

## *Do open acces journal articles experience citation advantage? A study in college*

Singgih Sugiarto, Thomas Sixtus Iswahyudi Hari Widodo<sup>ID</sup>,  
Suyanto

*Publishing and Academic Publications, University of Surabaya, Indonesia*

### **Abstract**

**Background of the study:** Implementation open access (OA) have pushed journal articles become more visible and increase in citations of articles. Whether it is the general case for authors in all university?.

**Purpose:** The aim of this study is to analyze the advantage of OA on numbers of citations of article journals published by authors from Universitas Surabaya, Indonesia.

**Method:** The methods of analysis employed are descriptive analysis and independent sample t-test.

**Findings:** The results showed three key findings, those are (1) the number of Scopus indexed OA articles at Universitas Surabaya is increased by 23% in 2022, (2) the majority of article publications are in OA journals, representing 70% of the 514 articles in question. (3) The t-test results indicated a significant difference with a value of  $t = 0.022$  and a significance level of  $p < 0.05$ . Specifically, the number of citations was found to be higher in articles published in non-OA access journals than those in published in OA journals.

**Conclusion:** The number of citations is not only affected by OA feature but also influenced by various factors, such as the reputation (quartile) of the journal, the scope of research collaboration, and the number of authors.

**Keywords:** scopus, sinta, citation, open-access, non-open-access

**Paper Type:**

*Research Paper*

Submitted: 27 February 2024

Revised: 6 March 2024

Accepted: 10 August 2024

Online: 4 December 2024

\*Correspondence:  
Suyanto

E-mail:  
[suyanto@staff.ubaya.ac.id](mailto:suyanto@staff.ubaya.ac.id)

## Introduction

The term "world-class university" has become a topic of interest for many academic institutions around the world. It has gained prominence as a key indicator in the Science and Technology Index (SINTA) portal, which is used to rank and cluster universities in Indonesia. In general, a world-class university refers to a prestigious research university ([Utama et al., 2019](#)). To achieve World-class university (WCU), scientific publications are crucial. They are the main target of research universities for transferring, developing, and renewing science and technology ([Lianto, 2023](#)). Outputs in the form of scientific publications and intellectual property rights (IPR) serve as the primary performance indicators of research universities leading to WCU ([Wardani, 2012](#)).

Research is one of the three pillars of lecturer performance evaluation and the finding should be disseminated or published ([Suhartono et al., 2017](#)). The Indonesian government has set a policy to develop science, technology, and art through the publication of research results in journals ([Iskandar et al., 2021](#)). This will not only enhance the university's reputation but also contribute to the accreditation of study programmes and institutional accreditation.

The Indonesian government has implemented a policy, outlined in Permenristekdikti No. 20/2017, to provide professional allowances for lecturers and honorary allowances for professors. To be eligible for these allowances, one must publish in reputable international journals indexed by Scopus or Web of Science (WoS). Scopus, which boasts a comprehensive scientific information database, is highly regarded by universities, research institutions, governments, and researchers worldwide ([Utama et al., 2019](#)).

In Indonesia, lecturers often prioritize the use of Scopus as a research platform due to its comprehensive information ([Aziz, 2019](#)). Additionally, some consider publishing research in Scopus indexed journals as a marker of academic excellence ([Dharma, 2019](#)). Scopus is a database of abstracts of scholarly journal articles, conference papers, books and citations, curated by independent subject experts, launched by Elsevier on 15 March 2004 ([Suyitno, 2023](#)).

Scopus is unique in that it not only provides data on titles, abstracts, journals, keywords, and subjects, but also offers an analysis of authors' performance, complemented by citation data on scientific works from around the world. This allows for an overview of the impact of scientific work and its usefulness for further scientific development ([Aziz, 2019](#)). The strengths of the Scopus database include 90,000,000 documents since 1788, 7,000 publishers of international repute, 94,000 institutional profiles, 17,000,000 author profiles and 1,800,000,000 citations since 1970 ([Scopus, 2023](#)).

The Budapest Open Access Initiative (BOAI) was established concurrently with the inauguration of the Scopus portal in early 2000. BOAI advocates for the accessibility of journal articles through the concept of open access (OA). In their study, Leslie Chan and colleagues posit that OA publishing leads to a notable and quantifiable enhancement in both the impact and visibility of peer-reviewed journal articles. ([GESIS - Leibniz Institute for the Social Sciences, 2004](#)).

