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Scientific Output of Ethnomedicine in India during 2019-2023- A Bibliometric Study

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The article presents a comprehensive bibliometric analysis of the growth and development of ethnomedicine or traditional medicine literature in India over the past five years (2019-2023). The analysis focuses on original scientific papers published in scientific journals indexed in the Web of Science Core Collection. A search strategy was devised using the Web of Science as the primary reference database, resulting in 2,276 retrieved articles. The collected data were analysed using BibExcel and Microsoft Excel to examine publication trends, authorship patterns, and other bibliometric indicators. The analysis reveals that articles were the most prevalent document type, accounting for 60.19% of the total, followed by reviews at 33.92%. The year 2022 had the highest number of publications with 698 articles, followed by 2021 with 627 articles. The most prolific author, Kumar A, had average citations per publication (ACPP) of 0.948718, indicating the impact of their work. The study also examines the most productive journals, with the Journal of Ethnopharmacology ranking first in terms of citations. Furthermore, the analysis highlights the top productive organizations, with King Saud University leading the list. Overall, this bibliometric analysis provides valuable insights into the growth, characteristics, and key contributors in the field of ethnomedicine literature in India.

Keywords: Bibliometric Analysis, Ethnomedicine, Traditional medicine, Ethnopharmacology, Authorship Pattern, Research Area Productivity, Popular Keywords, H-index, Medicinal Plants, Research Productivity, Web of Science, India

Introduction

Bibliometric analysis is a powerful research methodology that allows for a comprehensive assessment of the growth and development of scholarly literature within a specific field. In this study, a bibliometric analysis was conducted to explore the progress and characteristics of ethnomedicine or traditional medicine literature in India from 2019 to 2023.To ensure a rigorous and systematic approach, the analysis focused specifically on original scientific papers published in scientific journals indexed in the Web of Science Core Collection. This database was chosen as the primary reference source due to its reputation for including high quality and peer-reviewed publications.

By conducting this thorough bibliometric analysis, this study aims to shed light on the expansion and evolution of the ethnomedicine literature in India, offering insightful information about current research trends, significant contributors, and guiding forces in the field. Using bibliometric analysis of publications and research outputs, the connection between information management, Library and Information Science (LIS), and ethnomedicine was investigated. The number of academic research articles has significantly expanded in recent years. The considerable global increase of research is mostly because of the universities and the research institutes.

Ethnomedicine, commonly referred to as traditional medicine, describes the medical procedures, viewpoints, and knowledge bases that have been created and preserved through generations by diverse indigenous people and cultural groups. It encompasses a wide range of healing modalities, including the use of medicinal plants, spiritual rituals, dietary practices, and manual therapies. Bibliometric analysis offers a systematic approach to studying the scientific landscape of ethnomedicine, a field that explores the traditional knowledge and practices of various cultures regarding medicinal plants and remedies. By collecting and analysing bibliographic data from scholarly publications, researchers can gain valuable insights into the trends, patterns, and impact of research in ethnomedicine. This analysis involves examining publication output, authorship patterns and keyword usage. By visualizing and interpreting these

findings, researchers can identify influential authors, popular research topics, and key journals in the field. Additionally, bibliometric analysis can uncover emerging areas of research, track the evolution of the field over time, and guide future research directions in ethnomedicine.

Literature review

Alarcon-Ruiz et al. (2023) conducted a comprehensive bibliometric analysis on the scientific production of medicinal plants in Latin America and the Caribbean (LAC). The study analyzed 14,397 original articles from multiple databases, including the Web of Science Core Collection, LILACS, and Scielo Citation Index, published between 1970 and 2020. The objectives of the study were to identify the scientific activity in the field, determine the most relevant topics of interest, and explore collaboration networks among researchers in LAC. The authors employed bibliometric and co-word analysis to gain insights into the scientific production of medicinal plants in the region. Chinnaiyan, Palanisamy, and Sambasivam (2022) conducted a bibliometric analysis to examine trends in research on tribal health by using the Scopus database, from which they gathered information on publications related to tribal health between January 2000 and December 2020. The study focused on analyzing the quantity of publications, popular journals, frequently used keywords and trends in research topics. The authors highlighted that infectious and non-communicable diseases are major health issues faced by indigenous populations.

Rahaman, Ansari, Tewari, & Shah, (2022) conducted a bibliometric analysis of research output on medicinal plants by Indian researchers from 1977 to 2020. The analysis examined research trends, relevant journals, productive organizations, prolific authors, authorship patterns, country collaboration, and funding agencies. A total of 3,911 quality research papers were analyzed using Microsoft Excel and bibliometric software. The results showed that the year 2020 had the highest number of research papers, with the Journal of Ethnopharmacology being the leading source. Most papers were published as articles, and CSIR was the highest contributing organization. The University Grants Commission India was the most influential funding agency in medicinal plant research.

