RESEARCH ARTICLES

Bibliometrics Characteristics on Studies of Anxiety and Depression in University Students during the COVID-19 Pandemic

Características bibliométricas sobre estudios de ansiedad y depresión en estudiantes universitarios durante la pandemia del COVID-19

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Summary

The objective was to systematize the information on anxiety and depression during the COVID-19 pandemic in university students published in the PubMed database during the year 2020. 129 articles were analyzed whose variables were the following: number of authors, level of collaboration, country, journal of publication, associated topics, research approaches, sample size used, gender and age of the sample, language of publication and instruments used. The results found show that the number of average authors who sign a publication is 6; the countries that have published the most so far this year are China (26%) and the US (19%), in terms of factors related to anxiety and depression are stress, sleep-wake disorders, activity physical, loneliness and Post Traumatic Stress Disorder (PTSD), quantitative research approaches are the most used (97%), compared to qualitative and mixed (3%), the country that has worked with the largest samples is China with 746,217 people, the analyzed articles present simples made up mostly of the female gender (86,8%), the most frequent average age is 20-21 years old (33.3%) all the articles are in English and the most used psychometric instrument has been the Generalized Anxiety Disorders Scale (GAD-7), the Patient Health Questionnaire (PHQ-9) and the Depression, Anxiety and Stress Scale (DASS-21). It is recommended to expand the analysis taking into account the year 2021 and include other data bases.

Keywords: Anxiety, Depression, COVID-19, University students, Bibliometric review.

Resumen

El objetivo fue sistematizar la información sobre la ansiedad y depresión durante la pandemia por el COVID-19 en estudiantes universitarios publicada en la base de datos de PubMed durante el año 2020. Se analizaron 129 artículos cuyas variables fueron las siguientes: cantidad de autores, nivel de colaboración, país, revista de publicación, temas asociados, enfoques de investigación, tamaño de muestra empleada, género y edad de la muestra, idioma de publicación e instrumentos utilizados. Los resultados encontrados muestran que la cantidad de autores promedio que firman una publicación son 6; los países que más han publicado en lo que va del año son China (26%) y EEUU (19%), en cuanto a los factores relacionados a la ansiedad y depresión se encuentran el estrés, los trastornos del sueño-vigilia, la actividad física, la soledad y el Trastorno por estrés postraumático (TEPT), los enfoques de investigación cuantitativa son los más trabajados (97%), respecto a los cualitativos y mixtos (3%), el país que ha trabajado con una mayor muestras es China con 746,217 personas, los artículos analizados presentan muestras conformadas mayormente por el género femenino (86,8%), la media en edad más frecuente es 20-21 años (33,3%) todos los artículos se encuentran en inglés y los instrumento psicométrico más usado han sido la Escala de trastornos de ansiedad generalizado (GAD-7), el Cuestionario de Salud del paciente (PHQ-9) y Escala de depresión, ansiedad y estrés (DASS-21). Se recomienda ampliar el análisis tomando en cuenta el año 2021 e incluir otras bases de datos.

Palabras claves: Ansiedad, Depresión, COVID-19, Estudiantes universitarios, Revisión bibliométrica.

INTRODUCTION

The new coronavirus 2019 (COVID-19) has brought about many changes in our habits. The World Health Organization (WHO, 2020) announced that COVID-19 was considered a pandemic. Since its appearance in Wuhan (China), it has spread rapidly to more than 214 countries in the world, with more than 657 million people infected and more than 6 million dead (WHO, 2022). This accelerated irruption of the virus forced the authorities to implement measures to prevent cases from spreading, such as quarantine and social isolation, which meant a radical change in our lives.

In relation to the impact caused by the COVID-19 pandemic, Jacques-Aviño et al. (2020) point out that at the social level, confinement was related to gender, age and socioeconomic conditions, with women and young people being the most affected. The United Nations (UN, 2020) also refers to the impact on health systems and the capacity to respond to the health emergency, aspects that worsened in different countries, but especially in Latin America and the Caribbean, where there was a very high number of human lives lost, as well as the repercussions of social distancing and confinement affecting economic aspects due to long periods of inactivity.

