

**Endodontic Treatment in HIV Patients: important oral manifestations and basic preventive standards**

**Tratamento Endodôntico em Pacientes com HIV: manifestações orais importantes e normas básicas de prevenção**

**Tratamiento de endodoncia en pacientes con VIH: manifestaciones bucales importantes y pautas básicas de prevención**

DOI: 10.5281/zenodo.13121066

Received: Jun 27, 2024

Approved: Jul 25, 2024

**Oliver Renê Viana de Jesus**

Undergraduate Dentistry Student

Institution: Maurício de Nassau University Center/Uninassau

Address: Aracaju – Sergipe, Brazil

Orcid ID: 0009-0001-4129-2367

E-mail: vianawork@hotmail.com

**Andres Camilo Campo Arevalo**

Undergraduate Dentistry Student

Institution: Universidade Tiradentes/UNIT

Address: Aracaju – Sergipe, Brazil

Orcid ID: 0009-0005-6865-3459

E-mail: andrescamilocampo12@gmail.com

**Emanuele Souza Monteiro**

Undergraduate Dentistry Student

Institution: Maurício de Nassau University Center/Uninassau

Address: Aracaju – Sergipe, Brazil

Orcid ID: 0009-0008-1951-2598

E-mail: emanuelesouzaodonto@gmail.com

**Maria Thysbe Lima de Figueiredo**

Undergraduate Dentistry Student

Institution: Maurício de Nassau University Center/Uninassau

Address: Aracaju – Sergipe, Brazil

Orcid ID: 0009-0009-4240-6678

E-mail: thysbyfigueiredo@hotmail.com

**Letícia de Andrade Oliveira**

Undergraduate Dentistry Student

Institution: Maurício de Nassau University Center/Uninassau

Address: Aracaju – Sergipe, Brazil

Orcid ID: 0009-0009-0906-7627

E-mail: leticia.andrade.o@hotmail.com

**Gliciane Santana da Silva**

Undergraduate Dentistry Student  
Institution: Maurício de Nassau University Center/Uninassau  
Address: Nossa Sra. do Socorro – Sergipe, Brazil  
Orcid ID: 0009-0001-0735-5547  
E-mail: glicianesantan@hotmail.com

**Stephanie Cardoso Costa**

Undergraduate Dentistry Student  
Institution: Maurício de Nassau University Center/Uninassau  
Address: Aracaju – Sergipe, Brazil  
Orcid ID: 0009-0001-5787-3182  
E-mail: stephaniecardosoc@hotmail.com

**Juliana Maria Fernandes Santos**

Undergraduate Dentistry Student  
Institution: Maurício de Nassau University Center/Uninassau  
Address: Aracaju – Sergipe, Brazil  
Orcid ID: 0009-0007-6330-0085  
E-mail: julianaafernandeess@hotmail.com

**Guilherme Santos da Silva**

Undergraduate Dentistry Student  
Institution: Maurício de Nassau University Center/Uninassau  
Address: Pedrinhas – Sergipe, Brazil  
Orcid ID: 0009-0005-4648-8720  
E-mail: guilhermendes1001@gmail.com

**Cecília Bezerra de Meneses Corbal Guerra**

Master's student in Dentistry  
Institution: Federal University of Sergipe/UFS  
Address: Aracaju – Sergipe, Brazil  
Orcid ID: 0009-0008-9105-6697  
E-mail: ce.guerra92@hotmail.com

**ABSTRACT**

Human Immunodeficiency Virus (HIV) has changed its evolutionary pattern into an additional chronic one, due to the introduction of a new therapeutic regimen. Critical HIV infection is an illness that develops within two to four weeks of contracting HIV. HIV leads to a weaker immune system by attacking the immune system of the affected individual and Acquired Immunodeficiency Syndrome (AIDS) is induced by HIV. HIV can be transmitted via various routes including unprotected sex and multiple needle use. Oral health care is an important component of the management of patients with HIV. Endodontic treatment, particularly in immunocompromised patients may be correlated with endodontic outcomes. Many studies have reported a higher prevalence of dental caries and other oral manifestations. This article explores current approaches, clinical considerations, and treatment outcomes for patients with HIV undergoing endodontic procedures. The search was performed by prioritizing studies in English published in the last 10 years. 54 articles were analyzed to compose the integrative review concerning the subject. Various studies have shown that 70 to 90% of HIV-infected subjects will develop at least one oral manifestation in their lifetime and that the apparition of severe presentations can suggest a progression toward AIDS. Endodontic treatment for HIV-positive patients requires a multidisciplinary approach. Association between these specialists is critical to ensure effective treatment.

