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ROBOTIC SURGERY IN OBSTETRICS AND GYNECOLOGY: A BIBLIOMETRIC EVALUATION USING THE WEB OF SCIENCE VERSUS SCOPUS DATABASES

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Abstract: This comparative bibliometric study aimed to perform a bibliometric analysis of the earlier studies in order to comprehend the current application and scientific situation of robotic surgery in the field of obstetrics /gynecology. In this study, Scopus and Web of Science (WoS) databases were used to retrieve the publications since September 2022 on robotic surgery in the obstetrics/gynecology research area. All articles except commentaries, errata, and corrigenda, were included. All duplicate papers were verified twice and eliminated. Most impactful authors, date of publication, leading institutions, language, top published countries, affiliations and, prominent journals were analyzed. According to the methodology detailed above, we retrieved 267 publications from Scopus and 256 publications from the WoS database. Most of the publications were in English language. Harvard Medical School published most of the publications according to Scopus and Brigham and Women's Hospital (n=17) and Harvard Medical School (n=17) published most of the publications according to WoS. According to WoS, the first publication was published in 2002, and according to Scopus, it was published in 1998. Between 2008 and 2022, the amount of documents in both databases expanded dramatically. Concerning the number of publications, the United States of America (USA) ranked in first in both databases. According to Scopus, the second most prolific publishing countries were Germany and South Korea. According to WoS, South Korea is ranked second. Although the number of articles is in the increasing trend, the number of articles published on robotic surgery in gynecology is limited in both databases. The publications have been published from developed countries, especially the USA. Further studies can be done with visualization and other bibliometric methods.

Keywords: Bibliometric analysis, Gynecology, Hysterectomy, Robotic surgery

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1. Introduction

Technology is rapidly driving the specialty of surgery (Moon et al., 2020). Over the past twenty years, robotic assistance has gained recognition as an advancement in abdominal surgery that has the ability to make up for the shortcomings of standard laparoscopy. Even more significant breakthroughs are likely to eclipse the spectacular advancements in robotic surgery over the next twenty years (Fanfani et al., 2016; Moon et al., 2020). In an effort to make complex laparoscopic operations easier to conduct, particularly for surgeons who are not skilled in laparoscopy, robotic devices have recently been developed (Rassweiler et al., 2005). The most recent development in the field of minimally invasive surgery is computer-enhanced telesurgery, often known as robotic-assisted surgery or robotic surgery (RS). This device has been used in the departments of benign or malign gynecological surgeries, reproductive medicine and urogynecology (Cho et al., 2010). Gynecological RS procedures consist of benign hysterectomy, myomectomy, sacrocolpopexies, radical hysterectomy, and lymph node dissections (Pilka et al., 2017). Complex gynecologic surgeries have been made easier with the help of robotic surgery. The high-resolution 3-dimensional sight and robotic arms' action that resembles a wrist, and improved ergonomics all contribute to its advantages of excellent visualization (Moon et al., 2020). Similar to traditional laparoscopic procedures, it is connected to a reduced risk of long-term surgical morbidity, an early recovery, and enhanced aesthetics (Moon et al., 2020). When compared to open or laparoscopic surgery, gynecologic RS frequently results in longer operating room times but typically equivalent clinical outcomes, less bleeding, and a reduced hospital stay (Pilka et al., 2017). Some researchers claim that RS is safer and more clinically effective than conventional laparoscopy (Giri et al., 2012). One advancement in abdominal surgery that has the potential to make up for the limitations of traditional laparoscopy, such as its limited range of motion, 2D view, fulcrum, and pivoting effect, is robotic assistance (Kenngott et al., 2012).

