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THE RAPID ESCALATION OF PUBLICATIONS ON COVID-19: A SNAPSHOT OF TRENDS IN THE EARLY MONTHS TO OVERCOME THE PANDEMIC AND TO IMPROVE LIFE QUALITY

Abstract: *With its rapid contagion, the new coronavirus is spreading more and more around the world. Studies point out that the difficulty in solving this pandemic lies in the lack of identification of those infected for their symptoms, which sometimes do not exist. The objectives of this work are to carry out a bibliometric study, identifying the main countries, authors, journals, institutions and keywords that make up this field of knowledge; analyze the research opportunities in the main articles to identify the main study trends about Covid-19; and check if there is a correlation between the number of publications and the number of infected by Covid-19. Among the main groups identified in the studies, the following stand out: regulation of the wildlife market, detection, prevention, impacts on patients, proposal of vaccines, treatment and Covid-19 cure. One of the main contributions of this study was the transmission of relevant knowledge about Covid-19 with the intention to improve quality of life.*

Keywords: *Covid-19; Sars-Cov-2; Pandemic; Bibliometric Study*

1. Introduction

The Sars-Cov-2 pandemic in the year 2020, initially discovered in China, in Wuhan (Huang et al., 2020), with the first cases reported in December 2019, reached mostly individuals were in contact with the Huanan Seafood Wholesale Market (N. Chen et al., 2020). However, genomic studies have found that the introduction of the virus occurred from another location that is still unknown (Harapan et al., 2020).

The horseshoe bat (*Rhinolophus affinis*) is the probable species of origin of Sar-Cov-2, since the virus found in this species, called BatCovRaTg13, shares a similarity of 96% with the virus that infects humans. However, recent studies with samples of pangolin-malayan lung (*Manis javanica*) suggest that these animals are also intermediate hosts, considering that Pangolin-Cov, a virus present in these animals, is 91.02% similar to Sar-Cov-2. The contact of humans with these wild species carrying these viruses enabled

the jump of the new coronavirus to humans (Zhang et al., 2020; Zhou et al., 2020). It is observed that the field of study is still scarce, although the academic community intensely dedicates to understanding this new pathology (N. Chen et al., 2020).

Despite the significant range of transmissions, these are not the first cases from this virus. It should be noted that since 2002, research has been carried out to identify the occurrence of individuals with acute respiratory problems, by the then called Sars-CoV (Zhu et al., 2020). Besides this, in 2012, more cases similar to the Bat-Sars-CoV appeared and became known as Mers-Cov (Wu & McGoogan, 2020). The 2002 and 2012 outbreaks generated many cases of infected's and deaths, bringing a large-scale epidemic scenario to the Arabian Peninsula (Chan et al., 2020). However, asymptomatic infections can spread the virus, which is why social isolation was also suggested in the Sars-CoV outbreak (Munster et al., 2020).

The main symptoms presented by this new virus in patients were: fever, dry cough, some had diarrhea, nausea, and vomiting. However, the symptoms and respiratory signs were the main sources of the disease alert (Harapan et al., 2020).

According to information reported by the World Health Organization (World Health Organization, 2020), the number of people officially infected by COVID-19 as of April 18 was on the order of 2,160,207 people, while the total number of deaths was in the order of 146,088.

This concern with the virus that science knows little about is reflected in an significant amount of documents that are being produced and made available on the Internet and the

main academic databases. The articles in English that were indexed in the Web of Science database platform, which contained COVID-19 in the title and/or keyword, account, until April 18, 418 articles (Web of Science, 2020). On the Scopus platform, with the same filters and on the same date, a total of 570 publications (Scopus, 2020).

To better understand the information produced in this pandemic scenario and leave a new block of knowledge as a contribution to future research, we sought to identify what the priorities are in the first studies conducted on Sar-Cov-2, from an international perspective, of the main works indexed in the Scopus database? To answer this question, three objectives are proposed: (1) carrying out a bibliometric study, identifying the main countries, authors, journals, institutions and keywords that make up this field of knowledge. Bibliometric analysis aims to ascertain the importance of a particular field of research (Zuccala et al., 2015); (2) analyzing the research opportunities described in the most cited articles in the first quarter of 2020, aiming at elaborating study trends on COVID-19; (3) verifying if there is a correlation between the number of publications and the number of those infected by COVID-19.

2. Method

The research can be classified as applied exploratory and quantitative approach. As method and technical procedures adopted, respectively, by bibliographic research and literature review (Kothari & Garg, 2019). Figure 1 shows Methodological flow of the research.

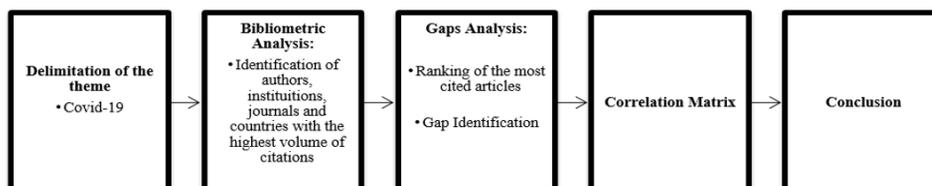


Figure 1. Methodological flow of the research

To achieve the objectives of this research, it was divided into four stages. Initially, the articles with the theme "COVID-19" were identified in the Scopus database, and only those published in English were considered, as it is the language most commonly used in science (Nunhes & Oliveira, 2018) on April 18.

