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GLOBAL TRENDS IN TRACHOMA

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Abstract: The study's goal is to examine the scientific outputs on Trachoma that have been published globally. A descriptive bibliometric analysis study was carried out. The Web of Science Core Collection was used as a bibliographic database and VOSviewer software version 1.6.18 for Windows was used to create the required network visualization. The search was conducted by using the keywords "trachoma" or "Chlamydia trachomatis" in the title. The most extensive timeframe was used, which included the years 1970 through 2021. Other publication genres such as case reports, editorials, and letters were eliminated from the search since they were not peer-reviewed papers. The overall citation counts of each trachoma-related publication published was the study's primary outcome. The topic of the publications, the publishing journal, and the year published, the language, the place of origin, the names of the first authors, the Hirsch (H) indexes, and the number of citations analyzed were all secondary outcomes. A total of 6556 articles were detected. The number of articles has never dropped under 100 articles per year since 1985. The highest number of articles was published in 2021 (n=233). 6251 (95.348%) of the articles were published in Science Citation Index Expanded (SCI-Expanded) journals. The University of California System was the leading affiliation on trachoma research. The USA (n=2585), England (n=910), and Canada (n=336) were the countries with the higher number of publications. The articles from the USA had the highest H indexes and the articles from England had a higher number of average citations per item. Studies on trachoma are increasing worldwide. The USA and England are the leading countries in scientific production in this regard. The USA and England are the leading countries in scientific production on this topic.

Keywords: Bibliometric analysis, Vos viewer, Trachoma, Chlamydia trachomatis

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1. Introduction

Trachoma is an infectious eye disease, caused by intracellular bacterium named *Chlamydia trachomatis* bacterium, and it is the most common infectious cause of visual impairment that can be prevented (Resnikoff et al., 2004). It spreads easily through direct human contact, sharing towels and clothing, and flies that come into touch with an infected person's eyes or nose. It can spread in regions where there is a lack of access to clean water and sanitation, affecting the world's most disadvantaged populations (Wright et al., 2007).

According to the Centers for Disease Control and Prevention (CDC), this disease affects about 8 million people worldwide, with 500 million individuals at risk of blindness in 57 endemic countries (Resnikoff et al., 2004). According to the World Health Organization (WHO) data, the most of the trachoma cases are from Africa. Also this disease can be seen in Central and South America, Asia, Australia, and the Middle East both have the disease. As of January 2, 2020, 13 countries had stated that they had met their elimination targets. In 2019, 92 622 persons had advanced trachoma surgically treated, and 95.2 million were treated with antibiotics (URL 1). Despite these achievements, the disease continues to be a major public health concern, with an estimated yearly productivity loss of US$ 8 billion owing to blindness and visual impairment (Solomon et al., 2022).

The objective of this research was to identify and analyze the trachoma publications. We evaluate the impact of trachoma literature, as well as the progress made in trachoma diagnosis, prevention, and therapy.

2. Materials and Methods

In this study, a descriptive bibliometric and visualizing study was carried out. The Web of Science Core Collection (Clarivate Analytics, Philadelphia, USA) was used as a bibliographic database. The Web of Science Core Collection indexes high-impact, high-quality scientific journals from throughout the world. The search was conducted using the terms "trachoma" or "*Chlamydia trachomatis*" in the title. The most extensive timeframe was used, which included the years 1970 through 2021. Other publication genres such as case reports, editorials, and letters were eliminated from the search since they were not peer-reviewed papers. In June 2022, the search

was done. The overall analysis of trachoma-related articles published was the study's primary outcome.

The topic of the publications, the publishing journal, and the year published, the language, the place of origin, the names of the first authors, the Hirsch (H) indexes, and the number of citations and international collabrations analysis were all secondary outcomes.

2.1. Statistical Analysis

Microsoft Excel 2010 was used to convert the data in the tables into absolute numbers (frequency and percentage). No advanced statistical analyses tests were used. VOSviewer software version 1.6.18 for Windows was used to create the required network visualization. VOSviewer is a free computer application that was created for the purpose of creating and viewing bibliometric maps (Ahmad et al., 2021; van Eck et al., 2010).