The development of robotic gynecological surgery has a short history. A research examining the viability of employing the ZEUS system for six pigs' tubal re-anastamoses was published in 1998. Eight of the twelve tubes were patent four weeks following the surgeries, according to the research, which showed that there were no problems. This led to the conclusion that because RS allowed for more accurate motions, an increased patency rate was possible (Margossian et al., 1998). The result of the method when used on people was examined in the next stage. Five of the ten women who had their tubes reanastomosed had given birth to children within a year of the procedure, and seventeen of the nineteen reanastomosed tubes were found to be patent postoperatively by hysterosalpingography (Falcone et al., 2000). Although the improvements in clinical outcomes were very marginal and the cost was greater than with the conventional method, this provided the impetus for further investigation. Based on a hysterosalpingogram, a follow-up experiment employing the daVinci system was conducted in 2000 and revealed that 9 out of 10 tubes were patent (Degueldre et al., 2000). In a trial conducted in 2002, the daVinci robotic system's effectiveness was tested through a more involved gynecological procedure called a hysterectomy with bilateral salpingo-oophrectomy. This study showed that using RS was preferable to using conventional methods because it allowed for better manipulation, a clearer vision of the operating field, and simpler dissection (Diaz et al., 2002). Research that examined 36 robotic myomectomy cases was published in 2004. The biggest advantage of a robotic myomectomy is that many surgeons prefer an open approach because they feel more at ease using a laparoscopic technique. As an alternative to the open method, the robot's high level of hand dexterity gives the surgeon to perform a significantly complicated procedure (Advincula et al., 2004). Nowadays, in the United States of America (USA) and Europe, robotic-assisted laparoscopy is already commonly used for the principal gynecological treatment, the hysterectomy, and has proven practical and comfortable for various gynecological procedures (Giri et al., 2012).

The main limitations of RS are its lengthy setup process, generally longer operating times, high expense, and limited adaptability. The system's expensive costs remain, to a significant part, the principal deterrent to its widespread adoption for other operations, even though setup and operating times can be reduced by hiring skilled workers. A significant barrier is the daVinci's relatively large body, which limits the surgeon's and the anesthesiologist's ability to approach the patient in an emergency. Future advances are therefore required, including robotic technology for specialized applications as NOTES and dynamically positioned lightweight robot arms (Margossian et al., 1998).

A peer-reviewed research article acts as a vehicle for disseminating the findings of a scientific inquiry, providing a chance for the work to be made public and for other academics to absorb the information that has been published. In order to create their own research or clinical practice utilizing the previous studies data, other researchers can further validate, refute, or amend the hypothesis. The process of extracting quantifiable data from published research papers and the way the knowledge included in a publication is utilised is known as bibliometrics (Agarwal A et al., 2016; Köylüoğlu et al., 2021; Özlü A, 2022; Akyüz et al., 2022; Moya-Anegon et al., 2007; Dindar D et al., 2022; Özlü C, 2021).

In order to grasp the current use and scientific situation of RS in the field of obstetrics/gynecology, this study attempted to do a bibliometric analysis of the earlier publications by making comparisons in two internet based bibliometric databases.

2. Materials and Methods

2.1. Study Design

This is a bibliometric analysis study that focused on RS in the field of obstetrics/gynecology.

2.2. Literature Search Strategy

The coverage, focus, and tools offered by various literature databases (such as PubMed, Scopus, and Web of Science) vary. While Scopus and WoS are broad, PubMed primarily focuses on life sciences and biomedical subjects (AlRyalat et al., 2019). Compared to Web of Science, Scopus provides a more thorough coverage of journals (Moya-Anegon et al., 2007; Dindar D et al., 2022; Özlü C 2021).

Citations are combined in databases, and some databases have developed their own bibliometric metrics. The two main rivals, Elsevier (Scopus) and Thomson Reuters (Web of Science), each employ specific data, articles, authority files, indexes, and subject categories that are exclusive to them. They give their data to labs so that they can develop new measures that are both openly and a la carte available online. The only free public access online citation database among the three is Google Scholar. Its database only includes e-publications but cites a large global collection of diverse books, journals, and data.

Scopus Elsevier's Scopus, which was introduced in late November 2004, is the largest abstract and citation database that includes both web sources and peer-reviewed research publications. The world's most comprehensive analysis of research outputs in humanities, social sciences, and natural sciences is provided by the subscription-based Scopus service. Scopus also includes publications from every region of the world. As long as English abstracts are offered alongside the papers, non-English titles are included (Agarwal et al., 2016).

In this study Scopus (http://www.scopus.com) and Web of Science (http://login.webofknowledge.com) databases were used to retrieve the published literature since September, 2022 on RS in obstetrics/gynecology research area.

