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Research Trends on Coronavirus (Covid-19) : A Bibliometric Analysis between 2010– March,2020.

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Abstract

Coronavirus is a respiratory syndrome, a virus causing stern pneumonia in humans. The results of the Pandemic virus is a high mortality, respiratory infections including common cold, high fever etc. The main objective of the study is to explore the publications trends of Coronavirus research by using R-Studio. Scopus database has been used to extract the bibliographic metadata of the publication between 2010 and April, 2020. A total of 10515 documents were published across the globe on Coronavirus (Covid-19) during the assessment period under consideration. The result of the current study suggests that the earlier outbreak of Coronavirus were understudied. It also observed that; the research volume of the disease, which emerges after an outbreak, is very high and very little on disease prevention. This may receive insufficient research and limited investment in obtaining a complete understanding of coronavirus management and prevention. The United State of America appeared as highest contributor and University of Honk Kong appeared as most productive affiliation during the study. The outcome of the current pandemic (COVID-19) outbreak, we believe that there should be an emphasis in the field of enticements on coronavirus research

Keywords: Coronavirus, Covid-19, R-studio, Bibliometrics

Introduction

Coronavirus (Covid-19) is an aggressive virus and new addition of (SARS CoV-2) Severe Acute Respiratory Syndrome, a zoonotic disease of viral pneumonia in human cause's high mortality and similarity clinical symptom of SARS-1. It is a common disease between humans and animals which is enveloped, non-segmented and has positive sense single standard RNA virus (Danesh & Ghavidel, 2020) and the fatality rate is very high. This virus first appeared in China in 2003 (Swine flu, SARS-CoV), subsequently in 2012 (MERS-CoV) in the Middle East, and 2013-2014 appeared in Africa (Ebola).(Kagan, Moran-Gilad, & Fire, 2020)More than 10,000 cumulative cases with mortality rates of (10%, SARC-CoV), 37% (MERS-CoV) in the past two decades.(Bonilla-Aldana, Holguin-Rivera, et al., 2020)The Present virus (Covid-19) recognised in Huan Seafood Market, South Huan, China(Tang, Tambyah, & Hui, 2020). (Bonilla-Aldana, Holguin-Rivera, et al., 2020)This pandemic syndrome results more than, 2544792 effected and around 175694 death till April,24.2020(Practice, 2020). The World Health Organisation (WHO) has considered and included coronavirus in Blueprint List of priority diseases in 2018. Currently the whole World has suffering from the epidemic outbreak. WHO declared the virus to be pandemic as a Public Health Emergency of International Concern on January 3, 2020.(Bonilla-Aldana, Holguin-Rivera, et al., 2020)(Bonilla-Aldana, Quintero-Rada, et al., 2020)

The rapid growth of academic publications becomes unfeasible to exist with what is being publishing. However, the prominence on pragmatic contribution has caused in voluminous and fragmented research streams.(Aria & Cuccurullo, 2017). The use of bibliometrics has been extended to all disciplines, bibliometric analysis is complex because it entails several steps that employ numerous and diverse analyses and mapping software tools, which are frequently available only under commercial licenses. In this research assessment has carried out through R-Studio a unique tool, developed in the R language utilised to analyze the data,. It is comprehensive open-source bibliometric tools, follows a classic logical bibliometric workflow that we reconstruct. It provides a wide variety of statistical and graphical techniques and is highly extensible (Matloff, 2011). The bibliographic assessment pattern like publication trends, most country publication, most author affiliation, author impact, the most productive title has been analysed. Hence, this bibliometric analysis makes a bossy impact to the researchers interested in the field of Coronavirus and allied research, as it outlines the research trends, determined the most relevant research areas to be taken into consideration in future endeavour. Therefore, it will be useful for the researcher to determine the relevant field of research in Coronavirus and allied research that focuses on the large scale gaps that must be addressed.

Objective of the study

This study is focused on accomplishing the following objectives:

1. Examine the scientific productivity on all Coronavirus related research articles cited in the Scopus database.
2. Determine the most productive authors, institutions, countries an in the field of Coronavirus research.
3. Identify the core journals publishing articles on Coronavirus research related trends.

Methodology

The methodology applied in this study is based on bibliometric techniques that allow the robust analysis of “Coronavirus Research” publications at different stages. The pragmatic methods depend on the number of publications in the area, that were chosen based on two keywords ‘Coronavirus’ and ‘COVID-19’ in the title of papers. The bibliographic information for the present study was derived from the Scopus database during the period from 2010 to 31st March 2020. Various bibliometric approaches have been used to ascertain the publications of Coronavirus research by using R-Studio statistical tool. A total of 10,515 documents have been extracted during this study using different bibliometric indicator i.e annual research trend, most productive country, affiliation, author, author impact, and most productive Journal.

