

Suicide and suicidal ideation in the times of the Covid-19 pandemic: A scientometric analysis

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ABSTRACT

Objectives: The article aims to explore the studies performed on suicide because of coronavirus disease 19 through a bibliometric analysis. A quantitative analysis of the topic furnishes data on the publication pattern, influential research journals, highly cited articles, productive countries and organizations, the authorship pattern, and the collaborative pattern between authors.

Methods: Data regarding the type of documents, most cited articles, influential research journals, contributions per country, and so on were extracted for the study from the Scopus database. Data analysis and visualization were performed through R-Studio and the VOSviewer application.

Results: A bibliometric analysis encompassing scientific contributions based on suicide or suicide-related ideation because of the coronavirus pandemic showed a total of 494 documents published in 230 journals/books. The articles published by proficient authors in reputed journals highlighted the key areas of research in the field. USA dominated the list of scientific production of countries contributing to 340 documents.

Conclusion: The results provided by this analysis could act as a steppingstone for experts to design a roadmap for mental health research during the pandemic. Studies can be designed to gather information on mental health conditions across specific age groups. Research collaborations that facilitate the publication of pooled protocols and data are encouraged.

Key words: Anxiety, bibliometric analysis, coronavirus, depression, mental health

INTRODUCTION

On December 31, 2019, the first outbreak of human-to-human transmission of a novel coronavirus was reported in Wuhan, China.^[1] The outbreak of this infectious disease instigated a global pandemic.^[2] The novel coronavirus has resulted in

2,862,664 deaths across 219 countries as of April 2021.^[3] Governments across the world imposed new regulations to restrict the movement of people and contain the spread of the virus.^[4] These restrictions indicated unprecedented constraints in socializing and performing daily activities.^[5] India was no exception to this as nationwide lockdowns were implemented to curb the surge of coronavirus disease (COVID) cases in the country.^[6] Furthermore, the fear and psychological distress that accompanied the pandemic among Indians was heightened because of the overwhelmed health care systems.^[7]

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Although the clinical conditions of COVID-19 drew immediate attention, lesser importance was given to the psychiatric implications of the pandemic.^[8] COVID-19 manifested its effects on the general population, health care professionals, and people suffering from psychiatric conditions.^[9] In a study conducted among health care professionals in India, a high prevalence of depression and anxiety-related symptoms along with a low quality of life was observed.^[10] Another study also highlighted the importance of social media in the pandemic because its coverage was perceived as emotionally disturbing and health care professionals may have experienced social isolation, stigma, and anxiety because of it.^[11]

With an increase in anxiety levels, depression, poor sleep quality, impulsivity, and chronic stress, suicidal tendencies got exacerbated in vulnerable populations.^[12,13] People with limited resources bore the brunt of the pandemic.^[14] The plight of migrants garnered worldwide attention because of the abject conditions as a consequence of the loss of their livelihood.^[15] Alarming, the isolation, fear of contacting the disease, and the burgeoning financial complications precipitated as suicides.^[16,17]

This article aims to explore the studies performed on suicide because of the COVID-19 pandemic through a bibliometric analysis. Bibliometrics is a science that provides structured information on large volumes of conceptual and empirical data or other documents available on a particular research topic.^[18] The article uses this quantitative form of analysis to draw inferences and discuss the publication pattern, influential research journals, highly cited articles, productive countries and organizations, the authorship pattern, and the collaborative pattern between authors.^[19] The systematic and transparent trends produced by the bibliometric analysis can give a broader picture of the ongoing research in the field.^[20] Scientists and researchers can utilize the quantitative results and their implications to focus their investigations on the key findings of the study.^[21]

MATERIALS AND METHODS

Data Sources and extraction

The data to be used for the bibliometric analysis was accessed utilizing the Scopus database.^[22] The timeline for the documents of the study was set from 2011 to 2021, but almost all the documents relating to suicide and COVID were obtained post 2020. The search query ‘Title-key-abs: (suicide OR suicide-ideation) AND title: (corona* OR 2019-ncov OR ncov-19 OR sars-cov-2 OR sars-cov2 OR covid*)’ was used to collect pertinent data for the study. The data set was further subjected to manual selection to yield a total of 494 documents which were then utilized in the analysis. These data were exported in .bib format with “full record and cited references” for R-studio processing and in .csv format for VosViewer analysis.^[23]

The data obtained at the time of the search (April 1, 2021) were immediately downloaded and retrieved to avoid discrepancies because of frequent database renewal.