The purpose of the following search words was to assure (a) high sensitivity, including a large catch of publications containing "robotic surgery" and "obstetrics and gynecology" or "Gynecological robotic-assisted laparoscopic procedures" or "Gynecological robotic-assisted laparoscopic surgery" or "Gynecology Robotic Assisted Surgery" or "Robotic surgery in gynecology" or "Robot-assisted laparoscopic surgery in gynecology" as the primary theme. All articles that had been published up to September 2022, except commentaries, errata, and corrigenda, were included. All duplicate papers were verified twice and eliminated. Robotic surgery articles in the obstetrics/gynecology research area were gathered after titles and abstracts were evaluated. Most impactful authors, date of publication, leading institutions, language, top published countries and affiliations, prominent journals, and H indexes were analyzed.

2.3. Search Terms in Scopus
Search terms in Scopus is follows; (TITLE (robotic AND surgery AND obstetrics AND gynecology) OR TITLE (gynecological AND robotic-assisted AND laparoscopic AND procedures) OR TITLE (gynecological AND robotic-assisted AND laparoscopic AND surgery) OR TITLE (gynecology AND robotic AND assisted AND surgery) OR TITLE (robot AND gynecology) OR TITLE (robotic AND surgery AND gynecology) OR TITLE (hysterectomy AND robot) OR TITLE (myomectomy AND robot) OR TITLE (lymph AND node AND dissections AND robot AND gynecology) OR TITLE (tubal AND anastomosis AND robot))

2.4. Search Terms in WoS
Results for robotic AND surgery AND obstetrics AND gynecology (Title) OR gynecological AND robotic-assisted AND laparoscopic AND procedures (Title) OR gynecological AND robotic-assisted AND laparoscopic AND surgery (Title) OR gynecology AND robotic AND assisted AND surgery (Title) OR robot AND gynecology (Title) OR robotic AND surgery AND gynecology (Title) OR hysterectomy AND robot (Title) OR myomectomy AND robot (Title) OR lymph AND node AND dissections AND robot AND gynecology (Title) OR tubal AND anastomosis AND robot (Title)

2.5. Statistical Analysis
Microsoft Office Excel 2019 was used to acquire the titles, years of publication, document types, first authors, affiliations, publishing journals, publishing languages, and number of citations within the WOS and Scopus publications as text file (TXT) files (Los Angeles, CA, USA). Frequency and percentage values were shown in tables for the categorical data.

3. Results
3.1. Based on These Outputs the General Features
According to the methodology detailed above, we retrieved 267 publications from Scopus and 256 publications from WoS database. Most of the publications were in English language. Harvard Medical School published most of the publications according to Scopus and Brigham and Women's Hospital (n=17) and Harvard Medical School (n=17) published most of the publications according to WoS. Table 1 provides a comparison of the distinctive traits of the two most widely used databases, including Scopus and WoS.

Table 1. Comparison of the distinctive traits of the literature from Scopus and Web of Science databases on robotic surgery in obstetrics/gynecology research area

Type of publication	Scopus	Web of Science
Number of publications	267	256
Number of articles	179	151
Number of reviews	56	25
Mostly publishing journal	Journal of Minimally Invasive Gynecology	Journal of Minimally Invasive Gynecology
Rate of open access publications	87	83
Language (English)	229	242
Mostly publishing affiliation	Harvard Medical School (n=13)	Brigham and Women's Hospital (n=17) and Harvard Medical School (n=17)
Mostly publishing country	The USA (n=87)	The USA (n=99)
First publication year	1998	2002

The first publication published in 2002 according to WoS and 1998 according to Scopus. Between 2008 and 2022, the number of documents in both databases increased exponentially (Figure 1 and Figure 2).

The Journal of Minimally Invasive Gynecology was the mostly publishing journals in both databases. Figure 3 decipts the number of publications of mostly publishing journals by years according to Scopus. Figure 4 decipts the number of citations of mostly publishing journals by years according to Scopus. Figure 5 decipts the citation analysis among mostly publishing authors.

