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Original Article

Analysis of publications on pulmonary embolism in the COVID-19 era

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ABSTRACT

Objectives: Recent publications on coronavirus disease 2019 (COVID-19) suggest that pulmonary embolism (PE) plays an important role in mortality and morbidity. In this context, it is natural that studies on COVID-19-associated PE are increasing rapidly. This study aimed to evaluate the studies on PE associated with COVID-19, see the overall picture in accordance with scientific literature and guide future research.

Materials and methods: In this scientometric study, the Web of Science Core Collection (WoSCC) was searched for all documents regarding COVID-19-associated PE. An Excel spreadsheet was applied to analyze the data, and the VOSviewer was used for visualization.

Results: A total of 159 records were retrieved in WoSCC. 41.5% (66) of the publications on the subject were original research articles. There were 151 articles in English, five in Spanish, two in German and one in Norwegian. A total of 66 articles were extracted by filtering the results. The mean citation number of these 66 articles was 2.17. Most of the articles were published in the United States of America (USA) (36, 22.64%), Italy (26, 16.35%), and France (20, 12.58%). Although most of the publications were from the USA, it was determined that the majority of citations were to articles published in France and Italy. It was determined that publications made in the journals Radiology, Circulation and European Heart Journal received the most citations when considering the distribution of articles with 10 or more citations. Content analysis showed that the majority of the publications were about the clinical features of the disease (71.2%), while the publications on other issues were limited.

Conclusion: Publications from countries other than the USA on COVID-19-associated PE are needed, especially on subjects other than clinical features.

Keywords: Co-citation, collaboration network, COVID-19, pulmonary embolism, VOSviewer.

Coronavirus disease 2019 (COVID-19) has caused 93,194,922 confirmed cases and 2,014,729 deaths since the World Health Organization (WHO) declared it a pandemic in March 2020, according to the data of January 17, 2021.[1]

Recent publications, developed during the COVID-19 pandemic, reported that excessive inflammation, hypoxia, immobilization, and diffuse intravascular coagulation contribute to the prothrombotic state.[2,3]

Also, it has been reported that serious complications of COVID-19, associated with coagulation changes, including pulmonary embolism (PE), play an important role in disease-related mortality and morbidity.[4-8] In a meta-analysis study, data from 1,835 patients were evaluated, and it was reported that

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Table 1. Summary of citiations of top cited journals

Source	Times cited total	Cited reference total	Document count	Citation
Radiology	270	25	3	90
Circulation	213	5	1	213
European Heart Journal	208	11	5	41.6
Thrombosis Research	123	139	12	10.25
Thrombosis and Haemostasis	71	25	1	71
European Respiratory Journal	50	10	1	50
Journal of Nuclear Medicine	36	18	3	12
Diagnostic and Interventional Imaging	29	3	2	14.5
Journal of Thrombosis and Thrombolysis	22	119	9	2.44
Seminars in thrombosis and hemostasis	18	32	1	18
Annals of Internal Medicine	16	12	1	16
European Journal of Nuclear Medicine and Molecular Imaging	16	39	5	3.2
Critical Care	14	40	4	3.5
European Radiology	13	50	2	6.5
Intensive Care Medicine	13	15	3	4.33
Respiratory Medicine	13	9	1	13
International Journal of Cardiology	12	10	2	6

approximately two out of 10 people develop PE and that COVID-19 patients with PE may have a higher mortality rate of up to 45% compared to general cases.[9] In this context, it is natural that increasingly more studies on COVID-19-associated PE are conducted.

This study aimed to evaluate the studies on PE associated with COVID-19, see the overall picture together with scientific literature and guide further studies.

MATERIALS AND METHODS

In this scientometric study, the Web of Science Core Collection (WoSCC) database (https://www.webofknowledge.com) was searched for all documents regarding COVID-19 associated-PE with keywords of 'Coronavirus', 'COVID-19', '2019 novel coronavirus disease', '2019 novel coronavirus infection', 2019-nCoV disease', '2019-nCoV infection', 'coronavirus disease 2019', 'coronavirus disease-19' plus 'Pulmonary embolism'. The studies published in the form of an article, editorial material, early access, letter or review between 01.01.2020 and 18.01.2021 were included in the study. The data were gathered from the Web of Science (WoS) database according to the data collection criteria and transferred to Microsoft Excel and VOSviewer programs for visualization.