Research trends in Coronavirus

During the study, a total of 10515 publications were recorded in the Scopus Database on Coronavirus research. Highest 7294 articles recorded in the shape of Article followed by, 1231 reviews, Notes 524, Letters 519, Editorials 487, Book chapters 177, Short Surveys 135, Conference papers 79, Erratum 56, Books 5, Conference Review 4, Articles in press 2 and Data paper 2 appeared on Coronavirus research between 2010 and March 2020.

The publications retrieved in 2020 were partial as the publications were retrieved until March 2020. The growth of research publications on Coronavirus was appeared to be uneven

/volatile. In the first three years, i.e., 2010-2012 witnessed (562, 517, and 577 respectively) little immobile, then suddenly increased significantly during 2013-2015 (809, 839, and 1,004 respectively) and kept on a decline during 2016-2017 (918, 830). A sudden spurt in publication happened in 2018 with 1,618 followed by shrinkage during 2019 with 814 publications and escalated to 1,927 publications till March 2020.

Publications types

Publication type
Table-1

| Sl.No | Document Type | Total |
|-------|-------------------|--------------|
| 1 | Article | 7294 |
| 2 | Article in press | 2 |
| 3 | Book | 5 |
| 4 | Book chapter | 177 |
| 5 | Conference paper | 79 |
| 6 | Conference review | 4 |
| 7 | Data paper | 2 |
| 8 | Editorial | 487 |
| 9 | Erratum | 56 |
| 10 | Letter | 519 |
| 11 | Note | 524 |
| 12 | Review | 1231 |
| 13 | Short survey | 135 |
| | Total | 10515 |

Publications on Coronavirus, 2010-2020

Table-2

| Year of Publication | TP | TC | CPP |
|---------------------|--------------|---------------|---------------|
| 2010 | 562 | 15079 | 26.83 |
| 2011 | 517 | 15239 | 29.48 |
| 2012 | 577 | 17807 | 30.86 |
| 2013 | 809 | 23254 | 28.74 |
| 2014 | 939 | 22899 | 24.39 |
| 2015 | 1004 | 16318 | 16.25 |
| 2016 | 918 | 11672 | 12.71 |
| 2017 | 830 | 6876 | 8.28 |
| 2018 | 1618 | 8052 | 4.98 |
| 2019 | 814 | 1525 | 1.87 |
| 2020 (March) | 1927 | 5356 | 2.78 |
| Total | 10515 | 144077 | 187.18 |

Average Citation 18.17

TP# Total papers; TC# Total Citations; CPP# Citations per paper

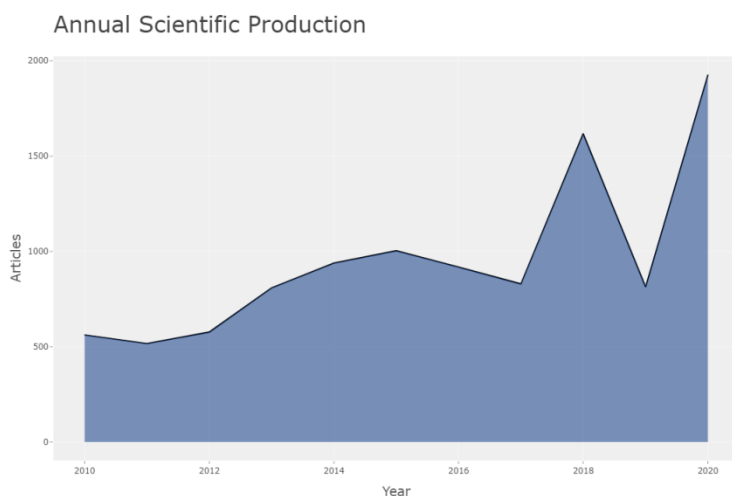


Fig: 1 Annual Scientific Production

Further, table-2 reveals a total of 10515 publications and 144077 citations have received on Coronavirus (COVID-19) research in 10.3 years averaged to 18.17 citations per publication (CPP) between 2010 and March 2020). The highest publications were calculated from 2020 till March with TP- 1927, TC- 1525, and CPP is 1.87. Similarly, the highest citations received during 2013 (TC, 23254) from 809 publication with 28.74 average citations per year.

