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Short Communication

A scientometric study on research trends and characteristics of Behçet's disease

Wenying Zhang [a,1], Xuanning Chen [b,c,1], Linjun Shi [b,c**], Liying Gu [d*]

[a] Department of Periodontology and Oral Mucosa, Changsha Stomatological Hospital, School of Dental Medicine, Hunan University of Chinese Medicine, Changsha, Hunan, China
[b] Department of Oral Mucosal Diseases, Shanghai Ninth People's Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, China
[c] College of Stomatology, Shanghai Jiao Tong University, National Center for Stomatology, National Clinical Research Center for Oral Diseases, Shanghai Key Laboratory of Stomatology, Shanghai Research Institute of Stomatology, Shanghai, China
[d] Department of Obstetrics and Gynecology, Renji Hospital, Shanghai Jiaotong University School of Medicine, Shanghai Key Laboratory of Gynecologic Oncology, Shanghai, China

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Abstract *Background/purpose:* Behçet's disease (BD) is a chronic systemic vasculitis characterized by recurrent oral and genital ulcers, skin lesions, and uveitis. The purpose of this study was to analyze the scientometric characteristics and research trends of BD.
Materials and methods: All the articles on BD were comprehensively retrieved from the Scopus database. Regional comparison (Turkey versus outside of Turkey) and chronological comparison (before 2010 versus after 2010) were performed.
Results: Among the 7023 articles on BD, Turkey was the country publishing most articles (2012 articles). In Turkey, questionnaire, quality of life, depression, and scoring system were distinctive keywords. In outside of Turkey, allele, gene expression, cytokine, interleukin 6, tumor necrosis factor-alpha, and phenotype were distinctive keywords. The trend of diagnostics mainly angiography before 2010 has changed to computed tomographic angiography, echocardiography, and optical coherence tomography. The trend of biology research has changed to research on metabolism, gene expression, allele, biomarkers, and genetic susceptibility after 2010. The trend of drug aspects mainly oral drug administration before 2010 has changed to drug withdrawal, drug dose reduction, drug safety, drug megadose, adalimumab, thalidomide, and salazosulfapyridine after 2010.

* Corresponding author. Department of Obstetrics and Gynecology, Renji Hospital, Shanghai Jiaotong University School of Medicine, 160 Pujian Road, Shanghai 200127, China.
** Corresponding author. Department of Oral Mucosal Diseases, Shanghai Ninth People's Hospital, 500 Quxi Road, Shanghai 200011, China.
E-mail addresses: shi-linjun@hotmail.com (L. Shi), guliying_obgyn@hotmail.com (L. Gu).
[1] W. Zhang and X. Chen contributed equally to this work.

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Conclusion: This scientometric study elucidated the current scenario and research trends of BD, and would help in improving in reciprocal collaboration and communication for investigations on this disease.

Introduction

Behçet's disease (BD), which was first identified by the Turkish dermatologist Hulusi Behçet, is a chronic systemic inflammatory disorder of unknown etiology.[1] This disorder has been increasingly recognized as a syndrome due to a broad spectrum of signs and symptoms, most commonly recurrent oral and genital ulcers, skin lesions, and uveitis. This multisystem disease can affect various organs, including the skin, eyes, joints, gastrointestinal tract, and central nervous system.[2] The global pooled prevalence of BD is 10.3 (95 % confidence interval, 6.1—17.7) per 100,000 population with high geographical variability. BD mainly occurs in regions along the ancient Silk Road, and Turkey has the highest prevalence with 420 cases per 100,000 persons.[2,3] Diagnosis of BD is primarily clinical due to the lack of a definitive diagnostic test, and management involves a multidisciplinary approach to control inflammation and manage symptoms.

Despite progress in understanding its clinical characteristics and management approaches, gaps remain in its pathogenesis and treatment challenge clinical practice, making BD a complex disorder associated with an increased risk of morbidity.[3,4] Since its first description, an increasing body of clinical and translational studies on BD has been published. Scientometric/bibliometric analysis is a useful tool that utilizes citation and literature data to measure scientific output and research trend of a specific research field.[5—7] Although some scientometric/bibliometric analyses for BD have been available,[8—13] little has been conducted to examine research trends with emphasis on the analysis of the keywords that can reflect research directions and topics of concern. Therefore, the purpose of this study was to analyze the scientometric characteristics and research trends of BD, highlighting the regional and chronological comparison of the keywords.

