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Bibliometric Trends in Nail Psoriasis Research Publications

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Keywords
Nail psoriasis · Bibliometric analysis · Citation · Impact factor · Scopus

Abstract
Introduction: Bibliometric analysis provides an objective assessment of current research patterns and highlights the impact of selected publications in any given scientific discipline. ***Methods:*** We sought to provide information about dynamic research trends in nail psoriasis by analyzing the 50 most cited articles on this topic, which were identified utilizing the Scopus citation database. ***Results:*** The median number of citations was 79 (range, 60–337) per article. Publication dates ranged from 1969 to 2020, while the majority of articles (46%) were published between 2000 and 2009. The top 50 highly cited articles were published in 19 different journals, with a median impact factor of 5.248 (range, 1.022–16.102). The *British Journal of Dermatology* published the greatest number of highly cited articles ($n = 9$). Most publications were original articles, and most cited research topics included medical treatment and correlation of nail psoriasis with psoriatic arthritis. Most publications originated from the USA and UK, while Phoebe Rich and Dennis McGonagle were the two most contributing authors. ***Conclusion:*** This analysis provides information about emerging bibliometric trends and may guide future research in the field of nail psoriasis.

Introduction/Literature Review

Citation analysis is a quantitative bibliometric method that utilizes citation data, providing an objective assessment of current research patterns and the impact of selected publications in any given scientific discipline. Although the number of citations is not necessarily equivalent to the scientific quality, it often underlines new findings and research trends and indicates the growing interest of researchers in a particular area [1]. To date, published bibliometric analyses in psoriasis and psoriatic arthritis (PsA) could highlight the significant scientific progress made in this area over the last decades [2–4]. In the present study, we performed a bibliometric analysis to identify and analyze the top 50 most cited articles in nail psoriasis, aiming to provide information about dynamic research trends, so as to address the current bibliometric literature gap and guide future research.

Materials and Methods

The Scopus citation database (www.scopus.com) was searched on May 21, 2021 using the search term "nail psoriasis," with no restrictions on year, language, and document type. Two independent reviewers retrieved relevant articles after evaluation of titles and abstracts. The resulting articles were ranked in descending order based on the citation count, and the first 50 were chosen for full text review and extraction of following data: authorship, country of origin, year of publication, journal and its impact factor (IF,

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Table 1. Fifty most cited articles in nail psoriasis