3. Results

A total of 6556 articles were found. In the year 1970, the first articles on trachoma were published. The number of articles never drop under 100 article per year since 1985. The highest number of articles published in 2021 (n=233) (Figure 1). 3,124 (47.651%) of the articles were published as Open Access category. 6251 (95.348%) of them published in Science Citation Index Expanded (SCI-Expanded) journals. 6,217 (94.829%) of the articles were published in English language.

The articles were mostly from Infectious Diseases (n=2071, 31.589%), Microbiology (n=1567, 23.902%) and Immunology (n=1182, 18.029%) research areas (Table 1). The USA (n=2585), England (n=910) and Canada (n=336) were the countries with higher number of publications (Figure 2). The articles were published from 4.406 different affiliations. University of California System was the leading affiliation on trachoma research (Table 2). The main funding sponsor were from the USA and European countries (Table 3). Most of the articles were published in the journal of Sexually Transmitted Diseases (n=348, 5.308%), Infection and Immunity (n=336, 5.125%) and Journal of Clinical Microbiology (n=289, 4.408%) journals (Table 4).

3.1. Citing Analysis

The articles were cited 165865 times (the average was: 25.3 times/ per article) and H index was 138. The number of citations has risen steadily over time (Figure 3). The articles from the USA had highest H indexes and the articles from England had higher number of average citation per item (Table 5).

3.2. Mapping

The mostly preferred keywords mapping was given in Figure 4. The map depicts the international collaborative network by using the VOSviewer (Figure 5, Figure 6 and Figure 7).

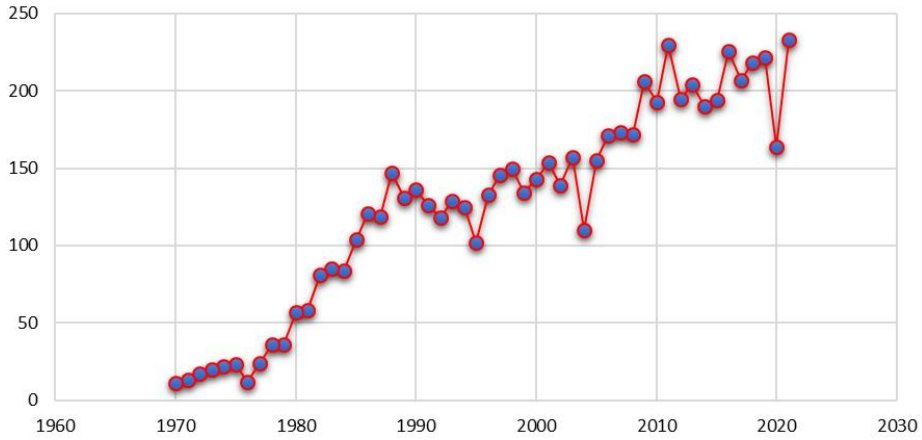

Figure 1. The number of articles published throughout time.

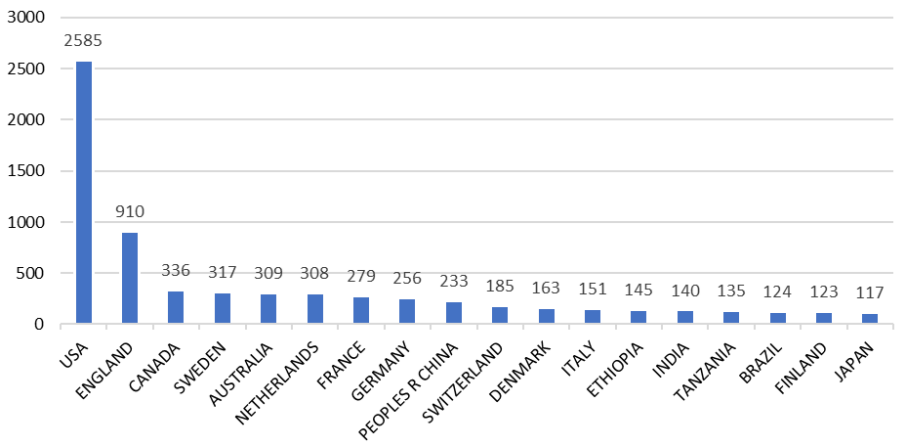

Figure 2. The countries with more than 100 articles.

