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Original Article

Pemphigus and pemphigoid research by dermatologists and stomatologists: A scientometric and comparative study

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Study topics

Abstract *Background/purpose:* Pemphigus and pemphigoid are systemic bullous autoimmune diseases affecting skin and/or mucosal membranes with the life-threatening nature, especially pemphigus vulgaris. The papers published by dermatologists and stomatologists preferentially represent their concerns of a mucocutaneous disease.
Materials and methods: The objective of this study was to compare the scientometric characteristics of pemphigus and pemphigoid publications by dermatologists and stomatologists in the Scopus database.
Results: There are 9276 and 760 papers published by dermatologists and stomatologists, respectively. The annual number of the publications by dermatologists stably raised from 218 to 526 during 2007–2022; while the number by stomatologists raised with a small amount from 18 to 51 during this period. For the most-cited top-200 papers, the total citation count is 42,766 and the *h* index is 148 for pemphigus publications by dermatologists; whereas the count is 14,689 and *h* index is 63 for publications by stomatologists. Notably, first signs of pemphigus often appear in oral mucosa, manifesting as erythema, blisters, as well as mouth ulcer, gingivitis, lichen planus-like pemphigus.

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Conclusion: This study firstly reports the scientometric characteristics of pemphigus publications by dermatologists and stomatologists. The scale and citations of dermatologists' publications greatly outweigh stomatologists' ones, suggesting stomatologists can learn from and more cooperate with dermatologists regarding pemphigus research.

Introduction

Pemphigus contains a heterogenous group of systemic bullous autoimmune diseases characterized by intraepithelial blistering affecting skin and/or mucosal membranes.[1] Among the pemphigus variants, pemphigus vulgaris (PV) accounts for 70–90% of cases including pemphigus vegetans (1–2%) and pemphigus herpetiformis (<2%). PV is the most common and also most aggressive variant of pemphigus, followed by pemphigus foliaceus (10–30%), as well as the rarer paraneoplastic pemphigus (5%) and IgA pemphigus (<2%).[2] Oral mucosal lesions are often the first signs of disease in PV and in paraneoplastic pemphigus, without skin involvement, making the diagnosis difficult. Oral mucosa was reported to be the site of initial manifestation in 50–75% of PV patients. Furthermore, a recent systematic review and meta-analysis concluded that the pooled prevalence of PV patients with oral lesions solely or concurrent with other mucocutaneous lesions was 90.3% and the prevalence of patients with exclusive oral mucosal lesions was 50.8%.[3] On the other side, pemphigoid diseases in contrast affect the subepithelial layers of the skin and/or mucous membranes, responsible for subepithelial blistering, and thus exhibit distinct clinical features.[1] Mucous membrane pemphigoid is such a rare, predominantly mucosal subepithelial blistering disorder involving the oral mucosa, anogenital tissues, conjunctiva, and upper aerodigestive tract.[4,5]

Generally, the diagnosis and treatment of pemphigus and pemphigoid diseases are conducted by dermatologists and stomatologists. For oral mucosal lesions, especially first signs, affected by pemphigus, the management mainly relies on stomatologists. Notably, patients with pemphigus and pemphigoid diseases can suffer recurrent, chronic pain, and lowered quality of life, as well as potentially life-threatening infections.[1] Given the complex and challenges of diagnosing and treating these diseases, increasingly large number of papers related pemphigus have been published. The papers published by dermatologists and stomatologists preferentially represent the scientific output and concerns of a mucocutaneous disease. Scientometrics is a useful tool that utilizes bibliometric and citation data to assess scientific output within the designated area.[6–8]

Herein, we hypothesized that there might be different scientific output of the pemphigus research by dermatologists and stomatologists. Therefore, the objective of this study was to compare the scientometric characteristics of pemphigus and pemphigoid publications by dermatologists and stomatologists, so as to promote mutual understanding and even reciprocal cooperation regarding these diseases in stomatology and dermatology.

