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# Rubella Virus Research in the Years 2000–2022: A Bibliometric Analysis

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## Abstract:

**Background:** This work aimed to undertake a bibliometric analysis of the Rubella virus. Medical studies were conducted between 2000 and 2022 to discover trends, dynamics, and research outputs in the industry.

**Methods:**A bibliometric study was performed using R software to determine research characteristics indexed worldwide and published in Rubella research in medical studies. The Rubella virus was chosen as the subject in the PUBMED database, and 374 papers from the previous two decades were reviewed.

**Results**: There was an increase in the number of publications after 2003. The United States was the most essential countryamong all which had the most contributions on Rubella Virus.

**Conclusion:**Rubella research has increased in the medical profession over the previous decade, with the United States leading to publications in this field.

***KEYWORDS:*** *bibliometric analysis, Pubmed, rubella virus, research output, research collaboration, Biblioshiny, Bibliometrix, R-package*

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**STATEMENT IN SUMMARY**

What is known about this subject already?

- Rubella is a significant public health issue, explaining the medical community's increased interest in this virus.
- The bibliometric study has recently gotten a lot of interest in various fields, including health care.
- In recent years, Bibliometric analysis in medical research has grown in importance.

**What value does this paper add?**

The United States of America was discovered to be the highest-ranking country collaborations and the highest degree of centrality in medical research in recent years.

The consequences of this publication are as follows:

- This study will be valuable for medical researchers focused on the rubella virus to provide Information on current themes and limitations.
- This research offers a larger view of the dynamics of Rubella Virus research in the medical profession, which may aid in the planning and formation of new collaborations.

# 1. INTRODUCTION

Rubella was once assumed to be a form of measles or scarlet fever, earning it the moniker "third illness." Rubella is derived from rubella's a Latin word, which means "small red." It was first recognized by the German medical literature in 1814 as a different disease from measles, earning it the moniker "German measles." In 1912, the United States made measles a nationally notifiable disease, requiring all US healthcare practitioners and laboratories to report all cases. In the first decade of writing, an average of 6,000 measles-related deaths per year were reported. In 1914, Hess postulated a viral etiology, which Hiro and Tosaka confirmed in 1938 by injecting infants with nasal washings from an infected individual who was sick. In 1941, Norman Gregg discovered congenital cataracts in 78 children whose mothers had rubella during the first trimester of pregnancy. Congenital rubella syndrome (CRS) was originally reported in these patients. Parkman and Weller isolated rubella for the first time in 1962 and then discovered the virus's main characteristics.

An RNA virus with a peak age of 15 years and a 14-21 day incubation period. Because of its brief lifespan, only humans are infected by the Rubella Virus, which causes the common pediatric illness known as German measles or Three Day Measles. A skin rash, fever, lymphadenopathy, and other mild symptoms are common in patients who develop the disease. Rubella can also cause arthritic symptoms, which affect more women than men. The MMR (Measles, Mumps, and Rubella) Vaccine protects against the Rubella Virus, making it rare in countries where vaccines are available. If a mother acquires the Rubella Virus during the first trimester of pregnancy, it can harm her unborn child. CRS (Congenital Rubella Syndrome) is a birth condition caused by the virus. CRS can result in miscarriage or stillbirth and a range of birth abnormalities. The following research questions were the focus of this study:

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1. How much study has been done on the Rubella virus worldwide, and how has it progressed?
2. What is the research's significance?
3. What are the global patterns of Rubella virus collaboration and authorship?
4. What are the active Rubella Virus Research institutions, authors, and journals worldwide?
5. What are the most often utilized Rubella virus research keywords around the world?
6. Does Rubella virus research worldwide have any form of bibliographic coupling of countries, journals, and authors?

The discipline of quantifying written communication is known as bibliometrics. It's a valuable tool for highlighting the evolution of literature and connecting disparate fields of study. Author productivity, teamwork, and authoring tendencies are also examined. Alan Pritchard created the term "bibliometric" in 1969 [1]. The terms 'bibliometric' and metrics,' which are derived from the Latin and Greek words 'Biblio' and metrics,' respectively, allude to the use of mathematics in the study of bibliography." The application of mathematical and statistical methods to literature and other forms of communication," according to the definition. Library Information Science researchers constantly employ bibliometric studies to appraise and evaluate the scientific output of the published literature on any given problem, domain, and period. In addition, bibliometric studies have benefited librarians in material selection and weeding.

