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Short Communication

A scientometric study on research trends and characteristics of oral leukoplakia and oral lichen planus

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Research characteristics

Abstract *Background/purpose:* Oral leukoplakia (OLK) and oral lichen planus (OLP) represent two common oral potentially malignant disorders. It would be interesting to know scientific output and characteristics of studies on OLK and OLP.
Materials and methods: This study aimed to investigate and compare scientometric characteristics of articles on OLK and OLP in the Scopus database, with emphasis on the analysis of the keywords that can reflect research directions and topics of concern.
Results: A total of 1,191 and 2,288 papers on OLK and OLP were retrieved in the Scopus database, respectively. The total citation count was 31,859 and the *h* index was 75 for articles on OLK, and the total count was 55,491 and the *h* index was 93 for articles on OLP. For OLK research, oral cancer-related cancer risk, cancer diagnosis, carcinogenesis, prognosis, tumor marker, e.g. protein P53 and Ki-67, risk assessment, e.g. tongue site, tobacco and alcohol consumption were distinctive frequent keywords. For OLP research, drug efficacy, immunosuppressive agents, e.g. corticosteroid, triamcinolone acetonide, tacrolimus, and glucocorticoids, inflammation-related T lymphocyte, lymphocytic infiltration, cytokines, e.g. gamma interferon, tumor necrosis factor, and interleukin 6, complication, e.g. hepatitis C

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and diabetes mellitus, and scoring system-related visual analog scale, pain, anxiety, quality of life, depression, and questionnaire were distinctive keywords.
Conclusion: This study elucidated the comprehensive identification and recognition of the important and relevant research topics concerned, and encouraged more studies in the field of OLK and OLP to refine management strategies of these diseases.

Introduction

Oral leukoplakia (OLK) and oral lichen planus (OLP) represent two common oral potentially malignant disorders (OPMD), which are a group of lesions that carry a significantly increased risk of oral cancer progression.[1] OLK is defined as a predominantly white plaque of questionable risk having excluded (other) known diseases or disorders that carry no increased risk for cancer.[1] OLP is a chronic inflammatory disease of probable immune-based etiology, displaying white reticular lesions, accompanied or not by atrophic, erosive and ulcerative and/or plaque type areas.[1] Plaque type may be difficult to distinguish from OLK. Although the relationship between OLP and malignant transformation remains controversial, OLP is classified as a potentially malignant disorder by the World Health Organization (WHO) workshop.[1] The workshop mentioned that OLK was among the most common and most studied OPMD encountered in clinical practice and in population surveys.[1] It would be interesting to know scientific output and characteristics of studies on OLK and OLP. Scientometrics is a useful tool that utilizes bibliometric and citation data to assess scientific output and research characteristics of a specific research field.[2–8] The current study aimed to investigate and compare the scientometric characteristics of OLK and OLP research, in order to help researchers to obtain detailed knowledge and main topics in these fields.

Materials and methods

A literature search utilized the Scopus database, as done in previous scientometric analyses.[3–8] We used medical subject terms "oral" and "leukoplakia" in the Title in literature search for OLK and "oral" and "lichen planus" in the Title in literature search for papers on OLP on 01 Aug 2024. "Article" in the filter of document type and "English" in the filter of language were included. Article was included since this type of publications substantially reflects original research, and only English literature was included because it is an international knowledge-exchange language. The scientometric characteristics of all the eligible papers were reviewed and recorded for the following information: title, keyword, 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. 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 are presented as numbers and percentages. No comparisons were made, and thus no *P*-values were set.