Many research studies show the effect of COVID-19 on mental health, for example, Wang et al. (2020) found that in the United States (U.S.) 48% of university students had depression, 38% had anxiety, both moderate to severe, and 18% had suicidal thoughts. Moreover, Odriozola-Gonzales et al. (2020) found that 21% of the members of the university community in Valladolid, Spain had anxiety, 34% had depression and 28% had moderate to extremely severe levels of stress. A meta-analysis on the mental health of higher education students during COVID-19 globally showed a prevalence of depression of 30.6% and anxiety of 28.2%. The results of these studies show that mental health may have been affected in terms of anxiety and depression (Zhu et al., 2021).

Anxiety refers to a state of agitation, unpleasant restlessness characterized by the anticipation of danger, the sensation of catastrophe or imminent danger; that is, the combination of cognitive and physiological symptoms manifesting a startle reaction, where the individual tries to find a solution to the danger, so the phenomenon is perceived with total clarity (Sierra et al., 2003). It that has been linked to neurotic, psychophysiological, sexual, eating disorders, addictive behavior and the weakening of the immune system (Cano & Tobal, 2001). Conversely, depression is a common mental disorder, characterized by the presence of sadness, loss of interest or pleasure, feelings of guilt or lack of self-esteem, sleep or appetite disorders, feeling of tiredness, and lack of

concentration (WHO, 2017). Likewise, they can lead to negative self-thoughts and suicidal ideation (Piqueras et al., 2008).

The United Nations Educational, Scientific and Cultural Organization (UNESCO, 2021) states that approximately 25 million higher education students in Latin America and the Caribbean were affected due to the closure of study centers. Vidal et al. (2021) point out that university students had to adapt the way they received their classes from face-to-face to virtual mode facing restrictions, social isolation, connectivity difficulties, among other situations that wreaked havoc on their physical and mental health. The COVID-19 pandemic has had an unprecedented impact on the psychological health of university students, a population vulnerable to mental health disorders (Sun et al., 2020).

The interest in knowing the impact caused by the COVID-19 pandemic in different areas has been reflected in the wide scientific production in different databases, which is necessary to evaluate using quantitative techniques based on statistics called bibliometrics, considered as a tool that allows for observing the progress of science and technology through the production of scientific articles in an area of specialization (Solano et al., 2009). The relevance of this type of studies, as indicated by Flores-Fernández and Aguilera-Eguías (2019), lies in the fact that they can be used to analyze different characteristics of scientific activity related to the production and consumption of information.

Regarding research on COVID-19 and depressive disorders, a bibliometric analysis of publications in Scopus from January to November 2020 indicates that 1,274 articles were published, of which 82% are original articles; 9% are review articles and 5% are letters. The largest number of publications are by North Americans (22%), followed by China (19%); and Italy (9%). Many papers focus on mental health among the general population and health care workers. Mental health should be included as a priority in the local and global public health agenda (Al-Jabi, 2021).

Nuryana et al. (2021) analyzed publications regarding schizophrenia, mental health and depression during COVID-19 in Scopus. In 2020, India published the highest number of publications on schizophrenia, mental health, and depression, followed by China, Australia, Bangladesh, and Japan. The most frequently used keywords were schizophrenia, COVID-19, mental health, depression and adolescents. They suggest future research on quality of life, obsessive-compulsive disorder, metabolic syndrome, prevalence and mental illness.

Hernandez et al. (2021) conducted a study on the scientific production of Latin American authors related to depression during COVID-19 published in Scopus, and found 452 articles. The analysis included the following types of documents: articles (72%); reviews (13%); letters to the editor (8%); editorials (3%). Likewise, Latin American scientific production increased by 18% in the last year. Brazil is the country that has published the most number of scientific papers, representing 44%, followed by Mexico, Argentina, Colombia, Peru and Chile, which have published more than 30 publications each, while other countries such as Puerto Rico, Uruguay, Costa Rica, Bolivia and Guatemala have at least one publication.