The relationship between one or more writers and the works they generate can be assessed and determined using bibliometric methods. Library and information science research patterns and collaboration amongst researchers in printed pieces can be utilized. In recent years, Bibliometrics has been one of the most investigated libraries and information science disciplines. Bibliometric analysis is a useful method for determining the influence of authors and related works by defining the relationship between two or more authors. It is a quantitative description of literature that assists in measuring all collected data; as a result, the researcher chooses the present study.

***Study's Objectives***

The following are the goals of this research on published work in Bibliometric Analysis of Rubella Virus Research:

1. Assess the year-by-year distribution of articles
2. To investigate the various forms of documentation
3. To draw attention to the most productive nations and institutions
4. To keep track of the most influential authors, their affiliations, and the number of documents they've written

## 2. LITERATURE REVIEW

Rubella was once assumed to be a form of measles or scarlet fever, earning it the moniker "third illness." Rubella is derived from rubella's a Latin word, which means "small red." It was first recognized by the German medical literature in 1814 as a different disease from measles, earning it the moniker "German measles." In 1912, the United States made measles a nationally notifiable disease, requiring all US healthcare practitioners and laboratories to report all cases. In

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the first decade of writing, an average of 6,000 measles-related deaths per year were reported. In 1914, Hess postulated a viral etiology, which Hiro and Tosaka confirmed in 1938 by injecting infants with nasal washings from an infected individual who was sick. In 1941, Norman Gregg discovered congenital cataracts in 78 children whose mothers had rubella during the first trimester of pregnancy. Congenital rubella syndrome (CRS) was originally reported in these patients.

Bibliometrics plays a significant function in measuring academic publishing creation and accurately defining characteristics using the statistic. "The quantitative study of published physical units, bibliographic units, or both" is how bibliometrics is defined. Bibliometric studies are among the best sources for statistical analysis to find out authorship patterns, publications, and literature usage. Bibliometrics is a branch of science that uses quantitative methods to investigate many features of written publications such as the subject, author, citations, title [2]. This form of analysis is beneficial for tracking the expansion of the literature and research tendencies. Bibliometric methodologies are strongly related to informatics, webometrics, and scientometrics[3]. These methods can be employed in research by extending the number of topics covered, such as distribution, frequency, and word usage in various databases, which help link to researchers' websites or citations in the literature [4]. Bibliometrics has been the most prevalent technique for assisting scientific operations. Bibliometrics is critical in the most often used quantitative method in Library and Information Science[5].

Bibliometrics is an admirable way of assessing the texts and Information contained in published data. Journal papers and authorship trends in the geographic, subject organization, and other relevant factors are frequently included in bibliometric analyses [6]. Alvarez et al. [7] proposed the scholarly literature on peri-implantitis. Authors and institutions have also become more collaborative. There appears to be a positive feedback loop between author-institution collaboration and scientific creation. They also demonstrate how well-established periodontology and implantology institutes have played an important role in peri-implant disease research.Hakan et al. [8] proposed that FUS and Rubella virus-associated uveitis are not interchangeable. RV-associated uveitis is characterized by chronic anterior uveitis, vitritis, early cataract development, and the absence of posterior synechiae and CME. Only a few of the patients with RV-associated uveitis manifested with FUS, even though almost all FUS cases had proven intraocular RV infection.

In this study[9], we looked at the phenotypes of infection with rubella virus (RV) strains in terms of cellular mechanical characteristics, cell mobility, and viral cytopathogenicity. As a high-throughput technology for assessing cell mechanics, real-time deformability cytometry (RT-DC) demonstrated a link between an increase in cortical filamentous-actin (F-actin) and increased cellular stiffness. Cell stiffness was reduced by the further reduction of stress fibers reported for just some RV strains as the most severe actin rearrangement. In addition, substantial abnormalities in cell shape were seen, as well as a reduction in collective and single-cell movement speed in a wound-healing assay.