Results

Citation characteristics of OLK versus OLP

With the search strategy algorithm, a total of 1,392 and 2,870 papers on OLK and OLP were retrieved respectively in the Scopus database. Of these, article type accounted for 1,191 (85.6%) and 2,288 (79.7%), respectively. Fig. 1A illustrates the number and distribution of their paper types. The total citation count was 31,859 and the *h* index was 75 for articles on OLK, and the total count was 55,491 and the *h* index was 93 for articles on OLP. To further concretize the trends of scientific output, we assessed the annual number of the articles and annual accumulated citations of the papers during 2004 to 2023 (Fig. 1B). The annual number of all the articles on OLK mildly rose from 19 to 59, and the accumulated citations of the articles increased from 618 to 1,916 during 2004–2023. The annual number of all the articles on OLP stably raised from 37 to 142, and the accumulated citations of the articles increased from 1,103 to 4,304 during this period.

Bibliometric characteristics of OLK versus OLP

The cloud graphs of journals of publications, contributing authors, institutions, and countries/regions of origin are shown in Fig. 2. The detailed information on publication year, authors, affiliations, title, journal of publication, citation count, keywords, and abstract of the top-100 most-cited articles on OLK and OLP are presented in Supplementary Tables S1 and S2. For OLK research, the journal of publication, contributing author, institution and country of origin with largest number of articles was *Journal of Oral Pathology & Medicine* (n = 86), Greenspan, J.S. (n = 26), University of California San Francisco (n = 35), and India (n = 238), respectively. For OLP research, the journal of publication, contributing author, institution and country of origin with largest number of articles was *Journal of Oral Pathology & Medicine* (n = 221), Zhou, G. (n = 40), Sichuan University (n = 56), and China (n = 301), respectively. The journals of publication, contributing authors, institutions and countries/regions of origin with largest number of articles (rank, 1–10) are presented in Table S3.