**Keywords:** AIDS. HIV. Human Immunodeficiency Virus. Health.

## RESUMO

O Vírus da Imunodeficiência Humana (HIV) alterou o seu padrão evolutivo para um padrão crônico adicional, devido à introdução de um novo regime terapêutico. A infecção crítica pelo HIV é uma doença que se desenvolve dentro de duas a quatro semanas após a contração do HIV. O HIV leva a um sistema imunológico mais fraco ao atacar o sistema imunológico do indivíduo afetado e a Síndrome da Imunodeficiência Adquirida (AIDS) é induzida pelo HIV. O VIH pode ser transmitido através de várias vias, incluindo relações sexuais desprotegidas e utilização de múltiplas agulhas. Os cuidados de saúde oral são uma componente importante do tratamento de pacientes com HIV. O tratamento endodôntico, particularmente em pacientes imunocomprometidos, pode estar correlacionado com os resultados endodônticos. Muitos estudos relataram maior prevalência de cárie dentária e outros tipos de manifestações bucais. Este artigo explora abordagens atuais, considerações clínicas e resultados de tratamento para pacientes com HIV submetidos a procedimentos endodônticos. A busca foi realizada priorizando estudos em inglês publicados nos últimos 10 anos. Foram analisados 54 artigos para compor a revisão integrativa sobre o tema. Vários estudos demonstraram que 70 a 90% dos indivíduos infectados pelo HIV desenvolverão pelo menos uma manifestação oral durante a sua vida e que o aparecimento de apresentações graves pode sugerir uma progressão para a AIDS. O tratamento endodôntico para pacientes HIV positivos requer uma abordagem multidisciplinar. A associação entre esses especialistas é fundamental para garantir um tratamento eficaz.

**Palavras-chave:** AIDS. HIV. Vírus da Imunodeficiência Humana. Saúde.

## RESUMEN

El Virus de Inmunodeficiencia Humana (VIH) cambió su patrón evolutivo a un patrón crónico adicional, debido a la introducción de un nuevo régimen terapéutico. La infección crítica por VIH es una enfermedad que se desarrolla entre dos y cuatro semanas después de contraer el VIH. El VIH conduce a un sistema inmunológico más débil al atacar el sistema inmunológico del individuo afectado y el VIH induce el síndrome de inmunodeficiencia adquirida (SIDA). El VIH se puede transmitir a través de varias vías, incluidas las relaciones sexuales sin protección y el uso de múltiples agujas. El cuidado de la salud bucal es un componente importante del tratamiento de los pacientes con VIH. El tratamiento endodóntico, particularmente en pacientes inmunocomprometidos, puede correlacionarse con los resultados endodónticos. Muchos estudios han reportado una mayor prevalencia de caries dental y otro tipo de manifestaciones bucales. Este artículo explora los enfoques actuales, las consideraciones clínicas y los resultados del tratamiento para pacientes con VIH sometidos a procedimientos de endodoncia. La búsqueda se realizó priorizando estudios en inglés publicados en los últimos 10 años. Se analizaron 54 artículos para componer la revisión integradora sobre el tema. Varios estudios han demostrado que entre el 70 y el 90% de las personas infectadas por el VIH desarrollarán al menos una manifestación oral durante su vida y que la aparición de presentaciones graves puede sugerir una progresión hacia el SIDA. El tratamiento de endodoncia para pacientes VIH positivos requiere un enfoque multidisciplinario. La asociación entre estos especialistas es fundamental para garantizar un tratamiento eficaz.

**Palabras clave:** SIDA. VIH. Virus de Inmunodeficiencia Humana. Salud.

## 1. INTRODUCTION

Human Immunodeficiency virus (HIV) was identified in 1983 and has before been responsible for a worldwide pandemic (Fontes, Marques, Gonçalves 2015). Since 1996, HIV/AIDS disease, usually characterized by a progressive immunodeficiency course leading to death, has changed its evolutionary pattern into an additional chronic one, due to the introduction of a new therapeutic regimen (Fontes, Marques, Gonçalves 2015). Critical HIV infection, also known as primary HIV infection, is an illness that develops within two to four weeks of contracting HIV (Prabhu; Wagoner 2023).

HIV leads to a broken and weaker immune system by attacking the immune system of the affected individual and Acquired Immunodeficiency Syndrome (AIDS) is induced by human HIV (Barbi *et al.*, 2021). This debilitated immune system causes the individual to be prone to various opportunistic infections that are life-threatening including diverse carcinomas and disorders affecting the neurological system (Rai *et al.*, 2020; Barbi *et al.*, 2021).