Kumar et al. [10] proposed assessing the current position and a brief realization in plant disease detection using artificial intelligence. They also described many things, such as technological advancements since the early 2000s. This study also provides a simple statistical way to learn about the top writers on the issue of plants and diseases and the top affiliations that have

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contributed to plant disease research, three of which are from India. It also details the several significant languages that have been utilized to publish our topic-based articles, conference papers, and other types of documents.

## 3. RESEARCH METHODOLOGY AND LIMITATIONS

In the current study, a bibliometric method was applied.Using statistical and mathematical tools in books and media communication is known as bibliometric analysis.'Biblioshiny' is a tool in the package meant for non-coders to provide complete scientometric and bibliometric analysis with various options separated into categories such as sources, documents, authors, conceptual structure, and social and intellectual structure. It allows you to get multiple results in the form of tables and graphs, which isn't something you'll find in other software.For a bibliometric analysis of rubella virus research from 2000 to 2022, a bibliometric analysis was used. Using visualization tools and excel sheets, articles from Pubmed were retrieved and evaluated. For the most productive and influential authors, Excel sheets were employed. Various factors such as authorship pattern, degree of collaboration, and year by year groupings of articles were used to read the papers in Pubmed. According to the study, between 2000 and 2022, 374 publications were published in Pubmed. No further issues published before 2000 or after 2022 were used in the study, which was limited to the period specified.

