RESEARCH ARTICLE

Bibliographic analysis of *Clinacanthus nutans* papers in Scopus database (2000–2019) [version 1; peer review: 2 not approved]

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Abstract

Background: There has been an increasing trend in *Clinacanthus nutans* research, an important medicinal herb of Malaysia and Thailand, well known as an anti-viral, anti-cancer, and insect bite treatment. This study examines the trend in *Clinacanthus nutans* research from 2000 to 2019 and compares the contribution of research on this topic from different institutions and authors.

Methods: Publications from the Scopus database were retrieved using keywords and identify top ten institutions/universities, list of prominent authors, top ten journals that published research, top five influential articles, top fifty cited papers, and global distribution of publications on *Clinacanthus nutans*. Microsoft Excel 2016, Wordcloud, SPSS version 26, and GunnMap 2 were used to analyse indicators. A total of 167 articles were identified from the Scopus database. All research publications were screened initially. Five articles (n=5) were removed due to the unavailability of the full-text version of the article. 162 articles were included in the final study.

Results: Universiti Putra Malaysia and the Journal of Ethnopharmacology published the highest number of articles on *Clinacanthus nutans*. Herpes, antioxidant, phenolic, flavonoids, cancer, antimicrobial were common keywords identified using a word cloud. Over the past 20 years, the literature on *Clinacanthus nutans* has continuously grown, with the rate increasing after 2012.

Conclusion: The prominent research on *Clinacanthus nutans* was based upon their identified and isolated bioactive constituents, and there is a need for more research on clinical trials.

Keywords

Clinacanthus nutans; Bibliographic analysis; Scopus

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Approval Status

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Abbreviations

CRO: Clinical Research Organisations
 NKEA: National Key Economic Areas Research Grant Scheme
 FRGS: Fundamental Research Grant Scheme
 NRGS: Niche Research Grant Scheme
 RAGS: Research Acculturation Grant Scheme
 FRIM: Forest Research Institute of Malaysia
 MIS: Malaysian International Scholarship
 NSFC: National Natural Scientific Foundation of China
 NAFOSTED: Vietnam National Foundation for Science and Technology Development
 TCM: Traditional Chinese Medicine

Background

Medicinal plants are a source of natural, semi-synthetic, or synthetic analogues with pharmacological potential and development of new therapeutic leads.¹ Their potentially curative properties' chemical source is the secondary metabolites of medicinal plants.² Traditional Chinese medicine (TCM) remedies have been used in China for centuries and often remain “different” from present Western medicine (WM), as they are still now primarily herbal mixtures.³ There is an increasing trend in identifying and isolating bioactive compounds in the poly-mixture of TCM. For example, pericarpium citri reticulatae (Rutaceae), commonly called *chen pi* in Chinese, as a regulating *qi* drug, is most frequently used in several Chinese medicine prescriptions.⁴

Clinacanthus nutans (Burm. f) Lindau (Acanthaceae) is indigenous to Southeast Asia.⁵ It is commonly known as *Belalai Gajah* (Malay) and *Phaya Yo* (Thai). *Clinacanthus nutans* used in different therapies, such as for skin rashes, snake bites, lesions caused by herpes simplex virus, diabetic myelitis, and fever.⁶ It is a good source of many flavonoids and phenolics.⁷ Several *in vivo* and *in vitro* pharmacological activities have reported. The most promising activities consist of anti-inflammatory,⁸ antioxidant, anti-tumour,⁹ anti-viral¹⁰ and antibacterial¹¹ activities.

Bibliometric analyses have used previously to study the measures of quality and impact of research performed in pharmacovigilance,¹² bioactive chemical constituents,¹³ and health-related issues such as burns,¹⁴ pressure ulcer,¹⁵ mesothelioma,¹⁶ colorectal cancer.¹⁷ It has also used to understand the impact of an important research topic. For example, Nano-medicine is one of the emerging issues in the treatment of cancer, and a bibliometric analysis was performed to understand the global trends in this field.¹⁸ The selection of the current topic is based upon the medicinal importance of *Clinacanthus nutans* in South East Asia.

