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Janus Kinase Inhibitors in Atopic Dermatitis: A Global Bibliometric Analysis (2015–2025)

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ABSTRACT

Objective: In recent years, the therapeutic use of Janus kinase (JAK) inhibitors in dermatology, particularly in the management of atopic dermatitis (AD), has expanded markedly. This bibliometric study aimed to characterize research themes, evaluate the scientific productivity of authors and countries, and identify emerging areas that may guide future research in this field over the past decade.

Materials and Methods: A bibliometric analysis of JAK inhibitors in AD from 2015 to 2025 was conducted using the Web of Science Core Collection (WoSCC) database as the data source. Bibliometric analyses and data visualizations were performed using CiteSpace, VOSviewer, and the Bibliometrix package in R.

Results: A total of 1249 studies were included in the analysis. The cluster plot classified all keywords into 9 categories. Pruritus and alopecia areata (AA) were the most frequently co-occurring keywords alongside atopic dermatitis, while delgocitinib and abrocitinib were the most frequently investigated JAK inhibitors. The United States produced the highest number of publications over the past decade. Oregon Health and Science University emerged as one of the most significant contributors to global collaborations, while the Icahn School of Medicine had the highest number of publications, reaching approximately 175 by 2025. Simpson EL emerged as both the most influential and the most cited author in the field, as reflected by citation impact, followed by Emma Guttman-Yassky.

Conclusion: Janus kinase (JAK) inhibitors represent one of the most effective and trending therapeutic classes in AD. These agents are not only highly effective for AD but also show promising efficacy in other dermatologic conditions, such as AA.

Keywords: Atopic dermatitis, bibliometric, eczema, JAK, Janus kinase inhibitors.

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INTRODUCTION

Atopic dermatitis (AD), also known as atopic eczema, is a chronic inflammatory skin disorder characterized by recurrent eczematous lesions, xerosis, and persistent pruritus.[1] Its global

prevalence has increased progressively over recent decades, particularly in developed countries, affecting approximately 10%-20% of children and 2%-3% of adults worldwide.[2,3] In 2021, global pediatric AD cases reached 72.4 million, representing a 6.2% increase from 2000, with projections for 2024 estimating approximately 19.8 million affected adults and 9.2 million children in the United States (US) alone.[4,5] In many patients, disease onset occurs in early childhood and may persist into adulthood, resulting in a substantial long-term burden for both patients and healthcare systems.[6] Pruritus, a hallmark symptom of AD, is one of the most debilitating aspects of the disease and contributes significantly to sleep disturbance, psychological distress, and impaired quality of life.[7]

The pathogenesis of AD is complex and multifactorial, involving interactions among genetic predisposition, skin barrier dysfunction, immune dysregulation, and environmental factors.[8] The Janus kinase-signal transducer and activator of transcription (JAK-STAT) signaling pathway plays a central role in the pathogenesis of AD.[9] This pathway mediates the effects of various cytokines, such as interleukin (IL)-4, IL-13, and IL-31, which are critically involved in the immune response, pruritus, and inflammation in AD.[10] Specifically, JAK1 has been identified as a key factor in the inflammatory cascade of AD.[11]

In recent years, Janus kinase (JAK) inhibitors have emerged as a promising therapeutic strategy in dermatology, particularly for the management of moderate-to-severe AD.[12] By targeting the JAK-STAT signaling pathway, these agents simultaneously inhibit multiple cytokines involved in AD pathogenesis, resulting in rapid improvement in symptoms such as pruritus and skin inflammation.[13,14] Several JAK inhibitors, including baricitinib, upadacitinib, and abrocitinib, have received regulatory approval for AD, transforming the therapeutic landscape for patients who do not respond to conventional treatments.[15,16]

Despite the rapid expansion of the literature on JAK inhibitors in AD, a comprehensive evaluation of global research output and thematic trends in this field is needed. To our knowledge, this is the first systematic bibliometric analysis of research trends on JAK inhibitors in AD. Bibliometrics is a comprehensive knowledge system that integrates mathematics, statistics, and linguistics, with a primary focus on quantification. In the current era of big data, bibliometric approaches enable scientists and clinicians to delineate the research landscape and emerging hot spots within a given field, predict future research trends, and substantially improve research efficiency.[17]

The present study aimed to perform a global bibliometric analysis of publications on JAK inhibitors in AD over the past decade. Specifically, it sought to characterize publication trends, identify leading authors, institutions, and countries, and delineate the evolution of key research themes. Through this approach, the study aimed to inform both current clinical practice and future research directions in the field of AD therapeutics.

KEY MESSAGES

- Bibliometric analyses indicate that AD research has shifted from studies on skin barrier dysfunction and immunopathogenesis to randomized clinical trials of targeted therapies, particularly JAK inhibitors.
- The United States led scientific output and international collaboration, while Simpson EL and Guttman-Yassky E. were key contributors who shaped JAK inhibitor research in AD.
- Evidence supports the therapeutic potential of JAK inhibition in AD and other immune-mediated dermatologic diseases, particularly alopecia areata, reflecting shared inflammatory pathways and broader translational applications.

MATERIALS AND METHODS

Data Sources and Search Strategy

A bibliometric analysis of publications on JAK inhibitors in AD published from 2015 to 2025 was conducted using the Web of Science Core Collection (WoSCC) database as the primary data source. The search strategy was defined as follows: TS=("atopic dermatitis" OR "atopic eczema") AND TS=("Janus kinase inhibitor*" OR "JAK inhibitor*" OR baricitinib OR upadacitinib OR tofacitinib OR abrocitinib OR ruxolitinib OR delgocitinib OR itacitinib OR oclacitinib OR brepocitinib). The search was limited to articles published between 2015-01-01 and 2025-12-31. A total of 2,036 records were initially identified through the database search. Duplicate screening revealed no duplicate records. Title and abstract screening was performed to assess eligibility. Publications other than original articles and review articles were excluded, as were non-English publications and publications published in 2026. Following the screening process, 1,249 publications met the eligibility criteria and were included in the bibliometric analysis (Fig. 1). Ethical approval was not required for this study. The study was based exclusively on previously published articles. No patient-level data, clinical interventions, surveys, or experimental procedures were conducted.

Statistical Analysis

CiteSpace is citation analysis software developed in the field of scientometrics to identify research trends and visualize scientific knowledge structures. VOSviewer is a specialized

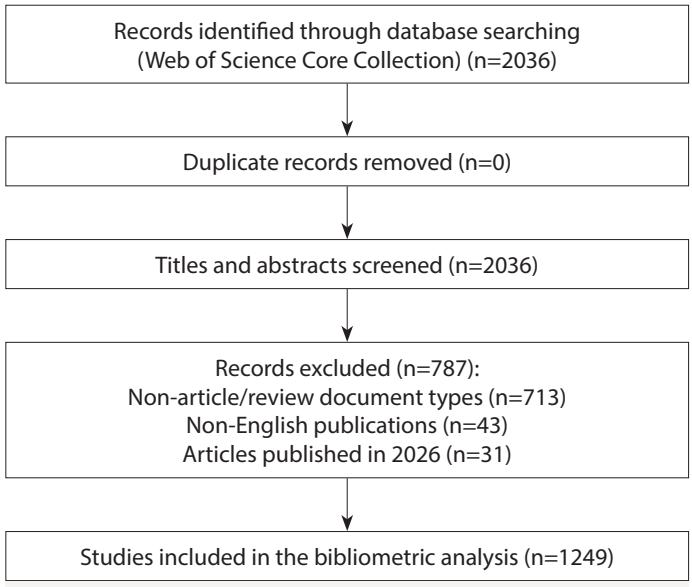


Figure 1. PRISMA flow diagram.

tool for constructing and visualizing bibliometric networks, including co-authorship, co-citation, and keyword co-occurrence maps. Bibliometrix is an advanced R package (version 5.0.1) that provides comprehensive bibliometric analysis and visualization capabilities. In this study, CiteSpace (version 6.3.R1) and the Bibliometrix R package were used to analyze authorship patterns, institutional and national contributions, journal distribution, reference networks, and keyword trends among the included articles. VOSviewer (version 1.6.20) was further used to perform co-occurrence and cluster analyses and to generate graphical visualizations of the bibliometric networks.

RESULTS

The initial search strategy yielded 2,036 records. After duplicate screening and study selection, 1,249 studies were included in the analysis. The analysis covered 337 sources, including journals and book chapters, from 2015 to 2025, with an average annual publication growth rate of 44.09%, indicating a marked increase in scientific production and growing academic interest in the field over time. The dataset included 6,157 authors, and 33 articles were written by a single author. International collaborations were present among 30.66% of the authors, while the average number of authors per article was 8.25, indicating that publications in this field were generally conducted by large teams and interdisciplinary partnerships. The number of publications on JAK inhibitors in patients with AD increased markedly after 2021. A total of 1,922 author keywords and 31,417 references were identified. The average number of citations per article was 29.75, and the life cycle of a paper was approximately 3.24 years. This metric represents the average duration between the publication year and the point at which citation frequency begins to decline significantly. Mathematically, it is derived from the mean citation age of documents within the dataset. This indicates that publications in the field attract substantial scholarly attention for a limited period and gradually lose influence over time. This finding also suggests that the research area is dynamic and rapidly evolving.

