

Research trends and characteristics of oral lichen planus

A bibliometric study of the top-100 cited articles

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Abstract

Background: Bibliometric analysis highlights the key topics and research trends which have shaped the understanding and management of a concerned disease. The objective of this study was to identify and characterize the most-cited articles on oral lichen planus (OLP), and highlight the analysis of key topics and research trends.

Methods: A comprehensive search was performed and identified in the Scopus database from 1907 to 5 March 2019 for the top-100 most-cited articles on OLP.

Results: The number of citations of the 100 selected articles varied from 101 to 570, with a mean of 178.7 citations per article. Malignant potential, immunopathogenesis, and topical drug therapy were the top-3 study topics, and the majority of high-quality articles were the research of the 3 topics. Journal of Oral Pathology and Medicine (n=19) and Oral Surgery Oral Medicine Oral Pathology Oral Radiology (n=14) were 2 journals with the most articles published. Both van der Waal I. and Scully C. were the most frequently contributing authors (n=9). United States (n=27) and Academic Centre for Dentistry Amsterdam (n=7) was the most contributing country and institution, respectively. Systematic reviews (n=2), randomized controlled trial (n=1), cohort studies (n=17) were study designs with higher evidence level, but the large majority (n=80) were considered lower level.

Conclusions: The results of this first citation analysis of the 100 most cited articles on OLP provide a historical perspective on scientific evolution, and suggest further research trends and clinical practice in the field of OLP.

Abbreviations: EBM = evidence-based medicine, HCV = hepatitis C virus, IF = impact factor, JCR = Journal of Citation Reports, OLP = oral lichen planus.

Keywords: bibliometric, citation analysis, most cited, oral lichen planus

1. Introduction

Oral lichen planus (OLP) is a relatively common chronic inflammatory mucocutaneous disease of probable immune-based aetiology, mainly involved oral mucosa.^[1,2] There are current controversies surrounding OLP, including etiopathogenesis, malignant transformation and diagnostic criteria used.^[3] Despite it is classified as a potentially malignant disorder by the World

Health Organization, it is still a controversy on malignant transformation ranging from 0 to 9.52%.^[3] Besides, OLP has a protracted clinical course despite various available treatments,^[4] with a substantial negative impact on the patients' quality of life.^[5] And many different diseases have been associated to OLP (i.e., hepatitis C virus (HCV) infection and diabetes).^[2] Given these challenges, the significance of OLP research is highly

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regarded in the field, and increasingly large number of articles related OLP have been published.^[6] It might be possible that clinicians and researchers do not always tend to evaluate the quality of articles, and might encounter some difficulties to recognize the major research areas of the concerned field.

Citation analysis is the area of bibliometrics that utilizes citation data to evaluate the academic influence of an article in its particular field.^[7] It is a definitely useful tool that the frequency and pattern of citations are objective parameters for evaluating the scientific performance within the designated area.^[8] The topics, study design, and levels of evidence-based medicine (EBM) of highly cited articles may influence the trends in clinical practice and further research.^[9–11] The number of citations of an article usually indicates the interest of the researchers on using the data to perform their own studies. A bibliometric analysis enables researchers to identify study hotspots and to explore the updated insights into a particular field.^[7,8] In addition, citation rating of articles significantly recognizes authors, institutions and countries of origin, and journals within a particular scientific community.^[7,8]

Top-cited articles and citation analyses have been reported in oral cancer,^[12] leukoplakia/erythroplakia,^[13,14] oral submucous fibrosis,^[15] periodontology,^[16] and immune-inflammatory diseases.^[17,18] However, no citation analysis of this type have yet been published on OLP, being a relatively common disease with inflammatory immune and potentially malignant nature. In the present study, we therefore identified the top-100 most cited articles on OLP and analyzed the characteristics, including the number of citations, topic, study design, evidence level, authorship, year of publication, contributing institution as well as country of origin. It is noteworthy that we would highlight the analysis of key topics and research trends of OLP.

