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RESUMEN

Introducción: La epidemia del virus de la inmunodeficiencia humana (VIH) ha mostrado tener un gran impacto en individuos que presentan tener la enfermedad con implicaciones sistémicas de salud bucal. Hoy en día, aproximadamente un tercio de los 38 millones de personas que viven con el VIH está afectado por enfermedades y lesiones bucales.

Objetivos: El trabajo se enfoca sobre la influencia del VIH en las condiciones de salud bucal, el impacto de la terapia antirretroviral (TAR), el impacto socioeconómico de las condiciones de salud bucal y el comportamiento de salud bucal en los pacientes seropositivos al VIH dentro de la comunidad dental.

Metodología: Mediante una búsqueda meticulosa, varias bases de datos confiables se han identificado: entre estos, 78 artículos analizan la salud bucal en relación con pacientes con VIH. Luego se establecieron los criterios de exclusión, reduciéndolos a 54 fuentes que se utilizaron directamente para producir este documento.

Discusión: La introducción del VIH en el cuerpo desencadena una cascada de complicaciones sistémicas y orales. La carga viral del VIH y las enfermedades bucales son directamente proporcionales entre sí. Las infecciones fúngicas, virales y bacterianas se encuentran comúnmente en la cavidad oral en las diferentes etapas de la enfermedad. En la era del TAR, las manifestaciones orales están cambiando y siguen evolucionando. A nivel mundial, el VIH sigue siendo un problema importante de salud pública; con la pandemia de COVID-19, se nota un empeoramiento del control de la epidemia del VIH.

Conclusión: El estado de salud bucal de los pacientes con VIH puede ayudar en el diagnóstico y pronóstico de la enfermedad debido a la presentación de ciertas manifestaciones bucales

fuertemente asociadas al VIH. El TAR ha disminuido la mortalidad global, pero a causa de restricciones socioeconómicas, el TAR todavía no está disponible universalmente para todos los pacientes. La comunidad dental juega un papel importante en la disminución del estigma de tratar a los pacientes con VIH y en el aumento de la calidad de vida.

ABSTRACT

Introduction: The human immunodeficiency virus (HIV) epidemic has shown great impact on the individuals exhibiting the disease with systemic and oral health implications. At present, approximately one-third of the 38 million individuals living with HIV are affected by oral diseases and lesions.

Objectives: The research paper focuses on the influence of HIV on oral health conditions, the impact of antiretroviral therapy (ART), and the socioeconomic impact of oral health conditions and oral health behaviour among HIV-seropositive patients within the dental community.

Methodology: Through meticulous search, several credible databases identified 78 articles which look at oral health in relation to HIV patients. The exclusion criterion was then set, narrowing it to 54 unique sources directly used to produce this paper.

Discussion: The introduction of HIV on the body triggers a cascade of systemic and oral complications. The HIV viral load and oral diseases are directly proportional to each other. Fungal, viral and bacterial infections are commonly found in the oral cavity at different stages of the disease. In the era of ART, oral manifestations are changing and continuing to evolve. HIV is still a major public health issue at a global level, and with the COVID-19 pandemic, a worsening of control on the HIV epidemic is noticeable.

Conclusion: The oral health condition of HIV patients can aid in the diagnosis and prognosis of the disease due to the presentation of certain oral manifestations that are strongly associated with HIV. ART has decreased global mortality, but due to socioeconomic restraints, ART is still not universally available to all patients. The dental community plays a vital role in decreasing the stigma of treating HIV patients and increasing the quality of life.

TABLE OF CONTENTS

1. INTRODUCTION	1
2. OBJECTIVES	5
2.1. Primary Objective	5
2.2. Secondary Objectives.....	5
3. METHODOLOGY	6
4. DISCUSSION.....	7
4.1. HIV Strains and Types.....	7
4.2. Modes of Transmission.....	7
4.3. Pathophysiology.....	8
4.4. Immunodeficiency - Effects on the Immune System.....	8
4.5. Clinical categories of HIV Infection.....	9
4.6. Oral Lesions Associated To Human Immunodeficiency Virus	14
4.7. Anti Retroviral Therapy	21
4.8. Quality Of Life.....	22
4.9. Human Immunodeficiency Virus: A Global Issue.....	23
5. CONCLUSION.....	26
6. RESPONSIBILITY.....	28
7. BIBLIOGRAPHY	29
8. ANNEXES.....	36

1. INTRODUCTION

Claiming more than 33 million lives, the human immunodeficiency virus (HIV) has been recognised by the World Health Organization, as a major global public health issue, more specifically a global public health threat (1). As of 2019, an estimate of 38 million people lived with HIV, a virus that compromises one's immune system, weakening the body's natural defence system, all whilst the virus infects the CD4⁺ T-helper lymphocytes, a type of white blood cells located within the immune system (2).

The CD4⁺ T-lymphocyte cell's natural function is an essential part of the immune's system natural response to fight off foreign infections. In cases of HIV-seropositive patients who are untreated, the CD4⁺ cell becomes depleted causing vulnerability to the body's system to a wide range of infections, which it would have contrarily been able to fight off (3).

This epidemic has grown globally causing havoc and devastation amongst individuals, families, and countries for nearly four decades now. Initially, the evolution and impact of HIV were unpredictable, but now as a result of antiretroviral therapy (ART) it is considered a chronic illness. It was estimated that in 2019, at a global level ART is administered to almost 67% of the 38.0 million people living with HIV (4).

The oral health issues that surface amongst HIV-seropositive patients is linked to their CD4⁺ cell count and viral infection load which determine their immune systems level of response. Weak immune systems put individuals at risk of opportunistic infections. With new and improved treatments aimed at HIV-seropositive patients, opportunistic infections are less common as healthcare professionals are able to stabilise and strengthen patient's immune systems. However there are many cases of individuals that are not aware that they may have HIV, some may still have not started treatment yet, and some treatments may not be keeping

the HIV viral load low enough for their immune system to function and fight off these infections (5–7).

Once the cells of the immune system are infected, the immune system suffers a progressive deterioration, which at some point can progress to become Acquired Immune Deficiency Syndrome (AIDS). AIDS refers to the most advanced stage of the HIV infection, a complex of symptoms and infections caused by HIV as the virus further impacts the immune system (8,9).

During these past few decades, many workshops and health assemblies have united clinicians and non-clinical scientists who developed an interest in oral manifestations of HIV disease. Individuals who are experts in their field and several organisations united together, sharing vast amounts of knowledge and understanding of oral health-related concerns in HIV infections(10). HIV-seropositive individuals often suffer from specific intraoral and perioral manifestations as a result of the negative toll the HIV infection has on their oral health as well the occurrence of opportunistic infections (11–13).

Throughout the early course of the HIV infection, approximately 40–50% of HIV-seropositive individuals often endure the occurrence of oral fungal, bacterial or viral infections (14). During dental visits and even regular medical check-ups by trained health care professionals, the mouth and pharynx can be examined effectively. Many of these oral pathologies can be clearly identified through the clinical signs and symptoms for an early assessment, accurate diagnosis, and management of HIV-seropositive individuals. It has been reported that oral lesions, therefore, can contribute to HIV patient morbidity (11). Oral lesions circuitously have an impact on the psychological and economic operative of individuals and communities that experience the consequences of HIV (15).

Pseudo-membranous candidiasis, oral hairy leukoplakia, HIV-gingivitis, and HIV-periodontitis are some of the oral manifestations associated with HIV infection that may occur. Some other conditions associated are xerostomia, ulcers, caries, Kaposi sarcoma, non-Hodgkin lymphoma. Of these oral manifestations, a selected few of them have been reported to display some of the first signs that a patient has the virus presenting with distinct clinical features of HIV- seropositive infected individual (16). As immunosuppression progresses, an increase in signs and symptoms of oral conditions may develop, that may require specific intervention by a clinical professional for the exact purpose of correct diagnosis and appropriate management. In addition, particular oral presentations of HIV-infected patients are associated with the risk of developing AIDS or may be seen as the first condition that determines AIDS (9,17).

Oral health organisations along with health care professionals have a significant responsibility in reducing new HIV infection by aiding the early diagnosis of HIV. By having this knowledge and proper differential diagnosis, dentists can be the first line of help and refer patients to doctors and potentially help the patient in early diagnosis (10,18).

To focus and understand the level at which oral health revolves around the HIV community, the influence of the human immunodeficiency virus on oral health conditions within HIV-seropositive patients will be investigated. HIV will be examined as a global issue, along with a thorough analysis of the types of intraoral lesions and extraoral lesions that are associated with HIV. Moreover, a review of the classification of oral lesions associated with HIV infection will be conducted. The clinical staging of HIV/AIDS for adults with confirmed HIV infection provided by WHO (19,20), will be delved upon as within each of the 4 stages, clear oral manifestation and opportunistic infection may occur independently or in association with other conditions.

Throughout this investigation, the relationship between HIV and its effects on an individual's oral health will be covered to reveal the importance the dental community has on the possibility of both diagnosing and determining the prognosis. The paper will examine the hypothesis that HIV directly affects an individual's oral health condition and the extent to which it does.

2. OBJECTIVES

2.1. Primary Objective

- The influence of the human immunodeficiency virus on oral health conditions within HIV-seropositive patients.

2.2. Secondary Objectives

- The impact of antiretroviral therapy on the oral health of HIV-seropositive patients undergoing treatment.
- The socio-economic impact of oral health conditions and oral health behaviour among HIV-seropositive patients within the dental community.

3. METHODOLOGY

This issue of HIV within the oral medical sector was assessed at a global level, with an extensive literature review as well as secondary data was retrieved from the years 2005-2020. A systematic review was conducted using trusted article databases such as Medline, PubMed, Cochrane, Scopus, ResearchGate, and others to find articles on the topic of: “Oral Health in HIV patients”. Information was acquired from books, scientific journals, conference proceedings, online databases, institutions and organisations, associations and research networks, digital repositories, websites of specialised resources. Keywords that were used to gather literature were: HIV, human immunodeficiency virus, AIDS, acquired immunodeficiency virus, oral health, oral manifestations, oral lesions, quality of life, antiretroviral therapy. These keywords were used alone and combined with adding in “or” and “and”.

Data gathered in this study included that concerning HIV, oral health in relation to HIV, dentistry and HIV, oral health needs and priorities, utilisation of treatment programs, quality of life, and HIV as a global issue. The search strategy was then executed by using numerous search operators, reviewing the results, and then proceeding to refine the search if necessary.

The identification of records was first documented through the primary database search, using Medline, and additional records identified using PubMed, Cochrane, Scopus, ResearchGate, and Wiley. Thereafter, an assessment of records was carried out, screening, in which the removal of duplicates was accounted for the record were screened. Subsequently, in accordance with the eligibility of the records, full-text articles were screened and assessed.

In total 78 sources were collected, after screening and assessment, 54 sources were used. The Vancouver citation of style was followed in the typesetting of this work.

4. DISCUSSION

4.1. HIV Strains and Types

The last century has brought on 2 distinct types of the HIV virus, HIV-1 and HIV-2. The more predominant strain, HIV-1 accounts for 95% of all infections worldwide, and HIV-2, less infectious but more commonly found in western Africa with growing popularity in India, still relatively uncommon and advances gradually in comparison to HIV-1 (16,21). HIV virus constantly at any point in time possess the capability to mutate and modify with time, some strains turn out to multiply faster and become more infectious, being more easily passed on from individual to individual, which sometimes results in cases in which certain ART are not functioning as required (3,16).

4.2. Modes of Transmission

Modes of transmission are shared between the two virus types. HIV both type 1 and type 2 can be transmitted through certain body fluids from an infected individual, e.g. blood, semen, rectal and vaginal fluids, and breast milk. Once these fluids come into contact with the bloodstream, mucous membrane, or damaged tissues, there is a high risk of the infection entering your body (16,21).

HIV transmission can occur by unprotected oral sex and sexual intercourse with an infected individual, blood transfusions or contaminated tissue transplantation, needle/syringe sharing, and also by the use of surgical equipment that may be contaminated (22). Perinatal transmission or mother-to-child transmission can also mean that HIV can be transmitted between a mother and her baby during pregnancy, childbirth or breastfeeding (22).

4.3. Pathophysiology

The life cycle of HIV consists of six stages: 1) binding and entry in the host cell, 2) reverse transcription, 3) integration in the cellular genome, 4) replication, 5) budding and 6) maturation with all the necessary components to infect other cells. Once the virus targets a cell, becoming a host cell, HIV uses them to manufacture numerous replicas, which there forward causes the cells containing HIV to have a decreased lifecycle. Consequently, HIV manages to constantly modify as it uses different host cells and continues to reproduce itself (3). Due to the mutations and range of genetic diversity during replication, this produces complications in an individual's immunodeficiency status (23).

4.4. Immunodeficiency - Effects on the Immune System

The immune system works by shielding our body by identifying and responding to antigens on bacteria, viruses, and fungi. Any compound that triggers a state of susceptibility and immune reactivity is referred to as an antigen. An immune response is initiated when antigens associate with cells of the immune system and antibodies. The course of action instigates the elimination of the antigen, which allows the individual to be rid of infections. In those cases where the HIV infection weakens and destroys one's immune system, individuals are labelled as immunodeficient as the body is vulnerable to infections (24). According to the Office of AIDS Research (OAR), immunodeficiency is referred to as the "inability to produce an adequate immune response because of an insufficiency or absence of antibodies, immune cells, or both" (25).

In situations where the HIV infection goes undetected and patients are at an advanced clinical stage or when ART treatment therapy is not available, patients transition from having an infection to the occurrence of a disease. The acquired immunodeficiency syndrome (AIDS)

is a lethal disease caused by the HIV infection that breaks down the body's immune system, leaving a person vulnerable to even more opportunistic diseases, neurological abnormalities, or rare malignancies that could all be life-threatening. The first case of AIDS was documented among homosexual men by the Center for Disease & Control (CDC) in 1981 (26).

Dentists can associate signs and symptoms of certain clinical stages of HIV; from this it can be comprehended the importance of regular dental check-ups in areas with a high incidence of HIV infections. (19,27). Poul Erik Petersen, the chief of the oral health programme at WHO headquarters, stated in the journal of Community Dentistry and Oral Epidemiology, guest editorial section, the importance of check-ups by trained health professionals, those that can thoroughly review the oral cavity and general health of the patient correctly and detect oral pathologies (15). Additionally, oral manifestations are diagnostic indicators of the HIV infection with a prognostic value of the HIV infection progression (28).

4.5. Clinical categories of HIV Infection

The development of the HIV infection and its pathogenesis is fundamentally assessed by the measurement of an individual's percentage of CD4⁺ cells. The decrease in the number of the CD4⁺ T lymphocyte cells indicates the progressive depletion of the CD4⁺, which reveals the severity of the HIV-associated immunodeficiency, which in turn can be used as an indication of the survival, prognosis, and development of the disease exclusive of ART treatment. This measurement can be applied to both adults and children, signifying the functioning of their immune systems. Clinical stage measurements are beneficial and used as a standard indicator of the virulency of the HIV infection when patients are initially diagnosed, starting ART treatment or throughout that treatment, and during follow-up sessions (17,19,20).

In 2007, World Health Organization published the “WHO Case Definitions Of HIV For Surveillance And Revised Clinical Staging And Immunological Classification Of HIV -Related Disease In Adults And Children” to help control the HIV infection incidence, prevalence, and treatment burden. This classification also assisted in the preparation of adequate community-based public health interventions. The usage of this reviewed clinical staging and immunological classification of HIV is intended to facilitate the management of HIV clinically, particularly in areas of the globe where clinics have limited laboratory resources (3,19,20).

The developed clinical staging of HIV/AIDS for adults and adolescents with confirmed HIV infection consists of 5 stages. The first staging refers to the primary HIV infection which can surface as either asymptomatic or it can also present with certain features that are associated with different severities of an acute retroviral syndrome. This acute primary infection indicates the period in which HIV is exposed into your body and the patient becomes HIV-seropositive. It is at this moment that an individual’s viral load soars, increasing the infectiousness and damaging one’s immune system. The particular reason for this circumstance is the increased number of cell copies produced from host cells.

The primary infection usually presents itself 2-4 weeks post-exposure as an acute feverish illness, which can be recognised in infants, children, and adults. Some other post-exposure presentations associated with the acute fever primary infection can be, lymphadenopathy, pharyngitis, maculopapular rash, urogenital ulcers, and meningoencephalitis (19). These signs and symptoms are categorised under acute retroviral syndrome, which newly infected adults may experience. In some individuals, a decrease in CD4⁺ cell count can occur during the post-exposure phase. At this stage, the CD4⁺ cells located in the thymus and lymph nodes are targeted, which in turn reduces the production rate of the

T- lymphocytes, which instigates the possible development of opportunistic infections as the patient becomes immunodeficient.

Clinical stage 1 consists of asymptomatic signs and presentation of persistent generalised lymphadenopathy. From clinical stage 2-4, many oral signs can be uncovered. Individuals in clinical stage 2 of the HIV infection can exhibit minor signs and symptoms, which can lead to the development of herpes zoster, angular cheilitis, and recurrent oral ulcerations. Clinical stage 3 entails advanced signs and symptoms of the infection as the viral load of HIV- seropositive patients progresses to increase and the CD4⁺ progresses to decrease. It is at this stage when acute necrotising ulcerative stomatitis, gingivitis, or periodontitis, oral candidiasis, oral hairy leukoplakia, and other opportunistic infections develop. Clinical stage 4 individuals are severely immunodeficient, which entails the continuous development of new opportunistic infections. With a clinical examination, orolabial chronic herpes simplex infection (more than one month's duration), oesophageal candidiasis, and Kaposi's sarcoma can be present (16,19).

Within a number of classification systems, many oral lesions will be a determining clinical criterion, in fact, the manifestation of oral lesions as the HIV infection progresses, is a prevalent symptom. At present, there are two leading classifications of oral lesions that are associated with HIV. One of the HIV associated oral lesion classifications is primarily centred around the aetiology, which classify all lesions under bacterial, viral or fungal infections; the second classification is based on strength of association (12,16,29).

As the prevalence of HIV infection spread, clinicians commenced to take note of certain lesions that were far more closely correlated with HIV. They began to account for lesions that appeared to indicate the start of HIV-induced immunosuppression, afterwards they proceeded to use certain appearances of oral lesions to further predict the progression of HIV infection to

AIDs and at what time to start antiretroviral therapy. The 1993 assembly brought together an agreement of the new classification of oral lesions of HIV infection, which to this day is the universally used classification system for oral manifestations of HIV (9,15). 1993 European Economic Community (ECC) Clearinghouse on Oral Problems Related to HIV Infection and WHO Collaborating Centre on Oral Manifestations of the Immunodeficiency Virus classified oral manifestations into 3 categories: lesions most commonly associated with HIV infection, lesions less commonly associated with HIV infection, and lesions associated with HIV infection (8,12).

Table 1: Oral manifestations associated with HIV infection according to the level of association (9,12,15).

CATEGORY 1	CATEGORY 2	CATEGORY 3
Lesions Strongly Associated With HIV Infection	Lesions Less Commonly Associated With HIV Infection	Lesion Associated With HIV Infection
1) Oral Candidiasis a) Erythematous b) Pseudo-membranous 2) Oral Hairy leukoplakia 3) Kaposi's sarcoma 4) Non Hodgkin's lymphoma 5) Periodontal disease	1) Melanotic hyperpigmentation 2) Necrotizing (ulcerative) stomatitis 3) Salivary gland disease a) Dry mouth due to decreased salivary flow rate	1) Bacterial infections a) Actinomyces Israel b) Escherichia coli c) Klebsiella pneumoniae 2) Catscratch disease 3) Drug reactions a) ulcerative b) Erythema multiforme

<p>a) Linear gingival erythema</p> <p>b) Necrotizing (ulcerative) gingivitis</p> <p>c) Necrotizing (ulcerative) periodontitis</p>	<p>b) Unilateral or bilateral swelling of the major salivary glands</p> <p>4) Thrombocytopenic purpura</p> <p>5) Ulceration NOS (not otherwise specified)</p> <p>6) Viral infections</p> <p>a) Herpes simplex virus</p> <p>b) Human papillomavirus (wartlike lesions)</p> <p>i) Condyloma acuminatum</p> <p>ii) Focal epithelial hyperplasia</p> <p>iii) Verruca vulgaris</p> <p>c) Varicella zoster virus</p> <p>d) Herpes zoster Varicella</p> <p>7) Bacterial infections</p> <p>a) <i>Mycobacterium aviumintracellulare</i></p>	<p>c) lichenoid</p> <p>d) toxic epidermolysis</p> <p>4) Epithelioid (bacillary) angiomatosis</p> <p>5) Fungal infection other than candidiasis</p> <p>a) Cryptococcus neoformans</p> <p>b) Geotrichum candidum</p> <p>c) Histoplasma capsulatum</p> <p>d) Mucoraceae (mucormycosis/zygomycosis)</p> <p>e) Aspergillus flavus</p> <p>f) Recurrent aphthous stomatitis</p> <p>6) Viral infections</p> <p>a) Cytomegalovirus</p> <p>b) Molluscum contagiosum</p> <p>7) Neurologic disturbances</p> <p>a) Facial palsy</p>
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	b) <i>Mycobacterium tuberculosis</i>	b) Trigeminal neuralgia
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4.6. Oral Lesions Associated To Human Immunodeficiency Virus

Oral candidiasis is the most common fungal infection and oral lesion associated to HIV infection. The primary etiological factor of oral candidiasis is *Candida albicans*, the most common fungal pathogen involved in the appearance of oral candidiasis in HIV patients (29–31). The occurrence of oral candidiasis has been linked to the development of HIV to AIDS and is used as a clinical indicator to outline the severity of the HIV infection at that point. In one study, 90% of HIV-seropositive patients with low CD4⁺ cell count, presented with oral candidiasis before starting ART (29). It is typically associated with a diminishing CD4⁺ cell count and an increased HIV viral load. The occurrence of oral candidiasis in HIV-positive patients who had underlying health problems, patients with a prosthesis, diabetes, asthmatic patients who use steroid inhalers, tobacco users, and patients on long-term antibiotic treatment, increased even more (6). Oral candidiasis presents itself in multiple forms, the two most common clinical forms associated with HIV are pseudo-membranous followed by erythematous. Pseudo-membranous candidiasis clinically appears as a creamy yogurt-like textured white plaque that is either recurring or persistent. It is raised and can be present in several sites in the oral cavity, buccal mucosa, oropharynx, tongue, palate, and lips (32). Erythematous candidiasis can be located on the tongue's dorsal surface, hard palate, soft palate, and oropharynx. It consists of atrophic red patches that are flat, which produce symptoms that may cause patients to complain of burning in the oral cavity whilst consuming liquids or solids that may be acidic, salty, spicy (29). In HIV clinical stage 4, oesophageal candidiasis can cause

difficulty in swallowing and retrosternal pain (30). The development of a multivalent vaccine that targets *Candida Albicans* is in the talks of production in potential research agendas (33,34).



Fig 1. Pseudo-membranous Candidiasis in HIV-infected male (29).



Fig 2. Erythematous Candidiasis in HIV-infected male (29).

Oral Hairy Leukoplakia clinically presents several fine, white, vertical small linear lesions that may be corrugated on the lateral borders of the tongue. Depending on the severity it can either present bilaterally or unilaterally on the tongue (19,31). This lesion is asymptomatic and, contrasting to oral candidiasis, a pathognomonic feature of this lesion is that it is nonremovable and cannot be scraped or wiped off with a gauze (30). It is classified as

a viral infection instigated by the Epstein-Barr virus (12). It can be observed in immunodeficient patients and it is a prevalent lesion that indicates the decline of the CD4⁺ cell count, the increase of the HIV viral load, and the deterioration of the patient's clinical condition (35). As this lesion is asymptomatic and does not cause discomfort to the patient, it seldomly requires treatment. Treatment is indicated when the patient requests it due to aesthetic concerns (16,30,31). Similar to oral candidiasis, this lesion can be diagnosed through clinical examination and it is an indicator of the progression of the HIV infection to AIDs (6,29).



Fig 3. Oral hairy leukoplakia in HIV- infected patient (35).

