ORIGINAL ARTICLE

Side Effects of COVID-19 Vaccine in Pregnant Women: A Bibliometric Study

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Abstract

Introduction: Side effects related to COVID-19 vaccination are short-lived and disappear within a few days and can affect both pregnant and nonpregnant women.

Aim: To evaluate the bibliometric profile of the worldwide scientific production on the side effects of COVID-19 vaccine in pregnant women, in Scopus.

Materials and methods: A retrospective, cross-sectional, bibliometric study that analyzed metadata published in scientific journals indexed in Scopus during 2019 and 2021. The search and download of the papers were performed on May 13, 2022, and the SciVal program was used for the measurement of the bibliometric indicators.

Results: *The Lancet Infectious Diseases and International Journal of Gynecology and Obstetrics* had the highest impact with 24.8 and 14.3 citations per publication, respectively. The institutions with the highest number of papers were Harvard University and National Institutes of Health, with 13 papers, respectively. Goldfarb Ilona Telefus, Kampmann Beate, and Khalil Asma were the authors with the highest number of papers, with 3 each. Only one publication on the side effects of COVID-19 vaccine in pregnant women was identified in 2019, whereas the highest scientific output was identified in 2021, with 127, of which 67 were from Q1.

Conclusion: In Scopus, there is an increase in the production of papers on the side effects of the vaccine against COVID-19 in pregnant women, with the United States being the country with the most institutions with the highest scientific production. However, over the years, the quartile of the journals where these studies were published decreased.

Keywords: COVID-19, Pregnancy, Side effects, Vaccines.

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Introduction

In pregnancy, physiological changes occur in different organs of the woman, which may increase the risk of severe SARS type-2 coronavirus severe acute respiratory syndrome infection, as well as negative obstetric outcomes.[1] In fact, current evidence demonstrates that clinical manifestations are more severe in pregnant women with COVID-19 compared with nonpregnant women.[2]

Given this, it was necessary to implement vaccination as a public health strategy to control the effects of the pandemic.[3] However, in pregnant women, the acceptance rate is highly variable,[4,5] and the main reason for vaccine refusal is concerned about their safety.[6]

According to the Centers for Disease Control and Prevention (CDC), side effects related to COVID-19 vaccination are short-lived and disappear within a few days[7] and can affect both pregnant and nonpregnant women.[8] In the second dose, the occurrence of these adverse reactions is usually more frequent than in the first dose. Vomiting, migraines, chills, fatigue, rash, and general malaise are the most reported effects.[9]

Therefore, a detailed description of the scientific literature published on this subject is required. Bibliometric analysis uses methods that allow the evaluation of the quantity and quality of published articles, as well as the evaluation of worldwide productivity in each area,[10] based on some indicators such as authorship, affiliation, countries, regions, keywords, and among others,[11] to identify trends and guide future research proposals.[12]

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The objective of this research was to evaluate the bibliometric profile of the worldwide scientific production on the side effects of COVID-19 vaccine in pregnant women, in Scopus.

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Materials and Methods

Study Design

This was a cross-sectional and retrospective bibliometric study. The unit of analysis was papers published in the Scopus database, between 2019 and 2021. The research does not contemplate the estimation of a sample because we analyzed all metadata (n = 180 papers), and all the variables were analyzed with SciVal tool of Elsevier.

Search Strategy

The search terms were selected from the MeSH and were conjugated using the Boolean operators "AND" and "OR", in addition to truncation. The following search strategy was employed: TITLE-ABS-KEY ("Drug-Related Side Effects and Adverse Reactions" OR "Drug-Related Side Effects and Adverse Reaction" OR "Drug-Related Side Effects and Adverse Reaction" OR "Drug Side Effects" OR "Drug Side Effect" OR "Effects, Drug Side" OR "Side Effect, Drug" OR "Side Effects, Drug" OR "Adverse Drug Reaction" OR "Adverse Drug Reactions" OR "Drug Reaction, Adverse" OR "Drug" OR "Reactions, Adverse" OR "Reactions, Adverse Drug" OR "Adverse Drug Event" OR "Adverse Drug Events" OR "Drug Event, Adverse"OR "Drug Events, Adverse" OR "side effects off drugs" OR "Drug Toxicity" OR "Toxicity, Drug" OR "Drug Toxicities" OR "Toxicities, Drug") AND TITLE-ABS-KEY (2019*cov OR nov OR (((cov) W/2 (19 OR 2019 OR 2)) AND NOT ("coefficient* off variation" OR "Torsion" OR cov*o*)) OR (covid W/2 (19 OR 2019 OR 2)) OR covid19 OR (*covid AND NOT entoconid) OR ((coronavirus OR "Corona virus" OR cov) W/2 (disease OR infection) W/2 (2019 OR 19 OR 2)) OR ((sars OR "Severe acute respiratory syndrome" OR ras) W/2 (cov OR coronavirus OR "Corona virus" OR cvid) W/2 ("2" OR 2019 OR 19)) OR "sars-cov" OR sarcoma OR "sras-cov" OR "severe acute respiratory syndrome cov" OR ((((novel OR wuhan OR china OR pandemi* OR outbreak OR "new human" OR crisis OR "new cases" OR "normalcy") W/2 (coronaviru* OR "corona viru*" OR cvid)) OR ("new corona*" AND NOT (coronar*)))) OR "Corona pandemic" OR (wuhan W/2 pneumonia) OR "Corona crisis" OR "Corona outbreak" OR "20I 501Y.V1" OR "20J501Y.V3" OR "CAL.20C "OR "20H501Y.V2" OR "mRNA 1273 vaccine" OR "goldshield" OR "AZD1222" OR "adp.cov2.s" OR "JNJ 78436735" OR "adpcovs" OR "BNT162 vaccine" OR "BNT162-01" OR "BNT162b1" OR "BNT162a1" OR "BNT162b2" OR "BNT162c2") AND TITLE-ABS-KEY ("combined vaccine" OR "vaccine" OR "vaccine control" OR "vaccine efficacy" OR "vaccine potency" OR "vaccine safety" OR "vaccines" OR "vaccines") AND TITLE-ABS-KEY ("Pregnant Woman" OR "Woman, Pregnant" OR "Women, Pregnant") AND (LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2021)).