Data analysis

Processing and visualization of data extracted from Scopus were performed using the R-studio application and VOSviewer 1.6.12 (Leiden University, Leiden, Netherlands).^[24,25] R-studio is a non-proprietary java-based application used for computing extensive data sets.^[26] The bibliometrics function was called for the processing, and “Biblioshiny”, a web-based client, was utilized to obtain infographics mapping the scientometric networks for the study.^[27] The Vosviewer application furnished the co-citation and the keyword co-occurrence infographics used in the study.^[28]

RESULTS

Publication pattern

A bibliometric analysis encompassing scientific contributions based on suicide or suicide-related ideation because of the coronavirus pandemic showed a total of 494 documents published in 230 journals/books. The most dominant type of document was articles (240). It was followed by letters (n = 144), reviews (n = 44), notes (n = 34), editorials (n = 29), and short surveys (n = 3), which are mentioned in descending order of their values. An analysis of the well-received articles demonstrated that they were either reviews, viewpoints, commentaries, or letters to the editor. For instance, public responses to the novel 2019 coronavirus (2019-nCoV) in Japan, amassing 300 citations, was a letter to the editor. However, “Suicide Mortality and Coronavirus Disease 2019—A Perfect Storm?” and “Suicide risk and prevention during the COVID-19 pandemic” were brief commentaries on the topic. Although the type of documents was diverse in nature, the top-cited articles followed a trend of brevity and conciseness.

Most cited articles

Citations can be regarded as a tool for measuring the role played by an article in a particular scientific field.^[29] Therefore, the most cited articles could be regarded to be the most prominent in their scientific areas, and the citations received could also be a result of an influential author with an extensive network.^[30]

The most prolific document was a letter titled ‘Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan: Mental health consequences and target Populations’, authored by Jun Shigemura and Robert Ursano among others [Table 1].^[31] The article with the second most citations ‘Suicide risk and prevention during the COVID-19 pandemic’, authored by John Ann and David Gunnell, explores the risk factors associated with suicide because of the pandemic and steps to prevent its occurrence [Table 1].^[32] ‘Suicide Prevention in the COVID-19 Era Transforming Threat Into

Opportunity’ enjoys the distinction of being third-placed in terms of citations [Table 1]. It is an article that discusses ground-level strategies to prevent suicidal tendencies in the population.^[33]

INFLUENTIAL RESEARCH JOURNALS

A majority of articles related to suicide in the COVID-19 pandemic were submitted to psychiatry journals because of most of its research dealing with factors related to mental health and the human psyche.

The most influential of journals in this topic was found to be ‘Psychiatry Research’ with 34 articles submitted to it [Table 2]. The scope of the journal includes psychological, neuroanatomic, and psychosocial determinants of psychiatric disorders.^[34] Following closely at second, the ‘Asian Journal of Psychiatry’ has 33 articles that deal with psychiatry as a subject for the Asian continent [Table 2].^[35] Another notable contribution of 15 articles was by ‘The Lancet Psychiatry’, which is a highly esteemed journal in the area of psychiatry [Table 2].^[36]

Although quantifiable publications are indicative of overall output, citations are suggestive of the extent of scientific

contribution and dissemination of knowledge in the field of its study.^[37] The ‘Brain, behavior, and Immunity’ Journal, having amassed 726 citations against 11 articles with an h-index of 10, leads this list [Table 2]. This was followed by the Asian Journal of Psychiatry and Psychiatry Research with 547 and 416 citations, respectively [Table 2].