RESULTS

The search resulted in a total of 159 publications. Among the publications, 41.5% (66) were original research articles, 32.8% were letters, 17.6% were editorial materials, 5% were meeting abstracts, 2.5% were reviews and 0.6% were corrections. There were 151 articles in English, five in Spanish, two in German and one in Norwegian.

Table 2. Content analysis of 66 research articles

Content	n	%
Clinical features	47	71.2
Incidence, prevalence	5	7.6
Treatment	6	9.1
Medical treatment	4	6.1
Nonmedical treatment	1	1.5
Prophylactic treatment	1	1.5
Radiology	4	6.1
Laboratory	2	3
In-hospital application	1	1.5
Risk factors	1	1.5

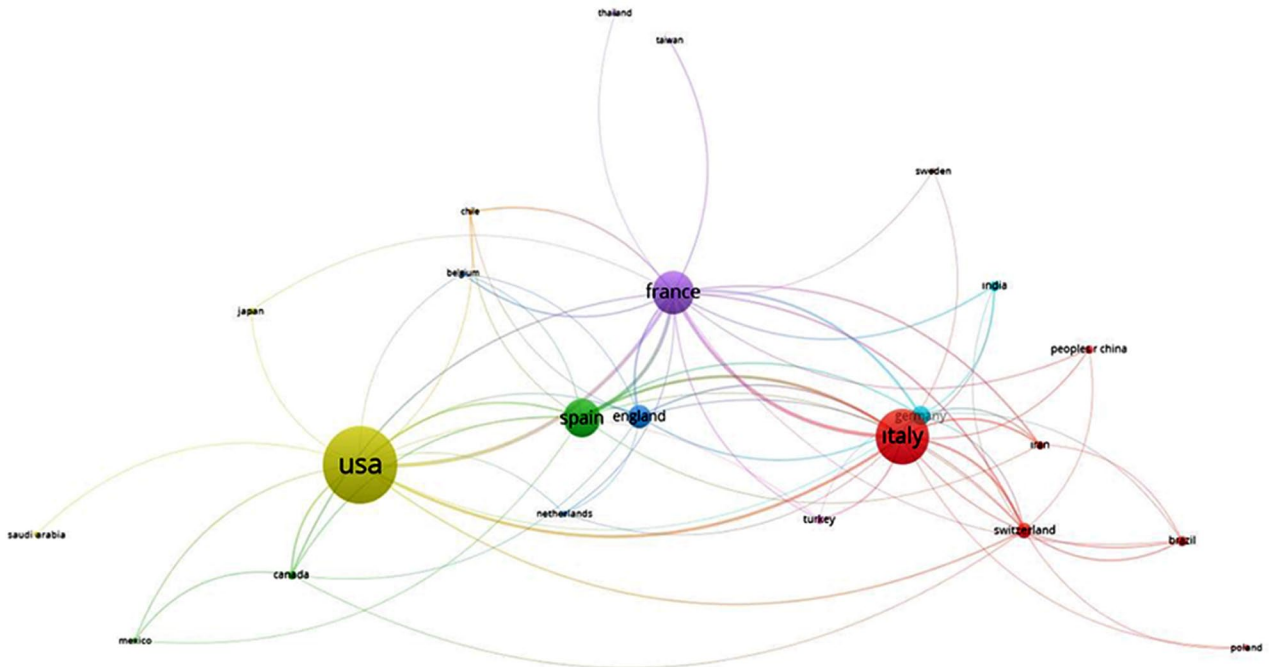
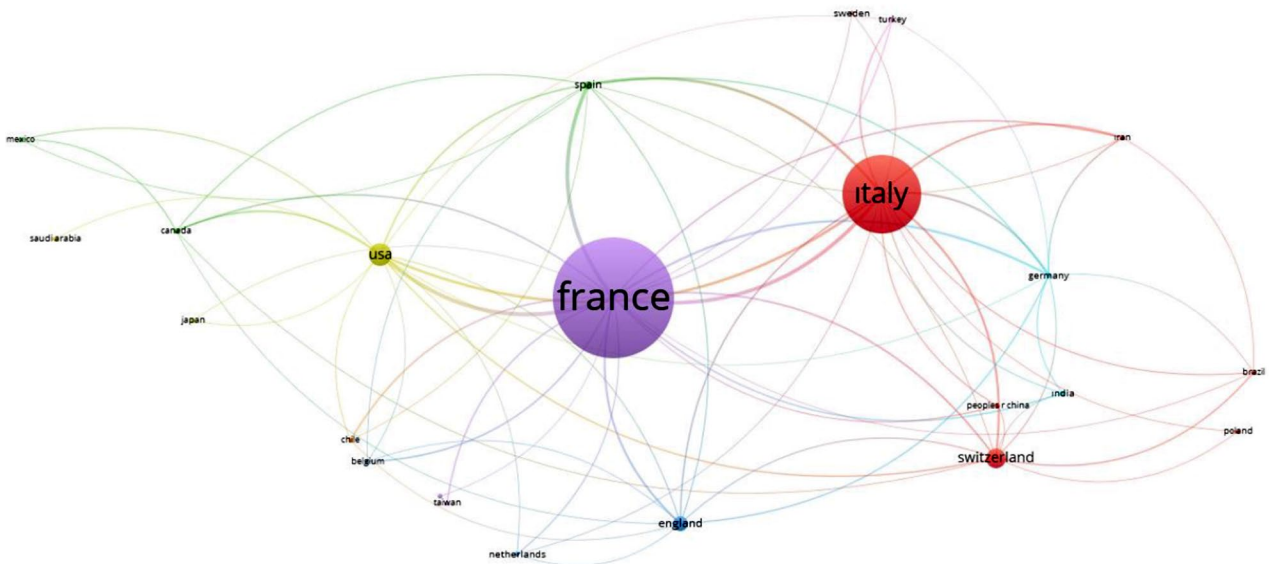