Inclusion Criteria

- Papers on side effects of COVID-19 vaccination.
- Papers in any language.
- Papers indexed in Scopus.

Exclusion Criteria

- Papers indexed in Web of Science, Scielo, PubMed, and EMBASE.
- Papers published before 2019 and after 2021.

Data Analysis

The Scopus search was performed considering the title, abstract, and keywords fields. Download and analysis of paper metadata were performed (n = 180 papers) on May 13, 2022. Original articles (62), reviews (60), letters (15), editorials (16), conference papers (2), notes (21), and short surveys (4) were included. Data processing were performed with Elsevier's SciVal system, which allowed analysis of country, author, journals, subject area, institutions, and publications. In addition, the VOSviewer program was used to elaborate collaborative networks among the papers analyzed. Frequencies and percentages were estimated for categorical variables using Microsoft Excel 2019.

Results

Top 10 Scientific Journals

American Journal of Obstetrics and Gynecology, Vaccine, Vaccines, and American Journal of Obstetrics and Gynecology MFM were the journals with the highest average of publications. The Lancet Infectious Diseases, International Journal of Gynecology and Obstetrics, and American Journal of Obstetrics and Gynecology MFM had the highest impact with 24.8, 14.3, and 13.7 citations per publication, respectively (Table 1).

Top 10 Institutions with the Highest Scientific Production

The institutions with the highest number of papers were Harvard University and the National Institutes of Health, with 13 papers, respectively. The largest production of the article was in the United States institutions (Table 2).

Table 1: Top 10 scientific journals with the highest scientific production

Scopus source	*Publications*	*Citations per publication*	*SNIP*	*CiteScore 2020*	*SJR*
American Journal of Obstetrics and Gynecology	8	9.3	3.0	11.1	3.4
Vaccine	7	12.6	1.2	5.6	1.5
Vaccines	7	7	1.1	2.7	1.2
American Journal of Obstetrics and Gynecology MFM	7	13.7	–	12.3	–
JAMA – Journal of the American Medical Association	6	11	10.9	24.8	4.6
Human Vaccines and Immunotherapeutics	5	7	1.1	4.8	1.0
Best Practice and Research in Clinical Obstetrics and Gynecology	4	6.5	2.3	8.2	1.6
The Lancet Infectious Diseases	4	24.8	8.2	36.6	7.4
The Lancet	3	21	23.6	91.5	13.1
International Journal of Gynecology and Obstetrics	3	14.3	1.3	3.7	0.8

SJR, SCImago journal rank; SNIP, Source-normalized impact per paper

Table 2: Top 10 institutions with the highest scientific production

Institution	*Country*	*Scholarly output*	*Views count*	*FWCI*	*Citation count*
Harvard University		13	531	8.1	337
National Institutes of Health		7	258	6.1	92
Johns Hopkins University		6	164	2.7	47
London School of Hygiene and Tropical Medicine		6	245	4.9	76
United States Food and Drug Administration		6	147	27.9	241
Mayo Clinic Rochester, MN		5	123	10.0	82
University of Lausanne		5	141	2.9	40
Cornell University		4	58	9.9	43
Monash University		4	165	3.7	63
St George's University Hospitals NHS Foundation Trust		4	108	3.6	55
St George's University of London		4	108	3.6	55
University of Melbourne		4	83	3.1	55

FWCI, Field-weighted citation impact

Table 3: Top 5 first authors with the highest scientific production

Author	*Affiliation*	*Country*	*Scholarly output*	*Views count*	*Citation count*
Goldfarb, Ilona Telefus	Harvard University		3	83	58
Kampmann, Beate B	London School of Hygiene and Tropical Medicine		3	45	10
Khalil, Asma A	St George's University Hospitals NHS Foundation Trust		3	103	55
Alimchandani, Meghna	United States Food and Drug Administration		2	75	231
Blumberg, Dean A	University of California at Davis		2	56	22

Top-5 First Authors of Scientific Production

Goldfarb Ilona Telefus, Kampmann Beate, and Khalil Asma were the authors with the highest number of papers, with 3 each. The other authors only generated two scientific publications from 2019 to 2021 (Table 3).

