Journal of Pregnancy and Child Health
ISSN: 2376-127X

Perspective Open Access

Mother to Child Transmission Toxicity and Pharmacotherapy: HIV in Pregnancy

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Abstract

In 2018, an estimated 1.3 million pregnant women have HIV. All HIV-positive pregnant women, regardless of clinical stage, should take a combination of antiretroviral medications to reduce maternal viral load and avoid vertical foetal infection since HIV infection is linked to worse pregnancy outcomes. Antiretroviral therapy during pregnancy unquestionably reduced mother-to-child HIV transmission, but there are still a few unknowns. For instance, pharmacokinetic parameters alter during pregnancy, yet there is a paucity of pertinent information from clinical research. Similar to this, nothing is known about the long-term negative consequences of antiretroviral exposure on foetuses. Here, we go through the most recent research on HIV's effects on the placenta and growing baby, suggested antiviral dosages, and pharmacokinetic factors with a focus on placental transport.

Keywords: HIV; Antiretroviral therapy; Mother-to-child transmission; Placental membrane transporters

Introduction

As well the possible consequences of antiretroviral medication on placental fetal development and programming, as well as recent developments in antiretroviral research [1]. Infection with the human immunodeficiency virus continues to be a problem for world health [2]. According to estimates, 1.7 million individuals acquired HIV in 2019 and about 700,000 died from HIV-related illnesses [3]. At the end of the year, there were 38 million people living with HIV globally [4]. Additionally, an estimated 1.3 million pregnant women with HIV were at risk of perinatal transmission of the virus to their foetus and the development of AIDS in 2018 [5]. Most paediatric HIV infections are caused through mother-to-child transmission, which can happen during the second and third trimesters of pregnancy, birth, or nursing. In the absence of any intervention, it has been suggested that the chance of HIV MTCT is up to 8% of children becoming infected during pregnancy, labour, and delivery, and after However, because to the widespread use of antiretroviral medications, 67% of HIV-positive individuals today get antiretroviral treatment, and over 60% are symptom-free [6]. Similarly, during the past 25 years, the incidence of MTCT has decreased to less than 1% due to the effective use of medication and other strategies [7]. The WHO and Pan American Health Organization teamed up to lower MTCT of HIV in Cuba as an illustration of excellent treatment of the disease [8]. All pregnant women were subjected to HIV testing; those who tested positive were given ART; caesarean sections were used to deliver the babies; and nursing was replaced with other methods [9]. Cuba was declared to have entirely eliminated MTCT of HIV five years after implementing these procedures [10]. Although the Cuban In certain other locations, like as sub-Saharan Africa, where nations must rely largely on timely and effective use of ART, the strategy is not practical.

Discussion

Antiretroviral medications that have been licenced by the Federal Food and Drug Administration are currently accessible to physicians and their patients, either alone or in different combinations. However, the majority of these medications are taken off-label since their pharmacokinetics, effectiveness, and maternal and foetal safety during pregnancy have not been properly explored. The effectiveness of ART in lowering MTCT is undeniable, but researchers and doctors should be aware of potential consequences of antiviral medication on prenatal programming and placental development that might lead to illnesses in adults. We summarise the most recent research on HIV during pregnancy in this review. Cytokine and chemokine receptors that may inhibit HIV replication in trophoblasts. One or more significant maternal HIV variations are transmitted during pregnancy. HIV MTCT mostly happens when HIV-infected cells transcytoses, although free virus can also cross the placenta if the villous surface is damaged.

Conclusion

Hofbauer cells, which are fetal-placental macrophages, have the potential to promote placental HIV transmission and aid in the selection of HIV variants that infect the growing foetus. HIV-1 penetrates immune system cells, such as Hofbauer cells, via interacting with CD4 and the chemokine co-receptors CCR5 or CXCR4, and the transmembrane envelope protein gp41 facilitates fusion of the virus with the plasma membrane of the host cell. The foetus may contract the virus intrapartum by micro transfusion during contractions or by the virus ascending through the placenta. During childbirth, the virus enters the cervix and vagina and enters the infant's digestive system. Contrary to in utero transmission of HIV, intrapartum infections are most frequently caused by small HIV-1 variations with relatively significant gene diversity. Breastfeeding transmission can happen at any time during breastfeeding. Because of the embryonic oral and intestinal epithelia's very small mucosal layers, poor stratification, and absence of expression of anti-HIV innate proteins, cell-free and infected CD4+ cells can transmigrate across these tissues. Less research has been done on the risk factors for HIV transmission during breastfeeding, although it appears that subclinical mastitis and maternal viral load are connected. Since the danger of viral transmission to the infant

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Received: 02-Jan-2023, Manuscript No. jpch-23-86629; **Editor assigned:** 06-Jan-2023, PreQC No. jpch-23-86629 (PQ); **Reviewed:** 20-Jan-2023, QC No. jpch-23-86629; **Revised:** 23-Jan-2023, Manuscript No. jpch-23-86629(R); **Published:** 30-Jan-2023, DOI: 10.4172/2376-127X.1000571

Citation: Srivastava S (2023) Mother to Child Transmission Toxicity and Pharmacotherapy: HIV in Pregnancy. J Preg Child Health 10: 571.

increases with time spent breastfeeding by an HIV-positive mother, this risk is cumulative.

Acknowledgement

None

Conflict of Interest

None

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