The USA ranked first in the number of publications in both databases. The second publishing country was Germany and South Korea according to Scopus, and South Korea according to WoS (Table 2).
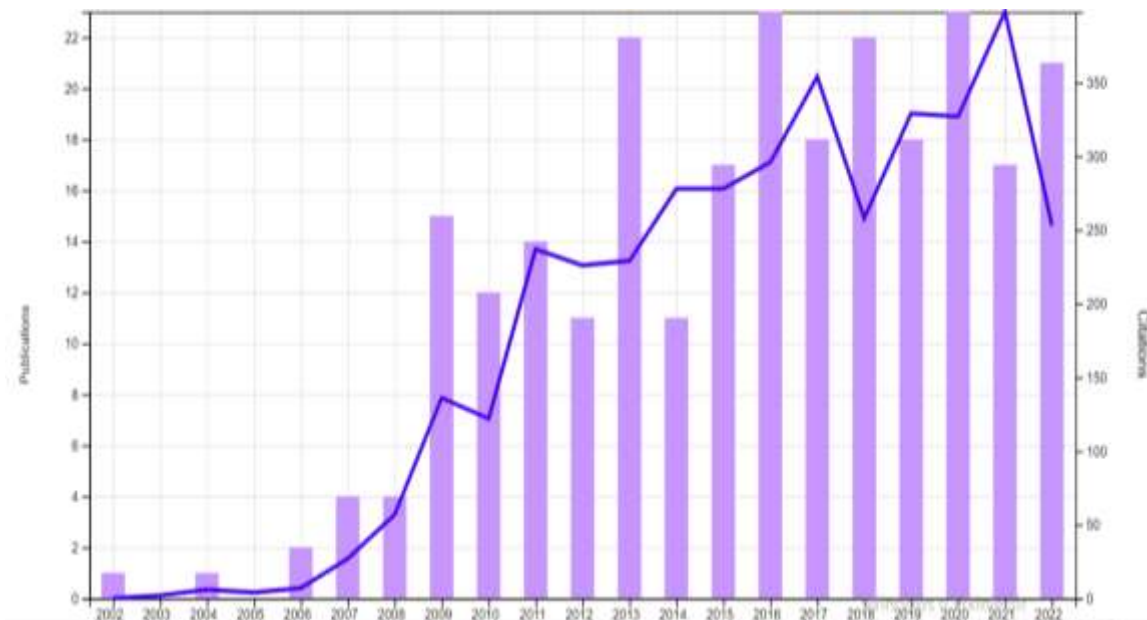
