REVIEW ARTICLE

Research Trend of Oral Manifestation in HIV Patient since 1984 to 2023: A Bibliometric Analysis

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ABSTRACT

Human Immunodeficiency Virus (HIV) infection has been a global concern since its discovery in 1984 due to its high morbidity and mortality rates. Currently, over 75 million people worldwide have been infected with HIV, and 37 million individuals are living with the virus. Oral manifestations may serve as significant diagnostic and prognostic indicators for HIV/AIDS patients. This study was conducted to analyze research articles on oral manifestations in HIV/AIDS patient using visual mapping methods from 1987 to 2023. Articles were extracted from Scopus and screened using advanced search with keywords "Human Immunodeficiency Virus" and "oral manifestation line". The contributions made by authors, journals, institutions, and countries were described using Microsoft Excel 2010 and VOSviewer. A total of 1574 articles were collected between 1987 and 2023. Countries that published the most articles were United States, India and Brazil. The top three authors are Deborah Greenspan, John S Greenspan, and Lauren L Patton, from United States with number of articles respectively 43, 39, and 23. Oral Surgery and the Journal of Oral Pathology & Medicine ranked as the top two, with 92 and 78 articles respectively. The central themes of the articles are oral candidiasis and oral hairy leukoplakia, followed by periodontal disease, Kaposi's sarcoma, and xerostomia. Oral manifestations in HIV/AIDS patients continue to be a persistent issue, particularly in countries with high prevalence, such as Africa and Asia. The limited coverage of certain topics in existing articles presents potential research opportunities for the future.

Keywords: HIV, AIDS, Oral manifestation, VOSviewer, Bibliometric

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INTRODUCTION

Human Deficiency Virus (HIV) Infection is a major global health problem with high morbidity and mortality rates. World Health Organization (WHO) estimates there are 36.7 million people living with HIV/AIDS in the world at the end of 2016. Indonesia ranks third for the highest number of HIV infection cases in Asia Pacific, after India and China, with a total of 48,000 cases in 2016.(1)

Intensive research on clinical markers assessing and monitoring the course of the disease, from the initiation stage of HIV infection to the development of AIDS, has been carried out since mid-1980s. Oral manifestations are one of the clinical markers and an early indicator in patients with HIV infection. Oral manifestations occur in 50% of HIV-infected patients and 80% of AIDS patients. Oral manifestations strongly-associated with HIV infection are oral candidiasis, oral hairy leukoplakia, Kaposi's sarcoma, non-Hodgkin's lymphoma, and periodontal disease.(2,3)

Bibliometric is an analysis of published information (books, journals, or articles) and associated metadata (abstracts, keywords, citations) using statistics to describe the relationships between published works. This analysis allows authors to discover the evolution of a particular field and provides an overview of research opportunities in that field.(4) A number of bibliometric analysis studies on HIV have been conducted over the past few years, including a bibliometric analysis to identify patterns of growth in HIV/AIDS in 2008(4), a bibliometric analysis of HIV/AIDS infection in Lesotho in 2017(5), analysis of social network and HIV/AIDS in 2022(6), and bibliometric analysis of HIV dementia in 2022(7).

This study was conducted to analyze the article and describe the evolution of research regarding oral manifestations in HIV patients using method of visual mapping from 1987 to 2023. The results of this study are intended to be a consideration for future research topics.

MATERIALS AND METHODS

HIV infection has various oral manifestations. The oral manifestations strongly-associated with HIV infection are oral candidiasis, oral hairy leukoplakia, periodontal disease, Kaposi's sarcoma, and non-Hodgkin's lymphoma. This study uses Scopus as a database based on VOSviewer's provision. Abstract inclusion criteria are

the classification of oral manifestations of HIV infection. The author conducted a search using advanced search on June 8, 2023, with the following criteria:
(ABS("HIV" OR "Human Immunodeficiency Virus") AND ABS("oral lesion" OR "oral manifestation" OR "oral finding" OR "oral candidiasis" OR "oral hairy leukoplakia" OR "periodontal disease" OR "non hodgkin's lymphoma" OR "oral kaposi's sarcoma")) AND (LIMIT-TO (SRCTYPE,"j")) AND (LIMIT-TO (DOCTYPE,"ar")) AND (LIMIT-TO (LANGUAGE,"English"))

The authors conducted a database search independently and evaluated titles and abstracts to exclude irrelevant articles. Authors analyze the results to get the final data. The search for the most contributions was carried out by extracting the bibliometric parameters; title, keywords, year of publication, citation, author, institution, and country. The extracted data was analyzed in Microsoft Excel 2010. Articles that have similarities are discarded and become exclusion criteria. The co-authorship study was conducted to look at the relationship between various authors, institutions and countries. This study conducted with VOSviewer 1.6.17.