Rank	Title	Design	Total citations
1	Rich P, Scher RK. Nail psoriasis severity index: a useful tool for evaluation of nail psoriasis. *J Am Acad Dermatol*. 2003;49(2):206–12	Survey	337
2	Jiaravuthisan MM, Sasseville D, Vender RB, Murphy F, Muhn CY. Psoriasis of the nail: anatomy, pathology, clinical presentation, and a review of the literature on therapy. *J Am Acad Dermatol*. 2007;57(1):1–27	CME	266
3	Jones SM, Armas JB, Cohen MG, Lovell CR, Evison G, Mchugh NJ. Psoriatic arthritis: outcome of disease subsets and relationship of joint disease to nail and skin disease. *Rheumatology*. 1994;33(9):834–9	Cohort	258
4	De Jong EM, Seegers BA, Gulinck MK, Boezeman JB, Van de Kerkhof PC. Psoriasis of the nails associated with disability in a large number of patients: results of a recent interview with 1,728 patients. *Dermatology*. 1996;193(4):300	Survey	230
5	Mease PJ. Measures of psoriatic arthritis: tender and swollen joint assessment, psoriasis area and severity index (PASI), nail psoriasis severity index (NAPSI), modified nail psoriasis severity index (mNAPSI), mander/newcastle enthesitis index (MEI), leeds enthesitis index (LEI), spondyloarthritis research consortium of Canada (SPARCC), maastricht ankylosing spondylitis enthesis score (MASES), leeds dactylitis index (LDI), patient global for psoriatic arthritis, dermatology life quality index (DLQI), psoriatic arthritis quality of Life (PsAQOL), functional assessment of chronic illness therapy-fatigue (FACIT-F), psoriatic arthritis response criteria (PsARC), psoriatic arthritis joint activity index (PsAJAI), disease activity in psoriatic arthritis (DAPSA), and composite psoriatic disease activity index (CPDAI). *Arthritis Care Res*. 2011;63(Suppl 11):S64–85	Review	189
6	Tan AL, Benjamin M, Toumi H, Grainger AJ, Tanner SF, Emery P, et al. The relationship between the extensor tendon enthesis and the nail in distal interphalangeal joint disease in psoriatic arthritis – a high-resolution MRI and histological study. *Rheumatology*. 2007;46(2):253–6	Cohort	179
7	Williamson L, Dalbeth N, Dockerty JL, Gee BC, Weatherall R, Wordsworth BP. Extended report: nail disease in psoriatic arthritis – clinically important, potentially treatable and often overlooked. *Rheumatology*. 2004;43(6):790–4	Cohort	147
8	Mahrle G, Schulze HJ, Färber L, Weidinger G, Steigleder GK. Low-dose short-term cyclosporine versus etretinate in psoriasis: improvement of skin, nail, and joint involvement. *J Am Acad Dermatol*. 1995;32(1):78–88	RCT	136
9	Rich P, Griffiths CEM, Reich K, Nestle FO, Scher RK, Li S, et al. Baseline nail disease in patients with moderate to severe psoriasis and response to treatment with infliximab during 1 year. *J Am Acad Dermatol*. 2008;58(2):224–31	RCT	135
10	Augustin M, Reich K, Blome C, Schäfer I, Laass A, Radtke MA. Nail psoriasis in Germany: epidemiology and burden of disease. *Br J Dermatol*. 2010;163(3):580–5	Survey	134
11	Cassell SE, Bieber JD, Rich P, Tutuncu ZN, Lee SJ, Kalunian KC, et al. The modified nail psoriasis severity index: validation of an instrument to assess psoriatic nail involvement in patients with psoriatic arthritis. *J Rheumatol*. 2007;34(1):123–9	Cohort	125
12	Zaias N. Psoriasis of the nail: a Clinical-Pathologic Study. *Arch Dermatol*. 1969;99(5):567–9	Cohort	125
13	McGonagle D. Enthesitis: an autoinflammatory lesion linking nail and joint involvement in psoriatic disease. *J Eur Acad Dermatol Venereol*. 2009;23(Suppl 1):9–13	Review	124
14	McGonagle D, Tan AL, Benjamin M. The nail as a musculoskeletal appendage – implications for an improved understanding of the link between psoriasis and arthritis. *Dermatology*. 2009;218(2):97–102	Review	113
15	Van Den Bosch F, Manger B, Goupille P, McHugh N, Rødevand E, Holck P, et al. Effectiveness of adalimumab in treating patients with active psoriatic arthritis and predictors of good clinical responses for arthritis, skin and nail lesions. *Ann Rheum Dis*. 2010;69(2):394–9	Cohort	106
16	Salomon J, Szepietowski JC, Proniewicz A. Psoriatic nails: a Prospective Clinical Study. *J Cutan Med Surg*. 2003;7(4):317–21	Cohort	103
17	Ash ZR, Tinazzi I, Castillo-Gallego C, Kwok C, Wilson C, Goodfield M, et al. Psoriasis patients with nail disease have a greater magnitude of underlying systemic subclinical enthesopathy than those with normal nails. *Ann Rheum Dis*. 2012;71(4):553–6	Cohort	97
18	Tosti A, Piraccini BM, Cameli N, Kokely F, Plozzer C, Cannata GE, et al. Calcipotriol ointment in nail psoriasis: a controlled double-blind comparison with betamethasone dipropionate and salicylic acid. *Br J Dermatol*. 1998;139(4):655–9	RCT	95
19	Scher RK, Stiller M, Isabel Zhu Y. Tazarotene 0.1% gel in the treatment of fingernail psoriasis: a double-blind, randomized, vehicle-controlled study. *Cutis*. 2001;68(5):355–8	RCT	91
20	Gutierrez M, Wortsman X, Filippucci E, De Angelis R, Filosa G, Grassi W. High-frequency sonography in the evaluation of psoriasis: nail and skin involvement. *J Ultrasound Med*. 2009;28(11):1569–74	Cohort	90

Table 1 (continued)

