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Review Article: Impact of Smoking on Individuals with Human Immunodeficiency Syndrome (HIV)

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Abstract:

Background: This article examines the pathophysiological processes behind health problems resulting from tobacco use in individuals with HIV, as well as the potential interactions between these mechanisms and HIV infection. HIV-infected persons experience a more pronounced health impact from smoking tobacco in comparison to others who are not infected. Smoking in people living with HIV (PLWH) is influenced by various factors, such as the presence of mental health conditions, alcohol and drug consumption, the quality of their health-related well-being, smoking habits within their social circles, and limited healthcare accessibility. People living with HIV (PLWH) who smoke are more susceptible to many infections connected with HIV and other health issues, such as a diminished response to antiretroviral drugs, a weakened immune system, lower cognitive abilities, poor lung function, and cardiovascular disease.

Aim: The objective of the study is to examine the correlation between smoking and the probability of contracting HIV. Smoking is recognized to impair the immune system and heighten susceptibility to infections and chronic illnesses, which can be especially harmful to individuals already impaired by HIV**.**

Methods: The journals were collected using the systematic literature review approach, adhering to the guidelines developed by the Preferred Reporting Items of Systematic Reviews and Meta-Analyses (PRISMA). The procedure consists of four phases: identification, screening, eligibility, and inclusion for satisfactory outcomes. The literature review was carried out by systematically scanning scientific papers using internet-based databases like Google Scholar, Science Direct, BMJ Open, and Lontar UI. The search was conducted using exact combinations of keywords. The topics of interest are HIV, tobacco usage, and those who have HIV and engage in smoking.

Keywords: HIV, Smoking, Identify health risks

Introduction: Smoking rates among individuals with HIV are commonly believed to be 2-3 times higher than in the general population, but this varies across different studies [8, 9]. The most precise prevalence data are often obtained by outpatient HIV clinics that serve various populations, where the percentage varies between 39% and 59% [11,14]. On the other hand, the percentage of people who actively smoked in the overall US population within 2010 was 19.3%

[18]. Furthermore, research on individuals with HIV infection consistently demonstrates a prevalence of smoking history above 75% [8, 13, 16]. The high prevalence of smoking in HIV-infected populations is likely due to multiple factors. These factors include the well-established links between smoking and characteristics that are common in HIV populations, such as lower socioeconomic, educational levels, psychiatric comorbidity, and concurrent use of illicit drugs and alcohol, and mental stress [18].

Properties and classification of HIV: The virus that causes immunodeficiency is classified under the Lentivirus genus under the Ortho retroviridae subgroup in the Retroviridae family [29]. HIV is categorized divided into two kinds, HIV-1 and HIV-2, according to genetic traits and differences in viral antigens. SIV, which stands for simian immunodeficiency virus, is a type of immunodeficiency virus found in non-human primates. It is classified under the lentivirus genus. Based on current epidemiological and phylogenetic studies, it is believed that HIV was introduced to humans sometime between the 1920s and 1940s. HIV-1 is thought to have originated from the SIV cpz virus found in essential African chimpanzees, while HIV-2 grown from the SIV sm virus found in Southey Manga Bay in West Africa [16,41,13].

HIV disease: The virus that causes immunodeficiency gains entry into the body via intact mucosa, eczematous or damaged skin and mucosa, and through parenteral inoculation. Regarding sexual transmission, HIV initially binds to dendritic cells, such as Langerhans cells and macrophages/monocytes are involved in a process where HIV strains that rely on the CCR-5 co-receptor (known as R5 virus) replicate more effectively. Macrophages phagocytose and replicate HIV [33], As demonstrated by intramucosal M cells. Blood cell exposure. HIV has the ability to directly invade T helper cells, which can be targeted by two types of viruses: the R5 virus and the X4 virus (which uses the CXCR4 co-receptor) [1]. As previously stated, the infectious dosage of HIV (1HID) is roughly 500 to 1000 HIV particles. Mucosal transmission necessitates greater doses comparing with direct blood transmission, like needle stick injuries. The majority of newly acquired HIV infections are transmitted through sexual contact. Another significant method of transmission involves the administration of medications through injection or inhalation, particularly when accompanied by nosebleeds. HIV can be identified in nearby lymphoid tissue within one to two days after infection [31] and subsequently infects nearby MPH nodes within 5 to 6 days. HIV can be detected in the body, including the brain system, 10 to 14 days after infection. The rate at which HIV spreads in the body relies on the major target cells, which include the tonsils and rectal mucosa [18]. Within an infected person, many divisions can be defined based on the levels of the virus present. However, there is no evident correlation among viral concentrations across these different compartments. The pertinent compartments of HIV encompass the blood, cerebral fluid, and the reproductive system, such as ejaculate and vaginal secretions [30,3].