In this regard, it is pertinent to carry out a bibliometric study with the aim of finding out the characteristics of scientific production with respect to studies of anxiety and depression in university students in the context of the COVID-19 pandemic, the specific objectives being to characterize the scientific production according to the number of publications in 2020 in the PubMed database, according to the following variables: number of authors, level of collaboration, country, journal of publication, associated topics, research approaches, sample size, gender and age of the sample, language of publication and instruments used.

METHOD

Type of Research

This is a retrospective and descriptive bibliometric study. It is descriptive because it provides quantitative information on articles published in different fields, whose data allow a comparative analysis of scientific productivity (Romaní et al., 2011).

Materials

We analyzed 2020 articles related to anxiety and depression in university students during the COVID-19 pandemic published in the PubMed database, which is an open-access search system whose project is developed by the National Center for Biotechnology Information (NCBI) and the National Library of Medicine (NLM) of the United States. It allows access mainly to medical bibliography databases (MEDLINE), which is the most important resource for Medicine, Biomedicine, Health Sciences and related Sciences.

Procedure

First, a search was carried out using the following descriptors: "Covid 19 anxiety depression students university 2020" and 428 publications were found listed by titles and authors. Second, we read the abstracts and proceeded to establish the inclusion and exclusion criteria in accordance with the objectives of the study: Inclusion criteria were a) Research with full access to the article, and b) Articles published in English or Spanish. The exclusion criteria were: a) Studies that were not conducted in university students, b) Studies not related to anxiety and depression, c) Psychometric studies, d) Bibliometric review, meta-analysis and debates, and e) Correction/Errata. 129 publications were left for analysis and a database was created. The details of the selection of articles are shown in Figure 1.
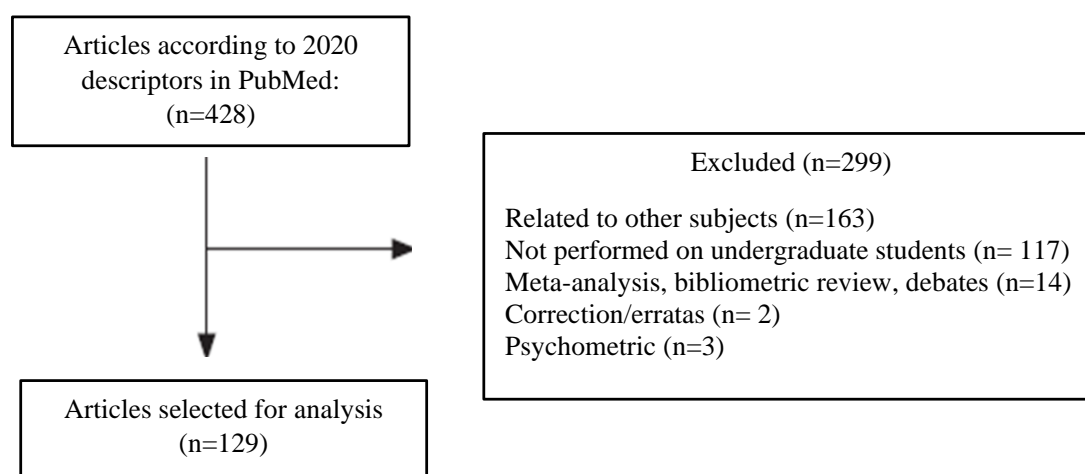
Source: Elaborated by author.

Figure 1.
Criteria in the selection of articles

Information Analysis

The data were downloaded in 2 files: in Excel in which cells were named with labels according to the bibliometric indicators to be worked on and in CSV format. The Statistical Package for the Social Sciences (SPSS), version 25, was used to analyze the frequencies of the indicators selected in the objectives, and the VOSviewer program version 1.6.18 was used.

RESULTS

In relation to the number of authors, 875 researchers were identified who signed publications referring to anxiety and depression. The average number of authors per article was 6.8 (SD=3.9) with a minimum of 2 authors and a maximum of 27 authors, which indicates that 100% of the publications are group-authored. Regarding the leading authors, we can indicate that there is no significant predominance, only the authors Islam (Bangladesh) and Johansson (Sweden) have 2 publications each.