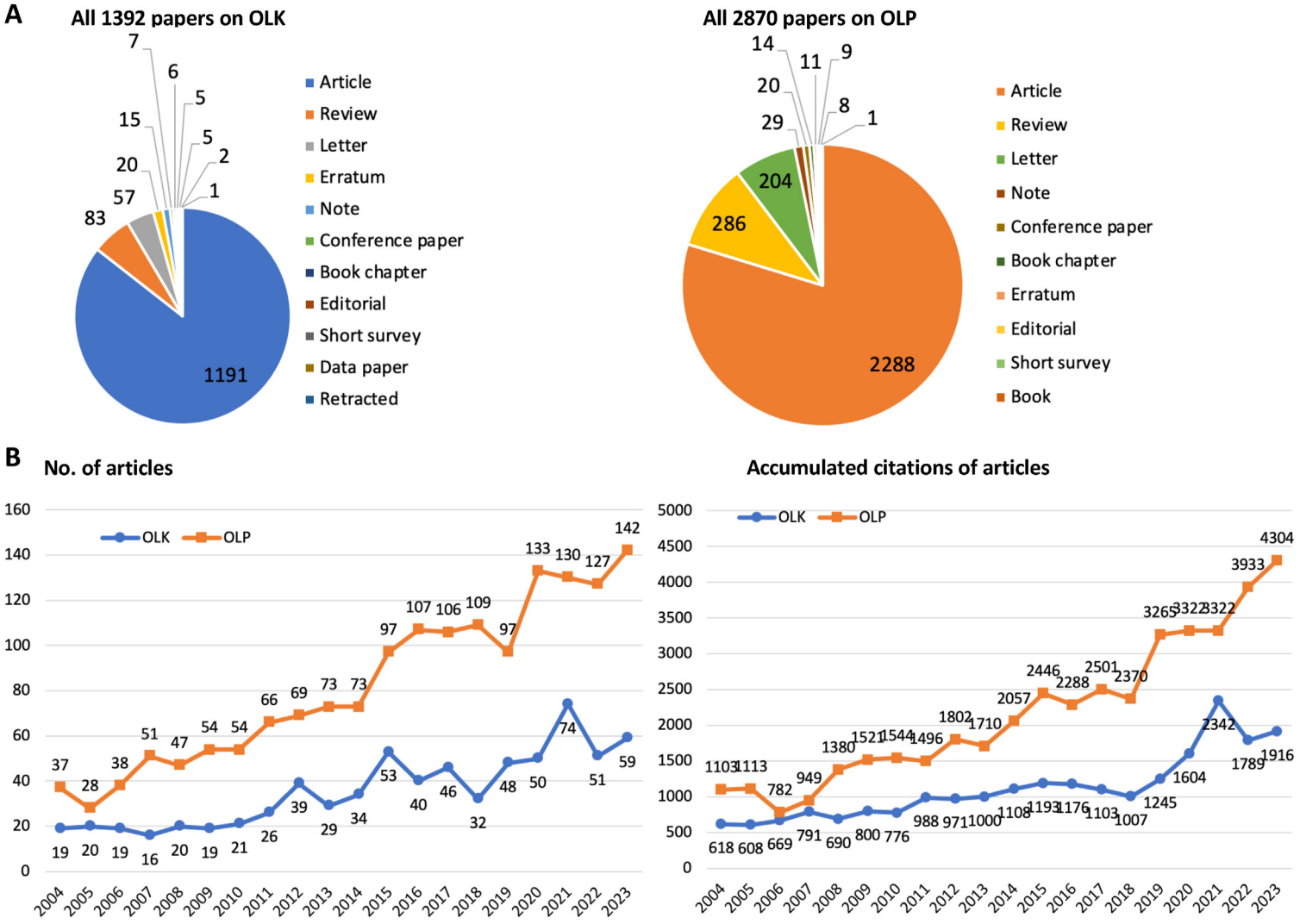

Figure 1 Bibliometric characteristics of the papers on oral leukoplakia (OLK) and oral lichen planus (OLP). (**A**) The types and numbers of the papers. (**B**) The annual number and accumulated citations of the articles during 2004—2023.

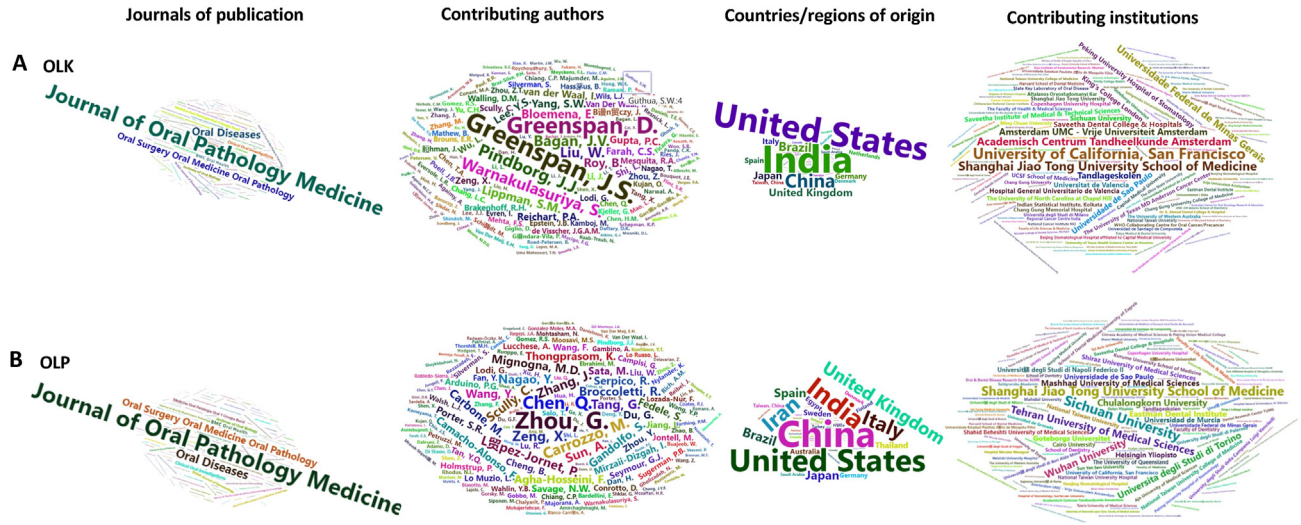

Figure 2 Cloud graphs of journals of publication, contributing authors, institutions, and countries/regions of origin from the articles on (**A**) oral leukoplakia (OLK) and (**B**) oral lichen planus (OLP). The font size indicates the number of articles; a larger size means more articles in the cloud graphs.