Authors and Affiliations

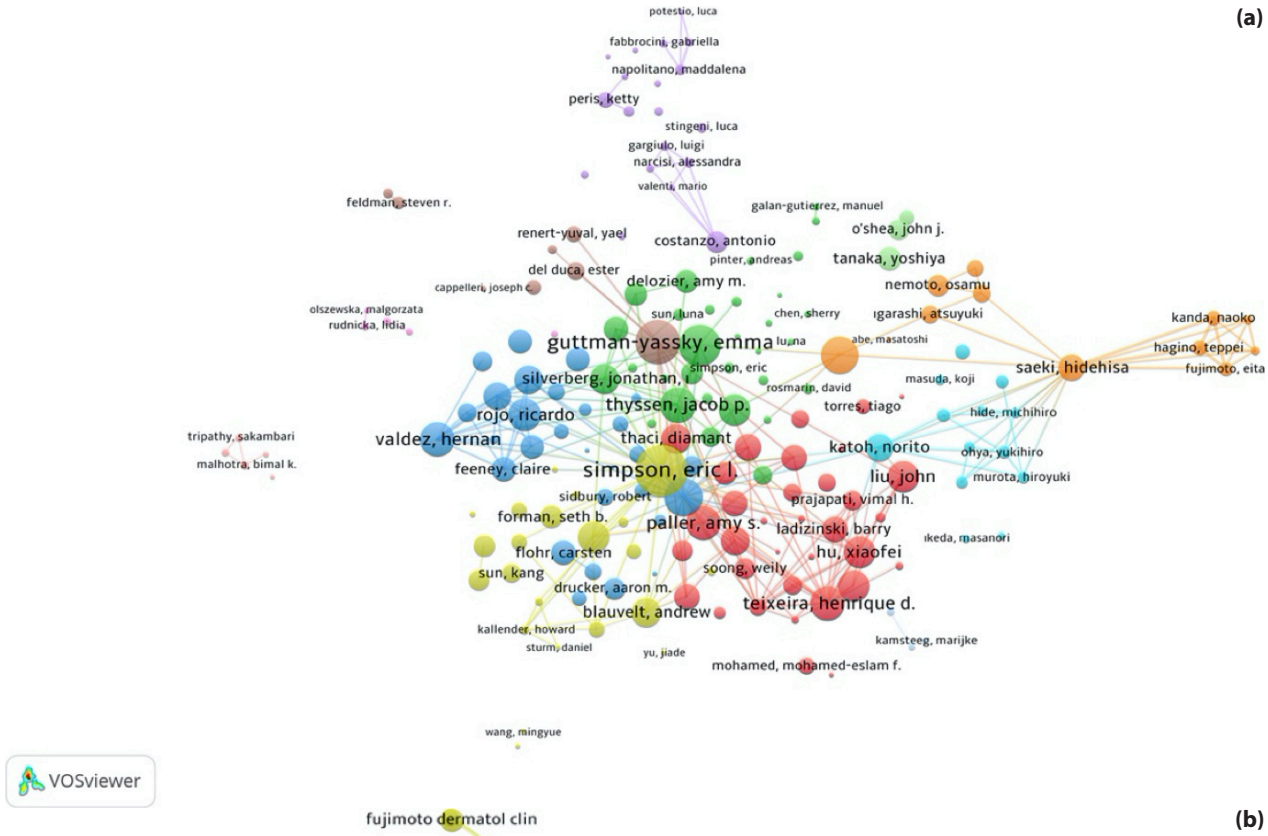
Figure 2a presents the author and institutional collaboration networks. The co-authorship network was constructed by including authors with five or more published papers and three or more citations. The analysis identified 12 clusters, 2,538 links,

Table 1. Academic Impact of authors based on PC, NP, PY start, h-index, g-index, and m-index

Author	h-index	g-index	m-index	TC	NP	PY start
Simpson EL	28	60	3.5	4894	60	2019
Guttman-Yassky E	26	43	2.364	3440	43	2016
Bieber T	22	36	2.2	4219	36	2017
Silverberg JI	22	55	2.75	3037	56	2019
Thyssen JP	20	44	2.857	2700	44	2020
Kabashima K	17	28	1.417	2638	28	2015
Silverberg J	17	27	2.125	1236	27	2019
Paller AS	16	31	1.6	2261	31	2017
Saeki H	16	25	3.2	647	33	2022
Valdez H	16	26	2.286	2007	26	2020

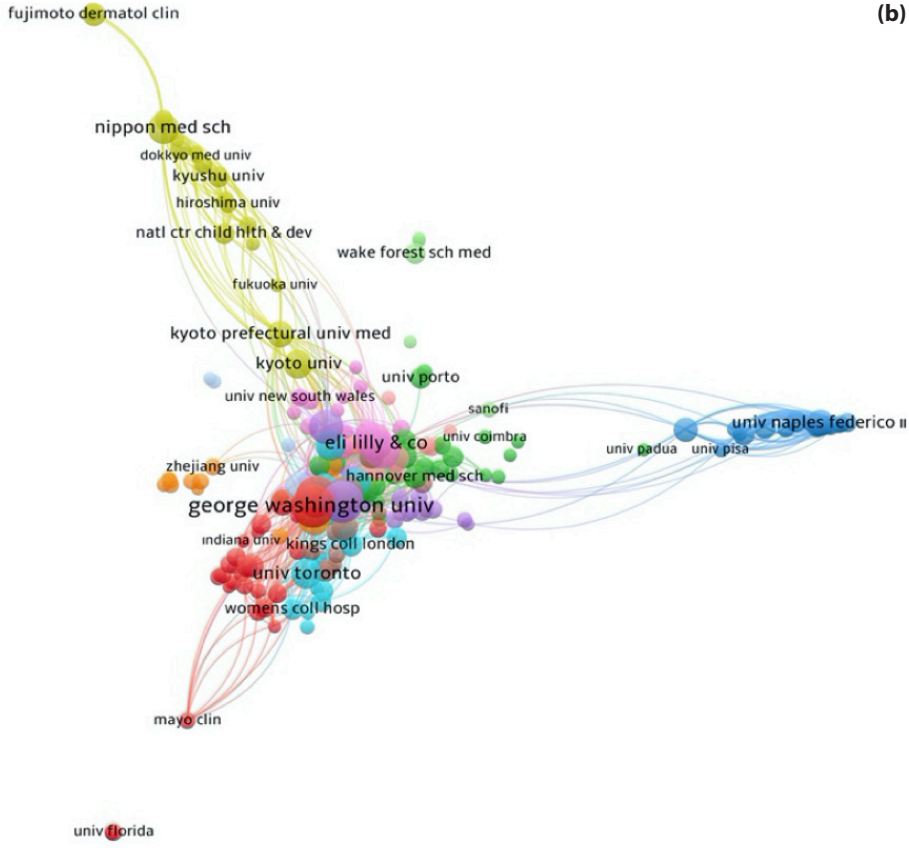
NP: Number of publications; PC: Publication count, defined as the total number of publications within the analysis period; PY start: Year of first publication; h-index: The maximum number h such that the author has published h papers, each cited at least h times; g-index: The largest number g such that the top g articles received at least g^2 citations in total; m-index: h-index divided by the number of years since the first publication.

(a)



VOSviewer

(b)



VOSviewer

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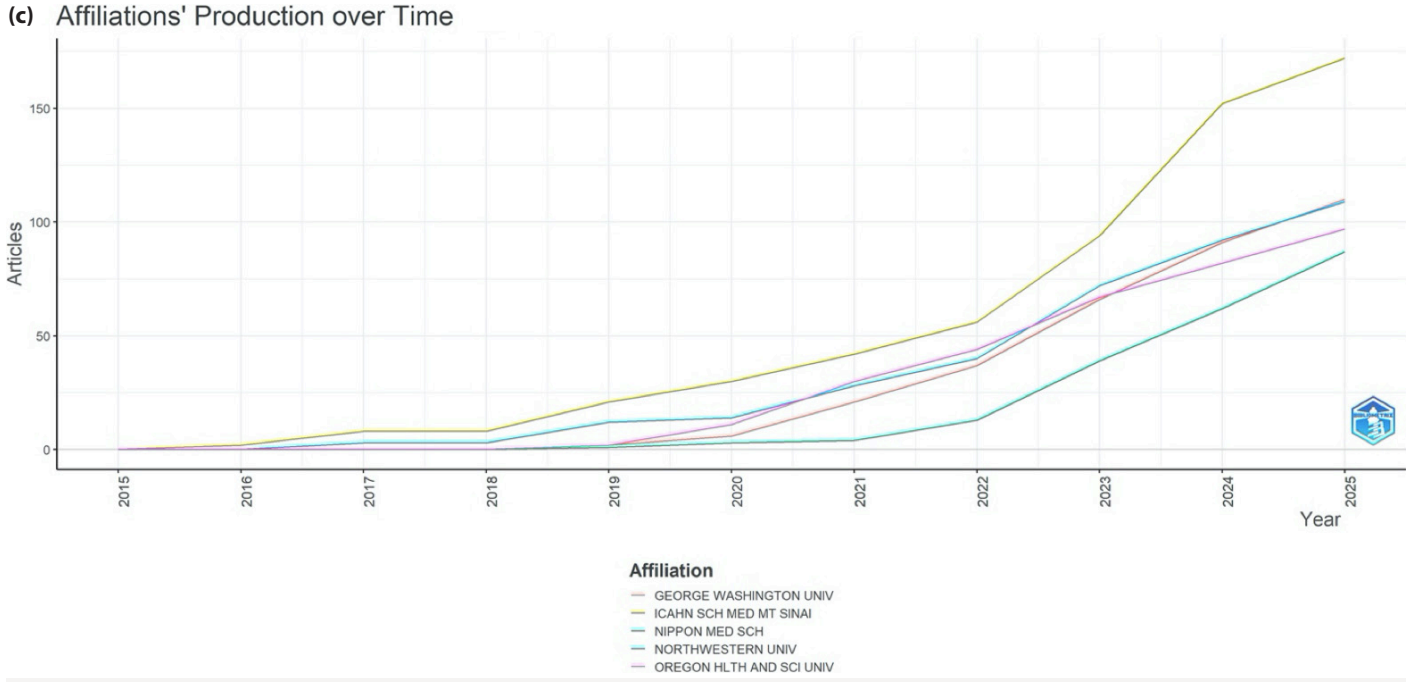