Co-authorship involves the participation of researchers from the same country or at an international level, making it possible to identify authors working in a network. Figure 2 shows the map of the co-authorship network with its respective links. The colors show the groups of authors that are most closely related to work on various research projects, in which 10 clearly identified groups can be seen.

Source: Elaborated by the author.

Figure 2.
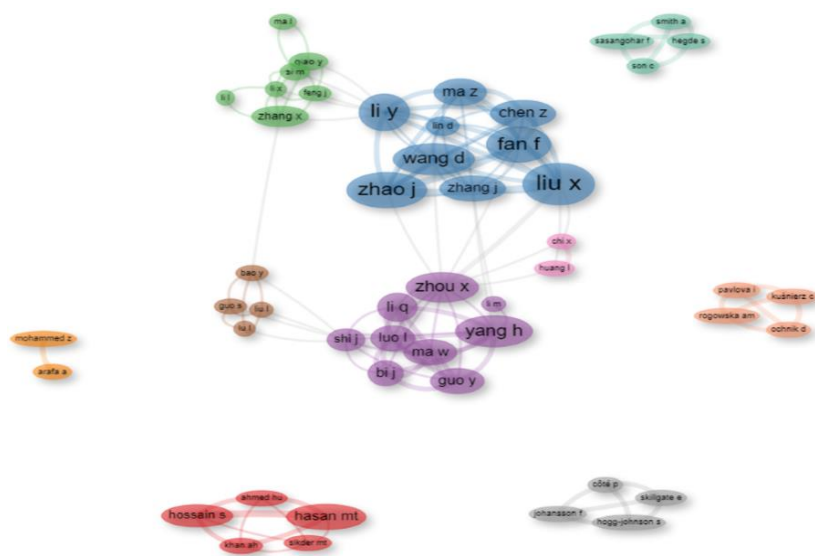*Co-authorship networks of the principal authors*

With respect to the country of the leading authors, China ranks first with 26.4%, followed by the United States with 19.4%. Authors from Bangladesh, Germany and Ethiopia also stand out for their large number of publications. Likewise, the links of the researchers by country are distinguished, with 5 well differentiated groups (see Table 1 and Figure 3).

Table 1.

Frequency according to the country of the leading authors

Country	*f*	%
Germany	6	4.7%
Saudi Arabia	3	2.3%
Austria	1	0.8%
Bangladesh	7	5.4%
Brazil	3	2.3%
Canada	1	0.8%
Chile	1	0.8%
China	34	26.4%
Ecuador	1	0.8%
United States	25	19.4%
Egypt	3	2.3%
United Arab Emirates	1	0.8%
Slovakia	1	0.8%
Spain	2	1.6%
Ethiopia	4	3.1%
France	3	2.3%
Greece	1	0.8%
India	3	2.3%
Iran	2	1.6%
Italy	1	0.8%
Japan	1	0.8%
Jordan	1	0.8%
Kazakhstan	1	0.8%
Lebanon	1	0.8%
Lithuania	1	0.8%
Malaysia	3	2.3%
Nepal	1	0.8%
Pakistan	1	0.8%
Pakistan	2	1.6%
Peru	1	0.8%
Poland	2	1.6%
Portugal	1	0.8%
United Kingdom	3	2.3%
Russia	1	0.8%
Sweden	2	1.6%
Switzerland	2	1.6%
Turkey	2	1.6%
Total	129	100.0%

Source: Elaborated by the author.
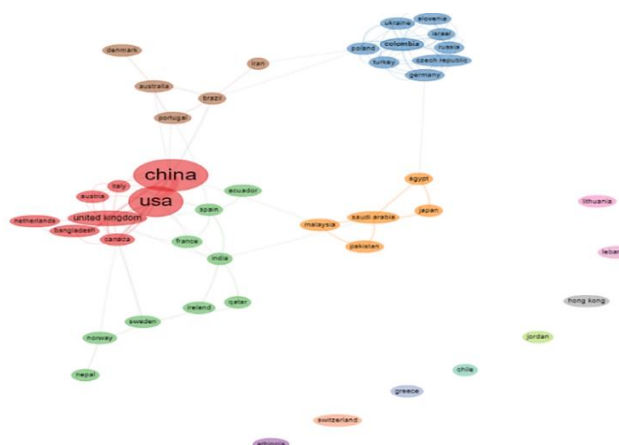
Source: Elaborated by the author.