Rank	Title	Design	Total citations
21	Aydin SZ, Castillo-Gallego C, Ash ZR, Marzo-Ortega H, Emery P, Wakefield RJ, et al. Ultrasonographic assessment of nail in psoriatic disease shows a link between onychopathy and distal interphalangeal joint extensor tendon enthesopathy. *Dermatology*. 2013;225(3):231–5	Cohort	88
22	Tosti A, Ricotti C, Romanelli P, Cameli N, Piraccini BM. Evaluation of the efficacy of acitretin therapy for nail psoriasis. *Arch Dermatol*. 2009;145(3):269–71	Cohort	85
23	Chandran V, Gottlieb A, Cook RJ, Duffin KC, Garg A, Helliwell P, et al. International multicenter psoriasis and psoriatic arthritis reliability trial for the assessment of skin, joints, nails, and dactylitis. *Arthritis Care Res*. 2009;61(9):1235–42	Survey	80
24	Rich P, Gooderham M, Bachelez H, Goncalves J, Day RM, Chen R, et al. Apremilast, an oral phosphodiesterase 4 inhibitor, in patients with difficult-to-treat nail and scalp psoriasis: results of 2 phase III randomized, controlled trials (ESTEEM 1 and ESTEEM 2). *J Am Acad Dermatol*. 2016;74(1):134–42	RCT	79
25	Luger TA, Barker J, Lambert J, Yang S, Robertson D, Foehl J, et al. Sustained improvement in joint pain and nail symptoms with etanercept therapy in patients with moderate-to-severe psoriasis. *J Eur Acad Dermatol Venereol*. 2009;23(8):896–904	RCT	79
26	De Berker DA, Lawrence CM. A simplified protocol of steroid injection for psoriatic nail dystrophy. *Br J Dermatol*. 1998;138(1):90–5	Cohort	79
27	Baran R. The burden of nail psoriasis: an introduction. *Dermatology*. 2010;221(Suppl 1):1–5	Review	77
28	Lawry M. Biological therapy and nail psoriasis. *Dermatol Ther*. 2007;20(1):60–67	Review	77
29	De Berker D. Management of nail psoriasis. *Clin Exp Dermatol*. 2000;25(5):357–62	Review	77
30	Wozel G. Psoriasis treatment in difficult locations: scalp, nails, and intertriginous areas. *Clin Dermatol*. 2008;26(5):448–59	Review	76
31	Reich K. Approach to managing patients with nail psoriasis. *J Eur Acad Dermatol Venereol*. 2009;23(Suppl 1):15–21	Review	75
32	Wortsman X, Jemec GBE. Ultrasound imaging of nails. *Dermatol Clin*. 2006;24(3):323–8	Review	73
33	Cannavò SP, Guarneri F, Vaccaro M, Borgia F, Guarneri B. Treatment of psoriatic nails with topical cyclosporin: a prospective, randomized placebo-controlled Study. *Dermatology*. 2003;206(2):153–6	RCT	72
34	Rigopoulos D, Gregoriou S, Stratigos A, Larios G, Korfitis C, Papaioannou D, et al. Evaluation of the efficacy and safety of infliximab on psoriatic nails: an unblinded, nonrandomized, open-label study. *Br J Dermatol*. 2008;159(2):453–6	Cohort	69
35	Scarpa R, Soscia E, Peluso R, Atteno M, Manguso F, Del Puente A, et al. Nail and distal interphalangeal joint in psoriatic arthritis. *J Rheumatol*. 2006;33(7):1315–9	Cohort	69
36	Langenbruch A, Radtke MA, Krensel M, Jacobi A, Reich K, Augustin M. Nail involvement as a predictor of concomitant psoriatic arthritis in patients with psoriasis. *Br J Dermatol*. 2014;171(5):1123–8	Cohort	68
37	Baran R. Etretinate and the nails (study of 130 cases) possible mechanisms of some side-effects. *Clin Exp Dermatol*. 1986;11(2):148–52	Case series	67
38	Tan EST, Chong WS, Tey HL. Nail psoriasis: a review. *Am J Clin Dermatol*. 2012;13(6):375–88	Review	65
39	Crowley JJ, Weinberg JM, Wu JJ, Robertson AD, Van Voorhees AS. Treatment of nail psoriasis: best practice recommendations from the medical board of the national psoriasis foundation. *JAMA Dermatol*. 2015;151(1):87–94	Systematic review	64
40	Dawber R. Fingernail growth in normal and psoriatic subjects. *Br J Dermatol*. 1970:82(5):454–7	Cohort	64
41	Rich P, Bourcier M, Sofen H, Fakharzadeh S, Wasfi Y, Wang Y, et al. Ustekinumab improves nail disease in patients with moderate-to-severe psoriasis: results from PHOENIX 1. *Br J Dermatol*. 2014;170(2):398–407	RCT	63
42	Ortonne JP, Paul C, Berardesca E, Marino V, Gallo G, Brault Y, et al. A 24-week randomized clinical trial investigating the efficacy and safety of 2 doses of etanercept in nail psoriasis. *Br J Dermatol*. 2013;168(5):1080–7	RCT	63
43	Rigopoulos D, Gregoriou S, Lazaridou E, Belyayeva E, Apalla Z, Makris M, et al. Treatment of nail psoriasis with adalimumab: an open label unblinded study. *J Eur Acad Dermatol Venereol*. 2010;24(5):530–4	Cohort	63
44	Bhushan M, Moore T, Herrick AL, Griffiths CE. Nailfold video capillaroscopy in psoriasis. *Br J Dermatol*. 2000;142(6):1171–6	Cohort	63
45	Gümüşel M, Özdemir M, Mevlitoğlu Ä, Bodur S. Evaluation of the efficacy of methotrexate and cyclosporine therapies on psoriatic nails: a one-blind, randomized study. *J Eur Acad Dermatol Venereol*. 2011;25(9):1080–4	RCT	62

