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Short Communication

A scientometric study on research characteristics of HIV/AIDS involving the oral cavity with an implication for public health

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KEYWORDS

Acquired immunodeficiency syndrome;
Bibliometrics;
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Oral manifestations;
Public health;
Saliva

Abstract *Background/purpose:* Oral manifestations are often the first signs of human immunodeficiency virus (HIV) infection. The purpose of this study was to analyze the scientometric characteristics and research trends of HIV/AIDS involving the oral cavity.

Materials and methods: All the papers on oral involvement of HIV/AIDS were comprehensively retrieved from the Scopus database. The years of publication were divided into before 2006 and 2006–2024 in the analysis of research trends.

Results: There were 1770 relevant papers on HIV/AIDS involving the oral cavity, with total citations of 26,307 and the *h* index of 63. The most common keyword of HIV-related oral diseases was thrush, followed by oral candidiasis, opportunistic infections, Kaposi sarcoma, hairy leukoplakia, periodontal disease, and dental caries. The trend of drug aspect, e.g., antifungal agent, nystatin, and azole drugs before 2006 has changed to reverse transcriptase inhibitors efavirenz and lamivudine. Importantly, the common keyword including public health, health survey, saliva, education, dental student, and knowledge, suggesting that HIV/AIDS remains a major challenge to public health. Herein, we highlight the awareness of early diagnosis, and screening and testing of HIV, e.g., using saliva seems well-suited in dental setting.

Conclusion: This study is the first scientometric analysis of HIV-related oral diseases with an implication for public health, underpinning that dentists and stomatologists can play active roles in providing early recognition and timely diagnosis of HIV/AIDS when it involved the oral cavity.

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Introduction

Human immunodeficiency virus (HIV) infection and it caused acquired immune deficiency syndrome (AIDS) continue to grow globally and remain a global public health challenge.¹ The early diagnosis and accurate treatment plan are very important to indicate the disease severity related to HIV infection. HIV/AIDS affects the individual's immune system which leads to various disorders as well as oral diseases.² It is estimated that there are more than 38 million people living with HIV currently, with over one third presenting with oral manifestations.² Oral manifestations are often the first signs of HIV infection, indicator of the compromised immune status, and predictors of disease progression.³ Hence, dentists and stomatologists can be the first to discover HIV-related oral lesions since patients are rarely aware when it is asymptomatic. Oral examination to reveal HIV-related lesions is thus important for early diagnosis of HIV infection. The quick and precise identification for a patient treatment was essential for comprehensive disease management. The management of oral lesions related to HIV infections could have a positive impact on HIV infection progression and prognosis.³

The significance of the oral manifestations of HIV/AIDS has been recognized since the start of the epidemic in 1980s.² HIV/AIDS involving the oral cavity continues to be a current health challenge highlighting the importance of continuing the research in the field. The World Workshops of Oral Health and Disease in HIV/AIDS have provided a setting for oral HIV clinicians and researchers from around the world to debate and work collaboratively to address topical problems.⁴ They have allowed the oral health research field to make a significant contribution to HIV research generally. Scientometrics is a useful tool that utilizes citation and bibliometric data to measure scientific output and research trend of a specific research field.^{5–7} The previous bibliometric analyses of HIV/AIDS focus on the other aspects, e.g., coronary heart disease and depression,^{8–11} without relevant study on HIV-related oral diseases. Therefore, the purpose of this study was to analyze the scientometric characteristics and research trends of all the papers on HIV/AIDS involving the oral cavity, in order to highlight the awareness of early recognition and timely diagnosis and improve the access to care for this disease.

