







## **SCIENTIFIC PRODUCTION IN ONLINE JOURNALS ABOUT THE NEW CORONAVIRUS (COVID-19): BIBLIOMETRIC RESEARCH**

Isabelle Cristinne Pinto Costa<sup>1</sup>   
Rômulo Severo Sampaio<sup>2</sup>   
Fernando André Costa de Souza<sup>3</sup>   
Thainá Karoline Costa Dias<sup>4</sup>   
Brunna Hellen Saraiva Costa<sup>4</sup>   
Erika de Cássia Lopes Chaves<sup>5</sup> 

<sup>1</sup>Universidade Federal de Alfenas, Programa de Pós-graduação de Enfermagem. Alfenas, Minas Gerais, Brasil.  
<sup>2</sup>Universidade Federal da Paraíba, Programa de Pós-graduação em Química. João Pessoa, Paraíba, Brasil.  
<sup>3</sup>Hospital de Câncer de Barretos, Unidade de Cuidados Paliativos. Barretos, São Paulo, Brasil.  
<sup>4</sup>Universidade Federal da Paraíba, Programa de Pós-graduação em Enfermagem. João Pessoa, Paraíba, Brasil.  
<sup>5</sup>Universidade Federal de Alfenas, Escola de Enfermagem. Alfenas, Minas Gerais, Brasil.

### **ABSTRACT**

**Objective:** to describe the bibliometric indicators of scientific production available in online journals that address Covid-19.

**Method:** bibliometric study using Bradford's Law, network maps and textual statistics conducted with publications available in databases, from January to March 2020.

**Results:** the sample consisted of 110 scientific articles. The main authors of the studies were linked to 83 institutions in 30 countries, giving priority to medical training. China was the country that published the most, providing a large number of research data. Patients infected with Covid-19 and the population in general made up the study populations and the hospital environment was the place where most of the research was performed. The journal with the highest number of publications has a high scientific influence among academic journals. The predominance of themes about Covid-19 was observed through the analysis of terms.

**Conclusion:** bibliometric indicators indicate existing directions and gaps in the scientific production of Covid-19, which will assist in the development of future research, especially at the national level.

**DESCRIPTORS:** Coronavirus. New Coronavirus (2019-nCoV). Coronavirus infections. Pandemic. Bibliometric Indicators. Bibliometrics.

**HOW CITED:** Costa ICP, Sampaio RS, Souza FAC, Dias TKC, Costa BHS, Chaves ECL. Scientific production in online journals about the new coronavirus (COVID-19): bibliometric research. Texto Contexto Enferm [Internet]. 2020 [cited YEAR MONTH DAY]; 29:e20200235. Available from: <https://doi.org/10.1590/1980-265X-TCE-2020-0235>

## PRODUÇÃO CIENTÍFICA EM PERIÓDICOS ONLINE SOBRE O NOVO CORONAVÍRUS (COVID-19): PESQUISA BIBLIOMÉTRICA

### RESUMO

**Objetivo:** descrever os indicadores bibliométricos da produção científica Available from periódicos *online* que abordam a Covid-19.

**Método:** estudo bibliométrico com utilização da Lei de Bradford, de mapas de redes e estatística textual realizado com publicações disponibilizadas em bases de dados, no período de janeiro a março de 2020.

**Resultados:** a amostra foi composta por 110 artigos científicos. Os autores principais dos estudos tinham vinculações com 83 instituições distribuídas em 30 países, apresentando prioritariamente a formação em medicina. China foi o país que mais publicou, fornecendo grande número de dados de pesquisa. Pacientes infectados pela Covid-19 e a população em geral compuseram as populações dos estudos e o ambiente hospitalar foi o local de desenvolvimento da maior parte das pesquisas. O periódico com maior quantitativo de publicações possui alta influência científica entre as revistas acadêmicas. Por meio da análise dos termos, observou-se a predominância de temáticas acerca da Covid-19.

**Conclusão:** os indicadores bibliométricos indicam direcionamentos e lacunas existentes sobre a produção científica da Covid-19, os quais auxiliarão no desenvolvimento de pesquisas futuras, sobretudo no âmbito nacional.

**DESCRITORES:** Coronavírus. Novo coronavírus (2019-nCoV). Infecções por Coronavírus. Pandemia. Indicadores bibliométricos. Bibliometria.

## PRODUCCIÓN CIENTÍFICA EN REVISTAS ONLINE SOBRE EL NUEVO CORONAVIRUS (COVID-19): INVESTIGACIÓN BIBLIOMÉTRICA

### RESUMEN

**Objetivo:** describir los indicadores bibliométricos de producción científica disponibles en revistas online que abordan Covid-19.

**Métodos:** estudio bibliométrico utilizando la Ley de Bradford, mapas de red y estadísticas textuales realizadas con publicaciones disponibles en bases de datos, de enero a marzo de 2020.

**Resultados:** la muestra consistió en 110 artículos científicos. Los principales autores de los estudios estaban vinculados a 83 instituciones en 30 países, dando prioridad a la formación médica. China fue el país que más publicó, proporcionando una gran cantidad de datos de investigación. Los pacientes infectados con Covid-19 y la población en general formaron las poblaciones de estudio y el entorno hospitalario fue el lugar donde se realizó la mayor parte de la investigación. La revista con el mayor número de publicaciones tiene una alta influencia científica entre las revistas académicas. A través del análisis de los términos, se observó el predominio de temas sobre Covid-19.

**Conclusión:** los indicadores bibliométricos indican las direcciones y lagunas existentes en la producción científica de Covid-19, lo que ayudará en el desarrollo de futuras investigaciones, especialmente a nivel nacional.

**DESCRIPTORES:** Coronavirus. Nuevo coronavirus (2019-nCoV). Infecciones por coronavirus. Pandemia. Indicadores bibliométricos. Bibliometría.

## INTRODUCTION

In December 2019, The World Health Organization (WHO) reported several cases of viral pneumonia with unknown causes in Wuhan which spread rapidly throughout China.<sup>1</sup> In January 2020, the disease was associated with the coronavirus and identified as a severe acute respiratory syndrome (SARS-CoV-2).<sup>2</sup>

In China, in March 2020 there were already 80,303 confirmed cases of COVID-19 with 2,597 documented deaths, in addition to a total of 12,536 cases identified in 74 other countries. As of March 3, 2020, the mortality rate for COVID-19 was approximately 3.0%.<sup>3</sup>

Covid-19 is a new highly contagious infectious disease that causes inflammation in the respiratory system, and is rapidly spread.<sup>3</sup> The first clinical and laboratory findings of Covid-19 disease are low to medium fever, dry cough, fatigue and normal counted leukocyte count, reduced lymphocyte count and high levels of highly sensitive C-reactive protein.<sup>4</sup>

A study conducted in Washington State in February 2020, analyzed patients from nine hospitals in Seattle, United States of America (USA), who were admitted to the Intensive Care Unit (ICU) with confirmed infection, developing severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). From the clinical data obtained in medical records, it was observed that, during the first three weeks of the Covid-19 outbreak, the most common reasons for admission to the ICU were hypoxemic respiratory failure, leading to mechanical ventilation, hypotension that requires vasopressor treatment or both. Mortality among these critical patients was high.<sup>5</sup>

In order to be able to deal with a high number of patients with Covid-19, isolation areas in the ICUs are necessary. Hospitals require screening areas and protocols for patients with severe respiratory symptoms, suspected viral infection or who need mechanical ventilation. Tests must be carried out quickly; and the availability of Personal Protective Equipment (PPE) for the health team must be guaranteed, with the organization of supplies and distribution, together with the training of all personnel at risk of the contagion; finally, every positive or suspected patient with Covid-19 should be reported to the regional coordination center.<sup>6</sup>

Some patients infected with the Covid-19 virus developed mild to moderate respiratory disease. However, there is a higher risk group that are the elderly population, and those with chronic diseases, such as: cardiovascular, diabetes, chronic respiratory diseases and cancer, who are more likely to develop the severe symptoms of that disease.