Table 1. Research areas*

Research Areas	n	% of 6.556
Infectious Diseases	2071	31.589
Microbiology	1567	23.902
Immunology	1182	18.029
Obstetrics Gynecology	564	8.603
Public Environmental Occupational Health	558	8.511
General Internal Medicine	473	7.215
Ophthalmology	364	5.552
Biochemistry Molecular Biology	310	4.728
Tropical Medicine	288	4.393
Science Technology Other Topics	247	3.768
Pharmacology Pharmacy	223	3.401
Parasitology	185	2.822
Pathology	184	2.807
Research Experimental Medicine	177	2.700
Reproductive Biology	154	2.349
Pediatrics	128	1.952
Urology Nephrology	117	1.785
Cell Biology	116	1.769
Dermatology	108	1.647
Biotechnology Applied Microbiology	97	1.480
Medical Laboratory Technology	61	0.930
Oncology	56	0.854
Virology	55	0.839
Genetics Heredity	54	0.824
Rheumatology	51	0.778

*Showing 25 out of 95 entries, 3 record(s) (0.046%) do not contain data in the field being analyzed

Table 2. The leading affiliations on trachoma research*

Affiliations	n	% of 6.556
University of California System	533	8.130
University of London	439	6.696
University of California San Francisco	367	5.598
League of European Research Universities Leru	349	5.323
London School of Hygiene Tropical Medicine	304	4.637
Johns Hopkins University	289	4.408
University of Washington	263	4.012
University of Washington Seattle	262	3.996
National Institutes of Health NIH USA	224	3.417
NIH Natıonal Institute of Allergy Infectious Diseases	199	3.035

*Showing 10 out of 4.406 entries, 71 record(s) (1.083%) do not contain data in the field being analyzed

Table 3. The leading funding agencies*

Funding Agencies	n	% of 6.556
United States Department of Health Human Services	1369	20.882
National Institutes of Health Nih USA	1304	19.890
National Institute of Allergy Infectious Diseases	943	14.384
European Commission	327	4.988
National Eye Institute	198	3.020
Wellcome Trust	170	2.593
UK Research Innovation	140	2.135
Medical Research Council UK	138	2.105
United States Agency For International Development	98	1.495
National Institute of General Medical Sciences	95	1.449

*Showing 10 out of 1.976 entries, 3.805 record(s) (58.038%) do not contain data in the field being analyzed

Table 4. The mostly publishing journals on trachoma*

Journals	RC	% of 6.556
Sexually Transmitted Diseases	348	5.308
Infection and Immunity	336	5.125
Journal of Clinical Microbiology	289	4.408
Sexually Transmitted Infections	186	2.837
International Journal of STD AIDS	142	2.166
Journal of Infectious Dıseases	135	2.059
Plos Neglected Tropıcal Dıseases	126	1.922
Plos One	126	1.922
Ophthalmıc Epıdemiology	94	1.434
Journal of Bacterıology	89	1.358
Genıtourınary Medicine	74	1.129
Amerıcan Journal of Obstetrıcs and Gynecology	73	1.113
Antımıcrobıal Agents and Chemotherapy	62	0.946
BMC Infectious Diseases	62	0.946
Brıtısh Journal of Ophthalmology	62	0.946
Journal of Medıcal Microbiology	61	0.930
Journal of Immunology	55	0.839
European Journal of Clinical Microbiology Infectious Diseases	53	0.808
American Journal of Tropical Medicine and Hygiene	52	0.793
Clinical Infectious Diseases	51	0.778
Diagnostic Microbiology and Infectious Disease	50	0.763
Journal of Clinical Pathology	47	0.717
Obstetrics and Gynecology	46	0.702
Fems Microbiology Letters	45	0.686
Molecular Microbiology	44	0.671