Materials and methods

As per the methodology described previously,^{13–15} all the papers on HIV/AIDS involving the oral cavity in the Scopus database were retrieved on 10 Jan 2025. In literature search, we used medical subject terms "HIV OR human immunodeficiency virus OR acquired immune deficiency syndrome OR acquired immunodeficiency syndrome" and "oral cavity OR oral mucosa OR oral health OR oral lesion OR oral

manifestation OR oral sarcoma OR dent* OR intraoral OR mouth OR tongue OR buccal OR cheek OR lip OR labial OR gingival OR palate" in the Title of the papers. There was not restriction to paper type and year of publication, but language was restricted to the English as an international knowledge-exchange language. The scientometric characteristics of all the eligible papers were recorded for the following information: title, keywords, citation count, publication year, journal of publication, authorship, affiliation, and country/region of origin. Data search and extraction were performed independently by two investigators, and any discrepancy of results was resolved in a consensus symposium. The years of publication were divided into before 2006 and 2006–2024, so that the number of papers can be to some extent compared in the analysis of research trends. Microsoft Office Excel 365 was used for index model building, and the Bibliometrix Biblioshiny R-package software was used for bibliometric statistics. In this descriptive study, variables were presented as numbers and percentages. No comparisons were made, and thus no *P*-values were set.

Results

Citation characteristics

With the search strategy algorithm, a total of 1770 papers on HIV/AIDS involving the oral cavity were retrieved in the Scopus database. As presented in Fig. 1A, the most type of papers on HIV/AIDS was article ($n = 1411$), followed by review ($n = 163$) and letter ($n = 68$). The total citation count (after removal of self-citations) was 26,307 (24,252) and the *h* index was 63 (61) for all the papers. To further concretize the trends of scientific output, we assessed the annual number and accumulated citations of the papers from 2005 to 2024 (Fig. 1B). The annual number of the papers on HIV/AIDS ranged from 33 to 67 with the mean number of 47 during 2005–2024. The accumulated citations (after removal of self-citations) of the papers ranged from 628 (582) to 1291 (1198) during this period. The detailed information on publication year, authors, title, abstract, journal of publication, citation count, institutions, keywords, and paper type of the 100 most-cited papers are presented in [supplementary Tables S1](#).

Bibliometric characteristics

Fig. 1C displays cloud graphs of journals of publications, contributing authors, institutions, and countries/regions of origin of the papers on HIV/AIDS involving the oral cavity, which were divided into before 2006 (863 papers) and after 2006 (907 papers), so that the number of papers can be to some extent compared in the analysis. Before 2006, the journal of publication, contributing author, institution and country of origin with largest number of papers was *Oral*