Figure 1. The number of publications and citations on robotic surgery in obstetrics/gynecology according to Wos database.
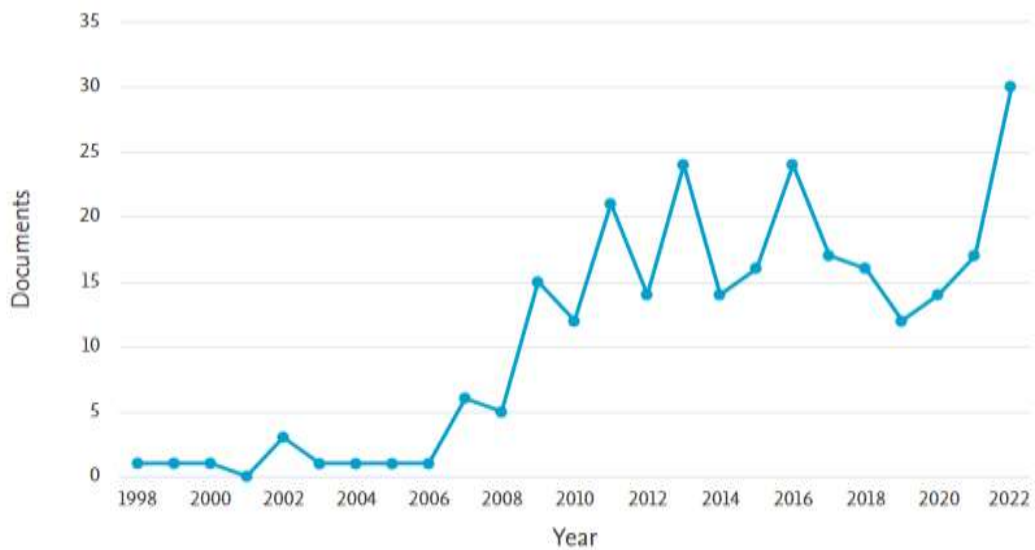
Figure 2. The number of publications on robotic surgery in obstetrics/gynecology according to Scopus database.
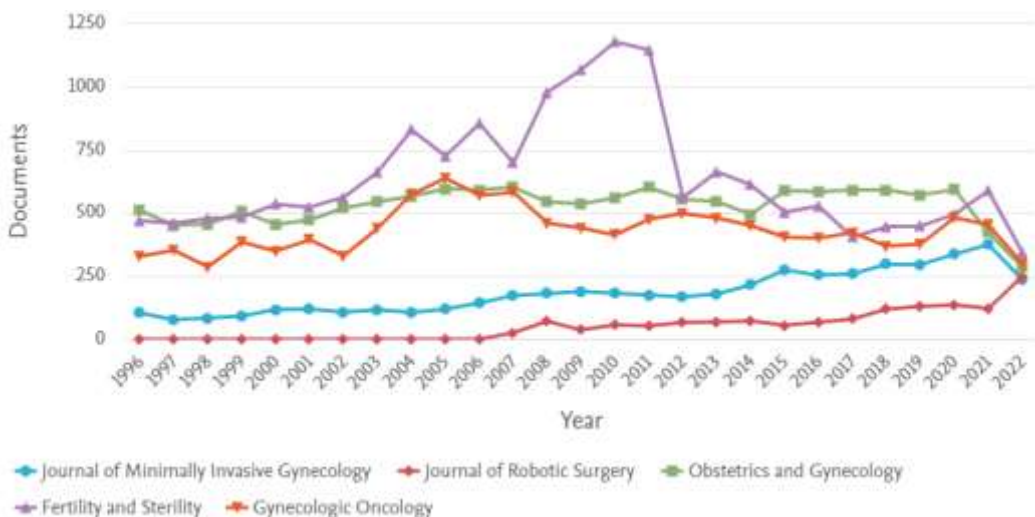
