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# **Relation between Human Immunodeficiency Virus (HIV) and Infective Endocarditis (IE)**

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## Abstract

**Background: Individuals** with Human Immunodeficiency Virus (HIV) (People living with Human Immunodeficiency Virus (PLWH)) have a high chance of becoming diagnosed with infective endocarditis (IE). In order to discuss the association between PLWH and Infective Endocarditis (IE). We'll mention the risk factor for Infective Endocarditis in HIV patients.

**Methods and materials:** A publication review was carried out to discover studies investigating the connection between the human immunodeficiency virus and endocarditis. In Spain two studies were conducted. And the other was carried out in Italy; these two studies were significant in improving the link between human immunodeficiency virus and infectious endocarditis.

**Results:** Most of the studies examined in this study showed a strong association between human immunodeficiency virus and infectious endocarditis cardiovascular diseases, one of which was carried out in Spain and the other in Italy. They were found to have a high correlation between HIV and possibilities of IE infection, particularly in HIV patients with inactive Cart; due to immunocompromised in people with human immunodeficiency virus.

**Conclusion:** the studies have shown that the association between HIV patient and IE disease is highly strong because HIV offers the opportunity for pathogens that can cause IE to enter the body without any impairment in its pathway; which increases the risk of developing IE disease. But they found many factors could increase or decrease the proportion of IE.

## Introduction

**Human Immunodeficiency Virus (HIV)** has become a public health problem about 75 million people worldwide have been diagnosed with HIV and around 37 million people currently live with HIV (PLWH) [1]. About 1.1 million deaths in 2015 were due to that infection. However, by the end of 2015, they reported more than 2.1 million new cases. Africa appears to be the hardest hit [2]. HIV is one of the two important human T-cell lymphotropic retroviruses (human T-cell leukemia virus) [3]. HIV infects and destroys helper (CD4) T lymphocytes that contribute to cell-mediated immunity loss (immunocompromised) [3]. It induces an increased risk of infection due to a deficiency in the ability of the immune system to detect pathogens. In the absence of combined antiretroviral therapy (CART), the patient with HIV has a progressive loss of T helper cell (CD4) and a wide range of immunological abnormalities. Amount of CD4 + T-cell principal risk factor for human immunodeficiency virus infection. HIV-infected patients with CD4 cell counts  $> 500$  cells/ $\mu$ L had an increased risk of infection relative to those with CD4 counts  $> 750$  cells/ $\mu$ L. Thus, the efficacy of cART and the electivity of se antiretroviral treatments in the last two decades may have been a key factor in the etiology of IE [4].

**Infective endocarditis (IE)** is inflamed reaction due to valve inflammation and the heart's endocarditis layer contributes to vegetation (valvular thrombi) [5], Rare still causes severe illness and death. People at risk of infection used to be people with rheumatic valvular heart disease, those with a history of dental procedures or intravenous users of drugs [5]. Almost all of them found that the incidence of IE in the general population increased from 2,72 in 2003 to 3,49 per 100,000 individual years in 2014[6]. Several population-based studies in Europe have shown that the prevalence of IE has increased in the general population and the intensive care units [6]. With respect to the responsible infectious agents, streptococci and staphylococci are the most common cause of IE (about 80 per cent) in most developed countries, but the proportion of these two microorganisms varies by area and year. Enterococci are the next most common cause of IE and less often of fungi and Gram-negative bacilli [7].

We aimed to discuss the correlation between the Human Immunodeficiency Virus (HIV) and infective endocarditis (IE), and determine the risk factor and pathogens of Infective Endocarditis (IE) in patients with HIV infection.

## **Materials and Methods**

A literature search was performed to discover studies reviewing the correlation between Human Immunodeficiency Virus (HIV) and infective endocarditis (IE). Outline sites and databases included in this report are *PubMed* database, *Google Scholar*, *Science Direct*. Keywords: "Human Immunodeficiency Virus (HIV)/ acquired Immunodeficiency syndrome (AIDS)" "infective endocarditis" "etiology of infective endocarditis" "risk factor of infective endocarditis" "HIV-associated acute cardiovascular diseases". Titles and abstracts were observed for significance. used scientific books to introduce these two diseases.

This report included studies conducted in Spain which was discussed the epidemiology of infective endocarditis on HIV patients. And the other one was conducted in Italy; cases were collected between 1986 and 1999. Only definite diagnosis according to the Duke criteria were analyzed. Those studies were significance for improved the correlation between both Human Immunodeficiency Virus (HIV) and infective endocarditis (IE).