Materials and methods

Based on the methodology described previously,[7,8] we searched the literature up to 22 March 2023 from the Scopus database according to the search strategy (Table 1). We used medical subject term "pemphig*" in the Title to retrieve all the papers on pemphigus and pemphigoid, without restriction to language, type, and year of publication. In literature search, the asterisk indicates a wildcard used to search for all endings including fifth or more root words. 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. Then, pemphigus publications by dermatologists and stomatologists were retrieved, respectively. The scientometric characteristics of all the eligible articles were reviewed and recorded the following information: publication year, title, keywords, citation count, paper type, authorship, affiliation, and country/region of origin. Data search and extraction were performed independently by two investigators (S.Z. and W.L.), and discrepancy of results was resolved in a consensus symposium. The Bibliometrix Biblioshiny R-package software (https://www.bibliometrix.

Table 1 The search strategy used in the Scopus database.

Literature on lichen planus (LP) retrieved	Search strategy
All the papers on pemphigus	TITLE (pemphig*))
Pemphigus publications by dermatologists	(AFFIL (derm*) AND TITLE (pemphig*))
Pemphigus publications by stomatologists	(AFFIL (dent* OR oral OR stomatolog*) AND TITLE (pemphig*))
Pemphigus publications by other scholars	(TITLE (pemphig*) AND NOT AFFIL (dent* OR oral OR stomatolog* OR derm*))
Pemphigus publications by dermatologists cooperated with stomatologists	AFFIL (dent* OR oral OR stomatolog*) AND AFFIL (derm*) AND TITLE (pemphig*)

org/home/; K-Synth Srl Inc., Naples, Italy) was used to analyze the relevant bibliometric data.

Results

Citation characteristics

With the search strategy algorithm, 15,355 papers on pemphigus and pemphigoid are published until the time of the search. A total of 9276 (60.4%) and 760 (4.95%) papers are published by dermatologists and stomatologists, respectively. There are 313 publications by dermatologists cooperated with stomatologists. Fig. 1A illustrates the number and distribution of the paper types. To assess scientific influence of the academics, the most-cited top-200 papers are retrieved (Fig. 1B). The total citation count is 42,766 and the *h* index is 148 for pemphigus publications by dermatologists, and the total count is 14,689 and the *h* index is 63 for pemphigus publications by stomatologists. The detailed information on publication year, title, journal,