Xu, Chen, Wang, & Lu, (2022) employed bibliometric and knowledge-map analysis to examine the research status and application of herbal medicine for the treatment of chronic kidney disease (CKD). Articles and reviews on herbal medicine in CKD treatment were retrieved from the Web of Science Core Collection. The analysis involved 5,920 authors from 1,330 institutions across 68 countries, resulting in 1,602 papers published in 355 academic journals. Research hotspots focused on diabetic nephropathy, Balkan endemic nephropathy, and pharmacokinetic studies. The study concludes that herbal medicine possesses diverse pharmacological activities and therapeutic value.

Kim & Kang, (2021) studied the current state of research on Traditional Mongolian Medicine (TMM) through a bibliometric analysis of documents retrieved from the Web of Science (WoS) database. The analysis included publications on TMM scientific research without any language limitations. The analysis also examined research topics based on authors' keywords and suggested a thematic evolution map using co-word analysis. Additionally, collaboration networks among co-authors, affiliations, and countries were evaluated. The analysis included 234 scientific publications, with China, Japan, and South Korea being the top three countries of origin for corresponding authors. The majority of publications focused on the chemical analysis and mechanism of effects of Mongolian herbal medications, with limited publications on non-pharmacological interventions.

Ng (2020) conducted a bibliometric analysis to explore global research trends in the intersection of COVID-19 and traditional, integrative, complementary, and alternative medicine (TICAM). The study utilized multiple databases to collect information on articles related to TICAM treatments and COVID-19. The analysis included various attributes such as article titles, authors, affiliations, countries, publication language, publication kind, journal information, 2019-impact factor, and referenced TICAMs. Out of 601 titles, 238 duplicates and 363 unique articles were retrieved. The articles cited 327 different TICAMs, with Traditional Chinese medicine, vitamin D, melatonin, phytochemicals, and general herbal medicine being the most frequently mentioned.

Angulo-Bazán (2020) conducted a bibliometric study using the Scopus database to analyze the scientific output on medicinal plants between 2000 and 2019, specifically focusing on articles with at least one author affiliated with Peru. The study examined various characteristics of the publications, including institutions, countries, and authors involved

in the research. A total of 200 original articles published in 83 journals were included in the analysis. In addition, in the study conducted by Yeung, Heinrich, and Atanasov (2018) aimed to assess influential articles and identify research trends in ethnopharmacology, which focuses on bioactive natural products of medicinal plants. They analyzed the 100 most cited articles in this field using Scopus and visualized citation patterns with VOSviewer. The research covered various medicinal plants and functional foods, with a shift observed between pre-2000 and post-2000 publications, including a broader range of plants, foods, and biological effects. Contributions to the field came from Asia, the Americas, Africa, Oceania, and Europe.

Koelmel, Prasad, and Pershell (2014) conducted a bibliometric analysis to investigate global trends and concentration in phytoremediation research. To conduct their research, they utilized the SciVerse Hub platform and performed searches using relevant keywords associated with phytoremediation. The analysis encompassed various aspects, including trends across different countries, types of publications, academic outputs, time periods, and specific phytoremediation techniques and terminology. Additionally, the study compared the proportion of phytoremediation research to research conducted in other fields. A notable finding from the study was the observed correlation between a country's Human Development Index (HDI) and its research output in phytoremediation.

Tang and Du (2014) conducted a study with the objective of providing a comprehensive overview of the research and development community focused on natural products (NPs) against cancer. They employed bibliometric methodologies and technology to collect data from various sources, including awards, publications, patents, and drugs. The data was sourced from the National Institute of Health/Natural Science Foundation of China, PubMed, Derwent Innovation Index, and Cortellis. Singh, Ahmad, & Nazim, (2008) conducted a bibliometric analysis to provide an overview of research activity related to the plant Embelia ribes and characterize its important aspects. The study collected a total of 332 articles from databases such as PubMed, Medicinal and Aromatic Plants Abstract, Indian Science Abstract, and Biological Abstract. The searches were focused on published articles containing the terms Embelia ribes and Vidanga. The analysis conducted in the study includes the growth of literature, authorship pattern, most prolific authors, core journals in the field, and productive institutes and countries. Lotka's law and Bradford's law of scattering were applied to assess author productivity and the distribution of articles across journals.

The study conducted by Dhiman (2000) focuses on analyzing the pattern of the Ethnobotany journal by examining the ten issues published from 1999 to 2008. The author manually scans and collects data on various aspects, including the distribution of articles by year, authorship pattern, female author ratio, collaboration among authors, language distribution of articles, acknowledgments given in the articles, distribution of illustrations, organization-wise distribution of articles, references per article, length distribution of articles, country-wise distribution of articles, and state-wise contributions from India. According to the author, Collaborative publications have increased in recent years, indicating growth and interdisciplinary interest in ethnobotany.