Figure 3. Number of publications of mostly publishing journals by years (Scopus).
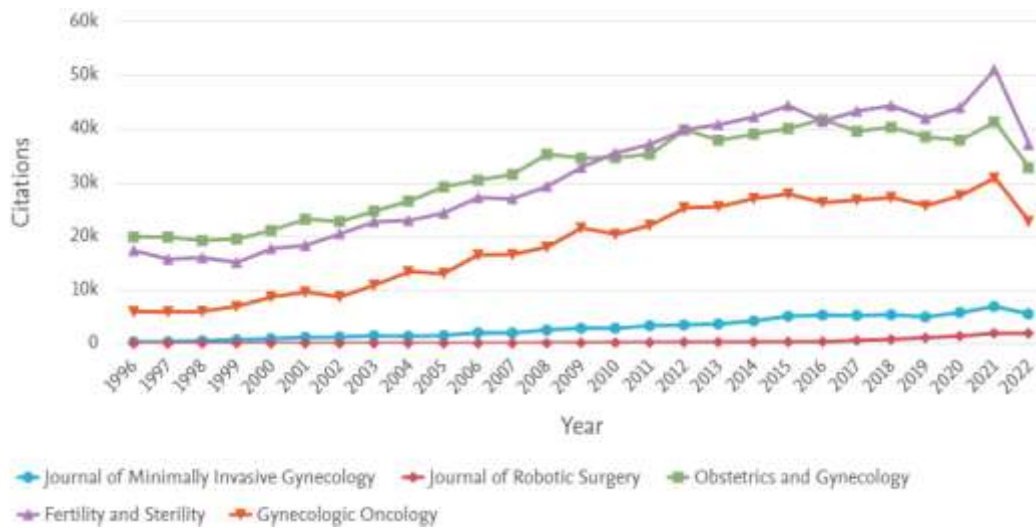
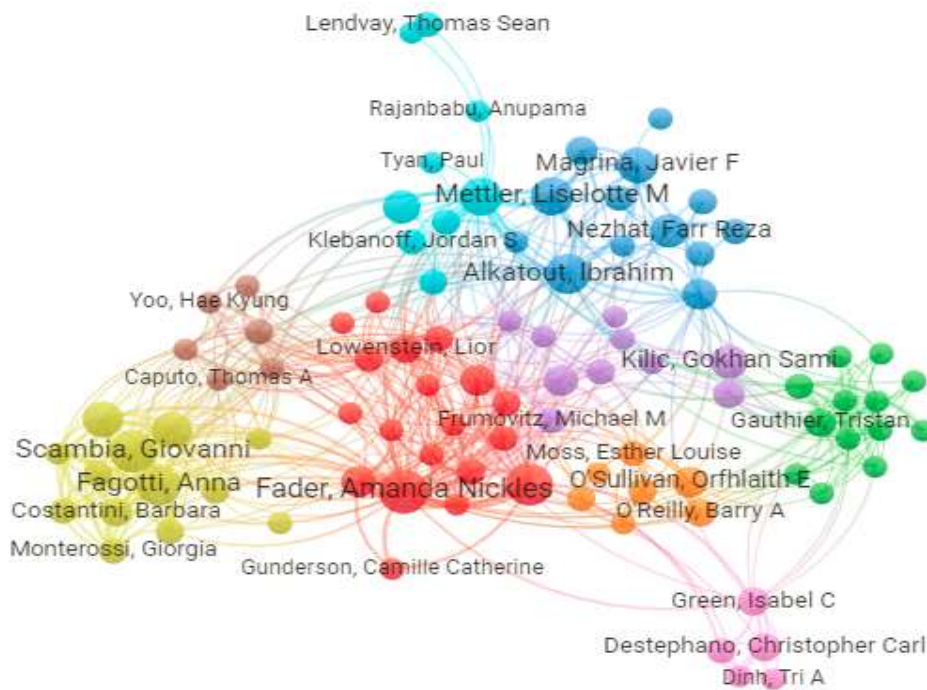**Figure 4.** Number of citations of mostly publishing journals by years (Scopus).