The potential for OA to provide a citation advantage has been the subject of several studies as early as 2000 (e.g. [Lawrence, 2001](#); [Antelman, 2004](#); [Kurtz et al., 2005](#); [Hajjem et al., 2006](#); [Sotudeh & Horri, 2009](#)). The readership of OA articles is larger than that of articles published in non-OA outlets. This is because access to OA articles is not restricted by a "paywall," and thus the readership of OA articles includes anyone with access to the internet ([Harnad et al., 2008](#)). OA journals are free to read online on the publisher's website or repository ([Piwowar et al., 2018](#)). One of the benefits of OA journals is the rapid electronic publication process ([Yang & Zheng, 2009](#)).

The transformation of printed journals into electronic journals (e-journals) with the



concept of OA has made OA journals more visible and accessible, resulting in an increase in citations and the impact factor of research results (Lukman et al., 2012). It can be reasonably assumed that researchers will utilize and cite articles that are readily accessible. Therefore, it can be posited that an increase in the readership of an article may potentially influence the number of citations (Cullen & Chawner, 2011). Additionally, studies have demonstrated that OA journals have a higher average citation rate than non-OA journals (Craig et al., 2007). Research conducted in the last decade has shown that freely available scientific articles on the internet receive more citations than paid articles (Swan, 2010; Wagner, 2010).

Citation is a crucial tool for evaluating research quality through journal or university impact indicators (Åström & Sándor, 2009). It is one of the 13 indicators used by the Times Higher Education World University Rankings (THE WUR) to determine rankings for both public and private universities (Lukman et al., 2012). Prior research has demonstrated the superiority of OA articles with respect to freedom of access, which has been shown to increase the number of citations. The objective of this study is to present an overview of the quantity and quality of lecturer articles at the Universitas Surabaya in reputable international journals indexed by Scopus. Additionally, this study aims to ascertain whether there are differences in the number of citations between articles published in OA journals and those published in non-OA journals, taking into account factors such as the number of authors, scope of collaboration, and journal reputation.

## Method

### *Research type*

This study employs a descriptive, quantitative approach and a t-test.

### *Population and sample*

The population of this study consisted of Scopus-indexed articles written by faculty members from various academic departments at the Universitas Surabaya, including the faculties of pharmacy, law, business economics, psychology, engineering, technology, and medicine. The purposive sampling technique is typically employed to select samples based on predetermined criteria and characteristics. In this study, the sample criteria consisted of Scopus-indexed journal articles written by authors with Scopus IDs and SINTA IDs whose home base is affiliated with the Universitas Surabaya. The articles were published between 2021 and 2022, and the citations were identified in the same period.

### *Research location*

The research location is the Universitas Surabaya.

### *Data collection*

The data on the number of articles and citations of articles by Universitas Surabaya authors were downloaded from the SINTA portal. The technique used to identify the type of journal access (OA or non-OA) is based on article metadata on the Scopus portal. The technique employed to calculate the number of articles and citations is single counting.

### *Data analysis*

The study employed descriptive quantitative analysis and independent sample t-test to analyse the data. Descriptive quantitative analysis was used to illustrate the trend and composition of publications. Meanwhile, independent sample t-test was used to determine the significance of the difference in the number of citations between journal articles published in AO journals and those published in non-OA journals. The independent sample t-test utilises a



significance level of 0.05 ( $\alpha = 5\%$ ). It is a statistical test that aims to determine the difference in the average value of two independent or unpaired groups. If the p-value is greater than 0.05, there is no significant difference in the number of citations between the two types of journal access. However, if the p-value is less than 0.05, there is a significant difference in the number of citations between the two types of journal access.

## Result and Discussion

Universitas Surabaya has been affiliated with Scopus since 1982 and currently has 695 authors with 1,053 indexed documents, including journal articles, conference articles, and books. In the years 2018-2022, 514 journal articles were published by 143 authors affiliated with Universitas Surabaya and indexed in Scopus and SINTA.