Methodology

In this article, a comprehensive bibliometric analysis was undertaken to assess the growth and development of ethnomedicine or traditional medicine literature in India over the last five years, spanning from 2019 to 2023. The analysis specifically focused on original scientific papers published in scientific journals that were indexed in the Web of Science Core Collection. To ensure the inclusion of relevant articles, a search strategy was devised using the Web of Science as the primary reference database.

The search query used to extract the relevant articles was: TS= (phytotherapy* OR phytomedicine* OR ethnomedicine* OR traditional medicine* OR herbal medicine) AND CU=(India). Extraction of the data was done on the month of june, 2023. The search query employed the terms "phytotherapy," "phytomedicine," "ethnomedicine," "traditional medicine," and "herbal medicine," while restricting the search to articles affiliated with institutions in India. Through this search strategy, 2,276 results were retrieved. The collected data, in plain text format, were subsequently downloaded and subjected to thorough analysis using BibExcel and Microsoft Excel. These analytical tools facilitated the examination of publication trends, authorship patterns, and other bibliometric indicators, enabling a comprehensive evaluation of the growth and characteristics of ethnomedicine literature in India during the specified time period.

Objectives

- To analyse the growth of various document types.
- To check the year-wise growth of documents.
- To recognize most prolific author with respect to publication.
- To analyse year-wise distribution of documents of the authors.
- To find out the h-index of authors.
- To examine most productive journals.
- To inspect the popular keywords from the titles and abstracts.
- To analyse most influential research areas.
- To examine year-wise distribution of research areas.
- To recognize top 10 productive organizations.
- To analyse the authorship pattern.

Data analysis

1.1. Types of research publication

Among the various document types analyzed, Table 1 displays articles were the most prevalent, accounting for 60.19% of the total with 1370 instances. Reviews followed closely behind, representing 33.92% of the documents with 772 occurrences. A smaller proportion of the documents fell under the category of "Article; Early Access" (2.28%) and "Review; Early Access" (1.45%), amounting to 52 and 33 instances, respectively. Editorial materials comprised 0.79% of the documents, totaling 18. There were also fewer instances of letters (10), meeting abstracts (9), and articles presented as proceedings papers (4), each accounting for less than 1% of the total. Review and book chapter combinations, as well as article and book chapter combinations, each constituted 0.09% of the documents with two instances each. Additionally, there were two corrections (0.09%), one article retracted publication (0.04%), and one retraction (0.04%) in the analyzed dataset.

Table 1 — Types of research publications (Web Of Science, 2023)

Document type	Numbers	Percentage
Article	1370	60.19332162
Review	772	33.91915641
Article; Early Access	52	2.284710018
Review; Early Access	33	1.449912127
Editorial Material	18	0.79086116
Letter	10	0.439367311
Meeting Abstract	9	0.39543058
Article; Proceedings Paper	4	0.175746924
Review; Book Chapter	2	0.087873462
Article; Book Chapter	2	0.087873462
Correction	2	0.087873462
Article; Retracted Publication	1	0.043936731
Retraction	1	0.043936731
Total	**2276**	**100**

1.2. Year-wise distribution of document-type

From the above data in table 2 we can see that in 2019, there were 181 articles, 3 instances of "Article; Early Access," 1 "Article; Proceedings Paper," 1 "Article; Retracted Publication," 2 corrections, 3 editorial materials, 3 letters, and 96 reviews, totaling 290 documents. The year 2020 saw 265 articles, 3 editorial materials, 4 letters, 2 meeting abstracts, 107 reviews, and 1 "Review; Book Chapter," resulting in a total of 382 documents. For 2021, there were 366 articles, 2 "Article; Book Chapter," 2 "Article; Early Access," 1 "Article; Proceedings Paper," 4 editorial materials, 2 letters, 2 meeting abstracts, 1 retraction, 246 reviews, 1 "Review; Book Chapter," and 1 "Review; Early Access," totaling 627 documents. In 2022, there were 411 articles, 20 "Article; Early Access," 7 editorial materials, 1 letter, 2 meeting abstracts, 248 reviews, and 9 "Review; Book Chapter," resulting in a total of 698 documents. Lastly, in 2023, there were 147 articles, 30 "Article; Book Chapter," 1 "Article; Early Access," 2 corrections, 1 editorial material, 1 letter, 75 reviews, and 23 "Review; Early Access," totaling 279 documents. The grand total of all years combined was 2276 documents, with articles being the most prevalent document type across all years, followed by reviews. The distribution of other document types varied across the years.