A total of 570 articles were published in 2020 and one in 2019. Among these, 20 were selected with the highest number of citations. Using the VOSviewer platform, the 2nd Stage was held where the authors, institutions, journals, countries, and keywords with the highest number of citations were identified and were sorted into tables and charts using Microsoft Excel software.

This bibliometric analysis was important, since it explains a relationship between the number of publications and citations, the results presented by the article and its use for other research (Bornmann et al., 2016). This analysis also makes it possible to visualize the performance of a research (Frittelli et al., 2016). Thus, it can be stated that a bibliometric analysis performs statistical analyzes on documents published from various indicators (Aledo et al., 2018).

Later, data from the countries with the 20 largest H-Index publications containing COVID-19 in the title and keywords were gathered, including data from those infected and deceased by the new coronavirus, on April 18. H-Index is a bibliometric metric that can measure the capacity of scientific achievement of a certain pole of academic production (Hirsch, 2007).

For the realization of the correlation matrix, the GRETL statistics and econometrics software was used. In a correlation matrix, the data close to zero show a low linear relation between the variables, while the result close to 1 or -1 refers to a very significant linear relationship between the variables. A correlation around 0.5 positive or negative produces indications that there is a linear correlation between the measured variables (Razdolsky, 2014).

3. Results and discussion

The main information on COVID-19 was provided. The most important areas of studies presented in the publications were delimited. Subsequently, the main countries related to the theme, and their relations were identified. The most relevant periodicals representing the publications with the highest numbers of citations were shown. Next, we identified the institutions that have been most active in the production of COVID-19. Later analyses were to show the keywords that have been most used in the articles that were indexed in the Scopus database.

In the second stage of the article, a content analysis was performed. First, the 20 articles that have presented themselves as the engines in the production of research on the subject were selected, with the identification of their research gaps. And then, the most relevant groups were organized according to the affinity of the respective researches.

And, finally, a third step is constituted with a correlation matrix where it was sought to verify the existence of a correlation between the number of publications and the number of infected by COVID-19.

3.1. Areas

As shown in Figure 2, the main areas of research on COVID-19 are shown below.

It was found that 58% of the articles are intended for the area of medicine, while 15% of the studies are linked to immunology and microbiology. The "other studies" field delimits the areas of dentistry, chemistry, economics, engineering, energy, administration and business, nursing, veterinary among the other fields. If all studies related to health are considered, more than 82% of studies for this purpose will be obtained. The areas focused on environmental and social sciences add up to a percentage of around 6%.

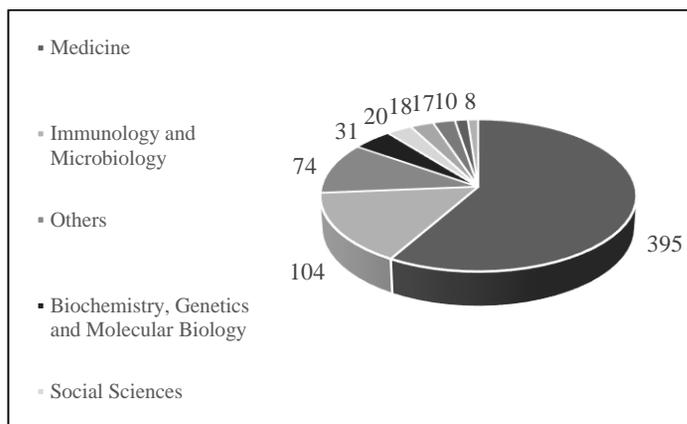


Figure 2. Study areas around COVID-19

3.2. Countries

This subsection presents the countries that achieved the most significant performance in COVID-19 publications, as shown in Figure 3.

The first 10 nations with the highest number of citations throughout the period were selected (Figure 3).

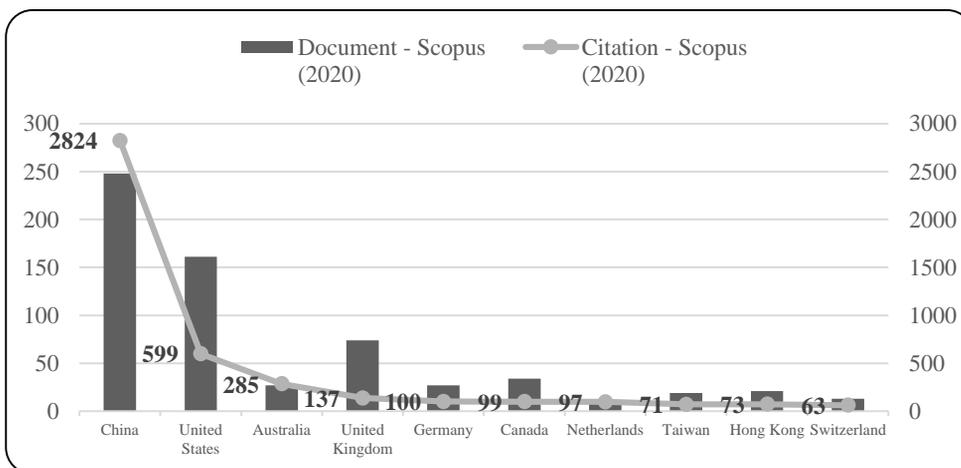


Figure 3. Main Countries

To Four of these countries belong to Europe (the United Kingdom, Netherlands, Switzerland, and Germany), two to North America (the United States and Canada), one to Oceania (Australia) and three to Asia (China, Hong Kong, and Taiwan). The significant number of articles is probably because the pandemic started in China.