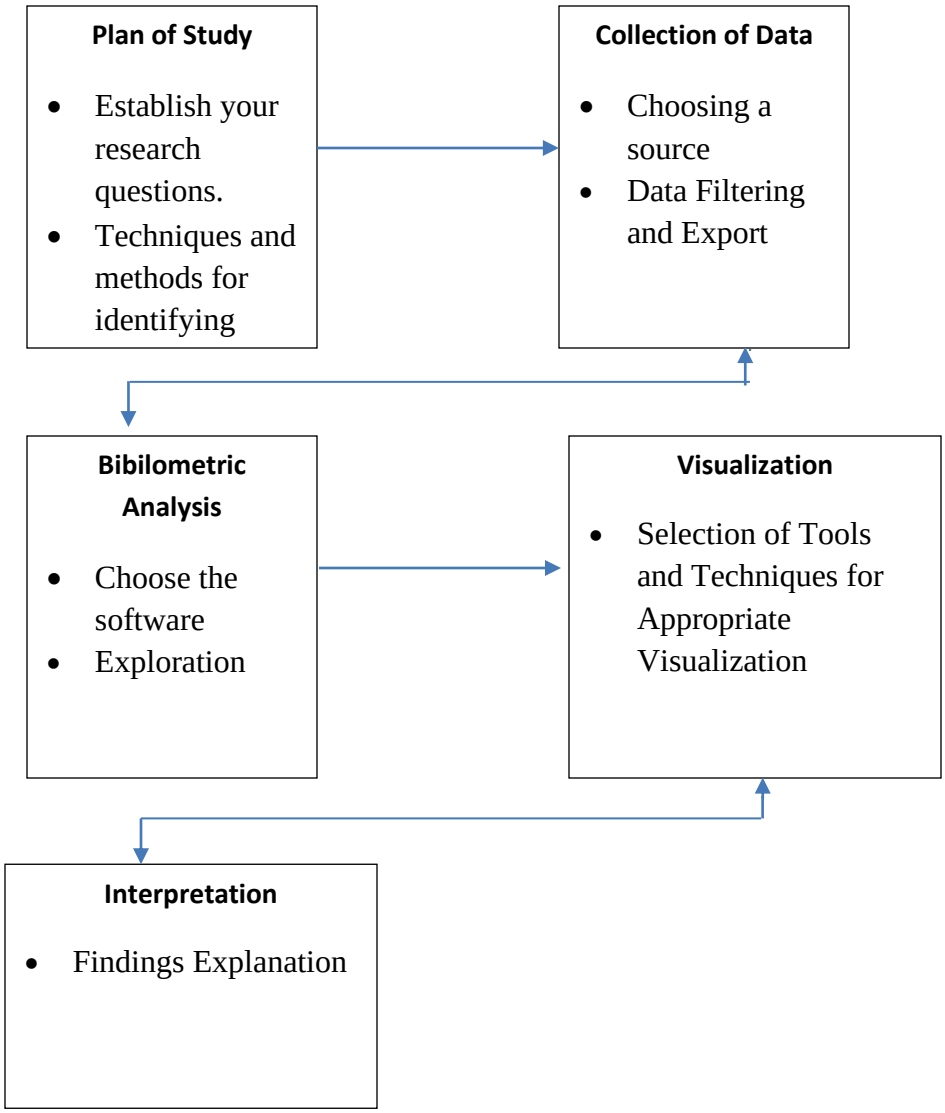


Figure. Abstract

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By offering a transparent, systematic, and repeatable review method, the bibliometric analysis considerably increases the literature review quality. It allows for mapping study domains and influential work without subjectivity, which is essential for a holistic approach to the literature review process. This study employs 'biblioshiny,' an R-package web-based interface ('bibliometrix 3.0') for bibliometric analysis.

**Data Analysis**

Table 1 shows the quantitative progress of primary Information about data in Pubmed from 2000 to 2022. The result reveals that in the timespan, a total of 374 articles were published—the most 166 significant number of Information from several sources (Journals, Books, etc.) in this. The Years on average since publication are 11.

**Table 1. More Information about Data**

| **Timespan** | **2000:2022** |
|---|---|
| Information from several sources (Journals, Books, etc.) | 166 |
| Documents | 374 |
| Years on average since publication | 11 |
| The average number of citations per document | 0 |
| The average number of citations per document every year | 0 |
| References | 1 |

Table 2 reveals the author's productivity and output during 2000-2022. According to the data, the number of authors is 1584; Author Appearances is 2351, Authors of the single-authored document is 9, and Authors of multi-authored papers is 1574.

**Table 2.Authors-wise contribution**

| | |
|---|---|
| Authors | 1584 |
| Appearances Author | 2351 |
| Single-authored document authors | 9 |
| Multi-authored document authors | 1575 |

Table.3 In 2010, the most significant number of articles recorded was 27.2005 was estimated to be the least prolific, with only nine articles published in research. The average year per publication is 11.

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Table 3. Annual Scientific Production

| Year | Articles |
|---|---|
| 2000 | 20 |
| 2001 | 14 |
| 2002 | 12 |
| 2003 | 16 |
| 2004 | 19 |
| 2005 | 9 |
| 2006 | 10 |
| 2007 | 27 |
| 2008 | 13 |
| 2009 | 11 |
| 2010 | 23 |
| 2011 | 19 |
| 2012 | 20 |
| 2013 | 15 |
| 2014 | 16 |
| 2015 | 17 |
| 2016 | 18 |
| 2017 | 16 |
| 2018 | 19 |
| 2019 | 22 |
| 2020 | 17 |
| 2021 | 18 |
| 2022 | 3 |

According to figure 2, FREY TK has remained in the first ranking, contributing thirty-seven research papers, followed by TZENG WP with twenty-four articles and CLAUS C, a researcher with twenty-one publications. ICENOGLE J has written fifteen articles.