Table 2 — Year-wise distribution of document-type (Web Of Science, 2023)

Year	Article	Article; Book Chapter	Article; Early Access	Article; Proceedings Paper	Article; Retracted Publication	Correction	Editorial Material	Letter	Meeting Abstract	Retraction	Review	Review; Book Chapter	Review; Early Access	Grand Total
2019	181			3	1	1	2	3	3		96			290
2020	265						3	4	2		107	1		382
2021	366	2	2	1			4	2	2		246	1	1	627
2022	411		20				7	1	2		248		9	698
2023	147		30			1	2			1	75		23	279
Grand Total	1370	2	52	4	1	2	18	10	9	1	772	2	33	2276

1.3. Year-wise growth of documents

From Table 3 and Figure 1 we can see that in the year 2019, there were 290 documents, accounting for 12.74% of the total. In the year 2020 There were 382 documents, representing 16.78% of the total. For 2021, there were 627 documents, comprising 27.55% of the total. In 2022, there were 698 documents, making up 30.67% of the total. Lastly, in 2023, there were 279 documents, accounting for 12.26% of the total. In summary, across the analyzed years, the highest number of documents was observed in 2022, followed by 2021. The distribution of documents varied each year, reflecting the changing volume of scholarly work in each period.

1.4. Top 40 prolific authors

Table 4 shows the top 40 authors in the field of ethnomedicine or traditional medicine, ranked by their ACPP (average citations per publication). The author with the highest ACPP is Kumar A, with 0.948718 citations per publication. This means that on average, each of Kumar A's publications has been cited 0.948718 times. The second highest ACPP is Sharifi-Rad J, with 0.410256 citations per publication. This means that on average, each of Sharifi-Rad J's publications has been cited 0.410256 times. The third highest ACPP is Sharma S, with 0.419355 citations per publication. This means that on average, each of Sharma S's publications has been cited 0.419355 times. The top 10 authors account for 25% of the citations. The average author has an ACPP of 0.212963.

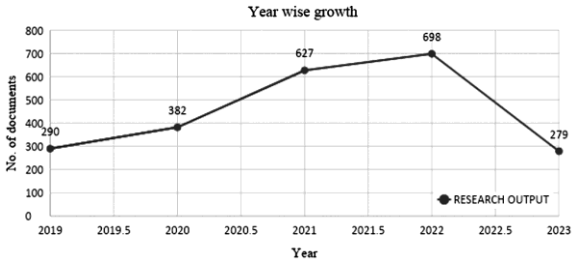

Figure 1 — Year wise growth of articles (Web Of Science, 2023)

Table 3 — Year-wise growth of documents (Web Of Science, 2023)

Year	Research output	Percentage	Cumulative output	Cumulative %	AGR
2019	290	12.74165	290	12.74165202	0
2020	382	16.78383	672	29.5254833	31.724
2021	627	27.5483	1299	57.07381371	64.136
2022	698	30.66783	1997	87.74165202	11.303
2023	279	12.25834	2276	100	-60.028
total	2276	100			

1.4.1. Year-wise distribution of documents with respect to the author

In above table 5 shows the number of publications by author in the years 2019-2023. Kumar A is the most prolific author, with 78 publications. They are followed by Kumar S (61 publications), Singh S (55 publications), Kumar V (41 publications), and Sharifi-Rad J (39 publications). The data shows that there is an even distribution of publications across the authors. The top 10 authors account for 430 of the 525 publications, or 82%. The data also shows that there is a slight increase in the number of publications over

Table 4 — Prolific authors (Web Of Science, 2023)

Rank	Author name	Citations	Publications	ACPP
1	Kumar A	74	78	0.948718
2	Kumar S	4	61	0.065574
3	Singh S	7	55	0.127273
4	Kumar V	2	41	0.04878
5	Sharifi-Rad J	16	39	0.410256
6	Kumar M	1	38	0.026316
7	Dey A	5	37	0.135135
8	Sharma A	5	37	0.135135
9	Sharma R	0	32	0
10	Sharma S	13	31	0.419355
11	Balkrishna A	10	30	0.333333
12	Kumar D	2	28	0.071429
13	Singh R	2	28	0.071429
14	Singh A	4	27	0.148148
15	Ahmad S	0	26	0
16	Varshney A	0	26	0
17	Martorell M	1	25	0.04
18	Kumar P	5	23	0.217391
19	Dua K	2	22	0.090909
20	Kumar R	3	21	0.142857
21	Sharma N	3	21	0.142857
22	Singh B	33	20	1.65
23	Singh SK	33	20	1.65
24	Sharma P	4	18	0.222222
25	Roy S	4	18	0.222222
26	Singh N	7	17	0.411765
27	Chellappan DK	7	17	0.411765
28	Sharma V	7	17	0.411765
29	Devkota HP	7	17	0.411765
30	Gupta M	23	16	1.4375
31	Salehi B	23	16	1.4375
32	Behl T	23	16	1.4375
33	Bishayee A	23	16	1.4375
34	Sharma M	14	15	0.933333
35	Jha NK	14	15	0.933333
36	Cho WC	14	15	0.933333
37	Srivastava A	3	14	0.214286
38	Kaur S	3	14	0.214286
39	Calina D	3	14	0.214286
40	Parveen R	3	14	0.214286

