OPINION

Drugs resistance in HIV

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Morris E. Drugs resistance in HIV. J Exp Clin Microbioll. 2022;6(3): 01.

INTRODUCTION

In recent years, access to combination Antiretroviral Therapy (ART) has considerably increased. At the end of 2011, over eight million HIV-positive patients in low- and middle-income countries were receiving Antiretroviral Therapy (ART). ART is often effective at keeping the virus under control and the patient healthy. Treatment, on the other hand, only works if the virus is not resistant to the medications utilized. In recent decades, HIV medications have improved in their ability to reduce the progression of drug resistance, to the point that some patients can be treated for many years without experiencing any resistance issues. Drug resistance, however, remains a severe concern to the health of some patients, particularly in low-income nations. Some people's drug resistance can be detected even before they start treatment. This resistance can be passed on at the time of infection or developed during previous treatments, such as in women taking antiretroviral medication to prevent HIV transmission from mother to child. To help determine the best first-line regimen, WHO recommends monitoring HIV medication resistance in adults starting or restarting Antiretroviral Therapy (ART) and in treatment-naive new born starting ART Medication resistance to the NNRTI drug class can be seen in up to 10% of persons initiating HIV therapy. People who have previously taken antiretroviral medicines are three times more likely to develop NNRTI resistance before starting treatment. Drug-resistant HIV is common in children under the age of 18 months and in people who have just been diagnosed with HIV. According to surveys conducted in ten countries in Sub-Saharan Africa from 2012 to 2020, over half of all infants newly diagnosed with HIV have NNRTI-resistant virus before starting therapy. The high prevalence of NNRTI resistance in adults and new-borns around the world highlights the need to move quickly to WHO recommended dolutegravir-based therapy. The global scale-up of Antiretroviral (ARV) therapy (ART) has led to dramatic reductions in HIV-1 mortality and incidence. However, HIV Drug Resistance (HIVDR) poses a potential threat to the long-term success of ART and is emerging as a threat to the elimination of AIDS as a public health problem by 2030. In this review we describe the genetic mechanisms, epidemiology, and management of HIVDR at both individual and population levels across diverse economic and geographic settings. To describe the genetic mechanisms of HIVDR, we review the genetic barriers to resistance for the most commonly used ARVs and describe the extent of cross-resistance between them. To describe the epidemiology of HIVDR, we summarize the prevalence and patterns of Transmitted Drug Resistance (TDR) and Acquired Drug Resistance (ADR) in both high-income and Low- and Middle-Income Countries (LMICs). We also review to two categories of HIVDR with important public health relevance:

(1) Pre-Treatment Drug Resistance (PDR), World Health Organization-recommended HIVDR surveillance metric and Pre-Exposure Prophylaxis (PrEP) related drug resistance, a type of ADR that can impact clinical outcomes if present at the time of treatment initiation. To summarize the implications of HIVDR for patient management, we review the role of genotypic resistance testing and treatment practices in both high-income and LMIC settings. In high-income countries where drug resistance testing is part of routine care, such an understanding can help clinicians prevent virological failure and accumulation of further HIVDR on an individual level by selecting the most efficacious regimens for their patients. Although there is reduced access to diagnostic testing and too many ARVs in LMIC, understanding the scientific basis and clinical implications of HIVDR is useful in all regions in order to shape appropriate surveillance, inform treatment algorithms, and manage difficult cases.

HIV strains that are resistant to drugs can be passed from patient to patient. A newly infected patient who has not yet utilized antiretroviral medications may carry a drug-resistant virus as a result of such transmitted drug resistance. Researchers have been concerned since the beginning of HIV treatment that drug-resistant strains might spread rapidly among newly infected individuals, rendering some medications worthless. This has never happened with HIV medications, thankfully. Because of the extensive transmission of drug-resistant malaria parasites, numerous malaria medications have been withdrawn from use by national authorities.

Although HIV has been known to transmit medication resistance, the number of cases has remained relatively low. Between 7% and 17% of newly infected patients in high-income countries have at least one significant treatment resistance mutation, which usually imparts resistance to one of two drug classes: Nucleoside Reverse Transcriptase Inhibitors (NRTI) or Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTI) 3,4 Therapeutic resistance is less likely when it comes to the third major drug class (protease inhibitors, or PIs).

Transmitted drug resistance is lower in middle and low-income nations than in high-income countries, although this is likely to change over time. The United Nations member nations decided in 2006 to aim for universal access to treatment by 2010. The term "rollout of ART" refers to the rapid expansion of ART availability in middle and low-income nations as a result of this decision. In the years following the implementation of ART in East and Southern Africa, there is evidence of a rapid rise in transferred drug resistance. 6 This is unsurprising, given that ART has grown in popularity in these areas from nearly non-existent to widespread. In middle- and low-income nations, the prevalence of transferred drug resistance is estimated to be at roughly 7%.

Despite the fact that high-income nations have a higher rate of transferred drug resistance than low-income countries, the impact on patients in high-income countries may be less severe. This is because genotyping the virus before starting treatment is common practice in high-income nations.

Essence of HIV Drug Resistance Investigation. Drug resistance study is a critical technique in assisting physicians in the selection of effective ARV medication regimens will increase the likelihood of positive treatment responses.The use of HIV drug-resistant tests in the treatment of Infected patients are valuable in a variety of ways. Drug-resistant Tests save the cost and toxicity of drugs that are unlikely to be effective. Function and select medications that are most likely to operate effectively these tests can be used to prevent patients without the need for therapeutic intervention. Vital resistance mutations resulting from an unreasonable changing to regimens which are beneficial to persons in need of such treatments Furthermore, these assessments serve as a guide for the selection of beneficial medication combinations.

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Received: 7-Mar-2022, Manuscript No. Puljecm-4421; Editor assigned: 9-Mar-2022, PreQC No. Puljecm–4421(PQ); Reviewed: 22-Mar-2022, QC No. Puljecm–4421(Q); Revised: 24-Mar-2022, Manuscript No. Puljecm–4421(R); Published: 30-Mar-2022, DOI:10.37532/ Puljecm.2022.6(3).19-20