Transmission of HIV: Human immunodeficiency virus (HIV) is a sexually transmitted infection. Throughout sexual intercourse, the virus can penetrate the protective layer from the

vagina, vulva, penis, and rectum Through way of initially engaging through immune cells, particularly dendritic cells. These cells function as Trojan horses, transporting the virus to the surface of the mucosa. Dendritic cells ensnare the virus on their exterior, transport it across the mucosal barrier, and discharge it into the lymphoid tissue or straight into the lymph nodes. In this case, the virus attaches to CD4 cells and facilitates the spread of the infection. The probability of transmission during sexual intercourse is considerably elevated if the patient has concurrent sexually transmitted illnesses, if the sexual activity involves partners of different sexes, or if [30,3]. The partner exhibits a significant viral load, which can occur with a primary infection or an advanced stage of HIV. The user's text is [2]. Typically, women have a higher likelihood of contracting HIV through heterosexual intercourse due to the extensive mucosal surface area that comes into contact with sperm. The consistent and proper utilization of condoms greatly diminishes the likelihood of transmission in heterosexual intercourse [36]. Nevertheless, the sole reliable method to prevent HIV infection is by sexual abstinence. Scientists are currently working on the development and experimentation of novel chemical and biological substances, like microbicides, that women may use as a preventive measure before engaging in sexual activity to safeguard themselves against HIV along with other sexually transmitted illnesses [36]. An instance of a phase III clinical research was conducted in Nigeria to evaluate the effectiveness of a vaginal gel, specifically 1.0% C31G (SAVVY), on 2,153 HIV-negative women who were at a high risk of infection. However, the trial did not demonstrate a reduction in the rate of HIV infection [14]. The World Health Organization, commonly referred to as the WHO, advocates for male circumcision as a crucial measure to decrease the likelihood of heterosexual transmission for HIV in men. HIV may also be transmitted by direct contact with contaminated blood, particularly among individuals who use drugs and engage in the reuse or sharing on syringes or needles [6]. Needle exchange programs have been effective in mitigating this risk, as evidenced by their implementation since 1985, resulting in a decrease in the contamination of the blood supply [10]. HIV testing is conducted to the United States, Canada, and Europe, and the likelihood of transmission via blood products is exceedingly low. Nevertheless, those who received blood products throughout the 1980s should have HIV testing [11]. Additionally, this is a potential for HIV transmission by the expectant mother into the fetus or baby during the stages of pregnancy, delivery, and breastfeeding. The frequency of antiretroviral medication in developed nations. The implementation of cesareans and artificial feeding has significantly decreased the transmission rate of infections from mother to child, reducing it from approximately 25% to 1-2%. However, in underdeveloped countries where access to antiretroviral therapy (ART) is limited and breastfeeding can't be avoided, the overall risk for infection at 18-24 months of age is estimated to be between 15-25%. Out of the 700,000 infants who contracted HIV in 2003, around 315,000 acquired the infection through breastfeeding [7]. Healthcare practitioners are at risk of contracting HIV through accidental needlesticks and contact of mucosal membranes to tainted blood. The United States reported 57 incidents of HIV seroconversion resulting from occupational exposure in 2007. In 2007, there was a significant rise in the number about HIV seroconversions resulting from occupational

exposure, reaching a total of 1.5 million cases annually [15]. The likelihood of contracting HIV in the workplace is determined by the nature and severity of the exposure. After being pricked by a needle, the average risk is estimated to be 0.3%, whereas the risk after exposure to mucous membranes is predicted to be 0.09% [5].

Epidemiology of HIV: Based on current information, it is understood that the HIV epidemic originated in the early 20th century [4]. The transmission for SIVcpz to chimpanzees (Pan troglodytes troglodytes) to humans happened approximately about 1920 for HIV-1 group M and group O, and around 1960 for HIV-1 group N [29,41]. The transmission of HIV-2 in West Central Africa occurred through zoonosis of Suthimanga Bay (Cercocebusatys) in West Africa, approximately about 1940 [13]. Based on molecular genetic studies, it is likely that HIV-1 was introduced to Haiti around 1966 and reached North America around two years afterwards [42,35]. Since the mid-1980s, various M subtypes of HIV-1 have started spreading, which lead to a worldwide pandemic. On the other hand, HIV-2 was initially confined to West Africa due to its considerably lowering ability to infect. Nevertheless, after being possibly assigned to Portugal and France in the mid-1960s, HIV-2 became more prevalent. Evidence has demonstrated that it exhibits a low incidence of transmission in Europe, South America, and Asia. By 2013, the global population of individuals infected with HIV reached an estimated 35 million. Since 1999, there has been a consistent decrease in the number of new infections, with approximately 1.9 million new infections reported in 2013. Approximately 75% of HIV diagnoses are concentrated in sub-Saharan Africa, with over 66% of new infections originating from this area. The prevalence rates for individuals aged 15 to 49 are Swaziland, Lesotho, and Botswana have the greatest prevalence and are the most impacted countries when it comes to HIV, with rates of approximately 27%, 23%, and 23% respectively [24,40].