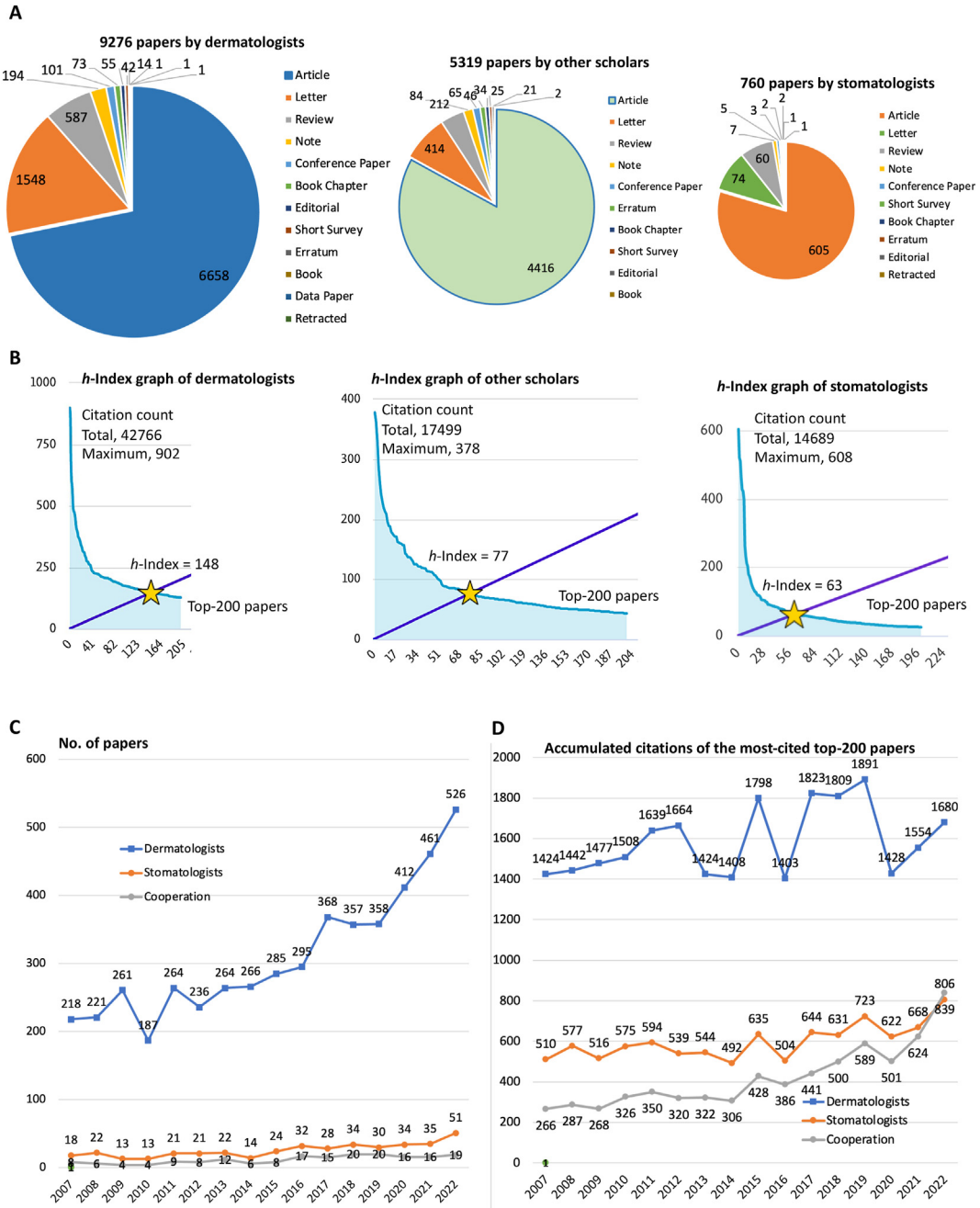

Figure 1 Citation characteristics of the papers on pemphigus. (A) Document types and distribution of the papers. (B) The *h*-Index graphs of the most-cited top-200 papers. (C) The annual number of the papers during 2007—2022. (D) The accumulated citations of the most-cited top-200 papers during 2007—2022.

citation count, authors, affiliation, keywords, and document types of the top-200 papers are presented in Supplementary Tables S1–S3.

To further concretize the treads of scientific output in pemphigus field, we assessed the annual number of the papers and accumulated citation count of the most-cited top-200 papers during 2007–2022. The annual number of the publications by dermatologists stably raised from 218 to 526 during 2007–2022 (Fig. 1C), and the accumulated citations of the top-200 papers slightly increased from 1424 to 1680 during this period (Fig. 1D). The annual number of the publications by stomatologists raised with a small amount from 18 to 51 during 2007–2022, and the accumulated citations of the top-200 papers increased from 510 to 806 during this period. Interestingly, the number of publications by dermatologists cooperated with stomatologists is modest growth from 8 to 19 during 2007–2022; while the accumulated citations of the top-200 papers stably increased from 266 to 839.

Bibliometric characteristics

The cloud graphs of journal names, contributing authors, institutions, and countries/regions are showed in Fig. 2. For