Figure 3.
Link of researchers by country

88 (68%) publications are carried out with the collaboration of national authors, although the authors belong to different institutions in the same country, and 41 (32%) publications are carried out with the collaboration of international authors.

Regarding periodic publications with research studies on anxiety and depression in university students, it is observed that they have been published in 76 journals, with the highest frequency being PloS One and Frontiers in Psychiatry, as shown in Table 2.

Table 2.
Journals with the highest frequency of publication

Journal	f	%
PloS One	9	7.0%
Frontiers in Psychiatry	9	7.0%
Journal of affective disorders	7	5.4%
Frontiers in Psychology	7	5.4%
Journal of American College health	7	5.4%
Journal of Psychiatry research	6	4.7%
International Journal of environmental research and public health	5	3.8%
Journal of medical internet research	5	3.8%
Frontiers in public health	3	2.3%
Psychology Research Behavior Management	2	1.6%
Sci Rep	2	1.6%
BMC Psychology	2	1.6%
Chileno Serv Rev	2	1.6%
GMS J Med Educ	2	1.6%
Scandinavian journal of public health	2	1.6%
International journal of mental health and addiction	2	1.6%
Journals with a single publication	57	44%
Total	129	100%

Source: Elaborated by the author.

In terms of the issues associated with anxiety and depression that have been the subject of research, there are stress (28%), sleep-wake disorders (6%); loneliness (5%); physical activity and Post-Traumatic Stress Disorder (PTSD), 4% each.

The predominant research approach is quantitative with 97%; mixed and qualitative approaches account for only 3%.

The sample size used varied for quantitative research from 83 to 746,217 participants, the average being 10371.64 (SD 67779.170) Qualitative and mixed research had a minimum of 9 and a maximum of 200 subjects.

In 86.8% of the publications (n=129), the sample is mostly composed of the female gender. 6.9% of articles included the possibility for participants to choose a third option (Third gender, diverse, non-binary gender identity, transgender, other).

Regarding the analysis of the age of the participants, ages are expressed as mean, median and age range, with the most frequent mean being 20 and 21 years of age (33.3%), as shown in Table 3.

Table 3.
Participants' ages expressed as mean, median and age range.

Measurements and ages:		*f*	%
Mean	18-19	12	9.3
	20-21	43	33.3
	22-23	17	13.2
	24-25	7	5.4
	26-27	2	1.6
Median	22-23	3	2.3
Age range		23	17.8
Not required		22	17.1
Total		129	100.0

Source: Elaborated by the author.

The most commonly used instruments were the Generalized Anxiety Disorder Scale (GAD-7) 23%; the Patient Health Questionnaire (PHQ-9) 21% and the Depression, Anxiety and Stress Scale (DASS-21) 20%. All items are published in English.

DISCUSSION

The uncertainty generated by the accelerated irruption of the SARS-COV-2 virus has affected the mental and emotional health of people as reported by numerous studies (Valero et al., 2020; Prieto et al., 2020; Huarcaya-Victoria 2020) that have found that anxiety, depression and stress are the frequent psychological responses due to the pandemic, so it is necessary to characterize the scientific production in terms of these constructs.

Bibliometrics allows the application of the statistical method and mathematical procedures to obtain measurable results of scientific production (Dávila et al., 2009). In this regard, the articles published in PubMed concerning anxiety and depression in the context of the pandemic in university students are analyzed. The global health emergency due to the COVID-19 pandemic has raised an interest in the impact on mental health and it has been appropriate to conduct an analysis of it.

