Research in progress

STI 2022 Conference Proceedings

Proceedings of the 26th International Conference on Science and Technology Indicators

All papers published in this conference proceedings have been peer reviewed through a peer review process administered by the proceedings Editors. Reviews were conducted by expert referees to the professional and scientific standards expected of a conference proceedings.

Proceeding Editors

Nicolas Robinson-Garcia
Daniel Torres-Salinas
Wenceslao Arroyo-Machado

OPEN ACCESS

Citation: Valderrama, P., & Torres-Salinas, D. (2022). Does the type of study on Covid-19 influence the value of Altmetrics?. In N. Robinson-Garcia, D. Torres-Salinas, & W. Arroyo-Machado (Eds.), *26th International Conference on Science and Technology Indicators*, STI 2022 (sti22233). https://doi.org/10.5281/zenodo.6957471

Collection: https://zenodo.org/communities/sti2022grx/

Does the type of study on Covid-19 influence the value of Altmetrics?

Pilar Valderrama* and Daniel Torres-Salinas*

* *piluvb95@ugr.es; torressalinas@ugr.es*
Department of Information & Communication, University of Granada, Campus Cartuja, Granada 18071 (Spain)

Introduction

Covid-19 has become a global research front that is being studied from different bibliometric perspectives. Some of these works have focused on determining the rate of growth (Torres-Salinas, 2020), on offering a general bibliometric perspective of actors and themes (Colavizza et al. 2021) or on analyzing the debate generated by scientific results on covid in society (Nane et al., 2021). This last line, that is, the measurement of the social influence of articles on Covid19, is another one of the perspectives that has generated the most work, especially when using altmetric indicators (Torres-Salinas et al., 2020). Altmetrics are alternative indicators derived from the mentions made in the media, web 2.0 and social networks to scientific results (Torres-Salinas et al., 2020) and are tracked to explore the social reception of research findings (Priem et al., 2010). These new metrics have emerged that are helping to understand aspects of science communication beyond traditional channels (Arroyo-Machado et al. 2021), which is why they have been important when studying the covid-19 phenomenon.

However, not all results, and especially those published in scientific journals, receive the same attention from an altmetric point of view. In this sense, it could be argued that in the medical field different documentary typologies (for example, case reports, clinical trials, reviews...) could receive different attention. Currently databases such as Pubmed offer detailed information on the typology, specifically classifying their works into 7 categories: 1. Case reports; 2. Clinical trials; 3. Consensus Development Conferences & Guidelines; 4. Reviews; 5. Systematic Reviews; 6. Meta-Analyses; 7. Observational studies. Considering all of the above, the main objective of this communication is to establish whether the attention, measured through altmeric indicators, received by scientific publications on covid-19 published in biomedical journals depends on the documentary type. For this, the works published during the year 2021 on Covid19 in the Pubmed database will be considered as a sample, which will be analyzed through statistical inference methods.

Methodology

Firstly, the recovery of works on Covid19 was proceeded. After searching for Coronavirus as the Mesh term, in the page of results we used filters from PubMed Clinical Queries to refine the search, selecting "Covid-19" for the filter Category within the filter field "General", thus obtaining a total of 124,141 results. The year selected to obtain articles was 2021; the types of

publication selected for the study were those 8 mentioned in the Introduction. A total of 21,218 publications were finally downloaded for our paper. To retrieve the altmetrics, Altmetric.com was used as a source, using the DOI as an identifier for the retrieval of works. In total 17,259 were retrieved through their DOI. As it is a work in progress, not all the altmetric indicators have been used and some of them were discarded based mainly on three criteria (a) Platforms with an irrelevant number of mentions (eg. Youtube, Policy reports, Wikipedia, Blog mentions, etc.), (b) Platforms with a strong geographic component (e.g. Weibo or Reedit) and Platforms that no longer exist or operate (eg. Google Plus, Syllabi). Finally, the altmetric indicators considered were: Altmetric Attention Score, News mentions, Twitter mentions and Mendeley readers. Likewise, Dimension citations were considered to make a comparison with traditional bibliometric indicators. Once the total data set had been classified, the first step was to calculate the mean value of the indicators for each type of study, and a graphic representation was made. Next, considering the eight types of study as reference variables, the normality hypothesis was contrasted using the Kolmogorov-Smirnov test. When it was significant, comparison between the variables was made using the non-parametric Kruskal-Wallis test. Finally, the possible association between the type of study and the different altmetrics was appraised by applying the chi-square test to the contingency table obtained.