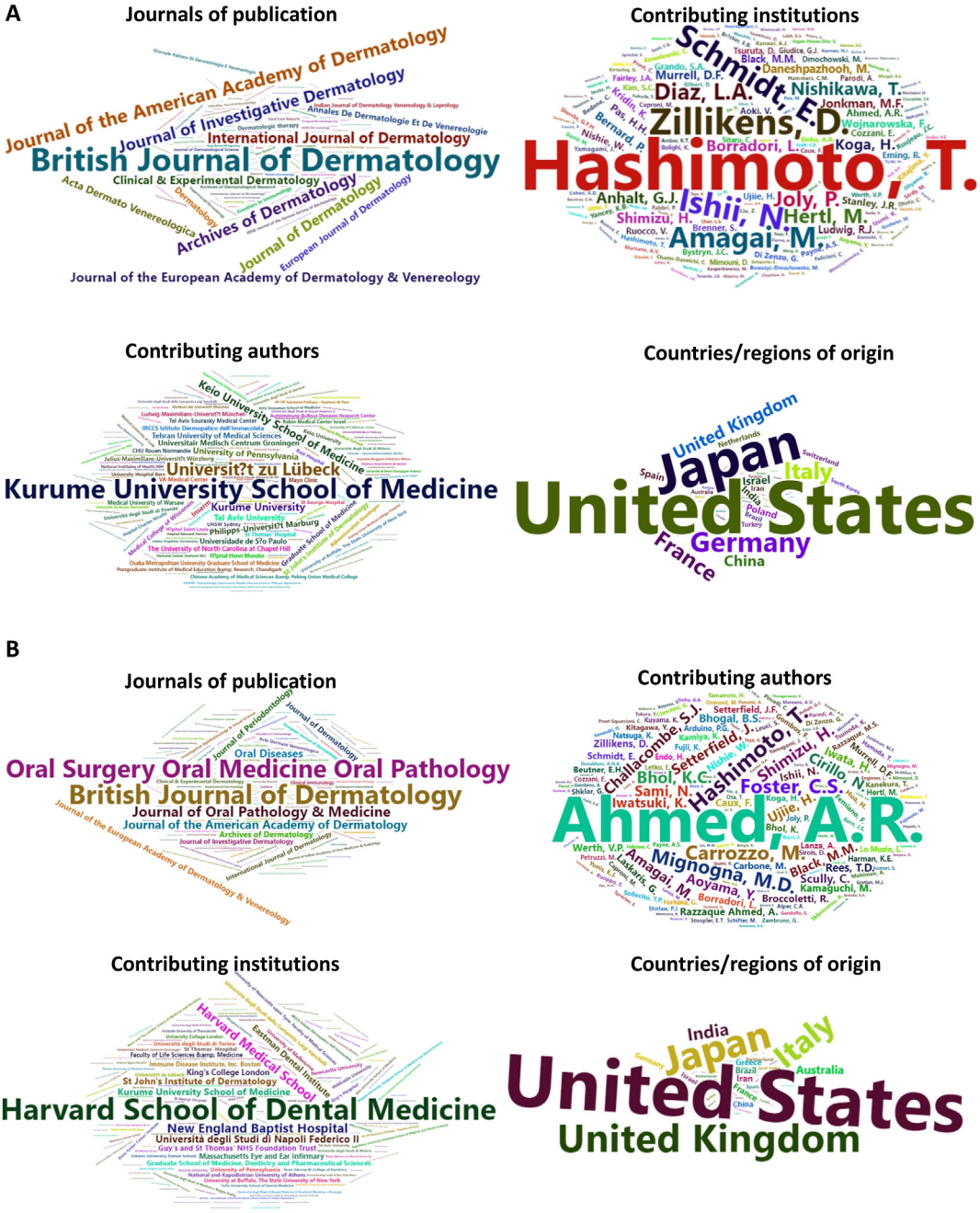

Figure 2 Cloud graphs of journal of publication, contributing authors, institutions, and countries/regions of origin in the publications by (A) dermatologists and (B) stomatologists.