*Showing 25 out of 1.093 entries, RC= record count

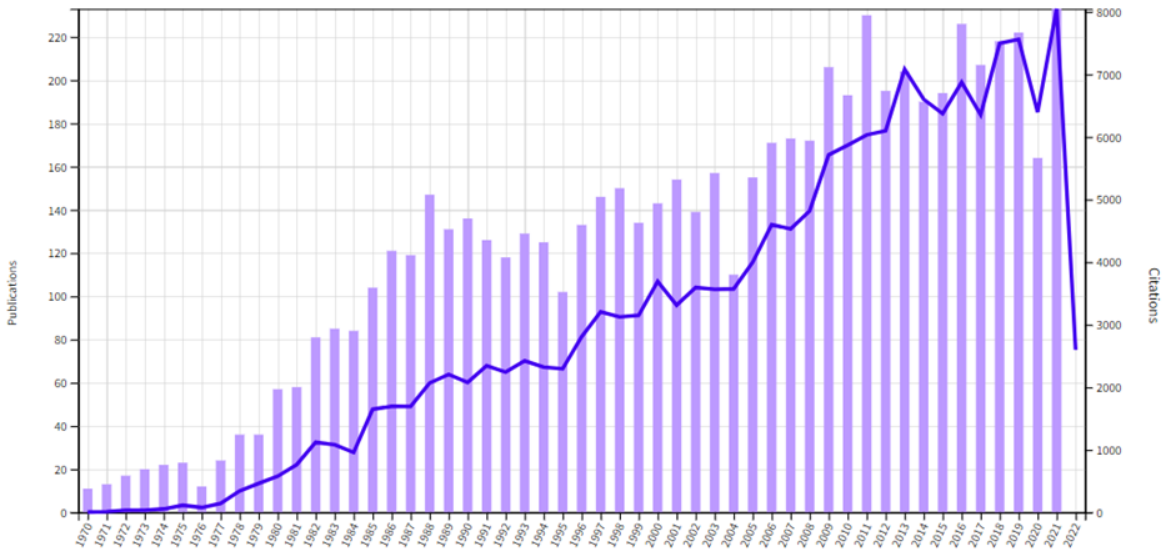

Figure 3. The visualition of citations and publications over the years.

Table 5. The comparison of number of publications, number of citations, H-indexes, number of average citation per items of the top 5 publishing countries*

C	NP	NC	H-İ	NACPI
Total	6556	165865	138	25.3
The USA	2585*	96043	127*	37.15
England	910	25678	71	28.22
Canada	336	13255	61	39.45*
Sweden	317	10099	55	31.86
Australia	309	5111	34	16.54

*It shows the highest value for each situation, C= country, NP= number of publications, NC= number of citation, H-İ= H index, NACPI= number of average citation per item