Many research articles (*i.e.*, phytochemical, pre-clinical, in-vitro studies) published recently on *Clinacanthus nutans* were funded by the Ministry of Education Malaysia (MOE) under the National Key Economic Areas Research Grant Scheme (NKEA),¹⁹ the Fundamental Research Grant Scheme (FRGS),^{9,20} the Niche Research Grant Scheme (NRGS),²¹ and the Research Acculturation Grant Scheme (RAGS).²² The research funded by universities' internal grants, the natural Products Division, Forest Research Institute of Malaysia (FRIM).²³ The student in Malaysia is also encouraged to study this medicinal herb under MyBRAIN²⁴ and Malaysian International Scholarship (MIS).²⁵ The study on the selected plant funded by other countries such as National Natural Scientific Foundation of China (NSFC),²⁶ Vietnam National Foundation for Science and Technology Development (NAFOSTED),²⁷ National Research Council Thailand,²⁸ Thailand Research Fund²⁹ and Higher Education Commission Thailand.¹⁰

This study investigated trends in *Clinacanthus nutans* research in recent years using the Scopus database. The researcher analysed publication outcomes from the last 20 years (2000–2019). This first attempt to use bibliographic to analyse *Clinacanthus nutans*-related publications aims to understand better global trends in research of one of the most well-known medicinal herb of Southeast Asia.

Methods

Data source and search strategy

Clinacanthus nutans was used as a keyword to search inside the Scopus database. The data collection strictly follows the Scopus database and relevant articles indexed during the given time. Other databases, such as PubMed or Web of Science, are not part of the current study. In this study, the search terms were as follows: TITLE-ABS-KEY (clinacanthus AND nutans) AND PUBYEAR > 1999 AND PUBYEAR < 2020. A flow diagram of selected articles on *Clinacanthus nutans* is shown in Figure 1.

Figure 1. Flow diagram of selected articles on *Clinacanthus nutans*.

Information extraction

The data were downloaded from the Scopus database and imported manually into Microsoft Excel 2016 (RRID: SCR_016137); Google Sheets (RRID:SCR_017679) is an open access alternative. KYJ and QLC verified the data entry and collection. The entered data consist of articles, the first author, co-authors, h-index of the first and corresponding author from Scopus. The number of Scopus citation of selected articles were part of data collection. Other data consist of the name of journal/conference, journal ranking according to Scopus (CiteScore), date of publication according to the journal website, year of paper according to Scopus, data of submission of an article, date of acceptance, number of universities/organisation contributed to that publication, name of universities/organisation contributed to that publication, journal impact factor (CiteScore) taken from Scopus, type of article, most vital topic/category, subject area, keywords, list of the significant issue addressed, number of countries, location of authors, number of pages, number of references, number of figures, number of tables, an affiliation of the corresponding author, the association of the first author, funding and department/institution/faculty.

Statistical analysis

IBM SPSS Statistics 26 (RRID:SCR_019096; JASP (RRID:SCR_015823) is an open source alternative) and Microsoft Office Excel 2016 (Microsoft Corporation, Santa Rosa, California, USA) was used to analyse the characteristics of the publications. [Wordclouds.com](https://www.wordclouds.com/) (Zygomatic, Netherlands) has been used to create a cloud of keywords. GunnMap 2 was used to create a custom world map to depict the distribution of global publications on *Clinacanthus nutans*.

Results

Universiti Putra Malaysia contained the maximum number of record ($n = 38$), followed by University Sains Malaysia ($n = 18$). [Table 1](#) shows the top 10 institutions/universities that published their research on *Clinacanthus nutans*.

Khatib, A., from the International Islamic University Malaysia was found to be the most prominent researcher to contribute to *Clinacanthus nutans* ($n = 11$). Abas, F., was the top female researcher that contributes from Universiti Putra Malaysia, Serdang, Malaysia, on *Clinacanthus nutans* ($n = 10$). A list of the most prominent authors in studying *Clinacanthus nutans* is shown in [Table 2](#).

The *Journal of Ethnopharmacology* (ISSN 0378-8741) has published the highest number of records on *Clinacanthus nutans* ($n = 9$), whereas *BMC Complementary and Alternative Medicine* (ISSN 1472-6882) were second to published

Table 1. The top 10 institutions/universities published research on *Clinacanthus nutans*.