Figure 2. Connections between authors and institutions. **(a)** Co-authorship network analysis performed using VOSviewer; **(b)** co-institution network analysis performed using VOSviewer; **(c)** Affiliations' productivity over time analyzed using Biblioshiny.

and 184 authors. Within this network, Simpson EL emerged as the most influential author, contributing to four clusters, with 108 links and 4,894 citations, an h-index of 28, and a g-index of 60 (Table 1). Guttman-Yassky was ranked second in influence and was associated with eight clusters, 74 links, and 3,440 citations, with an h-index of 26 and a g-index of 43 (Table 1). The co-organization network analysis, which included organizations with five or more published papers and three or more citations (Fig. 2b), identified 12 clusters, 3,056 links, and 222 organizations. Oregon Health and Science University emerged as one of the most significant contributors to global collaborations and was associated with five clusters and 123 links. The Icahn School of Medicine had the highest number of publications, reaching approximately 175 by 2025 (Fig. 2c).

Country

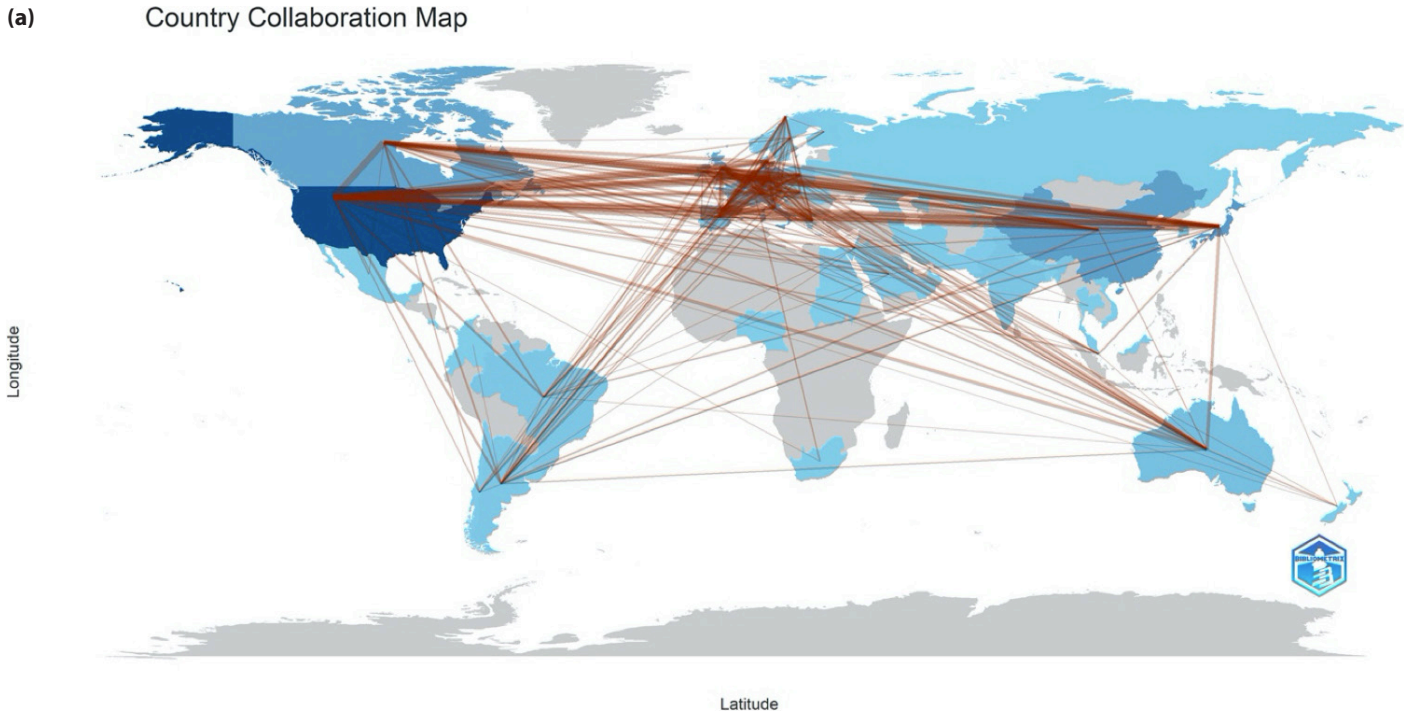
Collaborations among countries are illustrated on the world map (Fig. 3a). An inter-country collaboration network (Fig. 3b) was constructed by including countries with five or more published papers and three or more citations. The analysis identified six clusters, 410 links, and 41 countries. Within this network, the US emerged as the most collaborative country, contributing to all clusters, with 37 links and 518 documents. Germany was the second most collaborative country, with two clusters, 34 links, and 196 documents. The main corresponding authors' countries were the US, China, and Japan, respectively (Fig. 3c). The US produced the highest number of publications over the past decade, followed by Canada and Japan, demonstrating an upward trajectory with a marked increase in research output in recent years, reflecting growing interest in this field (Fig. 3d).

Keywords and Trend Topics

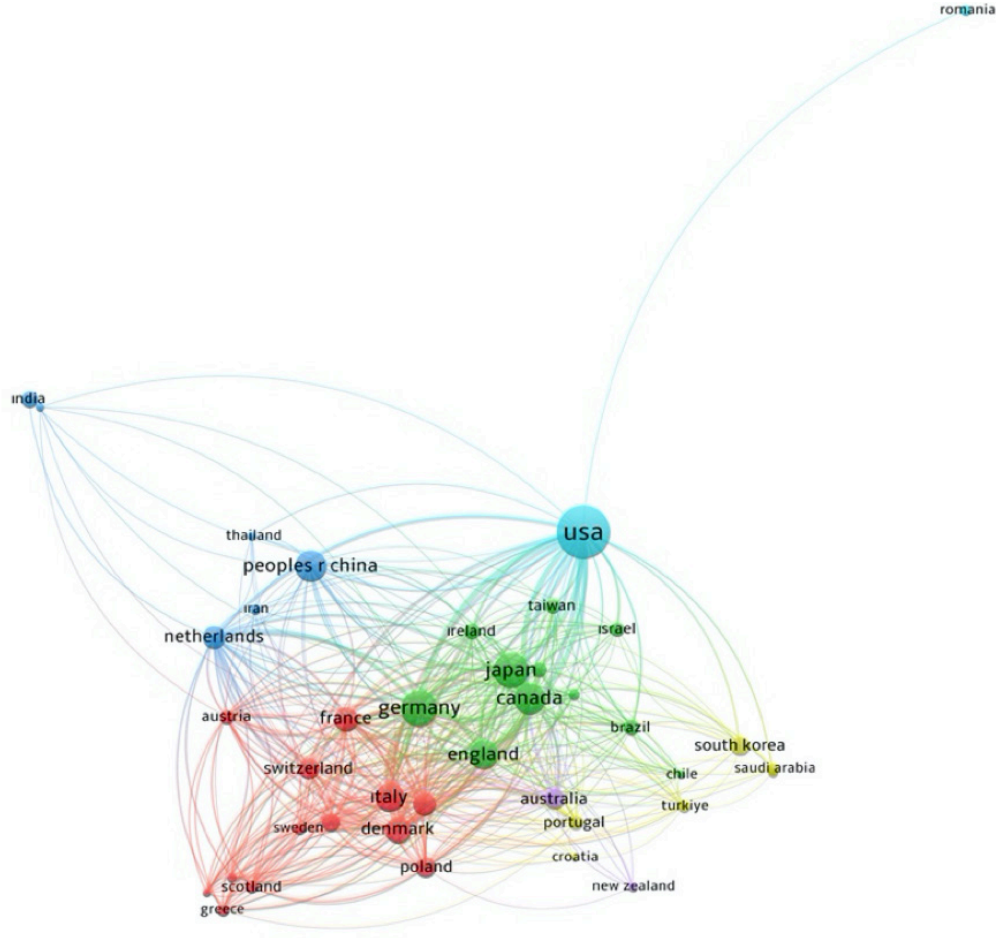
The keyword co-occurrence network analysis after synonym merging (Fig. 4a) generated 9 clusters with a total of 1,759 links, comprising 133 distinct keywords. Atopic dermatitis emerged as the most central and influential keyword, positioned at the core of the network with 129 co-occurrence links and 6 clusters. It demonstrated strong associations with JAK inhibitors, reflecting the pivotal role of these agents in current research trends. Among specific terms, upadacitinib, baricitinib, and eczema were also identified as highly frequent and strongly interconnected keywords, further highlighting the therapeutic and clinical relevance of JAK inhibition in AD research.