RESULTS

General data

There are 1,495 articles that have been extracted and will be analyzed from Scopus with a period of publication from 1987 to 2023. There are 4 duplicate articles removed from the database. Graphics, using Microsoft Excel, in Figure 1 shows number of articles published each year. Publications regarding oral manifestations in HIV patients began in 1987 or approximately 3 years since the emergence of HIV infection in 1984. The number of publications in worldwide was relatively small, namely eight articles in 1987, eleven articles in 1988, and began to increase in the following years. The highest number of publications occurred in 2012 with 62 articles. The highest total citations were 3.267 in 1997. The citation per publication was 26.94. The total citation total is 40,191. Journal involved in publishing articles from this database are 211.

Research on oral manifestations in HIV patients is still ongoing worldwide. Asia has an increasing number of article publications every year. Most published articles are in 2020 with 28 articles (Figure 1b). Africa is also still continuing the same research. The most published and cited article was in 2006 with 15 articles and 581 citations (Figure 1b). Australia continues to carry out research even though the number of articles is the least compared to others (Figure 1b). Europe and America experienced a decline in the number of publications. This could be due to the decreasing incidence of HIV cases (Figure 1b).

Research on oral manifestations in HIV patients has been carried out since this infection was discovered. Oral manifestations can be indicators in diagnosing and predicting prognosis in HIV patients. Oral manifestations are found in 50% of HIV patients and 80% of AIDS patients (CD4+ T lymphocytes <200). The results of this study can be used as a consideration in determining the theme and topic of investigation of oral manifestations in HIV patients in the future.

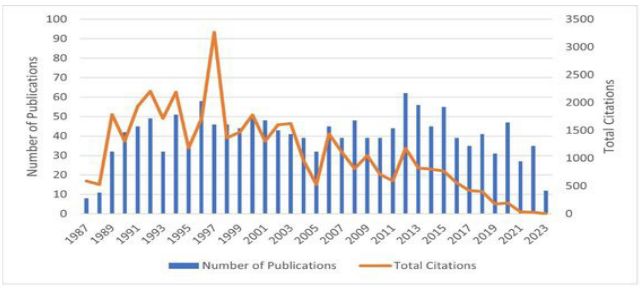

Figure 1: Number of publication and total citation based on year in the world.

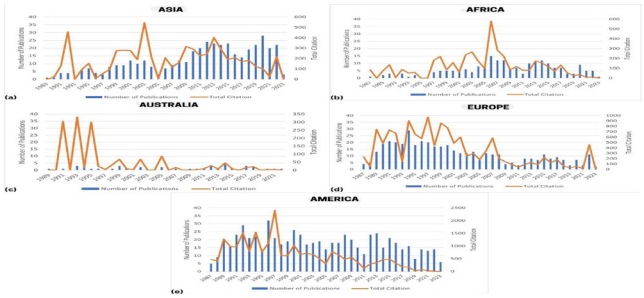

Figure 1B: Number of publication and total citation in (a) Asia, (b) Africa, (c) Australia, (d) Europe, (e) America

Collaboration analysis of Authors, Institutions, and Publishers

The results of the analysis showed that there were nine authors' collaboration groups in the study of oral manifestations in HIV patients (Figure 2). This result is obtained by adjusting the number of documents for each author to a minimum of ten, so that there are 19 authors. There are 14 writers who have a close relationship with each other.

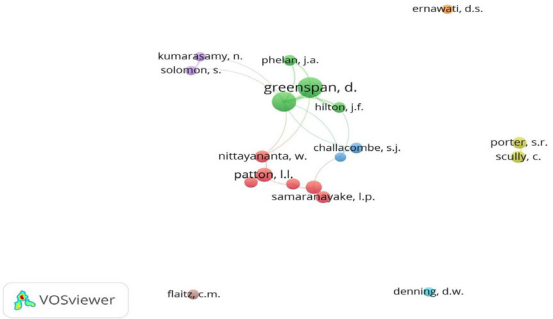

Figure 2: Authors' collaboration group.

The authors who published the most articles can be seen in Table I. Deborah Greenspan published 43 articles with 2562 citations and has a value of the number of citations for each article is 59.58. The University of

California (United States of America) and the University of North Carolina (United States of America) are the two institutions that publish the most articles.