Necrotising ulcerative gingivitis and periodontitis are both opportunistic oral pathologies that are associated with immunodeficient patients. A direct relationship between HIV viral load and the severity of periodontal diseases is observable (36). Patients with increased HIV viral loads present with advanced stages of periodontal destruction. Patients endure severe pain due to ulcerations present in the papilla of the gingiva, which can cause episodes of spontaneous bleeding, tooth loss, halitosis, bone loss, and soft tissue loss. With necrotising ulcerative gingivitis patients will complain of gingival bleeding and pain whilst masticating. On the other hand, necrotising ulcerative periodontitis consists of a more aggressive process in which the rapid destruction of periodontal tissue occurs. Necrosis of

gingival tissues, loss of periodontal ligament, loss of alveolar bone, soft tissue necrosis, and interproximal bone loss all characterise necrotising ulcerative periodontitis (30). In some situations, necrotising ulcerative periodontitis leads to bone exposure with hollow defects leading to sequestration of alveolar bone (29). Regular examination of HIV patients with periodontal destruction is recommended due to the rapid progression of this disease in order to assist in timely detection and provide specific treatment management (37).



Fig 4. Necrotising ulcerative gingivitis in HIV- infected patient (35).



Fig 5. Necrotising ulcerative periodontitis in HIV-infected female (29).

HIV- related salivary gland diseases clinically present an enlargement of the salivary glands, notably the parotid glands, either unilaterally or bilaterally, and as a result, decreases

the flow of saliva. This enlargement is due to the increase in lymphocytic infiltration by CD8⁺ lymphocytic cells. Patients experience sensations of dry mouth due to the reduced salivary flow causing xerostomia (35).



Fig 6. Parotid gland enlargement in HIV-infected male (38).

Xerostomia is reported to be a common symptom in HIV-seropositive patients, sometimes secondary to salivary gland diseases or an adverse effect of ART treatment. In dental clinics, patients on antidepressants and anxiolytic therapy also present with discomfort caused by xerostomia. Patients need to be advised of proper oral health care to decrease discomfort, gingival inflammation and decrease the risk of caries, as they are at high risk of cervical and root caries (30,35,36).



Fig 7. Extensive caries lesions due to xerostomia and drug abuse in HIV-infected male(29).

Kaposi Sarcoma, an opportunistic infection, is known to be the most common HIV-associated malignant lesion found in the oral cavity caused by the human herpes virus-8 (HHV-8) and can be referred to as Kaposi sarcoma-associated herpesvirus (6,39) A neoplastic hyperproliferation occurs due to the HHV-8 infection triggering the endothelial cells. Clinically it appears in the mouth, palate, gingiva, or oropharynx. Early Kaposi sarcoma lesions are pink or violet and flat, as the lesion advances it grows in size and multiplies developing into nodules or plaques (24,29–31). Unlike many other oral manifestations associated with HIV infection where the prevalence of the respective oral manifestations has decreased over the past decades, the prevalence of Kaposi Sarcoma has increased with time.



Fig 8. Kaposi sarcoma in HIV- infected patient (35).

Non-Hodgkin Lymphoma, a neoplastic tumour, is the second most common HIV/associated malignant lesion found in the oral cavity. It clinically presents as a rapid ulcerated growth that is characterised by a red to purple, limited swollen lesion that is located in the gingiva, palate, and alveolar mucosa (16,29,30).



Fig 9. Non-Hodgkin lymphoma in HIV- infected patient (12).

Human Papillomavirus Virus (HPV) infection can cause focal epithelial and connective tissue hyperplasia, resulting in the formation of oral condylomas (29). The introduction of highly active antiretroviral therapy treatment has increased the prevalence of HPV infection and has had a more important significance due to the risk of developing oral squamous cell carcinoma (35). Clinically oral warts due to HPV follow a cauliflower shape morphology, commonly one the upper and lower lip, lingual frenulum, dorsum of the tongue, and corners of the lips (24,40).



Fig 10. Oral Wart in HIV-infected female (29).

4.7. Anti Retroviral Therapy

ART is the treatment of choice for patients that are HIV-seropositive. Treatment on highly active antiretroviral therapy (HAART) triggers an increase in the CD4⁺ lymphocyte cell count and a decrease in the viral load of HIV which in turn decreases the complications and risk of death in HIV-seropositive patients. The introduction of HAART has decreased mortality and morbidity probabilities, allowing HIV individuals experience a healthier and productive life (11). HAART therapy consists of a vast combination of several drugs. They are combined to achieve a halt in the viral replication of HIV and increase the immune function of the patient. The general prevalence of oral complications has been shown to decrease amongst patients on HAART (36,41).

The occurrence of oral candidiasis was shown to decrease and have a generally a lower prevalence in HIV-seropositive patients on HAART as treatment inhibits one of the candida proteases. The reasoning behind this decrease is suspected possibly by the fact that oral candidiasis is normally present in individuals that had underlying health problems (32). The prevalence of periodontal disease among HIV-seropositive patients on HAART was reported to be low (8,31).

Benign HPV-associated oral neoplastic lesions and salivary gland disease were found to increase in patients that were on HAART therapy. The presence of oral warts was linked to the decrease in HIV viral loads which is linked to a symptom of immune reconstitution syndrome which was interconnected to the improved immune responses (42,43). Long-term HAART treatment produced a greater risk of developing cervical caries. This was linked to salivary flow levels and the presence of dry mouth and xerostomia due to salivary gland diseases. In HIV-infected patients on HAART, a decrease in salivary flow was detected in both unstimulated and stimulated salivary flow rates, which resulted in an essential factor that

played a role in increased caries risk in comparison to patients that were not on HAART (28,31,36).

Approximately 46% of HIV-seropositive patients suffer from orofacial pain located in the head and neck (30). Oral dryness caused by the reduction in salivary levels which in turn increased orofacial pain was present but had shown individuals on HAART reported a lesser risk of developing orofacial pain. Nevertheless, oral discomfort and oral symptoms had a substantial influence on the health-associated quality of life on many HIV-seropositive individuals (36).

4.8. Quality Of Life

The influence that oral health has on the general health and quality of life of HIV-infected individuals is substantial. This is due to the direct relationship between the presence of oral lesions affecting mental and physical health. Furthermore, it has effects on patient's socio-cultural relationships and financial aspects of life (18,44). Oral manifestation associated with HIV and HAART treatment may cause many challenges and most importantly cause pain and discomfort (8).

Pain is a subjective perception, that alters one's current nervous system response, thoughts, and emotions (45–47). Chronic pain in HIV is interrelated to psychological factors, familial and social attitudes, life stressors, cultural and spiritual factors (24). Lesions may produce pain, altering facial aesthetics and causing dysarthria, dysgeusia, and dysphagia (24). Dysphagia can potentially cause issues related to weight loss, and malnourishment which in consequence results in a rapid clinical decline (46). Salivary flow levels have a crucial function in the oral health and the systemic health of patients, the deficiency in salivary flow impacts the health-associated quality of life (36).

Diagnosis at a relatively early stage, the appropriate treatment, and interventions in improving mental and physical health, will increase the health-associated quality of life (8,30,36). The oral health care professionals take on an essential function in improving and upholding the health-associated quality of life, providing assistance in reducing pain and discomfort to HIV-seropositive individuals (36).

4.9. Human Immunodeficiency Virus: A Global Issue

From UNAIDS 2019 global and regional data, the number of people living with HIV is around 37.9 million, and 20% of that figure covers individuals that are unaware they have HIV (4,48). The acknowledgement of the advantages that ART treatment provides is extensively recognised however it is still not globally accessible to all HIV-seropositive patients that need it, out of the 37.9 million living with HIV, access to ART is merely provided to 25.4 million (4,10,44,49).

For 40 years, HIV-related oral health conferences have been steered to understand the influence HIV has on oral tissues, advance and improve stands of HIV-patient care and outcomes. During Sixty-Ninth World Health Assembly, the WHO responded by endorsing a new “Global health sector strategy on HIV for 2016-2021” which stated that their main public health aim with HIV was “preventing (the) disease, promoting health, and prolonging life among the population as a whole” (1).

Testing is also perceived to be an immense issue with only 81% of individuals aware they are HIV-positive, the remaining 19% are unaware that the virus is in their system (48). Potential to implement rapid HIV testing widescale in dental clinics but more evidence needed (44).

The 2016 Political Declaration by United Nations General Assembly on Ending AIDS, which has taken 39 million people's lives, put in place the 90-90-90 targets. These targets had the objective to ensure by the year 2020 that 30 million people will be on ART, 90% of all HIV living individuals are aware of their HIV status, 90% of those diagnosed secure continuous ART, and finally that 90% of individuals on ART obtain undetectable levels of HIV, ensuring viral suppression. The impact of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), took a stark toll on the distribution of ART amongst communities resulting in HIV-AIDS-related deaths. In some parts of the world, a decrease of 20% of ART distribution was accounted for, some individuals not having sufficient stock of ART medication for more than a 60-day lockdown, and some forgoing their medication to be able to afford food (48).

The relationship between HIV and stigma has also allowed clinicians, health personnel from the dental profession, and society to have healthy discussions in order to reduce stigma in the dental health care setting (18,44). Nevertheless, for nearly 4 decades, discrimination and stigma are still noticeable obstacles present in health care settings, even despite numerous studies (50).

The national health care systems and access to dental treatment, dictate the development state of countries which overall play a role in the prevalence of oral manifestations (32). A variation in the prevalence of oral manifestations associated with HIV is evident when looking at the status of a nation's development (51). On top of all of this, the distribution of ART is imperative in investigating the prevalence of oral manifestations over the past decades. Examining all these factors, the injustice in global health is comprehended, as many countries in the developing world, still suffer the challenges of HIV and its oral manifestations (32,52).

The highest prevalence of HIV infection is found in sub-Saharan Africa, with 20.7 million people, over half of the total number of people living with HIV (4). All sectors are affected, the most evident impact can be seen in the health sector, but this epidemic has also decreased the accessibility of education and threatened the security of food along with many other issues. The past decades have allowed HIV/AIDS to aggravate poverty (53).

With the appearance of SARS-CoV-2, there have been a few studies in regard to the interplay between SARS-CoV-2 and HIV. The disruption of health care services, economies, and the health of individuals living with HIV have been threatened. Issues have been raised in relation to whether the goals set by WHO and UNAIDS are achievable due to the collision of these two pandemics that affect society globally (48,54).

5. CONCLUSION

Analysing the HIV epidemic from a global, dental-medical, and socioeconomic aspect has shown how intricately convoluted the HIV crisis still is to this day. HIV directly affects an individual's oral health condition to several extents. Various oral manifestations are strongly associated with HIV and can be seen as diagnostic and prognostic indicators. Oral health is perceived as an integral part of an individual's general health, an indispensable constituent of quality of life, from the eyes of WHO. Oral manifestations associated with HIV are reflected to be an imperative obstacle in improving the general health of HIV patients. It has been deduced that a vital role is performed by dental healthcare professionals, in identifying oral manifestations at an early stage and ultimately preventing new infections. With appropriate treatment of oral manifestation associated with HIV, dental professionals can aid in alleviating the pain and in turn improving the quality of life. The key lies in early diagnosis and recognition of the disease inside the mouth, and this further highlights the role of dentists.

Oral manifestations can also be a marker for starting ART therapy and additionally they can play a role in making sure patients seek help and treatment due to pain, discomfort, and aesthetic issues that may arise. The influence that HIV has had on oral health conditions is nevertheless present to this day, and with the adequate provision of ART therapy, oral health conditions have improved and changed. The emergence of ART has resulted in improved immune systems, thereby decreasing the presence of opportunistic infections.

From a socio-economic perspective, the world is still lacking the full potential of progress due to the limitations in the access of ART present in developing countries. An inevitable necessity demanding urgent improvements in the oral health care systems in which countries who are resource-limited, ART limited, and have limitations in the accessibility to health care still continue carrying the burden of oral manifestations due to HIV. This poses a

gap in the affordability of ART, the only source of effective treatment. In certain nations, mainly in the developing world, the affordability and oral health services provided are usually poor due to the lack of oral health staff. HIV only affecting the body and the physical condition of a patient gives a false impression as the true effects of the disease also affect the mental and social properties. ART has affected many financial aspects of many lives. Nations with communities that still have high rates of HIV/AIDS still deal with the consequences to this day.

Many global oral health organisations have contributed momentously and unceasingly during the past four decades. The commendation of continuous collaborative work from dental professionals from all corners of the world should be highlighted. As the World Workshops of Oral Health and Disease in HIV/AIDS, WHO and UNAIDS, place more emphasis on the oral cavity as a primary indicator for overall health. Oral manifestations associated with HIV should therefore be known by dentists and patients in order to better the diagnosis and prevention of further complications that HIV may produce.

6. RESPONSIBILITY

This in-depth examination on “Oral Health in HIV” entails the impact oral health-related conditions have had on individuals and societies that face HIV directly. In regard to HIV, the globe’s social responsibility acts within environmental sustainability and social sustainability. The distribution of ART is essential to decrease chances of mortality considering it increases the quality of life. This is an issue that still needs to be tackled due to barriers geographically causing transportation issues that may be important determinants in the distribution of ART. Healthcare professionals should continue to decrease the stigma and break the barriers present behind treating HIV patients. As dentists, a crucial role in decreasing the spread of HIV infection by early diagnosis and the correct education in knowing how to treat HIV-seropositive patients, which must be introduced from the beginning stages at university.

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8. **ANNEXES**

The front page of all sources used are listed below in alphabetical order according to the title.

8th World Workshop for Oral Health and Disease in HIV/AIDS: Improving health and well-being: 13–15 September 2019, Bali, Indonesia

1 | A FOREWORD TO THE PROCEEDINGS

It is now over thirty years since the first World Workshop was convened in response to the AIDS pandemic and delegates to the eighth workshop were warmly received by dental colleagues from Bali and Indonesia who had hosted the event. The enthusiasm for the latest workshop was in no way diminished by the passage of time and attracted more than 650 delegates from the international research community, clinicians, patients and partners, and stakeholders with an interest in improving the health and well-being of a global population living with HIV.

Each of the World Workshops has explored a different major theme, this time on improving health and well-being. The workshops bring together clinicians and non-clinical scientists who have an interest in the oral manifestations of HIV disease, with the objective of sharing worldwide perspectives, knowledge and understanding of oral health and disease in HIV infection and to identify global research needs.

The programme for each workshop considered the chosen theme through the lens of clinical science, social science and basic science with particular consideration of the issues affecting the geographical location in which they have been held. The three-day programme in Bali lived up to the formidable reputation of previous workshops and provided an interactive forum based on plenary talks and workshop debates supported by a vigorous daily poster session.

The benefit of anti-retroviral therapy in HIV disease is widely recognised and yet access to these medications is not universally available to all patients who would benefit. By sharing the latest research and developing a consensus view on what actions need to be implemented, the publication of these proceedings provide the international clinical community with a powerful instrument to share with fundholders in their home countries

Speakers and delegates from five continents generated a very lively discussion that covered the impact of economic, demographic and social aspects of HIV/AIDS in economically developing countries, HIV-related stigma and discrimination in dental healthcare settings, and the advances in research and innovation in HIV/AIDS—an

understanding of these issues being critical to managing the ongoing global HIV epidemic and reducing health disparities.

During the basic and clinical science workshops, international experts in the field debated the latest research findings and reviewed the literature on the interplay of HIV and oral health, including the effect on the oral microbiome, innate immunity and cancer before agreeing on the priorities for future research in the subject.

The programme was organised by an International Steering Committee working in conjunction with three host universities (Universitas Padjadjaran, Universitas Mahasaraswati and Universitas Udayana) and the Indonesian Dental Association. The proceedings have been divided into four sections for ease of navigation;

- Plenary presentations
- Workshop debates and conclusions
- Abstracts of the prize-winning posters.
- The Bali 2019 Declaration and the research agenda going forward.

In late 2019, after the conclusion of the workshop and whilst preparing the proceedings for publication, a novel coronavirus SARS-CoV-2 causing coronavirus disease 2019 (COVID-19) appeared in Wuhan China, and on 11 March 2020 the World Health Organisation declared it to have developed pandemic status. The focus of many of the scientists who had previously engaged with HIV was now diverted to a new challenge. Fortunately, technology had moved on and could be utilised to understand the nature of the COVID pandemic and the role that dental healthcare workers might play. It is worth remembering that there was no real engagement with the Internet by the population at large until about ten years after HIV was first recognised. Currently, it is reassuring to see that most governments have learnt from the last pandemic and are basing their decision-making on science rather than emotion.

As the main replication sites for COVID-19 appear to be the mouth and the nasopharynx, it is obvious that the same healthcare community with knowledge of the head and neck region and the effect of HIV can be usefully involved. There is an additional benefit that international forums such as the World Workshops have

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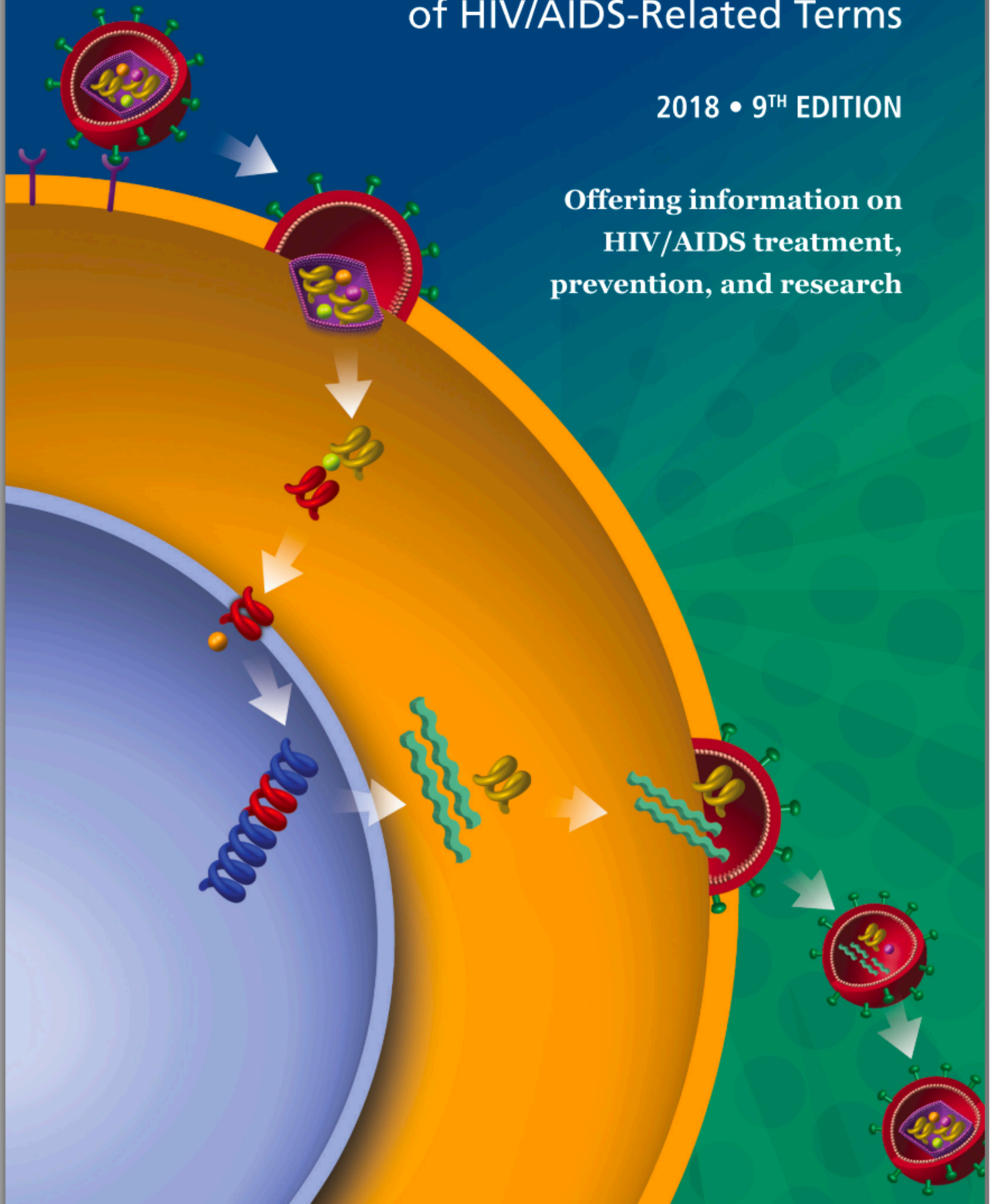
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AIDSinfo GLOSSARY

of HIV/AIDS-Related Terms

2018 • 9TH EDITION

Offering information on
HIV/AIDS treatment,
prevention, and research



Antiretroviral Drugs for Treatment and Prevention of HIV Infection in Adults 2020 Recommendations of the International Antiviral Society–USA Panel

Michael S. Saag, MD; Rajesh T. Gandhi, MD; Jennifer F. Hoy, MBBS; Raphael J. Landovitz, MD; Melanie A. Thompson, MD; Paul E. Sax, MD; Davey M. Smith, MD; Constance A. Benson, MD; Susan P. Buchbinder, MD; Carlos del Rio, MD; Joseph J. Eron Jr, MD; Gerd Fätkenheuer, MD; Huldrych F. Günthard, MD; Jean-Michel Molina, MD; Donna M. Jacobsen, BS; Paul A. Volberding, MD

IMPORTANCE Data on the use of antiretroviral drugs, including new drugs and formulations, for the treatment and prevention of HIV infection continue to guide optimal practices.

OBJECTIVE To evaluate new data and incorporate them into current recommendations for initiating HIV therapy, monitoring individuals starting on therapy, changing regimens, preventing HIV infection for those at risk, and special considerations for older people with HIV.

EVIDENCE REVIEW New evidence was collected since the previous International Antiviral (formerly AIDS) Society–USA recommendations in 2018, including data published or presented at peer-reviewed scientific conferences through August 22, 2020. A volunteer panel of 15 experts in HIV research and patient care considered these data and updated previous recommendations.

FINDINGS From 5316 citations about antiretroviral drugs identified, 549 were included to form the evidence basis for these recommendations. Antiretroviral therapy is recommended as soon as possible for all individuals with HIV who have detectable viremia. Most patients can start with a 3-drug regimen or now a 2-drug regimen, which includes an integrase strand transfer inhibitor. Effective options are available for patients who may be pregnant, those who have specific clinical conditions, such as kidney, liver, or cardiovascular disease, those who have opportunistic diseases, or those who have health care access issues. Recommended for the first time, a long-acting antiretroviral regimen injected once every 4 weeks for treatment or every 8 weeks pending approval by regulatory bodies and availability. For individuals at risk for HIV, preexposure prophylaxis with an oral regimen is recommended or, pending approval by regulatory bodies and availability, with a long-acting injection given every 8 weeks. Monitoring before and during therapy for effectiveness and safety is recommended. Switching therapy for virological failure is relatively rare at this time, and the recommendations for switching therapies for convenience and for other reasons are included. With the survival benefits provided by therapy, recommendations are made for older individuals with HIV. The current coronavirus disease 2019 pandemic poses particular challenges for HIV research, care, and efforts to end the HIV epidemic.

CONCLUSION AND RELEVANCE Advances in HIV prevention and management with antiretroviral drugs continue to improve clinical care and outcomes among individuals at risk for and with HIV.

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Antiretroviral treatment and its impact on oral health outcomes in 5 to 7 year old Ugandan children

A 6 year follow-up visit from the ANRS 12174 randomized trial

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Abstract

Background: Antiretroviral therapy for HIV in sub-Saharan Africa has transformed the highly infectious virus to a stable chronic condition, with the advent of Highly active antiretroviral therapy (HAART). The longterm effects of HAART on the oral health of children are understudied.

Objective: To compare the effect of lopinavir-ritonavir and lamivudine on oral health indicators (dental caries, gingivitis, tooth eruption, and oral health related quality of life) in 5 to 7 year old HIV-1 exposed uninfected children from the ANRS 12174 trial.

Methods: This study used data collected in 2017 among children aged 5 to 7 years from the Ugandan site of the ANRS 12174 randomized trial (ClinicalTrials.gov no: NCT00640263) implemented between 2009 and 2012 in Mbale district, Eastern Uganda. The intervention was lopinavir-ritonavir or lamivudine treatment to prevent vertical HIV-1 transmission. One hundred thirty-seven and 139 children were randomized to receive lopinavir-ritonavir or lamivudine treatment at day 7 postpartum to compare efficacy of prevention

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Trial protocol: <http://www.biomedcentral.com/1471-2334/12/246>.

