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Original Article

The scientometric characteristics of cheilitis researched by multidisciplinary specialists: A comparative study

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Abstract *Background/purpose:* Cheilitis is a relatively common lip disease with many etiologies and causes including concomitant mucocutaneous or systemic diseases, which needs multidisciplinary communication. The purpose of this study was to compare the scientometric characteristics of cheilitis publications by multidisciplinary specialists.

Materials and methods: All the papers on cheilitis were comprehensively retrieved from the Scopus database, and divided into three groups (dermatologists, stomatologists, and other scholars).

Results: There were 478 and 241 papers on cheilitis published by dermatologists and stomatologists, respectively. The total citation count was 5838 and the *h* index was 36 for cheilitis publications by dermatologists, and the total count was 2983 and the *h* index was 27 for cheilitis publications by stomatologists. Interestingly, we observed that dermatologists preferentially concerned contact cheilitis/dermatitis and plasma cell cheilitis, while stomatologists preferentially concerned cheilitis-related lip neoplasms including squamous cell carcinoma, dysplasia, and precancerous conditions. The most common disorder researched by both dermatologists and stomatologists was actinic cheilitis. The keywords such as patch test, cosmetic, edema, drug efficacy, toothpaste, lipstick, allergens, and granulomatous inflammation were common in dermatologists' publications; while the keywords such as protein expression, metabolism, risk factor, prevalence, malignant transformation, and carcinogenesis were common in stomatologists' publications.

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Conclusion: This study for the first time reported the scientometric characteristics of cheilitis as an interdisciplinary disease researched by specialists. It highlights that cheilitis-related specialists through reciprocal collaboration and communication will improve the patients' outcomes. © 2023 Association for Dental Sciences of the Republic of China. Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Cheilitis is a term describing a group of lip inflammatory lesions with various etiologies. It occurs relatively common and includes various clinical types, i.e. angular, actinic, contact, exfoliative, glandular, granulomatous, plasma cell, simplex, and so on.¹ This disease can appear as an isolated condition or as part of certain systemic diseases or comorbidities. Moreover, cheilitis can also be seen in some mucocutaneous diseases such as lichen planus, lupus erythematosus, atopic dermatitis, and candidiasis. According to the classification by Lugović-Mihić et al.,² the cheilitis can be classified as mainly reversible (transient), mainly irreversible (persistent), and cheilitis associated with particular dermatoses and systemic diseases. Reversible cheilitis includes mostly milder types of cheilitis, which often significantly regresses following elimination of the etiologic factors. Irreversible cheilitis are persistent and resistant to treatment, which usually requires histological biopsy. The third type of cheilitis contains inflammatory lip changes related to specific mucocutaneous or systemic diseases.²

Generally, the diagnosis and treatment of cheilitis are conducted by dermatologists and stomatologists. When diagnosing and managing the third type of cheilitis, the approach needs to be interdisciplinary and should include dermatologists, stomatologists, and also specialists in internal medicine and psychiatry.^{1,2} Professionals from different specialties can come to a conclusive diagnosis by additional specific diagnostics. It is important to have in mind that the approach to a patient with cheilitis includes, apart from local lip conditions, other related conditions such as some granulomatous diseases (e.g., Melkersson-Rosenthal syndrome and sarcoidosis), nutritional deficiencies (e.g., anemia due to iron/vitamin B12 deficiency), and gastrointestinal diseases (e.g., celiac disease and Crohn disease).^{1,2} Given the complex and numerous conditions of diagnosing and treating an interdisciplinary disease, increasingly large number of papers regarding cheilitis have been published. The papers published by

different specialists preferentially represent the scientific output and concerns of the same disease.

Scientometrics is a useful tool that utilizes bibliometric and citation data to assess scientific output within the designated area.^{3–7} Herein, we hypothesized that there might be different scientific output of cheilitis research by different specialists. Therefore, the objective of this study was to compare the scientometric characteristics of cheilitis publications by different specialists (dermatologists, stomatologists, and other scholars), so as to promote mutual understanding and reciprocal cooperation regarding this interdisciplinary disease in various specialists.