As shown in Figure 3, China had the highest number of publications in the period under review, with 132 concomitants to the highest number of citations (1384). This is preceded by the United States, which totaled 73 articles and was mentioned 302 times. However, Australia reached the highest average of citations per article with 19.93, followed by the Netherlands at 11.00.

According to Figure 4, it is observed that the countries in their great majority made associations among themselves. All 10

countries analyzed carried out works with at least two of the most cited. China gained prominence by associating with these.

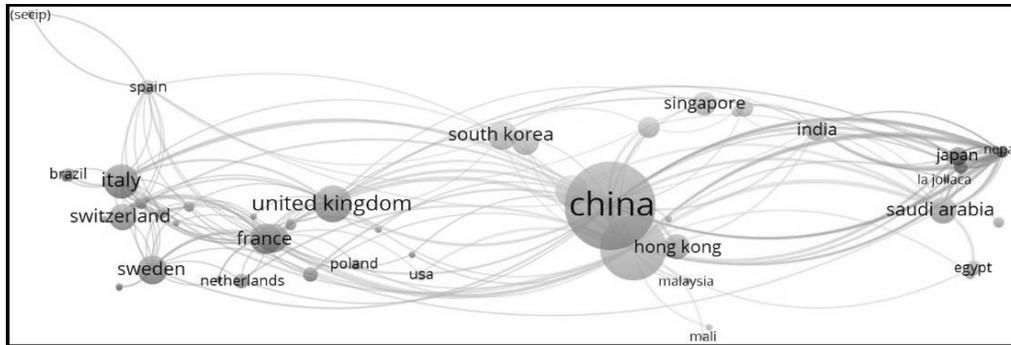


Figure 4. Country Clusters

Cluster formation is perceived as a characteristic of regionality since it is possible to group countries such as South Korea, Singapore, and India or even France, the Netherlands and Sweden. As shown in Figure 4, China and the United States presented participation in 8 and 9 clusters, respectively.

3.3. Main journals

This subsection presents the journals that achieved the most significant performance in COVID-19 publications, as shown in Figure 5.

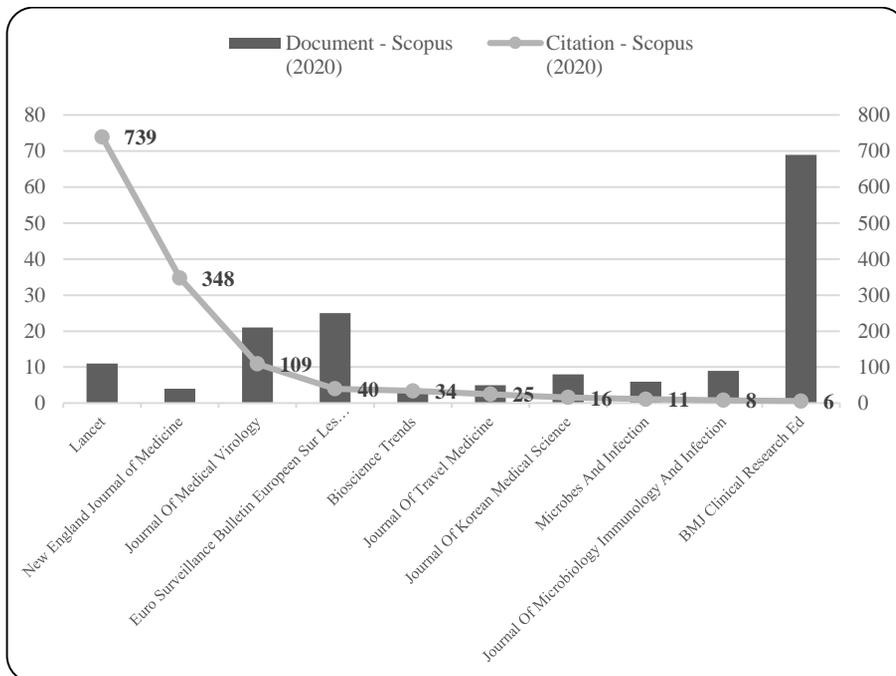


Figure 5. Major Journals

The New England Journal of Medicine presents a higher number of citations than the others, with an average of 87 citations per article, even with only four publications. The Lancet journal presents the second average among the most important, with 67 citations per article. The other journals have a relatively low average. It is observed that the journal BMJ Clinical Research presented a significant amount of 69 articles. However, at

the moment the information was treated, it got only six citations.

3.4. Institutions

This subsection presents the main educational institutions that have presented articles on COVID-19, as shown in Figure 6.