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University of Western Cape, South Africa: Cheryl Nikodem (site principal investigator until February 2011), Justus Hofmeyr (site principal investigator from March 2011), Mandisa Singata (principal investigator), Kim Harper, Debra Jackson, David Sanders, Joanne Batting.

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Dental Examinations as an Untapped Opportunity to Provide HIV Testing for High-Risk Individuals

Harold A. Pollack, PhD, Lisa R. Metsch, PhD, and Stephen Abel, DDS

We used data from the 2005 National Health Interview Survey to examine the potential role of dental care in reaching untested individuals at self-reported risk for HIV. An estimated 3.6 million Americans report that they are at significant HIV risk yet have never been HIV tested. Three quarters of these people have seen a dentist within the past 2 years. Dental care offers opportunities to serve at-risk individuals who are otherwise unlikely to be tested or to receive preventive care services. (*Am J Public Health*. 2010;100:88–89. doi:10.2105/AJPH.2008.157230)

Among the estimated 1 million Americans living with HIV and AIDS, roughly one fifth are unaware of their infected status.^{1,2} Early diagnosis, combined with other prevention services, could decrease HIV incidence and reduce morbidity and mortality.^{3–6} Recent Centers for Disease Control and Prevention guidelines make it a priority to bring HIV screening into many medical and social service settings.⁷ Key professional associations have set similar priorities.⁸

Rapid oral HIV testing offers a promising innovation for early HIV diagnosis. These rapid oral-testing technologies permit a highly sensitive and specific, fast, simple, minimally invasive, cost-effective way to screen for HIV serostatus.

For several reasons, dental offices provide a promising venue for such testing.^{9–14} First, the oral health provider is already conducting an examination. A rapid oral fluid test could be administered at the start of a routine visit, with results available within 20 minutes. Second, oral health providers are becoming involved in other

primary-care screening efforts (e.g., hypertension, oral cancer, glycosylated hemoglobin).^{15–17} Rapid HIV testing could be a logical extension of such activities. Third, some oral health providers practice in community health care settings that are especially well-equipped to link newly diagnosed patients to HIV primary care. Finally, persons may be more likely to regularly visit dentists than to frequent other settings where HIV testing is offered.

Data from the 2005 National Health Interview Survey (NHIS) were used to investigate whether persons at self-identified risk for HIV visit dental settings. In particular, we examined (1) the frequency with which persons at risk for HIV visit dental offices, and (2) whether dental settings reach at-risk persons who have not been tested in other clinical settings.

METHODS

We explored our study questions by performing a cross-sectional secondary data analysis of the NHIS, a large, annual, nationally representative sample of the noninstitutionalized US population. NHIS is one of the most widely used datasets in public health; its sampling methodology and structure have been described by many authors.¹⁸

NHIS includes self-reported information on health care utilization, including receipt of dental care and recent receipt of HIV testing. For our analysis, we combined this information with the following sociodemographic data: income, education, race/ethnicity, region, and health insurance coverage. Given the intimate nature of HIV risk behaviors and testing, we only used data for the responding adult who completed the survey. To accommodate the weighted, stratified, and clustered nature of NHIS, we computed all results using SVY routines in Stata version 10.0 (StataCorp, College Station, TX).

Ostermann et al. used 2000–2005 NHIS data to determine the prevalence of recent HIV testing among respondents who answered “high” or “medium” in response to the question “What are your chances of getting the AIDS virus?” or who reported that they were subject to at least 1 specific HIV risk.¹⁹ For the latter variable, respondents were asked whether any of the following standard risk factors applied to them: receipt of antihemophilia clotting factors,

men having sex with men, injection drug use, commercial sex work, or having sexual relations with someone with known HIV risk factors. (NHIS masks the specific risk factor.) We followed the same operationalization in the current study.

RESULTS

Table 1 shows the percent of the sample (and the estimated number of individuals) that was at self-reported risk for HIV. The table also shows the proportion of those at risk who obtained dental care in the prior 2 years. Among those who self-reported as being at HIV risk and who had never been tested or had not been tested in the prior 5 years, more than 70% had seen a dentist within the prior 2 years.

Appendix table A1 (available as a supplement to the online version of this article at www.ajph.org) presents our multivariate logistic regression analysis. We implemented 2 specifications to examine whether particular subpopulations were especially promising for HIV testing. In the first specification, the dependent variable was set to 1.0 for individuals who self-reported as facing HIV risk, had never been HIV tested, and had seen a dentist in the prior 2 years. In our second specification, the dependent variable was set to 1.0 for individuals who self-identified as facing HIV risk, had not been HIV tested in the prior 5 years, and had seen a dentist in the prior 2 years. We obtained a similar pattern in both specifications. Although several variables yielded statistically significant coefficients, none displayed an odds ratio greater than 2.0.

In our data, an estimated 610 000 Americans faced HIV risk, had never been tested for HIV, and received no preventive medical care from any source. Sixty-one percent of those people (approximately 370 000 people) reported that they had visited a dentist within the prior 2 years.

DISCUSSION

Regular dental care offers an opportunity to serve many at-risk individuals who are not currently being tested for HIV infection and who may not access other forms of care. According to an array of measures, more than 70% of adults facing self-reported HIV risk are in regular contact with an oral health provider. Many of



Diagnosis and treatment of solitary tongue papilloma. Case report and literature review

Diagnóstico y tratamiento de un papiloma solitario de lengua. Reporte de caso y revisión de la literatura

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ABSTRACT

Human papilloma viruses constitute a heterogeneous viral group; their genome is made up of a helicoidal double-stranded DNA molecule with a protein capsid. There are over 230 HPV types (118 of them well characterized; more than 40 are anal-genital types, out of which 15 are oncogenic). In humans they represent one of the viral groups which more frequently infect epithelium of skin and mucosae, conjunctive tissue, oral cavity, larynx, and bronchial tree among others. Oral mucosa squamous papilloma, caused by genotypes 33 and 32, is the most frequently found papillary lesion and represents 2.5% of all lesions of the oral cavity, larynx, bronchial tree, esophagus, bladder anus and genital tract. The aim of the present study was to conduct a literature review on oral papillomatosis as well as to review a clinical case.

Key words: Human papilloma virus, tongue, papilloma.

Palabras clave: Virus del papiloma humano, lengua, papiloma.

RESUMEN

Los virus del papiloma humano (VPH) constituyen un grupo viral heterogéneo, cuyo genoma está constituido por ADN de doble cadena helicoidal con una cápside proteica. Existen más de 230 tipos de VPH (118 de ellos bien tipificados), más de 40 tipos anogenitales, de los cuales 15 son oncogénicos y, en humanos, constituyen unos de los grupos virales que con mayor frecuencia infecta el epitelio de piel y mucosas: conjuntivas, cavidad bucal, laringe y árbol bronquial entre otros. El papiloma escamoso de la mucosa oral, ocasionado por los genotipos 33 y 32, es la lesión papilar más frecuente y constituye el 2.5% de todas las lesiones de la cavidad oral, laringe, árbol bronquial, esófago, vejiga, ano y tracto genital. El objetivo del presente estudio es realizar una revisión de la literatura sobre la papilomatosis oral y reportar un caso.

INTRODUCTION

Human papilloma viruses (HPV) conform a heterogeneous viral group; their genome is constituted by a helicoidal double stranded DNA molecule with a protein capsid. They are formed by epitheliotropic entities which infect the epithelium's basal state and, as a result, preserve its DNA transcription and replication at basal levels, producing hyperplastic papillomatous and verrucous lesions in the skin and mucosae.¹

There are over 230 HPV types (118 of them well characterized) and over 40 anal-genital types, out of which 15 are oncogenic. In humans, they represent one of the viral groups more frequently infecting epithelium of skin and conjunctive mucosae, oral cavity (genotypes 33 and 32) larynx, bronchial tree, esophagus, bladder, anus and genital tract.^{2,3}

In the case of tongue HPV, there are two main groups of clinical presentation:

a) Benign lesions and b) pre-malignant or malignant lesions. Among benign oral lesions we can find oral

papilloma, oral *verruca vulgaris* (common wart), oral acumina condyloma and focal epithelial hyperplasia (Hecks disease).⁴⁻⁶ Malignant and pre-malignant lesions are mainly represented by leukoplakia and squamous cell carcinoma.⁷

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Effects of long-term use of HAART on oral health status of HIV-infected subjects

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Abstract

BACKGROUND—The aim of this study was to determine the effects of long-term use of highly active antiretroviral therapy (HAART) on oral health status of HIV-infected subjects.

METHODS—Oral examination and measurement of saliva flow rate of both unstimulated and wax-stimulated whole saliva were performed in HIV-infected subjects with and without HAART, and in non-HIV individuals. The following data were recorded; duration and risk of HIV infection, type and duration of HAART, CD4 cell count, viral load, presence of orofacial pain, oral dryness, oral burning sensation, oral lesions, cervical caries, and periodontal pocket. Multiple logistic regression analysis was performed to determine the effects of long-term use of HAART on oral health status of HIV-infected subjects. **RESULTS:** One hundred and fifty-seven HIV-infected subjects – 99 on HAART (age range 23–57 years, mean 39 years) and 58 not on HAART (age range 20–59 years, mean 34 years) – and 50 non-HIV controls (age range 19–59 years, mean 36 years) were enrolled. The most common HAART regimen was 2 NRTI + 2 NNRTI. HIV-infected subjects without HAART showed greater risks of having orofacial pain, oral dryness, oral lesions, and periodontal pockets than those with short-term HAART ($P < 0.01$). The subjects with long-term HAART were found to have a greater risk of having oral lesions than those with short-term HAART ($P < 0.05$). The unstimulated and stimulated salivary flow rates of the subjects with HAART were significantly lower than in those without HAART ($P < 0.05$).

CONCLUSION—We conclude that long-term HAART has adverse effects on oral health status of HIV-infected subjects.

Keywords

HAART; HIV; oral health; oral lesion; risk factor; salivary flow rate

Introduction

Highly active antiretroviral therapy (HAART) has become a standard treatment for HIV infection. It induces a marked reduction in viral load and increase in the CD4⁺ cell count (1) leading to a declination in morbidity and mortality of HIV-infected subjects (2). At present,



ORIGINAL ARTICLE

Ethics, research and HIV: lessons learned- a workshop report

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Assessing risk for transmission of a blood-borne pathogen requires the use of the hazard and risk model. Infection control is a system that uses a number of individual processes to eliminate or reduce the probability of a hazard occurring. Strategies employed to reduce risk should be rehearsed, used routinely, audited, reviewed, and the results shared. Continuing dental education has improved dental healthcare worker willingness to treat people living with HIV/AIDS (PLWHA) and has decreased negative attitudes and staff fears. Providing care for PLWHA during undergraduate dental school or dental hygiene programme is also associated with a greater willingness to treat. Whether by identifying suspect oral lesions or offering rapid screening tests in the dental setting for HIV, the dental team can play an important role in linkage to confirmatory diagnosis and care with the goal of reducing to zero the number of undiagnosed cases.

Oral Diseases (2016) 22, 193–198

Keywords: HIV; AIDS Oral Health; dental treatment; risk control; dental education; PLWHA; HIV screening

Introduction

Initiatives in the dental setting to screen for HIV highlight the benefits of an integrated approach between the medical and dental professions. This effort can lead to earlier diagnosis and better health outcomes while reducing HIV transmission rates. When dealing with the risk of a new blood-borne pathogen, organised dentistry must quickly respond and disseminate information that is timely, morally sound and evidence-based.

The organisers of WW7 invited authors from four countries with different economies and healthcare systems to answer one of the questions posed by Dr. David Croser and Dr. David Reznik:

Question 1: *Can we use the international experience of managing the HIV infected patient to inform future new infection control risks in the dental setting?*

Question 2: *Considering the available evidence, what success has there been in meeting the educational needs of the dental team treating patients living with HIV (PLWHA)?*

Question 3: *What evidence is there to demonstrate the benefits of screening for HIV by the dental team in the dental setting?*

Question 4: *If the interests of the patient should always come first, what is the best model for the dental profession as a whole to balance dental/oral health needs with the fear of treating the patient when a new life-threatening disease arises?*

Each author presented a brief answer to their allocated question, which the participants then debated. This report synthesises the debate using notes and literature reviews provided by each author. The disparate nature of the individual author experiences generated an outcome that was more conceptual than practical. But then not every question will receive a complete answer on first being asked. If the question has value, it should be asked again in a different way.

Question 1

Can we use the international experience of managing the HIV infected patient to inform future new infection control risks in the dental setting?

Presenter: David Croser (UK)


Any assessment of risk also requires us to consider the concept of hazard (<http://www.hse.gov.uk/risk/theory/alarplance.htm> [accessed on November 2014]). By its nature, a hazard involves something that could potentially be harmful to a person's life, health, property or the environment. Simply put, a hazard is something that can lead to adverse effects. For example, water on a staircase is a

RESEARCH ARTICLE

Open Access



Evaluation of oral care protocols practice by dentists in Rio de Janeiro towards HIV/AIDS individuals

Carina Maciel Silva-Boghossian* , Brenda Azzariti Berrondo Boscardini, Claudia Maria Pereira and Edson Jorge Lima Moreira

Abstract

Background: The aim of this study was to evaluate the dentists' knowledge and practice regarding HIV positive individuals' oral care in Rio de Janeiro State.

Methods: Dentists from Rio de Janeiro State ($n = 242$) answered an electronic questionnaire on biosafety procedures, oral manifestations of AIDS, and knowledge of HIV infection. Collected information was stratified by gender, and data were analyzed using Chi-square and t tests.

Results: From the 14 oral manifestations investigated, oral candidiasis, necrotizing ulcerative gingivitis, and hairy leucoplakia were more associated with HIV, with no differences between the responses from men and women. Above 85% of the participants would be concerned about becoming infected with HIV after a needle/ sharp object injury and more than 80% of them were willing to be tested for HIV. However, significantly more women (98.8%), compared to men (91.3%), said they knew that HIV/ AIDS patients can contaminate dental care professionals, $p = 0.007$. There was a significant difference in the answers for the questions: "Are there special dental clinics for treatment of HIV/AIDS patients in Brazil?" ($p = 0.044$), and "Do the negative HIV tests surely indicate that the persons are free of viruses?" ($p = 0.005$). Significant differences between men and women were also observed regarding use of disposable mask ($p = 0.01$), and cap ($p < 0.0001$).

Conclusion: Most dentists who participated in the study presented a good knowledge on the care of HIV/ AIDS individuals, including biosafety protocols and in terms of the oral manifestations commonly associated to AIDS.

Keywords: Dental professional, Dentist, Oral health, HIV, AIDS

Background

After decades of its discovery, the human immunodeficiency virus (HIV) infection is still an alarming health public problem [1, 2]. Infected individuals may develop the acquired immune deficiency syndrome (AIDS) when the infection reaches advanced stages [2]. In that condition, immunosuppression is measured through the evaluation of CD4+ lymphocytes as well as the counts of virus particles in carriers' blood. Levels of CD4+ below 200 mg/ dL indicates deficient immune response, which is one

important indicator for highly active antiretroviral therapy (HAART) initiation [3]. Due to HAART, currently, there are millions of people living with HIV in the world without AIDS symptoms [3–5]. However, non-symptomatic HIV+ individuals may still transmit the virus through sex without preservatives, shared needles, needle stick accident, pregnant women and even nursing mothers [5]. Therefore, routine screening tests for the identification of HIV infection is still necessary in order to avoid spreading of contamination [2].

Additionally, HIV+ individuals may have oral pathognomic manifestations of AIDS, including oral candidiasis, hairy leucoplakia, Kaposi sarcoma, linear gingival erythema, necrotizing ulcerative gingivitis, necrotizing ulcerative periodontitis, and non-Hodgkin lymphoma [6–9].

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Factors associated with dental caries, periodontitis and intra-oral lesions in individuals with HIV / AIDS*

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ABSTRACT

This study aimed to investigate the factors associated with oral diseases in individuals with HIV/AIDS. A cross sectional study was carried out which included 312 individuals registered in the Specialized Care Services for HIV/AIDS in three municipalities of the State of Bahia: Feira de Santana, Santo Antonio de Jesus and Juazeiro, Brazil. Socioeconomic-demographic characteristics related to life style and to dental caries, periodontitis and intra-oral mucosal lesions were investigated in patients with HIV/AIDS infection. Prevalence Ratio with 95% Confidence Interval and significance level of 5% were employed for the statistical analysis. The majority of the individuals evaluated were male with a mean age (\pm standard deviation) of 41.5 ± 11.3 years, and a mean time of HIV infection diagnosis (\pm standard deviation) of 5.2 ± 4.4 years. The presence of dental caries was observed in 78.7% of the sample, periodontitis in 25.4% and 36.2% showed intra-oral lesions. Oral health status showed a statistically significant association with the following variables: gender, age, schooling level, current occupation, family income, past and current smoking, antiretroviral use time, latest viral burden dosage, latest CD4-positive T lymphocyte count, use of complete/partial dental prosthesis, need for dental prosthesis, and use of dental floss. With the exception of those factors directly related to HIV/AIDS i.e., antiretroviral use time, latest viral burden dosage and latest CD4-positive T lymphocyte count, the factors associated with oral diseases in this population were the same as those associated with oral diseases in the non-HIV/AIDS population.

ARTICLE HISTORY

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KEYWORDS

Acquired immunodeficiency syndrome; HIV infections; oral manifestations; periodontitis; dental caries

Introduction

Considered to be a global public health problem, Acquired Immunodeficiency Syndrome (AIDS) is a retroviral disease caused by the Human Immunodeficiency Virus (HIV). It is characterized by a profound state of immunosuppression, leading to opportunistic infections, secondary malignancies and neurological manifestations (Kumar, Abbas, & Aster, 2014).

Estimates indicate that, approximately, 35 million people are living with HIV/AIDS worldwide, with about 44,000 individuals in Brazil (UNAIDS, 2014).

Oral manifestations related to HIV are common in asymptomatic individuals and can often present as the first signs of the infection's progression. In this context they are considered as possible markers of the disease (Guerra, Pereira, Meneghim, & Hebling, 2008).

In the 1980s, following the identification of AIDS, a number of oral lesions including candidiasis (in its

various clinical presentations), periodontal diseases, hairy leukoplakia, Kaposi's sarcoma, non-Hodgkin's lymphoma and herpes simplex were described as frequently being related to the syndrome (Souza, Pereira-Pinto, Medeiros, Araújo-Jr, & Moura, 2000). More recently, with the widespread use of antiretroviral therapy, changes in the pattern and prevalence of these oral manifestations in individuals with HIV have been observed (Cherry-Peppers, Daniels, Meeks, Sanders, & Reznik, 2003).

In addition to opportunistic infections, immunodeficiency caused by HIV may have a direct influence on the pathogenesis of periodontal disease (Glick & Holmstrup, 2002). In this context, Trentin et al. (2007) have identified immunological changes in the gingival sulcus of individuals with HIV/AIDS.

With respect to dental caries, there is still no consensus that its progression is associated with HIV infection.

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***Summary:** The factors associated with oral diseases in this population were the same as those associated with oral diseases in the non-HIV/AIDS population.

World Health Organization global policy for improvement of oral health – World Health Assembly 2007

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The World Health Organization (WHO) Global Oral Health Programme has worked hard over the past five years to increase the awareness of oral health worldwide as an important component of general health and quality of life. Meanwhile, oral disease is still a major public health problem in high income countries and the burden of oral disease is growing in many low- and middle income countries. In the World Oral Health Report 2003, the WHO Global Oral Health Programme formulated the policies and the necessary actions for the improvement of oral health. The strategy is that oral disease prevention and the promotion of oral health needs to be integrated with chronic disease prevention and general health promotion as the risks to health are linked. The World Health Assembly (WHA) and the Executive Board (EB) are supreme governance bodies of WHO and for the first time in 25 years oral health was subject to discussion by those bodies in 2007. At the EB120 and WHA60, the Member States agreed on an action plan for oral health and integrated disease prevention, thereby confirming the approach of the Oral Health Programme. The policy forms the basis for future development or adjustment of oral health programmes at national level.

Key words: Oral health, general health, WHO, EB120, WHA60

In 2002, the World Health Organization (WHO) Global Oral Health Programme was reoriented according to a new strategy of integration with chronic disease prevention and general health promotion. Chronic diseases, which continue to dominate in middle- and high income countries, are becoming increasingly prevalent in many of the poorest developing countries. They create a double burden on top of the infectious diseases by which these countries continue to be afflicted¹. A somewhat similar pattern is observed for the unresolved burden of oral disease²⁻⁹. As for the major chronic diseases, socio-environmental factors are distal causes of oral disease¹⁰, moreover, a core group of modifiable risk factors is common to many chronic diseases and injuries, and most oral diseases. These common risk factors are however preventable as they relate to lifestyles, such as dietary habits, use of tobacco and excessive consumption of alcohol, and the standard of hygiene.

The objectives of the WHO Global Oral Health Programme, one of the technical programmes within the

Department of Chronic Disease and Health Promotion, imply that greater emphasis is put on developing global policies based on common risk factors approaches and which are coordinated more effectively with other programmes in public health. The policy of the WHO Global Oral Health Programme emphasises that oral health is integral and essential to general health, and that oral health is a determinant factor for quality of life. The policy is detailed in the World Oral Health Report 2003². The report provides a comprehensive analysis of the global burden of oral disease and additional information of oral health is further described in a Special Theme of the *Bulletin of the World Health Organization*, September 2005¹¹.

WHO priority action areas for the improvement of oral health worldwide are:

- Effective use of fluoride¹²⁻¹⁵
- Healthy diet and nutrition¹⁶⁻¹⁷
- Tobacco control¹⁸⁻²¹

Oral manifestations among people living with HIV/AIDS in Tanzania

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Background: This study aimed to determine the prevalence of various oral and peri-oral manifestations in people living with HIV/AIDS in Tanzania. **Methods:** A cross sectional study. A total of 187 persons with HIV infection were recruited from non-governmental organisations serving people living with HIV/AIDS, 16.6% were males and females 83.4%. Information on weight and height, as well as extra oral and intra oral examinations for different manifestations were gathered. Treatment and referral for special care were offered. **Results:** At least one oral lesion was present in 45% of the participants. Candidiasis (28.9%) and non-tender lymphadenopathy (11.8%) were the most common lesions. Candidiasis occurred most frequently on lips/mucosa, and the tongue, and pseudomembranous candidiasis was the most frequent type. Candidiasis occurred with several other conditions and was statistically significantly associated with low body mass index (BMI). **Conclusion:** This community survey carried out in an African sub-Saharan country showed that oral lesions are frequent among people living with HIV/AIDS. As emphasised by the World Health Organization Global Oral Health Programme, national HIV/AIDS programmes should incorporate oral health components.

Key words: Oral manifestations of HIV/AIDS, oral candidiasis, HIV/AIDS in Africa, prevention, health promotion

The HIV/AIDS pandemic has affected millions of people worldwide and the highest burden of the disease is on the countries of Africa. Recently, UNAIDS and WHO estimated that about 34 million people now are living with HIV/AIDS¹ and about 23 million people with HIV are in sub-Saharan Africa. In Tanzania, the overall prevalence of HIV infection among blood donors was found at 8.8% in 2003 and based on household surveys the sero-prevalence in adults is estimated to be 7%². Thus, despite the efforts made to introduce effective preventive programmes, HIV infection is still a significant public health problem in Tanzania.

HIV/AIDS often have oral and peri-oral manifestations and opportunistic infections may occur independently or in association with other conditions³⁻⁶. Oral

manifestations associated with HIV/AIDS may include candidiasis, HIV/AIDS-related necrotising ulcerative periodontal disease and oral hairy leukoplakia⁶. Other conditions are xerostomia, oral ulcers, Kaposi's Sarcoma (KS) and Non-Hodgkin's lymphoma^{7,8}. Oral lesions such as oral candidiasis and oral hairy leukoplakia have been suggested to be predictors or indicators of HIV infection^{6,9}.