## Result

Most of the studies researched showing high relation between Human Immunodeficiency Virus and cardiovascular diseases which is infective endocarditis. Almost of the studies that was conducted in Spain and the other one was conducted in Italy they improved this relation but in different way.

The results of first study which was conducted in Spain after the study population on 1800 hospital admissions of IE diagnosis in HIV-infected patients with combined antiretroviral therapy (cART) in Spain through a 17-year period, at the beginning of 1997 into 2014[4].

The result of the Italian study that was conducted which they take 263 cases have infective endocarditis, HIV-positive patients included in 100 cases, were detected in Intravenous drug users (IDUs). Right-sided connection was observed in 167cases, left-sided involvement in 115 cases. The tricuspid valve (TV) alone was non-natural in 135 cases, the mitral valve alone in 32 patients, the aortic valve alone in 41 cases and the pulmonic valve alone in 3 cases. *Staphylococcus aureus* was lonely in 156 cases and *Streptococcus* in 33 cases. There were no significant differences between HIV-negative and HIV-positive patients [8].

## Discussion

Regarding the first study in Spain were they discuss etiology and epidemiology of IE in HIV patients according to the age, gender, substances of abuse (drugs, alcohol, tobacco), and if they had another disease like diabetes, hypertension, coronary heart disease, peripheral vascular disease. This study shows the relation between IE and HIV patient with combined antiretroviral therapy (cART) was highly strong. They found the association between the EI in HIV patient with active cART which is main factors that impacts the risk for development of bloodstream infections is the availability of this drug to decrease the effect of HIV on the immune system ; HIV effect on immune system by decreasing the CD4+cell which play main role in host defense against the pathogen, even by stimulate some cells (B\_Lymphocytes to converged into the plasma cells) to producing some substance (Antibodies) to kill him or to reduce it is risk effect on the body[3]. So, they detected that the high effect of the HIV on the immune system by reduce the count of the CD4+ cells below 500 which is increase the risk of EI by increasing the bloodstream infection by any pathogens turn out to be the major leading cause of IE [4]. The study showed a decline in the increase in incidence rates and hospital admissions in Spain correlated with IE and PLWH. It is very likely that the decline observed in IE in this study may have been due to the widespread use of cART. The cART has enhanced its efficacy, and adherence has increased due to easier and less harmful medications, which could have led to this. Effectiveness of medication action of this drug on HIV patients is the main factor which determine the possibility to be infected by IE. They observed many other factors will increase the risk of IE even the therapy is benefit. Like infection with another viruses (hepatitis C or hepatitis B), Age (the immunity system of children lower than adult), gender (male effected more than female), possibility to be had another disease (diabetes, hypertension, coronary heart disease, peripheral vascular disease) that enhance the ability to be affected by IE[4].

The second study that the infective endocarditis in intravenous drug users (IDUs) increasing specially in HIV patients more than non-HIV patients but not in major different in how they effect. The IDUs are at high risk of IE. Infective Endocarditis in IDUs was significantly related with right side localization most common microorganism cased the IE is *staph. Aureus*, if it becomes left side involved in age greater than 35years are associated with death, while if it had HIV infection did not have any important effect on mortality [8]. In this study found that the IDUs is risk factor of IE in PLWH which intravenous drugs take with nonsterile needle or any defect in sterilization will facilitate the entry of the pathogens into the bloodstream by the vein

and due to the immunocompromised in patient with HIV the pathogens can colonize in the blood than diffused into the right side of the heart and cause non-sterile thrombi on the valve of the right side heart valve (tricuspid valve), thrombus on the valve called vegetation. And in non-HIV patient related to IDUs the possibility to be infected by infective endocarditis during their use intravenous drug they have the same ratio but depend on many factors like age, gender, diseases they'll decrease immune system function such as diabetes mellitus type 1 and type 2 and many other factors enhanced infected with IE. The association between the HIV and infective endocarditis specially in HIV patient related to intravenous drug users is highly strong and this correlation is very important to improvement to be carefully and awareness about this during any medication therapy [8].

## **Conclusion**

Most of the studies had shown that the relationship between HIV patient and IE disease is very strong because HIV gives the possibility of pathogens that may cause IE to be able to invade the body without any disability in its path; which is an increase the risk of developing IE disease. HIV patient healthy at risk they have difficult to combat the pathogens. HIV's patients with not benefit antiretroviral therapy have a higher risk of infectious endocarditis than those who is had active antiretroviral therapy. The patient with positive HIV or negative HIV they don't have major different to be infected by IE because there are many factors that may enhance the incidence of this disease. Therefore, they still have more research-based evidence is needed to better inform related of this correlation between HIV patient and IE disease.

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