Materials and methods

As per the methodology described previously,[5—7] all the articles on BD in the Scopus database were retrieved on 26 Oct 2024. We used medical subject terms "Behcet" in the Title in literature search, without restriction to year of publication. The name of the relevant countries was selected in the filter of Country/Region, and only English literature was included because it is an international knowledge-exchange language. The scientometric characteristics of all the eligible articles were 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. The years of publication were divided into before 2010 and 2010—2024, so that the number of articles can be to some extent compared in the analysis of research trends. 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 were presented as numbers and percentages. No comparisons were made, and thus no *P*-values were set.

Results

Citation characteristics of all the articles on BD

With the search strategy algorithm, a total of 7023 articles on BD were retrieved in the Scopus database. As presented in Fig. 1A, Turkey (n = 2012) was the country publishing most articles on BD, followed by Japan (n = 964) and China (n = 541). The countries of origin of the articles were divided into Turkey (2012 articles) and outside of Turkey (5011 articles). The total citation count (after removal of self-citations) was 52,737 (47,455) and the *h* index was 95 (89) for the articles from Turkey, and the total count (after removal of self-citations) was 108,739 (100,833) and the *h* index was 119 (113) for the articles from outside of Turkey. To further concretize the trends of scientific output, we assessed the annual number of the articles (Fig. 1B) and annual accumulated citations of the articles (Fig. 1C) during 2010—2023. The annual number of articles stably raised from 175 to 247 during 2010—2023, and the accumulated citations of the articles spirally increased from 6141 to 9799 during this period. The cloud graphs of journal names, contributing authors, institutions of origin of the articles on BD from Turkey and outside of Turkey are shown in Fig. 2. The journals, contributing authors, and institutions with largest number of papers (rank, 1—10) are presented in Supplementary Table S1.

Research characteristics of articles on BD from Turkey versus outside of Turkey

Based on the frequency of keywords in all included articles on BD, the keywords were automatically recognized in the order of highest to lowest frequency in the database. The cloud graph of the main keywords retrieved in the articles on BD is shown in Fig. 3A. The same common keywords in Turkey and outside of Turkey were mouth ulcer, uveitis,