Leading health experts from around the world gathered at WHO headquarters in Geneva to evaluate information on the new disease and accelerate research to help stop this outbreak, i.e., to seek control and prevention measures.<sup>7</sup>

However, the disease is currently growing at an alarming rate in several countries, which makes it necessary to invest in studies that analyze the scientific production on Covid-19. By means of a bibliometric study, it is possible to understand the directions of the Health sector, its strengths and weaknesses, its interfaces and possibilities for advances.

Furthermore, this method is used to evaluate national and international academic production, to identify articles, authors and more relevant and current topics, establishing greater alignment between the researched themes and the available academic productivity.<sup>8</sup> Therefore, the contribution of studies that aim to disseminate bibliometric indicators regarding publications about Covid-19 is undeniable.

Given the above, the present study has the following question as its guiding principle: what are the bibliometric indicators of scientific production available in online journals concerning Covid-19? Therefore, the research aims to characterize the bibliometric indicators of scientific production available in online journals that address Covid-19.

## METHOD

This is a descriptive bibliometric study, with a document-based quantitative approach, which consists of quantifying scientific production and communication with the aim of disseminating publications, the productivity of authors and institutions, in order to highlight the growth of science and the impact of publications in the international scenario.<sup>9</sup>

This type of research has been growing in the health area, especially in nursing. Thus, the following publications deserve to be highlighted: scientific production on moral harassment and nursing: bibliometric study<sup>10</sup>; scientific production of the International Classification for Nursing Practice: bibliometric study<sup>11</sup>; scientific production on falls and deaths in the elderly: a bibliometric analysis<sup>12</sup> and the scientific nursing production on violence in adolescence.<sup>13</sup>

According to the methodological description of the study, in April 2020, the search was carried out in the following databases: Embase, Medical Literature Analysis and Retrieval System Online/PubMed-MEDLINE, Scielo, Scopus and Web of Science, using the descriptor "Coronavirus".

The inclusion criteria for the sample selection were established as: scientific articles published from January to March 2020 whose title included the term Covid-19, with studies focused on the human species, which were made available in full for online access and included in the following modalities: case report, experience report, original and review. The following were excluded: newsletters, editorials, brief communication/expert opinion. This time frame is justified, considering that the Covid-19 outbreak started in December 2019, with few primary studies.

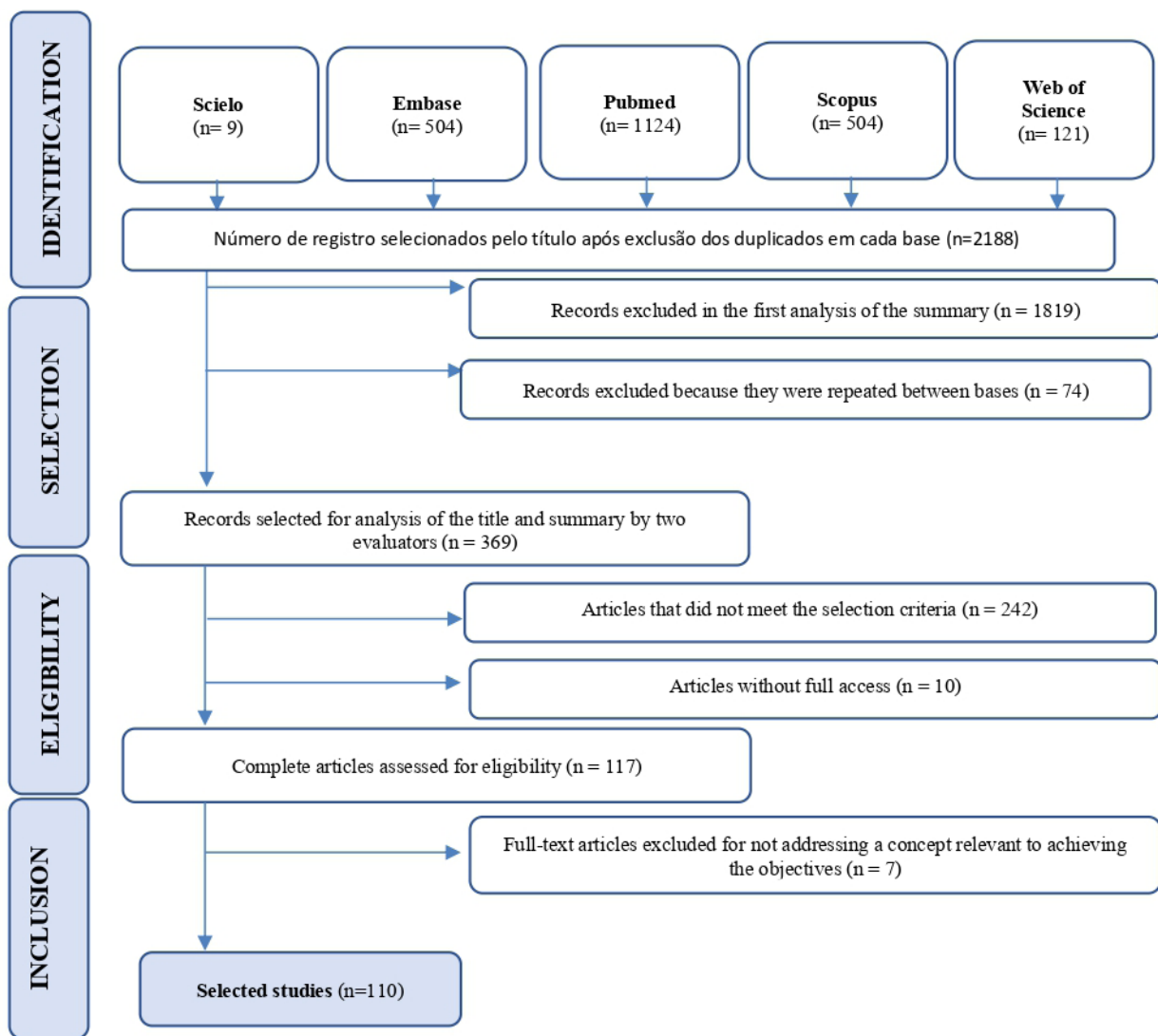
The study inclusion process was systematized using the PRISMA methodology (Preferred Reporting Items for Systematic Reviews and Meta-Analyzes)<sup>14</sup>. Thus, the titles and summaries of the articles found were read and analyzed, with the intention of selecting those who would be part of the research. In situations of doubt, the articles went on to the next phase, which involved the complete reading of each of the articles selected by two independent authors, seeking to confirm the relevance of the review question and, if so, extraction of the data of interest. Next, the results were checked and the disagreements were resolved by consensus. Thus, the sample consisted of 110 publications.