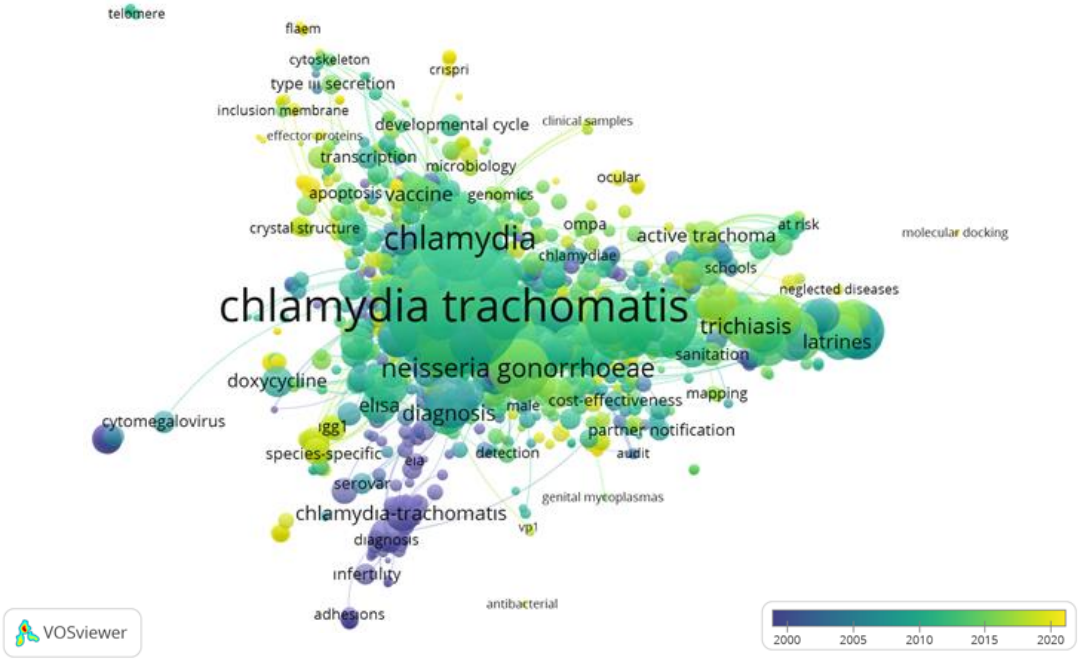

Figure 4. The mostly preferred keywords mapping

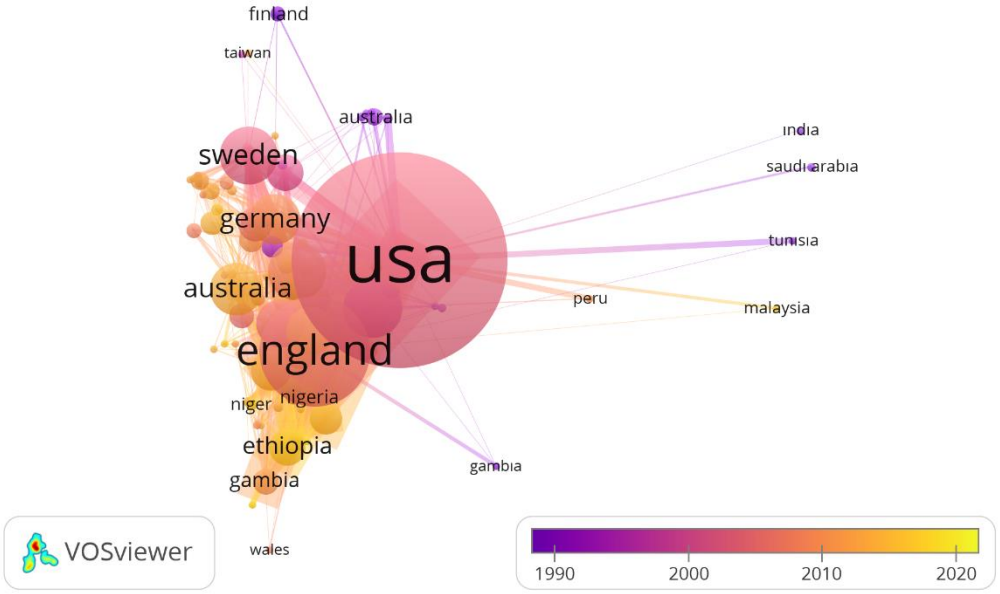

Figure 5. Network visualization map of co-authourship among countries with a minimum of five publications.