Several investigations of oral manifestations of HIV/AIDS have been carried out in industrialised countries, meanwhile, the findings from these studies may not directly apply to the situation in developing countries^{6,10}. Surveys undertaken in Africa on oral disease related to HIV/AIDS have suggested that 60-90% of people living with HIV/AIDS (PLWHA) had developed at least

General and Oral Health Related Behaviors among HIV Positive and the Background Adult Tanzanian Population

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Abstract

Objectives: To assess the general and oral health related behaviors among HIV positive adults and the background population.

Methods: A case-control study utilizing a structured questionnaire to collect data. Cross tabulations and Chi-square statistics were conducted for bivariate analyses and simple logistic regression was used for multivariate analyses

Results: 898 individuals aged 15-80 years participated in the study of whom 66.8% were females. Slightly more than half (51.2%) self-reported to be living with HIV/AIDS. Of the health behaviors investigated, positive behaviors frequently reported were: hand washing, eating fresh fruits, eating green vegetables, infrequent snacking or consumption of sweetened soft drinks, not smoking or consuming alcohol. Behaviors seldom reported were; tooth brushing (twice a day), use of fluoride toothpaste and regular dental visits. The OR for reporting hand washing before eating among people living with HIV/AIDS was 0.5 (0.3, 0.9). People living with HIV/AIDS had significantly higher odds for daily eating of fresh fruits and vegetables, OR 2.2 (1.6, 3.1) and 1.7 (1.2, 2.3), respectively. They were as well less likely to smoke and consume alcohol than the comparative general population. They were significantly less likely to use sweetened soft drinks (OR 0.6 CI (0.4, 0.8) but more likely than the general population, to have not used fluoridated toothpaste.

Conclusion: From the findings of this study, we conclude that most HIV positive individuals had better general health behaviors than the background population but only a few (18%) had good oral health behaviors (using fluoridated toothpaste and dental visit due to oral problem). HIV positive individuals should be encouraged to maintain positive health behaviors and be facilitated to practice the positive behaviors currently reported by few.

Keywords: Oral health; Health behavior; Oral health behavior; HIV, People living with HIV/AIDS; Case control study; Tanzania

Introduction

Conner and Norman [1] defined health behavior as any activity undertaken for the purpose of preventing or detecting disease or for maintaining health and well-being. Health related behaviors can be grouped into positive and negative health behaviors. Examples of positive or 'health-enhancing' health behaviors include participation in regular leisure-time physical activity, body and hand hygiene, annual health checks-ups, vaccination, screening for high blood pressure and high cholesterol, consumption of fruits and vegetables, and condom use in response to the threats from sexually transmitted diseases [2]. Whereas, negative or 'health-impairing' health behaviors include: tobacco use, drinking heavily, driving too fast, and eating a diet high in saturated fat [2]. Correspondingly, positive oral health behaviors are proper tooth brushing, fluoride use and dental consultation [3] while negative oral health behaviors include tobacco use and frequent in between meals and sugar consumption [4,5].

There is sufficient information on association between health-related behaviors and diseases, as well health-related behaviors and health status. For instance, morbidity and mortality from coronary heart disease (CHD), oral cancer, development and progression of periodontal disease are known to increase among smokers [6-10]. Likewise, excessive alcohol consumption is a known risk factor for periodontal diseases [7] and oral cancer [11]. Inadequate physical activity, especially when coupled with consumption of excess calories, lead to obesity [12] which is a risk factor for periodontal disease [13]. Frequent consumption of sugars, especially when taken in between

meals, is associated with increased risk of dental caries [4]. Recently, Liang et al.; [14] reported that obesity-related behaviors, such as increased food intake, dis-inhibited eating, and less physical activity are associated with executive dysfunction in children and adolescents. Galanti et al.; [15] reported, among adolescents, that tobacco and oral snuff use were significantly associated with a number of problematic behaviors such as drinking and driving, unsafe sex, and school truancy.

Positive behaviors like body & hand hygiene, physical examination, vaccination, screening for high blood pressure and high cholesterol, consumption of fruits and vegetables at least five portions a day promote good health [16]. Likewise, tooth brushing twice a day in the morning and before retiring to bed, use of fluoride and regular dental consultation promote good oral health as well as prevent dental caries [17].

In disease causation models, agent factors comprise characteristics that include the immunological state of the individual. Immune-

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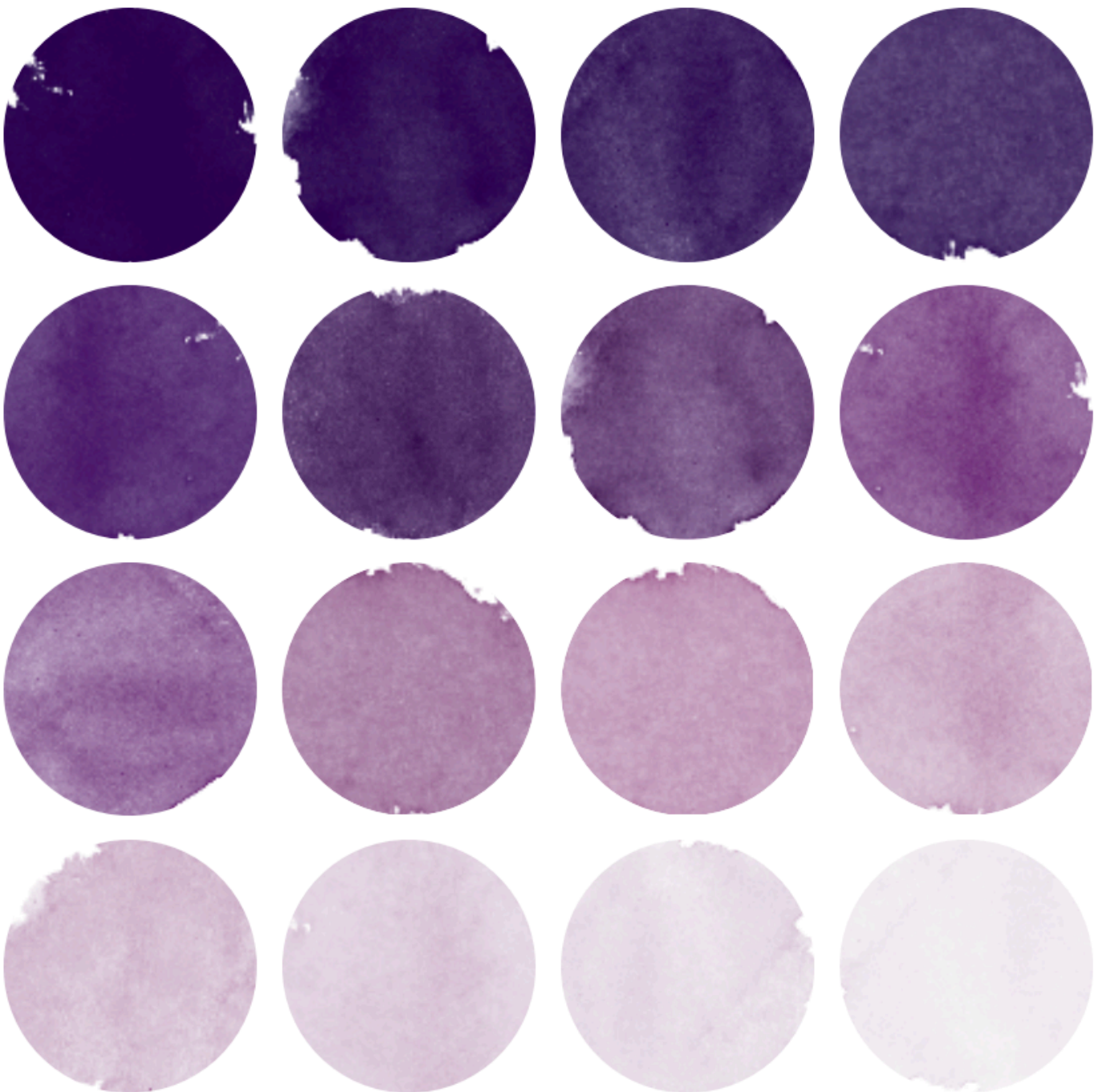
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GLOBAL HEALTH SECTOR STRATEGY ON
HIV
2016–2021

TOWARDS ENDING AIDS



FACT SHEET – WORLD AIDS DAY 2020**GLOBAL HIV STATISTICS**

26.0 million [25.1 million–26.2 million] people were accessing antiretroviral therapy as of the end of June 2020.

38.0 million [31.6 million–44.5 million] people globally were living with HIV in 2019.

1.7 million [1.2 million–2.2 million] people became newly infected with HIV in 2019.

690 000 [500 000–970 000] people died from AIDS-related illnesses in 2019.

75.7 million [55.9 million–100 million] people have become infected with HIV since the start of the epidemic (end 2019).

32.7 million [24.8 million–42.2 million] people have died from AIDS-related illnesses since the start of the epidemic (end 2019).

People living with HIV

- In 2019, there were 38.0 million [31.6 million–44.5 million] people living with HIV.
 - 36.2 million [30.2 million–42.5 million] adults.
 - 1.8 million [1.3 million–2.2 million] children (0–14 years).
- 81% [68–95%] of all people living with HIV knew their HIV status.
- About 7.1 million people did not know that they were living with HIV.

People living with HIV accessing antiretroviral therapy

- As of the end of June 2020, 26.0 million [25.1 million–26.2 million] people were accessing antiretroviral therapy.
- In 2019, 25.4 million [24.5 million–25.6 million] people were accessing antiretroviral therapy, up from 6.4 million [5.9 million–6.4 million] in 2009.
- In 2019, 67% [54–79%] of all people living with HIV were accessing treatment.
 - 68% [54–80%] of adults aged 15 years and older living with HIV had access to treatment, as did 53% [36–64%] of children aged 0–14 years.
 - 73% [60–86%] of female adults aged 15 years and older had access to treatment; however, just 61% [48–74%] of male adults aged 15 years and older had access.
- 85% [63–100%] of pregnant women living with HIV had access to antiretroviral medicines to prevent transmission of HIV to their child in 2019.

Global inequalities in HIV infection

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Abstract

HIV infection continues to be one of the world's greatest pandemics, affecting nearly every country on the globe. By September 2018, it is estimated that 38 million people were living with HIV, 30 million people are aware of their status, and 23 million people are taking anti-retroviral therapy (8 million in 2010). Thus, currently 8 million people living with HIV are not aware that they are HIV-positive and 15 million persons are not being treated. There are nearly 15 million orphans (aged 0–17). There is widespread inequality both in the prevalence of HIV infection and in the access to therapy. However, although the number of people living with HIV continues to increase, the number of new infections shows a steady decrease over the last 9 years and in 2018 was 1.7 million. Deaths from AIDS in 2018 also decreased to 750,000 from 1.2 million in 2010. The world prevalence of HIV is about 0.23% but is over 0.3% in South-East Asia, Latin America, North America and Eastern Europe and with particularly high prevalence in the Caribbean (1.1%) and sub-Saharan Africa (5.5%). It is approximately 0.5% in Indonesia. There were approximately 5,000 new HIV infections (adults and children) a day during 2018. About 61% were in sub-Saharan Africa, nearly 50% were in females and 500 were in children. HIV therapy seems to have had a global impact, with AIDS-related deaths decreasing by 33% since 2010, and new infections decreasing by 16%. Nevertheless, the majority of the world's HIV is in low and middle resource countries and social determinants are strongly related. Many people living with HIV or at risk for HIV still do not have access to prevention, care and treatment, and there is still no cure.

KEYWORDS

global, HIV, inequalities, infection, oral, pandemic

1 | BACKGROUND

HIV infection continues to be one of the world's greatest pandemics, affecting nearly every country on the globe, but not all countries are affected equally. At the end of 2019, the number of people living with HIV in the world was approximately 38 million and the number of people with HIV who are taking anti-retroviral therapy (ART) is 23.3 million (UNAIDS, 2019a, 2019b). However, only 20 million of these actually have suppressed viral loads. One dramatic figure is

that in 2019, there are nearly 15 million orphans due to AIDS who are aged up to 17 (UNAIDS, 2019a, 2019b). The total number of deaths in the HIV epidemic now number 39 million. There is little doubt that the quality of life is adversely affected by HIV infection, particularly in those who have not been treated (Thomas et al., 2017).

In December 2013, the UNAIDS programme on AIDS (UNAIDS) called on the worldwide community to support country and regional aid efforts to establish new targets for HIV infection control beyond 2015. These were named the 90–90–90 targets (Baggaley

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A GUIDE FOR EPIDEMIOLOGICAL STUDIES OF ORAL MANIFESTATIONS OF HIV INFECTION

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World Health Organization
Geneva
1993

HIV CURRICULUM

FOR THE HEALTH PROFESSIONAL



BIPAI

Baylor International
Pediatric AIDS Initiative

HIV in Indonesia and in neighbouring countries and its social impact

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Abstract

HIV incidence is still increasing in parts of Indonesia and in several Asian Countries. New cases of HIV in Indonesia have risen from 7,000 per year in 2006 to 48,000 per year in 2017. In spite of this increase, the number of newly diagnosed cases of AIDS has decreased from a peak of over 12,000 in 2013 to a little over 9,000 in 2017. The mean prevalence of HIV in Indonesia is 0.41% but there is a ten-fold difference in the prevalence in different regions with the highest in Papua (5%). Women represent over 35% of new infections per year and of the total (640,000) in Indonesia. Over 50% of HIV diagnoses are made when patients already have AIDS. Stigma and discrimination are still strong barriers in prevention and treatment but also there are considerable challenges in access to appropriate anti-retroviral therapy. There is a need for further investment in HIV Programs in Indonesia so that prevention can be enhanced, and diagnosis made at an earlier stage. Health Professionals including dentists should be readily willing to provide joint prevention efforts and care to people at risk and with HIV and other infectious diseases to help meet the WHO aims of 2030. Public health programmes are needed to make certain that the general public is aware of HIV testing and the role of dental healthcare workers in facilitating this, thereby further normalising attitudes to people living with HIV.

KEYWORDS

HIV, Indonesia, inequalities, infection, oral, stigma

1 | BACKGROUND

An overall view of the global pandemic is given in a paper in this issue (Challacombe, 2020). This confirmed that according to the latest figures available from WHO, that approximately 38 million people worldwide were living with HIV infection and that since the beginning of the HIV global pandemic nearly the same number of people had died with HIV infection. Worldwide, the number of infections continues to increase, and some 1.7 million people became infected during the year 2018 according to the latest figures. Some 21 million of those currently living with HIV are women (19 million) and children

(2 million). AIDS-related deaths globally amounted to 770,000 per year with over 100,000 of these deaths being in children.

2 | HIV IN THE ASIA-PACIFIC REGION

In the Asia-Pacific region, approximately 6 million people are estimated to be living with HIV (PLHIV), representing nearly 15% of the world total (Table 1). India has over 2.1 million people living with HIV, a figure which has remained stable over the last 5 years (Paranjape & Challacombe, 2016) and there are over 440,000 in Thailand and



HIV screening in dental settings: Challenges, opportunities, and a call to action

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Abstract

HIV is responsible for tremendous suffering and loss around the world, but many advances in HIV screening, diagnosis, treatment, and prevention provide hope for an end to the HIV epidemic. Global and national campaigns facilitate access to these HIV advances, but some individuals and communities still lack access, particularly in developing countries. To reach those who remain under-served, campaigns encourage greater integration of HIV services with non-HIV services. As members of the health-care team with a clinical stake in HIV, dental care providers have a unique contribution to make. Much research on the role of dental care providers in HIV has focused on HIV screening in the dental setting, and researchers have identified possible ways forward but also daunting challenges. Approaches for screening, brief intervention, and referral to treatment used in primary care and dental care settings for other health risks may help overcome challenges related to provider scope of practice and need for training. Approaches to managing distress and uncertainty in other clinical contexts may help overcome challenges related to patient acceptability, equipping providers to manage sensitive topics and emotional aspects of HIV screening. While not panaceas, these approaches may be useful to dental care providers interested in answering the global “call to action” for contributing to ending the HIV epidemic.

KEYWORDS

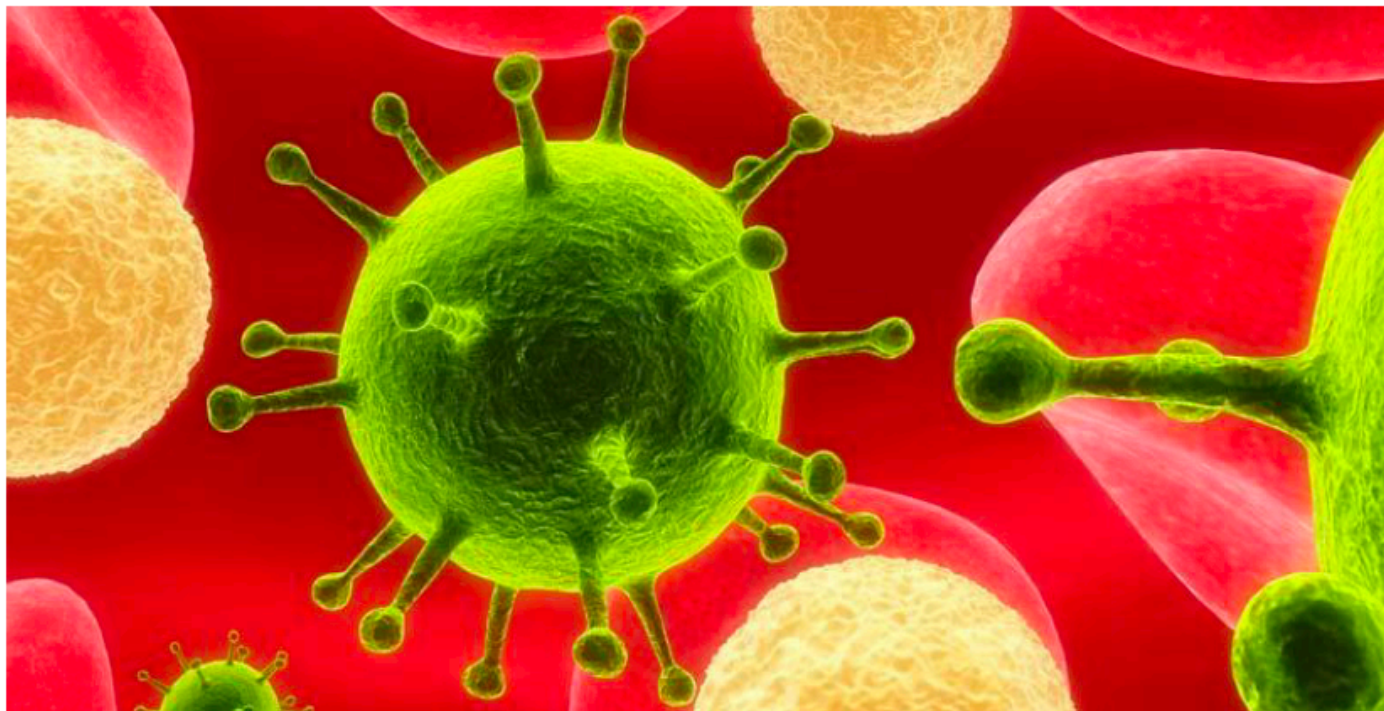
dentists, HIV, interprofessional collaboration, medical screening, scope of practice

1 | ADVANCES IN HIV SCREENING, TESTING, TREATMENT, AND PREVENTION

HIV infection has caused epidemic levels of suffering and loss around the world, claiming an estimated 32 million lives as of 2018, and leading to an estimated 37.9 million currently living with HIV/AIDS (World Health Organization, 2018). International efforts have developed effective tools for screening, testing, treating, and preventing HIV infection. User-friendly HIV rapid screening is now possible, producing reliable results in as little as 30 min from a saliva sample. These rapid tests earn high rates of acceptability

to patients, subsequent confirmatory testing, and linkage to treatment for those testing positive (Broekaert & Challacombe, 2015). Current treatment strategies for HIV include many anti-retroviral therapies (ART) that increase the life expectancy of newly diagnosed individuals, and with good adherence, suppress viral load to such an extent that risk of sexual transmission to others is essentially eliminated (Kanters et al., 2016). Individuals who are not HIV positive but are at risk may be candidates for pre-exposure prophylaxis (PrEP) regimens that are more than 95% effective in preventing HIV infection if taken daily (Centers for Disease Control & Prevention, 2018).

HIV strains and types



KEY POINTS

- There are two main types of HIV - HIV-1 (the most common) and HIV-2 (relatively uncommon and less infectious).
- Like many viruses, HIV has the ability to mutate and change over time - within the main types of HIV there are many genetically distinct subgroups.
- Tests to diagnose HIV and monitor the level of virus in the body that are sensitive to the full range of subtypes (and to group O and HIV-2) do exist, but may not be readily available in all settings.

Explore this page to find out more about [HIV-1 and HIV-2](#), [groups within HIV-1](#), [subtypes within HIV-1](#), and [whether differences in subtypes matter](#).

HIV-1 and HIV-2

HIV-1 and HIV-2 are two distinct viruses. Although tests which are sensitive to both types of viruses are widely available, only one antibody test currently available can specifically distinguish between antibodies to HIV-1 or HIV-2.

Worldwide, the predominant virus is HIV-1. HIV-1 accounts for around 95% of all infections worldwide. HIV-2 is estimated to be more than 55% genetically distinct from HIV-1.¹

The relatively uncommon HIV-2 virus is concentrated in West Africa but has been seen in other countries with links to West Africa. It is less infectious and progresses more slowly than HIV-1,

HIV testing in the dental setting: A global perspective of feasibility and acceptability

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Abstract

HIV is no longer a death sentence with early diagnosis and effective treatment contributing to a good prognosis. Surveillance data, however, suggest that one in four people globally living with HIV are unaware of their HIV infection and remains at risk of transmitting their infection if having unprotected sex. A wider array of testing opportunities and settings are thus needed to address this issue of public health significance. Evidence suggests there is a role for the dental team, particularly dentists, in offering chairside point-of-care HIV screening to patients during their dental appointments. Dentists, dental hygienists, and other members of the dental team may still have a role in helping to identify new cases of HIV with the goal of improving health outcomes, addressing health inequalities and improving the quality and quantity of life. This paper reviews the global epidemiology of HIV/AIDS, summarizes the point-of-care HIV testing process, highlights key findings of international studies (from high-, middle-, and low-income countries) on the role of dental professionals in point-of-care HIV testing, and offers suggestions for what additional evidence is needed to make point-of-care HIV testing a routine part of dental care.

KEYWORDS

dentist, dental hygienist, HIV, HIV testing, patient

1 | BACKGROUND

1.1 | Dental setting

Rapid oral HIV tests are a highly sensitive and specific, easy-to-use, and non-invasive way to screen for HIV (Pollack, Metsch, & Abel, 2010; Siegel et al., 2012). The oral health provider can administer a rapid test at the start of a visit, with results available within 10–20 min (Pollack et al., 2010; Siegel et al., 2012). Some oral health providers such as dentists and dental hygienists, largely in high-resource countries, provide primary care screenings such as for hypertension, oral cancer, and glycosylated hemoglobin (Pollack et al., 2010; Siegel et al., 2012). Some oral health providers also practice in community settings that are especially well-positioned to link newly diagnosed people living with

HIV (PLWH) with care, treatment, and support (Siegel et al., 2012). Moreover, persons may be more likely to regularly visit the dental setting than other settings where HIV testing is typically offered (Pollack et al., 2010; Siegel et al., 2012).

Lack of training and knowledge, limited time and concerns over costs (including reimbursement), perceived relevance of HIV testing to oral health, concerns over profiling or angering patients, and fears over the sensitivity of discussing sexual health matters are all major barriers that need to be overcome to implement rapid HIV testing in the dental setting (Santella, Conway, & Watt, 2016; Santella, Ngaihte, et al., 2016; Santella, Schlub, Schifter, Tolani, & Hillman, 2016). Cultural competency in the lesbian, gay, bisexual, transgender, and queer (LGBTQ) community has been recognized for minimizing health disparities, yet their integration within the oral health community has been minimal (Parish & Santella, 2018; Parish et al., 2018).

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1 | BACKGROUND

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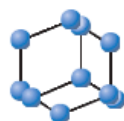
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LETTER TO THE EDITOR

How Does the Covid-19 Pandemic Affect the Target 90-90-90?