HIV can be transmitted from one individual to another via various routes including unprotected sex with affected individuals, sex with multiple partners, injectable drug abuse, blood transfusions and multiple needle use (Barbi *et al.*, 2021). Patients presenting with any symptoms consistent with critical HIV should undergo a complete sexual and social history to characterize the probability of HIV as the cause (Prabhu; Wagoner 2023).

As the life expectancy in people living with HIV increases, the risk of HIV-associated non-acquired immune deficiency syndrome (AIDS) comorbidities such as cardiovascular disease, neurocognitive disorders, cancer, and liver and kidney disease is increasingly reported (Li *et al.*, 2021). Oral health care is an important component of the management of patients with HIV infection and an inadequately functioning dentition can adversely impact the quality of life, complicate medical conditions, and create or exacerbate nutritional and psychosocial problems (Rai *et al.*, 2020).

Endodontic treatment, particularly in immunocompromised patients such as those with the human immunodeficiency virus (HIV), presents challenges and special considerations due to the nature of the disease and the compromised immune status of the patients, likewise, some systemic diseases may be correlated with endodontic outcomes (Aminoshariae *et al.*, 2017)

This article explores current approaches, clinical considerations, and treatment outcomes for patients with HIV undergoing endodontic procedures, it also aims to discuss the HIV main considerations and how this condition can affect oral health, mainly, in endodontic treatment.

## 2. THEORETICAL FRAMEWORK

Since the first reported case in 1981, as of 2015, 36.9 million people are reported to be HIV positive, among which 18.8 million are under 14 years of age (Rai *et al.*, 2020). In France, between 155,000 and 205,000 people are HIV-positive, and 27,000 live with AIDS and in 2020, it is estimated that 4856 people discovered they were HIV-positive (Benslama, 2022). Based on Li *et al.*, (2021), The World Health Organization reported that, at the end of 2019, approximately, 38 million people were living with HIV worldwide, with around 67% of them receiving antiretroviral therapy (ART).

According to the statistics, approximately 1.1 million people are living with HIV and need meticulous dental management to avoid the risk of transmission of the disease (Hussain; Bashar; Shikder 2021). In April 2004, a program was established in India under the National AIDS Control Program where free antiretroviral therapy was given to persons with AIDS/HIV (Barbi *et al.*, 2021).

AIDS is the condition that results from long-term (chronic) HIV infection and is defined by an absolute CD4 cell count of less than 200 cells  $\mu\text{L}^{-1}$  and/or the presence of specific opportunistic infections or malignancies

(Prabhu; Wagoner 2023). HIV/AIDS is diagnosed via laboratory testing and then staged based on the existence of certain manifestations and symptoms (Prabhu; Wagoner 2023).

A crucial aspect of mucosal HIV transmission is the interaction between HIV, the local environmental milieu and immune cells and the oral mucosa comprises many host-cell types including epithelial cells, CD4 + T cells, dendritic cells and monocytes/macrophages, as well as a diverse microbiome predominantly comprising bacterial species (Weinberg *et al.*, 2020)

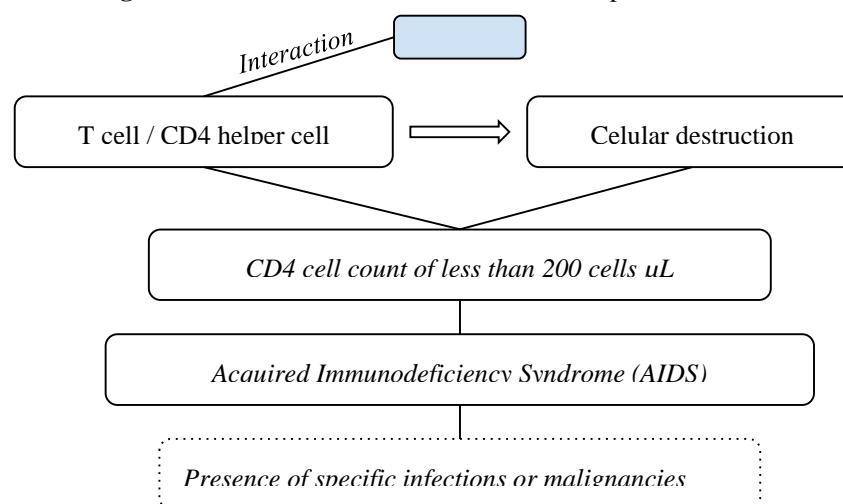
When concerning the dental characteristics of HIV patients, Rai *et al.*, (2020) declare that many studies have reported a higher prevalence of dental caries in HIV-infected, correspondingly, as other sorts of oral manifestations. Alterations in salivary composition and function in HIV infection might play a key role in the dysbiosis of the oral microbiome. Saliva contains various secretory components essential for maintaining oral homeostasis, and the alteration can lead to considerable oral critical situations (Li *et al.*, 2021).