Country Scientific Production

Table-3 presents the research publications on Coronavirus by top 20 most productive countries between 2010 and March 2020. The United States tops the list with number one position by contributing (4,059) highest no. of number publications and highest citations (18,545) with citation per publication of 4.57 with an average per citation being 23.27. China contributed 3,838 publications with 8,546 citations and ranked second followed by the Netherlands with a contribution of 976 publications along with 5,692 citations, ranked third.

Similarly, in terms of country collaboration, again the United States has the highest number of country's collaborated papers (797) with a frequency ratio of 0.211687 ranked amongst the top, in the top 20 countries. It has contributed 612 single country publications and 185 multi-authored publications with the MCP ratio 0.232. Followed by United Kingdom (TP=688, F=0.182736, SCP=554, MCP=134, MCPR=0.195) appeared as the second position and Korea (TP=294, F=0.078088, SCP=255, MCP=39, MCPR=0.133) appeared as the third position on Coronavirus research between 2010 and March 2020 (Table-4).

**Top 20 most productive Country
Table-3**

| SL.No | Country | TP | TPR | TC | CR | CPP | APC |
|-------|---------|------|-----|-------|----|------|-------|
| 1 | USA | 4059 | 1 | 18545 | 1 | 4.57 | 23.27 |

| | | | | | | | |
|----|----------------|------|----|------|----|------|-------|
| 2 | China | 3838 | 2 | 8546 | 2 | 2.23 | 12.42 |
| 3 | Netherlands | 976 | 3 | 5692 | 3 | 5.83 | 59.92 |
| 4 | Germany | 924 | 4 | 4154 | 4 | 4.50 | 26.80 |
| 5 | United Kingdom | 874 | 5 | 2875 | 5 | 3.29 | 15.88 |
| 6 | Saudi Arabia | 771 | 6 | 2596 | 6 | 3.37 | 22.38 |
| 7 | Korea | 642 | 7 | 2452 | 7 | 3.82 | 8.34 |
| 8 | Hong Kong | 548 | 8 | 1705 | 8 | 3.11 | 21.05 |
| 9 | Switzerland | 494 | 9 | 1663 | 9 | 3.37 | 25.59 |
| 10 | France | 491 | 10 | 1621 | 10 | 3.30 | 14.60 |
| 11 | Canada | 485 | 11 | 1528 | 11 | 3.15 | 15.28 |
| 12 | Spain | 449 | 12 | 1375 | 12 | 3.06 | 19.93 |
| 13 | Japan | 318 | 13 | 1245 | 13 | 3.92 | 11.22 |
| 14 | Italy | 314 | 14 | 1054 | 14 | 3.36 | 9.09 |
| 15 | Australia | 306 | 15 | 949 | 15 | 3.10 | 17.91 |
| 16 | Finland | 306 | 16 | 785 | 16 | 2.57 | 43.61 |
| 17 | Taiwan | 303 | 17 | 537 | 17 | 1.77 | 6.97 |
| 18 | Brazil | 224 | 18 | 521 | 18 | 2.33 | 6.68 |
| 19 | Sweden | 201 | 19 | 467 | 19 | 2.32 | 12.29 |
| 20 | India | 156 | 20 | 393 | 20 | 2.52 | 6.90 |

Note: TP# Total Publication, TPR# Total Publication Rank, TC# Total Citation, TCR# Citations ranking, APC# Average per Citation

Country Scientific Production

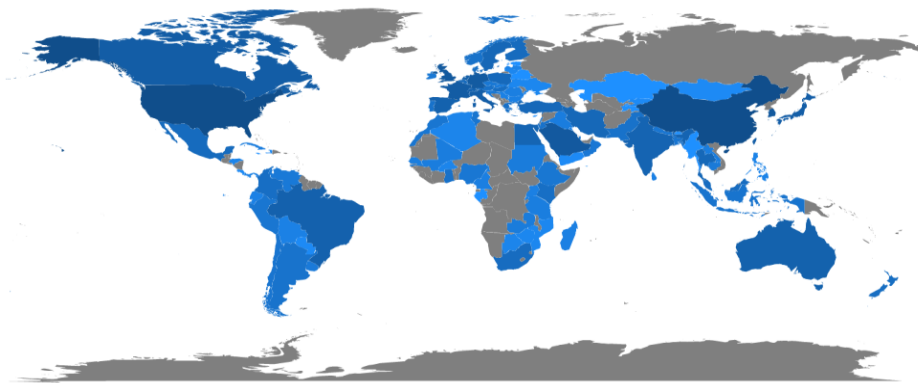


Fig:2 Country Scientific Production

Top 20 Corresponding Author Country

Table-4

| Country | TP | Freq | SCP | MCP | MCP_Ratio |
|---------|-----|----------|-----|-----|-----------|
| USA | 797 | 0.211687 | 612 | 185 | 0.232 |
| China | 688 | 0.182736 | 554 | 134 | 0.195 |