Name	Country	Global QS Ranking (2020)	Number of Records
Universiti Putra Malaysia	Malaysia	#159	38
Universiti Sains Malaysia	Malaysia	#=165	18
International Islamic University Malaysia	Malaysia	#651-700	15
Universiti Teknologi MARA	Malaysia	#651-700	12
Universiti Malaysia Sabah	Malaysia	#801-1000	10
Universiti Kebangsaan Malaysia	Malaysia	#=160	9
Universiti Teknologi Malaysia	Malaysia	#=217	8
Mahidol University	Thailand	#314	8
National University of Singapore	Singapore	#=11	5
Khon Kaen University	Thailand	#801-1000	5

Table 2. List of most prominent authors in studying on *Clinacanthus nutans*.

Name	Gender	Number of Records	Institution/Universities	h-index (Scopus, 2019)	i10-index (Scholar google)
Khatib, A.	Male	11	International Islamic University Malaysia, Kuala Lumpur, Malaysia	23	53
Abas, F.	Female	10	Universiti Putra Malaysia, Serdang, Malaysia	28	114
Zakaria, Z.A.	Male	8	Universiti Putra Malaysia, Serdang, Malaysia	31	108
Shaari, K.	Female	8	Universiti Putra Malaysia, Serdang, Malaysia	26	78
Ismail, M.	Female	6	Universiti Putra Malaysia, Serdang, Malaysia	25	110
Khoo, L.W.	Female	5	Universiti Putra Malaysia, Serdang, Malaysia	3	N/A
Tham, C.L.	Female	5	Universiti Putra Malaysia, Serdang, Malaysia	11	13
Abdullah Sani, N.	Female	5	Universiti Kebangsaan Malaysia, Bangi, Malaysia	13	23

Table 3. The top 10 journals to published on *Clinacanthus nutans*.

Rank	Journal	Number of Records	ISSN	CiteScore 2018
1	Journal of Ethnopharmacology	9	0378-8741	3.68
2	BMC Complementary and Alternative Medicine	8	1472-6882	2.69
3	Molecules	6	1420-3049	3.28
4	AIP Conference Proceedings	5	0094-243X	0.37
5	Evidence-based Complementary and Alternative Medicine	4	1741-427X	2.01
6	Acta Horticulture	4	0567-7572	0.25
7	Tropical Journal of Pharmaceutical Research	3	1596-5996	0.54
8	Asian Pacific Journal of Tropical Biomedicine	2	2221-1691	2.03
9	Asian Pacific Journal of Tropical Medicine	2	1995-7645	1.87
10.	Pharmaceutical Biology	2	1388-0209	2.43

(n = 8). The CiteScore (2018) of the *Journal of Ethnopharmacology* (3.68) was also highest among the other competing journals on this medicinal plant. Table 3 shows the top 10 journals publishing research on *Clinacanthus nutans*.

The authorship heat map shows some interesting facts. The number of authors has increased with time. There were few authors one of a paper in the initial years, but with time, the number of authors has increased to more than seven. This could be due to an increase in research on these medicinal herbs and increasing cross-collaboration among different institutions due to the rise in funding availability and utilisation of various resources from different universities (Figure 2).

The top influential articles published on *Clinacanthus nutans* are based upon bioactive constituents,^{30,31} anti-inflammatory property,²⁹ anti-cancer, and antioxidant potential of the plant³² (Table 4).

Figure 2. Authorship heat map of *Clinacanthus nutans* research 2000–2019.

Table 4. Top five influential articles on *Clinacanthus nutans* published during the period 2000–2019.