2. Materials and methods

2.1. Data source

As per the used in previous studies on oral leukoplakia and submucous fibrosis,^[13–15] we used the Scopus citation index to obtain citation information about published articles on OLP. Using query string “*TITLE-ABS-KEY (oral AND lichen AND planus)*” for search strategy, we searched in the Scopus database up to 5 March 2019. There was no restriction in the search regarding publication year, language, or study design and type of the articles. With the mentioned search strategy, 5346 articles on OLP were published since its inception in 1907. The articles were categorized in descending order based on their number of citations. The titles and abstracts or full texts of these articles were screened and reevaluated to assure their relevance to OLP. In cases of articles with the same number of total citations, the articles with higher citation density (citations per year) were positioned higher in the ranking. This study did not require any human/animal subjects to acquire ethics committee approval.

2.2. Data extraction

A list of top-100 articles was created by sorting among all the retrieved articles according to the number of citations in descending order. All the articles were reviewed and recorded the following information: authorship, publication title, publication year, number of citations, citation density, journal and its impact factor (IF, 2017 Journal of Citation Reports (JCR): Science Edition), institution and country of origin of the first

author, study type, study design, and level of evidence. Articles were classified as primary research studies (epidemiological, basic, or clinical) or secondary research (narrative review, systematic review or meta-analysis). Study design was classified as clinical trial, cohort study, case-control study, cross-sectional study, case series, basic study. As per the method used in previous studies on oral cancer^[12] and submucous fibrosis,^[15] the evidence level of the article was analyzed using the classification proposed by the Oxford Centre for Evidence-Based Medicine (<http://www.cebm.net/index.aspx?o=5653>). Two independent authors (WL and CS) carried out the screening and subsequent analysis of the articles. In case of discrepancy, the opinion of a third author (CL) was requested to achieve consensus.

3. Results

3.1. Characteristics of articles included

With the search strategy algorithm, 5346 articles on OLP were searched in the Scopus database for the period 1907 to the time of the search. From the collection, the top 100 most cited articles published from 1968 to 2017 were identified and their various characteristics analyzed. The total number of citations and that after removal of self-citations was 17,873 and 16,923, respectively. The overall *h* index and *h* index after removal of self-citations was 100 and 96, respectively. The mean number of citations was 178.7, with a range of 101 (article rank No. 100) to 570 (article rank No. 1). The top-5 articles were each cited more than 400 times, which were involved to 3 different study topics of malignant transformation, drug therapy, and pathogenesis. The whole information on ranking, author, title, year and journal of publication, number of citations, citation density, and journal IF of the each included article on OLP is shown in supplemental Table S1, <http://links.lww.com/MD/D553>.

3.2. Topic and type of study, study design, and evidence level of the articles included

The number of articles and citation density by year of publication and study topic and is shown in Figure 1. Malignant transformation (33 articles), etiology and etiopathogenesis (25 articles), treatment (13 articles), epidemiology (9 articles), lichenoid lesions or reactions (5 articles), and molecular markers/targets of oral carcinogenesis (9 articles) were the main study topics. There were 58 primary research articles, 39 narrative review articles, 2 systematic review or meta-analysis and 1 case report. Cohort study of follow-up outcome (17 articles) was the majority subcategory of malignant transformation topic. Inflammatory immune (10 articles) and HCV (4 articles) were the majority subcategories of etiology and etiopathogenesis. Drug therapy (10 articles) was the majority subcategory of treatment topic. With regard to the evidence level, 2 systematic review were considered evidence level 1 and only one RCT article was considered evidence level 2. The 17 cohort studies were considered evidence level 3, and the other 80 articles were considered lower level.

3.3. Authors, institution and country of origin, and journal of publication

The most influential authors, institutions and countries of origin within a particular scientific community are often recognized in the most cited articles. The top-3 contributing authors were van