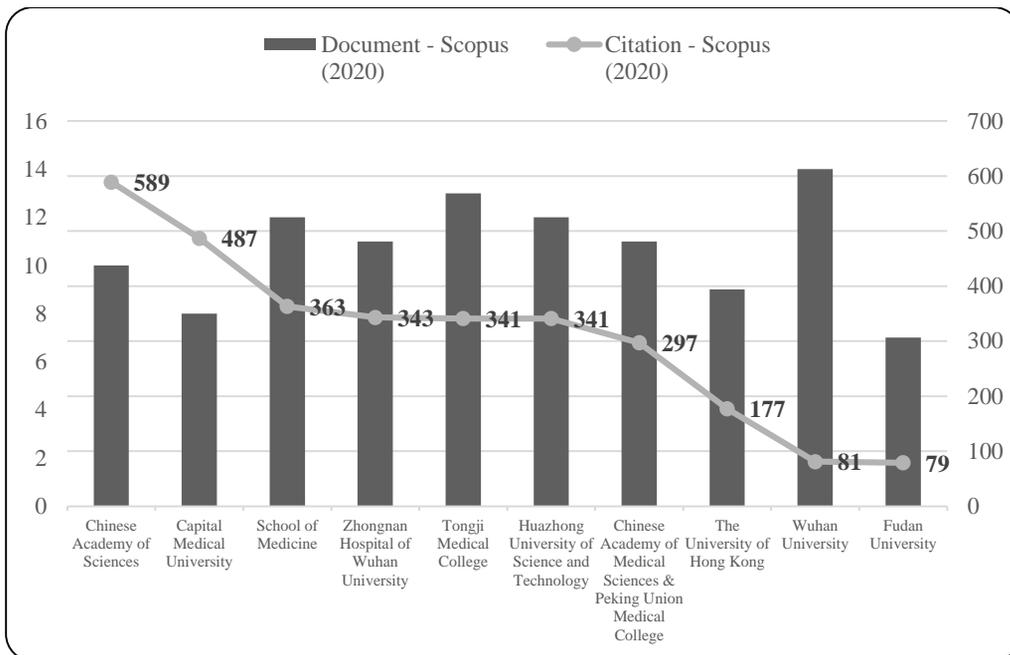


Figure 6. Educational Institutions

Chinese institutions have presented a larger number of papers, mainly those involved with the epicenter of transmission of the new coronavirus, the Zhongnan Hospital of Wuhan University, Tongji Medical College, Huazhong University of Science and Technology and Wuhan University. Among the 10 universities presented, only The University of Hong Kong is not officially part of China. The articles with the highest average are from the Chinese Academy of Sciences and Capital Medical University, both with an average of close to 60 citations per work.

3.5. Authors

The authors who published the most about COVID-19 in the first months due to the pandemic are shown in Figure 7.

The COVID-19 productions totaled 1522 authors. In this category, Wang W. stood out for presenting the largest volume of citations, 277, being preceded by Li X. with 224. With 12 publications, Liu Y. stood out for the largest number of productions related to the subject in the period under review. Gao G. F. and Huang B. stood out for the highest average number of quotations per article, both with 187.00. As seen in Figure 7.

From the VOSviewer software, it was found that the 10 authors presented associations for the production of documents related to the theme (Figure 8). Wang W. presented 52 links and the total link strength the equivalent of 65, being three the total strength with the second most cited author Li X.

The total strength of the link shows the co-authorship of a researcher with other researchers. From the VOSviewer software, was found that the 10 authors presented associations for the production of documents related to the theme (Figure 8).