First and corresponding author with year	Article Title	Journal	Total Citation	Reference
Sakdarat, S., et al., 2009	Bioactive constituents from the leaves of <i>Clinacanthus nutans</i> Lindau	Bioorganic and Medicinal Chemistry	81	³⁰
Wanikiat, P., et al., 2008	The anti-inflammatory effects and the inhibition of neutrophil responsiveness by <i>Barleria lupulina</i> and <i>Clinacanthus nutans</i> extracts	Journal of Ethnopharmacology	71	²⁹
Yong, Y.K., et al., 2013	<i>Clinacanthus nutans</i> extracts are antioxidant with antiproliferative effect on cultured human cancer cell lines	Evidence-based Complementary and Alternative Medicine	69	³²
Tuntiawachwuttikul, P., et al., 2004	Cerebrosides and a monoacylmonogalactosylglycerol from <i>Clinacanthus nutans</i>	Chemical and Pharmaceutical Bulletin	50	³¹
Pannangpetch, P., et al., 2007	Antioxidant activity and protective effect against oxidative hemolysis of <i>Clinacanthus nutans</i> (Burm.f) Lindau	Songklanakarin Journal of Science and Technology	42	³⁹

Table 5. List of top 50 cited papers on *Clinacanthus nutans*.

Rank	First author name	No of Citations	Rank	First author name	No of Citations
1	Chomnawang, M.T. ⁴⁰	173	26	Lusia Barek, M. ⁷⁵	23
2	Mahady, G.B. ⁴²	94	27	Huang, D. ⁷⁶	22
3	Chomnawang, M.T. ⁴⁴	88	28	Chelyn, J.L. ⁷⁷	22
4	Sakdarat, S. ³⁰	81	29	Aslam, M.S. ⁶	20
5	Uawonggul, N. ⁴⁷	72	30	Wong, F.-C. ⁷⁸	20
6	Wanikiat, P. ²⁹	71	31	Liew, S.-Y. ⁷⁹	20
7	Yong, Y.K. ³²	69	32	Shim, S.Y. ⁸⁰	18
8	Ching, S.M. ⁵¹	51	33	Abdul Rahim, M.H. ⁴¹	18
9	Tuntiwachwuttikul, P. ³¹	50	34	Saokaew, S. ⁴³	17
10	Alam, A. ⁵³	49	35	Yang, H.S. ⁴⁵	17
11	Cheeptham, N. ⁵⁵	42	36	Mustapa, A.N. ⁴⁶	16
12	Pannangpetch, P. ³⁹	42	37	Vachirayonstien, T. ⁴⁸	16
13	Arullappan, S. ⁵⁸	42	38	Chomnawang, M.T. ⁴⁹	16
14	Mustapa, A.N. ⁶⁰	40	39	Thongrakard, V. ⁵⁰	14
15	Janwitayanuchit, W. ⁶²	39	40	Zulkipli, I.N. ⁵	13
16	Siew, Y.-Y. ⁶⁴	36	41	Tsai, H.-D. ⁵²	13
17	Ghasemzadeh, A. ⁶⁶	33	42	Teoh, P.L. ⁵⁴	12
18	Chotchoungchatchai, S. ⁶⁸	32	43	Ch'ng, Y.S. ⁵⁶	12
19	Tu, S.-F. ⁷⁰	29	44	Raya, K.B. ⁵⁷	12
20	Kongkaew, C. ⁷¹	28	45	Sarega, N. ⁵⁹	10
21	Kunsorn, P. ¹⁰	28	46	Pongmuangmul, S. ⁶¹	10
22	Mustapa, A.N. ⁷²	28	47	Le, C.-F. ⁶³	9
23	Khoo, L.W. ⁷³	28	48	Fazil, F.N.M. ⁶⁵	9
24	Mai, C.W. ⁸	25	49	Radhakrishnan, N. ⁶⁷	9
25	Huang, D. ⁷⁴	23	50	Yahaya, R. ⁶⁹	9

Figure 4. Correlation between yearly output, number of citation and number of published articles.

toxicity studies³⁵⁻³⁷ before preparing for clinical trials to evaluate its health benefits on humans. Although there is an increasing trend in pre-clinical studies on *Clinacanthus nutans*, there is a lack of protocols or research to conduct the clinical trial. The only available registered clinical trial when search through clinicaltrials.gov had the title “prevention of mucositis in patients with head and neck cancer treated with radiotherapy”,³⁸ which completed in March 2018. The research also identified an increasing trend in research collaboration in recent years, which could be a positive direction for developing a new drug analogue or a multi-herb combination.