Scientific Production in Scopus According to Journal Quartile

Only one publication on the side effects of the COVID-19 vaccine in pregnant women was identified in 2019, whereas the highest scientific output was identified in 2021, with 127, of which 67 were from Q1 journals and 28 from Q2 (Fig. 1).

Discussion

This bibliometric research evaluated the profile of the global scientific production on the side effects of the COVID-19 vaccine in pregnant women in Scopus, especially describing the researchers, institutions, and journals with the highest production. The findings show that the highest number of publications was in 2021, and that, in 2020 there was a low output in Scopus, possibly since new

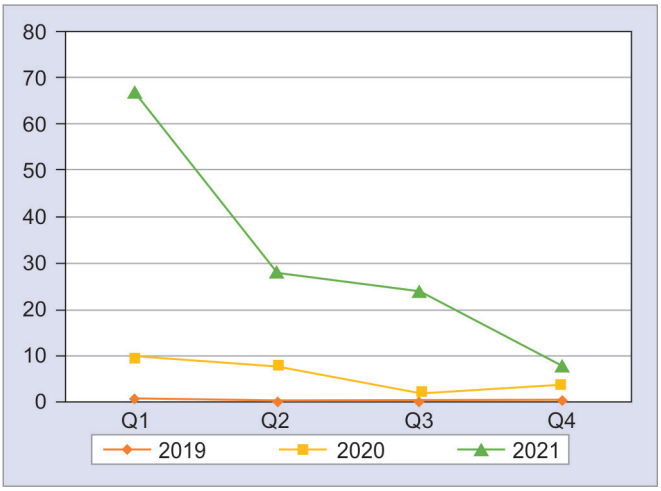


Fig. 1: Scientific production in Scopus according to journal quartile

research on the subject under study is in the editorial process of publication in any journal. In addition, another study shows that there are still few publications on the side effects of vaccination on COVID-19 in pregnant women.[13]

It is recognized that there are countries with a great capacity and level of scientific production, and the United States is the country that is best positioned, so far, as one of those that contribute significantly to production in this thematic area. Similarly, with Monash University and the University of Melbourne, Australia, but with a smaller number of articles.

According to Chen et al.[14] in a similar study on COVID-19 vaccine safety, they found that the journal BMJ has been the most popular journal in this field and that the United States remained in the first place, exerting worldwide influence, followed by China, India, and the United Kingdom. Like our results, Harvard University was considered a leader in research collaboration. Similarly, Ahmad et al.[15] also mentioned that in recent decades, there has been an increase in publications on different infectious diseases, including the COVID-19 pandemic. This bibliometric study provided valuable information on the COVID-19 vaccine. It indicated that most of the publications were published in developed countries.

The study by Xu et al.[16] also mentioned that vaccines had the highest number of papers, with 294 publications. The most cited journal was the New England Journal of Medicine, with an impact factor of 91.2. Concluding that this bibliometric analysis, as well as our findings, could help to identify the most productive researchers and countries to combat the COVID-19 pandemic as it is a topic of interest. Guleid et al.[17] also mentioned that the COVID-19 pandemic has forced global research to serve as a basis for achieving mitigation of this disease, for which, they conducted a bibliometric analysis to describe the research output on COVID-19 in Africa. They found that 46.6% were original articles, 48.6% were editorial, and 4.6% were secondary research articles. Concluding that in this study, Africa has the capacity to conduct research addressing this topic. However, more research focused on the application of vaccines against this disease is needed.

On the other hand, in a study conducted on older adults, Soytas[18] found the United States was the most productive and most cited country. Besides, The Journal of the American Geriatric Society had the highest number of publications and citations. They concluded that this bibliometric provided relevant information on the quality and thematic areas of research of the studies published on COVID-19 in older adults.

According to our results, it is evident that scientific production is still in development; although it is recognized that most of the papers are in high-impact journals (Q1 and Q2). At the national level, the production of articles on this subject is still pending. Therefore, this study represents an important contribution in the area of maternal health in the context of the COVID-19 pandemic to promote the development of research and expand knowledge in the academic and scientific community.

Among the limitations of this research is that Scopus was the only database analyzed,[19–21] which implies the omission of other papers published in other databases. Also, the cutoff date in the search may have resulted in the non-inclusion of recently published papers. Despite these limitations, we consider that this exploration of the scientific production contributes to the world knowledge on vaccination against COVID-19 in pregnant women.

Conclusion

There is an evident increase in the production of papers on the side effects of COVID-19 vaccine in pregnant women in Scopus, although 2019 was the year with the lowest number of papers. The United States was the country with the most institutions with the highest scientific production. Finally, we could indicate that more research focused on the adverse effects of COVID-19 vaccines should be conducted so that it can be useful to governmental leaders to have an overview on this issue.

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