Table I: Top ten authors

Rank	Author	Number of Publication	TC	CPP	Institution	Country
1	Greenspan, Deborah	43	2562	59,58	University of California	United States
2	Greenspan, John S	39	2122	54,41	University of California	United States
3	Patton, Lauren L	23	968	42,09	University of North Carolina	United States
4	Reichart, Peter A	23	809	35,17	Humboldt University	Germany
5	Samaranayake, Lakshman P	17	1086	63,88	University of Hong Kong	Hong Kong
6	Scully, Crispian	17	507	29,82	University of London	United Kingdom
7	Nittayananta, Wipawee	16	419	26,19	Thammasat University	Thailand
8	Shiboski, Caroline	15	326	21,73	University of California	United States
9	Phelan, Joan A	15	550	36,67	University College of Dentistry, New York	United States
10	Ficarra, Giuseppe	14	421	30,07	University of Florence	Italy

TC= Total Citation, CPP= Citation Per Publication

Journal regarding oral manifestations in HIV patients have been arranged based on the highest number of articles. This study shows the top ten journals. Almost all journals are first quartile (Q1) and second quartile (Q2) categories. Oral Surgery published 92 articles with a citation value of 50.25 per article, Journal of Oral Pathology & Medicine published 78 articles with a citation value of 49.91 per article, Oral Diseases published 50 articles with a citation value of 26.84 per article, AIDS published 42 articles with a citation value of 39.81 per article, PLos ONE published 26 articles with a citation value of 33.54 per article, and followed by Journal of Periodontology, Journal of Acquired Immune Deficiency Syndromes, Journal of Infectious Diseases, Medicina Oral, and Clinical Infectious Diseases.

This study also analyze article citation. The result show authors that cited more than 200 times. Poul Erik Petersen is the author with the highest citations from the University of Copenhagen, Denmark, with a total publication of 6 articles with a total of 505 citations.
The VOSviewer also can analyse the number of publications of countries. In this study, United States has the highest number of publications with 382 articles, followed by India 154 articles, Brazil 143 articles, and the United Kingdom 54 articles.

Intellectual Structure of Keyword

Bibliographical co-occurrence relationships are created by auto-extracting keywords. The method used is full counting. Thesaurus documents are created manually and are used to avoid terminology repetition. In this analysis, the author's keywords are set with a minimum occurrence of five and 88 articles that meet the criteria are obtained. Correlation between keywords is depicted with nodes Figure 3. The node that connects the keywords shows the strength of the correlation between one and the other. Keywords that have the same meaning are put into one group.

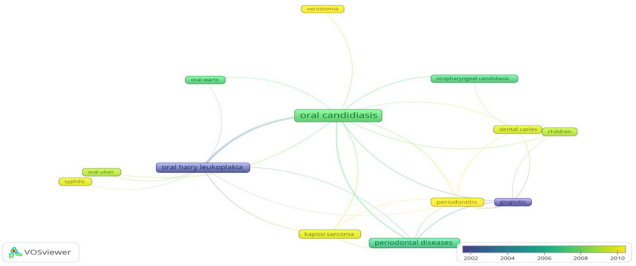

Figure 3: Co-occurence relationship

Topics of oral manifestations in HIV patients that have the greatest frequency are oral candidiasis and oral hairy leukoplakia. Oral hairy leukoplakia and gingivitis were the topics of research that were mostly carried out in the early days, but now they are starting to switch to the topic of Kaposi's sarcoma, periodontitis, and xerostomia. There are 4 groups obtained based on the search for the title of the article, namely periodontal disease, oral candidiasis, oral hairy leukoplakia, Kaposi's sarcoma. The total relationship obtained was 22 with a relationship strength of 96.

DISCUSSION

HIV/AIDS infection is a viral infection that attacks immune cell, causing a person to become more vulnerable to infection and disease. Approximately 39,0 million (33,1 – 45,7 million) people were living with HIV at the end of 2022. (8) HIV infection emerged and became a global pandemic in the mid-1980s. Currently HIV still has high morbidity and mortality and is a global health problem,

especially in countries with lower-middle income. In diagnosing HIV infection, oral manifestations are the earliest indicators and can predict the course of HIV/AIDS. As well as being the first clinical feature of HIV infection, oral lesions can also be a marker of a state of immunosuppression. These lesions can be used for examination, diagnosis, and initial treatment of HIV/AIDS patients. The appearance of oral lesions in HIV/AIDS patients has a major influence on the patient's quality of life. This is because oral health is related to one's physical and mental health. Orofacial lesions that are strongly-associated to HIV/AIDS in adults based on the EC Clearinghouse classification include candidiasis, hairy leukoplakia, Kaposi's sarcoma, non-Hodgkin's lymphoma, and periodontal disease.(2,3,9)