Clinacanthus nutans is one of the future potentially important herbs of Southeast Asia. Malaysia and Thailand were the most significant contributors to studies on the medicinal properties or therapeutic potential. Clinical research organisations could increase research collaboration with academia to reduce the literary gap, provide financial support, especially during a pandemic such as COVID-19; fasten the process of clinical trial and growing commercialisation of medicinal herbs, especially for herbal economies such as Malaysia and Thailand.

This study was secondary analysis based on previous published studies. Ethics approval and consent to participate is not applicable.

Not applicable.

Underlying data

All data underlying the results are available as part of the article and no additional source data are required.

All authors participated in the study conception and design. MSA performed the bibliographic analysis. KYJ and QLC interpreted the data, drafted and critically revised the manuscript and approved the final version to be published. All authors had full access to all the data and took responsibility for the data integrity and data analysis accuracy.

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Bibliographic analysis of *Clinacanthus nutans* papers in Scopus database (2000–2019) [version 1, not approved]

Thank you for asking me to review the above-titled manuscript. The current version is confusing, not carefully written, inaccurate, not well designed and full of bias. I have detailed comments below. If the authors respond to my comments, please kindly submit a point-by-point response letter, addressing each point raised by the reviewers, plus page and line numbers; thank you.

Abstract:

1. The aims do not mention "bibliometric analysis"; mentioned in the title.
2. State a research question.
3. What search words were used? And when the search was carried out?
4. State inclusion and exclusion criteria (if no space in the abstract, you must state this under methods).
5. Why only top 10 and then top 5? As a rule in bibliometric studies, we do not report samples; we assess the whole number of papers identified 162 papers.
6. Results should show figures - mean $\pm$ SD, Median IQR, correlations, factor analysis and p-value. Not numbers or %.
7. The statement "Five papers were removed because not available" is not clear. If these papers were withdrawn, state this. If they were not available to you, they should be ordered and studied.
8. The last 4 lines in methods are part of the results, please move them. We do not know any

bibliometric analysis like number of citations, type of article, number of authors, number of countries/institutes, number of grants received etc. Please read other bibliometric studies for reference.

9. Conclusions should be rewritten.

Introduction:

1. What triggered this study? Why do we need this study?

2. Provide more information about *Clinacanthus nutans* and research and uses.

3. The section about funding is redundant. It should be omitted or moved to the discussion. But, I wonder why the authors did not include grant funding in their assessment of the 162 papers as part of their bibliometric assessment? It should be included.

4. State your research question.

Figure 1:

1. These 5 figures that were not included, if these papers were withdrawn, state this clearly and add their details in a box. Showing names of authors, title, journal and detailed publication, and when was each withdrawn. If not withdrawn, we need we know on what bases were excluded. What was the justification?

Methods:

1. State study design. State why the Web of Science database was not searched instead of Scopus. Give justification.

2. State the inclusion and exclusion criteria.

3. State the bibliometric parameters and add grants/funding received.

4. Read other papers on bibliometric studies published in BMJ and BMJ open and other top journals for reference.

5. Citations are needed in the methods.

6. Analysis should include mean $\pm$ SD, Median IQR, correlation, p-value etc.

Results:

1. Why was the JIF not provided?

Table 1:

1. Total number of records is 128, while the total number of papers as per Figure 1 is 162. Where are the other missing records? Are you just interested in showing certain universities and ignoring others? But another bias is obvious when we look at Figure 5 and the authors showing Canada, the USA, Australia, India, Norway, Saudi Arabia and others involved in *Clinacanthus nutans*, I understand in these 162 papers. Why the universities and authors from these countries were not even mentioned in the paper or Table 1.

Table 2:

1. You should include all authors who have 2 or more papers, and show the citation number, and in which was the first author or co-author. The authors must read proper papers on this area.

2. Again we do not give samples. If you are studying 162 papers. They all must be analysed and they should be listed in the list of references to see them and assess them as reviewers, editors, and readers. Research is about transparency, please do not give samples or do short-cuts.