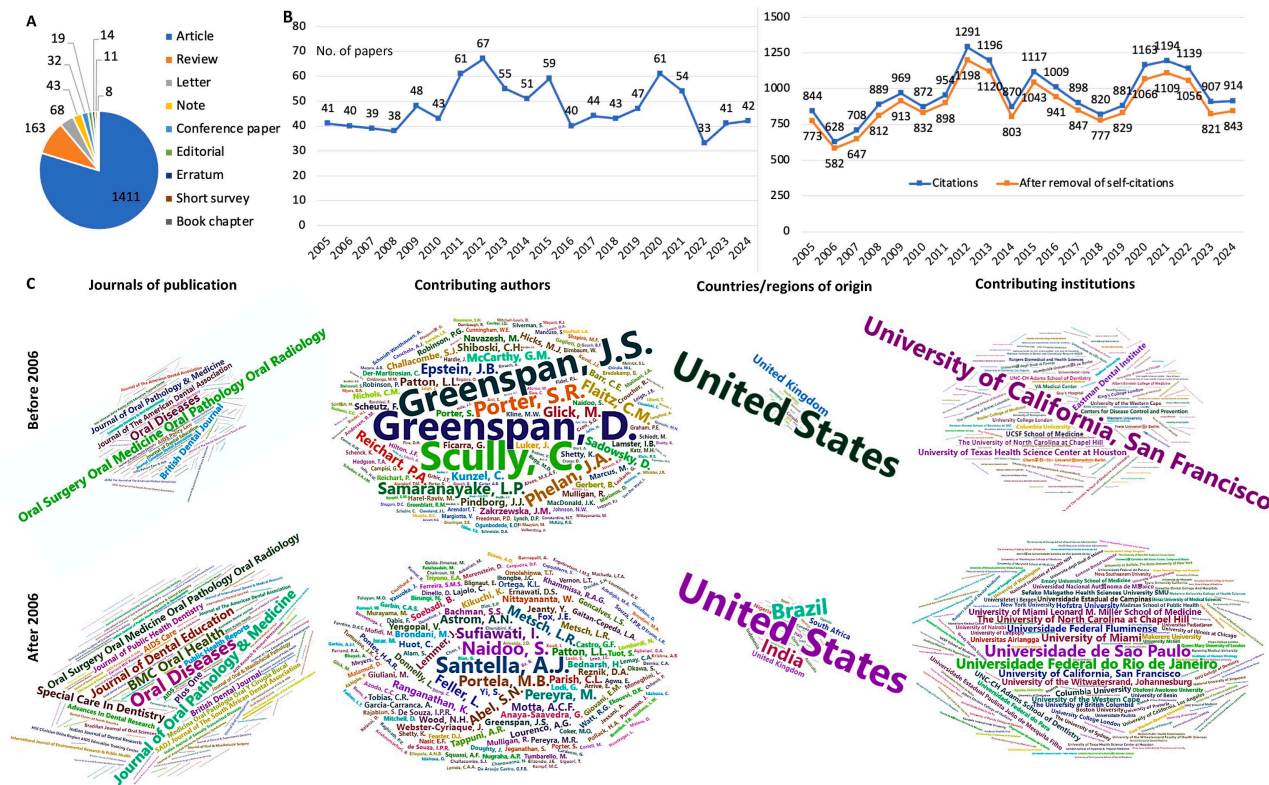


Figure 1 Bibliometric characteristics of the papers on HIV/AIDS involving the oral cavity. (A) The numbers of different paper types. (B) The annual number and accumulated citations of the papers during 2005–2024. (C) Cloud graphs of journal of publication, contributing authors, countries and institutions of origin before 2006 and after 2006. The font size indicates the number of papers; a larger size means more papers in the cloud graphs.

Surgery Oral Medicine Oral Pathology Oral Radiology (n = 48), Greenspan, D. (n = 32), University of California San Francisco (n = 57) and United States (n = 275), respectively. After 2006, the journal of publication, contributing author, institution and country of origin with maximum number was *Oral Diseases* (n = 29), Santella, A. J. (n = 15), Universidade de São Paulo (n = 29) and United States (n = 236), respectively. Table S2 presents the journals, contributing authors, institutions, and countries/regions with largest number of papers (rank, 1–10).

Research characteristics

Based on the frequency of the keywords in all the papers on HIV/AIDS involving the oral cavity (Fig. 2A), a list of the common keywords is automatically recognized by the database. The most common keyword of HIV-related oral diseases was thrush, followed by oral candidiasis, AIDS-related opportunistic infections, Kaposi sarcoma, hairy leukoplakia, periodontal disease, dental caries, mouth neoplasms, periodontitis, gingivitis, mouth tumor, mouth ulcer, candida albicans, xerostomia, cheilitis, occupational diseases (Fig. 2B). Before 2006 and 2006–2024, there have always been the same common keywords such as controlled study, prevalence, highly active antiretroviral therapy, questionnaire, virus load, dental care, attitude to health, risk factors, immunology, saliva, and psychological aspect. Based on the keywords of papers on HIV/AIDS involving the

oral cavity published in different years (Fig. 2C), the more common keywords can basically reflect research trends.

Before 2006, antifungal agent, nystatin, clotrimazole, fluconazole, ketoconazole, aciclovir, refusal to treat, and patient abandonment were more frequent keywords regarding treatment aspect. Interpersonal communication, social psychology, homosexuality, disease transmission patient-to-professional or professional-to-patient, occupational exposure, nonhodgkin lymphoma, dental ethics, medical ethics, legal aspect, health care and public health were more common keywords. After 2006, efavirenz and lamivudine as the drug related keywords and Brazil, India and Nigeria as the country related keywords were more frequent. Experimental keywords including genetics, mass screening, immunohistochemistry, enzyme linked immunosorbent assay, isolation and purification were more common. Moreover, clinical studies on cohort analysis, cross-sectional study, retrospective studies, follow up, complication, cheilitis, erythema, mouth examination, mouth hygiene, DMF index, quality of life, health survey, smoking, young adult, education, dental student, knowledge, and socioeconomic factors were also more frequent keywords after 2006.

Discussion

This scientometric study attempted to analyze the bibliometric characteristics and research trends of all the papers on HIV/AIDS involving the oral cavity. The bibliometric

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