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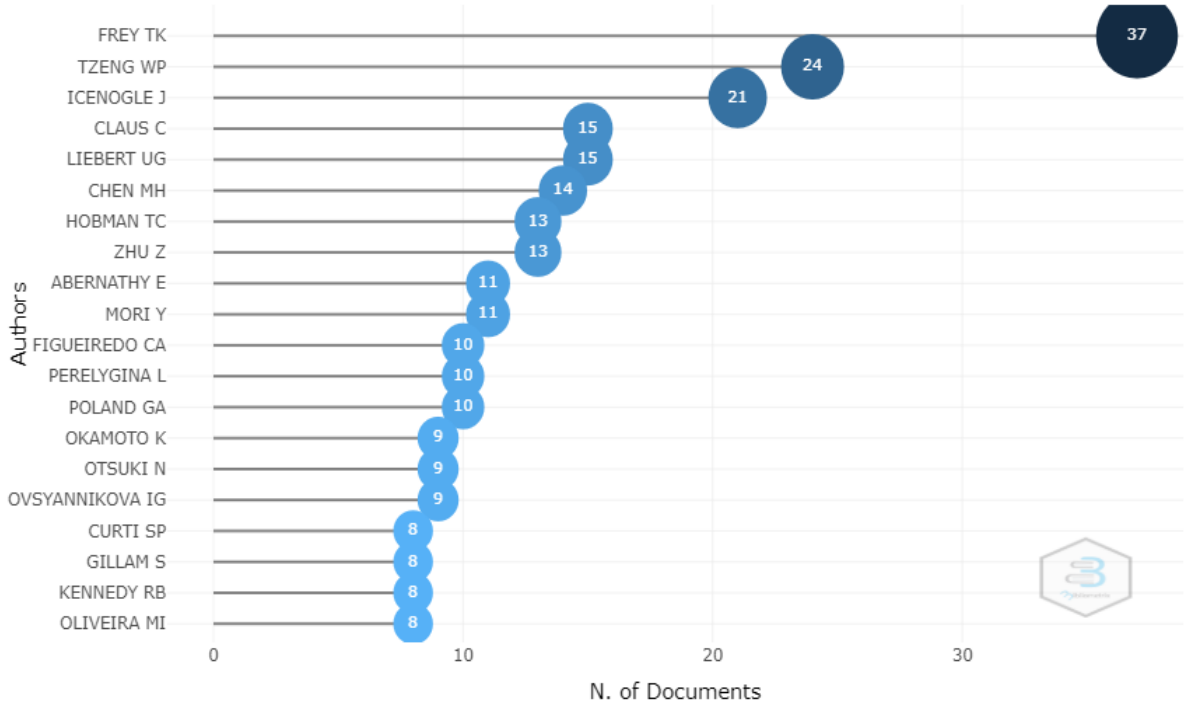


**Figure 1. Most Relevant Authors**

The data for the most productive institution may be found in figure 3. The UNIVERSITY OF LEIPZIG is first, with 46 publications published between 2000 and 2022. The NATIONAL INSTITUTE OF INFECTIOUS DISEASES is ranked second with 45 research papers.

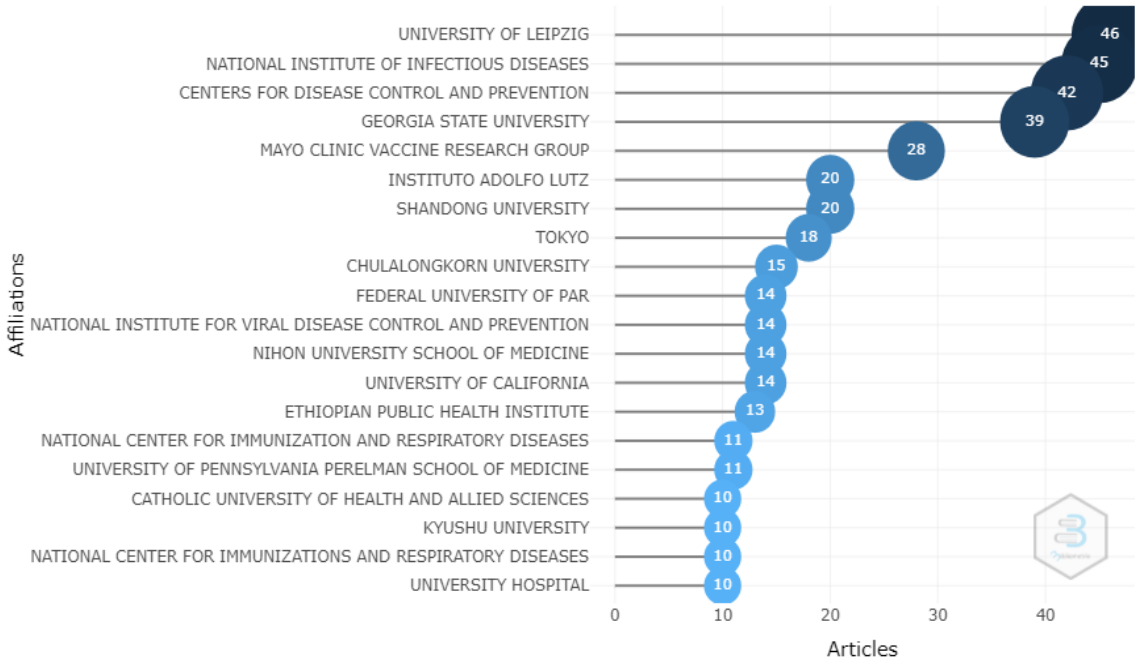


**Figure 2. Most Relevant Affiliations**

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The geographical distribution is shown in fig 4.