Figure 1 explains the results of each analysis step, according to the PRISMA 2009 Flow Diagram model.<sup>14</sup>

In order to facilitate the data organization and data analysis, a table was created with the Excel software, considering the bibliometric indicators: languages; number of authors; citation of the authors with the highest production addressing Covid-19; dispersion of magazines in areas of productivity; publication mode; studied environment; population participating in the studies; country; more productive institutions; qualification area of the main authors and descriptors/keywords. The data obtained from these indicators were grouped and analyzed using descriptive statistics (frequency and percentage).

To analyze the dispersion of scientific journals in relation to productivity, Bradford's Law was used as it is considered to be a model usually used in bibliometric studies for medical scientific production.<sup>15</sup> The referred Law makes it possible to separate the total number of groups into zones found, taking into account individual productivity. Thus, the most relevant journals are those that contain the first 33% of the total articles found in the review (zone 1), followed by zone 2, formed by the next 33%, and the rest would be composed of several journals that published few times on the topic (zone 3).<sup>16</sup>

Data tabulation was performed for the Law, followed by the application of the analytical formula  $mB = (1,781 \times Ym)^{1/p}$  to check the result, where "mB" is a constant (Bradford multiplier); "Ym" is the maximum productivity and "p" is the number of zones.<sup>17</sup>



**Figure 1** – Process of identification and inclusion of studies - Preferred Reporting Items for Systematic Reviews and Meta-Analyzes (PRISMA) Flow Diagram. Alfenas, Minas Gerais, Brazil, 2020.

Data analysis enabled the generation of tables, graphs and illustrative maps. Tables and graphs were generated with the aid of Microsoft Excel software. The generation of network maps was created with the support of VOSviewer software version 1.6.14, which makes it possible for the data from the research originating from the databases to be imported so that the assessments can then be processed and elaborated. Such maps use loops and colors to emphasize authors or concepts that are interconnected. For this purpose, the following analyzes were generated: relationship of keywords and co-citation between the authors.

## RESULTS

The 110 articles on the theme were identified and analyzed in the established period (January to March 2020). For this purpose, the analysis of the results was subdivided into seven topics: 1. Country, most productive institutions and the area of training of the main authors; 2. Languages available for reading in full; 3. Number of authors per article; 4. List of authors with the highest production on this topic; 5. Modality of publications and studied public; 6. Dispersion of magazines in areas of productivity; 7. Analysis of descriptors / keywords.

## Country, most productive institutions and training area of the main authors

Table 1 shows data related to the first authors identified in the numerical order of the author list in the publications. It was found that most authors belong to the Asian continent (71.84%; n=79). Among the countries belonging to that continent, China stands out with 55 (50.00%) researchers. Next, it was found that 14.56% (n=16) of the authors are located on the European continent, with an emphasis in Italy, with a total of four (3.64%) authors. In North America, the USA deserves to be highlighted with the number of eight (7.27%) researchers. However, the number of searches on the other continents showed a very small number of authors, with a maximum of two. Additionally, the data referring to the first authors identified in the numerical order of the author list of the publications are marked. There was a link to 83 institutions, distributed in 30 countries. Medical training stood out, however, 35 publications came from authors with training from different areas of knowledge.

**Table 1** – Results related to the country, affiliation and training area of the main authors, Alfenas, Minas Gerais, Brazil, 2020. (n=110)

Variables	Article numbers	%
<b>Country of the main author</b>		
China	55	50.00
United States	8	7.27
Japan and Korea	5*	4.55
Italy	4	3.64
Thailand and Taiwan	3*	2.73*
Germany, Australia, Egypt and England	2*	1.82*
Canada, Singapore, India, Maldives, Bangladesh, Lebanon, Hong Kong, Saudi Arabia, Kyrgyzstan, Norway, Poland, Switzerland, Sweden, France, Belgium, Spain, Hungary, Mali, Brazil	1*	0.91*
<b>Institutions with 3 or more articles</b>		
Wuhan University (China)	10	9.09
University of Hong Kong (Hong Kong)	5	4.55
Hokkaido University (Japan)	3	2.73
University of Macau (Macau)	3	2.73
Chulalongkorn University (Thailand)	3	2.73
Hangzhou Medical College (China)	3	2.73
Note: 6 institutions with 2 articles each	12	10.91
Note: 71 institutions with 1 article each	71	64.53
<b>Training area (main author)</b>		
Medicine	75	68.18
Computer Science	8	7.27
Biological Sciences	8	7.27
Math	6	5.45
Pharmacy	3	2.73
Chemical	3	2.73
Psychology	2	1.82
Dentistry	1	0.91
Biomedical Engineering	1	0.91
Industrial Engineering	1	0.91
Administration	1	0.91
Journalism	1	0.91

\*value for each country.

## Languages available for reading in full

The predominant language was English, exclusively present in 108 publications (98.18%), followed by one article (0.91%) available only in Spanish. Regarding accessible works for reading in more than one language, this condition was verified in only one publication (0.91%), included in this research, available at the same time in English and Portuguese.

## Number of authors per article

Individual production was present in seven (6.36%) publications. This proportion was also found for articles with two and seven authors. The proportion of five authors per article obtained the highest index, composed of 14 studies (12.73%). Studies developed with 13 (n=3), 10 (n=5) and eight (n=11) authors represented, respectively, 2.73%, 4.55% and 10.00% of the total publications. It was found that articles with three (n=12), four (n=12) and six (n=12) authors had the same incidence, with 10.91% of the total publications, for each one. The articles with nine (n=4) and 11 (n=4) authors presented the same proportion, with 3.64% of the total production, for each one. For productions with 12 (n=2) and 19 (n=2) authors, the same percentage was observed for both, corresponding to 1.82% of the total studies for each one. It should be noted that articles with 14, 15, 16, 17, 18, 20, 22 and 51 authors corresponded to only one (0.91%) publication for each one.

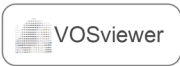
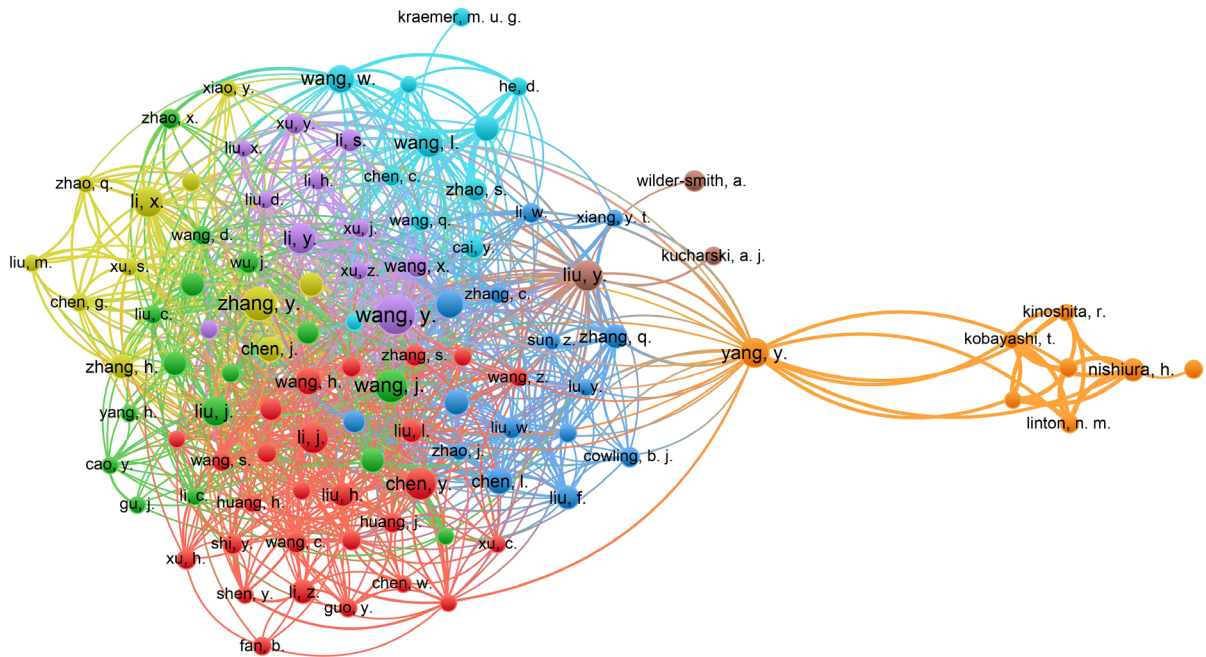
## Citation from the authors with the highest production addressing Covid-19