Productive countries and organizations

USA dominated the list of scientific production of countries by a sizable margin, contributing to 340 documents, followed by China (n = 169), France (n = 141), the UK (n = 129), and India (n = 122), each with a contribution of more than 100 documents. Although countries are awarded contributions based on [Table 3] the country of origin of authors, it is notable to understand that many of these articles were in collaboration with other countries. Figure 1 exhibits the extent of collaboration between countries. It can be seen that the US is the most heavily involved with other countries. Additionally, the UK and Australia also have significant collaborations with other countries with high nodal values.

Affiliated institutions often are indicative of hotspots in the research produced on a particular topic.^[38,39] In terms of research institutions, the prestigious Harvard Medical School had the most prominent contribution with 25 articles

Table 1: Most cited articles

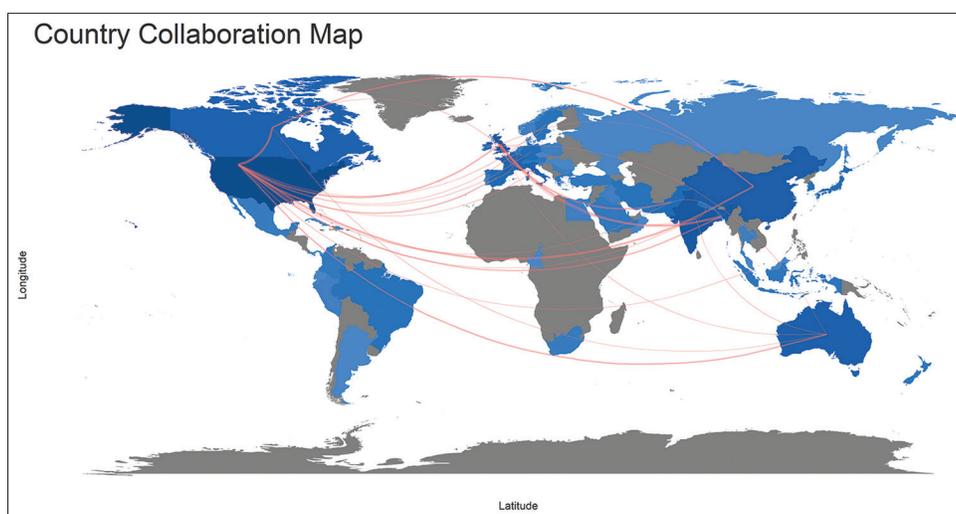
Author	Titles	Journal	Total Citations	Citations per Year
SHIGEMURA J, 2020	Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan	Psychiatry and clinical neuroscience	300	150
GUNNELL D, 2020	Suicide risk and prevention during the COVID-19 pandemic	Lancet Psychiatry	242	121
REGER MA, 2020	Suicide Mortality and Coronavirus Disease 2019—A Perfect Storm?	JAMA Psychiatry	182	91
HAO F, 2020	Do psychiatric patients experience more psychiatric symptoms during the COVID-19 pandemic and lockdown?	Brain, Behavior, and Immunity	170	85
LEE SA, 2020	Coronavirus anxiety scale: A brief mental health screener for COVID-19 related anxiety	Death Studies	165	82.5
MAMUN MA, 2020	First COVID-19 suicide case in Bangladesh due to fear of COVID-19 and xenophobia	Asian Journal of Psychiatry	147	73.5
CZEISLER M, 2020	Mental Health, Substance Use, and Suicidal Ideation During the COVID-19 Pandemic	Morbidity and mortality weekly report	141	70.5
TAN W, 2020	Is returning to work during the COVID-19 pandemic stressful?	Brain, Behavior, and Immunity	136	68
GOYAL K, 2020	Fear of COVID 2019: First suicidal case in India!	Asian Journal of Psychiatry	133	66.5
DOUGLAS M, 2020	Mitigating the wider health effects of covid-19 pandemic response	The BMJ	129	64.5