Keyword evolution analysis after removing irrelevant keywords and merging synonyms (Supplementary Material 1) revealed the frequency of occurrence of multiple key terms and their temporal trends (Fig. 4b). Research topics evolved from "hydrocortisone aceponate spray," which was the earliest focus, to "upadacitinib," "abrocitinib," and "phase 3 trials," which represent the latest focus. The analysis

(a)


Country Collaboration Map
Longitude
Latitude

(b)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VOSviewer

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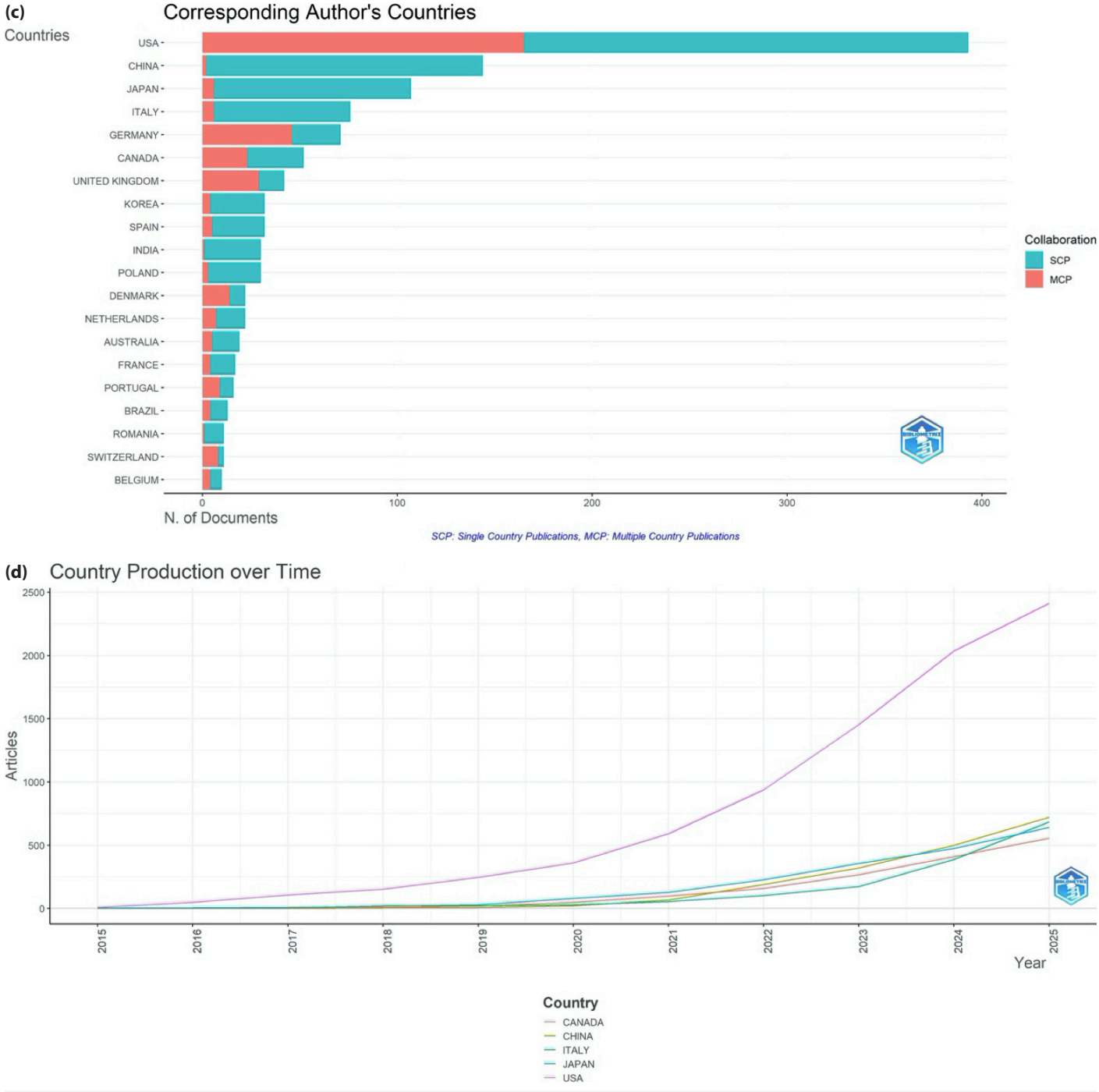
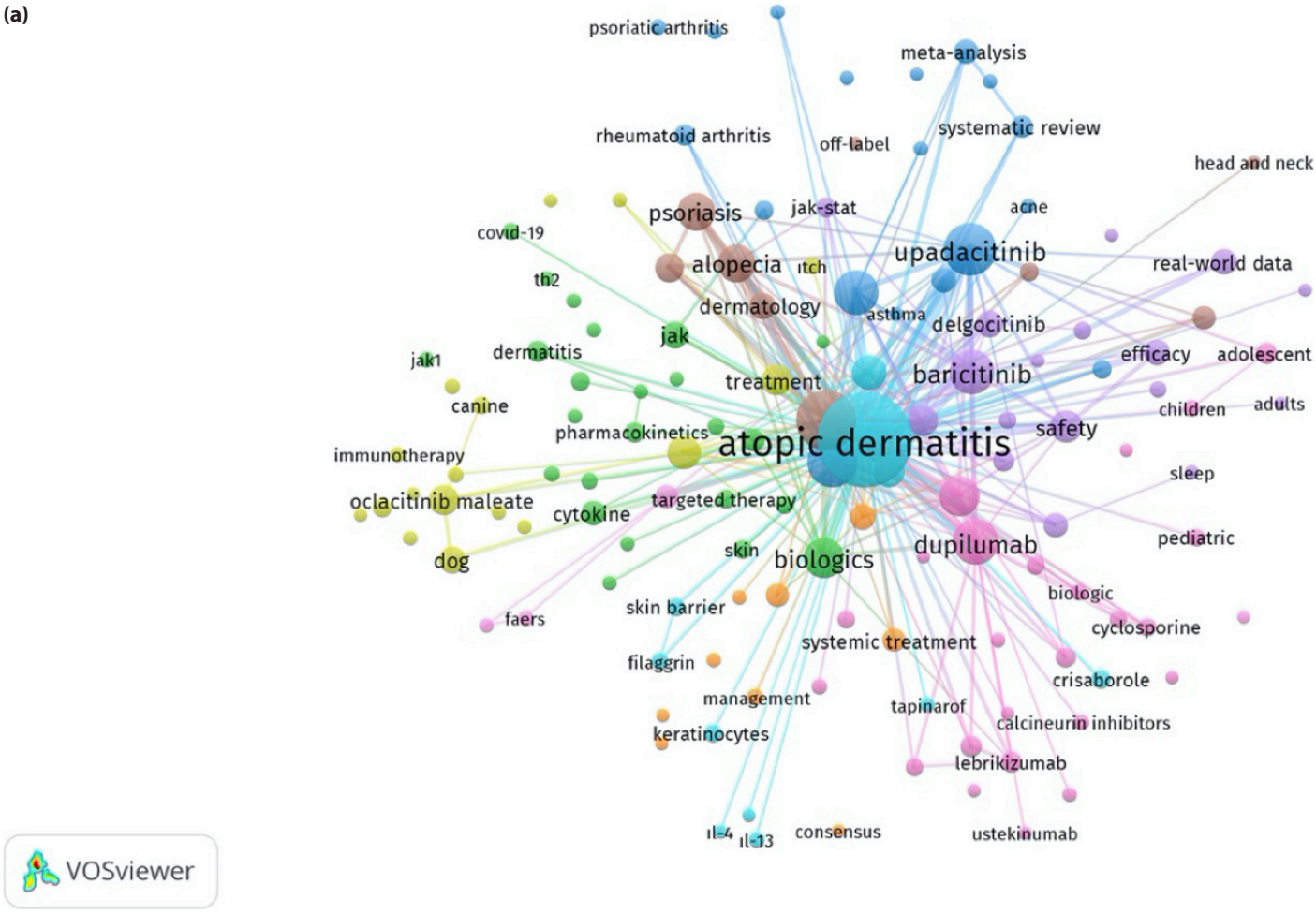