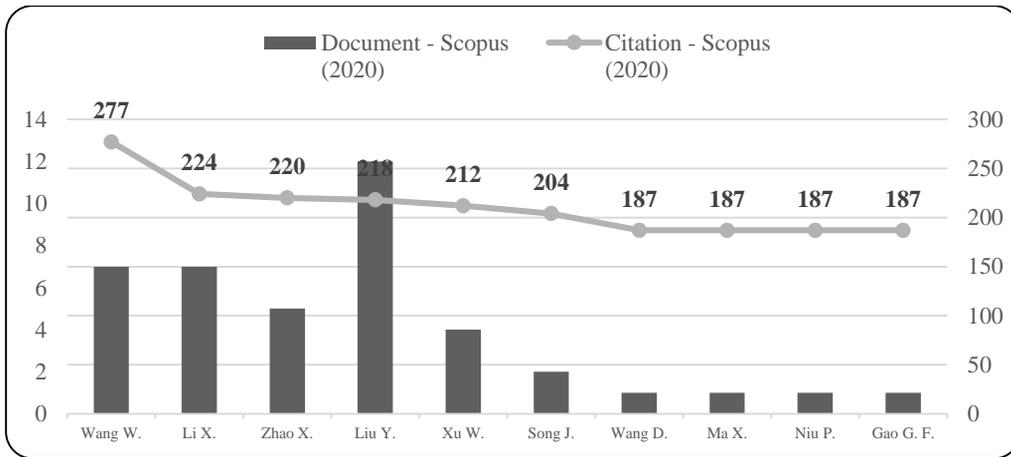


Figure 7. Main Authors

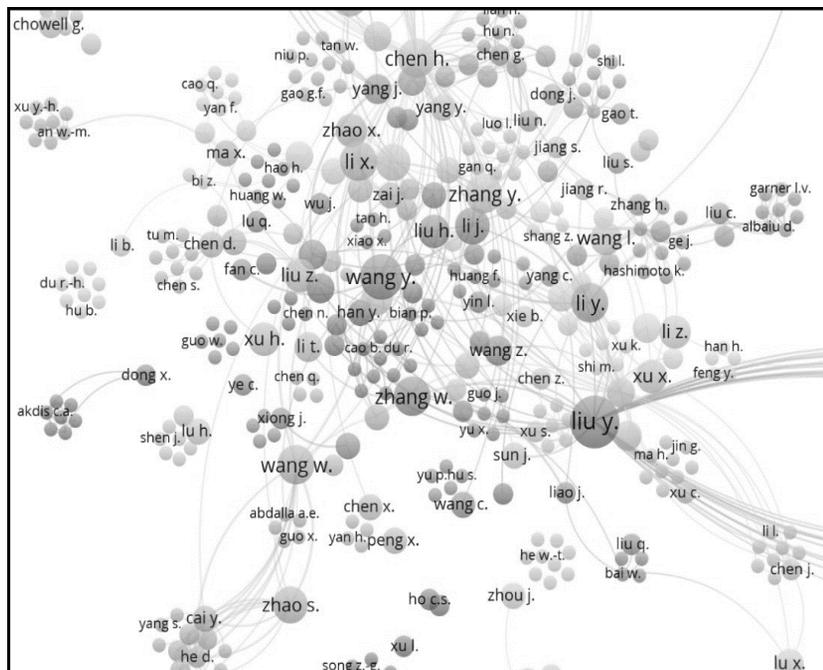


Figure 8. Association between authors on the theme COVID-19 performed in VOSviewer software

3.6. Keywords

The 10 most recurrent keywords regarding COVID-19 by the authors were Human/ Humans, Coronavirus Infection/ Coronavirus Infections, Viral Pneumonia/ Pneumonia,

Viral, Betacoronavirus, Severe Acute Respiratory Syndrome Coronavirus 2, Epidemic, Sars-Cov-2, 2019-ncov, Disease outbreaks and Coronavirus disease, as seen in Figure 9.

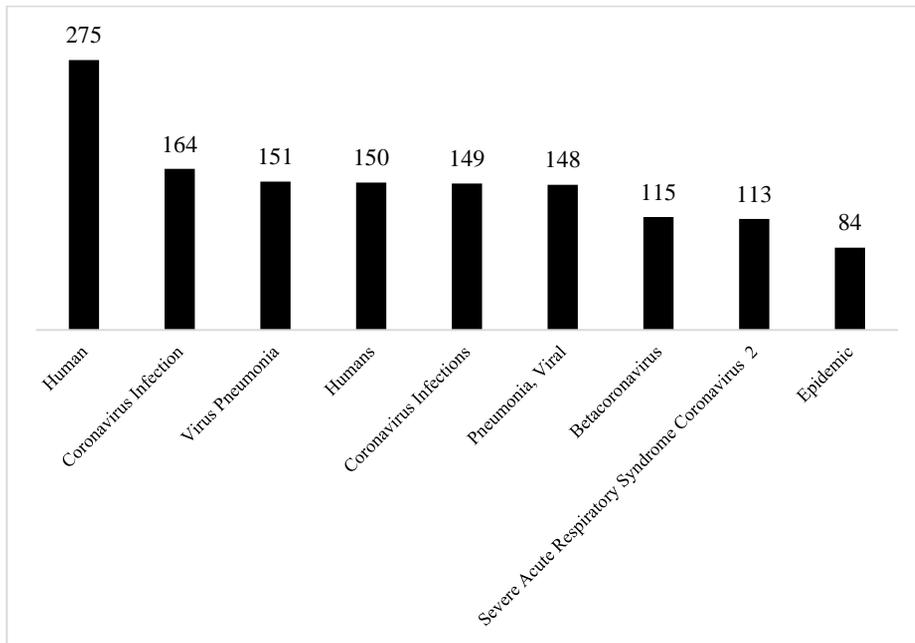


Figure 9. Ten Keywords with a higher incidence

For the selection of keywords, those with a clear reference to the research descriptor and place names were eliminated, being them COVID-19 (239), and China (96), Coronavirus (92), South Korea (12), Republic of Korea (9), Australia (7), Europe (7), Japan (6), Hubei (5), Italy (5), Taiwan (4), Thailand (4), Korea (4), Singapore (4) and Nigeria (2).

3.7. Presentation of the 20 most cited articles and scientific gaps

The 20 articles with the highest citation numbers were selected, according to Table 1. Altogether they all present a quantity of 1,448 notes, resulting in an average of 72.4 citations per article.

The gaps indicated by each of the 20 most cited publications in Scopus concerning COVID-19 were verified. In this way, it was possible to verify which are the relevant issues being dealt with at this moment. Then, the gaps grouped in the form of research trends. These observations of the publications, from the first three months that have emerged during the expansion of COVID-19, provide an understanding of the priorities that the scientific media have been dedicating to in that period. It should be noted that each of these groups should be further explored in the coming days, considering the large number of publications observed in the early stages of this disease.

According to Table 2, the grouping of the gaps in the articles follows, according to the similarity presented by each study.