The articles analyzed were all co-authored, which shows the tendency of collaborative work. The development of information and communication technologies has favored the rapprochement between frontiers, institutions and disciplines, promoting in the communities of experts a greater capacity for linking and working with peers in different contexts. Thus, links are strengthened, facilitating the extension and discussion of knowledge through networking, with better opportunities for circulation and weighting in appropriate media (Aguado-López et al., 2009).

Regarding the level of collaboration, 68% of the publications have been national and 32% have been international. Sebastian (2019) points out that the international dimension has always been present in the field of scientific research. There is currently a tendency towards greater international cooperation, giving rise to the proposal of global health, so there should be more participation among countries, without devaluing national links. Global health highlights the importance of globalization expressed through the interconnection and interdependence between countries (Ibargüen & Stroeyer, 2016).

As for the countries of the main authors, China and the United States stand out. These results coincide with the Rankings of countries with the highest number of publications, leading worldwide research in all thematic areas. It should also be noted that the United States stands out

in the ranking for the areas of health and specifically psychology (Scimago Journal & Country Rank).

According to the journals with the highest number of publications, we find Plos One and Frontiers in Psychiatry with 9% each. Plos One is currently the pioneer of the mega journal, is emblematic for being a publisher with an open access model and stands out for its expansion through the publication of many articles in a few journals. *Frontier*, however, groups together a significant number of titles per publication. (Schwarz et al., 2020).

The topics related to anxiety and depression that were identified in this study were stress, sleep disorders, physical activity, loneliness, and PTSD, The topics related to anxiety and depression identified in this study were stress, sleep disorders, physical activity, loneliness and PTSD, and coincide with Ramirez and Velasco (2021) findings stating that there have been multiple associated psychological reactions in response to the COVID-19 pandemic, including anxiety, depression, insomnia, and PTSD.

Most of the studies (97%) are quantitative and only 3% are qualitative and mixed. It is possible that due to the restrictions caused by the pandemic and the development of virtual activities, this has been a favorable scenario to work with questionnaires, scales and others media, being the data processing more agile and faster. However as mentioned by Archig and Pino (2017) it is also fundamental to conduct qualitative research since health is not an individual issue but rather an interaction between people, their society and their environment. Through qualitative research we can learn how people understand the world by taking into account the perspectives and experiences of the people who live it (Ulin et al., 2006).

The sample size has been very variable and heterogeneous. In qualitative studies, due to the nature of the research, large sample sizes are not required. As indicated by Martínez-Salgado (2012), it is possible to work with relatively small numbers of observation units, sometimes even with a single case. Each unit is carefully and intentionally selected for its potential to provide in-depth and detailed information on the subject of interest to the research. Conversely, in quantitative research, the sample size means that the sample can be considered representative, as well as being linked to the issue of statistical significance and whether or not we can corroborate the hypotheses we propose in our research. (Argibay, 2009).

The samples are predominantly comprised of women. In this regard, Marques et al. (2021) point out that this may be due to the fact that the majority of students are female and also it has been found that women are more willing to complete surveys of similar studies online.

Since one of the variables is university students, it is easy to understand that the most frequent mean age is 20-21, which indicates that they are undergraduate students.

The study shows that the most widely used instrument to measure anxiety was the Generalized Anxiety Disorder Scale (GAD-7) due to its psychometric properties, reporting good validity and reliability, in addition to being a short format that is very effective in clinical practice and research (Spitzer et al., 2006). For depression, they used the Patient Health Questionnaire (PHQ-9) which is a sensitive screening tool highly predictive of depression in Western and Chinese populations (Billy et al., 2018). Thus, they also employed the Depression, Anxiety and Stress Scale (DASS-21). A systematic review of the measurement properties of this instrument concludes that it presents sufficient high-quality evidence for validity and reliability (Lee et al. 2019).

Limitations

Some other bibliometric indicators, such as the original language in which the articles were written, could not be taken into account since it is not clearly specified. In addition, the authors have not described all the characteristics of the samples, making it difficult to include more sociodemographic indicators.

Recommendations

It is recommended that the analysis be extended to the year 2021 and that other databases such as Scopus, Web of Science and others be included. It is important to include other bibliometric indicators.

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