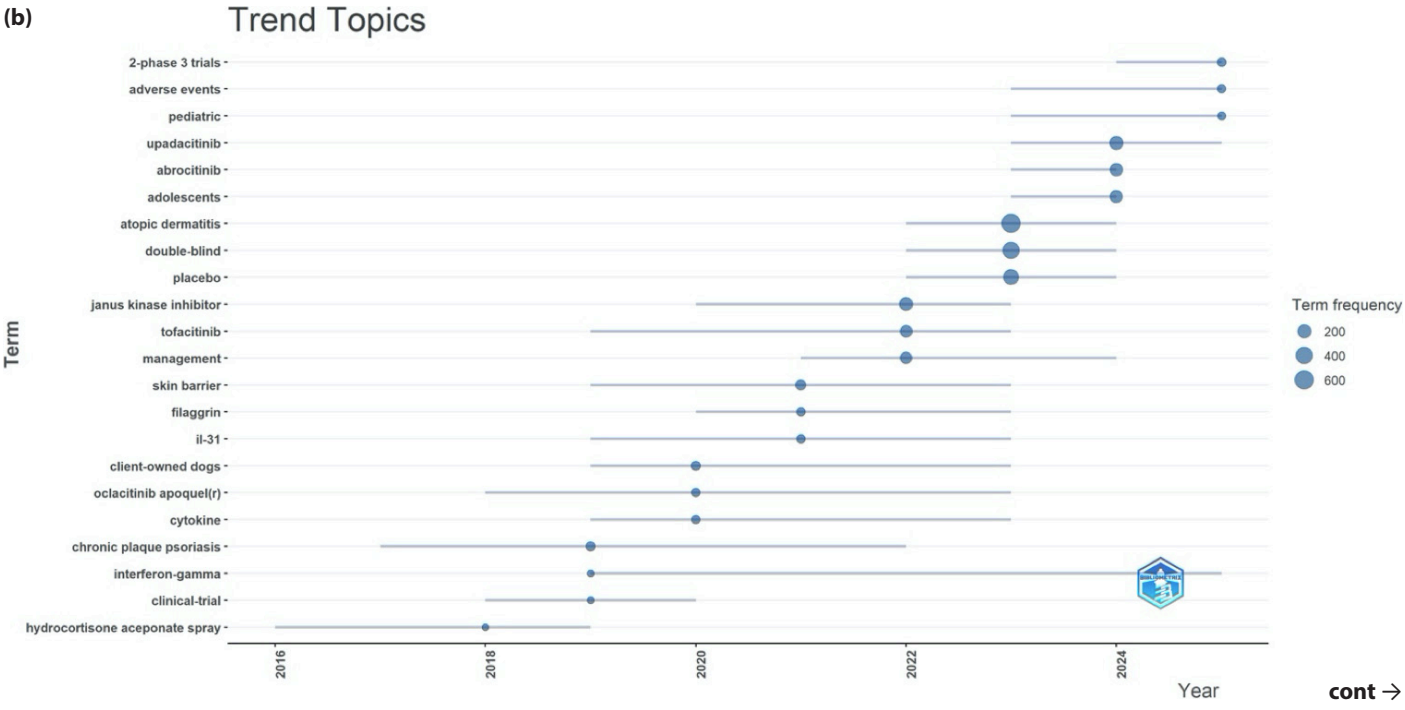
Figure 3. Country collaborations and research output. **(a)** Country collaborations shown on a world map and analyzed using Biblioshiny; **(b)** inter-country network analysis performed using VOSviewer; **(c)** corresponding authors' countries analyzed using Biblioshiny (pink: MCP, multiple-country publications; green: SCP, single-country publications); **(d)** countries' research output over time analyzed using Biblioshiny.

demonstrated that research on AD has shifted over time. Early studies predominantly focused on "filaggrin," "skin barrier," and "pruritus," reflecting an emphasis on disease pathophysiology. In contrast, more recent literature is characterized by the emergence of terms such as "JAK inhibitors," "atopic dermatitis," "double-blind," and "placebo,"

(a)


psoriatic arthritis
meta-analysis
rheumatoid arthritis
off-label
systematic review
head and neck
psoriasis
jak-stat
acne
covid-19
alopecia
itch
upadacitinib
real-world data
th2
dermatology
asthma
delgocitinib
jak
jak1
dermatitis
efficacy
adolescent
treatment
baricitinib
canine
children
adults
pharmacokinetics
atopic dermatitis
safety
immunotherapy
sleep
oclacitinib maleate
cytokine
targeted therapy
pediatric
dupilumab
skin
biologics
dog
biologic
skin barrier
faers
cyclosporine
systemic treatment
filaggrin
crisaborole
management
tapinarof
calcineurin inhibitors
keratinocytes
lebrikizumab
il-4
il-13
consensus
ustekinumab
VOSviewer

(b)


Trend Topics
2-phase 3 trials
adverse events
pediatric
upadacitinib
abrocitinib
adolescents
atopic dermatitis
double-blind
placebo
janus kinase inhibitor
tofacitinib
management
skin barrier
filaggrin
il-31
client-owned dogs
oclacitinib apoquel(r)
cytokine
chronic plaque psoriasis
interferon-gamma
clinical-trial
hydrocortisone aceponate spray
Term
2016
2018
2020
2022
2024
Year
Term frequency
200
400
600

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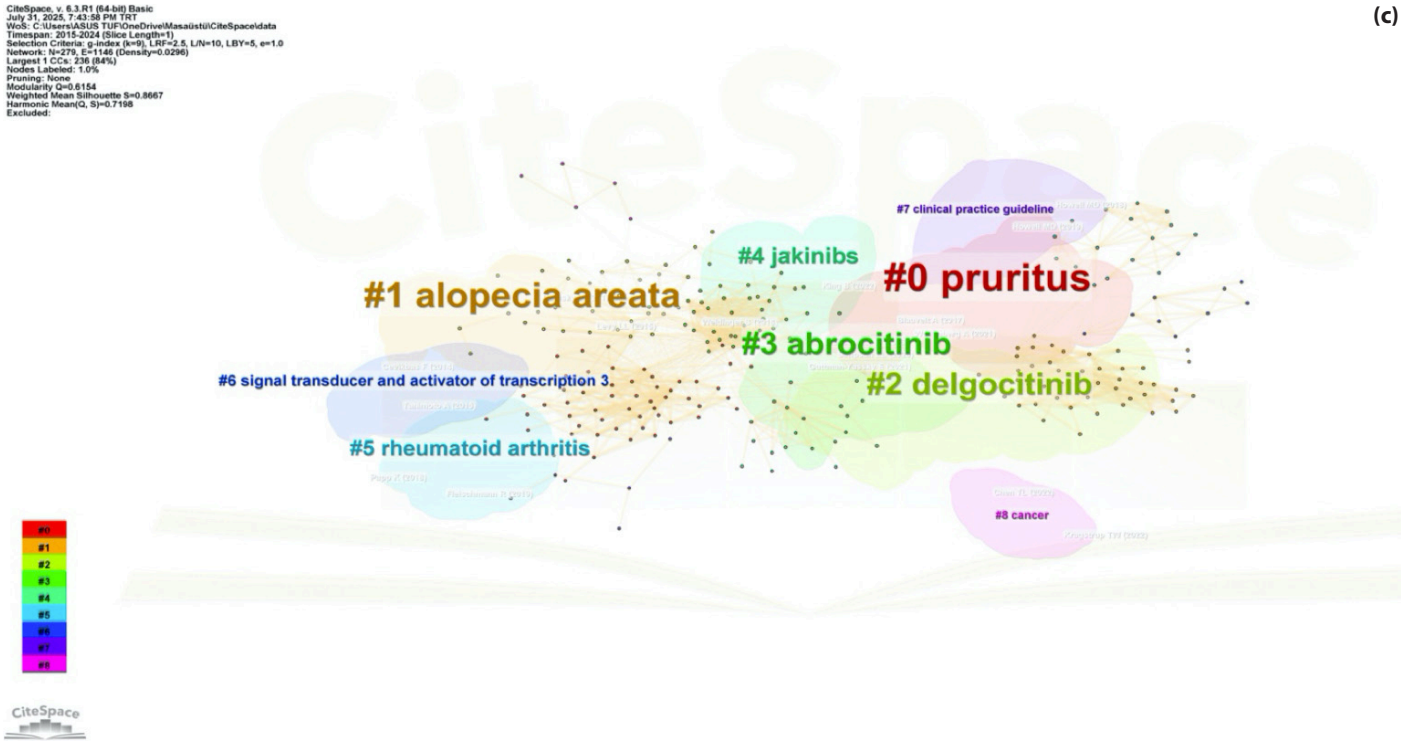