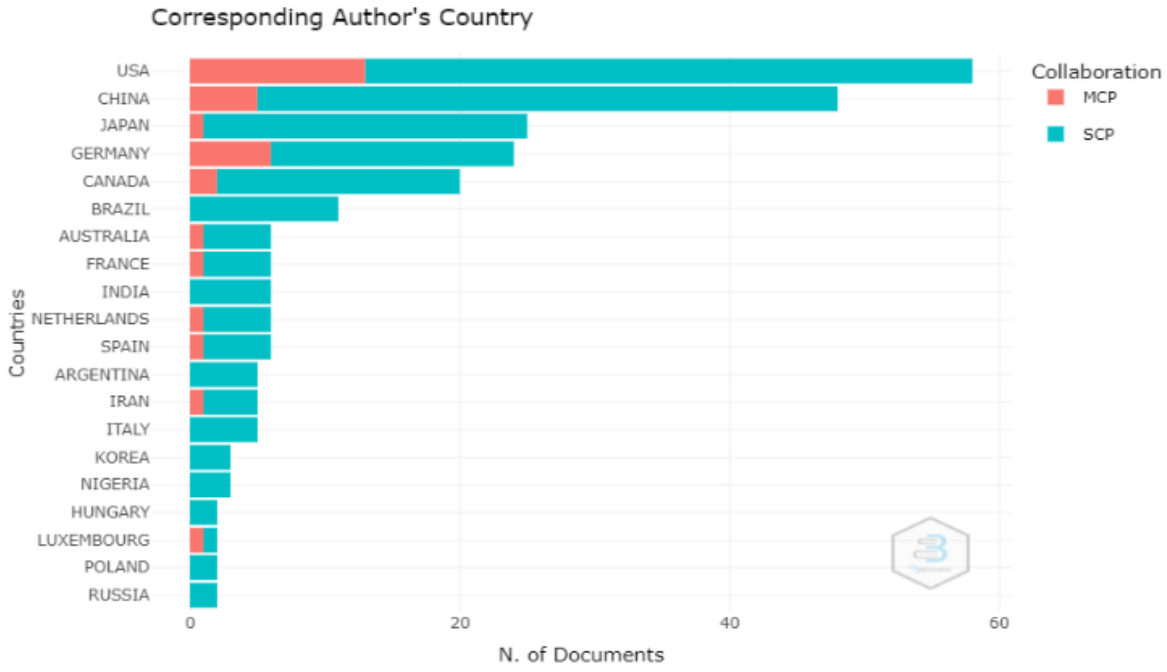


**Figure 3. Geographical Distribution of Affiliations**

The United States of America is the top-ranking country, with a research production of 58 articles. China has 48 research papers in second place. From 2000-to 2022, France, Australia, India, Netherlands, Spain, are submitted six research papers.

Table 4. Displays the level of collaboration. According to the data, FREY TK is the top author of the year with a gain of 7 frequency in 2012, and 2003 gained Top author of the year with the frequency of 6. Author GILLAM'S earned top author in 2000 with the frequency of 5.

**Table 4. Top 10 Author Production per Year**

| Author | Year | Freq |
|---|---|---|
| FREY TK | 2012 | 7 |
| FREY TK | 2003 | 6 |
| GILLAM S | 2000 | 5 |
| FREY TK | 2006 | 4 |
| FREY TK | 2007 | 4 |
| ICENOGLE J | 2016 | 4 |
| TZENG WP | 2006 | 4 |
| TZENG WP | 2012 | 4 |
| CURTI SP | 2012 | 3 |
| FIGUEIREDO CA | 2012 | 3 |

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In figure 6, 166 different journals can publish Rubella virus research. The most cited journals in the Rubella virus illnesses area in fig 1 are obvious from the results. The findings of this table reveal that the top four journals are multidisciplinary sciences (i.e., these journals are more thorough in many disciplines). In contrast, the remaining journals are primarily concerned. Medicine and infectious disease (i.e., these are professional in some fields).