Figure 5. Citation analysis among mostly publishing authors

Table 2. The distribution of robotic surgery in the field of obstetrics/gynecology focused articles by their publication country.

Countries	Scopus (Number of publications)	Web of Science (Number of publications)
United States	78	99
Germany	19	11
South Korea	19	20
France	17	12
Sweden	17	16
Italy	10	9
United Kingdom	10	9
China	9	8
India	9	9
Türkiye	8	6

4. Discussion

Over the last 30 years, gynecologic surgeons have broadened their surgical range to include slightly interfering surgery. One of the most amazing advantages was RS. The extensively utilized platform, the da Vinci Surgical System, was approved by the US Food and Drug Administration (FDA) in 2005 for a limited range of gynecologic surgeries. The system is now the only FDA-approved robotics stage on the market. Some of the advantages of this platform over standard laparoscopy include less postoperative discomfort, improved surgeon ergonomics, faster examination of the instrumentation's curve, removal of fulcrum effects, and others (Cho et al., 2010; Moon et al., 2020). But there is no avaliable bibliometric study on this topic. So, this study aimed to conduct a bibliometric analysis of previous works, in two databases, in order to better understand the current application and scientific situation of RS in the field of obstetrics/gynecology.

For more than 40 years, the Institute for Scientific Information (ISI, currently a part of Thomson Reuters) maintained the only bibliographic databases from which bibliometricians could collect data on a large scale. Even though they are frequently bibliometricians, Thomson's, databases-the Social Sciences Citation Index, the Science Citation Index (Expanded), and the Arts and Humanities Citation Index-which have been reorganized under the WoS-were the two most important. It should be noted that both WoS and Scopus have made efforts to remedy this problem; Elsevier, the company that owns Scopus, recently included books to its database coverage, while Thomson Reuters, the company that owns WoS, created its Book Citation Index (Mongeon et al., 2016; Dindar D et al., 2021; Archambautlt et al., 2009). This characteristic of WoS and Scopus databases was most thoroughly examined because the comprehensiveness of content coverage is the most crucial factor that should be considered when picking the best data source for all intended purposes. To assess the validity of these data sources for bibliometric analyses and research evaluations, the majority of early empirical comparisons mainly concentrated on overall content coverage and overlap between the databases or with other data sources, as well as the statistics derived from these databases. The key findings of these early research have been reported in numerous comprehensive literature reviews and have been discussed frequently in the literature reviews of later investigations (Hancı et al., 2021; Gökçe and Alkan, 20222; Gürler et al., 2021; Şahin, 2022; Özlü A, 2021; Alkan et al., 2022; Özlü C, 2021; Alkan et al., 2021; Öntürk et al., 2022; Pranckute et al., 2022; Kuyubaşı et al 2023; Şahin and Alkan, 20222). Although there are several analyses and comparisons of the major bibliographic DBs in the literature, most of these studies-including literature reviews-are very limited in scope or exclusively focused on a single subject. As a result, they hardly ever include the useful benefits of using databases online. Additionally, because databases are constantly extending their capabilities and content, the data from the early studies, conducted more than a few years ago, they could be considered obsolete and, as a result misleading (Waltman, 2016). The two databases provide reliable instruments for gauging science at the national level. To determine whether these findings hold true at smaller scales, further study employing extensive datasets should look at variations at the institutional level as well as in various disciplines (alRyalat et al., 2019; Archambault et al., 2009; Hancı et al., 2021; Gürler et al., 2021; Şahin, 2022; Özlü A, 2021; Alkan et al., 2022; Özlü C, 2021; Alkan et al., 2021; Öntürk et al., 2022). Despite the significant biases and restrictions that both WoS and Scopus have, the author believes that Scopus is better suited for assessing research findings and carrying out daily chores for a number of reasons. First, Scopus offers a broader and more comprehensive coverage of content. Second, because all authors, institutions, and serial publishers have individual profiles available, along with a connected database interface, Scopus is simpler to utilize on a daily basis. Thirdly, the implemented impact indicators outperform the metrics offered by WoS in terms of performance, are less prone to manipulation, and are available for all serial sources across all disciplines. Most crucial, however, is that Scopus is subscribed as a single database without any ambiguity or further limitations on information accessibility (Waltman, 2016; Caputo et al., 2022). For all these reasons, both WoS and Scopus data were analyzed in this study.

Each intersection of a column and a row is referred to as a "cell" in Microsoft Excel, a spreadsheet program for data analysis and documentation. One data point or piece of information is included in each cell. The program's flexibility in processing files exported from Scopus and WoS like ".csv" makes it particularly useful in bibliometric analysis. We did not merge databases as we wish to make comparison of two databases results. The comparasion of the databases were done via Microsoft Excel. The findings of two databases were nearly similar. The top countries have similar ranks in both databases, with small variations like this seldom moving a country more than two places down the rankings. The top 10 countries are also the same in both databases.

5. Conclusion

In the last 15 years, there has been a substantial development in RS research in the field of obstetrics/gynecology. Using the current research's results, we were able to obtain a general understanding of the current state and trend of this subject field, as well as pinpoint hot spots. It is a more effective way of understanding the literature and may give summaries for future academics.

Limitations

Both strengths and limitations exist in this study. The use of two sizable databases (Scopus and WoS) for

systematic searching and screening of publications helped to produce more accurate results. A thorough analysis of the main research areas in this field also turned up some disagreements. Due to the small sample size of these studies and the aforementioned controversies, we advise additional international scientific studies to paint a more accurate picture of this field. In addition, advanced analyzes such as content analysis, analysis of the most cited articles, keyword analysis was not carried out.

Author Contributions
Percentages of the author contributions is present below. The author reviewed and approved final version of the manuscript.

%	F.H.A
C	100
D	100
S	100
DCP	100
DAI	100
L	100
W	100
CR	100
SR	100
PM	100
FA	100

C= concept, D= design, S= supervision, DCP= data collection and/or processing, DAI= data analysis and/or interpretation, L= literature search, W= writing, CR= critical review, SR= submission and revision, PM= project management, FA= funding acquisition.

Conflict of Interest
The authors declared that there is no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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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