Materials and methods

Based on the methodology described previously,^{3–5} we searched the literature up to 23 Jun 2023 from the Scopus database according to the search strategy (Table 1). We used medical subject term "cheilitis" in the Title to retrieve all the papers on cheilitis, without restriction to language, type, and year of publication. In clinical practice, dermatologists and stomatologists generally belong to the dermatology and stomatology affiliation, respectively. Hence, the papers with the word ("derm*") and (dent* OR oral OR stomatolog*) in the affiliation generally represent scientific output of dermatologists and stomatologists, respectively. In literature search, the asterisk indicates a wildcard used to search for all endings including fifth or more root words. The papers without both 2 terms concurrently in the affiliation represent scientific output of other scholars. Then, cheilitis publications by dermatologists, stomatologists, and other scholars were retrieved, respectively. The scientometric characteristics of all the eligible papers were reviewed and recorded the following information: publication year, title, keywords, citation count, paper type, authorship, journal of publication, affiliation, and country/region of origin. Data search and extraction were performed independently by two investigators (X.G. and W.L.), and discrepancy of results was resolved in a consensus symposium. The Bibliometrix

Table 1 The search strategy used in the Scopus database.

Literature on cheilitis retrieved	Search strategy
All the papers on cheilitis	TITLE (cheilitis)
Cheilitis publications only by dermatologists	((AFFIL (derm*) AND TITLE (cheilitis))
Cheilitis publications only by stomatologists	((AFFIL (dent* OR oral OR stomatolog*) AND TITLE (cheilitis))
Cheilitis publications by other scholars	TITLE (cheilitis) AND NOT (AFFIL (derm*)) AND NOT (AFFIL (dent* OR oral OR stomatolog*))

Biblioshiny R-package software (<https://www.bibliometrix.org/home/>; K-Synth Srl Inc., Naples, Italy) was used to analyze the relevant bibliometric data.

Results

Citation characteristics

With the search strategy algorithm, a total of 478 and 241 papers on cheilitis were published by dermatologists and stomatologists, respectively. Meanwhile, there were 433

cheilitis publications by other scholars. Fig. 1A illustrates the number and distribution of the paper types. The total citation count was 5838 and the h index was 36 for cheilitis publications by dermatologists, and the total count was 2983 and the h index was 27 for cheilitis publications by stomatologists (Fig. 1B). Besides, the total count was 2475 and the h index was 26 for cheilitis publications by other scholars. The detailed information on publication year, title, journal, citation count, authors, affiliation, keywords, and document types of all the papers are presented in Supplementary Tables S1–S3.