Table 1. Scientific gaps in the Covid-19 theme

#	Title	Author	Journal / citation	Scientific gap
1	Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China	Huang C. et al.	The Lancet - 282	Understand the origin, epidemiology, duration of human transmission and clinical spectrum of COVID-19
2	A novel coronavirus from patients with pneumonia in China, 2019	Zhu N. et al.	New England Journal of Medicine - 198	Develop accurate and rapid methods to identify unknown respiratory pathogens
3	Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study	Chen N. et al.	The Lancet - 153	Better relate the history of patients with more gravities to pre-existing diseases
4	A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster	Chan J.F.-W. et al.	The Lancet - 145	Improve health measures to contain epidemics more efficiently
5	A pneumonia outbreak associated with a new coronavirus of probable bat origin	Zhou P. et al.	Nature - 116	enforce strict regulations against domestication and consumption of wildlife
6	Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding	Lu R. et al.	The Lancet - 111	Determine the biological reservoir of animals and its possible hosts
7	First case of 2019 novel coronavirus in the United States	Holshue M.L. et al.	New England Journal of Medicine - 78	Improve understanding of the clinical spectrum of COVID-19 infection
8	A new coronavirus associated with human respiratory disease in China	Wu F. et al.	Nature - 42	To more accurately identify the origin of the COVID-19 virus that infected humans
9	Characteristics of and Important Lessons from the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72314 Cases from the Chinese Center for Disease Control and Prevention	Wu Z. e McGoogan J.M.	JAMA - Journal of the American Medical Association - 42	To seek a more accelerated scientific development that is ahead of the spread of the COVID-19 virus
10	Receptor Recognition by the Novel Coronavirus from Wuhan: an Analysis Based on Decade-Long Structural Studies of SARS Coronavirus	Wan Y. et al.	Journal of Virology - 35	Identify the possible animal origins of COVID-19 based on the sequences of its proteins and atomic structures

Table 1. Scientific gaps in the Covid-19 theme (continued)

#	Title	Author	Journal / citation	Scientific gap
11	Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records	Chen H. et al.	The Lancet - 34	Check-in detail the possibility of pregnant women with COVID-19 infection exposing babies to the disease
12	Cross-species transmission of the newly identified coronavirus 2019-nCoV	Ji W. et al.	Journal of Medical Virology - 31	Identify how viruses may evolve when transmitted to other species
13	A novel coronavirus emerging in China - Key questions for impact assessment	Munster V.J. et al.	New England Journal of Medicine - 31	Use plasma and antibodies obtained from convalescent patients for further studies of possible cures for COVID-19
14	Emerging coronaviruses: Genome structure, replication, and pathogenesis	Chen Y., Liu Q. e Guo D.	Journal of Medical Virology - 30	Prepare animal markets and other facilities to contain epidemics such as COVID-19
15	Genomic characterization of the 2019 novel human-pathogenic coronavirus isolated from a patient with atypical pneumonia after visiting Wuhan	Chan J.F.-W. et al.	Emerging Microbes and Infections - 28	Analyze a more significant sample of animals to determine their natural biological reservoir and intermediate animal host with potential viral transmissibility
16	CT imaging features of 2019 novel coronavirus (2019-nCoV)	Chung M. et al.	Radiology - 25	Analyze how patients with parenchymal lung disease due to COVID-19 evolve after treatment
17	Pathological findings of Covid-19 associated with acute respiratory distress syndrome	Xu Z. et al.	The Lancet Respiratory Medicine - 19	Carry out studies to protect elderly people who have contracted the COVID-19 virus
18	Updated understanding of the outbreak of 2019 novel coronavirus (2019-nCoV) in Wuhan, China	Wang W., Tang J. e Wei F.	Journal of Medical Virology - 17	Use previous experiences in SARS and MERS treatments for the production of COVID-19 drugs and vaccines
19	Drug treatment options for the 2019-new coronavirus (2019-nCoV)	Lu H.	Bioscience trends - 17	To formulate therapeutic strategies for COVID-19 pneumonia to protect critically ill patients and reduce mortality.
20	Incubation period of 2019 novel coronavirus (2019-nCoV) infections among travellers from Wuhan, China, 20-28 January 2020	Backer J. et al.	European communicable disease bulletin - 14	Identify information on incubation periods of COVID-19 cases, with sampling that reflects the whole population

Table 2. Conceptual Map

Regulation of the wild animal market	Enforce strict regulations against domestication and consumption of wildlife Prepare animal markets and other facilities to contain epidemics such as COVID-19
Traceability of COVID-19	Understand the origin, epidemiology, duration of human transmission and clinical spectrum of COVID-19 Determine the biological reservoir of animals and its possible hosts Identify more precisely the origin of the COVID-19 virus that infected humans Identify the possible animal origins of COVID-19 based on the sequences of its proteins and atomic structures Identify how viruses may evolve when transmitted to other species Analyze a more significant sample of animals to determine their natural biological reservoir and intermediate animal host with potential viral transmissibility
Detection of COVID-19	Develop accurate and rapid methods to identify unknown respiratory pathogens Improve understanding of the clinical spectrum of COVID-19 infection
Prevention of COVID-19	Improve health measures to contain epidemics more efficiently To seek a more accelerated scientific development that is ahead of the spread of the COVID-19 virus Carry out studies aimed at protecting elderly people who have contracted the COVID-19 virus
Impacts of COVID-19 on patients	Better relate the history of patients with more gravities to pre-existing diseases Check-in detail the possibility of pregnant women with COVID-19 infection exposing babies to the disease Analyze how patients with parenchymal lung disease resulting from COVID-19 evolve after treatment Identify information on incubation periods of COVID-19 cases, with sampling reflecting the whole population
The proposition of vaccines, treatment, and cure of COVID-19	Use plasma and antibodies obtained from convalescent patients for further studies of possible cures for COVID-19 Using previous experiences in the treatment of SARS and MERS for the production of COVID-19 drugs and vaccines To formulate therapeutic strategies aimed at pneumonia arising from COVID-19 to protect critically ill patients and to reduce mortality