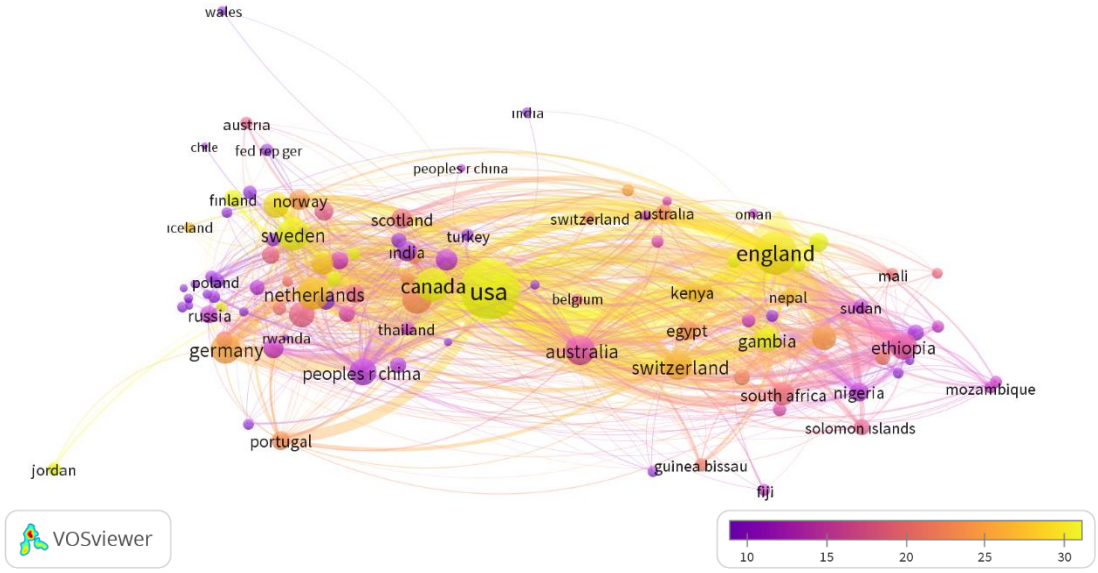

Figure 6. Network visualization map of citation map among countries with a minimum of five publications.

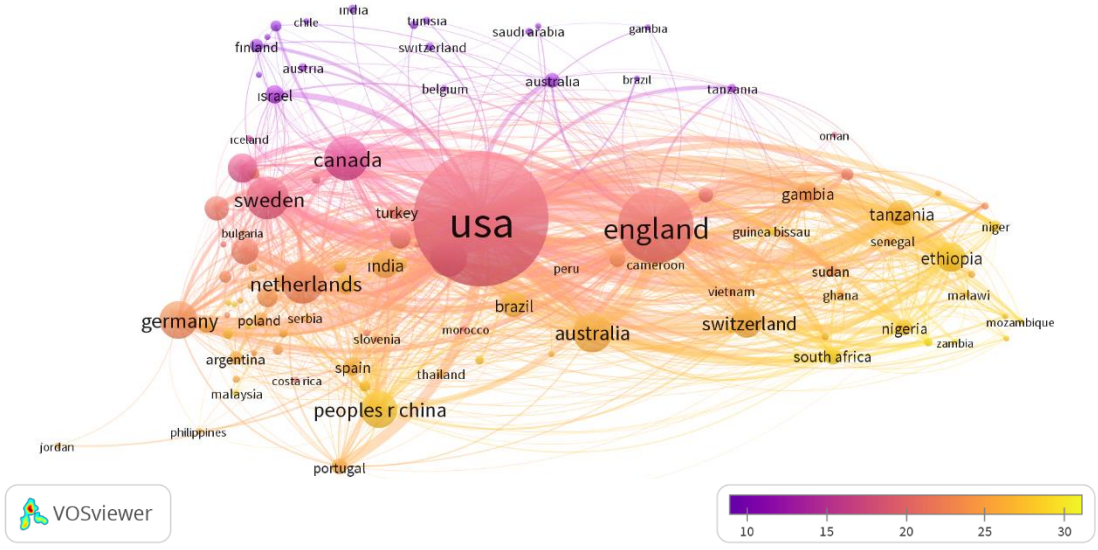

Figure 7. Citation visualization map among affiliations. Line express the cite number.

3. Discussion

The most prevalent infectious cause of blindness is trachoma. This infection several times as a child causes severe conjunctivitis, scarring, and possibly blindness inturned eyelashes (trichiasis or entropion) later in life. Trachoma is spread by children with filthy cheeks sharing infectious ocular secretions in resource-poor communities with poor hygiene. The epidemiology and pathophysiology of trachoma have been studied extensively. The SAFE Strategy is being implemented through integrated control programs that include trichiasis surgery, antibiotic mass distribution, facial hygiene promotion, and environmental enhancement. This technique has effectively eradicated trachoma in numerous countries, and global attempts to eradicate blinding trachoma by 2020 are ongoing (Taylor et al., 2014).

