Molecular characterization of HIV-1 drug resistance mutations among ARV-treated female commercial sex workers in a Nairobi cohort

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ABSTRACT

Antiretroviral drug resistance is a major contributing factor in treatment failure. Resistance to drugs develops as a result of mutations within the proteins targeted by drugs. Different HIV-1 subtypes follow different paths to resistance, differ in codon sites critical to resistance and also differ in viral fitness and sequence analysis of an antiretroviral-target region provides information on presence of resistance and genetic divergence from conventionally used reference sequences. The objective of this study was to determine the pattern and prevalence of HIV-1 subtypes and HIV-1 drug resistance among ARV-treated women from the Pumwani cohort based in Nairobi, Kenya.

This was a cross-sectional, laboratory-based retrospective study involving genotypic characterization of HIV-1 RNA from stored plasma samples obtained from persons enrolled in an ART programme for over six months. Viral RNA was extracted from 84 archived plasma samples. A region of the reverse transcriptase gene (697bp) was amplified by nested polymerase chain reaction (PCR) and sequenced using v3.1 BigDye® Terminator™ technology. Sequence alignment and phylogenetic analyses were performed in Genetyx® and Treeview® using ClustalW and referenced to The Los Alamos and Stanford HIV databases.

Sixty sequences were available for analyses. Sequence alignment and phylogenetic analysis showed 58 isolates (96.7%) to be subtype A1 and 2 isolates (3.3%) to be subtype D. Five isolates (8.3%) had virus population with reverse transcriptase inhibitor-associated resistance mutations. Of the 5, 3 were infected with subtype A1 virus and 2 with subtype D virus. Complete class resistance was identified in 2 isolates (3.3%). Minor mutations and polymorphisms were detected in all the 60 isolates that were analysed. HIV-1 subtype A1 dominates in this population while ARV- associated resistance mutations occurred in 8.3% of the patients, a low prevalence for a treated population. As sex workers are classified as a high risk group in HIV transmission, there is an urgent need to incorporate antiretroviral resistance monitoring protocols among HIV prevention programmes at both cohort and national level.