There are lesions strongly associated with HIV infection. (10) Candidiasis is common opportunistic infection in HIV-infected patient. This situation related to CD4 counts of the patient which depends on the use of Anti-retroviral treatment.(11,12) Periodontitis is an inflammatory disease caused by specific microorganisms or group of specific microorganisms in tissue supporting the teeth. Patient with HIV infection has higher risk of aggravation of the periodontitis. Prevalence of periodontitis in HIV infected patient ranges 51% before the introduction of antiretroviral therapy (ART). (13) Xerostomia is a subjective dry mouth condition. Chronic xerostomia may affect speech, chewing, swallowing, denture-wearing, and general well-being. Xerostomia secondary to hyposalivation frequently cause of certain medication (such as anticoagulant, antidepressant, antihypertensives, antiretrovirals, hypoglycaemics, levothyroxine, multivitamin and supplement, non-steroidal anti-inflammatory drugs, and steroid inhalers). (14) Kaposi's sarcoma has a substantial percentage in AIDS patients and cause of morbidity and mortality. After first anti-retroviral drugs introduction, its incidence decreased and fell further after the development of combination ART (cART).(15) Lymphoma can be predisposed by HIV. Despite high incidence of concomitant infections with Human Herpes Virus-8 (HHV-8) and Epstein Barr Virus (EBV), primary mechanism underlying malignant transformation is thought to be HIV-related immunosuppression. (16)

Oral manifestation in HIV articles has total 1,495 publications from 1987 to 2023. Among the years, 1997 marks as the highest number of citations with total 3,267. HAART (Highly Active Antiretroviral Therapy) becomes the new standard of HIV care. Decline in AIDS death in United States decline by 47% compares with the previous year. The report is from U.S Centers for Disease Control and Prevention (CDC).(17) There have been further advances in treating HIV as the availability and rapid scale up of antiretroviral therapy (ART) has transformed what was inevitably a fatal disease to a chronic. (18,19)

Africa has a higher prevalence of HIV than any other continent in the world, estimated average of 3,9% of the population living HIV-positive lives. HIV is believed to have evolved from the simian immunodeficiency virus (SIV). This Virus crossed the species barrier from primates in Central Africa. Human hunters may contact with the infected primate's blood, then evolved into HIV(20)

Bibliometrics analysis is a popular and rigorous method used for a variety of purposes, such as finding trending articles and journals, author collaborations, and the intellectual structure of existing literature. The data used is usually in large quantities (hundreds to thousands) and objective components (number of citations and publications, occurrence of keywords and topics). Interpretation of the analysis is guided by the results of the evaluation carried out according to established procedures and techniques. A well-crafted bibliometric analysis can build a strong foundation for developing knowledge. This helps authors to (1) get a simple overview, (2) identify knowledge gaps, (3) obtain new ideas in research, and (4) contribute in the field. (21) Bibliometric indicators have become one of the most frequent tools in evaluative research management. Bibliometric indicators were introduces to a wider audience during 1990s when the former science citation index became accessible on-line as the *Web of Science* (WoS).(22)

Bibliometrics analysis can have a big influence including in Health Education. Bibliometric can be used to define the health field by identifying relevant journals, articles and topics. (23) Collaboration is key in the study of bibliometrics and adding a bibliometrician or information scientist into team can provide great value in processing information structures and data management. In addition, experts can keep abreast of bibliometrics. Understanding the scope of research gives us the ability to spot trends and identify knowledge gaps. Bibliometric analysis has a very good future, and physician have the opportunity to use bibliometrics in their research.(24)

Thesaurus is a structure list of concepts, to represent a univocal way the content of the document and queries within a documentation system, and to help the user in the indexation of documents and queries. The user provided the semantic structure of the thesaurus: fundamentally the relation of equivalence, hierarchy and association.(25) Thesaurus analysed words that have the same meaning and replace them with one same word, resulting focus in an analysis.

CONCLUSION

In summary, this study shows us the analysis about oral manifestation in HIV/AIDS patient articles that has

published from 1987 to 2023 with its visual mapping using bibliometric analysis. Overall, the study indicates the persistent nature of HIV as a global health issue, with a high prevalence observed in countries including Africa and Asia. The analysis revealed four major research groups that extensively discussed periodontal disease, oral candidiasis, oral hairy leukoplakia, and Kaposi's sarcoma. Among these, oral candidiasis and oral hairy leukoplakia emerge as the most extensively researched topics. Furthermore, future research on oral manifestations in HIV patients could consider exploring the themes of periodontal disease and Kaposi's sarcoma.

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