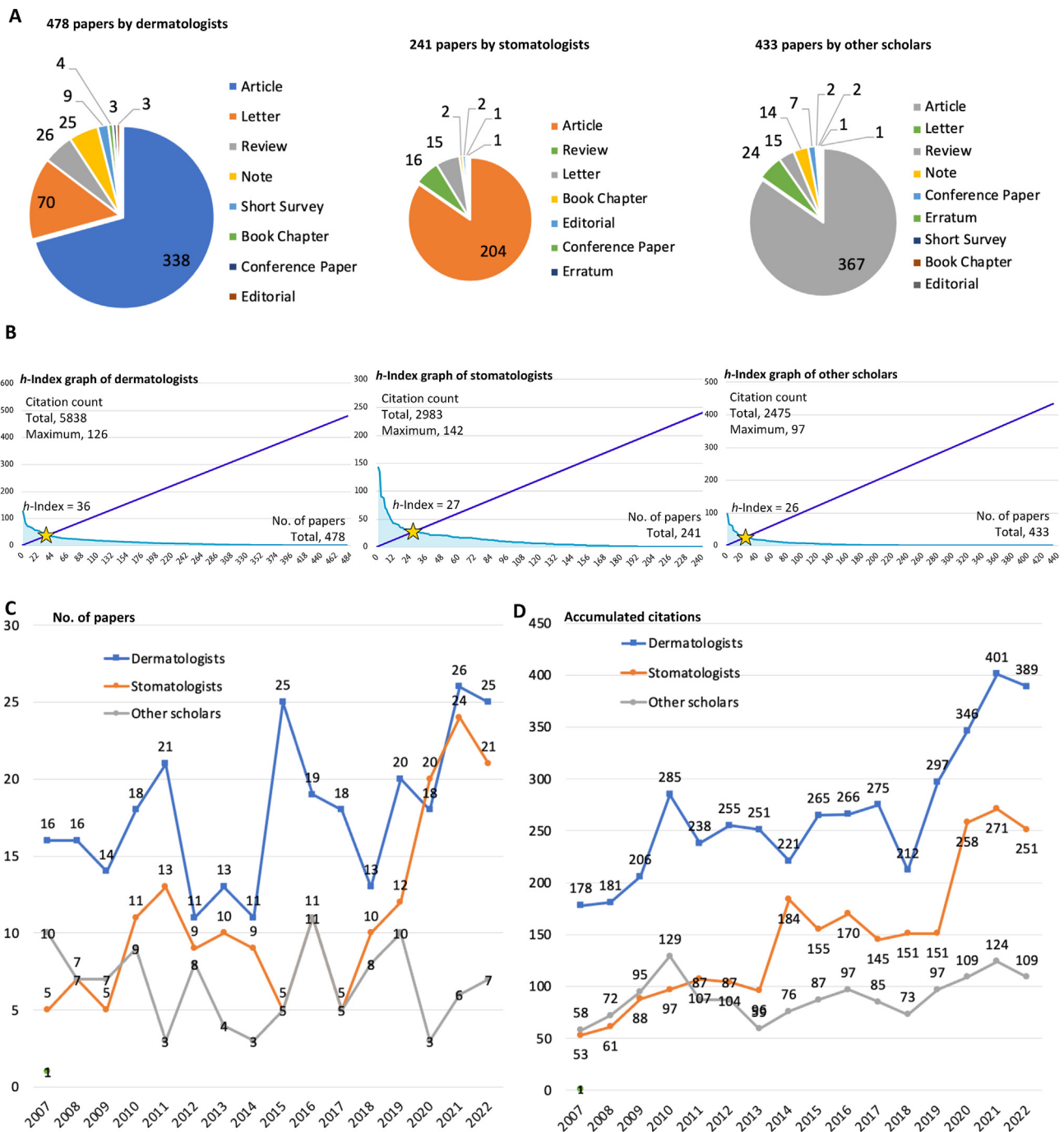


Figure 1 Citation characteristics of the papers on cheilitis. (A) Document types and distribution. (B) The h -Index graphs. (C) The annual number of the papers during 2007–2022. (D) The accumulated citations of the papers during 2007–2022.

To further concretize the trends of scientific output in cheilitis research field, we assessed the annual number and accumulated citation count of the papers during 2007–2022. The annual number of the publications by dermatologists stably changed between 11 and 26 during 2007–2021 (Fig. 1C), and the accumulated citations of their papers increased from 178 to 389 during this period (Fig. 1D). The annual number of the publications by stomatologists changed between 5 and 21 during 2007–2021, and the accumulated citations of their papers increased from 53 to 251 during this period. Besides, the number of publications by other scholars was changed between 3 and 11 during 2007–2021; while the accumulated citations of their papers changed between 58 and 129 during this period.

Bibliometric characteristics

The cloud graphs of journal names, contributing authors, institutions, and countries/regions are showed in Fig. 2. For dermatologists studying cheilitis, the journal with largest number was *Contact Dermatitis* ($n = 66$), followed by *Journal of the European Academy of Dermatology & Venereology* ($n = 22$) and *Journal of the American Academy of Dermatology* ($n = 21$). The contributing author with largest number of papers was Sotiriou, E. ($n = 7$), followed by Lourenço, S.V. ($n = 6$) and Apalla, Z. ($n = 5$). The contributing institution with the maximum number was Universidade de São Paulo ($n = 12$), followed by Aristotle University of Thessaloniki ($n = 8$) and Università degli studi di Bari Aldo Moro ($n = 8$). The country of origin with largest number of papers was United States ($n = 82$), followed by Japan ($n = 51$) and Spain ($n = 43$).

For stomatologists studying cheilitis, the journal with largest number was *Oral Diseases* ($n = 18$) and *Oral Surgery Oral Medicine Oral Pathology Oral Radiology* ($n = 18$), followed by *Journal of Oral Pathology & Medicine* ($n = 12$) and *International Journal of Dermatology* ($n = 7$). The contributing author with largest number of papers was Hayashi, Y. ($n = 56$), followed by Saito, I. ($n = 40$) and Tsubota, K. ($n = 39$). The contributing institution with the maximum number was Universidade de São Paulo ($n = 27$), followed by Universidade Federal do Rio Grande do Norte ($n = 15$) and Universidade Estadual Paulista Júlio de Mesquita Filho ($n = 10$). The country of origin with largest number of papers was Brazil ($n = 77$), followed by United States ($n = 33$) and China ($n = 19$).

For other scholars studying cheilitis, the journal with largest number was *British Dental Journal* ($n = 11$) and *Vestnik Dermatologii i Venerologii* ($n = 11$), followed by *Archives of Dermatology & Syphilology*, *British Journal of Dermatology* and *Contact Dermatitis* (all $n = 9$). The contributing author with largest number of papers was Kutin, S.A. ($n = 4$) and Mashkilleison, A.L. ($n = 4$), followed by Freeman, S., Hornstein, O. and Srinivas, C.R. (all $n = 3$). The contributing institution with the maximum number was Universidade de São Paulo ($n = 6$) and Universidade Federal do Rio Grande do Norte ($n = 6$), followed by Charité – Universitätsmedizin Berlin ($n = 4$) and The Ohio State University ($n = 3$). The country of origin with largest

number of papers was United States ($n = 56$), followed by Brazil ($n = 24$) and Germany ($n = 23$).