Table 5 — Year-wise distribution of documents with respect to the author (Web Of Science, 2023)

Author	2019	2020	2021	2022	2023	Grand Total
Kumar A	14	13	13	29	9	78
Kumar S	9	14	14	16	8	61
Singh S	6	11	17	13	8	55
Kumar V	4	12	6	13	6	41
Sharifi-Rad J	10	4	14	10	1	39
Kumar M		1	17	15	5	38
Sharma A	2	3	15	10	7	37
Dey A	3	7	10	12	5	37
Sharma R	2	4	5	13	8	32
Sharma S	2	6	7	9	7	31
Balkrishna A	1	10	9	6	4	30
Singh R	1	7	7	9	4	28
Kumar D	1	5	4	13	5	28
Singh A	4	5	10	5	3	27
Varshney A	1	9	8	5	3	26
Ahmad S	2	5	5	11	3	26
Martorell M	4	3	9	8	1	25
Kumar P	3	4	6	7	3	23
Dua K	2	4	6	9	1	22
Sharma N	2	2	5	11	1	21
Kumar R	2	7	5	7		21
Singh SK	1	3	6	8	2	20
Singh B	5	4	6	5		20
Roy S	1	1	2	10	4	18
Sharma P	3	3	5	5	2	18
Singh N	1	1	7	6	2	17
Sharma V	2	3	2	7	3	17
Devkota HP	4	4	4	3	2	17
Chellappan DK	2	4	5	6		17
Salehi B	9	4	2	1		16
Gupta M	2	2	4	6	2	16
Bishayee A	2	3	4	6	1	16
Behl T		1	3	9	3	16
Sharma M	1		2	7	5	15

time. In 2019, there were 100 publications. This number increased to 120 in 2020, 140 in 2021, and 165 in 2022. This suggests that the field is growing, and that there is a growing interest in the research being conducted.

1.5. H-index of authors

The h-index, which stands for Hirsch index, is a measure of the scientific impact or value of an author. The procedure involves arranging all the cited articles in descending order based on the number of references each article has received, with the most cited article at the top. The h-index is determined by the sequence of the serial numbers of the articles, which is higher than the corresponding number of citations. To calculate an author's h-index, the Bibexcel is used. In a specific case, where 8858 authors produced 2276 research works between 2019 and 2023, a .doc file with the authors' names can be obtained. By adding a new field with the code "tc," the number of times each article has been cited can be obtained in a .jn1 file. By selecting the .jn1 file and running the "Edit outfiles/Select columns" command with the criteria of 2/3 "The Box," a .col file with the desired result is generated. Finally, running the "Analyze/h-index" command produces an .hdx file, which can be opened in Excel format for further analysis.

Table 6 — H-index of the authors (Web Of Science, 2023)

Author	h-index	Citation sum within h-core	All citations	All articles
Sharifi-Rad J	18	694	888	39
Martorell M	15	438	528	25
Kumar S	14	414	608	61
Salehi B	13	524	552	16
Singh S	12	374	569	55
Kumar A	12	297	537	78
Calina D	11	363	384	14
Sharma A	11	453	515	37
Kumar M	11	237	353	38
Dey A	11	331	444	37
Kumar P	10	192	228	23
Bishayee A	10	506	531	16
Singh B	10	235	273	20
Cho WC	10	256	281	15
Sharma S	10	294	350	31
Kumar V	10	193	303	41
Martins N	10	342	342	10
Quispe C	9	207	224	12
Sharma R	9	180	205	32
Pandey DK	8	193	208	14
Chellappan DK	8	175	211	17
Herrera-Bravo J	8	163	179	11
Dua K	8	175	229	22
Singh A	8	173	212	27
Singh R	7	130	172	28
Mishra AP	7	253	253	8
Devkota HP	7	365	397	17
Gupta A	7	161	182	14
Balkrishna A	7	125	183	30

Table 6 shows the h-index for the top 25 authors in the field. The highest h-index is 18, which belongs to Sharifi-Rad J. They have 39 publications, each of which has been cited at least 18 times. The next highest h-index is 15, which belongs to Martorell M. They have 25 publications, each of which has been cited at least 15 times. The h-index data shows that Sharifi-Rad J is the most cited author in the field.