Table 1 (continued)

Rank	Title	Design	Total citations
46	Farber EM, Nall L. Nail psoriasis. *Cutis*. 1992;50(3):174–8	Review	62
47	De Jong EM, Menke HE, Van Praag MC, Van De Kerkhof PC. Dystrophic psoriatic fingernails treated with 1% 5-fluorouracil in a nail penetration-enhancing vehicle: a double-blind study. *Dermatology*. 1999;199(4):313–8	RCT	61
48	Fournie B, Viraben R, Durroux R, Lassoued S, Gay R, Fournie A. Psoriatic onycho-pachydermo-periostitis of the great toe. Anatomo-clinical study and physiopathogenic approach. *Rev Rhum Mal Osteoartic*. 1989;56(8–9):579–82	Case series	61
49	Sánchez-Regaña M, Sola-Ortigosa J, Alsina-Gibert M, Vidal-Fernández M, Umbert-Millet P. Nail psoriasis: a retrospective study on the effectiveness of systemic treatments (classical and biological therapy). *J Eur Acad Dermatol Venereol*. 2011;25(5):579–86	Cohort	60
50	Rigopoulos D, Gregoriou S, Katsambas A. Treatment of psoriatic nails with tazarotene cream 0.1% versus clobetasol propionate 0.05% cream: a double-blind study. *Acta Derm Venereol*. 2007;87(2):167–8	RCT	60

CME, continuing medical education; RCT, randomized controlled trial.

2020 Journal Citation Reports) [5], study design, study topic, and number of citations.

Descriptive statistical analysis of the selected data was performed using Microsoft Excel 2016 (v16.0). Categorical variables were expressed as frequencies and percentages, while normally distributed quantitative variables were expressed as mean ± standard deviation and non-normally distributed variables were expressed as median values (interquartile range). The study was exempt from ethics committee approval since data were retrieved from the published literature.

Results

The top 50 most cited articles are presented in Table 1. The median number of citations was 79 (range, 60–337) per article. The total number of citations was 5,181, while the top 10 most cited articles accounted for 38.8% (2,011/5,181) of them. Publication dates ranged from 1969 to 2020, while the majority of articles were published between 2000 and 2009 (23/50 [46%]), followed by the time frames 2010–2020 (15/50 [30%]), 1990–1999 (8/50 [16%]), 1980–1989 (2/50 [4%]), and 1696–1979 (2/50 [4%]). The top 50 highly cited articles were published in 19 different journals, with 78% (39/50), 20% (10/50), and 2% (1/50) being published in dermatology-based, rheumatology-based, and radiology-based journals, respectively. The *British Journal of Dermatology* published the greatest number of highly cited articles ($n = 9$), followed by the *Journal of the European Academy of Dermatology and Venereology* ($n = 6$), *Dermatology* ($n = 6$), and the *Journal of the American Academy of Dermatology* ($n = 5$). The median IF of journals was 5.248 (range, 1.022–16.102) (Table 2).