Research characteristics

Based on the frequency of keywords in all included papers, we highlighted the analysis of research characteristics of cheilitis publications by dermatologists, stomatologists, and other scholars (Fig. 3A). All the keywords were automatically recognized in the order of highest to lowest frequency by the database. The research keywords, related disorders, and drug research were identified. The research keywords such as pathology, histopathology, clinical feature, treatment outcome, sunlight, differential diagnosis, recurrent disease, erythema, and human tissue were relatively common in the publications by the 3-group scholars. For dermatologists, the keywords such as patch test, cosmetic, edema, drug efficacy, toothpaste, lipstick, allergens, and granulomatous inflammation were more common in their publications in comparison with those publications by stomatologists. For stomatologists, the keywords such as protein expression, metabolism, risk factor, minor salivary glands, staphylococcus aureus, prevalence, malignant transformation, and carcinogenesis were more common in their publications in comparison to those publications by dermatologists.

The most of the cheilitis-related disorders such as actinic cheilitis, Melkersson-Rosenthal syndromes, orofacial granulomatosis, cheilitis granulomatosa, and Crohn disease were similar in the publications by the 3-group scholars. The distinctive disorders such as allergic contact cheilitis, contact allergy, contact dermatitis, and plasma cell cheilitis were mainly concerned by dermatologists; whereas the distinctive disorders such as squamous cell carcinoma, angular cheilitis, dysplasia, candida albicans, leukoplakia, and lichen planus were mainly concerned by stomatologists (Fig. 3B). As for therapy options of cheilitis, drug, photodynamic therapy, and laser surgery were reported by the 3-group scholars, and the most 2 common drugs were reported to be corticosteroid and tacrolimus. Interestingly, the drugs such as clofazimine, triamcinolone, imiquimod, metronidazole, hydroxychloroquine, doxycycline, and minocycline were commonly reported in the publications by dermatologists but not by stomatologists. Besides, salazosulfapyridine, nystatin, mesalazine, and azathioprine were also reported in the publications by other scholars but not by stomatologists (Fig. 3C). Overall, drug research was not common in stomatologists' publications.

Discussion

Cheilitis is a lip inflammation that can spread to the surrounding skin and oral mucosa, and may appear as an isolated condition or co-occur with many dermatological, oral, or systemic diseases.^{1,2} Cutaneous concomitant with systemic diseases may also come into play, such as atopic dermatitis, lupus erythematosus, pemphigus, or lichen planus. Hence, the approach to diagnostics of cheilitis can be complicated by many etiologies and causes in practice. Cheilitis is an interdisciplinary disease that involves various



