Libyan International Medical University
Faculty of Basic Medical Science

Common Contraceptive Shot May Increase HIV Risk.

Student name: Lina Ashour Ali Hamad

Tutor name: Nawar Montaser

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Abstract: This data were collected from three different studies**(**Hormonal Contraception and the Risk of HIV Acquisition: An Individual Participant Data Meta-analysis, Injectable birth control may raise HIV infection risk, and Depot-Medroxyprogesterone Acetate (DMPA) and HIV.) , all studies examining the association between use of injectable contraceptives comprising mostly Depot-Medroxyprogesterone Acetate DMPA and the presence or acquisition of HIV.

As a result there was an association between DMPA and increased risk of HIV acquisition according to several factors.

Introduction:

In order for the HIV virus to be transmitted, there must be a point of access within the body where the infection may take place such as an open sore, a needle prick, a bleeding surface, inflammation or an otherwise fragile surface. Some studies suggest that the side effects associated with sex hormones that are used in hormonal birth control methods may increase the likelihood of these types of infection sites to occur.

The hormones that are used in birth control pills can produce a variety of effects on the female reproductive system. Some explanations as to how this hormonal birth control method may increase the risk of HIV/AIDS transmission

A report published by the International AIDS Society has linked the use of an injectable contraceptive known as depot medroxyprogesterone acetate (DMPA) with an increased risk of HIV-1 infections. Interestingly, women using DMPA were at a greater risk of HIV infection than women using no form of contraception at all.[1]

There is ongoing debate whether hormonal contraception (HC) increases the risk of HIV acquisition. Strong evidence for an association would have important implications for sexual and reproductive health, particularly in areas of sub-Saharan Africa where the incidence of both HIV infection and unintended pregnancy remain high. [2]

Discussion:

First study: Hormonal Contraception and the Risk of HIV Acquisition: An Individual Participant Data Meta-analysis.

Observational studies of a putative association between hormonal contraception (HC) and HIV acquisition have produced conflicting results. We conducted an individual participant data meta-analysis of studies from sub-Saharan Africa to compare the incidence of HIV infection in women using

combined oral contraceptives (COCs) or the injectable progestins depot medroxyprogesterone acetate (DMPA) or norethisterone enanthate (NET-EN) with women not using HC.[3]

Contraceptive Use and HIV Acquisition: Across studies there were 1,830 incident HIV infections, for an overall incidence of 4.2 per 100 woman-years. Based on time-varying exposure to contraceptive method, HIV incidence was highest among DMPA users (5.1 per 100 woman-years), followed by NET-EN users (4.8 per 100 woman-years), the no-HC group (3.9 per 100 woman-years), and COC users (3.4 per 100 woman-years). In univariable analyses, COC use was not associated with HIV acquisition while DMPA use and NET-EN use were. In multivariable analyses using a two-stage random effects approach and controlling for a common set of covariates for each study, we found no association between COC use and HIV acquisition , DMPA was associated with an increased risk of HIV acquisition, and the association between NET-EN use and HIV acquisition became weaker In direct comparisons between the three hormonal methods, we found that DMPA use was associated with an increased risk of HIV acquisition compared with both COC use and NET-EN use.[4]

Second study: Injectable birth control may raise HIV infection risk.

Professor Janet P. Hapgood, lead author of the review from the University of Cape Town's Department of Molecular and Cell Biology said: "To protect individual and public health, it is important to ensure women in areas with high rates of HIV infection have access to affordable and safe contraceptive options."

In the review, researchers noted that the injectable progestin contraceptive Depot-Medroxyprogesterone Acetate DMPA, is the major form of hormonal contraceptive used in sub-Saharan Africa, which also has the highest worldwide HIV prevalence, particularly in young women. researchers also noted that DMPA may raise the risk for HIV infection by 40% in women.

Studying the biology of medroxyprogesterone acetate (MPA) helps us understand what may be driving the increased rate of HIV infection seen in human research. Increasing the availability of contraceptives that use a different form of progestin than the one found in DMPA could help reduce the risk of HIV transmission.

Other forms of contraception, including combined oral contraceptives containing levonorgestrel or the injectable contraceptive norethisterone enanthate (NET-EN), were not associated with increased HIV infection risk.

In the review, the researchers wrote that individual progestins used in hormonal contraceptives have different biological effects via specific steroid receptors, and that estrogen may exert a protective, antiviral effect. In a review of animal, cell and biochemical research on the form of progestin used in DMPA, researchers found evidence that "supports a role for MPA in increasing the permeability of the female genital tract and promoting HIV".

The analysis revealed that MPA suppresses plasmacytoid dendritic cell and T-cell function, as well as select regulators of cellular and humoral systemic immunity.[5]

Third study: Depot-Medroxyprogesterone Acetate (DMPA) and HIV.

A recent meta-analysis in (2015), conducted in collaboration with the Population Research Institute, found that the associated risk of acquiring HIV with DMPA usage was significantly higher than for women who did not use DMPA based injectable contraceptives. DMPA was found to increase women's risk of contracting HIV by 49% compared to women not using steriodal (hormonal) contraceptives.[6]

How Does DMPA Increase the Risk of HIV Acquisition?

Researchers are not entirely certain why women who use DMPA injectables contract HIV at higher rates than the general population. A number of likely mechanisms of action have been proposed.

DMPA is an artificial steroid made to mimic the effects of natural endogenous progesterone, a hormone that helps regulate the menstrual cycle and is crucial during pregnancy for the health of the fetus. One of the effects of progesterone is to attenuate the immune system's inflammatory response to allow the body to accept the embryo during pregnancy. This attenuation of the immune system could also make it easier for the HIV virus to cause an infection.

Studies have shown that, unlike endogenous progesterone, DMPA has an affinity not only for the progesterone receptor, but also the glucocorticoid receptor (GR) and the androgen receptor.MPA has been found to mediate the upregulation or downregulation of various pro-inflammatory and anti-inflammatory cytokines and chemokines through, as some studies have found, MPA's affinity for the glucocorticoid receptor GR.

One study found that, in the presence of concentrations of MPA in similar to serum levels of MPA found in women after receiving a DMPA injection, MPA significantly increases transcytosis of HIV across genital epithelial cells in vitro. Epithelial layers in the genital tract are crucial preventing the HIV virus from reaching stromal tissues where active infection of target leukocytes such as CD4+ T cells and macrophages is easily effected. T cells cultured in epithelial cells challenged with a CRCX4-tropic strain of HIV and treated with MPA have been observed in vitro to produce significantly higher levels of HIV viral replication than estradiol treated cells.[7]

Conclusion:

The increased rate of HIV infection among women using DMPA contraceptive shots is likely due to multiple reasons, including decreases in immune function and the protective barrier function of the female genital tract. Studying the biology of DMPA helps us understand what may be driving the increased rate of HIV infection seen in human research. These findings suggest other forms of birth control should rapidly replace DMPA shots. Ideally, women should have access to a full range of contraceptive choices and should be informed regarding the benefits and potential dangers associated with each option.

References:

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