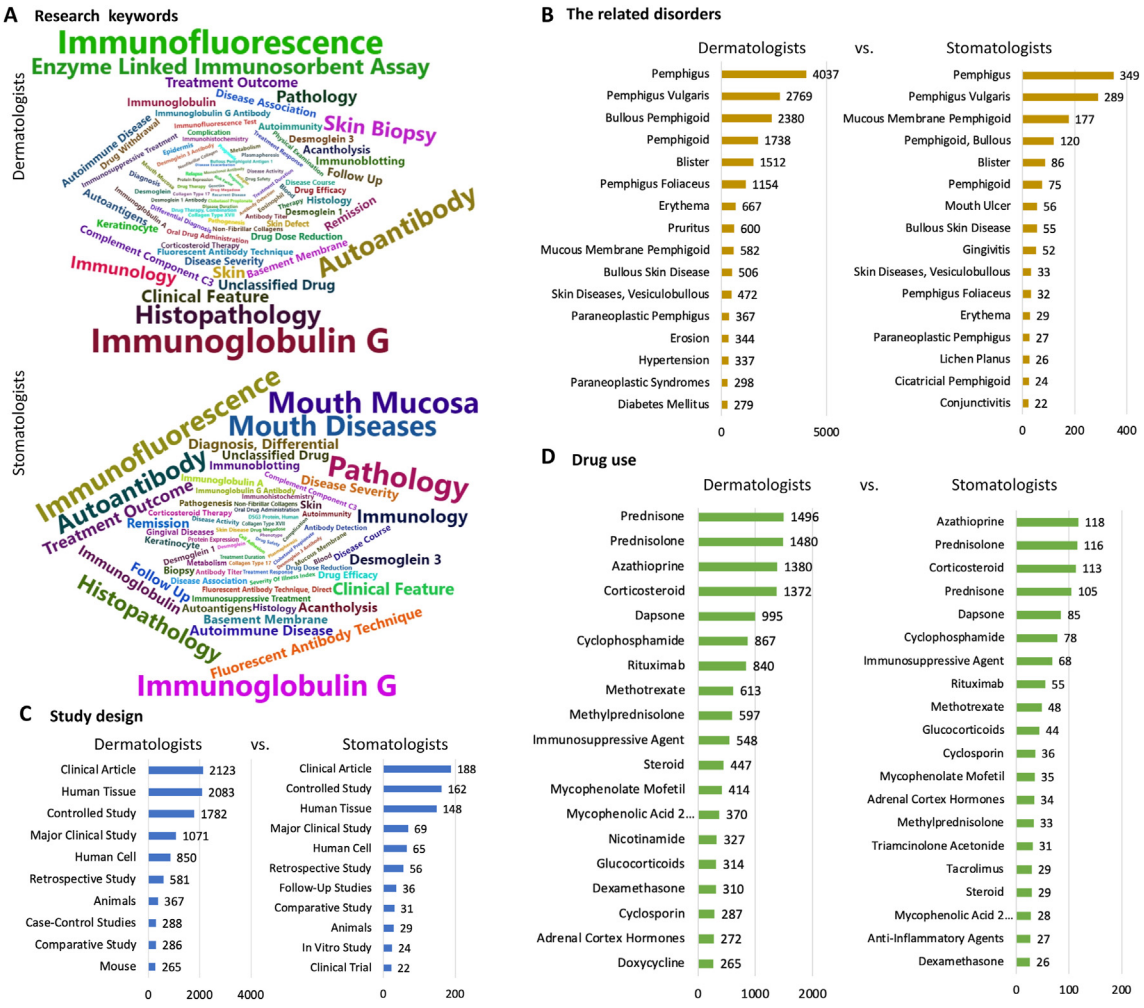

Figure 3 Research characteristics of the papers on pemphigus. (A) Cloud graphs of research keywords. The ranks of (B) related disorders, (C) study design, (D) drug use.

dermatologists, the journal with largest number is *British Journal of Dermatology* (n = 730), followed by *Journal of the American Academy of Dermatology* (n = 437) and *Journal of Investigative Dermatology* (n = 382). The contributing author with largest number of papers is Hashimoto, T. (n = 515), followed by Zillikens, D. (n = 270) and Ishii, N. (n = 236). The contributing institution and country of origin with the maximum number is Kurume University School of Medicine (n = 471) and United States (n = 2153), followed by Universität zu Lübeck (n = 300) and Japan (n = 1589), respectively. For stomatologists, the journal with largest number is *British Journal of Dermatology* (n = 54), followed by *Oral Surgery Oral Medicine Oral Pathology* (n = 50) and *Journal of Oral Pathology & Medicine* (n = 29). The contributing author with largest number of papers is Ahmed, A.R. (n = 69), followed by Hashimoto, T. (n = 25) and Carrozzo, M. (n = 22). The contributing institution and country of origin with the maximum number is Harvard School of Dental Medicine (n = 91) and United States (n = 220), followed by New England Baptist Hospital (n = 39) and Japan (n = 121), respectively.