Research characteristics of OLK versus OLP

Based on the frequency of keywords in all included articles, the keywords were automatically recognized in the order of highest to lowest frequency in the Scopus database. Fig. 3A displays cloud graphs of the common shared keywords retrieved in the articles on OLK and OLP. Common keywords, such as controlled study, pathology, histopathology, immunohistochemistry, protein expression, metabolism, genetics, and squamous cell carcinoma were similar in the articles on OLK and OLP. Fig. 3B shows cloud graphs of distinctive research keywords. For OLK research, oral cancer-related cancer risk, cancer diagnosis, carcinogenesis, prognosis, tumor marker, e.g. protein P53 and Ki-67, DNA, cytology, hyperplasia, hyperkeratosis, risk assessment, e.g. tongue site, candidiasis, tobacco and alcohol consumption were distinctive frequent keywords. For OLP research, drug efficacy, immunosuppressive agents, e.g. corticosteroid, triamcinolone acetonide, tacrolimus, and glucocorticoids, inflammation-related T lymphocyte, lymphocytic infiltration, blood, keratinocyte, cytokines, e.g. gamma interferon, tumor necrosis factor, and interleukin 6,

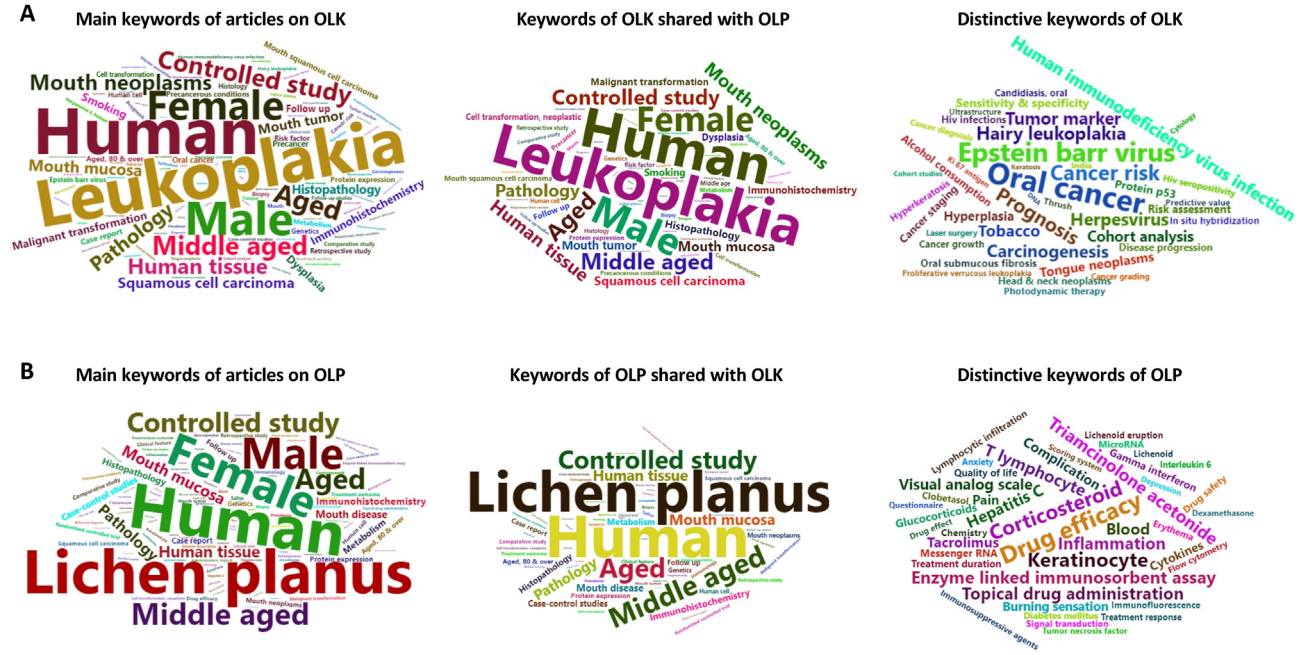

Figure 3 Cloud graph of the keywords of the articles on (**A**) oral leukoplakia (OLK) and (**B**) oral lichen planus (OLP). The font size indicates the number of articles; a larger size means more articles in the cloud graphs.