The first group of gaps identified relates to the importance of wild animal marketing regulations (Zhou et al., 2020). The initial episode of COVID-19 occurred in a humid market where slaughtered animals placed without proper sanitary conditions (Huang et al., 2020) while these sites are also responsible for increasing contact between humans and wild animals, which are virus reservoirs. From the evidence that the first contamination occurred from an animal to a human being, it becomes imperative to regulate this portal of disease transmission (Chan et al., 2020).

The second group of gaps prioritizes the traceability of COVID-19. The studies carried out up to this research include bats as the main reservoir and it is believed that there was a supposed transmitter to the new coronavirus before it was transmitted to humans (Chan et al., 2020). Since these wet markets market a wide range of animals, this makes it difficult to identify the intermediate host (Y. Chen, Liu, & Guo, 2020).

The third group of research gaps relates to disease detection efforts. The possibility of pleural fluid accumulation in a COVID-19-contaminated patient is significant and can occur significantly within just three days

(Zhou et al., 2020). Therefore, recognition of individuals who are contaminated should occur as soon as so that treatment measures can be taken in cases of worsening, isolation of patients affected by the new coronavirus and thus reduce the potential risk of transmission of the disease (Holshue et al., 2020).

The fourth group to be studied concerns the prevention of COVID-19. In this cluster, the protective measures to contain large-scale transmission and special protection for those belonging to risk groups, composed of depressed, elderly, diabetics and HIV carriers (Chan et al., 2020), fit. Studies show that the most affected environments with the coronavirus pandemic have been homes, with about 64% of the total contamination, and the rapid spread that COVID-19 has obtained in the hospital environment should not be overlooked (Lu, 2020). Strict measures are currently being taken almost everywhere to contain the proliferation of this pandemic (Chung et al., 2020) Governments must act rigorously to prevent unbridled spread (Wu & McGoogan, 2020).

The fifth cluster of gaps concerns the impacts of COVID-19 on infected patients who develop the most important forms of the disease. Symptoms can evolve rapidly in a certain portion of those infected, causing

fever, dry cough, breathing difficulties, headache, and pneumonia, leading to the patient dying with no response to supportive treatment (Zhou et al., 2020). Current studies indicate that the first symptoms of the new coronavirus may be presented in an average of 6.4 days; however, it is not prudent to disregard the 14 days as a time to carry the virus, especially for cases suspected of contact with infected people (Backer et al., 2020).

The sixth and last group of gaps aims at detecting the medications to mitigate or overcome the disease, to make it less lethal for cases requiring hospitalization. Several research centers seek to produce vaccines that can immunize the population to the new coronavirus, and these initiatives can be carried out based on the experiences obtained with Sarv-CoV and Bat-CoV (Munster et al., 2020; Wu & McGoogan, 2020). Another possibility that has been admitted among researchers is the use of plasma and antibodies from individuals who obtained the cure of COVID-19 (Y. Chen et al., 2020).

3.8. Correlation Matrix

As shown in Table 3, information was obtained from the main countries that published articles on COVID-19.

Table 3. Information from countries with higher H-Index in publications about COVID-19 (Adapted from Scopus, 2020; The World Bank, 2020 and World Health Organization, 2020)

Nº	Countries	H-Index	Publications	Citations	Infected (Covid-19) (2020)	Dead (Covid-19) (2020)	Population * Millions (2018)	GDP * Trillions (2018)
1	China	20	248	2824	82.758	4.632	1393,000	13,608
2	United States	10	161	376	665.330	30.384	326,687	20,544
3	United Kingdom	7	74	137	108.696	14.576	66,46	2,855
4	Canada	6	34	99	30.659	1.250	37,057	1,713
5	France	6	32	56	108.163	18.659	66,977	2,778
6	Germany	5	27	100	137.439	4.110	82,905	3,948
7	Italy	5	56	75	172.434	22.747	60,421	2,084
8	Taiwan	5	19	71	398	6	23,78	1,127
9	Netherlands	4	11	97	30.449	3.459	17,231	0,913
10	Hong Kong	4	73	47	1.024	4	7,451	0,362

Table 3. Information from countries with higher H-Index in publications about COVID-19 (Adapted from Scopus, 2020; The World Bank, 2020 and World Health Organization, 2020)

Nº	Countries	H-Index	Publications	Citations	Infected (Covid-19) (2020)	Dead (Covid-19) (2020)	Population * Millions (2018)	GDP * Trillions (2018)
11	Saudi Arabia	4	16	37	7.142	87	33,699	0,786
12	India	4	32	27	14.378	480	1353	2,719
13	Australia	3	27	285	6.533	67	24,982	1,434
14	Switzerland	3	13	63	26.997	1.058	8,513	0,705
15	South Korea	3	28	49	10.653	232	51,606	1,619
16	Sweden	3	16	38	13.216	1400	10,175	0,556
17	Singapore	3	21	27	5.050	11	5,638	0,364
18	Japan	3	14	21	9.795	154	126,529	4,971
19	Spain	2	13	10	188.068	19.478	46,796	1,419
20	Denmark	2	8	10	7.073	336	5,793	0,355

The countries present, with their number of H-Index in descending order, are China (17), United States (8), United Kingdom (6), Canada (5), Germany (5), France (4), Netherlands (4), Italy (3), Sweden (3), Taiwan (3), Hong Kong (3), Switzerland (3), Saudi Arabia (3), South Korea (2), Australia (2), Singapore (1), Japan (1), India (1), Spain (1) and Denmark (1). The criteria for the tie-breaker was the number of publications and then the number of citations obtained by each country.