Table 2: Most Prolific Journals

Source	H-index	Total Citations	No. of documents	Impact Factor (2018)
PSYCHIATRY RESEARCH	10	416	34	2.2
ASIAN JOURNAL OF PSYCHIATRY	9	547	33	1.93
FRONTIERS IN PSYCHIATRY	2	26	16	3.16
THE LANCET PSYCHIATRY	5	439	15	18.329
BRAIN, BEHAVIOR, AND IMMUNITY	10	726	11	6.17
JOURNAL OF AFFECTIVE DISORDERS	5	55	10	4.08
INDIAN JOURNAL OF PSYCHIATRY	2	11	9	1.12
PSYCHIATRY AND CLINICAL NEUROSCIENCES	4	392	7	3.48
FRONTIERS IN PSYCHOLOGY	2	7	6	2.12
IRISH JOURNAL OF PSYCHOLOGICAL MEDICINE	3	29	6	0.53
JOURNAL OF MEDICAL INTERNET RESEARCH	3	19	6	4.94

Table 3: Country production and Affiliation

Country	Country Production	Average Article Citations	Total Citations	Affiliations	Articles
USA	340	14.351	1105	HARVARD MEDICAL SCHOOL	25
INDIA	122	10	400	JAHANGIRNAGAR UNIVERSITY	15
BANGLADESH	67	21.611	389	NOTTINGHAM TRENT UNIVERSITY	14
ITALY	78	16.571	348	UNIVERSITY OF TORONTO	14
UNITED KINGDOM	129	14.864	327	UNIVERSITY OF MANCHESTER	12
JAPAN	36	44.571	312	UNDERGRADUATE RESEARCH ORGANIZATION	10
SINGAPORE	9	153	306	ICAHN SCHOOL OF MEDICINE AT MOUNT SINAI	9
FRANCE	141	12.105	230	MCGILL UNIVERSITY	9
CHINA	169	5.867	176	ALL INDIA INSTITUTE OF MEDICAL SCIENCES	8
CANADA	82	7.688	123	HUAZHONG UNIVERSITY OF SCIENCE AND TECHNOLOGY	8

**Figure 1:** A diagrammatic representation of country collaboration for production of documents relating to COVID-19 and suicide

[Table 3]. Jahangirnagar University was the second most affiliated university with 15 documents. Both Nottingham Trent University and the University of Toronto played a distinguishable role with 14 documents to the research topic [Table 3].

Author productivity

The field of bibliometrics has seen the evolution of the term “productivity” measures. It is an important scientometric tool to quantify an author’s contribution.^[40,41]

A total of 2216 different authors have contributed to the journal on this subject. The five authors who published the most papers among these include Mohammed A. Mamun, Dr Mark Griffiths, Sher L, Ann John, and Alonso J. Among them, Mohammed A. Mamun is the Director at CHINTA Research Bangladesh [Table 4]. Jahangirnagar University ranks first, with 15 studies. Dr. Mark Griffiths (n = 13), a distinguished Professor of Behavioral Addiction at Nottingham Trent University, was placed second in terms of contribution [Table 4].

Their quantified contribution to the topic was also backed by the citations they had amassed. Although Mohammed A.

Mamun had an H-index of 8 with 482 total citations, Mark Griffiths had lower total citations (300) with an H-index of 5 [Table 4]. This feat asserts the position of the aforementioned two authors as being a significant achievement. These two authors have made exemplary contributions to this research and have become authorities in the subject. Another notable author, Ann John, is a Professor in Public Health and Psychiatry at the Swansea University Medical School [Table 4]. She chairs the National Advisory Group to the Welsh Government on the prevention of suicide and self-harm and has an H-index of 5.