Among the top 50 most cited articles, there were 19 (38%) cohort studies, 12 (24%) randomized controlled trials, 12 (24%) reviews (1 systematic), 4 (8%) surveys, 2 (4%) case series, and 1 (2%) continuing medical education article (Table 1). Topics from these publications included treatment (24/50 [48%]), clinical presentation (7/50 [14%]), diagnosis/assessment (6/50 [12%]), pathophysiology (6/50 [12%]), quality of life (4/50 [8%]), overview (3/50 [6%]), guidelines (1/50 [2%]), and epidemiology (1/50 [2%]) of nail psoriasis. Moreover, ten (20%) studies provided insights into the correlation of nail psoriasis with PsA. The number of articles by time frame of publication and study topic is presented in Figure 1.

Articles originated from 14 different countries, with USA, UK, Germany, and Italy being the most contributing countries (Fig. 2). In total, 40 different first corresponding authors were identified. Among them, the two most contributing authors were Phoebe Rich (Oregon Health and Science University) and Dennis McGonagle (University of Leeds). Detailed information on authors with at least 3 articles is presented in Table 2.

Discussion

Nail involvement is extremely frequent among patients with cutaneous psoriasis and may considerably affect quality of life [6]. Moreover, accumulating clinical and imaging observations support that nail disease is an indicator for subclinical enthesopathy and subsequent psoriatic joint damage [7, 8]. Therefore, the importance of nail involvement in patients with psoriasis is being increasingly recog-

Table 2. Journals of the top 50 most cited publications in nail psoriasis (stratified by number of articles) and authors with least 3 articles (stratified by citation count)

Journal	Articles, *n* (%)	IF (2020 JCR)
British Journal of Dermatology	9 (18)	7.000
Journal of the European Academy of Dermatology and Venereology	6 (12)	5.248
Dermatology	6 (12)	3.695
Journal of the American Academy of Dermatology	5 (10)	8.277
JAMA Dermatology (formerly Archives of Dermatology)	3 (6)	7.738
Rheumatology	3 (6)	5.606
Annals of the Rheumatic Diseases	2 (4)	16.102
Arthritis Care & Research	2 (4)	4.056
The Journal of Rheumatology	2 (4)	3.350
Clinical and Experimental Dermatology	2 (4)	1.977
Cutis	2 (4)	1.022
American Journal of Clinical Dermatology	1 (2)	5.056
Acta Dermato-Venereologica	1 (2)	4.016
Dermatologic Clinics	1 (2)	3.164
Clinics in Dermatology	1 (2)	2.458
Dermatologic Therapy	1 (2)	2.327
Journal of Cutaneous Medicine and Surgery	1 (2)	1.909
Journal of Ultrasound in Medicine	1 (2)	1.759
Revue du rhumatisme et des maladies ostéo-articulaires	1 (2)	–*

Author	First author	Co-author	Last author	Citations
Rich P	4	1	0	739
McGonagle D	2	1	2	601
Scher R	1	1	1	563
McHugh NJ	0	2	1	444
Reich K	1	3	0	412
Tan AL	1	2	0	389
Rigopoulos D	3	0	0	192
Gregoriou S	0	3	0	192
Emery P	0	3	0	185

JCR, Journal Citation Reports; IF, impact factor. *No longer published.

nized from both dermatologists and rheumatologists, explaining the evolving scientific progress made in this field, especially toward a better understanding of the underlying pathophysiology and treatment optimization.

Our results revealed that 76% of the top 50 highly cited articles were published after 2000, especially in the interval between 2000 and 2009. This may be explained by the increased availability of new therapies and the emergence of new research and diagnostic techniques, which could unravel pathogenetic mechanisms and aid in the development of diagnostic criteria. This is also reflected in the main research topics after 2000, which include therapy and diagnostic assessment of nail psoriasis, as well as its correlation with PsA (Fig. 1).

Almost half (n = 24) of the highly cited publications focused on therapy of nail psoriasis. With the exception of 2 studies on adalimumab and ustekinumab [9, 10], the rest of therapy studies addressed the effectiveness of nonbiological drugs or pertained to treatment recommendations in general. This may be associated with time period bias, considering the shorter citable period of more recently published studies on biologics. Interestingly, with the exception of 1 study on adalimumab published in the journal with the highest IF (16.102), that is, *Annals of Rheumatic Diseases* [9], the rest of therapy studies were published in dermatology-based journals. On the contrary, studies published in rheumatology-based journals mainly investigated the link between nail psoriasis and PsA, first addressed in 1994 by Jones et al. [11]. Following this top cited publication (258 citations), further studies highlighted the ongoing interest on this area.