Research characteristics

Based on the frequency of keywords in all included papers, we highlight the analysis of research characteristics of the papers on pemphigus by dermatologists and stomatologists (Fig. 3). All the keywords are automatically recognized in the order of highest to lowest frequency by the database. The related disorders, drug use, study design, and research keywords are identified. The research keywords such as immunoglobulin G, immunofluorescence, autoantibody, enzyme linked immunosorbent assay (ELISA), and desmoglein are similar in the publications by both dermatologists and stomatologists. As expected, the ratio of keyword 'skin biopsy' and 'mouth mucosa' in the publications by dermatologists is 1364:380 (3.59:1). On the other side, the ratio of keyword 'mouth mucosa' and 'skin' in the publications by stomatologists is 154:56 (2.75:1). The most of the related disorders are similar in the publications by both dermatologists and stomatologists. The distinctive disorders such as pruritus, erosion, hypertension, and diabetes mellitus are mainly concerned by dermatologists; whereas the disorders such as mouth ulcer, gingivitis, lichen planus, and

conjunctivitis are mainly concerned by stomatologists. The drug use and study design are also similar in the publications by both dermatologists and stomatologists, with slightly different order.

Discussion

Pemphigus especially PV often affects skin and mucous membranes, as the oral, nasal, conjunctiva, and genital mucosa; and some studies have demonstrated that first signs of this disease constantly appear in the oral mucosa, preceding other presentations. Pemphigus patients at younger ages were reported to be prone to present only oral mucosal lesions, and the prevalence of patients with exclusive oral mucosal lesions was demonstrate to be over 50%.[3] While in older ones, pemphigus was prone to affect both skin and oral mucous membranes. These suggests that as age increases, more skin lesions are involved in pemphigus patients. Even when mouth signs of pemphigus disappear, and cutaneous lesions persist. The prevalence of PV patients with oral lesions solely or concurrent with cutaneous lesions was demonstrate to be over 90%.[3] One explanation for the high prevalence of oral mucosal lesions may be related to reduplicative masticatory trauma, common at buccal mucosa, gingiva, palate, tongue, and lower lip. Other mucous membranes also can be affected, as conjunctiva, genital, and upper gastrointestinal tract mucosa,[4] particularly at advanced disease stages. Cutaneous lesions, manifesting as erythema, pruritus, erosions, or blisters, can take years to appear after the first lesions presents in mouth. Mouth lesions manifest as erythema, blisters, as well as mouth ulcer, gingivitis, lichen planus-like pemphigus.[9,10] If the mouth signs are neglected, this might result in late diagnosis of pemphigus.

The pathophysiology and autoantigen profile of bullous autoimmune diseases, particularly pemphigus and its subtypes, are more complex. Generally, clinical diagnosis of pemphigus conduct with a further histopathological analysis. The further analysis such as direct or indirect immunofluorescence or ELISA is implemented to ensure the diagnosis of pemphigus or pemphigus or their subtypes.[11] Considering the life-threatening nature of pemphigus especially PV, the management of pemphigus should contain two main stages: induction of remission and maintenance of remission.[12] Systemic glucocorticoids shock therapy remain the primary therapeutic option for patients with pemphigus to successfully control this disease. Notably, rituximab combined with short-term systemic glucocorticoids is increasingly accepted as first-line therapy. The maintenance of remission often uses azathioprine, methotrexate, dapsone, cyclophosphamide, cyclosporine, mycophenolate mofetil, and so on (Fig. 3). Mucocutaneous PV tends to be a more severe disease with a protracted clinical course. Mouth lesions usually are slower to respond to therapy and less likely to achieve remission off-treatment than skin lesions solely.[12] Given the long-term severe adverse effects of immunosuppressive therapies and the low efficacy in some subset of pemphigus patients, novel therapeutic strategies are desirable.

Collectively, the scientometric characteristics of pemphigus publications by dermatologists and stomatologists are firstly comprehensively reported in this study. The scale and citations of dermatologists' publications greatly outweigh stomatologists' ones, suggesting stomatologists can learn from and more cooperate with dermatologists regarding pemphigus research.

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.2023.04.011.

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