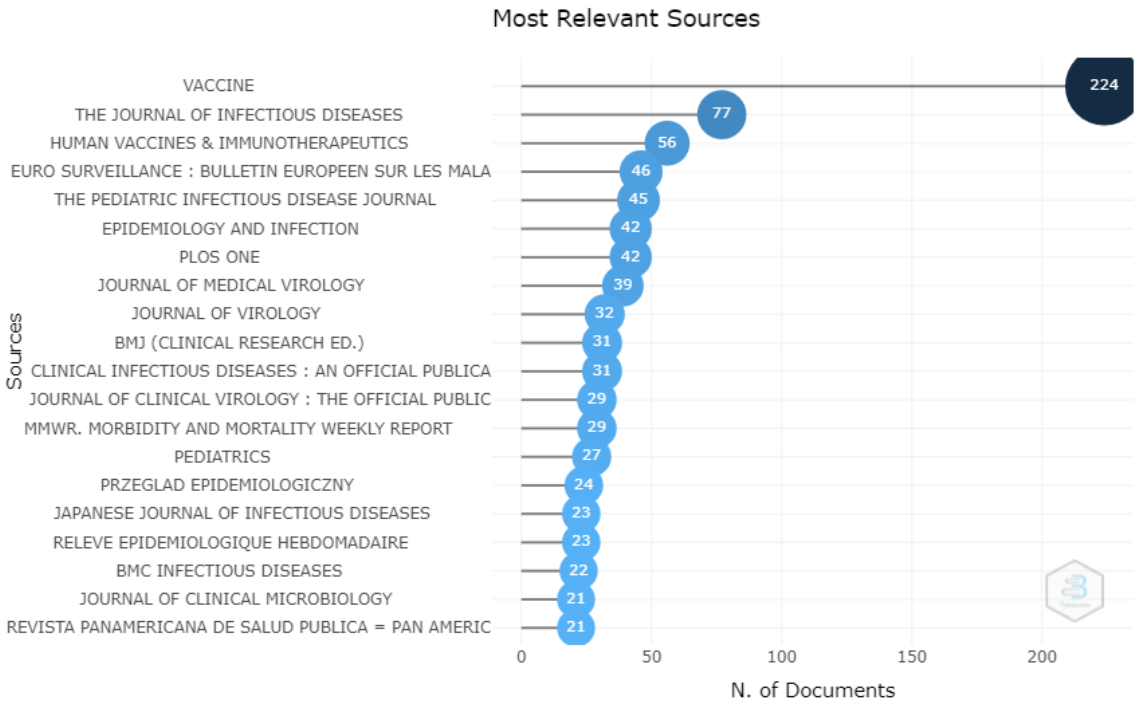


**Figure 4.Most Relevant Sources**

In figure 7, Keywords are significant in a publication because they allow readers to rapidly receive essential Information about the terms, goals, and procedures involved. Keyword co-occurrence occurs when two or more keywords simultaneously appear in the same article. Keyword co-occurrence analysis can identify hot research topics and track the transitions of a scientific knowledge domain's research frontiers. Keywords should be preprocessed before visualization, combining multiple versions with the same meaning to increase the quality of keyword co-occurrence analysis.