Figure 2 shows the co-citation network produced based on the references belonging to the main authors. As the authors appear together, a link is formed, inferring a connection or relationship between them. The size of the bubble indicates the normalized number of citations received by the articles and the thickness of the lines represents the strength of the citation connection. The color of the bubble indicates the cluster to which the author is associated, which represents a set of authors included in that map. Thus, it is observed that the network map generated in this study has a total of eight clusters.

The identification of the most cited authors is carried out by means of a cut number established by the VOSviewer software, thus, in the red cluster, the authors that stand out are Yaling Chen (Chen, Y.), Juan Li (Li, J.) and Hongxia Wang (Wang, H.). In the green cluster, researchers Jia Liu (Liu, J.) and Janxiu Wang (Wang, J.) stand out. In the dark blue, yellow and lilac clusters, Qi Zhang (Zhang, Qi), Yi Zhang (Zhang, Yi) and Yeming Wang (Wang, Y.) stand out as the most cited authors, respectively. The authors Wang, I and Wenxia Wang (Wang, W.), belonging to the turquoise blue cluster, are the most cited. As for the orange and brown clusters, the researchers Yang Yang (Yang, Y.) and Yingxia Liu (Liu, Y.) stand out in this order.

## Modality of publications and studied public

The majority of the population participating in the surveys consisted of patients infected by Covid-19, making up 40.00% (n=44) of the total population studied, with one (0.91%) being young, 23 (20.91%) adults and 13 (11.82%) elderly. Only seven (6.36%) studies covered the child audience infected by Covid-19, and it was found that six (5.45%) performed with children and one (0.91%) with babies. It was also found that ten (9.09%) studies were carried out with the general public, five (4.55%) with health professionals, three (2.73%) with family members of infected patients and one (0.91%) with pregnant women. It should be noted that 47 (42.73%) studies had not defined a specific population.



**Figure 2** – Co-citation network map between the main authors of the articles included in the study. Alfenas, Minas Gerais, Brazil, 2020.

Regarding the methodological design of the original investigations, it was found that 100% (n = 56) of the studies were quantitative, identifying four (7.14%) descriptive, five (8.93%) experimental, six (10.71%) simulations, 20 (35.72%) cohort (longitudinal prospective and retrospective) and 21 (37.50%) transversal studies.

As for the location of development of the studies, it was observed that the hospital environment was present in 57.58% of the original articles. Research was also carried out in laboratories (n=7; 10.61%), in health departments (n=5; 7.58%), in airports (n=3; 4.55%), in outpatient clinics (n=2; 3.03%) and in automobiles (n=1; 1.52%). Another mode of research development occurred through the dissemination on social media, with an incidence of 15.15% (n=10) of the total of the study sites.

### Scattering of magazines in productivity zones

By applying Bradford's Law, a total of 110 articles were distributed in 69 journals. Considering that 33% of the total (110) articles represent 36.3, and that it is not possible to consider part of the articles in a journal, a mathematical approach was used to encompass all articles in each journal, which resulted in 37 articles. The Bradford multiplier (mB) varied acceptable between the zones, and the result of the calculation in the analytical form was approximately  $mB \approx 2.3$  (analytical). Table 2 shows the top ten most important journals (zone 1) which contain 33.60% (n = 110) of the total number of articles.

Zone 2 contains 23 journals, and those that have published a total of 37 articles together. Zone 3 is composed of 36 journals that published only one article each, making a total of 36 articles.



**Table 2** – List of articles published in the first ten most productive journals according to the application of the Bradford Law, Alfenas, Minas Gerais, Brazil, 2020. (n=110)

Journal title	Journal abbreviation	Article numbers	%
<i>Eurosurveillance</i>	Euro Surveill	6	5.45*
<i>International Journal of Biological Sciences</i>	IJBS	6	5.45*
<i>Journal of Clinical Medicine</i>	J. Clin. Med.	5	4.55*
<i>Journal of Korean Medical Science</i>	J. Korean. Med. Sci.	4	3.64*
<i>Journal of Medical Virology</i>	J. Med. Virol	3	2.73*
<i>Journal of Infection</i>	J. Infect.	3	2.73*
<i>Infectious Disease Modelling</i>	-	3	2.73*
<i>Emerging Microbes &amp; Infections</i>	Emerg. Microbes Infect.	3	2.73*
Annals of translational medicine	Ann Transl Med	2	1.82*
<i>Asian pacific journal of allergy and immunology</i>	Asian Pac J Allergy Immunol	2	1.82*

\*Calculated based on 110 articles found in the study.