Results

Table 1. Frequency, median and interquartile intervals of altmetrics for the eight types of study

Study type according to type PubMed database	General Indicators		Median values (interquartile interval)				
	Num. Publ.	Total mentions	Altmetric Atten. Score	News mentions	Twitter mentions	Mendeley readers	Dim. citations
1. Case Report	2052	1597	4 (1-12)	0 (0-1)	3 (1-14)	25 (15-41)	2 (1-6)
2. Clinical Trial	848	772	11 (3-68)	0 (0-3)	10 (3-54)	64 (34-115)	7 (2-24)
3. Consensus Dev. Conf. Guideline	83	72	11.5 (3-46)	0 (0-2)	14.5 (3-49.75)	49.5 (30-97.25)	6.5 (2-12)
4. Reviews	7454	5637	6 (2-17)	0 (0-1)	5 (2-19)	46 (25-86)	5 (1-13)
5. Systematic Rev.	554	504	8 (2-25)	0 (0-1)	9 (3-26.75)	60 (32.25-102)	7 (2-17)
6. Meta-Analysis	153	126	8 (2-29.25)	0 (0-1)	10 (2-32)	47.5 (27.75-77.25)	8 (3-20.25)
7. Observ. Study	1821	1512	7 (2-22)	0 (0-1)	6 (2-22)	41 (23-71)	5 (1-12)

The table of frequencies and the median values of the altmetrics for the seven types of study are shown in Table 1, while the corresponding graphic representation for the means is displayed in Figure 1. When the data does not fit a normal distribution, it is more correct to use the median. The median is much more robust, which means that it is less affected by the presence of biases in the distribution or extreme values.