Keyword analysis

In the figure [Figure 2] of keyword co-occurrence analysis, the node size indicated by the circle is based on the frequency of keywords.^[42] The frequency of two keywords co-occurring in the article is visualized by the thickness of a line.^[42] Of the 2936 total keywords covered in this study, 58 keywords that occurred more than 41 times in the data set were included.

The nodes were divided into four clusters as shown in the figure: Cluster 1 (suicide-related risk factors, in red), cluster 2 (patient profile, in green), cluster 3 (clinical manifestations,

Table 4: Most Productive Authors

Author	H-index	Total Citations	No. of docs	Affiliated University
MAMUN MOHAMMED	8	452	15	Jahangirnagar University, Dhaka
GRIFFITHS MARK	5	300	13	Nottingham Trent University
SHER L	3	124	8	University of California
JOHN ANN	5	323	6	Swansea University Medical School
ALONSO J	0	0	3	Health Services Research Unit, Barcelona
BRUFFAERTS R	0	0	3	Universitair Psychiatrisch Centrum - Katholieke
CLOONAN SA	4	102	5	University of Arizona College of Medicine
DAILEY NS	4	102	5	University of Arizona College of Medicine
GUNNELL D	4	284	5	University of Bristol, Bristol
KESSLER RC	0	0	3	Harvard Medical School, Boston
KILGORE WDS	4	102	5	University of Arizona College of Medicine

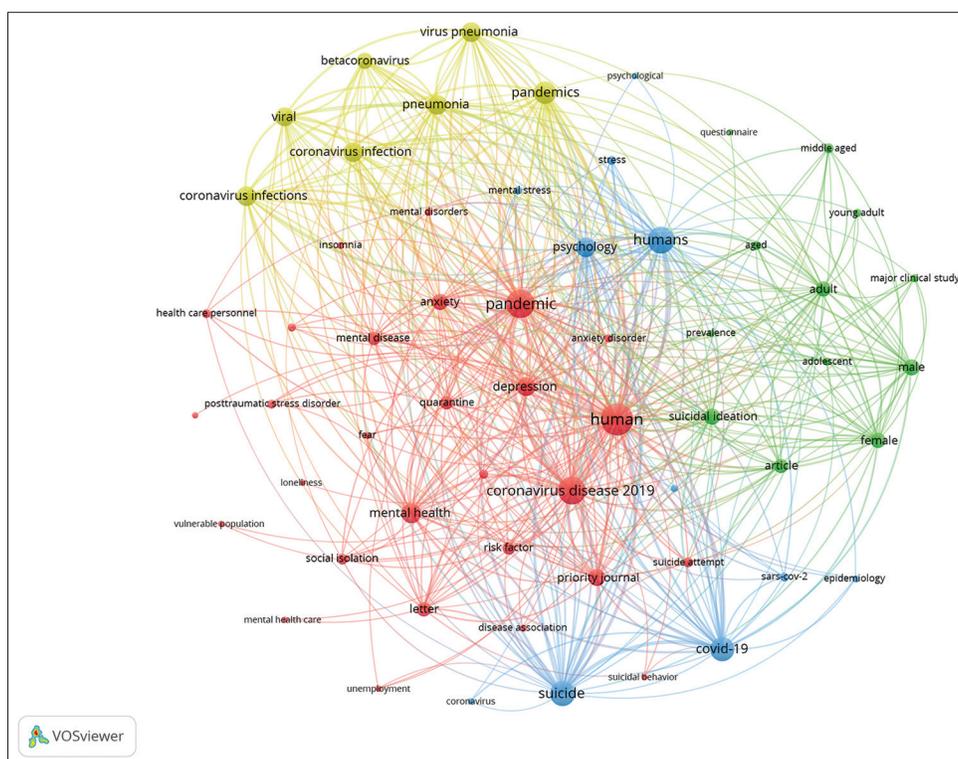


Figure 2: A co-occurrence analysis of keywords utilized in documents related to COVID-19 and suicide

in blue), and cluster 4 (pathogenesis, in yellow). For cluster 1, the following keywords occurred the most: anxiety (153), anxiety disorder (58), depression (189), and mental disease (121). The most relevant keywords in cluster 2 included male (149), female (143), middle-aged (77), and adolescent (61). In cluster 3, primary keywords include covid-19 (268), psychology (204), and suicide (288). Similarly in cluster 4, the most frequent keywords were coronavirus infection (201), pneumonia (197), and beta coronavirus (148).