In the case of any dental procedure for HIV-positive patients, it is adequate to select any less invasive procedure, however, oral lesions also provide a valuable prognostic factor in HIV patients and the majority of patients infected with HIV usually present one or more oral presentation and lesion, with candidiasis being the most common condition (Barbi *et al.*, 2021; Li *et al.*, 2021).

The provision of care for HIV-positive patients should be coordinated between medical and oral health care providers, similarly, the health care provider should encourage all patients under care to schedule a semi-annual oral health examination and to adhere to the oral health care provider's recommendations regarding appropriate follow-up (Li *et al.*, 2021).

HIV targets a particular form of immune cell in the human body. It's also known as a T cell or CD4 helper cell and when HIV kills this cell, the body's ability to fend off other infections is harmed (**Figure 1**). An individual has advanced to AIDS when the virus has killed a certain number of CD4 cells and the CD4 count falls below 200 (Hussain; Bashar; Shikder 2021).

**Figure 1.** HIV, the immune cells and the development of AIDS.



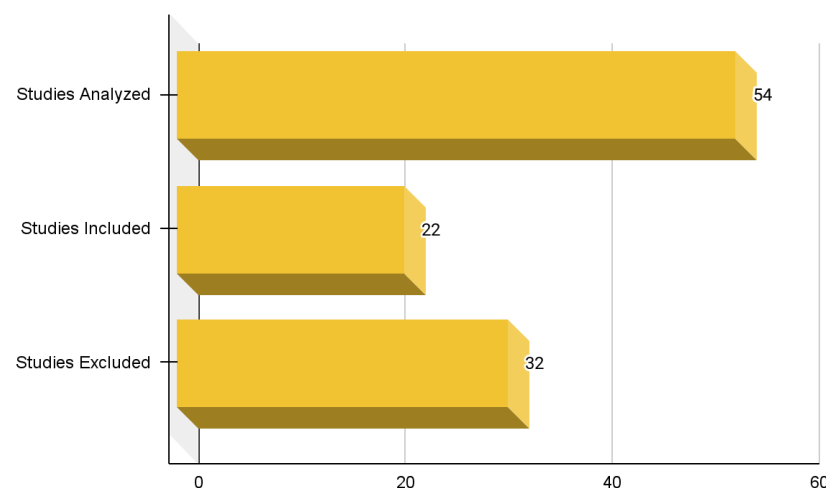
Source: elaborated by the authors (2024).

Because the oral environment is the source of endodontic bacteria, any changes in the oral microbiome after HIV infection may be reflected by subsequent root canal infections. The hypothesis that a direct relationship exists between the salivary microbiome and periodontal biofilms has been proven true.

### 3. METHODOLOGY

An integrative literature review was carried out using as databases PubMed, Scielo, Springer Link, Scholar Google and Science Direct. The search was performed prioritizing studies in English published in the last 10 years, using the following keyword combinations: HIV AND endodontic; virus AND periapical; virus AND pulpitis; herpesvirus AND periapical; papillomavirus AND periapical. We subsequently selected the most relevant studies, which complied with the search criterion. After the previous analysis of the sample collected (n= 54), a total of 22 articles were included and 32 were exempted from being included in the general review. The numerous regarding the sample analyzed, included and excluded are expressed in **Chart 1**, respectively:

**Chart 1** – Percentage graphic exposing the studies included and excluded in the integrative review.



Source: elaborated by the authors (2024).

### 4. RESULTS AND DISCUSSIONS

#### 4.1 ORAL MANIFESTATIONS

Dental treatment modifications for patients with HIV infection should be based on the patient's general medical status rather than his/her HIV infection. Universal precautions should be used with all patients to avoid transmission between patients and dental care workers, and from one patient to another since dentists and patients themselves will not always be aware of who is HIV positive (Rai *et al.*, 2020).

HIV-positive patients are seeking routine dental care rather than episodic treatment for the oral manifestations of HIV/AIDS, and dental clinicians should know how to appropriately care for them (Wynne, 2018).

Oral and facial manifestations are observed at all stages of HIV infection and are mainly the result of immunosuppression. According to Benslama (2022), oral manifestations occur at all stages of human immunodeficiency virus (HIV) infection and their clinical manifestations and severity depend on the evolution of the infection and become critical at the stage of acquired immunodeficiency (AIDS). As stated by Sembera, Radochova and Slezak (2016) and Andrusiów *et al.*, (2020), candidiasis is the most common oral infection in HIV patients.