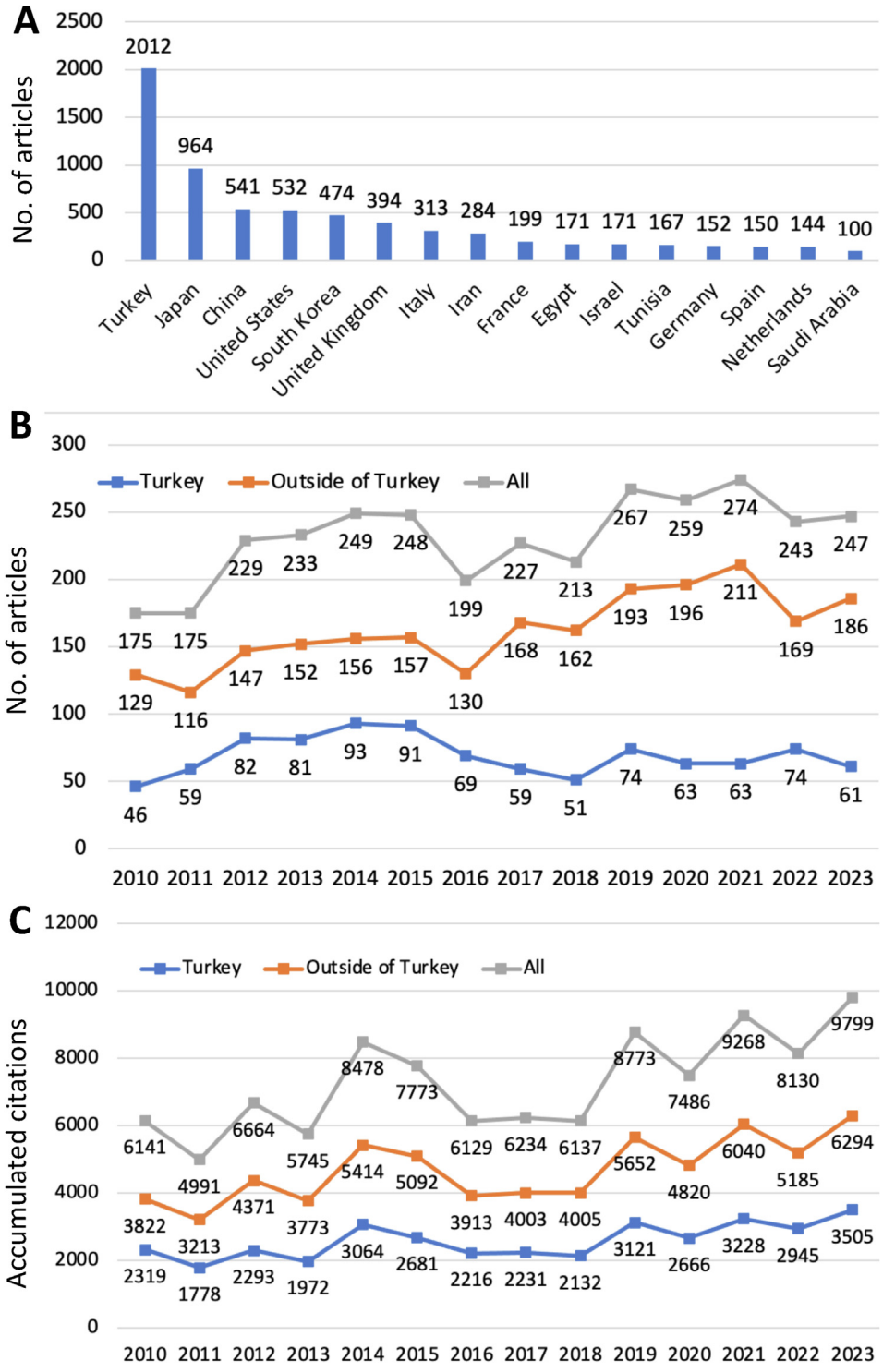

Figure 1 Citation characteristics of the articles on Behcet's disease. (**A**) The numbers of the articles from the main countries with over 100 articles. (**B**) The annual number of the articles during 2010–2023. (**D**) The accumulated citations of the articles during 2010–2023.

genital ulcer, vasculitis, thrombosis, erythema nodosum, arthritis, complication, neurologic disease, immunosuppressive agent, colchicine, azathioprine, prednisolone, prednisone, corticosteroid, cyclophosphamide, infliximab, inflammation, immunology, pathology, genotype, HLA B51 antigen, and genetics. We highlight the analysis of distinctive research keywords (Fig. 3B). In Turkey, clinical symptoms such as pulmonary artery aneurysm, thrombophlebitis, hemoptysis, and dyspnea were distinctive keywords. Diagnostic aspects of sensitivity & specificity, fluorescence angiography, optical coherence tomography, neurologic examination, and anamnesis were distinctive