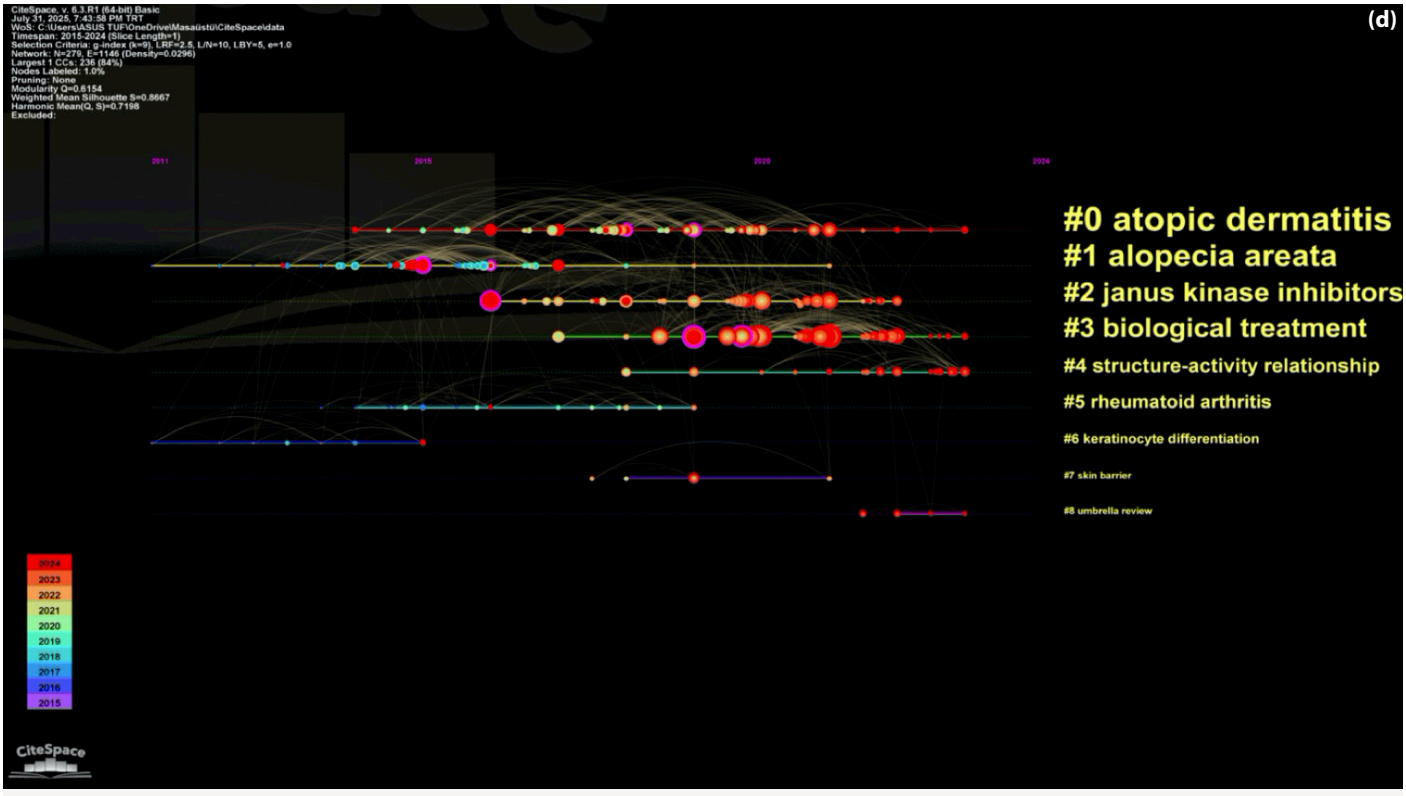


Figure 4. Keyword co-occurrence and evolution analyses. **(a)** Keyword co-occurrence analysis performed using VOSviewer; **(b)** Keyword evolution analysis performed using Biblioshiny; **(c)** Keyword co-occurrence clusters identified by CiteSpace in studies related to JAK inhibitors (2017–2024); **(d)** Temporal distribution of keyword clusters generated using CiteSpace.

Table 2. Most globally cited documents identified using biblioshiny

Paper	DOI	Total citations	TC per year	Normalized TC
Oetjen et al.[18]	10.1016/j.cell.2017.08.006	862	86.20	8.48
Xue et al.[19]	10.1038/s41392-023-01468-7	538	134.50	20.71
Bieber et al.[40]	10.1038/s41573-021-00266-6	491	98.20	13.16
Guttman-Yassky et al.[21]	10.1016/S0140-6736(21)00588-2	453	75.50	7.89
Blauvelt et al.[41]	10.1001/jamadermatol.2021.3023	425	70.83	7.40
Wollenberg et al.[42]	10.1111/jdv.14888	420	46.67	8.18
Simpson et al.[43]	10.1016/S0140-6736(20)30732-7	411	58.71	6.02
Tanaka et al.[44]	10.1038/s41584-021-00726-8	408	81.60	10.94
Damsky et al.[29]	10.1016/j.jaad.2016.12.005	396	39.60	3.90
Bieber et al.[45]	10.1056/NEJMoa2019380	379	63.17	6.60

TC per Year indicates the average number of citations received annually by each publication. Normalized TC represents citation counts adjusted for publication year to allow comparison between older and newer studies. DOI: Digital Object Identifier; NA: Not available; TC: Total citations.

indicating a transition toward clinical trials and therapeutic interventions, particularly randomized controlled studies. The keyword "adverse events" has appeared more frequently in recent years.

The cluster plot divided all keywords into nine categories. Pruritus and alopecia areata (AA) were the most frequently co-occurring keywords alongside AD, while delgocitinib and abrocitinib were the most commonly investigated JAK inhibitors (Fig. 4c). The timeline relationship of key clusters is shown in Figure 4d, with the current main focus being on "biological treatment" and "Janus kinase inhibitors."

References and Sources

The 10 most globally cited articles are shown in Table 2, indicating that, since 2015, research articles on AD published by Oetjen et al.[18] and Xue et al.[19] in Cell and Signal Transduction and Targeted Therapy, respectively, have been widely cited, with 862 and 538 global citations, respectively. Oetjen et al.[18] demonstrated that activation of the IL-4/IL-13 signaling axis and its downstream JAK1 pathway directly activates and sensitizes sensory neurons, playing a critical role in pruritus in patients with AD.[18] Xue et al.[19] demonstrated that JAK-STAT dysregulation, particularly JAK1 signaling, contributes to AD by promoting Th2 inflammation and pruritus.

The bibliographic coupling analysis of sources (Fig. 5a) included journals with at least three published papers and one or more citations. The co-cited journal network revealed 5 clusters connected by 4,970 links, comprising a total of 104 journals. Figure 5b displays the 20 documents with the highest burst citation intensity. Among them, "Bissonnette R, 2016" achieved the highest burst value (22.84) during 2017–2021. The article evaluated the efficacy and tolerability of topical tofacitinib in patients with mild-to-moderate AD, demonstrating significant improvements across endpoints with an early onset.[20]

The three-field plot (Fig. 5c) illustrates that landmark clinical trials, such as those by Guttman-Yassky et al.[21] in The Lancet in 2021 and Reich et al.[22] in The Lancet in 2021, were predominantly authored by Guttman-Yassky, Simpson, and Silverberg and focused on topics such as AD, dupilumab, and JAK inhibitors.[21,22] The dense connections reflect growing research interest in RCTs evaluating JAK inhibitors in comparison with placebo or dupilumab for the treatment of AD. The most frequently cited journals were The Lancet, The New England Journal of Medicine, The British Journal of Dermatology, and JAMA Dermatology, indicating that highly influential publications in this field predominantly appeared in high-impact clinical journals. Dermatology and Therapy published the highest number of studies in this field, with a marked increase observed after 2023. It was followed by the Journal of Dermatological Treatment (Fig. 5d).

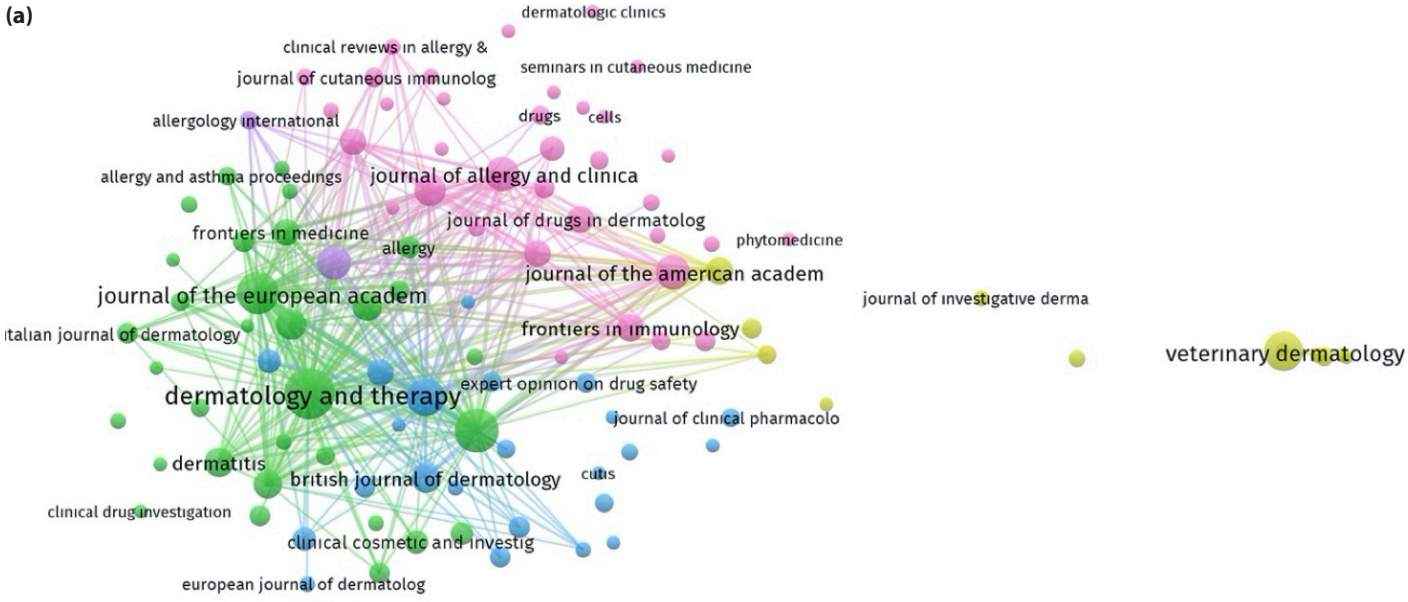
DISCUSSION

This bibliometric study is the first to comprehensively evaluate global research trends on JAK inhibitors in AD between 2015 and 2025. The findings indicate a marked increase in scientific output after 2020, closely associated with the growing clinical relevance and therapeutic use of JAK inhibitors in dermatology. Based on keyword, burst, and cluster analyses, the following major research themes were identified.