| | | | | | |
|----------------|-----|----------|-----|----|-------|
| Korea | 294 | 0.078088 | 255 | 39 | 0.133 |
| United Kingdom | 181 | 0.048074 | 127 | 54 | 0.298 |
| Germany | 155 | 0.041169 | 91 | 64 | 0.413 |
| Italy | 116 | 0.03081 | 89 | 27 | 0.233 |
| Saudi Arabia | 116 | 0.03081 | 45 | 71 | 0.612 |
| France | 111 | 0.029482 | 76 | 35 | 0.315 |
| Japan | 111 | 0.029482 | 87 | 24 | 0.216 |
| Canada | 100 | 0.02656 | 62 | 38 | 0.38 |
| Netherlands | 95 | 0.025232 | 51 | 44 | 0.463 |
| Hong Kong | 81 | 0.021514 | 55 | 26 | 0.321 |
| Brazil | 78 | 0.020717 | 66 | 12 | 0.154 |
| Taiwan | 77 | 0.020452 | 58 | 19 | 0.247 |
| Spain | 69 | 0.018327 | 45 | 24 | 0.348 |
| Switzerland | 65 | 0.017264 | 31 | 34 | 0.523 |
| Singapore | 62 | 0.016467 | 44 | 18 | 0.29 |
| India | 57 | 0.015139 | 45 | 12 | 0.211 |
| Australia | 53 | 0.014077 | 33 | 20 | 0.377 |
| Sweden | 38 | 0.010093 | 27 | 11 | 0.289 |

Note: TP# Total Publication, SP# Single Country Publication, MCP# Multi Country Publication

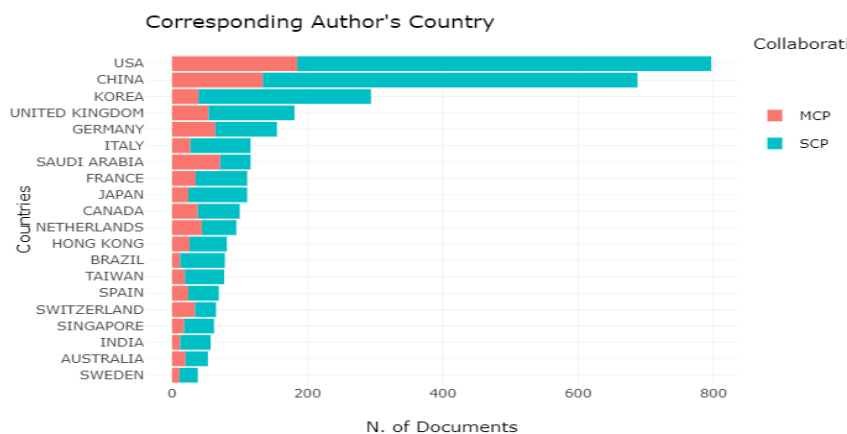


Fig-3: Most corresponding author's country

Most Relevant author affiliation

The University of Hong Kong produced the highest number of publications with (314) articles and highest (19190) citations on Coronavirus research from 2010 to March 2020 and ranked first position among all the top ten affiliations. The University of California received the second position with total 195 publications, 11024 citations followed by National Institute of Allergy and Infectious Diseases with 120 publications and 9540 citations on Coronavirus research during the period the said period as presented in table-5.

Top 10 most relevant author affiliation
Table-5

| Sl.No | Affiliations | TP | TC | CPP | TCR |
|-------|---|-----|-------|-------|-----|
| 1 | The University of Hong Kong | 314 | 19190 | 61.11 | 1 |
| 2 | University of California | 195 | 11024 | 56.53 | 1 |
| 3 | National Institute of Allergy And Infectious Diseases | 120 | 9540 | 79.50 | 1 |
| 4 | Fudan University | 98 | 7854 | 80.14 | 1 |
| 5 | Wuhan University | 91 | 7987 | 87.77 | 1 |
| 6 | Utrecht University | 88 | 7945 | 90.28 | 1 |
| 7 | Huazhong University of Science And Technology | 87 | 6325 | 72.70 | 1 |
| 8 | University of Iowa | 87 | 4586 | 52.71 | 1 |
| 9 | Zhejiang University | 86 | 4253 | 49.45 | 1 |
| 10 | University of Washington | 84 | 4158 | 49.50 | 1 |