Infections are mostly fungal (candidiasis), viral (herpes, zoster, human papillomavirus infections, etc.), and less frequently bacterial (streptococcemia). Mycotic infections are mostly candidiasis, favored by xerostomia (caused by lymphocytic infiltration of salivary glands), substance abuse, or tobacco addiction (Sembera; Radochova; Slezak, 2016; Kalanzi *et al.*, 2018; Andrusiów *et al.*, 2020; Benslama, 2022).

Rai *et al.*, (2020) discuss that oral candidiasis and oral hairy leukoplakia are predictors of AIDS evolution, being related to CD4 T-lymphocyte cell count <200 cells/ml (Rai *et al.*, 2020). Candidiasis, Kaposi's sarcoma, Hairy leukoplakia, Canker sores-ulcers, Gingivitis, Necrotizing ulceration gingivitis, salivary pathologies, Warts-condyloma, Lymphoma, Herpes and Squamous cell carcinoma are common conditions manifested in patients with HIV/AIDS (Benslama, 2022).

Various studies have shown that 70 to 90% of HIV-infected subjects will develop at least one oral manifestation in their lifetime and that the apparition of severe presentations can suggest a progression toward AIDS (Benslama, 2022). Some oral disorders are very indicative of HIV infection (Kaposi's sarcoma and oral hairy leukoplakia). None are directly linked to HIV, yet, they result from immunosuppression, which facilitates the emergence of major opportunistic infections when immunodeficiency is severe (Sembera; Radochova; Slezak, 2016). Additionally, some studies have suggested that the administration of anti-retroviral medications (ARV) themselves may alter the oral microbiota. It should be noted that. It does appear that in untreated HIV-positive patients, changes occur in the oral microbiota, particularly as HIV viral load increases (Kalanzi *et al.*, 2018).

People living with HIV may be susceptible to extensive caries that may be related to HIV and ART, and complete loss of teeth compounds the stigma associated with HIV/AIDS. Further studies are needed to investigate the mechanisms of increased risk of caries among HIV patients (Kalanzi *et al.*, 2018; Wynne, 2018).

#### 4.2 ENDODONTIC TREATMENT

Pulpitis is a frequent dental condition caused by tooth pulp inflammation. Caries, fractured restorations, unsuccessful vital pulp therapy, and trauma can all lead to pulpal inflammation. Root canal infections trigger a complicated immune response that includes cell recruitment along with the production of various inflammatory mediators (Abraham *et al.*, 2022).



A small subgroup of patients with advanced HIV disease may demand customized modification, such as antibiotic prophylaxis or transfusion of blood products for their care (Wynne, 2018). If the granulocyte count ranges above 500 cells/ $\mu$ L of blood, endodontic treatment should be performed under prophylactic antibiotic cover.

As maintained by Wynne (2018), the endodontic treatment of patients with apical periodontitis would have a poorer prognosis in immunocompromised patients such as HIV-infected patients. This is because T cells play an important role in the pathogenesis as well as healing of apical periodontitis.

In a study developed by Machado *et al.*, (2022) in Brazil, people living with HIV (PLHIV) older than 50 years showed a high prevalence of apical periodontitis and considering the lack of studies on this distinct group of HIV carriers, new investigation in this area is encouraged by many authors, such as Machado *et al.*, (2022).

Regarding endodontic outcomes, the data from PLHIV is still insufficient. Thus, the research developed by Machado *et al.*, (2022) aimed to explore a possible association between the endodontic outcome and sociodemographic, medical, and oral (clinical and radiographic) characteristics in these subjects (Machado *et al.*, 2022).

One of the challenges faced by HIV-positive patients and their dentists is the potential for adverse drug interactions, as HIV-positive patients usually take an antiretroviral regimen of three or more drugs from at least two different classes, there exists a potential for unwanted side effects and toxicities (Wynne 2018).

In patients with AIDS, the compromised immune system renders them more susceptible to bacterial infections, including those affecting the oral cavity. Dental infections, such as pulpitis, can occur more frequently and progress rapidly in AIDS patients due to their impaired ability to fight off pathogens (Elnazarovich *et al.*, 2024). Besides, factors such as poor oral hygiene, medication side effects, and systemic health issues associated with HIV/AIDS can further exacerbate dental problems (Elnazarovich *et al.*, 2024).