BENTHAM
SCIENCEHayat Kumbasar Karaosmanoglu^{1,*}¹Bakırköy Dr. Sadi Konuk Training and Research Hospital Infectious Diseases and Clinical Microbiology, Istanbul, Turkey

Abstract: In 2014, The Joint United Nations Program on HIV and AIDS (UNAIDS) has set an ambitious target code-named 90-90-90, which aims to ensure that 90% of all people living with HIV will know their state, 90% of all people diagnosed will receive sustained antiretroviral therapy, and 90% of all people receiving ART will have viral suppression by 2020. Since 2014, many tests and treatment programs have been developed to achieve the above goals worldwide. In 2019, it was reported that many developed countries can reach the target with the right strategies, as well as regions that are still far from the targets.

It has been reported that the fourth 90 should be one of the targets related to HIV infection in recent years. This view, beyond virological suppression, was towards developing programs that would enable people living with HIV to live not only longer but also healthy.

The socio-cultural and economic obstacles to reach the targets may vary according to geographical regions, but it is clear that COVID-19 disease, which has taken the whole world under the influence since 2019, is a major obstacle to the 90-90-90 targets worldwide.

Difficulties in the diagnosis and access to ART and treatment nonadherence which may be encountered more frequently due to many factors may threaten both the health of people living with HIV and public health.

The COVID-19 pandemic has disrupted many programs developed in the fight against the HIV epidemic.

Considering COVID-19 disease and future epidemics that may create a chaotic environment, analyzing the difficulties experienced in the pandemic retrospectively, and determining new strategies that will bring appropriate solutions to the problems will play an important role in the proper management of future issues.

Keywords: HIV AIDS, COVID-19, pandemic, the target 90-90-90, PLWHIV, ART.

1. TO THE EDITOR,

Early diagnosis and treatment both reduce HIV-related morbidity and mortality and prevent the spread of the disease.

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Since 2014, many tests and treatment programs have been developed to achieve these goals worldwide. In 2019,

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It has been reported that the fourth 90 should be one of the targets related to HIV infection in recent years [8-10]. This view, beyond virological suppression, was towards developing programs that would enable individuals living with HIV to live not only longer but also healthy.

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We can consider the negative impacts of the COVID-19 pandemic on the 90-90-90 targets under 3 headings.

2. THE FIRST 90: DIFFICULTIES IN DIAGNOSING

This pandemic brought a heavy burden to the health system and the whole world was caught unprepared. Almost all

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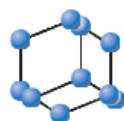


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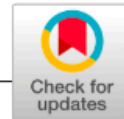
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Abstract

HIV is no longer a death sentence with early diagnosis and effective treatment contributing to a good prognosis. Surveillance data, however, suggest that one in four people globally living with HIV are unaware of their HIV infection and remains at risk of transmitting their infection if having unprotected sex. A wider array of testing opportunities and settings are thus needed to address this issue of public health significance. Evidence suggests there is a role for the dental team, particularly dentists, in offering chairside point-of-care HIV screening to patients during their dental appointments. Dentists, dental hygienists, and other members of the dental team may still have a role in helping to identify new cases of HIV with the goal of improving health outcomes, addressing health inequalities and improving the quality and quantity of life. This paper reviews the global epidemiology of HIV/AIDS, summarizes the point-of-care HIV testing process, highlights key findings of international studies (from high-, middle-, and low-income countries) on the role of dental professionals in point-of-care HIV testing, and offers suggestions for what additional evidence is needed to make point-of-care HIV testing a routine part of dental care.

KEYWORDS

dentist, dental hygienist, HIV, HIV testing, patient

1 | BACKGROUND

1.1 | Dental setting

Rapid oral HIV tests are a highly sensitive and specific, easy-to-use, and non-invasive way to screen for HIV (Pollack, Metsch, & Abel, 2010; Siegel et al., 2012). The oral health provider can administer a rapid test at the start of a visit, with results available within 10–20 min (Pollack et al., 2010; Siegel et al., 2012). Some oral health providers such as dentists and dental hygienists, largely in high-resource countries, provide primary care screenings such as for hypertension, oral cancer, and glycosylated hemoglobin (Pollack et al., 2010; Siegel et al., 2012). Some oral health providers also practice in community settings that are especially well-positioned to link newly diagnosed people living with

HIV (PLWH) with care, treatment, and support (Siegel et al., 2012). Moreover, persons may be more likely to regularly visit the dental setting than other settings where HIV testing is typically offered (Pollack et al., 2010; Siegel et al., 2012).

Lack of training and knowledge, limited time and concerns over costs (including reimbursement), perceived relevance of HIV testing to oral health, concerns over profiling or angering patients, and fears over the sensitivity of discussing sexual health matters are all major barriers that need to be overcome to implement rapid HIV testing in the dental setting (Santella, Conway, & Watt, 2016; Santella, Ngaihte, et al., 2016; Santella, Schlub, Schifter, Tolani, & Hillman, 2016). Cultural competency in the lesbian, gay, bisexual, transgender, and queer (LGBTQ) community has been recognized for minimizing health disparities, yet their integration within the oral health community has been minimal (Parish & Santella, 2018; Parish et al., 2018).

Human immunodeficiency virus interaction with oral and genital mucosal epithelia may lead to epithelial–mesenchymal transition and sequestration of virions in the endosomal compartments

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Abstract

Oral and genital mucosal epithelia are multistratified epithelial barriers with well-developed tight and adherens junctions. These barriers serve as the first line of defense against many pathogens, including human immunodeficiency virus (HIV). HIV interaction with the surface of mucosal epithelial cells, however, may activate transforming growth factor-beta (TGF- β) and mitogen-activated protein kinase signaling pathways. When activated, these pathways may lead to the disruption of epithelial junctions and epithelial–mesenchymal transition (EMT). HIV-induced impairment of the mucosal barrier may facilitate the spread of pathogenic viral, bacterial, fungal, and other infectious agents. HIV-induced EMT promotes highly motile/migratory cells. In oral and genital mucosa, if EMT occurs within a human papillomavirus (HPV)-infected premalignant or malignant cell environment, the HPV-associated neoplastic process could be accelerated by promoting viral invasion of malignant cells. HIV also internalizes into oral and genital mucosal epithelial cells. The majority (90%) of internalized virions do not cross the epithelium, but are retained in endosomal compartments for several days. These sequestered virions are infectious. Upon interaction with activated peripheral blood mononuclear cells and CD4+ T lymphocytes, epithelial cells containing the virus can be transferred. The induction of HIV-1 release and the cell-to-cell spread of virus from epithelial cells to lymphocytes is mediated by interaction of lymphocyte receptor function-associated antigen-1 with the epithelial cell receptor intercellular adhesion molecule-1. Thus, mucosal epithelial cells may serve as a transient reservoir for HIV, which could play a critical role in viral transmission.

KEYWORDS

endosomal sequestration, epithelial–mesenchymal transition, human immunodeficiency virus

1 | INTRODUCTION

Human immunodeficiency virus (HIV) interaction with oral and genital mucosal epithelia may occur upon primary HIV contact and during systemic HIV/AIDS disease. Oral and genital epithelial cells

may express one or more of the following proteins, which may facilitate HIV binding and entry: C-X-C chemokine receptor type 4 (CXCR4), C-C chemokine receptor type 5 (CCR5), *galactosylceramide* (GalCer), heparan sulfate proteoglycans (HSPG), mannose receptor, and T-cell immunoglobulin and mucin domain 1 (TIM-1) (Bobardt

Human papillomavirus infection in the oral cavity of HIV patients is not reduced by initiating antiretroviral therapy

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Objective: The incidence of human papillomavirus (HPV)-related oral malignancies is increasing among HIV-infected populations, and the prevalence of oral warts has reportedly increased among HIV patients receiving antiretroviral therapy (ART). We explored whether ART initiation among treatment-naïve HIV-positive adults is followed by a change in oral HPV infection or the occurrence of oral warts.

Design: Prospective, observational study.

Methods: HIV-1 infected, ART-naïve adults initiating ART in a clinical trial were enrolled. End points included detection of HPV DNA in throat-washes, changes in CD4⁺ T-cell count and HIV RNA, and oral wart diagnosis.

Results: Among 388 participants, 18% had at least one HPV genotype present before initiating ART, and 24% had at least one genotype present after 12–24 weeks of ART. Among those with undetectable oral HPV DNA before ART, median change in CD4⁺ count from study entry to 4 weeks after ART initiation was larger for those with detectable HPV DNA during follow-up than those without ($P = 0.003$). Both prevalence and incidence of oral warts were low (3% of participants having oral warts at study entry; 2.5% acquiring oral warts during 48 weeks of follow-up).

Conclusion: These results suggest: effective immune control of HPV in the oral cavity of HIV-infected patients is not reconstituted by 24 weeks of ART; whereas ART initiation was not followed by an increase in oral warts, we observed an increase in oral HPV DNA detection after 12–24 weeks. The prevalence of HPV-associated oral malignancies may continue to increase in the modern ART era.

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Keywords: HIV, human papillomavirus, immune reconstitution, oral warts

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Human Papillomavirus–Associated Oral Warts among Human Immunodeficiency Virus–Seropositive Patients in the Era of Highly Active Antiretroviral Therapy: An Emerging Infection

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Oral warts are a manifestation of human papillomavirus infection that have been noted infrequently in persons with human immunodeficiency virus (HIV). A nested case-control study was conducted to assess rates of and risk factors for oral warts among a cohort of HIV-seropositive patients. From 1997 through 1999, 56 patients with oral warts were identified among 2194 HIV-positive patients attending an urban oral health center (prevalence, 2.6%). Incident cases of oral warts were significantly more likely to have been diagnosed in 1999 than they were in 1997–1998 ($P = .001$). Multivariate analysis indicated that the risk of oral warts was associated with a $\geq 1\text{-log}_{10}$ decrease in HIV RNA level in the 6 months before diagnosis of oral warts (odds ratio [OR], 2.35; 95% confidence interval [CI], 1.08–5.11) and with serologic evidence of chronic or previous infection with hepatitis B virus (OR, 2.66; 95% CI, 1.31–5.41). The incidence of oral warts in HIV-seropositive patients appears to be increasing in the era of highly active antiretroviral therapy. Oral warts were associated with reductions in virus load, which suggests that this may in part be related to immune reconstitution.

Human papillomavirus (HPV) has been implicated as a cause of several types of benign oral lesions, including oral warts (figure 1) [1]. Studies that used electron microscopy, immunohistochemical staining, and DNA hybridization have all provided evidence of the etiologic role of HPV in oral warts [2–5]. Oral warts in immunocompetent hosts are uncommon, with a reported prevalence of <0.5% [6]. However, a higher prevalence of oral warts has been reported in a population of im-

munosuppressed persons who had undergone renal transplantation [7].

Oral manifestations of HIV infection are common and include oropharyngeal candidiasis, oral hairy leukoplakia, aphthous ulceration, stomatitis, oral herpes simplex, linear gingival erythema, and necrotizing ulcerative periodontitis. The clinical manifestations and spectrum of opportunistic infections in HIV-infected patients are continuing to evolve in the era of highly active antiretroviral therapy (HAART) [8, 9]. Similarly, oral manifestations of HIV are changing in the era of HAART [10–12]. The prevalence of oral hairy leukoplakia and necrotizing periodontal diseases have been noted to be decreasing in the era of HAART; 2 reported studies that involved small numbers of patients with clinically apparent oral HPV infection have suggested that the prevalence of oral warts is increasing in the era of HAART [10, 11]. However, the prevalence and in-

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Immunosuppression Induced by HIV Infection

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Abstract

Immunosuppression due to HIV infection is a resultant of several factors including defective innate signaling pathways, increased viral replication and virus load, gradual loss of peripheral CD4⁺T cells and depletion of T lymphocytes at mucosal sites that collectively lead to progressive immune deficiency and AIDS development. T cells derived from HIV patients were anergic and failed to mount a robust adaptive immune response. The host, on the other hand, becomes vulnerable to opportunistic infections such as tuberculosis and AIDS-related cancer such as Kaposi sarcoma, non-Hodgkin lymphoma, and cervical cancer with remarkable level of immunosuppression. Elucidation of the various mechanisms involved in these immunologic perturbations is necessary to understand HIV pathogenesis for an effective immunotherapy.

Keywords: HIV pathogenesis; Immune activation

Background and Significance

Infection with human immunodeficiency virus (HIV) has been identified as a causal agent of AIDS, a pandemic disease that constitutes a global public health threat for the past 3 decades [1]. It is well established that HIV preferentially infects lymphocytes with consequent depletion of CD4⁺lymphocytes at mucosal sites [2,3]. The progressive death of T lymphocytes is attributed to immune activation rather than to viral cytopathic effect. The resulting immune dysfunction in HIV patients is likely due to combinatorial effects resulting from infection of immune cells (CD4⁺T cells, macrophages, dendritic cells) with HIV, uncontrolled viral replication that impairs antigen presentation, increased mutations in env protein gp120 that leads to virus tropism and survival, increased activation of T helper cells by alloantigens, increased apoptosis by activated CD4⁺T helper cells, down-regulation of CD4⁺synthesis with functional impairment, and perturbation of cytokine pathways [4-6]. The sequel of these effects renders the patients immunosuppressed and vulnerable to opportunistic infections with consequent death. Among the common opportunistic disorders encountered in HIV patients, tuberculosis and AIDS-related cancer such as Kaposi sarcoma, non-Hodgkin lymphoma and cervical cancer.

However, these immunologic defects can be partially restored in HIV patients treated with highly active antiretroviral therapy (HAART) [7]. Patients who accessed HAART treatment and adhered to its regimen had shown significant reduction in AIDS-related mortality and high prevalence of comorbidities due to cardiovascular disease, diabetes, and non-AIDS cancers [8]. Thus, HIV is a relentlessly progressive disease and difficult to cure with HAART due to the persistence of HIV-1 virus in latent reservoirs that may lead to viral remission and development of AIDS [9]. The progression of HIV disease in HAART-treated patients can be virtually monitored by evaluation of inflammatory markers (e.g. kynurenines, Kyn) and Th17/Treg balance in HIV progressors [10, 11]. Despite the functional improvement in HAART-treated patients, as evidenced by reduced

viral load and improved CD4⁺T cells count, a paradoxical response known as immune reconstitution inflammatory syndrome (IRIS) has evolved [12]. The induction of IRIS is worsened in HIV patients with preexisting opportunistic infections. In general, the severity of IRIS depends on CD4⁺T cells count (≤ 100 -200 cells/ μ l), degree of lymphocyte apoptosis or proliferation, and the degree of viral suppression and immune recovery after the initiation of treatment with HAART.

Furthermore, the status of immunosuppression is complicated by increased HIV mutations and genetic diversity during virus replication, ability of the virus to establish a pool of latently infected CD4⁺T cells during early stage of infection, failure of neutralizing antibodies to eliminate HIV replication, and failure of viral antigens to induce an effective T cell memory [13-18]. All of these factors lead the virus to evade the immune system with consequent failure of immune control. Therefore, development of an effective HIV vaccine remains elusive [13] unless obstacles pertaining to the virus and the host are defined for successful discovery of vaccine targets. In the era of omics technologies [19], application of high-throughput methods for vaccine discovery is promising to resolve the above hurdles and might be helpful for better understanding of the immune response to HIV infection with consequent development of an effective vaccine for which conventional methods had failed. In light of these challenges, current efforts for vaccine discovery against HIV are focused on the identification of immunogens that elicit broadly neutralizing antibodies coupled with the induction of HIV-specific cytotoxic T lymphocytes [13].

Conclusion:


In conclusion, immunosuppression elicited by HIV infection is different from other microbial infections [20], and solely complicated to be unidirectionally manipulated. Elucidation of the mechanistic events involved in virus replication coupled with the incurred perturbations in the host innate and adaptive immune signaling pathways are of paramount importance to define HIV pathogenesis and immunity.

STUDY PROTOCOL

Open Access



Improving overall health of children living with HIV through an oral health intervention in Cambodia: study protocol for a randomized controlled trial

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Abstract

Background: Currently, the number of children living with HIV is the highest ever. This has led to an increased focus on a healthy life expectancy in this population. Improving oral health status may contribute to improved immunity, which could in turn lead to greater overall health in this population. This study aims to evaluate the effectiveness of an oral health intervention in improving oral health and immune status among children living with HIV in Cambodia.

Methods: A randomized controlled trial will be conducted in Phnom Penh from May 2018 to April 2020. Among 520 dyads of children living with their respective caregivers, half will be randomly allocated to the intervention group and the other half to the control group. Children aged 3–15 years who are currently receiving antiretroviral therapy at the National Pediatric Hospital will be recruited. In addition, 260 HIV-uninfected children (age-matched to the intervention group) will be recruited from the communities. They, together with their caregivers, will comprise the second control group. The main components of the intervention will include oral health education sessions for the children, as well as daily oral self-care under the supervision of their caregivers. The primary study outcome will be the change in oral health status including the number of decayed, missing, or filled permanent teeth, and the secondary outcome will be CD4 count. The effects of the intervention will be assessed by comparing outcome indicators between the children in the intervention and those in the control groups.

Discussion: This trial will investigate the effects of an oral health intervention on the improvement of oral health and immune status among children living with HIV and determine the differences compared with the control groups. This intervention would encourage the promotion of oral health interventions among children living with HIV and thus contribute to delaying the onset of AIDS.

Trial registration: Current Controlled Trials, International Standard Randomized Controlled Trial Number Register, [ISRCTN15177479](https://www.ccrtrials.com/ISRCTN15177479). Registered on 17 January 2018.

Keywords: HIV, Child, Randomized controlled trials, Cambodia, Community-based, Oral care

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Innovations for prevention and care of oral candidiasis in HIV-infected individuals: Are they available?—A workshop report

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Abstract

Oral candidiasis (OC) is the most prevalent HIV-related oral lesion in patients on combined anti-retroviral therapy (cART) or without cART. Management is challenged in some patients by development of resistance toazole drugs, such as fluconazole. Recent scientific knowledge about OC pathogenesis, the role of OC in the immune reconstitution inflammatory syndrome (IRIS), the relationship of OC with the microbiome, and novelties in OC treatment was discussed in an international workshop format. Literature searches were conducted to address five questions: (a) Considering the pathogenesis of *Candida* spp. infection, are there any potential therapeutic targets that could be considered, mainly in HIV-infected individuals resistant to fluconazole? (b) Is oral candidiasis part of IRIS in HIV patients who receive cART? (c) Can management of the oral microbiome reduce occurrence of OC in patients with HIV infection? (d) What are the recent advances (since 2015) regarding plant-based and alternative medicines in management of OC? and (e) Is there a role for photodynamic therapy in management of OC in HIV-infected patients? A number of the key areas where further research is necessary were identified to allow a deeper insight into this oral condition that could help to understand its nature and recommend alternatives for care.

KEYWORDS

anti-fungal therapy, *Candida*, HIV, immune reconstitution inflammatory syndrome, microbiome, probiotics

1 | INTRODUCTION

Oropharyngeal candidiasis remains the most common oral manifestation in people living with the human immunodeficiency virus (HIV), including patients on anti-retroviral therapy (ART) (26.2%) (El Howati & Tappuni, 2018). Alongside with the incidence of *Candida* infections, there has been an increasing prevalence of drug resistance (particularly against fluconazole) and the recent emergence of *C. auris*, which is highly drug resistant (Forsberg et al., 2019). This article reports on a workshop about

“Innovations for prevention and care of oral candidiasis (OC) in HIV-infected individuals: are they available?” The objectives of this workshop were to achieve a comprehensive understanding of these issues and to identify knowledge gaps and research needs in the field. Literature searches were conducted in PubMed to answer the following questions: (a) Considering the pathogenesis of *Candida* spp. infection, are there any potential therapeutic targets that could be considered, mainly in HIV-infected individuals resistant to fluconazole? (b) Is OC part of immune reconstitution inflammatory syndrome (IRIS) in HIV patients who receive



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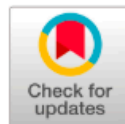
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REVIEW

ORAL COMPLICATIONS OF HIV DISEASE

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Leão JC, Ribeiro CMB, Carvalho AAT, Frezzini C, Porter S. Oral complications of HIV disease. Clinics. 2009;64(5):459-70.

Oral lesions are among the early signs of HIV infection and can predict its progression to acquired immunodeficiency syndrome (AIDS). A better understanding of the oral manifestations of AIDS in both adults and children has implications for all health care professionals. The knowledge of such alterations would allow for early recognition of HIV-infected patients. The present paper reviews epidemiology, relevant aspects of HIV infection related to the mouth in both adults and children, as well as current trends in antiretroviral therapy and its connection with orofacial manifestations related to AIDS.

KEYWORDS: HIV; AIDS; Oral diseases; Oral manifestations; Mouth.

EPIDEMIOLOGY OF HIV INFECTION AND ITS CURRENT TRENDS

HIV infection remains a significant health care problem.¹ Since Barre-Sonoussi and Gallo's initial description of the human immunodeficiency virus type I (HIV-1) in 1983 and Clavel et al. first described HIV-2 in 1986, these two viruses have been recognized for almost 20 years as the primary cause of the acquired immunodeficiency syndrome (AIDS).²

By the end of 2005, an estimated 40.3 million people were alive with HIV infection in the world, the vast majority of whom were resident in low-income countries.³ However, in 2007, advances in the methodology of estimating HIV epidemics applied to an expanded range of country data, resulting in substantial changes to the estimates of the number of persons living with HIV worldwide; nevertheless, the qualitative interpretation of the severity and implications of the pandemic have altered little.⁴ The estimated number of persons living with HIV worldwide in 2007 is now assumed to be 33.2 million [30.6–36.1 million], a reduction of 16%

compared with the estimate published in 2006 (39.5 million [34.7–47.1 million]).⁴ Of this number, only 1.6 million live in high-income countries; the remaining more than 95% of HIV-infected people live in developing countries.⁵ In developed countries, the number of children newly infected with HIV has decreased dramatically. However, in developing countries, there are an estimated 3.5 million children younger than the age of 15 who are infected. In developing countries in 2007, an estimated 330,000 children younger than the 15 years of age died of AIDS, and more children younger than the age of 5 years die from AIDS now than from any other cause.⁶

The prevalence and incidence of HIV/AIDS vary considerably from continent to continent, from country to country, and from region to region. Several countries in sub-Saharan Africa report infection rates of 30%, especially in urban areas; however, in other countries, HIV prevalence still remains low. Low national prevalence rates can be misleading. They often disguise serious epidemics that are initially concentrated in certain localities or among specific population groups and that threaten to spill over into the wider population.⁷

HIV infection leading to AIDS has been a major cause of illness and death among children, teens, and young adults worldwide. AIDS has been the sixth leading cause of death in the United States among 15- to 24-year-olds since 1991. In recent years, AIDS infection rates have been increasing

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Oral health and HIV: What dental students need to know

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Abstract

Introduction: Dentists have an important role in reducing new HIV infections by early diagnosis and need to know how to treat patients with HIV and understand universal cross-infection control. In many parts of the world, healthcare professionals struggle to provide care because of barriers including stigma and cultural attitudes.

Aim: To investigate the effectiveness of a brief educational intervention in understanding/changing the views of dental school deans regarding the quality of the oral health and HIV/AIDS teaching and their willingness to undertake a curriculum review if appropriate.

Methods: Questionnaires before and after interactive presentation to the deans of 30 Indonesian dental schools and discussion.

Results: Only six of 30 dental school deans believed that their HIV undergraduate dental student teaching was inadequate before the intervention, but 29 of 30 deans recognised the need to review their curriculum after the intervention. Whilst the majority (24/30) felt that their HIV teaching was adequate, good or excellent, the majority also thought that their students would find it difficult to treat patients with HIV.

Conclusion: The brief educational intervention was effective in improving the understanding/changing the views of dental school deans regarding the quality of HIV/AIDS teaching and learning at their own institution and engaging a willingness to undertake curriculum review.