Author dominance

**Author dominance Factor
Table-6**

| Sl.No | Author | Author Affiliation | Dominance factor | TA | SA | MA | FA | RA | RDF |
|-------|--------------|---|------------------|-----|----|-----|----|----|-----|
| 1 | Al-Tawfiq Ja | Saudi Aramco Medical Services Organization, Dhahran, Saudi Arabia | 0.45977011 | 90 | 3 | 87 | 40 | 2 | 1 |
| 2 | Chen Y | State Key Laboratory of Virology, College of Life Sciences, Wuhan University, Wuhan, China | 0.19642857 | 112 | 0 | 112 | 22 | 13 | 2 |
| 3 | Memish Za | Preventive Medicine Directorate, Ministry of Health, Alfaisal University, Riyadh, Saudi Arabia | 0.19310345 | 149 | 4 | 145 | 28 | 19 | 3 |
| 4 | Wang L | Vaccine Research Center, National Institute of Allergy and Infectious Diseases, United States | 0.18888889 | 90 | 0 | 90 | 17 | 2 | 4 |
| 5 | Wang J | Infection Disease Department, Wuhan Jinyintan Hospital, Wuhan, China | 0.18644068 | 118 | 0 | 118 | 22 | 14 | 5 |
| 6 | Li X | State Key Laboratory of Biocontrol, School of Life Sciences, Sun Yat-sen University, Guangzhou, China | 0.15625 | 96 | 0 | 96 | 15 | 6 | 6 |
| 7 | Liu Y | The Office of Drug Clinical Trial Institution, Wuhan Jinyintan Hospital, Wuhan, China | 0.13636364 | 88 | 0 | 88 | 12 | 1 | 7 |

| | | | | | | | | | |
|----|-----------|--|------------|-----|---|-----|----|----|----|
| 8 | Chen J | Chen, J., Division of Swine Infectious Diseases, Nangang District, Harbin, 150001, China | 0.13541667 | 98 | 2 | 96 | 13 | 7 | 8 |
| 9 | Wang X | Animal Influenza Laboratory of the Ministry of Agriculture, Harbin, China | 0.13207547 | 106 | 0 | 106 | 14 | 10 | 9 |
| 10 | Jiang S | Lindsley F Kimball Research Institute, New York Blood Center, New York, NY, United States | 0.13043478 | 95 | 3 | 92 | 12 | 5 | 10 |
| 11 | Li Y | Department of Microbiology, Perelman School of Medicine, University of Pennsylvania | 0.12582781 | 151 | 0 | 151 | 19 | 20 | 11 |
| 12 | Zhang J | Department of Veterinary Diagnostic and Production Animal Medicine, College of Veterinary Medicine, Iowa State University | 0.125 | 129 | 1 | 128 | 16 | 15 | 12 |
| 13 | Li J | Departments of Microbiology and Immunology, University of Arkansas for Medical Sciences, United States | 0.12264151 | 106 | 0 | 106 | 13 | 10 | 13 |
| 14 | Wang H | Engineering and Technology Research Center of Traditional Chinese Veterinary Medicine of Gansu Province, Lanzhou, Gansu, China | 0.11764706 | 102 | 0 | 102 | 12 | 9 | 14 |
| 15 | Wang Y | Laboratory of Wildlife Epidemic Diseases, East China Normal University, Shanghai China | 0.1056338 | 142 | 0 | 142 | 15 | 18 | 15 |
| 16 | Zhao J | Zhao, J., College of Animal Science and Veterinary Medicine, Henan Agricultural University, Zhengzhou, Henan , China | 0.10204082 | 98 | 0 | 98 | 10 | 7 | 16 |
| 17 | Zhang Y | State Key Laboratory of Biocontrol, School of Life Sciences, Sun Yat-sen University, Guangzhou, 510006, China | 0.09929078 | 141 | 0 | 141 | 14 | 17 | 17 |
| 18 | Perlman S | Department of Microbiology, University of Iowa, Iowa City, IA 52242, United States | 0.05660377 | 109 | 3 | 106 | 6 | 12 | 18 |
| 19 | Drosten C | Drosten, C., Institute of Virology, University of Bonn Medical Centre, Bonn, | 0.03007519 | 135 | 2 | 133 | 4 | 16 | 19 |

| | | | | | | | | | |
|----|----------|--|-----------|----|---|----|---|---|----|
| | | Germany | | | | | | | |
| 20 | Yuen K Y | The University of Hong Kong, University Pathology Building, Queen Mary Hospital, Hong Kong, China | 0.0106383 | 94 | 0 | 94 | 1 | 4 | 20 |