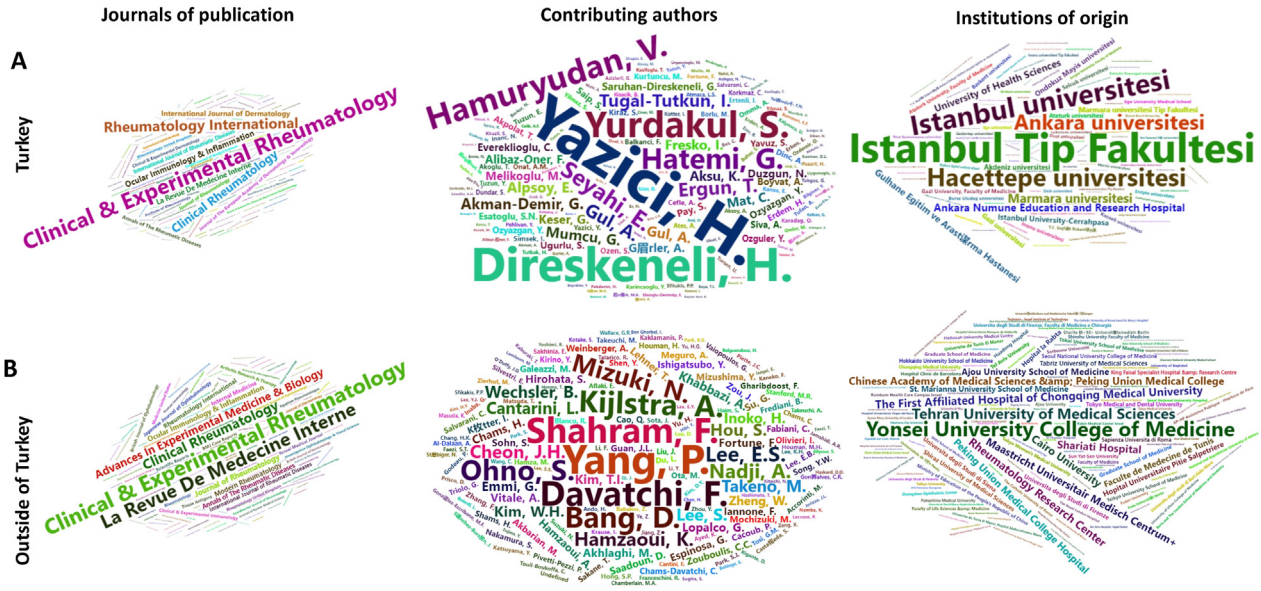

Figure 2 Cloud graphs of journal of publication, contributing authors, and institutions of origin regarding Behcet's disease research in (**A**) Turkey and (**B**) out of Turkey. The font size indicates the number of papers; a larger size means more papers in the cloud graphs.

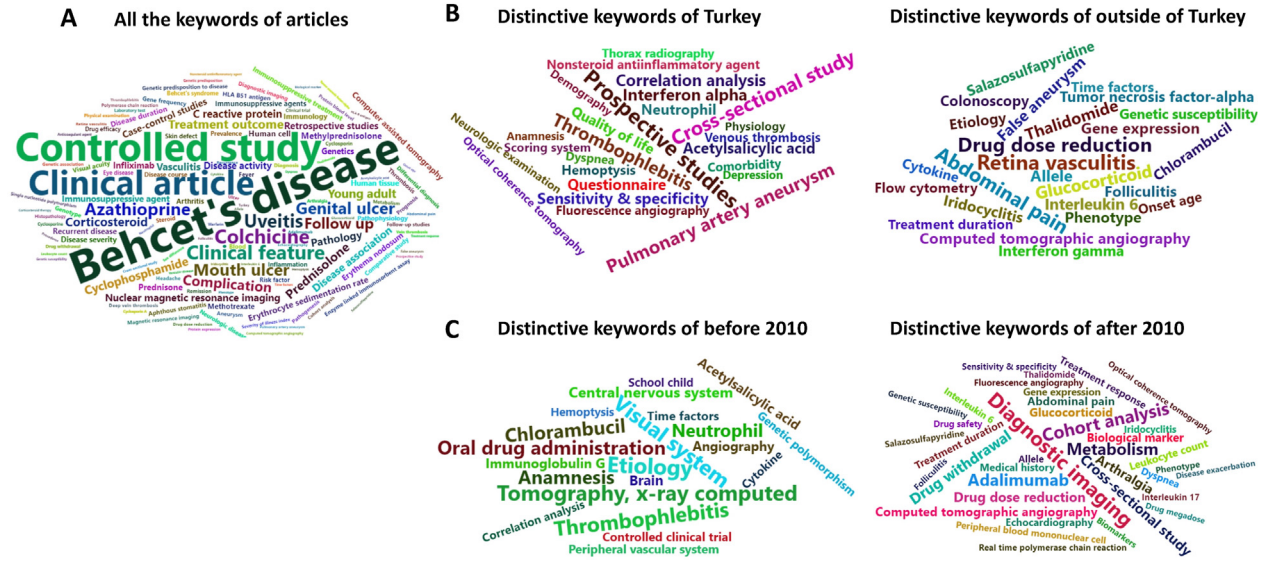

Figure 3 Research characteristics of the articles on Behcet's disease. Cloud graphs of (**A**) all the keywords, (**B**) distinctive keywords of articles from Turkey and outside of Turkey, and (**C**) distinctive keywords of articles published before 2010 and after 2010.

keywords. Prospective studies, cross-sectional study, correlation analysis, interferon alpha, questionnaire, quality of life, depression, and scoring system also distinctive keywords in Turkey. In outside of Turkey, clinical symptoms such as retina vasculitis, abdominal pain, false aneurysm, folliculitis, and iridocyclitis were distinctive keywords. Experimental aspects of allele, interleukin 6, tumor necrosis factor-alpha, interferon gamma, cytokine, gene expression, phenotype, and flow cytometry were distinctive keywords. Studies on computed tomographic angiography, colonoscopy, drug dose reduction, thalidomide, salazosulfapyridine, and chlorambucil were more common in outside of Turkey.