DISCUSSION

The comprehensive analysis of the documents on suicide during the COVID-19 pandemic highlighted the emerging trends in the field. Although the subject of the study itself is in its nascent stage, the article outlines promising

scientific aspects in the (i) publication pattern, (ii) topics discussed by the articles, (iii) role of journals in the outreach of the articles, (iv) country-specific studies, (v) country collaborations, and (vi) the current areas of interest in the discipline.

First, the publication pattern indicates a growing interest of researchers in topics related to suicide because of COVID-19. This is evident from the results because the topic garnered immediate attention from the scientific community and resulted in a publication of 402 articles in 2020. With the second wave of COVID-19 hitting several nations, a substantial increase in the research on mental health during COVID-19 can be predicted in the coming years.^[43,44]

Second, the analysis highlights the importance of the results and discussions covered in the documents.

Articles such as “Suicide risk and prevention during the Covid-19 Pandemic”, published in the *Lancet Psychiatry*, or “First COVID-19 suicide case in Bangladesh due to fear of COVID-19 and xenophobia: Possible suicide prevention strategies”, published in the *Asian Journal of Psychiatry*, provide recommendations to create awareness and strategies to mitigate suicides during COVID-19.^[32,45] “Suicide Mortality and Coronavirus Disease 2019 – A perfect storm”, published in the *JAMA Psychiatry*, discusses the factors that can precipitate suicides among vulnerable populations.^[33] “Coronavirus anxiety scale: A brief mental health screener for COVID-19 related anxiety”, published in *Death Studies*, evaluates a “Coronavirus Anxiety Scale (CAS)” screener to identify potential cases of dysfunctional anxiety related to the COVID-19 pandemic.^[46] To design strategies to deal with suicides during the pandemic, the results and discussions presented by these articles are vital. The results can be corroborated by the literature that discusses the impact of the results and discussion of an article on the citations received by it.^[47,48] This suggests that the results based on empirical evidence are more likely to gain impetus in the scientific community because of their essentiality.

Third, the results align with studies that analyze the role of the prestige and scope of the journal in the research conducted in a particular area.^[49,50] The top-cited articles appeared the most in the journals “*Brain Behavior and Immunity*”, “*Asian Journal of Psychiatry*”, and “*Lancet Psychiatry*”. Although a journal’s reputation can affect the outreach of an article, it can also be inversely observed that prolific articles improve the status of a journal in a research area. For instance, the articles titled “Suicide risk and prevention during COVID-19 pandemic” and “COVID-19, unemployment, and suicide”, published in *The Lancet Psychiatry*, greatly impacted its influence on the mental health research during the pandemic.

Fourth, growing interest in country-specific studies is demonstrated by the results. It is evident that articles that specifically focus on identifying the mental health issues prevalent among a particular population have gained prominence. For instance, “Fear of COVID 2019: First suicidal case in India!”, published in the *Asian Journal of Psychiatry*, is a case report which discusses the first instance of suicide in India which stemmed from the fear of the relatively unknown disease. “Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan” emphasized mental health concerns and their probable consequences, especially in susceptible Japanese populations. The diversity in the findings of the studies highlights the uniqueness of the reasons behind the psychological issues faced by the people of a particular nation. Hence, documents focusing on area-specific information are indispensable tools for formulating specific strategies to decrease nationwide suicide incidences.