TA# Total article, SA# Single article, MA# Multi author, AR# author rank, DF# Dominance factor ranking

Most productive author

Top 20 most author with publications and h index

Table-6

| SL.No | Author | Author Affiliation | NP | TC | TCR | hi | gi | mi | hR | PY |
|-------|-----------|---|-----|------|-----|----|----|-----------|----|------|
| 1 | Li Y | Department of Microbiology, Perelman School of Medicine, University of Pennsylvania | 149 | 2171 | 11 | 21 | 42 | 1.9090909 | 11 | 2010 |
| 2 | Memish ZA | Preventive Medicine Directorate, Ministry of Health, AlFaisal University, Riyadh, Saudi Arabia | 149 | 6173 | 2 | 37 | 76 | 4.7777778 | 3 | 2012 |
| 3 | Wang Y | Laboratory of Wildlife Epidemic Diseases, East China Normal University, Shanghai China | 138 | 2428 | 9 | 19 | 46 | 1.7272727 | 14 | 2010 |
| 4 | Zhang Y | Department of Veterinary Diagnostic and Production Animal Medicine, College of Veterinary Medicine, Iowa State University, Institute of Virology, | 140 | 2845 | 7 | 28 | 51 | 2.5454545 | 7 | 2010 |
| 5 | Drosten C | University of Bonn Medical Centre, Bonn, Germany | 134 | 7399 | 1 | 46 | 84 | 4.1818182 | 1 | 2010 |
| 6 | Na Na | | 131 | 327 | 20 | 8 | 17 | 0.7272727 | 20 | 2010 |
| 7 | Zhang J | Department of Veterinary Diagnostic and Production Animal Medicine, College of Veterinary Medicine, Iowa State University | 124 | 2054 | 12 | 24 | 41 | 2.1818182 | 10 | 2010 |
| 8 | Baric RS | Department of | 122 | 4100 | 3 | 38 | 61 | 3.4545455 | 2 | 2010 |

| | | | | | | | | | | |
|----|-----------|--|-----|------|----|----|----|-----------|----|------|
| 9 | Wang J | Immunology, University of North Carolina at Chapel Hill, United States Infection Disease Department, Wuhan Jinyintan Hospital, Wuhan, China | 112 | 2348 | 10 | 21 | 46 | 1.9090909 | 12 | 2010 |
| 10 | Chen Y | State Key Laboratory of Virology, College of Life Sciences, Wuhan University, Wuhan, China | 112 | 1428 | 18 | 19 | 33 | 1.7272727 | 15 | 2010 |
| 11 | Perlman S | Department of Microbiology, University of Iowa, Iowa City, IA , United States | 109 | 3134 | 6 | 32 | 52 | 2.9090909 | 5 | 2010 |
| 12 | Li J | Departments of Microbiology and Immunology, University of Arkansas for Medical Sciences, United States | 101 | 2014 | 13 | 19 | 43 | 1.7272727 | 16 | 2010 |
| 13 | Wang X | Animal Influenza Laboratory of the Ministry of Agriculture, Harbin, China | 105 | 1947 | 15 | 20 | 41 | 1.8181818 | 13 | 2010 |
| 14 | Wang H | Engineering and Technology Research Center of Traditional Chinese Veterinary Medicine of Gansu Province, Lanzhou, Gansu, China | 98 | 617 | 19 | 12 | 19 | 1.0909091 | 19 | 2010 |
| 15 | Chen J | Chen, J., Division of Swine Infectious Diseases, Nangang District, Harbin, China | 98 | 1773 | 16 | 19 | 40 | 1.7272727 | 17 | 2010 |
| 16 | Zhao J | Zhao, J., College of Animal Science and Veterinary Medicine, Henan Agricultural University, Zhengzhou, Henan , China | 84 | 2500 | 8 | 26 | 48 | 2.3636364 | 8 | 2010 |
| 17 | Li X | State Key Laboratory of Biocontrol, School of Life Sciences, Sun Yat-sen University, Guangzhou , China | 95 | 1450 | 17 | 15 | 36 | 1.3636364 | 18 | 2010 |