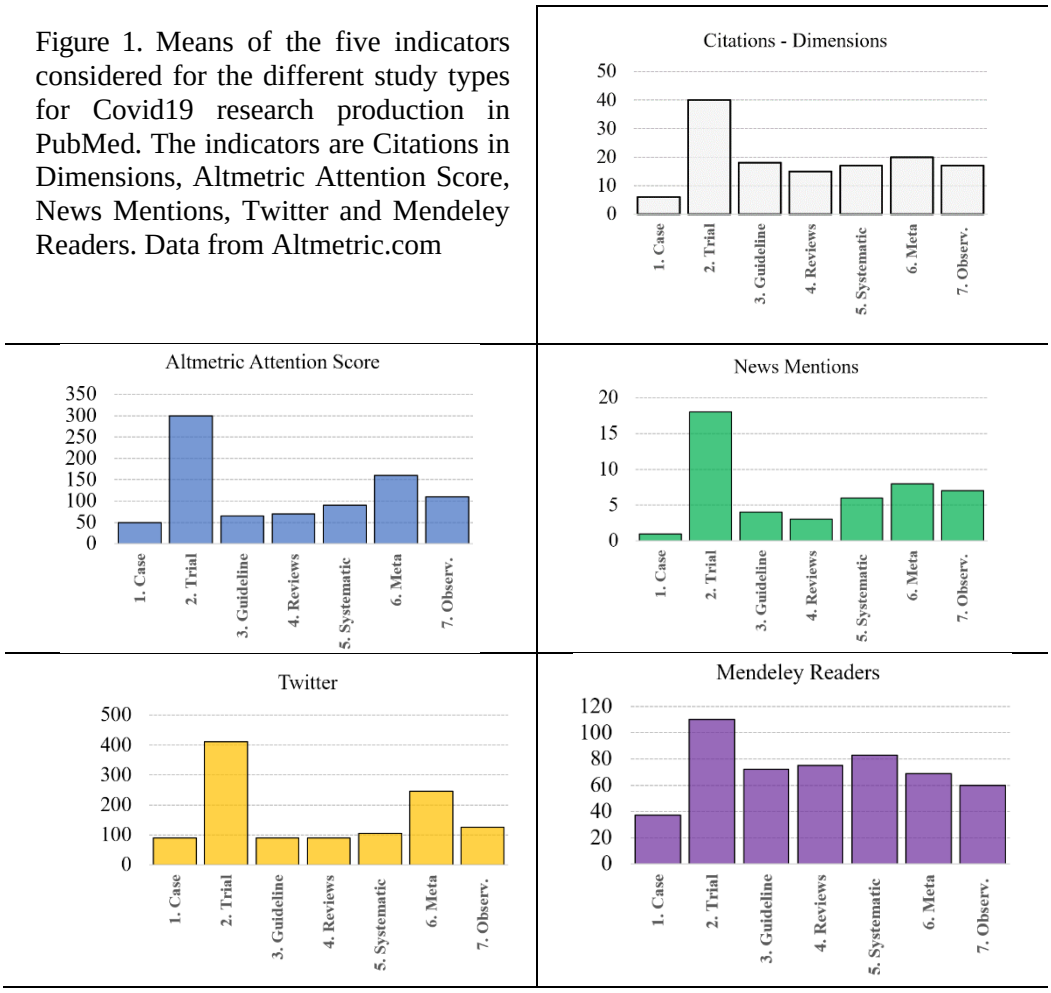

Figure 1. Means of the five indicators considered for the different study types for Covid19 research production in PubMed. The indicators are Citations in Dimensions, Altmetric Attention Score, News Mentions, Twitter and Mendeley Readers. Data from Altmetric.com

The application of the Kolmogorov-Smirnov test was significant in all cases ($p<0.001$), which indicates that the study type variables were not distributed according to the Gauss model. Therefore, comparisons between the altmetrics for the eight study types were carried out, in order to analyse how the selected indicators, behave according to each study type and as a function of the level of the "pyramid" of scientific evidence (Figure 2), by means of the Kruskal-Wallis test, resulting in $p<0.001$, meaning there were significant differences among the altmetrics of each study type. The Twitter platform harvested the highest number of mentions, followed by the Altmetric Attention Score, Mendeley readers, and far behind, Dimension citations and News mentions. A cross-tabulation between Study type and altmetrics, collecting the joint frequencies, is shown in Table 2. The chi-square test of independence was also significant ($\chi^2=136{,}128.95$; $p<0.001$), so the null hypothesis was rejected, admitting that there is an association between the two.

Table 2. Cross-tabulation of joint frequencies between altmetric and study type

Study type	Indicators				
	Altmetric Attent. Score	News mentions	Twitter mentions	Mendeley readers	Dim. citations
1. Case Report	84,410	2,371	138,225	51,500	9,723
2. Clinical Trial	229,425	14,002	320,017	85,071	30,616
3. Consensus Guideline	5,035	243	6,315	5,252	1,243
4. Reviews	330,780	13,128	526,306	424,562	77,842
5. Systematic Rev	47,562	2,929	58,451	44,617	8,209
6. Meta-Analysis	22,268	1,016	32,419	8,901	2,578
7. Observ. Study	157,331	9,993	201,869	88,071	20,918

Conclusion

More than half of the News mentions are not analyzed because period studied is very recent, while volume of information about Covid-19 is high. Scientific evidence Pyramid (Kowalcyk and Truluck, 2013; Murad et al., 2016) is well reflected by the Altmetric Attention Score. At the forefront we find Consensus development conferences & guidelines (3), given their great utility in a period of such uncertainty about the pandemic and the fact that they are usually backed by international organizations.

Consensus development conferences are a way to bring together citizens, decision-makers and experts to address issues of public importance. Involve a series of experts who deliver scientific evidence on a subject. This category is followed by Clinical trials (2), at the peak of the pyramid of scientific evidence, since their results are highly valid (Lazcano-Ponce et al., 2004) and it can be considered the flame of scientific knowledge. Behind these two are the Systematic reviews (6) and Meta-analyses (7), with similar values.

On the other hand, Systematic review attempts to gather all available empirical research by using clearly defined systematic methods to obtain answers to a specific question. A meta-analysis is the statistical process of analyzing and combining results from several similar studies (Harris et al., 2014). Reviews (5), in addition to their educational component, are hypothesis generators, which is very important to analize a new topic such as Covid-19 (Valderrama et al., 2021). The lowest values in all the altmetrics were Case reports (1); although they are useful to start a clinical investigation, is the base of the pyramid. The graphic trends of Twitter mentions and the Altmetric Attention Score are nearly identical, due to AAS collects the 95% of Twitter mentions.

We can conclude that altmetric in biomedical research, specifically in the covid research front, could be highly determined by the type of study, and that altmetric can capture the utility or altmetric at attention marker.