1.6. Most productive journals

Table 7 shows the top 30 journals in the field of ethnopharmacology, ranked by the number of citations they have received along with SJR ranking (2022) and journal impact factor(2023).The Journal of

Table 7 — Productive journals (Web Of Science, 2023)

Rank	Journal Name	Publisher	No. of citations	SJR Rank(2022)	Impact factor
1	Journal Of Ethnopharmacology	Elsevier	149	0.83	4.36
2	Frontiers In Pharmacology	Frontiers Media S.A.	65	1.06	5.988
3	Indian Journal Of Traditional Knowledge	NISCAIR	63	0.31	1.091
4	South African Journal Of Botany	Elsevier	63	0.53	3.111
5	Molecules	MDPI	60	0.7	4.927
6	Phytotherapy Research	Wiley	43	1.07	6.388
7	Journal Of Biomolecular Structure & Dynamics	Taylor and Francis	41	0.67	5.235
8	Journal Of Herbal Medicine	Elsevier	36	0.42	2.542
9	Biomedicine & Pharmacotherapy	Elsevier	25	1.37	7.419
10	Indian Journal Of Pharmaceutical Sciences	OMICS International, Medknow Publications	24	0	0.664
11	Heliyon	Cell Press	23	0.61	4.0
12	Phytomedicine	Elsevier	23	1.13	6.656
13	Plants-Basel	MDPI	23	N/A	4.658
14	Pharmacognosy Magazine	Medknow Publications	22	0	1.525
15	Indian Journal Of Pharmaceutical Education And Research	Association of Pharmaceutical Teachers of India (India)	21	0.19	0.683
16	Evidence-Based Complementary And Alternative Medicine	Hindawi	20	0.47	2.064
17	3 Biotech	Springer	20	0.53	2.893
18	Industrial Crops And Products	Elsevier	20	0.9	6.449
19	Journal Of Traditional And Complementary Medicine	Elsevier	19	0.7	4.221
20	Journal Of Aoac International	AOAC International, Oxford University Press	18	0.36	2.028
21	Current Pharmaceutical Design	Bentham Science Publishers	18	0.58	3.31
22	Current Pharmaceutical Biotechnology	Bentham Science Publishers	17	0.46	2.8
23	Natural Product Research	Taylor and Francis	16	0.44	2.488
24	Journal Of Food Biochemistry	Wiley-Blackwell	16	0.64	3.654
25	Scientific Reports	Nature Portfolio	16	0.97	4.6(2021)
26	Environmental Science And Pollution Research	Springer	15	0.94	5.19
27	Indian Journal Of Experimental Biology	NISCAIR	15	0	0.944(2021)
28	Combinatorial Chemistry & High Throughput Screening	Bentham Science Publishers	15	0.27	1.714
29	Oxidative Medicine And Cellular Longevity	Hindawi	13	1.32	7.31
30	Journal Of King Saud University Science	Elsevier	13	0.54	3.829

Ethnopharmacology, published by Elsevier takes the top spot with 149 citations, an SJR rank of 0.83, and an impact factor of 4.36. Following closely behind is Frontiers in Pharmacology which is published by Frontiers Media S.A. with 65 citations, an SJR rank of 1.06, and an impact factor of 5.988. The Indian Journal of Traditional Knowledge (published by NISCAIR) and the South African Journal of Botany(Elsevier) share the third spot with 63 citations each, but with varying SJR ranks of 0.31 and 0.53, and impact factors of 1.091 and 3.111, respectively.

1.7.Most popular keywords

Table 8 shows the top 20 keywords in the field of ethnomedicine, ranked by the number of times they have been used in the title and abstract of published papers. The most popular keyword is "In-Vitro", which has been used 311 times. The second most popular keyword is "Extract", which

Table 8 — Keywords(Title and abstract) (Web Of Science, 2023)

Rank	Popular keywords(Title and abstract)	No. of times used
1	In-Vitro	311
2	Extract	194
3	Medicinal-Plants	185
4	Antioxidant	171
5	Oxidative Stress	165
6	Antioxidant Activity	144
7	Extracts	98
8	Leaves	92
9	Plants	85
10	Apoptosis	85
11	Inhibition	82
12	Chemical-Composition	82
13	Nf-Kappa-B	78
14	Antibacterial Activity	74
15	Identification	73
16	Essential Oil	71
17	Antimicrobial Activity	71
18	Natural-Products	68
19	Expression	68
20	Acid	66

has been used 194 times. The third most popular keyword is "Medicinal-Plants", which has been used 185 times.