| | | | | | | | | | | |
|-------|-----------------|---|------|-------|----|----|----|-----------|---|------|
| 18 | Jiang S | Lindsley F Kimball Research Institute, New York Blood Center, New York, NY, United States | 95 | 2005 | 14 | 26 | 41 | 2.3636364 | 9 | 2010 |
| 19 | Yuen KY | The University of Hong Kong, University Pathology Building, Queen Mary Hospital, Hong Kong, China | 94 | 3757 | 4 | 34 | 60 | 3.0909091 | 4 | 2010 |
| 20 | Al-Tawfiq JA | Saudi Aramco Medical Services Organization, Dhahran, Saudi Arabia | 90 | 3376 | 5 | 30 | 57 | 3.0909091 | 6 | 2012 |
| Total | | | 2280 | 53846 | | | | | | |

The author dominance factor is a ratio indicating the fraction of multi-authored publications where the author appears as first author (Aria, M. & Cuccurullo, C., 2017). Table-6 depicts Al Tawfiqja from Saudi Aramco Medical Services Organization, Dhahran, Saudi Arabia dominates their research group as he ranked first (DF= 0.45977011, TA= 90, SA=3, MA=87, FA=40) followed by Chen, Y from State Key Laboratory of Virology, College of Life Sciences, Wuhan University, Wuhan, China (DF=0.19642857, Ta=112, SA=0, FA= 22) ranked second. Similarly, Memish ZA from Preventive Medicine Directorate, Ministry of Health, AlFaisal University, Riyadh, Saudi Arabia (DF= 0.19310345, TA= 149, SA=4, MA=145, FA=28) ranked as the third position.

Furthermore, a total of 2,280 publications with 53,846 citations received together by the top 20 most authors originated in table-6 in the field of Coronavirus during the period under consideration. In terms of total publication and their citations, Drosten C (TP= 135, TC=7399) from Institute of Virology, University of Bonn Medical Centre, Bonn, Germany secured the first rank followed by Memisha ZA (TP=149, TC=6173) from Preventive Medicine Directorate, Ministry of Health, AlFaisal University, Riyadh, Saudi Arabia and Baric RS (TP=122, TC=401) ranked second and third respectively. Similarly for metrics ranking, again Drosten C (hi= 46,gi=84, mi=4.1818182) ranked first followed by Baric RS (hi= 38, gi=84, mi=3.4545455) ranked second and Memish ZA (hi= 37, gi=76, mi=4.7777778) secured the third position.

Top 20 most Productive Journal
Table-7

| Sl.No | Source | NP | HI | GI | MI | TC | PS | Rank |
|-------|------------------------------|-----|----|----|-------|-------|------|------|
| 1 | Journal of Virology | 421 | 58 | 84 | 5.273 | 12408 | 2010 | 1 |
| 2 | Plos One | 255 | 35 | 48 | 3.182 | 4120 | 2010 | 2 |
| 3 | Viruses | 209 | 25 | 39 | 2.273 | 2423 | 2010 | 3 |
| 4 | Emerging Infectious Diseases | 168 | 44 | 74 | 4 | 6375 | 2010 | 4 |
| 5 | Journal of Medical Virology | 155 | 20 | 30 | 1.818 | 1255 | 2010 | 5 |
| 6 | Virology | 147 | 26 | 38 | 2.364 | 2133 | 2010 | 6 |
| 7 | Virus Research | 146 | 26 | 38 | 2.364 | 2251 | 2010 | 7 |
| 8 | The Lancet | 144 | 22 | 58 | 2.2 | 3472 | 2011 | 8 |
| 9 | Archives of Virology | 139 | 21 | 31 | 1.909 | 1555 | 2010 | 9 |

| | | | | | | | | |
|----|----------------------------------|-----|----|----|-------|------|------|----|
| 10 | Veterinary Microbiology | 134 | 23 | 34 | 2.091 | 1832 | 2010 | 10 |
| 11 | BMJ (Clinical Research Ed.) | 103 | 6 | 7 | 0.667 | 82 | 2012 | 11 |
| 12 | Journal of General Virology | 101 | 25 | 47 | 2.273 | 2448 | 2010 | 12 |
| 13 | Antiviral Research | 100 | 24 | 36 | 2.182 | 1738 | 2010 | 13 |
| 14 | Journal of Virological Methods | 98 | 16 | 24 | 1.455 | 968 | 2010 | 14 |
| 15 | Nature | 97 | 17 | 53 | 1.545 | 2811 | 2010 | 15 |
| 16 | Virology Journal | 96 | 19 | 32 | 1.727 | 1427 | 2010 | 16 |
| 17 | Scientific Reports | 90 | 15 | 23 | 1.875 | 898 | 2013 | 17 |
| 18 | Vaccine | 89 | 18 | 26 | 1.636 | 1054 | 2010 | 18 |
| 19 | BMC Veterinary Research | 85 | 16 | 25 | 1.778 | 831 | 2012 | 19 |
| 20 | Emerging Microbes and Infections | 85 | 12 | 17 | 1.333 | 539 | 2012 | 20 |