Three parameters define the clinical staging for HIV: opportunistic infections, CD4+ count, and viral load (Aminoshariae *et al.*, 2017). T cells play an important role in developing, progressing, and resolving endodontic infections (Aminoshariae *et al.*, 2017). Consequently, Segura-Egea *et al.*, (2023) demonstrate that immunity disorders, especially HIV infection and AIDS, that affect T lymphocytes, involved in periapical repair, could also influence the outcome of endodontic treatments.

During the development of periapical lesions, the in-filtrated number of different types of T cells and the secretion of T-cell-related cytokines in the region of root apex reflected the inflammatory status of periapical lesions and related with the periapical bone destruction, HIV patients could have damaged periapical repair (Segura-Egea *et al.*, 2023). Moreover, the success rate of root canal therapy in AIDS patients may be lower compared to the general population due to the complexity of their medical condition (Elnazarovich *et al.*, 2024).

The presence of a virus inside the dental pulp was first reported in an AIDS patient and the DNA of HIV was also detected in periapical lesions (Fontes; Marques; Gonçalves 2015). However, it was not established that HIV might cause pulpal disease. Regarding the presence of fungal species (Fontes; Marques; Gonçalves 2015).



Antiretroviral therapy has been fundamental in the management of HIV patients, helping to restore immune function and reduce viral load. Patients under ARV treatment may show a more favorable response to endodontic treatment due to the improvement of the immune system (Elnazarovich *et al.*, 2024).

Patients with HIV are often susceptible to opportunistic infections due to their reduced CD4 cell count and compromised immune system and this can influence the response to endodontic treatment, increasing the risk of secondary infections and post-operative complications. Therefore, a thorough assessment of the patient's health status, including CD4 cell count and viral load, is crucial before proceeding with endodontic treatment (Elnazarovich *et al.*, 2024).

The conventional treatment approaches can present challenges, traditional treatment options for pulpitis, such as root canal therapy, may present limitations in patients with AIDS (Elnazarovich *et al.*, 2024). Root canal therapy involves the complete removal of the infected pulp tissue and subsequent filling of the root canal to prevent reinfection. However, this procedure can be invasive, requiring multiple appointments and placing additional stress on the patient's compromised immune system (Elnazarovich *et al.*, 2024).

When patients with HIV infection or AIDS are unable to return for repeated appointments, one-step endodontic therapy should always be considered and pulpotomy seems very favorable endodontic therapy for treating acute irreversible pulpitis of an HIV-positive patient as it can be done single sitting while root canal treatment can't be done in single visit always and sometimes multivisit appointment is required (Hussain; Bashar; Shikder 2021).

Neither HIV infection nor AIDS are contraindications for endodontic treatment, including pulpotomy. One-step endodontic therapy should always be considered in case of acute pulpitis, when patients require antibiotic prophylaxis, or when patients with physical limitations are unable to return for multiple visits (Rai *et al.*, 2020).

As oral diseases harm the quality of life and can adversely affect various vital functions, there is a need to deliver prevention and care services for oral diseases in the most vulnerable population (Nouaman *et al.*, 2015)

#### 4.3 BIOSAFETY, TRANSMISSION AND PRECAUTIONS

Providing care to HIV-positive patients is a reality of the dental surgeon's daily professional life, especially considering the considerable number of people living with HIV and the conduct of the dental professional must be completely based on the code of professional ethics and the principles of biosafety learned during the Dentistry formation to avoid any sort of contamination to the dentist and further patients (Lima *et al.*, 2020).

All the aspects surrounding the professional's refusal to treat people with HIV are based on discrimination, the fear of becoming infected as a result of an accident during the procedure, and the lack of information about the disease. Another aspect that influences preventing HIV-positive patient care is the confidentiality concerning the patient's condition (Lima *et al.*, 2020).

During dental treatment, there is a considerable risk of cross-contamination and infection with HIV, and the disease it causes, AIDS, is one of the main public health problems worldwide (Machado *et al.*, 2024). Cross-infection may occur by accident with cutting or puncturing contaminated material and the dental treatment sets are a perfect

candidate place for cross-contamination due to saliva and blood sprays produced during treatment (Silva-Boghossian *et al.*, 2020).