Bibliometric studies have become important instruments for assessing scientific activity as they provide a snapshot of the development, amount, and distribution of scientific literature in a certain area. The bibliometric technique entails quantifying broad trends and identifying hidden links or correlations among enormous volumes of data. In recent years, many various bibliometric analysis methods have come to the forefront in the medical literature, and methods like mapping and graphing can help to deepen analytic research. Many methodologies, including as content analysis, comparisons of scientific productivity by years, nations, and citation numbers, can be used to conduct these evaluations. Databases that allow quick and extensive data analysis, such as Pubmed, EBSCO, Scopus, Pro-Quest, and Web of Science, are often used for bibliometric analysis. Additionally, this approach may be used to evaluate other sources such as any database, theses, journals, conferences, and so on (Alkan Çeviker et al., 2021; Dindar Demiray et al., 2021; Durgun et al.2022; Küçük et al.2021; Mızrakçı S, 2022; Nichols et al.2021; Öntürk et al.2021; Özlü A,2022; Özlü, 2021; Şahin S.,2022; Tahmaz et al., 2022; Yıldız E., 2022). We believe that the scientific effectiveness of serious diseases, as well as many other areas in health, should be assessed using this technique, and that a roadmap for future research should be formed. The Wos database was utilized to conduct the research in this study. We did a literature research on trachoma before to doing this study and were unable to find any similar studies. This illness is significant since it is the most prevalent infectious cause of vision loss that can be avoided. This study served as a starting point for developing future policy and research funding to effectively manage trachoma in endemic regions. The trachoma literature has developed dramatically since 1980, with at least 100 new papers being published each year.

As of March 2022, 44 nations, including 26 in the WHO African Region, were recognized to require trachoma interventions (Solomon et al., 2022). The USA has the most studies published, followed by England and Canada. The current analysis follows the same patterns as many earlier bibliometric studies in many fields, confirming the USA as a global research leader in both quantitative and qualitative terms (Dindar Demiray et al., 2021; Mızrakçı, 2022; Şahin, 2022).

Keywords play an important role to locate any research in showing the required document. In our analysis, the most used keywords were given in Figure 4. Journals are key instruments for disseminating research; hence, the quality and prestige of a journal play a significant role in transferring findings to the target audience (Shah et al., 2021). In our study, most of the articles were published in the journal of Sexually Transmitted Diseases (n=348, 5.308%), Infection and Immunity (n=336, 5.125%) and Journal of Clinical Microbiology (n=289, 4.408%) journals.

Scientometrics may now examine the impact of publications using citation reports, knowledge mapping methodologies, and other quantitative bibliometrics criteria, because to advancements in health informatics (Alshahrani and Owaifeer, 2020). Quantitative data on document types, authors, journals that published the trachoma documents, languages, publication origins, and citation reports were also included in the current bibliometric analysis. Also, we used the VOSviewer for the purpose of creating and viewing bibliometric maps (Figure 4-7). The current analysis was carried out since we believe that a comprehensive review of H-index, number of citations, and citations per article is required, with a special focus on the trachoma literature. The articles from the USA had highest H indexes and the articles from England had higher number of average citation per item.

5. Conclusions

On the other hand, one could argue that an increase in the number of publications does not necessarily imply an increase in interest in corneal transplantation, given the number of journals and hence the number of published papers grows year after year. Because the quality of journals, acceptance rates, and acceptance methodology differ from one to the other.

Limitations

Our research has some limitations. To begin with, it was impossible to read the full texts of all the published articles in order to provide more information. The sorts of parameters that can be analyzed in bibliometric research are also limited by the database programs' options. Other databases, besides Thomson Reuters Web of Science, may be explored in future investigations. The current study only used one database search (WoS), which could affect the number of citations and publication frequency in trachoma. WoS database, on the other hand, is one of the most widely used databases for bibliometric analysis. This limitation must be taken into account while interpreting our data.

Author Contributions

Concept: M.Y. (50%) and E.K.D.D. (50%), Design: M.Y. (50%) and E.K.D.D. (50%), Supervision: M.Y. (50%) and E.K.D.D. (50%), Data collection and/or processing: M.Y. (50%) and E.K.D.D. (50%), Data analysis and/or interpretation: M.Y. (50%) and E.K.D.D. (50%), Literature search: M.Y. (50%) and E.K.D.D. (50%), Writing: M.Y. (50%) and E.K.D.D. (50%), Critical review: M.Y. (50%) and E.K.D.D. (50%), Submission and revision M.Y. (50%) and E.K.D.D. (50%). All authors reviewed and approved final version of the manuscript.

Conflict of Interest

The authors declared that there is no conflict of interest.

Ethical Approval/Informed Consent

The study complied with the Helsinki Declaration, which was revised in 2013. Ethics committee approval is not required as there is no human or animal research.

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