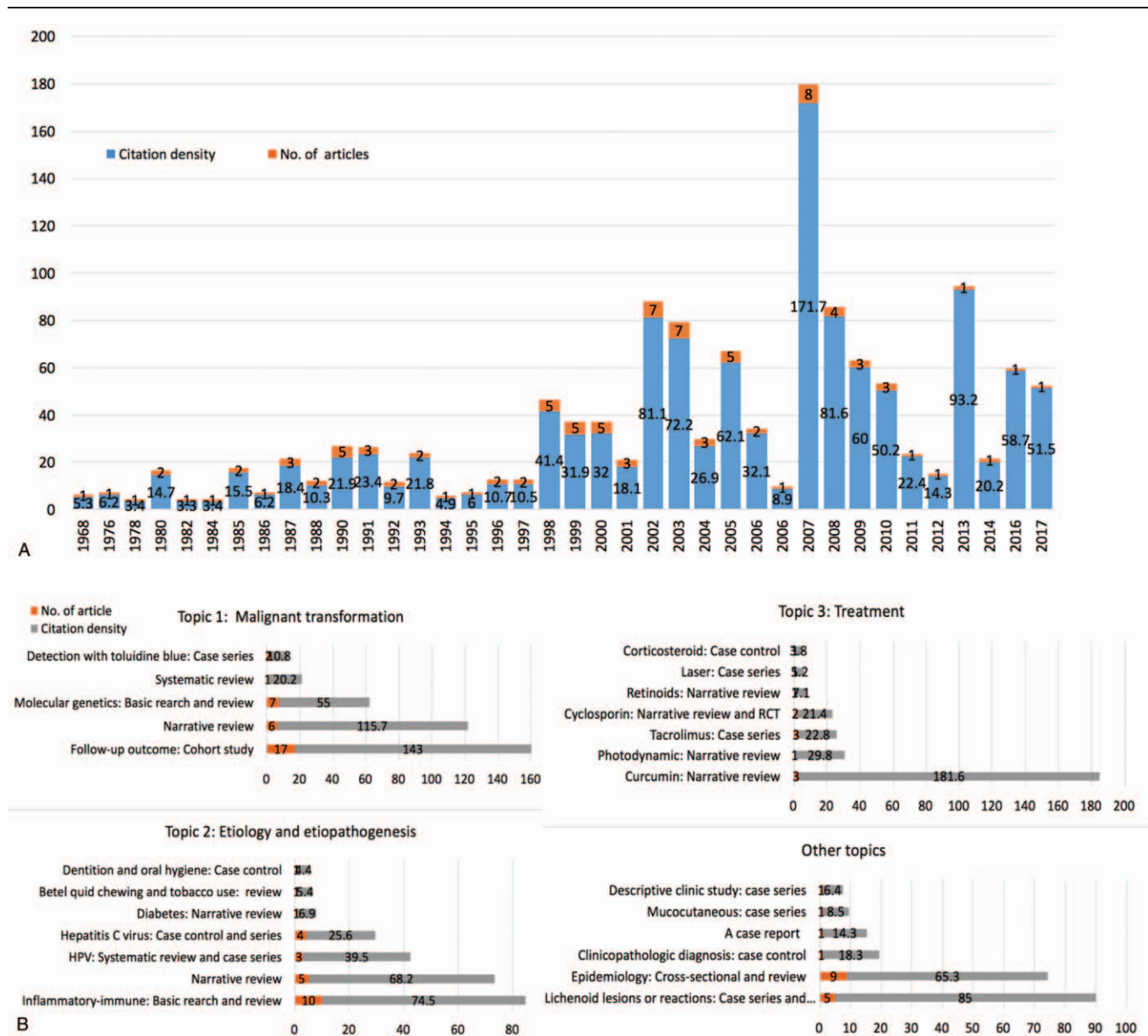


Figure 1. The number of the top-100 cited articles and citation density on oral lichen planus by year of publication and study topic.

der Waal I. (9 articles), Scully C. (9 articles), and Carrozzo M. (8 articles). The detailed information on authors (first Author, coauthor, and last author) with at least 4 articles included in the 100 most cited articles was showed in Table 1. The top-4 contributing countries were United States (27 articles), United Kingdom (12 articles), Italy (10 articles), and Netherlands (7 articles). The top-4 contributing institutions were Academic Centre for Dentistry Amsterdam (7 articles), School of Dentistry, University of California (4 articles), Eastman Dental Institute (4 articles), and School of Medicine and Dentistry, University of Turin (4 articles). The detailed information on countries and their institutions of origin with at least 3 articles of the 100 most cited articles showed in Table 2.