complication, e.g. hepatitis C and diabetes mellitus, RNA (messenger RNA, microRNA), and scoring system-related visual analog scale, pain, anxiety, quality of life, depression, and questionnaire were distinctive frequent keywords.

Discussion

A previous bibliometric analysis, which searched in article titles, abstracts, and keywords for all documents containing oral leukoplakia/erythroplakia until December 2016 using the Scopus database, provided a descriptive overview of the global research activity on OLK.[8] Our previous analysis, which searched in article titles and abstracts for the documents until March 2019, provided a bibliometric analysis of only top-100 most-cited papers on undistinguished OPMD.[9] The current study, which focused on searching in article titles for all documents containing OLK or OLP until July 2024 using the Scopus database, provided a scientometric and comparative analysis of the studies on two diseases, with emphasis on the analysis of the keywords that can reflect research directions and topics of concern. This study will help in evaluating the historical citation and characteristics in the field of OLK and OLP that have undergone scientific evolution over the past decades. And we hope to improve in reciprocal collaboration and communication for investigations on two diseases.

The WHO workshop mentioned that OLK was among the most common and most studied OPMD encountered in clinical practice and in population surveys.[1] According to the recent systematic review and meta-analysis, the global prevalence and of OLK and OLP was reported to be 1.39—3.41% and 0.74—1.32%, respectively.[10,11] The malignant transformation rate of OLK and OLP was reported to be 7.9—11.7% and 0.44—1.2%, respectively.[12,13] Besides, the prevalence of oral submucous fibrosis among areca nut chewers was reported to be 3—8%, and its malignant transformation rate was reported to be 4.2—6.0%.[14,15] Nevertheless, areca nut/betel quid chewing is of obviously distinct regional characteristic, mostly focusing on South and Southeast Asia.[6,7] Hence, the overall prevalence and malignant transformation rate of OLK should be higher than other types of OPMD, underpinning OLK was among the most common and important OPMD encountered in population surveys. In clinical practice, OLP as a chronic inflammatory disorder of unknown etiology with characteristic relapses and remissions, often have a more protracted clinical course despite various available treatments.

It is noteworthy that we compared the scientific output and research characteristics of studies on OLK and OLP. First, we observed that both number and citations of articles on OLP greatly outweigh those of the articles on OLK, suggesting OLP but not OLK was the most studied OPMD. This is mainly because more than half of articles on OLP investigated the inflammatory immune aspect except malignant potential aspect; While the great majority of articles on OLK only focused on malignant potential aspect. Secondly, the analysis of keywords revealed that cancer risk assessment, carcinogenesis, and tumor markers remain the main topics of OLK research.[16,17] Whereas inflammatory immune, pathogenesis, and drug therapy aspects were the important topics of OLP research.[18—20] Risk factors of tongue site, candidiasis, tobacco and alcohol consumption were more frequently mentioned by investigators of OLK. While complications, e.g. hepatitis C and diabetes mellitus, were mainly mentioned by investigators of OLP. Besides, cohort analysis/study, laser surgery, and photodynamic therapy were more frequent in studies on OLK. Whereas scoring system and quality of life aspects were more common in studies on OLP. These suggest that there could be mutual learning the management strategies regarding OLK and OLP research.

In summary, this study was the first comprehensive report of the scientometric characteristics of OLK and OLP research. Our findings elucidated the comprehensive identification and recognition of the important and relevant research topics concerned, and encouraged more studies in the field of OLK and OLP to refine management strategies of these diseases.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jds.2024.08.025.

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