KEYWORDS

AIDS, curriculum, education, HIV, oral health, stigma

1 | INTRODUCTION

The world has experienced nearly four decades of human immunodeficiency virus (HIV) and acquired immune deficiency syndrome (AIDS). The disease evolution and impact were initially unpredictable, but HIV/AIDS is no longer considered to carry a death sentence thanks to antiretroviral therapy (ART). The disease is now considered a chronic illness in the developed world although it still remains a major challenge to public health and human rights in the rest of the world. The worldwide HIV population is actually increasing due to

the longer life span of people or patients living with HIV (PWH) with the advent of antiretroviral therapy (ART) in spite of a 16% decrease in the global rate of new infections since 2010 (Challacombe, 2016), though some modelling suggests an increase in some groups (Mittler et al., 2019).

Healthcare professionals including dentists have an important role in reducing new infections because of their unique role in early diagnosis of HIV/AIDS. Dentists also need to know how to treat PWH and have a crucial role in alleviating pain and infection and increasing the quality of life (Campo-Trapero et al., 2003; Rogers

Oral lesions in infection with human immunodeficiency virus

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Abstract This paper discusses the importance of oral lesions as indicators of infection with human immunodeficiency virus (HIV) and as predictors of progression of HIV disease to acquired immunodeficiency syndrome (AIDS). Oral manifestations are among the earliest and most important indicators of infection with HIV. Seven cardinal lesions, oral candidiasis, hairy leukoplakia, Kaposi sarcoma, linear gingival erythema, necrotizing ulcerative gingivitis, necrotizing ulcerative periodontitis and non-Hodgkin lymphoma, which are strongly associated with HIV infection, have been identified and internationally calibrated, and are seen in both developed and developing countries. They may provide a strong indication of HIV infection and be present in the majority of HIV-infected people. Antiretroviral therapy may affect the prevalence of HIV-related lesions. The presence of oral lesions can have a significant impact on health-related quality of life. Oral health is strongly associated with physical and mental health and there are significant increases in oral health needs in people with HIV infection, especially in children, and in adults particularly in relation to periodontal diseases. International collaboration is needed to ensure that oral aspects of HIV disease are taken into account in medical programmes and to integrate oral health care with the general care of the patient. It is important that all health care workers receive education and training on the relevance of oral health needs and the use of oral lesions as surrogate markers in HIV infection.

Keywords HIV infections/diagnosis; Acquired immunodeficiency syndrome/diagnosis; Oral manifestations; Antiretroviral therapy, Highly active/adverse effects; Dental care; Child; Candidiasis/epidemiology/therapy, Oral; Leukoplakia, Hairy/epidemiology/therapy; Sarcoma, Kaposi/epidemiology/therapy; Gingivitis, Necrotizing ulcerative/epidemiology/therapy; Gingivitis/epidemiology/therapy; Lymphoma, Non-Hodgkin/epidemiology/therapy (*source: MeSH, NLM*).

Mots clés Infection à VIH/diagnostic; SIDA/diagnostic; Manifestation buccale; Thérapie antirétrovirale hautement active/effets indésirables; Soins dentaires; Enfant; Candidose buccale/épidémiologie/thérapeutique; Leucoplasie chevelue/épidémiologie/thérapeutique; Sarcome de Kaposi/épidémiologie/thérapeutique; Gingivite ulcéro-nécrotique/épidémiologie/thérapeutique; Gingivite/épidémiologie/thérapeutique; Parodontite/épidémiologie/thérapeutique; Lymphome non hodgkinien/épidémiologie/thérapeutique (*source: MeSH, INSERM*).

Palabras clave Infecciones por VIH/diagnóstico; Síndrome de inmunodeficiencia adquirida/diagnóstico; Manifestaciones bucales; Terapia antirretroviral altamente activa/efectos adversos/terapia; Atención odontológica; Niño; Candidiasis bucal/epidemiología/terapia; Leucoplaquia vellosa/epidemiología/terapia; Sarcoma de Kaposi/epidemiología/terapia; Gingivitis ulcerosa necrotizante/epidemiología/terapia; Gingivitis/epidemiología/terapia; Periodontitis/epidemiología/terapia; Linfoma no Hodgkin/epidemiología/terapia (*fuentes: DeCS, BIREME*).

Arabic

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Voir page 704 le résumé en français. En la página 705 figura un resumen en español.

The importance of oral lesions in HIV infection

Oral lesions can not only indicate infection with human immunodeficiency virus (HIV), they are also among the early clinical features of the infection and can predict progression of HIV disease to acquired immunodeficiency syndrome (AIDS). They can therefore be used as entry or end-points in therapy and vaccine trials and can be determinants of opportunistic infection

and anti-HIV therapy and be used in staging and classification systems (Box 1). Oral manifestations are the earliest and most important indicators of HIV infection. Seven cardinal lesions: oral candidiasis, hairy leukoplakia, Kaposi sarcoma, linear gingival erythema, necrotizing ulcerative gingivitis, necrotizing ulcerative periodontitis and non-Hodgkin lymphoma are strongly associated with HIV infection and have been identified internationally. These lesions may be present in up to 50% of people with HIV infection and in up to 80% of those with a

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EDITORIAL

Oral manifestations in AIDS[☆]

Manifestações orais na SIDA



Nowadays, patients with AIDS can live a life with considerable quality in relation to oral health, being healthy enough to tolerate most surgical and dental procedures. Furthermore, several studies have shown that patients with HIV disease are not more susceptible to complications, regardless of CD4-cell counts.

There are no oral lesions that are specific to HIV patients. All lesions found among HIV-positive patients also occur in other diseases associated with immunosuppression. Thus, we conclude that there is a clear correlation between the onset of oral lesions and decreases in the immune system. Several lesions, such as oral thrush, hairy leukoplakia, ulcerative necrotizing periodontal disease and Kaposi's sarcoma are strongly suggestive of impaired immune response, with CD4 counts below 200 cells/mm³. If we consider oral lesions as markers of immunosuppression and progression of AIDS, it may play a role in intervention strategies and treatment.

We can cite as major oral lesions of patients with HIV:

Fungal infections

Candidiasis: Caused primarily by *Candida albicans*, it is the most frequent oral manifestation. Although not being, by itself, pathognomonic of AIDS, oral candidiasis may be an indication of immunosuppression and disease progression.

Angular cheilitis: Mixed infection involving *C. albicans* and *Staphylococcus aureus*, manifests itself as red cracks with origin from the labial commissure of the mouth, and may be present along with intraoral candidiasis. The concomitant occurrence of dry mouth is not an uncommon cofinding.

The treatment of oral candidiasis includes topical and systemic antifungal medication. Topical therapies include

topical antifungal mouthwash, tablets and oral gel. These formulations should be used concomitantly with systemic drugs, especially in cases of esophageal candidiasis. Topical antifungal therapies are more effective in patients with CD4 counts over 150–200 cells/mm³. Common topical treatments are nystatin oral suspension (100,000 units/mL), nystatin tablets, and oral gel, for example, miconazole and clotrimazole 1%. The most common systemic antifungal agents are fluconazole (150-mg tablets) and itraconazole 100 mg. Resistance to fluconazole was reported as occurring in patients with severe immune deficiency.

Treatments of fluconazole-resistant patients with a combination of fluconazole and terbinafine have been successful.

Deep infections

Intraoral manifestations caused by *Cryptococcus neoformans*, *Histoplasma capsulatum*, *Geotrichum candidum* and *Aspergillus* spp. are uncommon and generally suggest a significant immunosuppression. Disseminated intraoral lesions associated with cryptococcosis, histoplasmosis and aspergillosis were described as ulcerative and nodular events, while geotrichosis lesions are described as pseudomembranous events. As the oral lesions in this category are non-specific, the definitive diagnosis requires histological verification. In general, the treatment of these lesions consists in intravenous amphotericin B.

Viral infections

Although there are no specific oral lesions caused by HIV infection, patients may exhibit oral manifestations as an early sign of HIV infection.¹ Such symptoms include non-specific oral ulcers, pharyngitis and oral candidiasis during the acute phase of infection.

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ORAL MANIFESTATIONS IN THE ERA OF HAART

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AIDS has reached epidemic proportions in the United States, disproportionately affecting African-Americans and other minorities. As highly active antiretroviral therapy (HAART) have improved the length and quality of life for HIV-infected people, oral health care has made similar strides. It is important that physicians and dentists recognize the earliest signs and symptoms of HIV infection in order that a timely diagnosis and patient referral can be made for early counseling testing, and treatment. At the same time, dentists have seen themselves at considerable risk from HIV infection. Some dentists believe that they may also be more at risk from stigma than other providers if they treat HIV patients.

Key words: HIV/AIDS ♦ dental care
♦ HAART

The 20th year of HIV/AIDS is a milestone in the fight against HIV/AIDS. Since the first acquired immunodeficiency syndrome (AIDS) cases were reported in 1981, AIDS has caused approximately 22 million deaths worldwide. In the United States, approximately 400,000 persons have died, and approximately 1 million persons have been infected¹. The CDC estimates that 1 in 50 black men and 1 in 160 black women are infected with HIV, meaning that blacks are 10 times more likely to be diagnosed with HIV, and 10 times more likely to die of AIDS¹.

Highly active antiretroviral therapy (HAART) have improved the length and quality of life for the HIV-infected person. The epidemic has affected all aspects of primary care^{1,2,3,4}. This report outlines some of the oral health changes of the HIV-infected patient since the advent of HAART and other drug treatment regimen.

Oral manifestations of HIV infection are a fundamental component of disease progression and occur in approximately 30 to 80 percent of the affected patient population.^{5,6,7} Factors which predispose expression of oral lesions include CD4 counts less than 200 cells/mm³, viral load greater than 3,000 copies/mL, xerostomia, poor oral hygiene and smoking.^{8,9}

The overall prevalence of oral manifestations in HIV disease has changed since the advent of HAART. One study noted a reduction of oral lesions from 47.6 percent pre-HAART to 37.5 percent during the HAART era⁷. The details of this study included a significant reduction in oral hairy leukoplakia and necrotizing ulcerative periodontitis, yet there was no significant change in the incidence of oral candidiasis, oral ulcers and Kaposi's sarcoma. This population did, however, see an increase in salivary gland disease. Other

Oral Manifestations of HIV

G.A. Agbelusi, O.M. Eweka, K.A. Ûmeizudike and M. Okoh

Additional information is available at the end of the chapter

<http://dx.doi.org/10.5772/52941>

1. Introduction

Human Immunodeficiency Virus (HIV) was first reported in USA. In June and July of 1981, the CDC published two reports on clusters of young homosexual men who developed opportunistic infections that were chiefly detected in several immunodeficient individuals (CDC, 1993).

Acquired Immunodeficiency Syndrome (AIDS) is a complex of symptoms and infections caused by the HIV virus as it impacts the immune system. It is an acquired infection, not hereditary. AIDS since its appearance in 1981 has spread to become a major cause of premature death and so far a cure has not yet been found. The diagnosis of HIV/AIDS requires a positive HIV antibody test or evidence of HIV infection and the appearance of some very specific conditions/diseases (CDC, 1993).

AIDS is a global pandemic, 33.4 million people are currently living with the disease worldwide, and it has killed an estimated 2.4 million people, including 330,000 children (UNAIDS, 2010). Over three-quarters of these deaths occurred in Sub-Saharan Africa, retarding economic growth and destroying human capital. South Africa has the largest population of HIV patients in the world, followed by Nigeria and India (McNeil, 2007).

Oral lesions have been reported to be early clinical features of HIV infection (Greenspan et al., 1992). These lesions are often indicators of immune suppression and can be used for early testing, diagnosis and management of patients with HIV/AIDS. Oral lesions contribute to patients' morbidity, affecting the psychological and economic functioning of the individual and community (Kaminu et al., 2002).

The overall prevalence of oral manifestations of HIV infection has changed since the advent of Highly Active Anti-Retroviral Therapy (HAART). Several Studies have shown reduction in prevalence of herpes labialis and periodontal diseases along with other lesions to more

Oral manifestations of HIV disease: A review

Daiva Aškinytė, Raimonda Matulionytė, Arūnas Rimkevičius

SUMMARY

The HIV/AIDS pandemic continues to plague the world. Evaluation of oral health status is important at every stage in the management of HIV disease. Oral health services and professionals can contribute effectively to the control of HIV/AIDS through health education, patient care, infection control and surveillance. Dental professionals have an important task of determining accurate diagnosis of oral manifestations and choosing proper treatment for each case. This review provides information on HIV associated orofacial lesions, their clinical presentation and up to date treatment strategies.

Key words: oral lesions, HIV, AIDS, oral health care.

INTRODUCTION

The HIV/AIDS pandemic has become a human and social disaster, particularly in resource limited settings. Oral health is an important component of the overall health status in HIV infection and essential component of quality of life (1,2). HIV-related oral abnormalities occur in 30 to 80 percent of the affected patient population (3). Policies for strengthening oral health promotion and the care of HIV-infected patients have been issued by WHO (2). Oral health services and professionals can contribute effectively to the control of HIV/AIDS through health education, patient care, infection control and surveillance.

Oral lesions are among the early signs of HIV infection and for individuals with unknown HIV status may suggest possible HIV diagnosis. For persons diagnosed with HIV who are not yet on therapy, the presence of certain oral manifestations may predict progression to AIDS (4). Furthermore, for patients on highly active antiretroviral therapy (HAART) the presence of certain oral manifestations may serve as surrogate markers for the efficacy of antiretroviral therapy (5,6). Even though the preva-

lence of specific oral lesions like candidiasis, hairy leukoplakia and Kaposi's sarcoma has been proven to be lower among patients on HAART (7,8,9,10) other conditions such as oral warts (11,12) and salivary gland disease (11,13) have been found to be more prevalent in this population as part of immune reconstitution resulting from antiretroviral therapy initiation.

CLASSIFICATION

There are two main classifications of oral lesions associated with HIV (HIV-OL). The first is based on the HIV-OLs etiology and according to it, they are classified as bacterial, viral, or fungal infections or as neoplastic lesions or other conditions. In 1993 EC-Clearinghouse on Oral Problems Related to HIV Infection and WHO Collaborating Centre on Oral Manifestations of the Immunodeficiency Virus has reached a consensus on new classification of the oral manifestations of HIV infection. It classifies HIV-OLs into three: lesions strongly associated with HIV infection, those less commonly associated with HIV infection and lesions seen in HIV infection (14). (Table1). The 1993 EC-Clearinghouse classification is still globally used despite controversy on the relevance of periodontal diseases today (15). HIV-OL case definitions were updated in 2009 to facilitate the accuracy of HIV-OL diagnoses by non-dental health-care workers in large-scale epidemiologic studies and clinical trials (16).

Besides diagnosing, it is essential to choose proper treatment for each case. This review provides

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Oral Manifestations of HIV: A Didactic Review

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ABSTRACT

The lesions of HIV infection in the oral cavity are typical and usually consist of oral expositions of formerly referred opportunistic diseases. Such lesions in the mouth are indicative of the deficiency in the immune system of the body and hence make it highly imperative to perform cautious history collection of the patient and comprehensive scrutiny of the patient's oral cavity. The presence of associated oral lesions can have a mammoth effect on the class of life of the affected subject. The quality of life can be enhanced by an appropriate diagnosis at a very early stage and subsequent treatment. The purpose of the article is to highlight the common lesions observed in the oral cavity following an immunodeficiency condition.

KEYWORDS: Oral Manifestations; HIV; AIDS

INTRODUCTION

The newly emerging and re-occurring diseases are formulating an intense universal influence on human civilization. It has emerged as a menace observed in the low-resource area of the world which has created a social isolation for the people suffering from it. HIV is transmitted by both sexual route as well as the blood route and data has suggested that over 35 million people across the world are in distress. Oral lesions are observed in about 30-70% of the patients suffering from HIV.¹ It serves as one of the earliest signs that a person is anguishing from the disease and potentially be of an important diagnostic value.² The lesions in the oral cavity associated with the HIV may range from just fungal and viral infections to extreme neoplasms or salivary gland disorders. These lesions are not only indicative of HIV, but very severe lesions can point to the progression of HIV to AIDS. Few lesions which are considered as the fundamental oral pathologies associated with HIV patients are as follows:

- Hairy Leukoplakia
- Oral Candidiasis
- Necrotizing Ulcerative Gingivitis
- Necrotizing Ulcerative Periodontitis
- Kaposi Sarcoma
- Linear Gingival Erythema
- Non-Hodgkin Lymphoma
- Xerostomia

These pathologies can be observed in up to 40% of the subjects suffering from HIV to up to 80% of the subjects suffering from AIDS.³ The importance of the oral lesions is not only restricted to diagnose HIV and AIDS but helps

in denoting the progression of the disease from HIV to AIDS and can also be used as entry points for the trials of the vaccine. The lesions can be easily detected on clinical examination and the presence of oral candidiasis and hairy leukoplakia suggests the progression from HIV to AIDS.⁴

- a) **Hairy Leukoplakia:** Hairy leukoplakia is ordinarily witnessed in an immune compromised individual and is a common lesion in patients suffering from AIDS. It is caused by an Epstein- Barr virus and usually, patients do not suffer from any major symptoms. It is considered to be one of the foremost consistent indicators of the declined count of CD4 cells.⁵ The lesion is characterized by a hyperplastic growth of benign nature usually observed on the lateral borders of the tongue. One of the pathognomonic features of the pathology is that it cannot be wiped away with the aid of a gauze.⁶ It is either unilateral or could be present on both the lateral borders depending upon the severity of the disease. Since there are no major discomforts associated with the diseases, the treatment is only considered if the patient demands it for the aesthetic concerns.
- b) **Oral Candidiasis:** Currently, it is the most common oral lesion associated with the HIV.⁷ Associated with a strong decline in the count of CD4 cells; it presents itself in multiple forms which include the erythematous as well as the pseudomembranous type. Usually asymptomatic, it might get symptomatic which includes symptoms like discomfort and burning sensation. The erythematous form presents itself as a red lesion which is flat and observed either on the dorsal surface of tongue or on the hard palate. The pseudomembranous variety

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Oral manifestations of HIV: Can they be an indicator of disease severity? (A systematic review)

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Abstract

Objective: To review the existing research literature on the paradigm that the oral lesions could be an indicator of the disease severity with the objective of documenting the current status of research, highlighting its major findings.

Material and methods: Publications were identified through a careful search, of which a majority focused on oral lesions as an indicator for HIV progression. A PubMed journal search of 10 years OF period publication (2009–2019) for “oral lesion, oral manifestation, indicator, HIV and HIV-associated” was performed and analysed. Various research methods were included within the study criteria including clinical study, clinical trial, comparative study and randomised control trial.

Results: A total 33 studies were obtained and analysed, including cohort study, cross-sectional study, case-control study, clinical trial, retrospective observational analysis study, prospective observational study and randomised control trial. The most common oral lesions found in the studies were Kaposi sarcoma (KS), followed by oral candidiasis, periodontitis, necrotising ulcerative gingivitis (NUG), necrotising ulcerative periodontitis (NUP) and oral hairy leucoplakia (OHL). The early diagnosis and accurate treatment plan were very important to indicate the disease severity related to HIV infection.

Conclusion: Oral lesions reported in 39% articles and could be an indicator of HIV disease severity due to its effects on decreased cluster-differentiated (CD4+) T-cell count and increased viral load.

KEYWORDS

HIV, HIV-associated, oral lesion, oral manifestations

1 | INTRODUCTION

Acquired immunodeficiency syndrome (AIDS) affects the individual's immune system which leads to various disorders as well as oral lesions (Araujo et al., 2018). The characteristic extensive immunosuppression leads to opportunistic infections, secondary neoplasm and neurologic manifestations. Oral lesions are common in HIV-positive patients and can be used to diagnose their immune status (Bodhade,

Ganvir, & Hazarey, 2011). Dentists are often the first to discover HIV-related oral lesions since patients are rarely aware when it is asymptomatic. A dentist's ability to distinguish lesions was very important, as well as to recognise its various aetiologies, to establish a proper diagnosis, to correctly categorise it based on the HIV infection stage and to predict the severity of a patient's systemic condition. The quick and precise identification for a patient treatment needs was essential for comprehensive disease management (Batavia et al., 2016).

Oral Manifestations of Human Immunodeficiency Virus-Infected Patients

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Abstract

Introduction:

Oral lesions are among the earliest clinical manifestations of human immunodeficiency (HIV) infection and are important in early diagnosis and for monitoring the progression to acquired immunodeficiency syndrome (AIDS). The purpose of this study was to determine the prevalence of oral lesions and their relationship with a number of factors in HIV/AIDS patients attending an HIV center.

Materials and Methods:

A total of 110 HIV-positive patients were examined to investigate the prevalence of oral lesions according to the criteria established by the European Community Clearing House on Oral Problems Related to HIV Infection. An independent T-test was used for correlation of oral lesions with CD4+ count and a χ^2 test was used for analysis of the relationship of co-infection with hepatitis B virus (HBV), sexual contact, route of transmission, history of drug abuse, and history of incarceration.

Results:

Most of the cases were male patients (82.7%). The mean age across all participants was 36.2 ± 8.1 years. Rampant carries, severe periodontitis and oral candidiasis were the most notable oral lesions. Oral lesions were more prevalent in patients between 26–35 years of age. There was a significant difference between patients with and without pseudomembranous candidiasis and angular cheilitis according to mean level of CD4+.

Conclusion:

The most common oral presentations were severe periodontitis, pseudomembranous candidiasis and xerostomia.

Keywords:

Acquired Immunodeficiency Syndrome, HIV, Oral manifestations.

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Oral Manifestations Related to Immunosuppression Degree in HIV-positive Children

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Oral manifestations often found in HIV-infected children are frequently the first clinical sign of the infection. This article aims to report the prevalence of oral manifestations in soft tissues and their relationship with the degree of immunosuppression in 80 HIV-infected patients (average age 6.30 ± 3.32 years old) at the IPPMG - UFRJ. Thirty children (38%) presented some type of oral lesion and the percentage of CD4 was lower than that found in lesion-free children ($p < 0.05$); 22.5% presented candidiasis, 17.5% gingivitis, 8.8% enlargement of parotids, 1.3% herpes simplex and 1.3% hairy leukoplakia. Of the 30 children with lesions, 70% showed severe immunosuppression, 23.3% moderate immunosuppression and in only 6.7% was immunosuppression absent. Oral manifestations were directly related to the degree of immunosuppression and such lesions can be considered as indicators of the progression of the HIV infection in children.

Key Words: acquired immunodeficiency syndrome, HIV infections, child, oral manifestations, immunosuppression.

INTRODUCTION

Acquired Immune Deficiency Syndrome (AIDS) was first reported in children in 1983 (1) and presented differences from infection in the adult: means of transmission, risk factors, methods of diagnosis and oral manifestations (2-4). According to the Brazilian Health Ministry (5), the number of cases reported until September 2000 was 196,016, of which 6,857 were children.

Oral manifestations frequently observed in HIV-positive patients may be classified according to etiologic factors: fungal, viral, bacterial and neoplastic infections. These lesions are often the first clinical symptoms of HIV infection and their diagnosis is an auxiliary method to raise early suspicion of AIDS (6).

The purpose of this article is to report the prevalence of oral soft tissue manifestations and their relationship with the degree of immunosuppression observed in HIV-infected children.

MATERIAL AND METHODS

Eighty HIV-infected children were examined between January and December of 1996, from a total of 120 patients at the Pediatric AIDS Outpatients Clinic (Instituto de Pediatria e Puericultura Martagão Gesteira (IPPMG) of the Universidade Federal do Rio de Janeiro (UFRJ)) who are treated by the dental team of the "AIDS in Pediatric Dentistry II" Project (F.O. - NESC - IPPMG/UFRJ). The 30 girls and 50 boys were aged from 2 to 12 years (6.3 ± 3.32 years). The criterion for inclusion was definitive diagnosis of HIV infection confirmed by 2 positive ELISA tests and 1 Western Blot. Signed consent for the participation of the children in the study was obtained from those responsible.