The top 100 articles were published in different scientific 41 journals. The journal of publication with largest number was Journal of Oral Pathology and Medicine (19 articles), followed

by Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology (14 articles), Oral Oncology (6 articles), and Oral Diseases (6 articles). There were 73 articles published in the journals with at least 2 articles in top 100 list. The detailed information on period of publication, the name and IF of these journals with at least 2 articles in the most cited articles showed in Table 3. It is particularly noteworthy that one RCT article entitled “Effect of topical cyclosporine rinse on oral lichen planus: a double-blind analysis” and one case of LP report published on the rank No. 2 New England Journal of Medicine (IF=79.258, 2017 JCR).

4. Discussion

Bibliometric analysis helps in evaluating the historical perspective and research trends in the targeted field which has undergone changes over the decades.^[9-11] It is well known that both IF of

Table 1**Authors with at least 4 articles included in the 100 most cited articles on oral lichen planus.**

Rank	Name	First Author	Coauthor	Last Author	Total
1	van der Waal, I.	4	0	5	9
2	Scully, C.	3	5	1	9
3	Carrozzo, M.	2	5	1	8
4	Axéll, T.	2	2	1	5
5	Thongprasom, K.	1	1	3	5
6	Sugerman, P.B.	1	3	1	5
7	Eisen, D.	4	0	0	4
8	Van der Meij E.	4	0	0	4
9	Walsh, L.J.	2	2	0	4
10	Gandolfo, S.	1	2	1	4
11	Broccoletti, R.	0	3	1	4
12	Holmstrup, P.	1	3	0	4
13	Lozada-Nur, F.	0	2	2	4
14	Savage, N.W.	0	4	0	4

Table 2**Countries and their institutions of origin with at least 3 articles of the 100 most cited articles on oral lichen planus.**

Rank	Country with at least 3 articles	No. of articles total n=85	Institution with at least 2 articles	No. of articles total n=28
1	United States	27	School of Dentistry, University of California, San Francisco	4
			Dermatology Research Associates, Cincinnati	3
2	United Kingdom	12	Eastman Dental Institute	4
			Bristol Dental Hospital and School	3
3	Italy	10	School of Medicine and Dentistry, University of Turin	4
4	Netherlands	7	Academic Centre for Dentistry Amsterdam (ACTA)	7
5	Sweden	6		
6	Japan	4		
	France	4		
8	Malaysia	3	Faculty of Dentistry, University of Malaya	3
	India			
	China (Taiwan and mainland)			
	Germany			
	Denmark			

Table 3**Journals with at least 2 articles in which the 100 most cited articles on oral lichen planus were published.**

Rank	Journal (abbreviated name)	Impact factor (2017 JCR)	No. of articles total n=73	Period of publication (No. of articles)
1	J. Oral Pathol. Med.	2.237	19	1970s (1), 1980s (3), 1990s (6), 2000s (8), 2010s (8)
2	Oral Surg. Oral Med. Oral Pathol.	1.718	14	1960s (1), 1980s (2), 1990s (6), 2000s (5)
3	Oral Oncol.	4.636	6	2000s (5), 2010s (1)
	Oral Dis.	2.31	6	2000s (5), 2010s (1)
5	J. Am. Acad. Dermatol.	6.898	5	1990s (2), 2000s (3)
6	Community Dent. Oral Epidemiol.	1.992	4	1980s (3), 1990s (1)
7	Arch. Dermatol.	NA	3	1990s (2), 2000s (1)
8	Crit. Rev. Oral Biol. Med.	NA	3	1990s (1), 2000s (2)
9	J. Am. Dent. Assoc.	2.486	3	2000s (2), 2010s (1)
10	New Engl. J. Med.	79.258	2	1990s (1), 2010s (1)
	Antioxid. Redox Signal.	6.53	2	2000s (2)
	Br. J. Cancer	5.922	2	1980s (1), 1990s (1)
	Drugs	4.69	2	1980s (1), 1990s (1)
	Br. J. Oral Maxillofac. Surg.	1.26	2	2000s (2)

publication journal and citation rating of an article are the major determinants for evaluating the influence of an article.^[19] To the best of our knowledge, there is not available report concerning citation of articles on OLP in literature. This is the first study that evaluated the characteristics of the 100 most cited articles on OLP, being a relatively common disease with inflammatory immune and potentially malignant nature.