Figure 1. Network visualization of publications of COVID-19-associated pulmonary embolism.

Map prepared according to document numbers between countries with at least one publication and citations. Lines connecting countries are indicative of citations. Countries represented by larger circle size or font size have relatively more articles.

The mean citation number of these 159 publications was 7.53. The H index reached by these publications, which were cited 1,198 times in total, was 14. From these results, research articles were filtered, and a total of 66 articles were examined. The mean citation number of these 66 articles was 2.17. The H index of these articles, which were cited 143 times in total, was 7.



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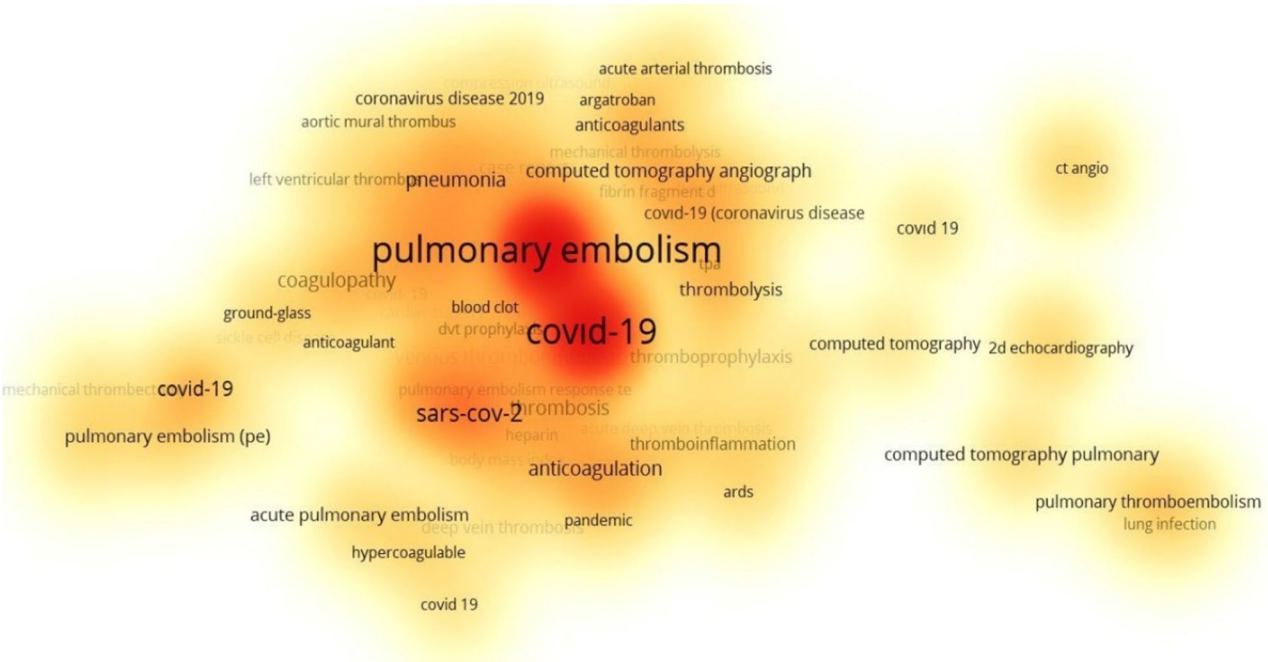

Figure 3. The density graph of publications according to keywords.