A record card was made for each child, providing data on anamnesis and oral examination. Prior to the examination, each child was given a toothbrush and fluoridated toothpaste to brush their teeth under the

Overview of the Fourth International Workshop on the Oral Manifestations of HIV Infection

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Keywords: HIV; AIDS; oral manifestations; dentistry

New directions in research – clinical aspects

The Workshop was held in Skukuza Camp in the Kruger National Park in early July 2000. During the meeting the value of keeping all 200 delegates together became evident with discussions continuing over meals and social sessions. The conference was divided into plenary sessions in the mornings with workshops in the afternoon followed by a final plenary session and workshop reports. The 10 workshops had been given a series of questions to address relating to their field. These questions had been derived from the international advisory committee as being the pertinent questions in each area. Each workshop had, in addition to a chair and vice chair, a panel of experts representing four different continents in every case and including experts from Africa. A reporter (rapporteur) summarized the workshop for the benefit of the plenary session. The questions themselves were intended to clarify the current state of knowledge and to identify areas that required further research. The questions are listed below. The 10 workshops covered both clinically related research and basic research. One of the objectives of holding this conference in Africa was to allow exchange between delegates from local countries with those experts in the field largely coming from developed countries. A second major objective was to make those delegates from developed countries aware of the scale of the problem facing African countries. Both objectives appear to have been successful and it was noted that over 50% of attendees had not been to a previous world workshop and that over 50% of the delegates were from Africa.

Where are we now?

According to the current WHO data, of 34 million HIV-infected patients, 24 million of these are in Africa with

4.3 million in South Africa, which represents 20% of the African total. The mean adult prevalence of HIV in South Africa is over 22%, with provinces ranging from 7% to 32% in Kwazulu-Natal. This baseline prevalence is 40 times greater than in the USA. The impact has been considerable with a mean 16 years reduction in life expectancy in many of the affected countries, i.e. without HIV the life expectancy is greater than 65 years but with HIV it is less than 40 years.

We were reminded of the maxim of Jonathan Mann to think globally but act locally. The need for World Bank and WHO funding for cheaper drugs was a constant theme of the meeting. The term Skukuza is translated as 'he who turns things upside down' and the challenge presented by the scale of the epidemic and of the viral infection is dramatic. In an infected person there are 10^9 new viral particles produced per day, i.e. 40 million new viral particles per hour.

In the plenary sessions on the global overview of HIV, the issues to be addressed were:

- mono versus dual versus triple therapy,
- when to treat, who to treat, how long to treat or whether to treat at all?
- cost of therapy versus cost of no therapy, particularly in the face of opportunistic infections; for instance, we were presented with data suggesting that for every \$1 spent on therapy there would be a saving of \$8 in the cost of medical treatment.

HIV disease is a chronic incurable disease that necessitates a life-long therapy. Elna van der Ryst summarized the state of play with regard to vaccines (Table 1). Live attenuated virus and live vectors seemed to be the most effective so far, with the latter showing most promise.

Dr van der Ryst emphasized the maxim that the search for a vaccine just *had* to succeed, since in the long run preventive therapy is likely to be the only answer. Other calculations indicated that if HIV therapy was at the same

Table 1 General effectiveness of HIV vaccines

Whole inactivated virus	–
Live attenuated virus	+
Live vectors	+
Protein subunits	±
Naked DNA	±

PATHOPHYSIOLOGY OF THE HUMAN IMMUNODEFICIENCY VIRUS

Nancy R. Calles, MSN, RN, PNP, ACRN, MPH
Desiree Evans, MD, MPH
DeLouis Terlonge, MD

OBJECTIVES

1. Provide an overview of the healthy immune system.
2. Describe the human immunodeficiency virus (HIV).
3. Describe the major components of the HIV life cycle.
4. Identify the various HIV types and subtypes.
5. Discuss HIV's effects on the immune system.

KEY POINTS

1. The immune system protects the body by recognizing invading antigens on pathogens (bacteria, viruses, fungi, and parasites) and reacting to them.
2. T lymphocytes, or T cells, regulate the immune system and destroy antigens.
3. HIV continuously uses new host cells to replicate itself.
4. The HIV life cycle includes six phases: binding and entry, reverse transcription, integration, replication, budding, and maturation.
5. Once HIV is in the circulatory system, it targets the CD4+ lymphocyte.
6. Two types of HIV cause AIDS: HIV type 1 (HIV-1) and HIV-2.
7. Primary infection refers to the time when HIV first enters the body.
8. Clinical latency refers to the time before onset of symptoms and complications in the HIV-infected individual. In HIV-infected adults, this phase may last 8-10 years.
9. Early signs and symptoms of HIV can include candidiasis, lymphadenopathy, cervical carcinoma, herpes zoster, and peripheral neuropathy.
10. Late signs and symptoms of HIV and AIDS-defining illnesses can include the development of life-threatening infections and malignancies.

OVERVIEW

The human immunodeficiency virus (HIV) is a retrovirus belonging to the family of lentiviruses. Retroviruses can use their RNA and host DNA to make viral DNA and are known for their long incubation periods. Like other retroviruses, HIV infects the body, has a long incubation period (clinical latency), and ultimately causes the signs and symptoms of disease, here AIDS. HIV causes severe damage to the immune system and eventually destroys it by using the DNA of CD4+ cells to replicate itself. In that process, the virus eventually destroys the CD4+ cells.

THE HEALTHY IMMUNE SYSTEM

The immune system protects the body by recognizing antigens on invading bacteria and viruses and reacting to them. An antigen is any substance that induces a state of sensitivity and immune responsiveness. These antigens interact with antibodies and immune cells, initiating an immune response. This process destroys the antigen, allowing the body to be free of infections. Types of antigens include bacteria, viruses, fungi, and parasites. When the immune system is weakened or destroyed by a virus such as HIV, the body is left vulnerable to infections.

The immune system consists of lymphoid organs and tissues, including the bone marrow, thymus gland, lymph nodes, spleen, tonsils, adenoids, appendix, blood, and lymphatic vessels (**Figure 1**). All components of the immune system are vital in the production and development of lymphocytes, or white blood cells. B lymphocytes (or B cells) and T lymphocytes (or T cells) are produced from stem cells in the bone marrow. B cells stay in the bone marrow to complete the maturation process, but T lymphocytes travel to the thymus gland to complete their maturation. There T lymphocytes become immunocompetent, multiply, and become more differentiated.

Patient Perspectives on Improving Oral Health-Care Practices Among People Living with HIV/AIDS

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ABSTRACT

This qualitative study explored the impact on oral health-care knowledge, attitudes, and practices among 39 people living with HIV/AIDS (PLWHA) participating in a national initiative aimed at increasing access to oral health care. Personal values and childhood dental experiences, beliefs about the importance of oral health in relation to HIV health, and concerns for appearance and self-esteem were found to be determinants of oral health knowledge and practice. Program participation resulted in better hygiene practices, improved self-esteem and appearance, relief of pain, and better physical and emotional health. In-depth exploration of the causes for these changes revealed a desire to continue with dental care due to the dental staff and environmental setting, and a desire to maintain overall HIV health, including oral health. Our findings emphasize the importance of addressing both personal values and contextual factors in providing oral health-care services to PLWHA.

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Policy for Prevention of Oral Manifestations in HIV/AIDS: The Approach of the WHO Global Oral Health Program

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The HIV/AIDS pandemic has become a human and social disaster, particularly affecting the developing countries of Africa, Southeast Asia, and Latin America. By the end of 2004, about 40 million people were estimated to be infected by HIV globally. The health sectors in many affected countries are facing severe shortages of human and financial resources, and are struggling to cope with the growing impact of HIV/AIDS. In most developed countries, the availability of antiretroviral treatment has resulted in a dramatic reduction in HIV/AIDS-related mortality and morbidity. In contrast, in the developing countries, there is little access to treatment, and access to HIV-prevention services is poor. The '3 by 5' initiative was launched by the WHO and UNAIDS in 2003 with the aim of providing antiretrovirals to three million people in developing countries by the year 2005. HIV infection has a significant negative impact on oral health, with approximately 40-50% of HIV-positive persons developing oral fungal, bacterial, or viral infections early in the course of the disease. Oral health services and professionals can contribute effectively to the control of HIV/AIDS through health education and health promotion, patient care, effective infection control, and surveillance. The WHO Global Oral Health Program has strengthened its work for prevention of HIV/AIDS-related oral disease. The WHO co-sponsored conference, *Oral Health and Disease in AIDS*, held in Phuket, Thailand (2004), issued a declaration calling for action by national and international health authorities. The aim is to strengthen oral health promotion and the care of HIV-infected persons, and to encourage research on the impact of oral health on HIV/AIDS, public health initiatives, and surveillance.

The HIV/AIDS Pandemic

The HIV/AIDS pandemic has become a human, social, and economic disaster, with far-reaching implications for individuals, communities, and countries. No other disease has so dramatically highlighted the current disparities and inequities in health-care access, economic opportunity, and the protection of basic human rights. By the end of 2004, about 40 million people were estimated to be infected with HIV (UNAIDS/WHO, 2004). During 2004, the HIV/AIDS pandemic claimed more than three million lives, and five million people became infected with HIV. Each day, there are 14,000 new HIV infections, more than half of these occurring among young people under 25 years of age. Over three million children are infected with HIV (UNAIDS/WHO, 2004).

Global data available on the HIV/AIDS pandemic are illustrated in Figs. 1 and 2. Sub-Saharan Africa has been most severely affected, with almost 10% of the adult population being infected in 2004, and an estimated 25 million people living with HIV (UNAIDS/WHO, 2004). Life expectancy has

fallen to below 50 years. Nearly 10% child mortality is HIV-associated, with a negative impact on the progress in child survival made during the past decades. In Southeast Asia, there are more than seven million people infected, and further spread could lead to millions more becoming infected in the coming decade. The epidemic in Latin America is well-established, with nearly two million people being infected, while rapid growth has been observed in recent years in Eastern Europe and Central Asia. Globally, the major mode of HIV transmission is through sexual intercourse, intravenous drug use, mother-to-child transmission, and contaminated blood in the health-care setting. The relative importance of the different modes of transmission varies between and within regions of the world.

HIV/AIDS and Society

In all affected countries with either high or low HIV prevalence, AIDS hinders development, exacting a devastating toll on individuals and families (US Agency for International Development, 2004). In the hardest-hit countries, it is eroding decades of health, economic, and social progress—reducing life expectancy by years, deepening poverty, and contributing to and exacerbating food shortages. Sub-Saharan Africa has the world's highest prevalence of HIV infection and faces the greatest demographic impact. In seven African countries where HIV prevalence is more than 20%, the average life expectancy of a person born between 1995 and 2000 is now 49 years, which is 13 years lower than in the absence of AIDS. In Swaziland, Zambia, and Zimbabwe, which lack access to antiretroviral programs, average life expectancy is predicted to drop below the age of 35.

In some of the worst-affected countries, the living standards of many poor people deteriorated before they experienced the full impact of the HIV epidemic. In general, HIV/AIDS-affected households are more likely to suffer severe poverty than non-affected households; this is true for countries with low as well as high prevalence rates. HIV/AIDS reduces the income and production of family members who are ill, at the same time creating extraordinary care needs, rising household medical expenses, and other costs which, on average, absorb one-third of a household's monthly income.

The HIV/AIDS epidemic is also a significant obstacle to the universal access of children to primary education. In many countries of Africa, the epidemic is expected to contribute substantially to the future shortage of primary school teachers. As skilled teachers fall ill and die, the quality of education suffers. Children, especially girls, from AIDS-affected families are often withdrawn from schools to look after the home and

Key Words

Oral disease, HIV/AIDS, oral health care, prevention, WHO.

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Research

Prevalence of HIV related oral lesions in people living with HIV and on combined antiretroviral therapy: a Nigerian experience



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Key words: Oral lesions, cART, HIV

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Abstract

Introduction: oral lesions comprise significant clinical features of HIV infection and are often indicators of immune suppression. However, the advent of antiretroviral therapy has significantly reduced its prevalence. The aim of this study was to relate the prevalence of oral lesions of HIV to treatment outcome of Combined Antiretroviral Therapy (cART) in a Nigerian HIV adult population. **Methods:** a cross-sectional study was conducted on 491 People Living with HIV (PLWHIV) on cART from two HIV centres in Lagos state, Nigeria. The EC-clearing house guidelines were employed to categorise oral lesions. Presence or absence of these lesions was reconciled with CD4+ cell count as a measure of efficacy of cART treatment. **Results:** a total of 491 PLWHIV on cART were enrolled, 366 (74.5%) were females and 125 (25.5%) were males. Age ranged between 18-80 years, with a mean of 41.2 ± 9.1 years. On examination, 12 (2.4%) patients presented with HIV oral lesions. Oral hyperpigmentation (10, 2.0%) was the most common lesion seen, followed by oral ulcers (2, 0.4%). Majority (75%) of the affected patients were on a Lamivudine containing regimen. 7 out of the 12 patients with oral lesions had CD4+ cell count between 200-500 cell/mm³ prior to cART initiation. Eleven (92%) of the patients with oral lesions had significant improvement of their CD4+ cell count after cART administration. **Conclusion:** the prevalence of oral lesions in HIV patients on cART therapy in Lagos is low. Oral hyperpigmentation and oral ulcers are the most frequent lesions seen. The presence or absence of oral lesions were not associated with CD4+ cell count. Therefore, we conclude that the oral lesions seen in HIV patients on cART may not be a direct manifestation of the disease.

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Rapidly Progressive Periodontal Disease Associated with Human Immunodeficiency Virus

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ABSTRACT

Severe periodontal inflammation with generalized dental plaque accumulation, spontaneous and severe gingival bleeding, fungal infection, and interdental papillae necrosis are presented in a patient infected with human immunodeficiency virus (HIV). Bite-wing radiographs revealed a generalized horizontal alveolar bone loss of 7-8 millimetres in both arches. Erythematous patches were noted on the gingival mucosa in both jaws. DNA testing was performed to identify the periodontopathogens. The patient had no signs or symptoms of acquired immunodeficiency syndrome. This case-report presents the massive periodontal destruction that occurred in a patient infected with HIV. Therefore, it is highly recommended that patients infected with HIV should be regularly monitored to aid in early detection and to provide proper management of periodontal inflammatory conditions to minimize its destruction.

Key words: Periodontitis. HIV-AIDS. Interdental papillae necrosis. Periodontal bone loss.

INTRODUCTION

Periodontal inflammatory disorder may either be a slowly progressive or rapidly progressive disease. If left undiagnosed and untreated in its early stages, rapidly progressive periodontal disease may cause alveolar bone destruction and ultimately tooth loss at an alarming rate.

Rapidly progressive periodontal disease is a common manifestation in immunocompromised patients particularly those infected with Human Immuno-deficiency Virus (HIV) in comparison to periodontal disease in HIV-negative individuals.¹⁻³ The group of disorders affecting individuals infected with HIV is predominantly notable since oral manifestations are usually the first clinical expressions of the viral infection.¹ There are many established oral manifestations of HIV including oral candidiasis, oral leukoplakia and periodontal disease. In a recent study, Paster *et al.* reported a diverse variety of microbes associated with the development of periodontal diseases in HIV-positive patients which differ from the typical periodontal pathogens such as *Porphyromonas gingivalis* (*P. gingivalis*).⁴ Mechanical

plaque removal and oral hygiene maintenance are important steps in healing periodontal inflammatory conditions.⁵

In the present report, we describe a case of an unusual rapidly progressive periodontal disease and necrotizing ulcerative periodontitis in a HIV-positive individual.

CASE REPORT

A 49-year-old male reported with a 10-year history of infection with the HIV. The patient also reported a three-year history of loss of vision, renal failure, and hypertension.

The patient presented with severe pain, ulcerated gingival papillae, mobile teeth and fetor oris. A comprehensive full-mouth periodontal examination revealed the presence of severe periodontal inflammatory conditions with a generalized dental plaque accumulation and spontaneous gingival bleeding on gentle probing. Necrotizing ulcerative periodontitis manifests as a rapid necrosis and destruction of the gingiva and periodontal attachment apparatus. White and erythematous patches were observed on the gingival mucosa in both jaws (Figure 1). These white patches were gently scraped off and a light microscopic investigation revealed the presence of fungal hyphae. At the first-visit full-mouth peri-apical and bite-wing radiographs were taken (Figure 2). The radiographs showed the bone level to be at the cemento-enamel junction. However, at the one year follow-up, the radiographs displayed an aggressive and generalized horizontal alveolar bone loss of 7-8 millimetres in both arches (Figure 3).

Subgingival plaque was collected using absorbent paper points and a polymerase chain reaction-based test (Micro-IDent HAIN Lifescience GmbH, Nehren, Germany)

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Research Agenda from the 8th World Workshop on Oral Health and Disease in HIV AIDS

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Keywords: AIDS, global health, HIV, immunity

1 | INTRODUCTION

The 8th *World Workshop on Oral Health and Disease in AIDS: Improving Health and Wellbeing (WW8)* was held in Bali, Indonesia, September 2019. The location was carefully selected due to Indonesia's rising number of HIV infections, associated with reports of social stigma, discrimination, inadequate testing, and suboptimal treatment within South-East Asia. Greenspan and Challacombe described the history of the World Workshops and their importance of informing the oral health research community, setting the research agenda, and informing the practicing community (Greenspan & Challacombe, 2020).

As with previous workshops, one of the specific aims of the 8th World Workshop is to identify current research gaps and propose a research agenda that will hopefully be of assistance to funding agencies, institutions, scientific societies, and individual investigators in the field of oral health and HIV/AIDS research. In addition, the conference summary will define the obstacles that impede progress in specific areas of HIV/AIDS and will prepare a set of specific recommendations and directions for future research.

The workshop spanned the breadth from basic science to social science along with an educational component for local clinicians. The critical research questions arising from the workshop are presented below.

A panel of experts led a dedicated Workshop discussing the important concept of patient and public involvement (PPI) in HIV/AIDS-related research. The contribution that people with HIV (PWHIV) can make to oral HIV research and its logistical and ethical

considerations were highlighted. There was focused discussion on the best approaches to encourage involving PWHIV to engage with oral health research. The Workshop contributors concluded that the concept of PPI is relevant in research in general and should be embraced into the research practices in oral health and HIV. Applying PPI will empower patients, improve the value of research by increasing its relevance, and increase accountability and transparency of oral HIV research (Sharma-Mahendra et al., 2020).

2 | BASIC SCIENCE RESEARCH AGENDA

2.1 | HIV/mucosal epithelial interactions

- Identify the critical molecular targets for epithelial–mesenchymal transition (EMT) termination and mesenchymal–epithelial transition (MET) induction (Tugizov, 2020).
- Investigate the molecular mechanisms of HIV vesicular sequestration in oral and genital epithelia.
- Design new anti-viral drugs that would inhibit viral sequestration and/or inactivate endosomal virions.

2.2 | Innate immune mechanisms

- Identification of critical molecular targets for inhibition of MAPK and TGF- β signaling, chronic inflammation, and EMT that may lead to the development of efficient drugs to prevent the disruption

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Saliva and inhibition of HIV-1 infection: molecular mechanisms

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Oral fluids are rarely a vehicle for HIV-1 infection *in vivo*, unlike other mucosal secretions. This unique property raises questions regarding (1) the molecular mechanisms responsible for the lack of salivary transmission, (2) the extent to which oral immunological responses mirror responses at other mucosal sites, (3) the use of promising salivary markers of HIV-1 disease progression, (4) the relationship between oral and blood viral loads, (5) cofactors that influence oro-genital transmission, and (6) the feasibility of oral-based antibody testing for HIV-1 diagnosis in the home. This paper discusses these questions and provides background summaries, findings from new studies, consensus opinions, practical relevance to developing countries, and suggestions for future research agenda on each of the key topics.

Keywords: HIV, antiviral, saliva, transmission, mucosal immunity, antibody testing

Introduction

HIV-1 is rarely transmitted through infected saliva, unlike other mucosal fluids such as genital secretions and breast milk (Shugars and Wahl, 1998). This property of saliva may shed insight into novel strategies for protecting against mucosal infection, the predominant mode of HIV-1 transmission. The lack of salivary transmission also prompts an evaluation of the mechanisms responsible for the effect, the extent to which viral and immunological responses in the oral cavity mirror systemic and other mucosal compartments, and potential diagnostic and preventive uses of saliva and saliva-derived components to prevent HIV-1 infection. Participants at this workshop sought to answer six questions that address these key issues. Background information, new data and consensus opinions are summarized below for each question. Based on workshop discussions, potential strategies

are presented that might assist in reducing viral transmission in developing countries where the infection is reaching devastating proportions. Suggestions for future research agenda are also offered.

Question 1: What are the inhibitory factors responsible for anti-HIV-1 activity present in saliva, what are their molecular mechanisms of action, and are they active at other mucosal sites?

Several studies have demonstrated the consistent and potent inhibition of HIV-1 infectivity by human saliva *in vitro* (Shugars and Wahl, 1998). Inhibitory activity is present in salivary secretions from both infected and uninfected donors. The effect appears to be specific for HIV-1, with little effect on related (e.g. HIV-2 and simian immunodeficiency virus, SIV) and unrelated viruses (e.g. adenovirus and herpes simplex virus type 1) (Nagashunmugam *et al*, 1997). These observations suggest that the anti-HIV-1 effects of saliva involve a specific mode of action such as physical blocking via high viscosity or viral lysis due to low hypotonicity (Baron *et al*, 1999). Additional experiments have excluded salivary proteases as being responsible for the loss in viral infectivity *in vitro* (Kennedy *et al*, 1998).

Many laboratories have attempted to identify and isolate salivary inhibitors (Shugars and Wahl, 1998). As illustrated in Figure 1, these molecules use a variety of complementary mechanisms to reduce infectivity. The presence of multiple endogenous inhibitors in saliva is reminiscent of the antibacterial activity contributed by salivary proteins (Edgar, 1992). Nonspecific mechanisms such as lysis of infected cells by hypotonicity (Baron *et al*, 1999) may supplement the actions of inhibitors. However, the relative potencies of the proposed salivary inhibitors have not been determined. If anti-HIV-1 molecules are indeed active *in vivo*, this scenario could account for the observations that saliva contains substantial quantities of viral RNA and proviral DNA when assayed by sensitive methods such as PCR, but is rarely present as infectious virus (Shugars and Wahl, 1998).

Daniel Malamud provided an update describing efforts to characterize the anti-HIV-1 activity of submandibular

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The global burden of oral diseases and risks to oral health

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Abstract This paper outlines the burden of oral diseases worldwide and describes the influence of major sociobehavioural risk factors in oral health. Despite great improvements in the oral health of populations in several countries, global problems still persist. The burden of oral disease is particularly high for the disadvantaged and poor population groups in both developing and developed countries. Oral diseases such as dental caries, periodontal disease, tooth loss, oral mucosal lesions and oropharyngeal cancers, human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS)-related oral disease and orodental trauma are major public health problems worldwide and poor oral health has a profound effect on general health and quality of life. The diversity in oral disease patterns and development trends across countries and regions reflects distinct risk profiles and the establishment of preventive oral health care programmes. The important role of sociobehavioural and environmental factors in oral health and disease has been shown in a large number of socioepidemiological surveys. In addition to poor living conditions, the major risk factors relate to unhealthy lifestyles (i.e. poor diet, nutrition and oral hygiene and use of tobacco and alcohol), and limited availability and accessibility of oral health services. Several oral diseases are linked to noncommunicable chronic diseases primarily because of common risk factors. Moreover, general diseases often have oral manifestations (e.g. diabetes or HIV/AIDS). Worldwide strengthening of public health programmes through the implementation of effective measures for the prevention of oral disease and promotion of oral health is urgently needed. The challenges of improving oral health are particularly great in developing countries.

Keywords Mouth diseases/epidemiology; Tooth diseases/epidemiology; Oral manifestations; Dental care/economics; Dental caries/epidemiology; Mouth neoplasms/epidemiology; HIV infections/complications; Noma/epidemiology; Tooth erosion/epidemiology; Developmental disabilities/epidemiology; Fluorosis, Dental/epidemiology; Risk factors; Cost of illness (source: MeSH, NLM).

Mots clés Bouche, Maladie/épidémiologie; Dent, Maladies/épidémiologie; Manifestation buccale; Soins dentaires/économie; Carie dentaire/épidémiologie; Tumeur bouche/épidémiologie; Infection à VIH/complication; Noma/épidémiologie; Erosion dentaire/épidémiologie; Troubles développement enfant/épidémiologie; Fluorose dentaire/épidémiologie; Facteur risque; Coût maladie (source: MeSH, INSERM).