Table 3:

1. Citations must be given next to the number of papers. If the number of papers is 9, you should write 9 [Reference numbers of the 9 papers].

Figure 2 is not clear.**Table 4:**

1. What is "Influential"? On what basis did you select these papers and give them that title? What is your definition of an "Influential" author or paper? We must see an assessment of the 162 papers not samples of 5 or 10. This table should be omitted. It also contradicts Table 5. In Table 5, Chomnawang, M.T has the highest number of citations (173), compared to Sakdarat, S. (81 citations). It is confusing and not clear how did you define "influential"? What are the criteria? Why were such details not explained in the method?

Figure 5:

1. Distribution of global publications on *Clinacanthus nutans*. - This should be explained in the methods and results, and we need to know details about papers produced by these countries. The authors should not be selective.

Discussion:

1. Should be rewritten and improved. The whole manuscript needs an English language edit to improve grammar for clarity.

References:

1. The 162 papers must be listed all in references, not samples of them. Please read other literature in bibliometric analysis for reference.

Is the work clearly and accurately presented and does it cite the current literature?

No

Is the study design appropriate and is the work technically sound?

No

Are sufficient details of methods and analysis provided to allow replication by others?

Partly

If applicable, is the statistical analysis and its interpretation appropriate?

No

Are all the source data underlying the results available to ensure full reproducibility?

No

Are the conclusions drawn adequately supported by the results?

No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: In bibliometrics analysis, top-cited articles, medical informatics, and medical education.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Reviewer Report 02 June 2021

<https://doi.org/10.5256/f1000research.56280.r86084>

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Aidi Ahmi

Tunku Puteri Intan Safinaz School of Accountancy, Universiti Utara Malaysia, Sintok, Malaysia

This paper seems to have the interest to cover a bibliometric analysis of the *Clinacanthus nutans* over the past 20 years. However, while it has presented a few bibliometric indicators, this paper seems doesn't have a clear direction and objectives. I would suggest the aims of this paper and the research questions clearly being defined in the background section. The authors did specify that they want to analyze the trend but it seems too general.

I'm not sure if the problem statement is clearly being defined i.e. the reason why this bibliometric analysis is important to be conducted. The literature review on the subject matters also seems not convincing.

Why the results of the fundings are presented in the background section?

Methods

- I'm not sure mentioning the author names in order to do the data entry and verification is proper in this academic paper.
- Based on this statement: "*The entered data consist of articles, the first author, co-authors, h-index of the first and corresponding author from Scopus.*" - I'm not sure the data entry still required as most of the data downloaded from Scopus were already completed. I'm not sure if the h-index of the first and corresponding author from Scopus is necessary to be collected while it not being presented in the results. The result presented is just about the top author (in which they can be not just the first or corresponding author). I don't think the h-index of the authors is necessary as well. The h-index of the publications probably more meaningful.
- These statements seem quite confusing: "*journal ranking according to Scopus (CiteScore)*" and "*journal impact factor (CiteScore)*" - I think the definition of CiteScore has been misinterpreted here.

- Some of the data collected and mentioned in the information extraction section seem not even been analyzed. So, what for? Some also seem not practical such as the location of authors (?), the association of the first author (?), most vital topic/category (?).
- Not sure why IBM SPSS Statistics 26 has been used since there is no complicated statistic has been presented in this paper.

Results

- All the results presented are too descriptive. There are no further interpretations or elaborations that worth as part of the contribution of this paper. The so-what question has not properly addressed for each of the results.
- Would be good if the analysis can be extended in order to analyze the impact of the paper based on the number of citations and h-index on the publications.
- Figure 4 looks quite confusing. What is the difference between yearly output and the number of published articles?
- There is no legend for Figure 5. Not sure what the colours are representing.

Discussion

- I am not sure how the results of this paper can really "help find similar funding".
- *"Several articles published on bibliographic analysis in health-related fields"* - this is the health-related topic, of course, it will be published in this related journal.
- The contribution of this paper seems not convincing enough to justify the indexing of this paper.

Conclusions

- Not sure if the conclusion is really derived from the findings.
- How about the limitations of the study and future research?

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

No

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

No

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Bibliometric analysis

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

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