The incubation period understood as the time elapsed from infection to the symptoms of Acute HIV Syndrome is 3-6 weeks and it is important to know the routes of HIV transmission (Machado *et al.*, 2024), which are inserted in **Board 1**, respectively:

**Board 1.** Routes of HIV transmission.

1. Sexual Contact	Through semen and vaginal secretions
2. Parenteral route	It occurs due to blood transfusions and blood products, as well as the sharing of needles and syringes between addicts to intravenous drugs, contaminated needles and ink for tattoos, and accidents with sharp instruments
3. Vertical	It is given from mother to child through the placenta, at birth or during breastfeeding
4. Accidental	Aimed at health professionals who are exposed to the virus by punctures or traumatic maneuvers with instruments contaminated with the blood of infected people

**Source:** elaborated by the authors (2024).

Due to the potential advanced risk of transmission of HIV, it is essential to adopt rigorous biosafety protocols during endodontic procedures. This includes proper sterilization of instruments, use of protective barriers and proper disposal of contaminated materials (Silva-Boghossian *et al.*, 2020).

Wounds and needle stick injuries following dental procedures resulting in bleeding and subsequent instrument or materials contamination represent the biggest problem concerning potential viral transmission to clinical staff (Wynne, 2018, Machado *et al.*, 2024).

The risk of seroconversion after a needle stick injury with HIV-infected blood is approx. 0.03%. In case of deep penetrating injury with accidental exposure to HIV-infected blood and body fluids, a prophylactic administration of triple antiretroviral therapy along with immediate referral to a specialist is recommended (Wynne, 2018; Silva-Boghossian *et al.*, 2020).

Precautions such as not putting the used injection needle back into the sheath and wearing gloves and goggles during the treatment are considered adequate infection control precautions and it is important to inform all staff members of the patient's infection before starting the treatment to ensure vigilance (Wynne, 2018).

**Board 2.** Basic preventive health standards in the face of a patient with HIV/AIDS.

Keep your vaccination schedule up to date.
Use protective barriers to prevent contact with blood and other contaminating fluids.
Effective sterilization and disinfection procedures.
Waste Management and Disposal Biosafety Protocol.

Hand washing: The hand is the main vector for pathogen transmission. Hands should be washed with soap and water before and after each patient's care or when contact with blood has occurred.
Clothing: it is necessary to use caps and long-sleeved surgical clothing. Contaminated clothing should be removed in the same work area and placed in waterproof bags and transported to the washing area.
Gloves: Use double gloves to prevent contact of the hands with blood. It does reduce the risk of infection by 25%.
Mask: for the care of patients with HIV, the most recommended is the use of the KN95 or FFP2.
Hat: Hair is an area of contamination, so a protective cap should be worn.
Eye protectors: The professional must wear eye protection to avoid eye infections caused by aerosols and splashes.
Face shield: it must exceed at least 8 cm below the chin and must also have a fluid-repellent layer.

**Source:** elaborated by the authors (2024).

Finally, the practitioner should be aware of occupational risks in treating these patients, should familiarize himself/herself with the CDC's postexposure prophylactic guidelines, implement preventive measures to prevent occupational exposures, and provide occupational risk training for their staff (Wynne, 2018). In general, biosecurity in dentistry for HIV patients requires a combination of proper sterilization of instruments, use of appropriate PPE, following standard precautions, and additional measures, such as the use of disposable items and rapid test kits (Machado *et al.*, 2024).

Since HIV can be found in both pulpal tissues and apical granuloma, the use of a rubber dam is considered mandatory. With using rotary instruments, not only should the used instruments but also the handpiece must be disinfected and sterilized after every treatment (Wynne, 2018; Silva-Boghossian *et al.*, 2020).

Conclusively, a dentist may not ethically refuse to provide treatment purely because of the patient's HIV status (Wynne, 2018). This article highlights the importance of considering specific clinical aspects and implementing strict biosafety measures when performing endodontic treatment on HIV-positive patients, to optimize clinical outcomes and ensure the safety of the patient and the healthcare team. Furthermore, Studies have provided data demonstrating that several systemic conditions, including HIV infection, can impact the prognosis of endodontic treatments (Wynne, 2018).

## 5. CONCLUSION

Endodontic treatment for HIV-positive patients requires a multidisciplinary approach, involving the dentist, infectious disease doctor and other health professionals. Association between these specialists is critical to ensure safe and effective treatment, as well as promote oral health and quality of life for patients.

Studies have shown that HIV patients undergoing endodontic treatment can achieve satisfactory clinical results, provided that adequate preventive measures are implemented to minimize the risk of infectious complications. The success rate of endodontic treatment in HIV patients can be comparable to that of uninfected patients when clinical management is carried out properly.