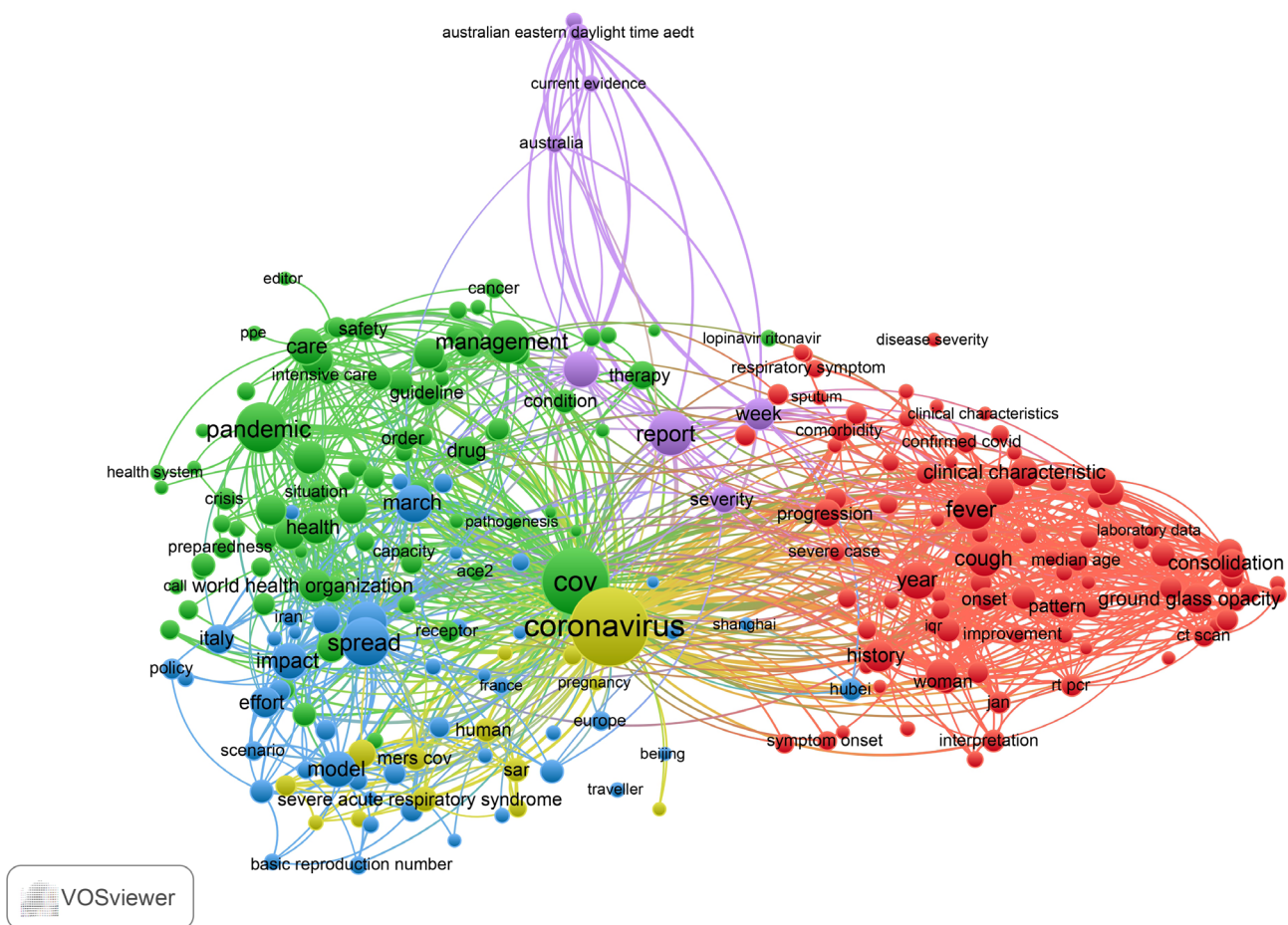
### Analysis of descriptors / keywords

In order to explore the topics covered, an analysis of the frequency of the descriptors/keywords of the articles published in the databases was carried out from January to March 2020, which allowed the main lines of study to be ratified. It is important to mention that the VOSviewer software analyzes a relevance score of these terms and, based on this score, the most relevant ones are selected. Therefore, the 241 terms were selected. However, when exporting the graphic representation to the figure format, the referred software highlights those with greater relevance.

Figure 3 reveals the existence of five clusters related to Covid-19. In the red cluster, themes related to the general aspects and some clinical characteristics of the disease are identified, as shown below: disease severity; progression; severe case; comorbidity (comorbidity); clinical characteristics; clinical (clinical); characteristics; respiratory symptom; sputum; fever; cough; ground glass opacity; Confirmed covid; history; start (onset); symptom onset; woman; laboratory data; inter-quartile amplitude - IQR (iqr); reverse transcription followed by polymerase chain reaction - RT-PCR (rt pcr); computed tomography (CT scan); interpretation; median; consolidation; pattern; improvement; abbreviation for the month of January (Jan); year.

The green cluster focuses on the terms of the pandemic and management of Covid-19 related to topics such as: personal protective equipment - PPE (PPE); safety; care; intensive care; orientation (guideline); cancer; disease; health system; crisis; situation; health; preparedness; alert; World Health Organization; capacity; receiver; angiotensin-converting enzyme - ACE (ace2); VOC; sequence/chain; drug; lopinavir ritonavir; therapy; pathogenesis.

In the blue cluster, themes related to the estimation of the Covid-19 epidemiological outbreak are identified, namely: policy; impact; spread; effort; scenario; traveler; model; mathematical model; basic reproduction number R0. These themes were highlighted in the following locations: Italy; Iran; Beijin; Hubei, Shanghai, Europe and France. As for the yellow cluster, there was a relationship between Covid-19 and some pathologies and population, such as: coronavirus; Mers-CoV; Severe Acute Respiratory Syndrome - SARS; acquired systemic resistance (SAR); pregnancy; and human. The main theme of the lilac cluster is the issue of a report about Covid-19, highlighting some issues: current evidence; severity; review / content; week; Australian Eastern Daylight Time (AEDT); Australia.



**Figure 3 – Network map of co-citation of descriptors/keywords about COVID-19 in 2020 (January/ March) Alfenas, Minas Gerais, Brazil, 2020.**

## DISCUSSION

The pandemic of the new coronavirus (Covid-19) has been marked by rapid spread, with an increase in the number of patients and deaths, consequently leading to an overload of health systems worldwide. It is important to mention that this is a new situation, in which the information and knowledge gaps are wide regarding the lethality rate, the potential for transmission, the specific treatment, the existence of a vaccine and other effects or sequelae in the body of those who have been infected, whose information is still incipient.

Therefore, research using methodologies and scientific and technological approaches plays a crucial role in the prevention and control of this disease, and, therefore, must be fully mobilized, implemented and comprehensively strengthened, with a view to updating knowledge regarding the effects of Covid-19 on the health of the population in relation to the economic and social impacts of this pandemic.

It is in this context that the survey of bibliometric indicators performed in this study found that several studies have been developed for the prevention and control of Covid-19, which have been based on the lessons learned from other disease outbreaks in recent decades. It is noteworthy that

the largest scientific production comes from the Asian continent, mainly from China, where health professionals from Wuhan have contributed significantly to the provision of research data for the conduct of health care worldwide. This is due to the fact that the city was the first epicenter of the Covid-19 pandemic.

Regarding Brazil, only one article was identified at the time of the research, which was developed with the scope of presenting measures that can help surgeons and other health professionals, as well as patients, in cases of surgical intervention, to deal with the current pandemic.<sup>18</sup> This reality of Brazilian research on Covid-19 may be associated with the fact that the first case was registered on February 26, 2020. Currently, Brazil is one of the countries with community transmission of the disease, in which confirmed by 10:00 am on June 1 of the same year the total of 498,440 cases and 28,834 deaths from the disease.<sup>19</sup> Research confirms that it is necessary to learn the course and the impact of this pandemic in Brazil, and that this will depend on the collaborative effort of everyone, including the government and the community.<sup>20</sup>

Not coincidentally, the most productive institutions are also from the Asian continent. They are: Wuhan University (China) and University of Hong Kong. The University of Wuhan has two linked hospitals, which have taken significant responsibility in combating Covid-19, providing support related to science, technology development and resource provision. The institution has played a key role in the fight against the epidemic, as has the university in Hong Kong. In order to provide greater dissemination of knowledge to the community in general, the university created a page on its institutional website, called "Fight COVID-19".