Future directions of HIV treatment: Ensuring the effectiveness, safety, and tolerability of HIV treatment is crucial for its sustained success. Moreover, future clinical development will prioritize the simplicity of antiretroviral treatment regimens [39]. Presently, there are two single-tablet regimens (STR) being studied, namely DTG/RPV and 3TC/DTG, which aim to disrupt the conventional structure of two-agent NRTIs by introducing a third agent. The combination therapy of 3TC/DTG demonstrated encouraging outcomes in a limited proof-of-concept investigation involving treatment-naïve patients. Encouraging outcomes were noted after a 24-week course of treatment with the inclusion of once-daily NRTI sparing regimens, specifically the combination of DT G and darunavir enhanced cobicistat (DRV). It is crucial to confirm that the two-drug regimen sustains viral suppression for extended durations without the development of resistance, in contrast to the currently favored three-drug regimen. Phase 3 trials will assess the effectiveness of long-acting injectable forms of medicines, including cabotegravir and RPV, which have already been demonstrated effective in oral forms. Enrollment trials. If these trials validate their long-term safety and efficacy, they could offer a more streamlined and feasible approach to maintenance treatment. Nevertheless, it is crucial to ascertain the extended-term resilience and acceptability of monthly or biweekly intramuscular injections. Furthermore,

alternative sustained-release drug delivery technologies have the potential to enhance the convenience of antiretroviral therapy. However, existing patches, implants, and other drug delivery technologies have restricted capacity and are likely to necessitate more powerful substances. Novel antiretroviral medications, including adhesion inhibitors and maturation inhibitors, are currently undergoing advanced clinical trials. If authorized, they could broaden the range of therapy options, particularly for patients who are resistant to many classes of drugs and require rescue treatment. Ideally, these newly developed medicines can be prescribed alongside existing antiretroviral medications to form single-agent regimens (STRs) to take care of second- and third-line cases. Ongoing research and development of novel therapeutic techniques are targeting the persistent reservoir for HIV, in addition for advancements in antiretroviral treatment [37,43]. These endeavors can result in an extended period of being free from drugs and achieving a cure for HIV. Emerging strategies prioritize the use of latency-reversing agents to activate viral reservoirs, immunotherapy involving activators for innate immunity and effector antibodies, gene therapy, and therapeutic vaccines aimed at eliminating persistent viral reservoirs and enhancing the immune system's ability to control HIV infection [37,43].

Results: Retrospective cohort research conducted on HIV+ participants revealed that individuals who were current or previous smokers with a higher dose and/or longer duration of smoking had a significantly greater chance of all-cause mortality compared to those who had never smoked. The given text is a list containing two elements: [9 , 44]. Nevertheless, the overall death rate is reduced by 50% in former smokers when compared with current smokers. The number 9 is enclosed in square brackets. Furthermore, after accounting for the quality and availability of healthcare and antiretroviral therapy, the data suggests that among groups of individuals living with HIV, the number of years of life lost due to smoking is greater than the number of years lost due to HIV [10] . Smokers have three times higher excess mortality and HIV patients have double the population-attributable risk of death from smoking compared to matched population controls [10] .

Discussion: **Tobacco** consumption is a significant contributor to illness and mortality in the overall populace [25], and it serves as a predisposing factor for several severe ailments, such as coronary heart disease, myocardial infarction (MI), stroke, and lung disease. Furthermore, smoking escalates the likelihood of developing many types of cancer in the oral cavity, pharynx, esophagus, stomach, pancreas, larynx, lung, cervix, bladder, and kidney [27]. The prevalence of smoking among individuals with human immunodeficiency virus (HIV) is considerably higher than that of the general population, exceeding 40% in multiple studies [45, 26].This raises concerns regarding the potential correlation between smoking and heightened complications and mortality rates in cardiovascular (CV) disease as well as early cancer among those who are HIV positive. The study paper examines the correlation between smoking and pneumonia in a study conducted on HIV positive patients demonstrated that cessation of smoking resulted in a 27% decrease in the likelihood of contracting bacterial pneumonia. HIV infection remains a prominent worldwide health concern. The global population of individuals living with HIV

(PLHIV) reached an average of 37.9 million at the end of 2018 [20]. On a global scale, tobacco smoking poses a substantial risk to the well-being of the general population, resulting in about 8 million fatalities per year. Moreover, smoke plays a substantial influence in the onset of cardiovascular diseases, which are the primary cause of mortality globally. In 2018, the global mortality toll from AIDS-related illnesses amounted to 770,000. Moreover, HIV infection is increasingly acknowledged as a heightened risk factor for cardiovascular disorders, along with to the typical risk factors associated with cardiovascular health.

Conclusion: Smoking elevates the likelihood of developing heart disease, lung disease, and cancer. People living with HIV/AIDS, who already have a compromised immune system, may face heightened susceptibility to more severe hazards. Smoking significantly raises the rates of illness and death in patients with HIV infection.

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