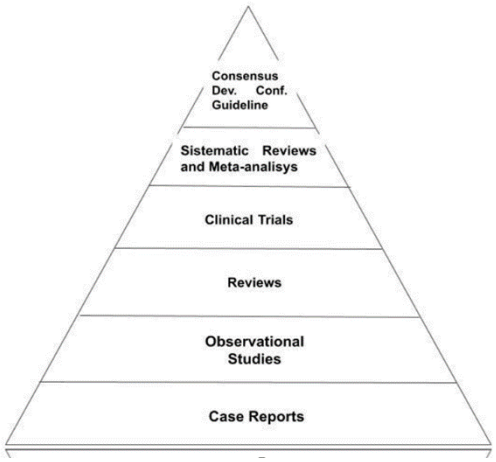

Figure 2. Pyramid adapted from Evidence-Based Medicine by University of Washington Health Sciences Library (Kowalczyk and Truluck, 2013) and from Murad et al. (2016)

* *It has been considered that the consensus conferences and the guidelines, if they have been based on systematic reviews and meta-analyses, could be placed in the highest part of the scientific pyramid, since they are forms of synthesis of information for clinical application.*

References

Arroyo-Machado, W., Torres-Salinas, D. & Robinson-Garcia, N (2021). Identifying and characterizing social media communities: a socio-semantic network approach to altmetrics. *Scientometrics*, 126, 9267–9289

Colavizza, G., Costas, R., Traag, V.A., van Eck, N.J., van Leeuwen, T., y Waltman, L. (2021) A scientometric overview of CORD-19. *PLoS ONE*, 16(1), e0244839.

Harris, J.D., Quatman, C.E., Manring, M.M., Siston, R.A. y Flanigan, D.C. (2014). How to write a systematic review. *American Journal of Sports Medicine*, 42(11), 2761-2768.

Kowalczyk, N. y Truluck, C. (2013): Literature reviews and systematic reviews: What is the difference? *Radiologic Technology*, 85(2), 219-222.

Lazcano-Ponce, E., Salazar-Martínez, E., Gutiérrez-Castrellón, P., Angeles-Llerenas, A., Hernández-Garduño, A. y Viramontes, J.L. (2004). Ensayos clínicos aleatorizados: variantes, métodos de aleatorización, análisis, consideraciones éticas y regulación. *Salud Pública de México*, 46(6), 559-584.

Murad, M.H., Asi, N., Alsawas, M. y Alahdab, F. (2016). New evidence pyramid. *BMJ Evidence-Based Medicine*, 21, 125–127.

Nane, G.F., van Schalkwyk, F., Dudek, J., Torres-Salinas, D., Costas, R., Robinson-Garcia, N. (2021). The Role of Scientific Output in Public Debates in Times of Crisis: A Case Study of the Reopening of Schools During the COVID-19 Pandemic. *Communication and Resilience during Pandemics. David M. Berube (Ed.).*

Priem, J., Taraborelli, D., Groth, P. y Neylon, C. (2010), Altmetrics: A manifesto, 26 October 2010. http://altmetrics.org/manifesto

Torres-Salinas, D. (2020). Ritmo de crecimiento diario de la producción científica sobre Covid-19. Análisis en bases de datos y repositorios en acceso abierto. *Profesional De La información*, 29(2), e290215.

Torres-Salinas, D., Arroyo-Machado, W., & Robinson García, N. (2020). Una mirada alternativa a la producción científica de la Sociología Española ¿Qué nos dicen las altmetrics? Tech. Rep (Digibug).

Torres-Salinas, D., Robinson-García, N., Castillo-Valdivieso, P. Open Access and Altmetrics in the pandemic age: Forescast analysis on COVID-19 related literature.
Yu, Y., Li, Y., Zhang, Z., Gu, Z., Zhong, H., Zha, Q., Yang, L., Zhu, C., & Chen, E. (2020). A bibliometric analysis using VOSviewer of publications on COVID-19. *Annals of translational medicine*, 8(13), 816.

Valderrama, P., Baca, P., Solana, C., & Ferrer-Luque, C. M. (2021). Root Canal Disinfection Articles with the Highest Relative Citation Ratios. A Bibliometric Analysis from 1990 to 2019. *Antibiotics*, 10(11), 1412.