Table-7 depicts top 20 most productive journals in terms of total publication, citations and some indexing term from 2008 to March 2020. Journal of Virology considered as a most productive journal with 421 publications. The Journals H index is 54, G index, 84, M index, 5.273 and a total of 12408 citations received from 2010.

Discussion

The present study represents the bibliometric analysis using R-Studio based on 10,515 documents indexed on Scopus database. The analysis of sequential development of scientific outcome on Coronavirus depicts that, though SARCOV-1 was identified mostly two decades ago, the publications trends are uneven. The trends of scientific productions of the coronavirus research appear suddenly high after the outbreak occurred in December 2019 in Huanan City, China. When the outbreak becomes pandemic and spread to all over the world, the WHO prioritise this disease under the list of blueprint and accelerated the research. Therefore, the accomplishment of scientific output is being encouraged in the coming years. Out of 10,515 documents on Coronavirus research were considered for analysis, 26,557 authors contributed their research on Coronavirus Research. Out of which 756 appeared as the author of single-author documents, (25,801) multi-authored and (12,95) authors have recognised as single author document. LI Y, (151 papers) from Department of Microbiology, Perelman School of Medicine, University of Pennsylvania appeared as the most productive author in terms of document publication. However, he was ranked 20 (ad=0.12582781) lowest ranks appeared in the Table-6 in terms of author dominance because most of his publication is with multi-author. LIU Y (0.13636364) from Office of Drug Clinical Trial Institution, Wuhan Jinyintan Hospital, Wuhan, China, ranked first in the category of author dominance. Drosten C from Institute of Virology, University of Bonn Medical Centre, Bonn, Germany ranked top in the chart in both citation and h-index. He received 7,399 citations with h-index = 46, g-index= 84 and m-index = 4.1818182 till March, 2020.

The United State of America has played a significant role by contributing the highest number of papers (38.60%) on the Coronavirus research followed by China 3,838 (36.50%), and none of the other countries has contributed beyond 1,000 publications. Both USA and China has contributed more than 70% of total papers on Coronavirus research. Again USA has strong collaboration than China followed by Korea, United Kingdom, and Germany. These countries have strong collaboration in which more than 150 publications contributed to Coronavirus research. Remaining countries were fewer contributors with below 150 publications. Though USA is the topmost contributors of publications, the University of Hong Kong, China appeared as leading affiliation institution followed by University of

California, USA and the National Institute of Allergy and Infectious Diseases, USA. They contributed 6% of the total paper on Coronavirus research.

The Journal of Virology emerged as the maximum number of publications on Coronavirus research followed by PLoS One and Viruses. The characterization of Coronavirus disease is a zoonotic, viral and pneumonia in human cause's high mortality and similarity clinical symptom. Therefore, Vaccine development and related subjects mostly dealt with in the publication of Coronavirus research.

Conclusion

Coronavirus (Covid-19) has become global pandemic; the rate of fatalities has been increasing day by day at present almost all the country (213) suffers from this epidemic. The USA has been affected hardest by the pandemic in terms of the number of fatalities. The outcome of the study demonstrates the sanctity of the research output related to Coronavirus research. Though in 2010 the research output is stagnant, with little progress and suddenly it has been enhanced in 2013 due to the MERS-CoV appeared in the Middle East and in 2020 because of the current epidemic. The University of Hong Kong, China and the University of California, USA were found a majority of the contributor on Coronavirus research during the study. A huge degree of collaboration was appeared among inter-country and inter-content, like USA, China, Korea, UK etc., revealed that these developing countries work together to imbibe the current epidemic. The scientific literature on Coronavirus research (COVID-2019) was published across 1803 sources (Journal, Book, Conferences), quantitatively, 20 core journals have published approximately 27% of the publications on the Coronavirus research during the study. The initiatives of the World Health Organisation (WHO) to restrain the virus (COVID-19) are likely to enhance the scientific development of zoonotic infection. Though the occurrences of human infection have been spreading all over the world, countries from all over the world are in severe concern about the virus (COVID-19).

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