More than 50% of the publications on the subject were made in the fields of Cardiovascular System/Cardiology and General Internal Medicine. The publication was from 28 different countries. Most of the articles were published from the United States of America (USA) (36, 22.64%), Italy (26, 16.35%), and France (20, 12.58%).

The articles on the subject were published in 88 different journals and most of them were published in Thrombosis Research (7.5%), Cureus (5.6%) and Journal of Thrombosis and Thrombolysis (5.6%).

Citation analysis

The citation analysis of the publications showed that 75 (47.2%) were cited and 84 (52.8%) were not cited. Although most of the publications were from the USA, it was determined that most of the citations were to articles published in France and Italy.

The publications made in the journals Radiology, Circulation and European Heart Journal received the most citations when considering the distribution of articles with 10 or more citations. The number of citations of other articles and the number of documents is given in Table 1 and Figures 1-3.

Content analysis

In content analysis, there were publications on clinical features (71.2%), and the publications related to other issues were limited (Table 2).

DISCUSSION

In a retrospective study conducted in Italy with hospitalized COVID-19 patients, chest computed tomography pulmonary angiographies (CTPA) were retrospectively analyzed. In the 3-month study, 76 out of 170 patients (44.7%) developed PE without major risk factors for venous thromboembolism, patients with PE showed a slightly longer hospital stay, and 85.9% of patients were discharged and 14.1% died.[5] Therefore, in our bibliometric study, we aimed to examine the instant visualization of the current literature and the connections between countries by investigating the scientific activities carried out on COVID-19-associated PE, which causes an increase in hospital stay and mortality.

Wang and Tian[6] reported in their bibliometric analysis study, which was carried

out by October 2020, that 21.3% of the journals were scanned in the WoS database and 37.1% of publications were published in other leading journals in the USA. It has been reported that Chinese publications constitute 20.7% of all publications. In our study, the examination of scientific productivity related to our topic showed that the USA, Italy and France are in the top three, and China, which is the origin of the pandemic, ranks 14th. We can attribute this to the fact that the number of patients in the USA and Europe has rapidly exceeded the number of Chinese patients.

While different databases such as SCOPUS and PubMED were preferred for this purpose in other studies, we preferred WoS, the database in which journals are indexed by indices such as SCI and SCI-E. The scientific productivity on COVID-19 has increased since the first case of the disease, and even only in the WoS database, there are 76,475 publications related to COVID-19, and 159 of these publications are related to our search of keywords 'COVID-19' plus 'pulmonary embolism' - and only 66 of these are research articles. The medical importance of this issue shows the urgent necessity for further studies. In an analysis utilizing the PubMED database, there were 91,130 studies on COVID-19, while there were 678 studies on COVID-19-associated PE.[7] There were 665 full texts, 588 free full texts, nine meta-analyses, 92 reviews, 21 system reviews but no randomized controlled studies. Of the studies, 678 were written in English, five were in French and only one was in German.[7] PE was primarily examined in only three of these nine meta-analysis studies,[8-10] and the other six studies were examined under the heading of thromboembolic complications.[11-15] 1,359 COVID-19 and PE related articles were found in the analysis performed on the Science Direct website.[16] Of these, 442 were research articles. There are over 90,000 publications and over 100 bibliometric analyzes on COVID-19 in the available literature. However, we did not find similar studies involving the association of PE and COVID-19, which was the subject of our research. In addition, only four of these bibliometric studies were carried out on the WoS database, similar to this study.

No publications on non-COVID-19-associated PE have been found, that said, similar studies on respiratory conditions are limited in the available literature.[17-19] In this respect, our work is important. The main limitation of this study is that only the WoS database was used in the study.

In conclusion, publications from other countries on COVID-19-associated PE are needed, particularly on subjects other than clinical features.

Declaration of conflicting interests

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