Pathophysiology and Skin Barrier Dysfunction

Early research activities centered on the fundamental mechanisms underlying AD, with an emphasis on epidermal barrier dysfunction, immune dysregulation, and pruritus. Keywords such as filaggrin, itch, and skin barrier dominated

(a)



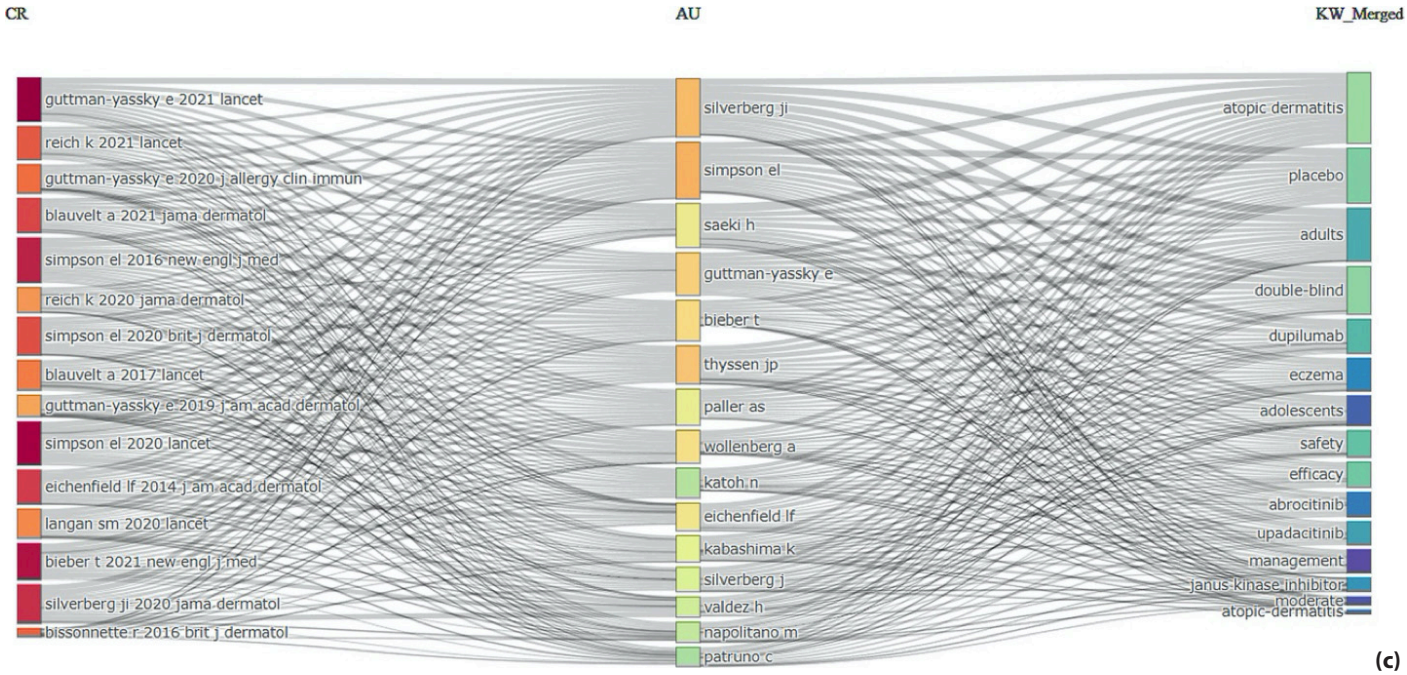
VOSviewer

(b)

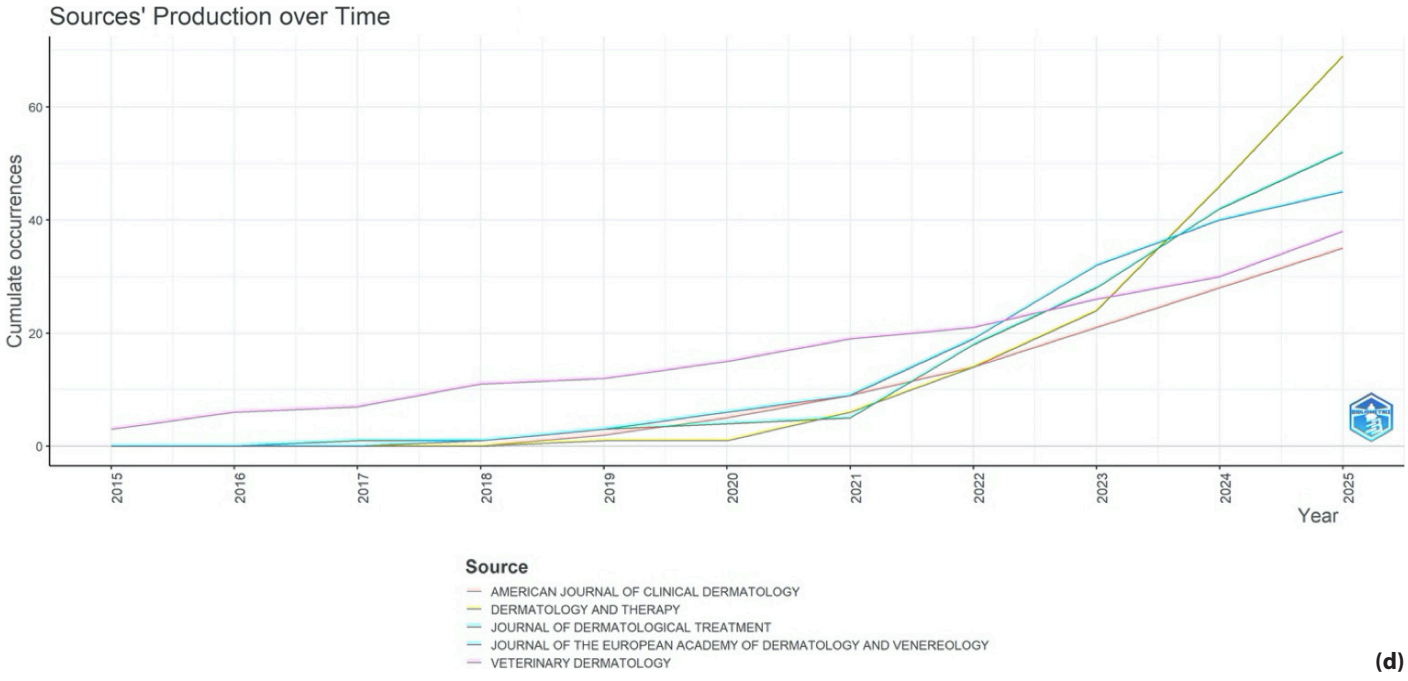
Top 20 References with the Strongest Citation Bursts

References	Year	Strength	Begin	End	2015 - 2024
Bissonnette R, 2015, BRIT J DERMATOL, V172, P1395, DOI 10.1111/bjd.13551, DOI	2015	6.01	**2015**	2019	
Beck LA, 2014, NEW ENGL J MED, V371, P130, DOI 10.1056/NEJMoa1314768, DOI	2014	4.91	**2015**	2019	
Bao Lei, 2013, JAKSTAT, V2, Pe24137, DOI 10.4161/jkst.24137, DOI	2013	4.86	**2015**	2018	
Tanimoto A, 2015, INFLAMM RES, V64, P41, DOI 10.1007/s00011-014-0782-9, DOI	2015	4.6	**2015**	2020	
Levy LL, 2015, J AM ACAD DERMATOL, V73, P395, DOI 10.1016/j.jaad.2015.06.045, DOI	2015	15.87	**2016**	2020	
Bachelez H, 2015, LANCET, V386, P552, DOI 10.1016/S0140-6736(14)62113-9, DOI	2015	11.02	**2016**	2019	
Papp KA, 2016, BRIT J DERMATOL, V174, P1266, DOI 10.1111/bjd.14403, DOI	2016	6.98	**2016**	2019	
Papp KA, 2015, BRIT J DERMATOL, V173, P949, DOI 10.1111/bjd.14018, DOI	2015	4.94	**2016**	2019	
Genovese MC, 2016, NEW ENGL J MED, V374, P1243, DOI 10.1056/NEJMoa1507247, DOI	2016	2.77	**2016**	2020	
Bissonnette R, 2016, BRIT J DERMATOL, V175, P902, DOI 10.1111/bjd.14871, DOI	2016	22.84	**2017**	2021	
Amano W, 2015, J ALLERGY CLIN IMMUN, V136, P667, DOI 10.1016/j.jaci.2015.03.051, DOI	2015	11.83	**2017**	2020	
Simpson EL, 2016, NEW ENGL J MED, V375, P2335, DOI 10.1056/NEJMoa1610020, DOI	2016	10.48	**2017**	2021	
Nakagawa H, 2018, BRIT J DERMATOL, V178, P424, DOI 10.1111/bjd.16014, DOI	2018	8.88	**2018**	2021	
Guttman-Yassky E, 2018, J AM ACAD DERMATOL, V78, P872, DOI 10.1016/j.jaad.2018.01.016, DOI	2018	8.69	**2018**	2021	
Simpson EL, 2018, J AM ACAD DERMATOL, V78, P863, DOI 10.1016/j.jaad.2018.01.017, DOI	2018	7.75	**2018**	2021	
Blauvelt A, 2017, LANCET, V389, P2287, DOI 10.1016/S0140-6736(17)31191-1, DOI	2017	6.46	**2018**	2022	
Damsky W, 2017, J AM ACAD DERMATOL, V76, P736, DOI 10.1016/j.jaad.2016.12.005, DOI	2017	5.43	**2018**	2022	
Tanimoto A, 2018, EXP DERMATOL, V27, P22, DOI 10.1111/exd.13370, DOI	2018	4.69	**2018**	2021	
Cotter DG, 2018, J AM ACAD DERMATOL, V78, PS53, DOI 10.1016/j.jaad.2017.12.019, DOI	2018	2.63	**2018**	2021	
Guttman-Yassky E, 2019, J AM ACAD DERMATOL, V80, P913, DOI 10.1016/j.jaad.2018.01.018, DOI	2019	5.94	**2019**	2022	

cont →



(c)