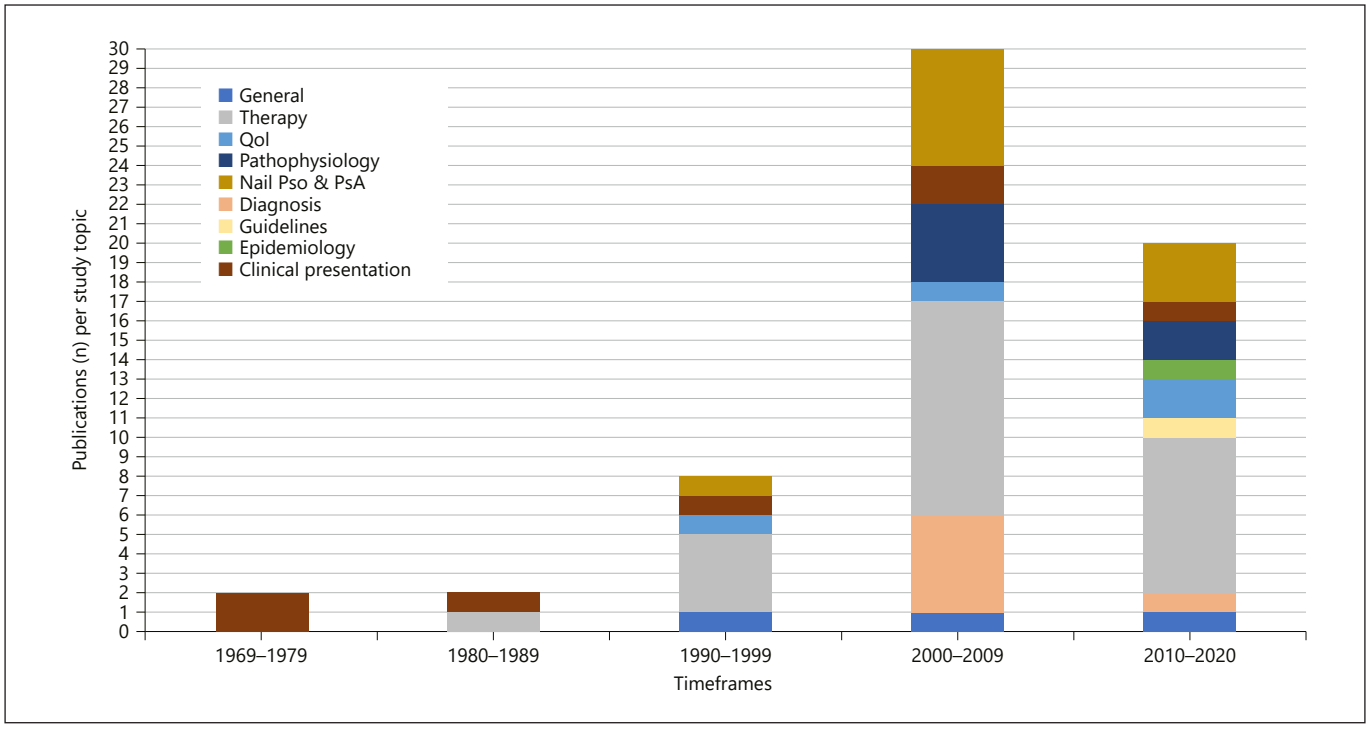
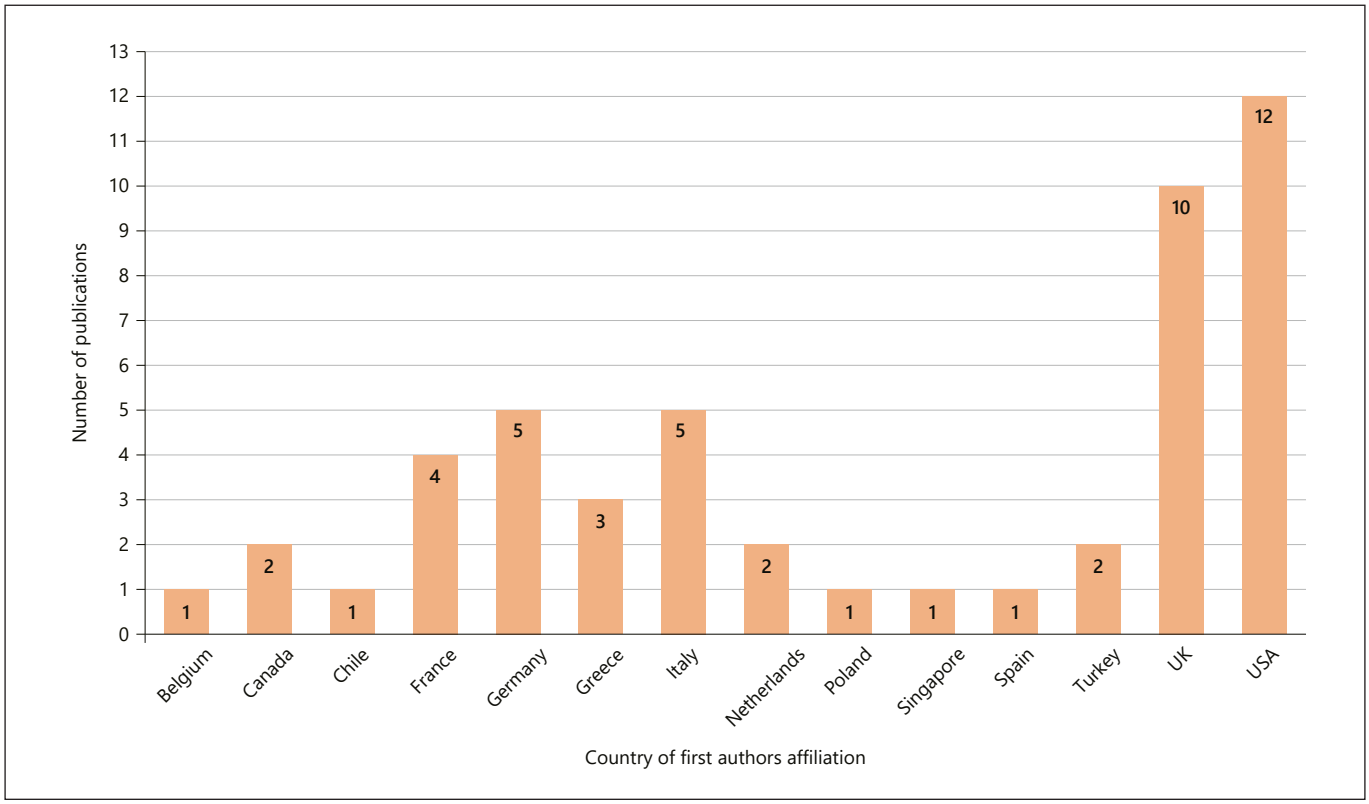