Although most of the scientific production comes from China, it appears that the predominant language of the selected articles was English and not Mandarin. This finding reveals the concern of the authors to disseminate the data found through a language that is understood by as many researchers as possible, which allows sharing and exchange of information. Additionally, articles published in English receive more citations than those published in other languages, which translates into greater visibility and credibility.<sup>21</sup>

It was identified that the training of the main author was primarily in the medical field. This finding may be linked to the expressive number of studies aimed at early recognition and rapid diagnosis, in addition to the treatment of the disease. Other qualifications were also verified, such as mathematics professionals, who assist in epidemiological studies through mathematical models with a view to understanding the epidemic evolution, and in the search for efficient measures for its prevention.<sup>22</sup> In contrast, there were no studies verified in this review with the nurse as the main author. Attention is drawn to this finding, in view of the plurality of training of these professionals, care professional excellence, and their leadership position in the team, which places them as protagonists in combating the transmission of the disease.

As for the observation made regarding the variable number of authors per article, it was revealed that the total of co-authored productions was significantly higher (93.64%), proving to be a common practice in the health area, which enriches the discussions through the sharing of ideas about the complexity of Covid-19 with less chance of error, since it can count on the evaluation of third parties. It was also possible to verify interinstitutional co-authorship, which provides a diversification of knowledge sources, the establishment of flexible and multidisciplinary networks between research groups, cooperation between companies and other public and private organizations, thus helping in the scientific development for the management of Covid-19.

These findings are consistent with those found in the literature, in which scientific collaboration stands out as a healthy practice, which benefits not only the scientific community but also the institutions and countries to which researchers are affiliated. Collaboration favors some benefits, namely: access to equipment and materials; sharing of scientific knowledge; greater specialization and in-depth research.<sup>23</sup>

Regarding the evaluation of co-citations (Figure 3), it was possible to reveal that the author Yeming Wang had a higher frequency of occurrence, being mentioned 33 times by the studies belonging to the sample. This fact is identified in the network map by the visualization of the larger bubble, which indicates the normalized number of citations received by the articles. It should be noted that the aforementioned researcher has medical training and is linked to a university in Beijing, China, called Capital Medical University, and that he develops research about Covid-19, especially in relation to its treatment.<sup>24-25</sup>

The study “Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China” is noteworthy, in which Yeming Wang, despite not being the first author, made the same contribution as other collaborators. This research was one of the first to be published addressing Covid-19, in January 24, 2020 through the journal ‘The Lancet’, whose objective was to describe the epidemiological, clinical, laboratory and radiological characteristics, treatment and results of patients infected by Covid-19; in addition to comparing the clinical characteristics of patients admitted to the ICU with those not hospitalized in the respective unit. Using the academic google tool, it was found that the study had 3,624 citations at the time of the research.

In this study, most publications were original. However, there was a significant production of review articles. This finding is linked to the fact that Covid-19 is a newly discovered disease, which leads researchers to gather as many concepts as possible in an article, to provide updated information about that disease, not only to professionals, but also to the community.

As for the original research, it was found that all productions presented the methodological quantitative design, with emphasis on cohort research (prospective and retrospective longitudinal) and cross-sectional. The research design guides its planning and implementation, aiming to answer questions or test hypotheses put for investigation.<sup>26</sup>

Therefore, the quantitative study is strongly observed in scientific research that addresses diseases, as it is a type of work that adopts a systematic, objective and rigorous strategy to generate and refine knowledge.<sup>27</sup>

One of the method’s distinctive potentials concerns the use of a large sample, through a series of mathematical operations performed within a static model, making it possible to generalize the results to much larger populations<sup>26</sup>, which seems to have very relevant applicability in investigations about Covid-19.

Despite the lack of research with a qualitative approach in this study, it is important to point out the need of developing scientifically sound studies, which seek to identify trends regarding Covid-19, in addition to exploring groups or experiences related to that disease. Researchers use the qualitative approach when there is a gap in knowledge, or when little is known about a particular phenomenon, experience or concept.<sup>26</sup>

The participating public with the highest index in the original researches and in the case studies was composed mainly of patients infected by Covid-19 (57.97%) and, consequently, developed mostly in the hospital (57.58%) , a result previously expected because it is considered a new disease and with little information, requiring the observation of such patients, especially in relation to diagnosis<sup>28</sup>, clinical manifestations and their possible complications<sup>29-31</sup> and treatment.<sup>32-33</sup>

Another important public was also found in the findings, the community in general (residents; travelers; internet users), whose studies were developed with the purpose of evaluating knowledge and attitudes towards this disease<sup>34</sup>, in addition to exploring the impact of Covid -19 on people's mental health.<sup>35-36</sup>

Most of these studies were developed through questionnaires disseminated via social media, using the non-probabilistic snowball sampling technique, in which the initial participants in a study indicate new participants. The saturation point is reached when the new interviewees start to repeat the content already obtained in previous interviews, without adding new relevant information to the research.<sup>37</sup>

It is worth noting that, among the sample publications, there was only one study developed with pregnant women, with the scope of evaluating the management and safety of epidural or general anesthesia for cesarean delivery in parturients with coronavirus disease (COVID-19) and their newborns, in addition to evaluating standardized procedures to protect medical staff. The researchers observed that most of the 17 parturient women participating in the research had non-classical clinical characteristics. There were only two cases with chest discomfort and only one case with dyspnea. However, none were hypoxemic or required supplemental oxygen before the operation. Nine of the parturients did not have typical symptoms, such as fever and cough; instead, they showed only abnormalities in the chest computed tomography.<sup>38</sup>

However, the Royal College of Obstetricians and Gynecologists (RCOG) points out that parturients have relatively depressed immunity and theoretically could be at greater risk of infection with this virus. Thus, infection with the virus during pregnancy is reported as a serious threat to pregnant women and their fetuses. However, the clinical manifestations of parturients infected with Covid-19 and their babies remain unknown and therefore, the development of research for this population is required.<sup>39</sup>

Regarding the periodicals included in the study, through the application of the Bradford Law, it was possible to verify the existence of a small nucleus of periodicals that addresses the subject more extensively, and a wide peripheral region divided into zones, in which an increase is observed in the number of journals that reduce the productivity of publishing articles on Covid-19. In this nucleus, Eurosurveillance, the European magazine, stands out, whose scope is research focused on the area of epidemiology, surveillance, prevention and control of communicable diseases. Its most recent impact factor, for the year 2018, is 7,4<sup>40</sup>, which makes it the fourth (n=89) best positioned journal in the category of infectious diseases. Therefore, it appears that the journal has a tendency to establish a nucleus with superior quality and greater relevance in this area of knowledge.

Concerning the analysis of descriptors/keywords, it was observed that research involving Covid-19 is studied and published in scientific productions with reliable results in different contexts, covering the following predominance of themes: epidemiology, causes, manifestations clinics, diagnosis, prevention and control; pandemic management; and repercussions on the mental health of the population.

## CONCLUSION

Bibliometric indicators indicate that the scientific production available in online journals on Covid-19 is under development at the international level, but with little expression at the national level. It appears that most of the scientific production comes from the Asian continent, mainly from China (50.00%), with co-authored works (93.64%), in an inter-institutional way, with publications available mainly in the English language (98.18%), and presenting patients infected by Covid-19 (57.97%) in

the hospital setting (57.58%) as the study population. Through the relationship maps, it was possible to evidence the emergence of co-citation clusters and descriptors/keywords. Additionally, by applying the Bradford Law, it was shown that the journal with the largest number of publications has a high scientific influence among academic journals.