Palabras clave Enfermedades de la boca/epidemiología; Odontopatías/epidemiología; Manifestaciones bucales; Atención odontológica/economía; Caries dental/epidemiología; Neoplasmas de la boca/epidemiología; Infecciones por VIH/complicaciones; Noma/epidemiología; Erosión dentaria/epidemiología; Incapacidades del desarrollo/epidemiología; Fluorosis dentaria/epidemiología; Factores de riesgo; Costo de la enfermedad (fuente: DeCS, BIREME).

Arabic

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Voir page 668 le résumé en français. En la página 668 figura un resumen en español.

Introduction

WHO recently published a global review of oral health (1) which emphasized that despite great improvements in the oral health of populations in several countries, global problems still persist. This is particularly so among underprivileged groups in both developing and developed countries. Oral diseases such

as dental caries, periodontal disease, tooth loss, oral mucosal lesions and oropharyngeal cancers, human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS)-related oral disease and orodental trauma are major public health problems worldwide. Poor oral health may have a profound effect on general health, and several oral diseases are related to

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Strengthening the prevention of HIV/AIDS-related oral disease: a global approach

The HIV/AIDS epidemics are one of the greatest challenges ever to global well-being. Approximately 42 million people were infected with HIV by the end of 2002, and millions have already died of AIDS. Many more people are affected because their parents, other family members, friends and co-workers have died from AIDS or are infected with HIV. HIV/AIDS is the fastest growing threat to development today and the epidemic is particularly severe in Sub-Saharan Africa and Asia. National programmes, international organizations, civil society, communities and individuals have responded to the epidemic. The initial efforts were often weak and scattered as the full nature and scope of the threat were not comprehended. As the epidemic has progressed, understanding of the complex causes and effects has increased. The greatest challenge in responding to HIV/AIDS at present is ensuring that proven, gender sensitive strategies for prevention and care are widely implemented to a level where there will be significant impact on the epidemic.

Oral health services and professionals can contribute effectively to the early diagnosis, prevention and treatment of this disease. A number of studies have demonstrated that approximately 40–50% of HIV positive persons have oral fungal, bacterial or viral infections often occurring early in the course of the disease. Oral lesions strongly associated with HIV infection are pseudo-membranous oral candidiasis, oral hairy leukoplakia, HIV gingivitis and periodontitis, kaposi sarcoma, non-Hodgkin lymphoma. Dry mouth as a result of decreased salivary flow rate may not only increase the risk of dental caries but further impact negatively on quality of life because of difficulty in chewing, swallowing and tasting food.

The World Health Organization (WHO) has worked for control of HIV/AIDS-related oral conditions through several activities. The WHO Oral Health Programme has prepared a guide (1) which is intended to provide a systematic approach to the implementation of epidemiological studies of oral conditions associated with HIV infection; to provide guidelines for the collection, analysis, reporting and dissemination of data from such studies, and to facilitate comparison of findings from different studies. It aims also to encourage oral health personnel and public health practitioners to make oral health status an integral part of optimum case management and introduction of surveillance activities of oral diseases associated with HIV infection.

Recently, WHO analysed the global burden of oral disease and outlined the strategy and approaches to improved oral health in the 21st century. According to the World Oral Health Report 2003 (2) priority is given to effective prevention of oral manifestations of HIV/AIDS through additional actions. These actions are integral components of WHO and joint United Nations global programmes for control of HIV/AIDS (3–5).

The WHO Oral Health Programme, in collaboration with other WHO technical programmes and WHO Collaborating Centres in Oral Health, will facilitate and coordinate the expansion of successful initiatives through technical and managerial support. Such activities may focus on:

- Identification of the most indicative oral manifestation of HIV/AIDS.
- Involvement of oral health personnel in the documentation of HIV/AIDS to ensure appropriate medical evaluation, prevention and treatment.

The Bali declaration on oral health in HIV/AIDS

Anwar R. Tappuni and Irna Sufiawati on behalf of WW8 delegates who voted in support of this declaration

Co- chairs of 8th World Workshop for Oral Health and Disease HIV/AIDS

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KEYWORDS: HIV, AIDS, HIV, Oral health inequalities.

Having reviewed the evidence presented to the 8th World Workshop on Oral Health and Disease in HIV/AIDS, held in Indonesia, the delegates agreed that the UNAIDS objective of ending the global HIV/AIDS epidemic by 2030 could be significantly enhanced by improving the current level of knowledge in healthcare professionals and the public at large.

The workshop concluded that it is necessary to eliminate the stigma of HIV/AIDS and to improve accessibility and compliance with effective therapy in order to stop HIV transmission. To achieve this, targeted educational input is required to ensure:

1. That the role of dental professionals is recognised as an integral part of the healthcare team committed to achieving the aims of UNAIDS.
2. HIV education of dental students and dental healthcare workers should be an essential element of the dental curriculum to ensure the profession has the appropriate knowledge and attitudes to manage people living with HIV.
3. That public health programmes make certain that the general public is aware of HIV testing and the role of dental healthcare

workers in facilitating this, thereby further normalising attitudes to people living with HIV.

Research into oral health serves to improve the diagnosis and care of patients and provides the evidence base that underpins future education. High-quality research and educational initiatives for doctors, dentists and the community are urgently required to achieve the UNAIDS objectives.

Bali, Indonesia: 15 September 2019.

CONFLICT OF INTEREST

Contributors were all WW8 delegates who voted to support this declaration. No conflict of interest was declared.

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The Correlation of Pathognomonic Periodontal Manifestation with CD4⁺ Level in People Live with Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome in a Tertiary Hospital, Surabaya, Indonesia

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Abstract

Aim: The prevalence of human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) patients worldwide continue increasing annually, thus it has become a global health problem and burden. An oral manifestation can be used as the clinical biomarkers in people living with HIV/AIDS (PLWHA) using the pathognomonic periodontal manifestation, such as Necrotizing Ulcerative Gingivitis (NUG) and Necrotizing Ulcerative Periodontitis (NUP). This study aims to investigate the prevalence and correlation of pathognomonic periodontal manifestations with Cluster of Differentiation 4 (CD4⁺) level in PLWHA in a tertiary hospital, Surabaya, Indonesia.

Materials and Methods: It presents an observational analytical study with a cross-sectional and total sampling method conducted from July to August 2014 in Dr. Soetomo General Tertiary Hospital. There were 88 HIV-seropositive patients who have not received any antiretroviral therapy yet who were recruited for this study. The patients and their guardians were explained about the study aims and participation approval which was obtained by the written informed consents. The diagnosis of NUP and NUG in PLWHA was based on its clinical features. The CD4⁺ level the latest 6 months was obtained from medical record as a retrospective data. The correlation between low CD4⁺ levels with pathognomonic periodontal manifestation in PLWHA was analyzed by Spearman's correlation test. **Results:** There are 9 (10.23%) PLWHA with pathognomonic periodontal manifestation, 7 (77.7%) with NUG, and 2 (22.3%) with NUP. All PLWHA (100%) have low CD4⁺ level (<200 cell/mm³). The Spearman's correlation shows that there are a correlation between pathognomonic periodontal manifestation with CD4⁺ level in PLWHA ($r = -0.464$) ($P = 0.03$; $P < 0.05$). **Conclusion:** NUG and NUP are pathognomonic periodontal manifestation found in Indonesian PLWHA which are associated with low CD4⁺ level reflecting the immune suppression level, and it can be used to predict HIV/AIDS stage of progression.

Keywords: Cluster of differentiation 4 level, Human immunodeficiency virus/acquired immunodeficiency syndrome, Necrotizing ulcerative gingivitis, Necrotizing ulcerative periodontitis, Oral manifestation

INTRODUCTION

The etiology of Acquired Immunodeficiency Syndrome (AIDS) is Human Immunodeficiency Virus (HIV). HIV/AIDS is the most emerging infectious disease in the world.^[1] The prevalence of HIV/AIDS patients worldwide continues increasing annually, thus it has become a global health problem and burden.^[2] HIV/AIDS infection in Indonesia is stated as one of Asia's fastest growing epidemics.^[3] Furthermore, Indonesia is the country with the most prevalent HIV/AIDS infection.^[4] People living with HIV/AIDS (PLWHA) is among

the 5.2 million (4.1–6.7 million) in Asia and the Pacific at the end of 2017.^[5] Indonesia's HIV/AIDS prevalence and epidemic are very dynamics and enormously.^[6] The numbers of AIDS-related deaths and new HIV/AIDS infections show

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Purpose of review

The role of the CD4 cell count in the management of people living with HIV is once again changing, most notably with a shift away from using CD4 assays to decide when to start antiretroviral therapy (ART). This article reflects on the past, current and future role of CD4 cell count testing in HIV programmes, and the implications for clinicians, programme managers and diagnostics manufacturers.

Recent findings

Following the results of recent randomized trials demonstrating the clinical and public health benefits of starting ART as soon as possible after HIV diagnosis is confirmed, CD4 cell count is no longer recommended as a way to decide when to initiate ART. For patients stable on ART, CD4 cell counts are no longer needed to monitor the response to treatment where HIV viral load testing is available. Nevertheless CD4 remains the best measurement of a patient's immune and clinical status, the risk of opportunistic infections, and supports diagnostic decision-making, particularly for patients with advanced HIV disease.

Summary

As countries revise guidelines to provide ART to all people living with HIV and continue to scale up access to viral load, strategic choices will need to be made regarding future investments in CD4 cell count and the appropriate use for clinical disease management.

Keywords

advanced HIV disease, antiretroviral therapy, CD4 cell count, treatment monitoring, viral load

INTRODUCTION

The CD4 cell count has been an essential component of HIV treatment and care programmes since HIV was identified as a disease compromising the immune system. For healthcare providers, the CD4 cell count has guided key clinical decisions ranging from when to start antiretroviral therapy (ART) [1^{••}] to whether or not to screen for or provide prophylaxis against opportunistic infections [2,3]. CD4 testing has also provided valuable insight into programme performance over time [4,5] and predicted patient prognoses, with epidemiologists having identified associations between CD4 cell counts and a risk of death [6], life expectancy [7] and treatment adherence [8[•]]. As a critical test for ART programmes, deployment of point-of-care (POC) CD4 test devices has been used as a way to improve linkage to care and accelerate treatment initiation [9]. Most importantly though, CD4 cell count provides the best direct measurement of a patient's immune status and risk for opportunistic infections, and it remains an important test with regard to diagnostic decision-making, particularly for patients with advanced HIV disease.

The role of the CD4 cell count in the care of persons with HIV/AIDS has evolved over the last 30 years. It began as and remains the best way to quantify the degree of immunosuppression and associated risk of AIDS illnesses. However, it is likely best known for its role in guiding the initiation of ART in national treatment programs. The roots of using CD4 thresholds for ART initiation lie in the early days of the ART era when drug toxicity, affordability, and accessibility of paramount concern. CD4 subsequently developed into a measure for

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The global changing pattern of the oral manifestations of HIV

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Abstract

The significance of the oral manifestations of HIV has been widely recognised since the start of the epidemic. It is estimated that more than 38 million people are living with HIV currently, with more than a third presenting with oral manifestations. Access to optimum clinical management and effective treatment in resource-rich countries has led to a remarkable decrease in some of the oral manifestations in the HIV population but this is not mirrored in developing countries, where most HIV-positive patients reside. In this paper, a review of the literature since the start of the HIV infection in different parts of the world is presented to highlight the current significance of the oral conditions in this population. Oral candidiasis was repeatedly reported as the most encountered oral manifestation of HIV in different countries, including in studies on groups on anti-retroviral therapy. Over time salivary gland disease was reported less in developed countries but was encountered more in developing countries. There is evidence to show that the prevalence of oral warts increased with the establishment of anti-retroviral therapy. A review of the worldwide prevalence of HIV-related oral conditions indicates that except for oral hairy leucoplakia, the prevalence of all other nine commonly reported oral conditions remained the same or increased over time. Oral opportunistic infections in HIV-infected patients are an ongoing clinical burden mainly in developing countries. Maintaining research in the subject and improving access to HIV treatment will help address the oral health inequalities around the world.

KEYWORDS

candidiasis, Global, oral hairy leucoplakia, oral health inequity, oral warts, salivary gland disease

1 | BACKGROUND

The number of people affected by human Immunodeficiency Virus (HIV) infection continues to grow globally (UNAIDS, 2019). The oral manifestations (OM) of HIV are well established markers of disease progression, and their presence is an indication of a compromised immune status. They can cause morbidity and affect the quality of life of patients. The literature indicates that there has been a

significant decrease in the prevalence of the OM of HIV documented in Europe and USA in response to anti-retroviral therapy (ART) (Nicolatou-Galitis et al., 2004; Patton, McKaig, Strauss, Rogers, & Eron, 2000; Schmidt-Westhausen, Priepke, Bergmann, & Reichart, 2000; Tappuni & Fleming, 2001). In contrast, in resource-limited countries where accessibility to health care and anti-retroviral therapy (ART) is limited, OM of HIV continues to place a substantial burden on these countries' health systems. (Challacombe, 2020).

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The impact of the world Workshops on oral health and disease in HIV and AIDS (1988-2020)

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Abstract

The first World Workshop on Oral AIDS was held in San Diego in 1988, organized by John and Deborah Greenspan who saw the need and advantages of getting together all those health workers globally who were interested in oral aspects of HIV with a common purpose of advancing the field collectively and collaboratively. Since that time and over the following 30 years, World Workshops on oral HIV have been held every four years or so. The aims of the first and all subsequent Workshops were to bring together clinicians and non-clinical scientists who have an interest in the oral manifestations of HIV disease, to share worldwide perspectives, knowledge and understanding of oral health and disease in HIV infection, to agree on global definitions and classifications of oral diseases and to identify research needs taking account of the worldwide perspectives and opportunities. Thus, there have been clinical science, social science and basic science aspects of each World Workshop. The Workshops have achieved their aims and have had impact in all three fields, leading to robust research agendas, changes in national HIV policies and international collaborations. They have led to policy declarations of access to oral care as a basic human right for both HIV-positive and HIV-negative individuals and advancing the rights of all HIV-positive healthcare workers to perform clinical practice.

KEYWORDS

AIDS, global, HIV, Kaposi's, oral, oral research, Workshops

1 | INTRODUCTION

About 3 or so months after the MMWR initial report of the new as yet unnamed syndrome (Centers for Disease Control, 1982) and a few weeks after Marc Conant's first talk on Kaposi's sarcoma at UCSF, John Greenspan was on the oral pathology service at UCSF reading his cases and up popped a slide of an oral lesion of what was then called Burkitt's lymphoma. It was in a young male nurse at the San Francisco Veterans Administration Hospital. John Greenspan recalls "I made the connection with the emerging syndrome because non-Hodgkins lymphomas of this type were known in people with

immunosuppression secondary to chemotherapy and other conditions. We soon saw four such cases and these were the first reported in the syndrome" (Figure 1; Ziegler, 1981; Ziegler et al., 1982).

The original reports of the syndrome included examples of oral Kaposi's sarcoma (Figure 2a) and pseudomembranous oral candidiasis (Figure 2c), while about a year later Deborah Greenspan led the UCSF group in the discovery of the new lesion oral hairy leukoplakia, (Greenspan et al., 1984, 1985a, 1985b; Greenspan, 1987) (Figure 2b), which the group soon showed was due to the Epstein-Barr virus (Greenspan et al., 1985a, 1985b). John Greenspan recalls "Then we and lots of other teams started to see a plethora of oral

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The interplay between HIV and COVID-19: summary of the data and responses to date

Lillian B. Brown*, Matthew A. Spinelli*, and Monica Gandhi

Purpose of review

We examine the interplay between the HIV and COVID-19 epidemics, including the impact of HIV on COVID-19 susceptibility and severe disease, the effect of the COVID-19 epidemic on HIV prevention and treatment, and the influence of the HIV epidemic on responses to COVID-19.

Recent findings

Evidence to date does not suggest that people living with HIV (PLWH) have a markedly higher susceptibility to SARS-CoV-2 infection, with disparities in the social determinants of health and comorbidities likely having a greater influence. The majority of literature has not supported a higher risk for severe disease among PLWH in Europe and the United States, although a large, population-based study in South Africa reported a higher rate of death due to COVID-19. Higher rates of comorbidities associated with COVID-19 disease severity among PLWH is an urgent concern. COVID-19 is leading to decreased access to HIV prevention services and HIV testing, and worsening HIV treatment access and virologic suppression, which could lead to worsening HIV epidemic control.

Conclusion

COVID-19 is threatening gains against the HIV epidemic, including the U.S. Ending the HIV Epidemic goals. The ongoing collision of these two global pandemics will continue to need both study and interventions to mitigate the effects of COVID-19 on HIV efforts worldwide.

Keywords

clinical outcomes, COVID-19, HIV, incidence, severe disease

INTRODUCTION

An unprecedented public health emergency is unfolding worldwide with the COVID-19 pandemic [1]. In response to multiple outbreaks from January to February 2020, a massive public health response was mounted globally, with cities, states and countries imposing school closures, prohibition of public gatherings, 'shelter in place' ordinances and closures of establishments that provide nonessential services. Medical care was also closed for 'nonessential' functions. The COVID-19 epidemic led HIV clinics to cancel nonurgent visits; convert in-person visits to remote telephone visits for needed care; divert HIV and Infectious Diseases providers to inpatient, public health, occupational health or logistical duties; and decrease routine laboratory testing and social services for people living with HIV (PLWH). In the space of weeks, the HIV care system globally changed from efforts to link and retain patients into care to instead limit in-person clinical visits for patients with chronic diseases. Although care is now opening up for patients with chronic illness

worldwide, the impact of this paradigm shift for HIV testing, prevention and care worldwide will set back HIV epidemic control efforts for some time.

Beyond the effects of the COVID-19 pandemic on HIV outcomes, it is critical to examine whether HIV has an impact on COVID-19 susceptibility or severity of outcomes [2,3]. Some of the risk factors for severe COVID-19 [4–9] (older age [10], cardiovascular disease (CVD) [11], pulmonary disease [12,13]) are more prevalent in PLWH than those without HIV, although HIV itself may not predispose to markedly more severe COVID-19 outcomes.

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The role of patient and public involvement in oral health and HIV/AIDS research, practice and policy

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Abstract

Patient and public involvement (PPI) is a process whereby patients, caregivers, service users and other relevant stakeholders, including the general public, are actively involved and engaged in activities to develop research. The dental research agenda has traditionally been driven by clinicians, where patients and the public have participated in research as subjects; patient and public involvement can contribute to the research agenda including the design and conduct of research by providing unique perspectives gained through lived experience. This panel of the 8th World Workshop on Oral Health and Diseases in AIDS considered the role of people living with HIV (PLHIV) to contribute to oral health and HIV research and policy through a process of involvement and empowerment. The panel introduced the concepts of PPI, described the purpose of PPI, reflected upon the logistic and ethical considerations thereof and considered how PPI had been utilised effectively in HIV research and policy change. The audience discussion focused on ways in which PPI could more readily and consistently be encouraged within oral health research involving PLHIV.

KEYWORDS

co-production, HIV, involvement, oral health, research methodology

1 | INTRODUCTION

The dental research agenda has traditionally been driven by clinicians, where patients and the public have only participated in research as subjects. In recent years, however, the research paradigm in health care has been shifting towards the inclusion of patients and the public in the development and conduct of research; this is particularly evident in the field of HIV research where advocates for people living with HIV (PLHIV) have been recognised as an asset in the HIV/AIDS response for more than two decades (UNAIDS, 1999).

There is growing recognition that working *with* (rather than *on*) communities to study and address their issues and concerns can have a greater influence on policy and promote health equity.

Involving patients and the public in research and policy development has increasingly become a priority for policymakers, commissioners, funding bodies, researchers and also patients (CEPPP, 2017; Hanney, Kuruvilla, Soper, & Mays, 2010; Walshe et al., 2013).

Increasingly, patient and public involvement (PPI) is becoming a requirement of research funding bodies; therefore, an understanding of the concepts of PPI will become ever more important to the dental researcher.

Within the context of this workshop at the 8th World Workshop on Oral Health and Diseases in AIDS, the panel members considered the role of PLHIV to contribute to oral health and HIV research and policy through a process of involvement and empowerment. The panel introduced the concepts of PPI, described the purpose of PPI,

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An ambitious treatment target
to help end the AIDS epidemic

UNAIDS DATA 2019



Oral health status and treatment needs among HIV/AIDS patients attending antiretroviral therapy center in Western India: A cross-sectional study

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ABSTRACT

Aims and Objectives: Human immunodeficiency virus infection/acquired immunodeficiency syndrome (HIV/AIDS) is a major public health problem across the globe. Among 37.9 million people are living with HIV in the world and 21.40 lakh are in India itself. The aim of this study was to assess the oral mucosal, periodontal, and dentition status of HIV/AIDS patients attending ART (antiretroviral therapy) center in Jaipur city, India. **Methods and Materials:** A total of 588 HIV/AIDS subjects at the ART center in Jaipur city were examined. Oral mucosal, periodontal, and dentition status was recorded using a modified WHO Oral Health Assessment form 1997. A pilot study was conducted among 50 patients. The data were analyzed using Statistical Package for the Social Sciences (SPSS) software, version 20.0. The statistical tests that were applied for the analysis included Chi-square test, Fisher exact test, and one-way analysis of variance (ANOVA). **Results:** Of 588 study subjects examined, 65.6% were men and 34.4% were women. Candidiasis was the most prevalent oral lesion (32.5%) followed by acute necrotizing gingivitis (26%), hyper melanotic pigmentation (15.8%), and ulcerations (8.7%), respectively. Oral hairy leukoplakia was observed in only 3.9% and not a single case of Kaposi's sarcoma was reported. Buccal mucosa (36.7%) was the most common site of the presence of oral mucosal lesions. The mean decayed, missing, and filled teeth (DMFT) score was 4.03 ± 1.54 . Almost all the subjects needed one or other form of dental treatment. Only 12% of the patients had healthy periodontium. **Conclusion:** Candidiasis was the most prevalent oral lesion. Efforts should be made to meet the increased treatment needs in these patients.

Keywords: Acquired immunodeficiency syndrome, antiretroviral therapy, candidiasis, human immunodeficiency virus

Introduction

Acquired immunodeficiency syndrome (AIDS) is a fatal illness caused by the human immunodeficiency virus, which breaks down the body's immune system, leaving an individual exposed to life-threatening opportunistic infections, neurological disorders, or unusual malignancies.^[1]

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The first case of AIDS was reported by CDC (Center for Disease & Control) in 1981 among homosexual men in the USA.^[2]

Globally unprotected heterosexual route is the most common route of transmission of HIV. The other modes of transmission of HIV comprise unprotected penetrative sex between men, injecting drug use, and unsafe blood transfusions or injections.^[1]

According to the UNAIDS (United Nations Program on HIV and AIDS) report in 2019, a total of 37.9 million people are

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Viruses and oral diseases in HIV-infected individuals on long-term antiretroviral therapy: What are the risks and what are the mechanisms?

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Abstract

As a result of the extension of life span produced by increasing access to combined antiretroviral therapy, people living with HIV/AIDS (PLWH) face new challenges from comorbidities. Although advances in medical care for HIV infection have dramatically reduced opportunistic infections and AIDS-defining cancers, some non-AIDS-defining cancers (NADC) and specific oral diseases such as periodontitis and salivary gland disease are now more prevalent. Cancer prevention is, therefore, a priority issue in care of PLWH, stressing both restoration of immune function and reduction of non-HIV cancer risk factors (tobacco in all its forms; areca nut; heavy alcohol consumption; diets lacking antioxidant vitamins and minerals; and oncogenic virus infections) through specific interventions, especially tobacco and areca nut cessation and alcohol moderation. Detection of oral high-risk human papillomaviruses (HR-HPV) and the universal preventive HPV vaccination among PLWH should be promoted to reduce the malignancy burden, along with routine oral examinations which remain the cheapest, most reliable, most reproducible, and non-invasive tool to identify suspicious lesions. Also, considerations of oral inflammation and periodontal health are important to replication and gene expression of viruses in the mouth. Considering that a key risk factor for this scenario is the presence of oncogenic virus infection such as several members of the human herpesvirus and human papillomavirus families, here we analyze the variables involved in the seeming increase in comorbidities in PLWH.

KEYWORDS

cancer, HIV/AIDS, viral infections