriptase inhibitor (NNRTI) resistance mutations were found in 6.1% (ART-experienced) and 1.3% (naïve). Nucleoside reverse transcriptase inhibitor (NRTI) mutations occurred in 0.4% of those on ART. The most common specific mutations were M184V (NRTI) and K103N (NNRTI). A key finding was the high prevalence of protease inhibitor (PI) resistance mutations, identified in 19.5% of sequences analyzed, with I54V being common. Notably, PI resistance was also detected among treatment-naïve individuals. In conclusion, CRF02_AG is the dominant HIV subtype in this Yaoundé cohort. Significant resistance to common first-line drugs exists, driven by both treatment failure and transmission. The alarmingly high rate of PI resistance (19.5%), even in treatment-naïve individuals, suggests potential transmission of PI-resistant strains. This poses a serious challenge to treatment success and requires urgent attention through enhanced resistance surveillance and informed ART regimen planning in Cameroon.

Keywords

First-line Antiretroviral Therapy, HIV-1 Drug Resistance, Viral Subtype, Transmitted Drug Resistance, Centre, Transversal Study