## REFERENCES

- ANDRUSIÓW, Szymon et al. Oral cavity fungal flora among HIV-positive people. **Epidemiological Review/Przegląd Epidemiologiczny**, v. 74, n. 1, 2020.
- AMINOSHARIAE, Anita et al. Association between systemic diseases and endodontic outcome: a systematic review. **Journal of Endodontics**, v. 43, n. 4, p. 514-519, 2017.
- ARAHAM, Dax et al. Correlation of endodontic infection and cytokine expression in patients with systemic diseases: A systematic review of clinical studies. **Endodontology**, v. 34, n. 3, p. 143-150, 2022.
- BARBI, Wagisha et al. Assessment of oral health and prevalence of oral conditions in human immunodeficiency virus-infected subjects visiting antiretroviral therapy centers. **Journal of Pharmacy and Bioallied Sciences**, v. 13, n. Supl 2, p. S1470-S1473, 2021.
- BENSLAMA, L. Oral and maxillofacial manifestations of human immunodeficiency virus infection. **Journal of Stomatology, Oral and Maxillofacial Surgery**, v. 123, n. 6, p. 622-633, 2022.
- ELNAZAROVICH, Zoyirov Tulqin et al. Treatment Of Acute Pulpitis In Patients With Aids By Means Of Vital Amputation. **Academia Repository**, v. 5, n. 03, p. 90-93, 2024.
- FONTES, Tatiana Vasconcellos; MARQUES, Fábio Vidal; GONÇALVES, Lucio Souza. Endodontic infection in HIV-infected individuals: An overview. **Endodontic Practice Today**, v. 9, n. 1, 2015.
- GOLDBERG, Brittany E. et al. The oral bacterial communities of children with well-controlled HIV infection and without HIV infection. **PLoS One**, v. 10, n. 7, p. e0131615, 2015.
- HUSSAIN, Muhammad Imran; BASHAR, A. K. M.; SHIKDER, AHM Zakir Hossain. Alternative Management of Acute Irreversible Pulpitis of an Adult HIV-Positive Patient: A Case Report: Acute irreversible pulpitis. **Bangladesh Medical Research Council Bulletin**, v. 47, n. 2, p. 230-234, 2021.
- KALANZI, Dunstan et al. Extensive dental caries in a HIV positive adult patient on ART; case report and literature review. **BMC Oral Health**, v. 18, p. 1-5, 2018.
- LIMA, Fiana Lopes et al. Atendimento odontológico ao paciente portador do HIV/AIDS. **Revista Cathedral**, v. 2, n. 3, p. 37-48, 2020.
- LI, Shuang et al. Alterations in the oral microbiome in HIV infection: causes, effects and potential interventions. **Chinese Medical Journal**, v. 134, n. 23, p. 2788-2798, 2021.
- MACHADO, Camilla dos Santos Tiburcio et al. Prevalence of apical periodontitis in people living with HIV in southern Brazil. **Revista da Faculdade de Odontologia-UPF**, v. 27, n. 1, 2022.
- MARTÍNEZ, Verónica Alicia Vega et al. Biosafety in the Management of HIV Patients in Dentistry (Systematic Review). **African Journal of Biological Sciences**, v. 6, n. 8, 2024.

NOUAMAN, Marcellin N. et al. Oral health and HIV infection among female sex workers in Abidjan, Côte d'Ivoire. **BMC Oral Health**, v. 15, p. 1-9, 2015.

PRABHU, S. R.; VAN WAGONER, Nicholas. Human Immunodeficiency Virus Infection and Acquired Immunodeficiency Syndrome (HIV/AIDS): An Overview. **Sexually Transmissible Oral Diseases**, p. 51-71, 2023.

RAI, A. et al. Comprehensive Dental Treatment to an Eight-year-old HIV Positive Patient: A Case Report. **J Nepal Dent Assoc**, v. 20, n. 31, p. 121-5, 2020.

SEGURA-EGEA, Juan J. et al. Impact of systemic health on treatment outcomes in endodontics. **International Endodontic Journal**, v. 56, p. 219-235, 2023.

ŠEMBERA, Martin; RADOCHOVÁ, Vladimíra; SLEZÁK, Radovan. Dental and oral lesions in HIV-positive individuals in east Bohemia–Czech Republic, Single Centre Experience. **Acta medica**, v. 58, n. 4, p. 123-127, 2016.

SILVA-BOGHOSSIAN, Carina Maciel et al. Evaluation of oral care protocols practice by dentists in Rio de Janeiro towards HIV/AIDS individuals. **BMC Oral Health**, v. 20, n. 1, p. 13, 2020.

WEINBERG, Aaron et al. Innate immune mechanisms to oral pathogens in oral mucosa of HIV-infected individuals. **Oral diseases**, v. 26, p. 69-79, 2020.

WYNNE, Catherine. Endodontics in systemically compromised patients. **Common Complications in Endodontics: Prevention and Management**, p. 263-292, 2018.