Despite the systematization used in the search and the selection of articles included in the bibliometric review, the impossibility of reaching the totality of studies published on the theme is recognized. In addition, the number of studies identified can be exceeded when considering productions published in Mandarin.

Bearing in mind the area of nursing, it is hoped that the findings of this review may arouse the interest of researchers for the development of studies that address the aforementioned theme, since they assume a crucial role in the detection and evaluation of suspected cases, since these professionals are at the forefront of preventive actions, combating the spread and assisting people infected with the new coronavirus.

## REFERENCES

1. Wang F, Nie J, Wang H, Zhao Q, Xiong Y, Deng L, et al. Characteristics of peripheral lymphocyte subset alteration in COVID-19 pneumonia. *J Infect Dis.* [Internet] 2020 [cited 2020 Apr 4]; 221(11):1762-9. Available from: <https://dx.doi.org/10.1093/infdis/jiaa150>
2. Gorbalenya GA, Baker SC, Baric RS, Groot RJ, Drosten C, Gulyaeva AA, et al. The species severe acute respiratory syndrome-related coronavirus: classifying 2019-nCoV and naming it SARS-CoV-2. *Nat Microbiol.* [Internet] 2020 [cited 2020 Apr 4]; 5: 536-44. Available from: <https://dx.doi.org/10.1038/s41564-020-0695-z>
3. Guan CS, Ly ZB, Yan S, Du YN, Chen H, Wei LG, et al. Imaging features of Coronavirus disease 2019 (COVID-19): evaluation on thin-section CT. *Acad Radiol.* [Internet] 2020 [cited 2020 Apr 4];27(5):609-13. Available from: <https://dx.doi.org/10.1016/j.acra.2020.03.002>
4. Han R, Huang L, Jiang H, Dong J, Peng H, Zhang D. Early clinical and CT manifestations of Coronavirus disease 2019 (COVID-19) Pneumonia. *Am J Roentgenol.* [Internet] 2020 [cited 2020 Apr 6]; 215(2):338-43. Available from: <https://dx.doi.org/10.2214/ajr.20.22961>
5. Bhatraju PK, Ghassemieh BJ, Nichols M, Kim R, Jerome K R, Nalla AK, et al. Covid-19 in critically ill patients in the Seattle Region - case series. *N Engl J Med.* [Internet] 2020 [cited 2020 Apr 6];382:2012-22. Available from: <https://dx.doi.org/10.1056/nejmoa2004500>
6. Grasselli G, Presenti A, Cecconi M. Critical care utilization for the COVID-19 outbreak in Lombardy, Italy: early experience and forecast during an emergency response. *JAMA.* [Internet] 2020 [cited 2020 Apr 8];323(16):1545-6. Available from: <https://dx.doi.org/10.1001/jama.2020.4031>
7. Nações Unidas Brasil. Especialistas e financiadores mundiais estabelecem prioridades para a pesquisa COVID-19. Brasil; 2020 [cited 2020 Mar 11]. Available from: <https://nacoesunidas.org/especialistas-e-financiadores-estabelecem-prioridades-para-pesquisas-sobre-covid-19/>
8. Xavier BM, Silva AD, Gomes GRR, Costa H. Mineração de texto e suas aplicações na literatura científica: estudo bibliométrico. *Exatas & Engenharia.* [Internet] 2012 [cited 2020 Apr 14];2(4):13–25. Available from: <https://dx.doi.org/10.25242/885X204201290>
9. Hutchins BI, Yuan X, Anderson JM, Santangelo GM. Relative Citation Ratio (RCR): a new metric that uses citation rates to measure influence at the article level. *PLoS Biol.* [Internet] 2016 [cited 2020 Apr 14];14(9):e1002541. Available from: <https://dx.doi.org/10.1371/journal.pbio.1002541>
10. Lucena PLC, Costa SFG, Batista JBV, Lucena CMF, Morais GSN, Costa BHS. Scientific production on workplace bullying and nursing: a bibliometric study. *Rev Esc Enferm USP.* [Internet] 2018 [cited 2020 Apr 27];52:3354. Available from: <https://dx.doi.org/10.1590/s1980-220x2017029103354>

11. Beserra PJF, Gomes GLL, Santos MCF, Bittencourt GKGD, Nóbrega MML. Scientific production of the international classification for nursing practice: a bibliometric study. *Rev Bras Enferm.* [Internet] 2018 [cited 2020 Apr 27];71(6):2860-8. Available from: <https://dx.doi.org/10.1590/0034-7167-2017-0411>
12. Wingerter DG, Azevedo UN, Marcaccini AM, Alves MSCF, Ferreira MAF, Moura LKB. Scientific production on falls and deaths among elderly persons: a bibliometric analysis. *Rev Bras Geriatr Gerontol.* [Internet] 2018 [cited 2020 Apr 27];21(3):320-9. Available from: <https://dx.doi.org/10.1590/1981-22562018021.170168>.
13. Reis NSP, Peres EM, Leite DC, Gomes HF, Santos MFG. Scientific production in nursing on violence in adolescence. *Rev Enferm UERJ.* [Internet] 2017 [cited 2020 Apr 27];25:e26475. Available from: <https://dx.doi.org/10.12957/reuerj.2017.26475>
14. Moher D, Liberati A, Tetzlaff J, Altman DG; PRISMA group. preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med.* [Internet] 2009 [cited 2020 Apr 27];6(7):e1000097. Available from: <https://dx.doi.org/10.1371/journal.pmed.1000097>
15. Goffman W, Warren KS. Dispersion of papers among journals based on a mathematical analysis of two diverse medical literatures. *Nature.* [Internet] 1969 [cited 2020 Apr 27];221:1205-7. Available from: <https://dx.doi.org/10.1038/2211205a0>
16. Guedes VLS. A bibliometria e a gestão da informação e do conhecimento científico e tecnológico: uma revisão da literatura. *Ponto de Cited.* [Internet] 2012 [cited 2020 Apr 29];6(2):74-109. Available from: <https://dx.doi.org/10.9771/1981-6766rpa.v6i2.5695>
17. Egghe L, Rousseau R. Introduction for informetrics: quantitative methods in library, documentation and information science. Amsterdam: Elsevier; 1990.
18. Correia MITD, Ramos RF, Bahten LCV. The surgeons and the COVID-19 pandemic. *Rev Col Bras Cir.* [Internet] 2020 [cited 2020 May 3];47:e20202536. Available from: <https://dx.doi.org/10.1590/0100-6991e-20202536>.
19. World Health Organization. Coronavirus disease (COVID-19). situation report – 133. Geneva; 2020 [cited 2020 June 01]. Available from: [https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200601-covid-19-sitrep-133.pdf?sfvrsn=9a56f2ac\\_4&ua=1](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200601-covid-19-sitrep-133.pdf?sfvrsn=9a56f2ac_4&ua=1)
20. Oliveira AC, Lucas TC, Iquiapaza RA. What has the COVID-19 pandemic taught us about adopting preventive measures? *Texto Contexto Enferm.* [Internet] 2020 [cited 2020 June 01];29:e20200106. Available from: <https://dx.doi.org/10.1590/1980-265X-TCE-2020-0106>
21. Bitetti MSD, Ferreras JA. Publish (in English) or perish: the effect on citation rate of using languages other than English in scientific publications. *Ambio.* [Internet] 2016 [cited 2020 May 3];46(1):121-7. Available from: <https://dx.doi.org/10.1007/s13280-016-0820-7>
22. Zhao S, Chen H. Modeling the epidemic dynamics and control of COVID-19 outbreak in China. *Quant Biol.* [Internet] 2020 [cited 2020 May 5];8:11-9. Available from: <https://dx.doi.org/10.1007/s40484-020-0199-0>
23. Vanz SAS, Stumpf IRC. Scientific collaboration: theoretical and conceptual review. *Perspect Ciênc Inf.* [Internet] 2010 [cited 2020 May 5];15(2):42-55. Available from: <https://dx.doi.org/10.1590/S1413-99362010000200004>
24. Wang Y, Zhang D, Du G, Du R, Zhao J, Jin Y, Fu S. Remdesivir in adults with severe COVID-19: a randomised, double-blind, placebo-controlled, multicentre trial. *The Lancet.* [Internet] 2020 [cited 2020 May 3];395(10236):1569-78. Available from: [https://dx.doi.org/10.1016/S0140-6736\(20\)31022-9](https://dx.doi.org/10.1016/S0140-6736(20)31022-9)