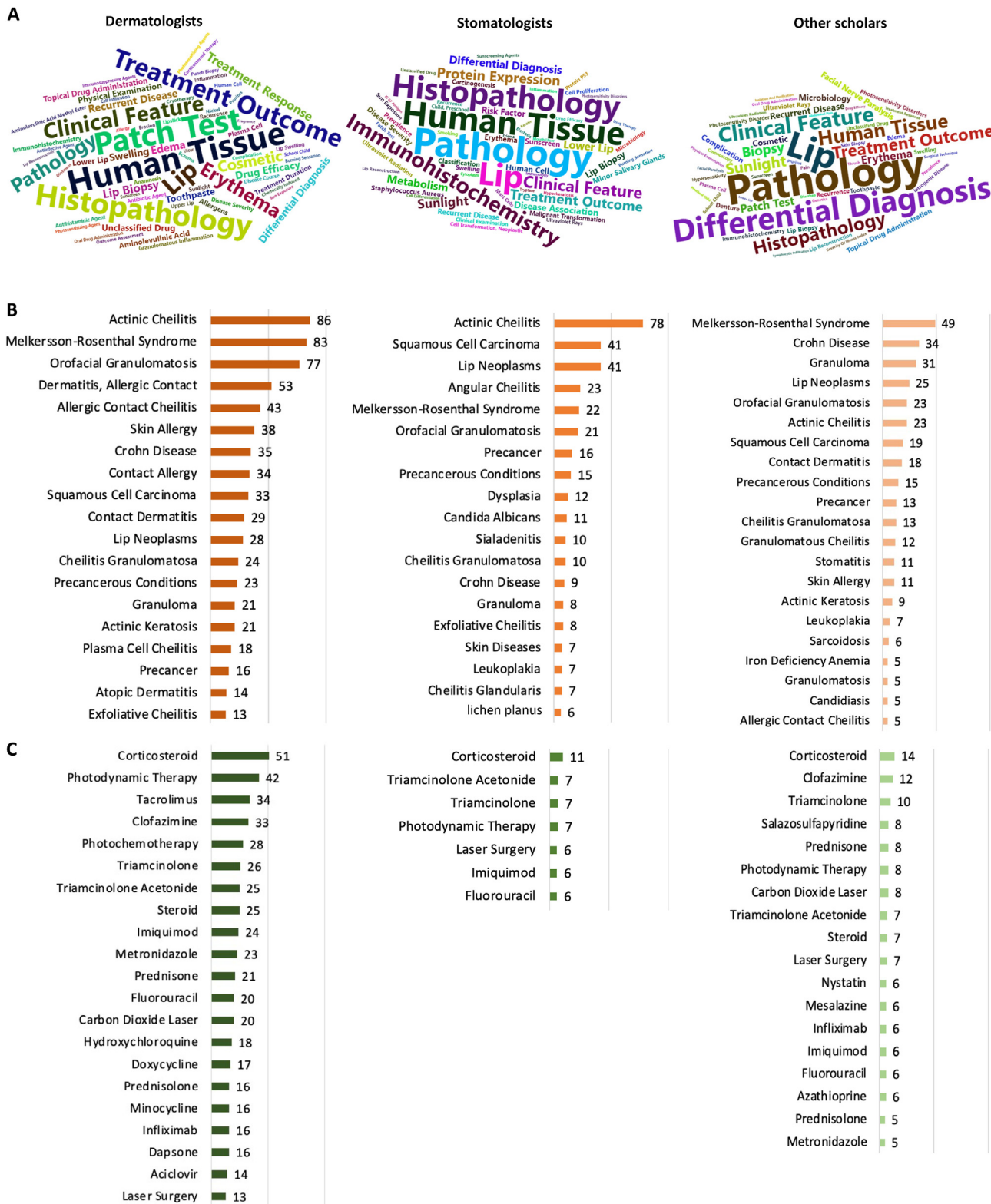


Figure 3 Research characteristics of the papers on cheilitis. (A) Cloud graphs of research keywords. The ranks of (B) cheilitis-related disorders and (C) therapy options.

(ultraviolet radiation) located on the vermillion of the lips, most often on the lower lip.^{8–10} Due to potentially malignant nature, actinic cheilitis should be biopsied to rule out severe dysplasia or squamous cell carcinoma. Also, actinic

cheilitis should be concerned the differential diagnosis of granulomatous cheilitis, glandular cheilitis, or plasma cell cheilitis.^{11–14} These constitute a group of chronic cheilitis types for which diagnoses are usually based on a biopsy and

histopathology. Besides, a dozen of drugs were frequently researched by dermatologists but not by stomatologists, implying whether stomatologists may carry out more related drug investigations.

In correctly diagnosing and managing the different types of cheilitis, it is necessary to be aware that this disease not only appears as an isolated lip condition but also may occur with many dermatological or systemic diseases. Importantly, cutaneous or systemic diseases sometimes begin on oral mucosa involving the lips as first signs, and so an adequate examination of all parts of the oral mucosa, skin and other mucosa is necessary for appropriate management. When approaching patients, the crucial step is getting detailed medical history of the patient with all possible information on the potential mitigating factors. Several factors need to be taken into account, particularly patient undesirable habits (lip licking, frequent sun exposure, lip contact with various substances), general medical history (e.g., detailed cutaneous/systemic diseases and drug use), exposure to external factors (e.g., atopy, contact allergens, weather conditions), the possibility of vitamin or mineral deficiencies, and so on.^{1,2} It is also important to know whether the lesions are persistent or whether they are reversible since irreversible cheilitis demands a different treatment approach.

In summary, this study for the first time comprehensively elucidated the scientometric characteristics of cheilitis as an interdisciplinary disease researched by specialists. Complete medical history, clinical manifestation, and appropriate diagnostic workup are the vital determinants in recognizing the correct type of cheilitis and of its successful treatment. It highlights that multispecialty collaboration and communication involving dermatology, stomatology, clinical immunology, internal medicine, and other fields can be crucial for improving the outcomes and quality of life for the patient diagnosed with cheilitis.

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.2023.08.015>.

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