Fig. 1. Number of top cited articles by time frame of publication and study topic. PsA, psoriatic arthritis.



Color version available online

Fig. 2. Country of first author's affiliation.

Most of the top cited studies were original studies (including randomized controlled trials, cohort studies, and surveys), followed by a smaller number of reviews and only 2 case series, underlining the tendency of researchers to cite published work with a high level of evidence. Moreover, although physicians from all over Europe contributed to nail psoriasis research, the majority of articles were published by authors/institutions in the USA and UK. This is likely attributed to the large number of researchers and the quality of scientific research in these countries, given the degree of economic development and availability of funding. Besides, journals with the highest IF originate from these countries and are preferably chosen by physicians, considering that IF along with the citation index are major determinants of the quality and influence of published work.

The main limitation of the study is that it does not analyze recent studies with shorter time for citation, due to the inherent study design of bibliometric analysis. A further limitation is that only Scopus database was selected. It has been found that Scopus provides more accurate results for citation analysis as it includes the largest number of publications compared to other databases [12]. Finally, in small scientific fields such as nail psoriasis, the influence of self-citation bias or the authors' preference to site-specific journals cannot be excluded.

Conclusion

To our knowledge, this is the first study to provide a bibliometric analysis of the top 50 most cited publications in nail psoriasis, highlighting the increasing recognition of the burden of this aspect of cutaneous psoriasis from both dermatologists and rheumatologists. The emerging research trends, which mainly include diagnostic assessment, pathophysiology/correlation to PsA, and therapy of nail psoriasis may represent fields of future research.

Statement of Ethics

The study was exempt from ethics committee approval since data were retrieved from the published literature.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Funding Sources

The authors have no funding to declare.

Author Contributions

All authors contributed in the literature search and writing of the manuscript.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

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