25. Cao B, Wang Y, Wen D, Liu W, Wang J, Fan G, et al. A trial of lopinavir–ritonavir in adults hospitalized with severe covid-19. *N Engl J Med*. [Internet] 2020 [cited 2020 May 6];382(19):1787-99. Available from: <https://dx.doi.org/10.1056/nejmoa2001282>
26. Sousa VD, Driessnack M, Mendes IAC. An overview of research designs relevant to nursing: part 1: quantitative research designs. *Rev Latino-Am Enfermagem*. [Internet] 2007 [cited 2020 May 6];15(3):502-7. Available from: <https://dx.doi.org/10.1590/S0104-11692007000300022>
27. Polit DF, Beck CT. *Fundamentos da pesquisa em enfermagem: avaliação de evidências para a prática da enfermagem*. São Paulo (BR): Artmed; 2018.
28. Long C, Xu H, Shen Q, Zhang X, Fan B, Wang C, et al. Diagnosis of the Coronavirus disease (COVID-19): rRT-PCR or CT? *Eur J Radiol*. [Internet] 2020 [cited 2020 May 7];126:108961. Available from: <https://dx.doi.org/10.1016/j.ejrad.2020.108961>
29. Yang W, Cao Q, Qin L, Wang X, Cheng Z, Pan A, et al. Clinical characteristics and imaging manifestations of the 2019 novel coronavirus disease (COVID-19): a multi-center study in Wenzhou city, Zhejiang, China. *J Infect*. [Internet] 2020 [cited 2020 May 9];80(4):388-93. Available from: <https://dx.doi.org/10.1016/j.jinf.2020.02.016>
30. Lo IL, Lio CF, Cheong HH, Lei CI, Cheong TH, Zhong X, et al. Evaluation of SARS-CoV-2 RNA shedding in clinical specimens and clinical characteristics of 10 patients with COVID-19 in Macau. *Int J Biol Sci*. [Internet] 2020 [cited 2020 May 9];16(10):1698-707. Available from: <https://dx.doi.org/10.7150/ijbs.45357>
31. Su L, Ma X, Yu H, Zhang Z, Bian P, Han Y, et al. The different clinical characteristics of corona virus disease cases between children and their families in China – the character of children with COVID-19. *Emerg Microbes Infect*. [Internet] 2020 [cited 2020 May 9];9(1):707-13. Available from: <https://dx.doi.org/10.1080/22221751.2020.1744483>
32. Shanmugaraj B, Siritattananon K, Wangkanont K, Phoolcharoen W. Perspectives on monoclonal antibody therapy as potential therapeutic intervention for coronavirus disease-19 (COVID-19). *Asian Pac J Allergy Immunol*. [Internet] 2020 [cited 2020 May 10];38(1):10-18. Available from: <https://dx.doi.org/10.12932/ap-200220-0773>
33. Chen Z, Hu J, Zhang Z, Jiang S, Han S, Yan D, et al. Efficacy of hydroxychloroquine in patients with COVID-19: results of a randomized clinical trial. *medRxiv*. [Internet] 2020 [cited 2020 May 10]. Available from: <https://dx.doi.org/10.1101/2020.03.22.20040758>
34. Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT, et al. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *Int J Biol Sci*. [Internet] 2020 [cited 2020 May 10]; 16(10):1745-52. Available from: <https://dx.doi.org/10.7150/ijbs.45221>
35. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health*. [Internet] 2020 [cited 2020 May 11];17(5):1729. Available from: <https://dx.doi.org/10.3390/ijerph17051729>
36. Li S, Wang Y.; Xue J, Zhao N, Zhu T. The impact of COVID-19 epidemic declaration on psychological consequences: a study on active weibo users. *Int J Environ Res Public Health*. [Internet] 2020 [cited 2020 May 11];17(6):2032. Available from: <https://dx.doi.org/10.3390/ijerph17062032>
37. Valliant R., Dever JA, Kreuter F. *Practical tools for designing and weighting survey sample*. New York: Springer; 2013.
38. Chen R, Zhang Y, Huang L, Cheng BH, Xia Z, Meng Q. Safety and efficacy of different anesthetic regimens for parturients with COVID-19 undergoing Cesarean delivery: a case series of 17 patients *Canadian journal of anaesthesia*. *Can J Anaesth*. [Internet] 2020 [cited 2020 May 11]; 67(6):655-63. Available from: <https://dx.doi.org/10.1007/s12630-020-01630-7>



39. Royal college of obstetricians and gynecologists. Coronavirus (COVID-19) infection in pregnancy. Information for healthcare professionals. Version 7. 2020 [cited 2020 Apr 4];21(5):682-6. Available from: <https://www.rcog.org.uk/>
40. Djamel D. Latest Impact Factors Journal List, Thomson Reuters based on 2017. J Cit Reports. [Internet]. 2018 [cited 2020 Apr 4];21(5):682-6. Available from: [https://www.researchgate.net/publication/326016342\\_latest\\_impact\\_factors\\_journal\\_list\\_thomson\\_reuters\\_2017-2018](https://www.researchgate.net/publication/326016342_latest_impact_factors_journal_list_thomson_reuters_2017-2018)



## NOTES

### CONTRIBUTION OF AUTHORITY

Study design: Costa ICP, Chaves ECL.

Data collection: Souza FAC, Dias TKC, Costa BHS.

Data analysis and interpretation: Costa ICP, Sampaio RS.

Discussion of results: Costa ICP, Sampaio RS; Souza FAC; Dias TKC, Costa BHS, Chaves ECL.

Writing and/or critical review of the content: Costa ICP, Sampaio RS, Chaves ECL.

Final review and approval of the final version: Costa ICP, Sampaio RS, Souza FAC, Dias TKC, Costa BHS, Chaves ECL.

### CONFLICT OF INTEREST

There is no conflict of interest.

### EDITORS

Associated Editors: Ana Izabel Jatobá de Souza, Gisele Cristina Manfrini Fernandes, Mara Ambrosina de Oliveira Vargas.

Editor-in-chief: Roberta Costa.

### HISTORICAL

Received: June 02, 2020.

Approved: June 24, 2020.

### CORRESPONDING AUTHOR

Isabelle Cristinne Pinto Costa.

isabelle.costa@unifal-mg.edu.br