For the composition of the correlation matrix, according to Table 4, the following criteria

were taken into account: (1) H-Index of countries regarding publications on COVID-19 by April 18 of that year; (2) number of publications by April 18; (3) number of citations by April 18; (4) number of official COVID-19 infected's, with information obtained by WHO by April 18; (5) number of deaths by COVID-19, according to WHO, by 18 April; (6) total population of each of the countries according to World Bank data for 2018; (7) gross domestic product of each of the countries according to World Bank data for 2018. COVID-19.

Table 4. Correlation Matrix (Adapted from Scopus, 2020; The World Bank, 2020 and World Health Organization, 2020)

	H-Index	Publications	Citations	Infected (Covid-19)	Dead (Covid-19)	Population	GDP
H-Index	1						
Publications	0,9424	1					
Citations	0,9170	0,8589	1				
Infected (Covid-19)	0,3500	0,4945	0,1038	1			
Dead (Covid-19)	0,2654	0,3622	0,0281	0,8411	1		
Population	0,6534	0,6257	0,6830	0,0823	-0,0141	1	
GDP	0,7400	0,8223	0,5755	0,8059	0,5382	0,4837	1

Correlation coefficients, using observations 1 - 20
5% critical value (two-tailed) = 0,4438 for n = 20

It is verified after the application of the correlation matrix that the most correlated data were between the number of H-Index and the amount of publication performed by the sampling of the 20 countries. Then it is observed the strong correlation between several publications and citations and, in third, the correlation between H-Index and citations.

After these identifications, starting now for the analyses concerning COVID-19, the one that presents a higher percentage is that of infected numbers with the number of contaminated, with the index of 0.8411. Next, the relationship of COVID-19 infected with the GDP of nations, with the index of 0.8059. It can also be verified that there is a correlation between COVID-19 deaths with the wealth of the countries and mainly, to answer one of the objectives of the article, that there is a correlation between the infected and the production of works directed to the pandemic, with the respective indexes of 0.5382 and 0.4945. Although the indices are not high, it can be noted that there is a correlation between the data set analyzed.

There is a very low correlation between the number of COVID-19 deaths and the number of publications (0.3622), and there is no correlation with COVID-19 infections and the number of citations (0.1713). The number of inhabitants also does not correlate with the number of infected (0.0865) and the number of deaths by COVID-19 (-0.0327).

4. Conclusion

The objectives of this survey were duly achieved. The main countries, authors, journals, institutions, and keywords were first identified. Then, we analyzed the research opportunities described in the most cited articles in the first quarter of 2020, planning the main trends about COVID-19 soon for the next days. It was found that there is a moderate correlation that may attest to the higher number of studies among the countries with the most diagnosed cases of COVID-19.

The main contributions of this study were the transmission of this study were the transmission of relevant information about a new block of scientific knowledge, COVID-19, which may serve as a basis for future studies related to the theme in the most varied areas of knowledge.

The scientific contribution of this study was the transmission of relevant and inherent themes to COVID-19 highlighting a new block of scientific knowledge. Most of the studies are linked to a language directed to doctors and health professionals since 80% more of the studies conducted so far seek to study the action of drugs that can be used as prevention, treatment, cure or immunization, which correspond to the desires of our entire population. But we believe that there is the importance of transmitting this scenario to the scientific community that encompasses other areas, since the slowdown that is being verified in economic activity in recent months will impact several other areas of knowledge, such as business, education, public policies, law, etc., also leading to many other research opportunities.

The applied contribution of this article is directed at the opportunities that research trends signal, for example, the concerns arising from the prevention of the disease, are fundamental to be reported to those involved in public security, since they play strategic roles in the guidelines of actions that may contain the population of circulation in public environments. The needs for the proposals of cure and vaccine show the need to open ways for the technical-scientific community to organize its supply chain more locally, to reduce the external dependence. These solutions are necessary because countries are focused on their demands to fight the epidemic, leading the logic of cooperation and trade between countries to be suppressed for their own "survival" interests.

A high correlation between those infected by COVID-19 and GDP was observed in the studies. This information may suggest that the economically richer countries may present a

part of their population more prone to international travel, a fact that may have contributed to the spread of the virus in their respective regions.

As suggestions for future studies, a new mapping is recommended when the pandemic has reached six months, because of the changes are likely to occur to fill gaps, such as the participation of other areas of study in the development of solutions to humanitarian crises that can be triggered by economic recessions. Case studies on the measures that private companies and public institutions

have adopted in the current crisis are also recommended, to serve as a reference for future problems that humanity may have. What is intended is to improve the quality of life for all the inhabitants of the planet.

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