Journals with high IF are attracted by authors in selecting for their high-quality papers, whereas speciality journals are also selected to publish their high-quality articles over general medical journals.^[16] In the present study, we noted that 19 of 100 most cited articles were published in 14 journals with high IF > 5, such as *New England Journal of Medicine*, *Blood*, *Hepatology*, *International Journal of Cancer*, *European Journal of Cancer*, *Journal of the American Academy of Dermatology*, *Journal of Investigative Dermatology*. It is noteworthy that the majority of those high-quality articles were the research of topical drug therapy, malignant potential, and etiopathogenesis, which may indicate a trend in clinical practice. Besides, 81 articles were published in 33 journals with IF < 5; the journals with largest number (rank 1–4) were the speciality journals (Table 3). This demonstrates that the researchers follow these 4 journals most frequently for achieving information on OLP.

All the articles included in this analysis were published in English language. The majority of articles included were published by authors and institutions in the United States (n = 27), in agreement with the results of the relevant studies on oral cancer and leukoplakia.^[12,13] United States has a strong influence on research in the health sciences; this can be attributed to the high level of financial grant support given to research in that country and a large number of American researchers.^[12] Indeed, the United States is the leading country for medical research publications.

In our bibliometric analysis, we highlighted the analysis of the topic, type of study, study design, and level of EBM of the 100 most cited articles on OLP, so as to guide the trends in future research and clinical practice. The results of this bibliometric analysis revealed that research trends of OLP were topics on malignant potential, immunopathogenesis, and topical drug therapy of OLP, due to the majority of the most cited articles and high-quality articles were the research of the 3 topics.

The largest number of the most cited articles classified by topic was the controversy of malignant transformation (n = 33), which may reflect the most importance among OLP research. Although Holmstrup concluded the controversy of premalignant potential was over,^[21] there was no case of malignant transformation observed thereafter in two follow-up cohort studies.^[3] Collectively, OLP is associated with an increased risk of progression to oral cancer with an overall rate of malignant progression of 1.40% (range, 0–9.52%).^[3] As for etiopathogenesis, the growing evidence about this disease suggests certain inflammatory immune response patterns. Moreover, there is convincing evidence that, at least in some geographic regions, OLP is associated with HCV infection.^[2]

In recent era, great importance has been given to EBM, and efforts are being made to improve the quality of research.^[20] However, the large majority of the most cited articles in the field of OLP had a low evidence level; and a couple of these articles, 2 systematic reviews and one RCT, had a high evidence level. Interestingly, the aim of this RCT was research of drug therapy of OLP published in *New England Journal of Medicine*. Besides, 10 (76.9%) of 13 treatment articles were drug therapy, such as tacrolimus (n = 3), curcumin (n = 3), and cyclosporine (n = 2).

Steroids and these agents have been recommended and used in the treatment of OLP, but strong evidence on their effectiveness is lacking.^[4] Therefore, more RCTs with large sample size, adequate duration of treatment and follow-up are required for clinical utility in OLP patients. These emphasize the impact of the topic of the article, their quality and their relevance to further research and clinical practice.

We are aware of certain limitations in the bibliometric analysis on OLP, although we attempted to minimize the potential defects. First, we used only Scopus database rather than other different databases for analysis, because the advantage of Scopus database can automatically exclude self-citing for citation analysis. And Scopus offers more coverage and provides results of more consistent accuracy for citation analysis compared to other databases.^[22,23] Second, citation counts do not directly reflect quality of an article but enable a quantitative evaluation of the scientific impact of an article in a designed field. Authors tend to cite previous highly cited articles independently of content and quality through snowball effect. Thirdly, there is definite time effect in bibliometric analysis, but we have calculated citation density of each article which explains their scientific impact annually.

5. Conclusion

The current study for the first time reported the characteristics of the top-100 most cited articles on OLP. The results of this study not only provide a historical perspective on scientific evolution but also suggest research trends of key topics and clinical practice in the field of OLP. We believe that the list of top-cited articles presented herein will definitely be the important source information for researchers and clinicians. We hope that the recent era of EBM will influence the quality of articles in OLP research.

Author contributions

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Writing – original draft: Wei Liu.

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