(d)

Figure 5. Source and citation analyses. **(a)** Co-cited journal network analysis performed using VOSviewer; **(b)** top 20 articles with citation bursts calculated using CiteSpace; **(c)** three-field plot illustrating relationships among the most cited references (CR), leading authors (AU), and frequently used keywords (KW), generated using Biblioshiny; **(d)** sources' production over time analyzed using Biblioshiny.

the literature between 2018 and 2024. The pathophysiology of AD is complex and has not yet been fully elucidated; however, it is critically influenced by three intersecting factors: dysregulation of the immune response, barrier dysfunction, and pruritus. Innate immune cells, including Th2 cells, type 2 innate lymphoid cells, and basophils, collectively produce key Th2 cytokines such as IL-4, IL-5, IL-13, and IL-31 in lesional skin.[23] Skin barrier dysfunction in AD results from filaggrin

mutations and cytokine-mediated suppression of barrier proteins. IL-4, IL-13, and IL-22 reduce filaggrin, involucrin, and loricrin expression, impairing epidermal integrity. Barrier injury triggers keratinocyte-derived IL-25, IL-33, and thymic stromal lymphopoietin (TSLP), activating Th2/Th17/Th22 and ILC2 responses that sustain inflammatory cytokine production and perpetuate chronic inflammation and barrier failure.[24,25] Chronic pruritus, defined as itch lasting more than 6 weeks, is a cardinal feature of AD, and research on this subject has increased markedly over the past decade. Scratching exacerbates barrier damage and contributes to the itch-scratch cycle. IL-31 directly induces pruritus, while IL-4 and IL-13 enhance neuronal activation and itch signaling.[26]

JAK Inhibitors

The therapeutic landscape of AD has evolved considerably over time, shifting from conventional corticosteroids to advanced biologic therapies, with particular emphasis on JAK inhibitors. The JAK-STAT pathway, a key mediator of cytokine signaling, involves JAK1, JAK2, JAK3, and TYK2, which activate STATs to regulate gene expression. Given the Th2-dominant nature of AD, JAK-STAT signaling is central to Th2 differentiation, providing a strong rationale for targeting this pathway with JAK inhibitors.[27]

Tofacitinib represents the first small molecule developed as a selective inhibitor of JAKs.[28] First-generation JAK inhibitors include tofacitinib, ruxolitinib, baricitinib, and oclacitinib, whereas second-generation inhibitors include upadacitinib, deucravacitinib, and abrocitinib.[29] Delgocitinib cream represents an emerging JAK inhibitor that has been increasingly highlighted in recent clinical studies for its efficacy in AD, particularly in patients with chronic hand eczema refractory to conventional topical corticosteroid therapy.[30,31] In recent years, ruxolitinib, particularly in its topical formulation, has emerged as a major focus of research and clinical interest in the management of AD. Clinical trials have demonstrated that topical ruxolitinib provides rapid and sustained relief of pruritus while exerting potent anti-inflammatory effects, thereby improving both objective disease severity scores and patient-reported outcomes. Importantly, long-term extension studies have confirmed its favorable safety profile, with low rates of application-site reactions and minimal systemic absorption, supporting its role as a safe and effective option for chronic use in patients with mild-to-moderate AD.[32] The emergence of topical agents such as ruxolitinib cream and delgocitinib reflects a growing trend toward safer and more localized treatment options.

Other Dermatologic Diseases

In the bibliometric analysis, AA emerged as one of the most frequently co-occurring keywords alongside AD. This finding reflects the increasing research overlap between these two immune-mediated skin diseases.[33] Epidemiological studies have demonstrated that individuals with AD are at higher risk of developing a broad spectrum of autoimmune comorbidities.[34] A comprehensive meta-analysis of 26 cohort studies, encompassing more than 1.6 million patients with AD and more than 15 million controls, demonstrated a significant association between AD and autoimmune diseases overall (HR=1.49; 95% CI=1.31–1.70), with statistically strong links to AA, celiac disease, rheumatoid arthritis, vitiligo, systemic lupus erythematosus, Sjogren disease, ulcerative colitis, and thyroid dysfunction.[35] Although AA is primarily mediated by Th1 pathways and AD by Th2 pathways, the two conditions are interrelated and share overlapping pathophysiologic mechanisms involving Th1, Th2, Th17, and Th22 imbalance. These converging mechanisms may partly explain their observed clinical coexistence and provide a rationale for investigating targeted immunomodulatory therapies that could potentially benefit both disorders. Beyond AD, JAK inhibitors have demonstrated efficacy in several other dermatologic disorders, highlighting their broad therapeutic potential. In psoriasis, both oral and topical JAK inhibitors have been shown to reduce disease severity by targeting cytokine signaling pathways central to disease pathogenesis, including IL-23, IL-17, and interferon signaling.[34] In both phase II and pivotal phase III trials, topical ruxolitinib 1.5% cream demonstrated significant efficacy in promoting repigmentation in patients with vitiligo.[36] These findings highlight the therapeutic versatility of JAK inhibition and indicate a paradigm shift toward targeted immune modulation.

Side Effects and Safety Profile

JAK inhibitors have demonstrated robust efficacy in the treatment of AD; however, their use is associated with an increased risk of specific infections and laboratory abnormalities. Although the potential risk of malignancy with JAK inhibitors has emerged as a growing concern, a recent network meta-analysis by Russell et al.[37] reported no increased risk of cancer compared with placebo or other agents, with a higher risk observed only in comparison with tumor necrosis factor inhibitors. Despite these findings, uncertainties regarding long-term safety persist and require cautious interpretation. Accordingly, appropriate patient selection, vigilant clinical and laboratory monitoring, and a shared decision-making approach are critical for optimizing therapeutic outcomes. Among adverse events, acne was identified as the most frequently reported side effect in the included studies.[38] This signal has been increasingly recognized in recent literature and may warrant further investigation as a potential class-related safety concern.

The use of JAK inhibitors in patients with AD has been associated with a modestly increased risk of thromboembolic events, including pulmonary embolism and deep vein thrombosis, compared with agents such as dupilumab and methotrexate.[39] Although the absolute risk remains relatively low, these observations highlight the importance of individualized patient selection, particularly in patients with pre-existing cardiovascular or thrombotic risk factors.

The broad immunomodulatory effects of JAK inhibitors require careful monitoring for potential side effects. Although JAK inhibitors are highly effective in the management of AD, clinicians must remain cautious regarding the potential for serious adverse events. The decision to initiate therapy should be individualized, with careful consideration of patient-specific risk factors. Before treatment initiation, appropriate screening for comorbidities and risk profiles is essential to ensure the safe and optimized use of these agents.

Limitations

This analysis was restricted to English-language publications and the WoSCC database, which may have resulted in the exclusion of relevant studies published in other languages or indexed in other databases, such as PubMed and Embase. Bibliometric analysis provides only quantitative data and does not assess the quality or methodological rigor of the studies. Moreover, citation-based metrics are time-dependent, favoring older articles and potentially underestimating the impact of newer research.

CONCLUSION

This bibliometric analysis provides a comprehensive overview of global research trends on JAK inhibitors in AD. The findings reveal a significant increase in scientific output and international collaboration. Although the efficacy of these agents has been well established, careful evaluation of their long-term safety and risk-benefit balance, as well as personalization of treatment, remains crucial. Overall, this study delineates the intellectual structure of research on JAK inhibitors, identifies emerging focus areas, and provides researchers with a roadmap for future investigations.

Ethics Committee Approval: Ethical approval is not required, as this study is an analysis of published literature.

Informed Consent: Written informed consent is not required, as this study is an analysis of published literature.

Conflict of Interest: The authors have no conflicts of interest to declare.

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Supplementary Material

For the statistical analysis of keyword trends using Biblioshiny, we removed irrelevant keywords and merged synonyms to improve the readability and accuracy of the results.

Removed: pde4 inhibitor, apremilast, ustekinumab

Synonyms:

clinical trial, trial
clinical trial, controlled-trial
chronic plaque psoriasis, to-severe psoriasis
skin barrier, barrier
tofacitinib, tofacitinib citrate

In VOSviewer, during the co-occurrence analysis of keywords, we merged synonyms to improve the consistency and accuracy of the results.

label	replaced by
adolescents	adolescent
adverse effects	adverse event
adverse events	adverse event
alopecia areata	alopecia
alopecia universalis	alopecia
atopic	atopic dermatitis
atopic eczema	atopic dermatitis
biological therapy	biologics
clinical trials	clinical trial
cytokines	cytokine
dogs	dog
eczema area and severity index	EASI
eczema area and severity ındex	EASI
effectiveness	efficacy
jak inhibitor	jak-inhibitor
jak inhibitors	jak-inhibitor
jakinibs	jak-inhibitor
keratinocyte	keratinocytes
janus kinase	janus kinases
janus kinase inhibitor	janus kinase inhibitors
therapeutics	therapy
targeted therapies	targeted therapy
systemic therapy	systemic treatment
oclacitinib	oclacitinib maleate
real-world	real-world data
real-world evidence	real-world data
stat	stat pathway