1.8.Top 30 influential research areas

Table 9 displays the top 30 research areas in the field of ethnomedicine, ranked by the number of articles published in these areas. The most influential research area is pharmacology and pharmacy, with 734 articles published. The second most influential research area is plant sciences, with 430 articles published. The third most influential research area is biochemistry and molecular biology, with 359 articles published.

1.8.1. Year-wise distribution of research areas

Table 10 shows the number of articles published in each research area in the years 2019-2023. The most research was conducted in the area of pharmacology and pharmacy, with 734 articles published. This was followed by plant sciences, with 430 articles published, and biochemistry and molecular biology, with 359 articles published. The top 10 research areas account for 67% of the articles. The average research area has 120 articles. There are a few research areas with a very high number of articles, such as pharmacology and pharmacy with 734 articles. In addition, there are a few research areas with a very low number of articles, such as education and educational research with 22 articles.

Table 9 — Research areas (Web Of Science, 2023)

Rank	Influential research areas	No. of articles
1	Pharmacology & Pharmacy	734
2	Plant Sciences	430
3	Biochemistry & Molecular Biology	359
4	Integrative & Complementary Medicine	304
5	Chemistry	299
6	Food Science & Technology	136
7	Science & Technology - Other Topics	114
8	Biotechnology & Applied Microbiology	88
9	Environmental Sciences & Ecology	66
10	Biophysics	62
11	Engineering	62
12	Toxicology	60
13	Research & Experimental Medicine	58
14	Life Sciences & Biomedicine - Other Topics	55
15	Oncology	54
16	Agriculture	51
17	Neurosciences & Neurology	45
18	Materials Science	42
19	Public, Environmental & Occupational Health	42
20	Cell Biology	42
21	Nutrition & Dietetics	39
22	Computer Science	31
23	Physics	25
24	Microbiology	25
25	General & Internal Medicine	25
26	Endocrinology & Metabolism	25
27	Education & Educational Research	22
28	Immunology	21
29	Genetics & Heredity	19
30	Polymer Science	19

1.9. Top 15 productive organizations

Table 11 shows the top 15 organizations that have published the most articles in the field of ethnomedicine. The organization with the most publications is King Saud University, with 89 articles published. This organization is located in Saudi Arabia and is a leading research university in the Middle East. The second most prolific organization is the Academy of Sciences and Innovative Research (AcSIR), with 72 articles published. This organization is located in India and is a government-funded research organization. The third most prolific organization is Lovely Professional University, with 71 articles published. This organization is located in India and is a private university. The top 15 organizations account for 30% of the articles. The average organization has 21 articles. The most common range of articles is 10-20.

Figure 2 presents a comparison of research productivity across various institutions, measured by

Table 10 — Year-wise distribution of research areas (Web Of Science, 2023)

Rank	Research areas	2019	2020	2021	2022	2023	Grand Total
1	Pharmacology & Pharmacy	90	119	219	216	90	734
2	Plant Sciences	60	81	119	122	48	430
3	Biochemistry & Molecular Biology	38	61	91	111	58	359
4	Integrative & Complementary Medicine	43	57	89	84	31	304
5	Chemistry	32	42	66	109	50	299
6	Food Science & Technology	22	23	42	34	15	136
7	Science & Technology - Other Topics	9	16	33	42	14	114
8	Biotechnology & Applied Microbiology	7	14	21	29	17	88
9	Environmental Sciences & Ecology	9	12	18	21	6	66
10	Biophysics	5	5	10	31	11	62
11	Engineering	7	12	11	24	8	62
12	Toxicology	8	12	12	21	7	60
13	Research & Experimental Medicine	8	5	19	16	10	58
14	Life Sciences & Biomedicine - Other Topics	4	14	19	14	4	55
15	Oncology	7	6	13	27	1	54
16	Agriculture	12	11	12	9	7	51
17	Neurosciences & Neurology	8	10	16	7	4	45
18	Cell Biology	4	7	12	13	6	42
19	Materials Science	9	5	7	17	4	42
20	Public, Environmental & Occupational Health	11	4	13	10	4	42
21	Nutrition & Dietetics	2	5	10	15	7	39
22	Computer Science	1	8	9	8	5	31
23	Endocrinology & Metabolism	3	5	7	4	6	25
24	General & Internal Medicine	1	2	6	13	3	25
25	Physics	3	3	4	13	2	25
26	Microbiology	3	2	6	10	4	25
27	Education & Educational Research	2	6	7	6	1	22
28	Immunology	2	5	4	8	2	21
29	Genetics & Heredity	3	5	7	3	1	19
30	Polymer Science	2	5	5	4	3	19

Table 11 — Productive organizations (Web Of Science, 2023)