The significant contributions by various countries point toward a unified effort to find a solution to mental health issues faced by the general populace. Appreciable contributions by China can be attributed to the fact that it was the ground zero of where severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) occurred and also significantly where the previous SARS outbreak originated from.^[51] Furthermore, a considerable number of the top-cited articles are products of collaboration within the country or across different nations.^[52] For instance, the article titled “Suicide Mortality and Coronavirus Disease 2019-A Perfect Storm?”, having 182 citations, is a contribution of authors from VA Puget Sound Health Care System, University of Washington and Florida State University. The article titled “Suicide risk and Prevention during the covid-19 pandemic”, published in *The Lancet Psychiatry*, shows the extensive collaboration of authors from the UK, Ireland, Pakistan, and Australia. Another noteworthy product collaboration is the article titled “Do psychiatric patients experience more psychiatric symptoms during the COVID-19 pandemic and lockdown?” This article is a recipient of 170 citations and is the output of collaborations between USA, Canada, China, Singapore, and Vietnam. These findings can be corroborated by the literature that explores the impact of collaborations on the citations received by an article.^[53] It is evident that although the involvement of western countries plays a significant role in the outreach of the article, the collaboration between different nations across the world contributes toward the diversity of the research team and its widespread network.^[54,55]

Last, the results from the keyword analysis provide an insight into the hotspots of research in the field. The first cluster highlights various suicide-related risk factors such as anxiety, depression, and mental disease. This is supported by the literature that indicates the neurological manifestation of depression in SARS-CoV-2 and its role in exacerbating pre-existing mental conditions.^[56,57]

The second cluster indicates the demographics of the people affected by mental health disorders during the pandemic. Studies on age-related differences indicate that both the prevalence rates and aggregate scores for anxiety and depression on standardized scales are the highest among those under 25 years and the lowest among those over 60 years.^[58] Be that as it may, the adult population is seen to have grappled with the real-world repercussions of the pandemic such as unemployment, socio-economic disadvantage, and the struggle to provide for the family.^[59] A study based in Japan suggested that as of September 2020, women were vulnerable to greater suicidal tendencies from COVID-19 than men. A 20–30% rise was seen in suicide numbers compared to what had been reported in the pre-pandemic years.^[60]

Although a comprehensive analysis was performed on publications related to suicide and COVID-19 using applications such as R-studio and VosViewer, some pitfalls are inevitable. First, most of the non-English articles published in the area were not taken under the purview of the study. This could have led to an omission of significant and diverse scientific literature in the discipline. Second, because the topic of interest is relatively recent, the study only covers the literature published from 2019 to 2020. Because of an upward trend in the publication pattern, substantial literature published after March 2021 will not be covered in the study. Third, the scientific data extracted for the study are restricted to the Scopus database. This might have led to an exclusion of important literature that is not indexed by Scopus. Although the inclusion criteria for the study were selected on the basis of relevant bibliometric literature, there is a possibility that certain pertinent documents may not have been included in the study.

CONCLUSION

This is the first bibliometric analysis of its kind which covers research published on suicide and COVID-19. The articles published by proficient authors in reputed journals highlight the key areas of research in the field. The increase in the number of articles published in this area indicates an exponential growth in research on mental health at times of the pandemic.

Although there is an increased awareness of the psychological impact of COVID-19 on varied populations, a dire need of filling pre-existing gaps in mental health research is identified. Suicide, being the most extreme outcome of the crisis, requires suicide prevention measures that are backed by empirical data. Further studies are required to build a correlation between suicide and COVID-19.

Hence, the results provided by this analysis could act as a stepping stone for experts to design a roadmap for mental health research during the pandemic. Studies can be designed to gather information on mental health conditions of specific age groups across low-income, middle-income, and high-income countries. Research collaborations that facilitate the publication of pooled protocols and data are encouraged. Expanding our knowledge bases will prepare us for harrowing situations that might inflict the mental health of people across the world.

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Conflicts of interest

There are no conflicts of interest.

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