Research trends of articles on BD before 2010 versus after 2010

The years of publication were divided into before 2010 (3563 articles) and after 2010 (3460 articles). There have always been the same common keywords such as uveitis, mouth ulcer, genital ulcer, vasculitis, complication,

colchicine, prednisolone, azathioprine, corticosteroid, cyclophosphamide, cyclosporin A, immunosuppressive agent, drug efficacy, immunology, pathology, genetics, genotype, HLA B51 antigen, and single nucleotide polymorphism. The more common keywords in different years can basically reflect research trends (Fig. 3C). Before 2010, research on etiology, thrombophlebitis, hemoptysis, peripheral vascular system, cytokine, visual system, anamnesis, central nervous system, brain, angiography, immunoglobulin G, oral drug administration, chlorambucil, and school child were more frequent keywords. After 2010, diagnostic aspects of diagnostic imaging, computed tomographic angiography, echocardiography, fluorescence angiography, optical coherence tomography, and sensitivity & specificity were distinctive keywords. Biology research on metabolism, gene expression, allele, interleukin 6, interleukin 17, peripheral blood mononuclear cell, biomarkers, biological marker, and genetic susceptibility were distinctive keywords. Drug research on drug withdrawal, drug dose reduction, drug safety, drug megadose, adalimumab, thalidomide, salazosulfapyridine, treatment duration and response were more common. The aspects of cohort analysis, cross-sectional study, abdominal pain, dyspnea, iridocyclitis, and folliculitis were also more frequent keywords after 2010.

Discussion

This scientometric study attempted to analyze the characteristics and research trends of all the publications on BD since 1941 retrieved from the Scopus database. The previous scientometric/bibliometric studies analyzed the publications on BD limited a period retrieved from Web of Science or PubMed database.[8—13] For instance, Shahram et al. analyzed the publications on BD during 1990—2010;[8] Şenel et al. analyzed the publications on BD during 1980—2014;[9] Kocyigit and Akyol analyzed the publications on BD during 2010—2019;[10] El Masri et al. analyzed the publications on BD during 2005—2019 from Arab countries.[13] The advantage of the Scopus database can automatically exclude self-citing, and provide about 20 % more coverage than Web of Science.[14] We found that self-citing rate (10.0 %) of Turkish authors was slightly higher than that (7.3 %) of the authors from out of Turkey. It is plausible to speculate that Turkish authors have a tendency to cite local articles instead of international articles. Moreover, there was not analysis of the keywords in previous scientometric/bibliometric studies. Turkey accounted for over one-fourth (28.6 %) of the total number of articles on BD, mainly because it has the highest prevalence of this disease. Therefore, the strength of this scientometric study was to perform the regional comparison (Turkey versus outside of Turkey) and chronological comparison (before 2010 versus after 2010) based on all the articles on BD.

The research keywords can reflect the directions and concerned topics of research. According to the frequency of the keywords in the articles on BD, Turkish scholars could focus on the symptoms of pulmonary artery aneurysm, thrombophlebitis, hemoptysis, and dyspnea. Whereas the scholars from outside of Turkey could focus on the symptoms of retina vasculitis, abdominal pain, false aneurysm, folliculitis, and iridocyclitis. Turkish scholars could pay more attention to quality of life of BD patients, because questionnaire, quality of life, depression, and scoring system were their main keywords. While the other scholars could perform more experiment aspects to research biology of this disease, because allele, gene expression, cytokine, interleukin 6, tumor necrosis factor-alpha, and phenotype were their main keywords. On the other side, the more common keywords in different years can basically reflect research trends. The trend of diagnostics mainly angiography before 2010 has changed to computed tomographic angiography, echocardiography, and optical coherence tomography. The trend of biology research has changed to research on metabolism, gene expression, allele, biomarkers, and genetic susceptibility after 2010. The trend of drug aspects mainly oral drug administration before 2010 has changed to drug withdrawal, drug dose reduction, drug safety, drug megadose, adalimumab, thalidomide, and salazosulfapyridine after 2010.

In summary, this scientometric study on BD elucidated the current scenario and research trends in the field of this disease. Finding the scientometrics would elucidate the comprehensive identification and recognition of the important research topics concerned, and help in improving in reciprocal collaboration and communication for investigations on this disease.

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.2024.11.010.

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