Rank	Main organization	Place	No. of documents
1	King Saud University	Saudi Arabia	89
2	Academy of Scientific and Innovative Research	India	72
3	Lovely Professional University	India	71
4	Jamia Hamdard	India	62
5	Banaras Hindu University	India	43
6	King Khalid University	Saudi Arabia	40
7	Presidency University	India	36
8	Bharathiar University	India	35
9	All India Institute of Medical Sciences	India	35
10	Govt India	India	34
11	Chitkara University	India	34
12	CSIR	India	33
13	Manipal Academy of Higher Education	India	30
14	Amity University	India	30
15	Jawaharlal Nehru University	India	29

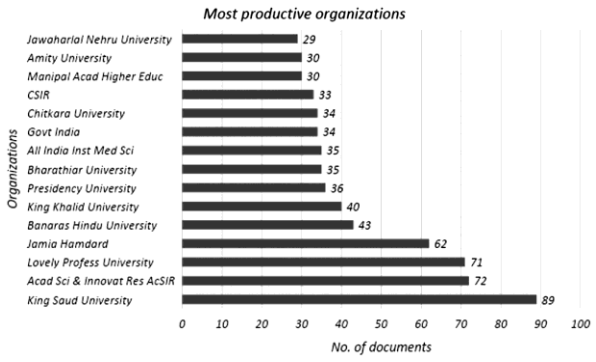

Figure 2 — Most Productive organizations (Web Of Science, 2023)

the number of documents produced. King Saud University leads as the most productive organization, followed by the Academy of Scientific and Innovative Research (AcSIR) and Lovely Professional University.

1.10. Authorship pattern

The data of authorship is divided into 3 categories viz. Single author, two authors and multi author. Out of a total of 2,242 research papers examined, it was found that 27 of them were authored by a single

Table 12 — Authorship pattern (Web Of Science, 2023)

1.10. Authorship pattern

Authors	Contribution	Percentage
Single author	27	1.204
Two author	231	10.303
Multi author	1984	88.49
Total	2242	100

individual, constituting 1.204% of the total as displayed in table 12. In contrast, there were 231 papers written collaboratively by two authors, accounting for 10.303% of the total. The majority of the papers, 1,984 to be precise, involved multiple authors, representing a significant 88.49% of the total. Here, it can be seen that collaborative authorship are more popular than single authorship.

Findings

- Among the analyzed document types, articles were the most prevalent (60.19%), followed by reviews (33.92%).
- The data analyzed depicts that the year 2022 with 698 research publications, had the highest number of documents, followed by 2021 with 627 research publications.
- It has been found that the top author in terms of average citations per publication (ACPP) was Kumar A, with an ACPP of 0.948718.
- The most prolific author Kumar A emerged as the top author in terms of average citations per publication (ACPP), with an ACPP value of 0.948718, signifying the impact and recognition of their work. Kumar A also stood out as the most prolific author with 78 publications, followed by Kumar S with 61 publications.
- From the presented study h-index rankings showed that Sharifi-Rad J had the highest h-index value of 18.
- The Journal of Ethnopharmacology was found to be the most productive journal, with 149 citations.
- The most popular keyword was "In-Vitro," used 311 times followed by “Extract” that has been used 194 times.
- It was found that Pharmacology & Pharmacy was the most influential research area, with 734 articles followed by Plant Sciences with 430 research publications.
- King Saud University was the most productive organization, with 89 articles followed by Acad Sci & Innovat Res AcSIR with 72 research publications.
- The authorship pattern showed that multi-author papers constituted the majority with 88.49% and two-author research publications that constituted with 10.303%. There is a very small percentage of Single-author paper consisting with only 27 documents out of 2276 documents, which accounts for 1.2% from the total.

These findings provide insights into the document types, authors, journals, research areas, and authorship patterns in the field of ethnomedicine.

Conclusion

The bibliometric analysis conducted on ethnomedicine literature in India from 2019 to 2023 has provided valuable insights into the growth, trends, and characteristics of research in this field. Through the systematic examination of scientific papers published in indexed journals, key findings have emerged that contribute to our understanding of ethnomedicine and its significance.The analysis revealed a steady growth in ethnomedicine literature over the specified time period, reflecting the increasing interest and recognition of traditional medicine practices in India. The examination of document types highlighted the predominance of original scientific papers, indicating a focus on empirical research and scientific validation of ethnomedicinal practices.

The bibliometric analysis has illuminated the growth, trends, and key characteristics of ethnomedicine literature in India. It emphasizes the importance of interdisciplinary research, collaboration, and the preservation of traditional knowledge for the advancement of ethnomedicine. The findings of this analysis can guide future research endeavors, policy formulation, and the promotion of evidence-based integration of ethnomedicine into healthcare practices, ultimately fostering the well-being and health of individuals and communities.

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