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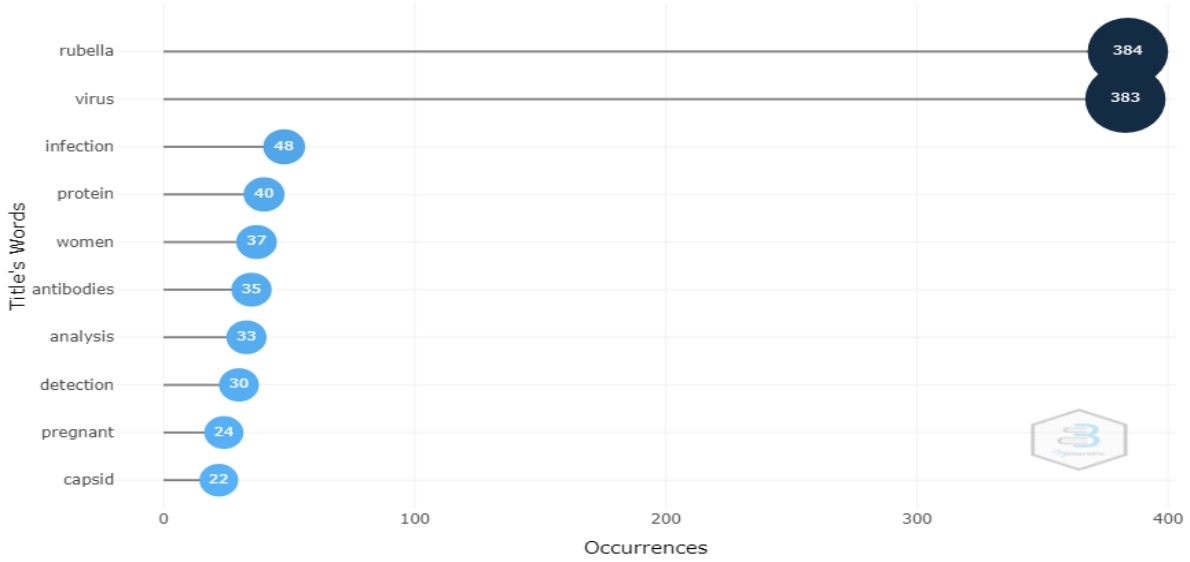


**Figure 5. Most Relevant Keywords**

Table 5. Reveals the number of documents published in PUBMED during 2000-2022.

**Table 5. Types of Document**

| Document Type | Frequency |
|---|---|
| journal article;research support, nih, extramural;research support, us gov't, non-phs | 93 |
| Others | 74 |
| Journal article;review | 25 |
| Journal article;research support, us gov't, phs;review | 24 |
| Journal article;research support, us gov't, phs | 23 |
| journal article;research support, non-us gov't;validation study | 22 |
| journal article;research support, non-us gov't;review | 21 |
| journal article;research support, non-us gov't;research support, us gov't, phs | 20 |
| journal article;research support, non-us gov't | 18 |
| journal article;research support, nih, extramural;research support, us gov't, phs | 16 |
| journal article;research support, nih, intramural | 17 |
| journal article;research support, nih, extramural;research support, non-us gov't | 11 |
| englishabstract;journalarticle;research support, non-us gov't | 10 |

It shows that 374 articles were published in PUBMED. Journal article; research support, non-us gov't is 101, Journal article is 91, Journal article; research support, NIH, extramural is 18, Journal article; research support, non-us gov't; research support, us gov't, phs is 14, English abstract; Journal article is 11, Evaluation study; journal article is 3, and other types of documents are 136.

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## 4. CONCLUSION AND RECOMMENDATIONS

The study reveals that between2000 and 2022, a total of 374 publications were published on rubella virus research. The majority of the articles were contributed by single authors (1265). A research scholar FREY TK was one of the prolific contributors among all authors who published 37 papers on rubella virus during 2000 and 2022. Among the most dynamic institutions in terms of researchers, the University of Leipzig contributed a total of 46 pieces. The study reveals that authors from the United States of America contributed 58 papers. The Chinese author contributed 48 articles. Among the countries, the contributions of the United States of America were ranked first. Based on the study result, the following recommendations have been made for the researchers in medical science, stakeholders, editorial team, etc.

Researchers all over the world should investigate this topic for public awareness at the group and national levels. Campaign on all fronts about the rubella virus may be extended for researchers in medical sciences and the general public. Both healthcare providers and parents need to be targeted with adequate information about the Rubella virus. Research on the Rubella virus should be encouraged. Librarians and health practitioners should be involved in collaborative research for public awareness. Health-relevant librarians should be encouraged to share the right information in the time of need.

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