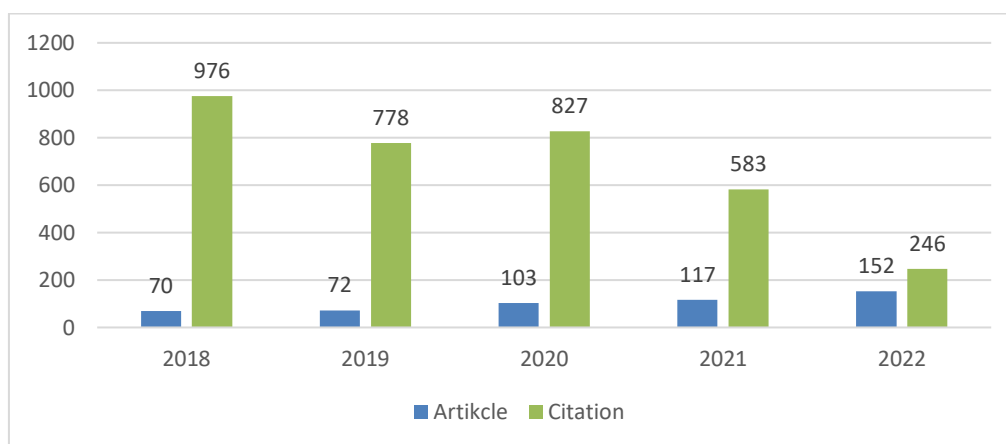


Figure 1. Shows the number of journal articles indexed on Scopus and the citations received by authors affiliated with Universitas Surabaya between 2018 and 2022. (The data was obtained from Scopus and SINTA on 21 April 2023).

The number of Scopus-indexed journal articles published by the author from Universitas Surabaya has increased rapidly, as shown in Figure 1. The most significant growth occurred in 2022, with a 23% increase from the number of journal articles achieved in 2021, which was 117. Between 2018 and 2022, Universitas Surabaya published a total of 514 Scopus-indexed journal articles, which received a total of 3,410 citations. On average, each article published between 2018 and 2022 received seven citations.

Figure 1 illustrates that articles published in Scopus-indexed journals received a considerable number of citations in 2018, with an average of 14 citations per article per year. The data set comprises 70 articles and 976 citations. It is notable that articles tend to be widely read and cited by researchers three years after their initial publication (Yang & Zheng, 2009). Consequently, articles published in 2018 received a greater number of citations than articles published in 2019, 2020, 2021, and 2022.

In 2022, Scopus-indexed journal articles have the lowest citation value, with a tendency for one article to receive only two citations. This is a common pattern, as most publications receive few citations at the beginning of their publication and then gradually increase until they reach a maximum, after which they decrease until there are no further citations. This citation pattern is known as the sleeping beauty citation pattern (van Raan, 2012).

The Internet and electronic publishing have given rise to a new model of scholarly communication that both complements and challenges the established system of traditional publishing (Craig et al., 2007). The movement to provide openly accessible research literature

has brought about significant changes in OA journals ([Craig et al., 2007](#)). The visibility and easy accessibility of OA journals have a positive impact on increasing citations and the impact factor of research results ([Craig et al., 2007](#)). Table 1 shows the average citations per article in OA and non-OA journals.

Table 1. Shows the number of articles and citations published by authors affiliated with Universitas Surabaya in both OA and non-OA journals between 2018 and 2022.

Acces	Article	%	Citation	%	Mean
OA	375	73%	1.951	57%	5.20
non-OA	139	27%	1.459	43%	10.50
Total	514	100%	3.410	100%	6.63

A total of 375 articles, or 73% of the total number, were published in OA journals indexed by Scopus, while non-OA journals accounted for 139 articles, or 27% of the total number. This indicates a preference among authors from Universitas Surabaya to publish their articles in OA journals. The average citation value for articles published in OA journals was 5.20, with a total of 1,951 citations. Therefore, on average, articles published in OA journals receive five citations or quotes per article. In contrast, articles published in non-OA journals received 1,459 citations with an average citation value of 10.50. This indicates that non-OA journal articles tend to receive more citations than those published in OA journals. It is important to note this difference in citation acquisition between OA and non-OA journal articles.

The test for homogeneity assumption of articles published in non-OA and OA journals resulted in a p-value of 0.000 ( $p < 0.05$ ). This indicates that the homogeneity assumption test is not met, as the number of articles published in OA journals exceeds that of non-OA journals (refer to Table 1). Therefore, the independent sample t-test with equal variances assumed cannot be used as an alternative to using unequal variances.

The independent sample t-test yielded a t-value of 0.022 with  $p < 0.05$ , indicating a significant difference in the number of citations between articles published in non-OA and OA journals. The mean difference analysis revealed a positive value of 5.294, indicating that non-OA journal articles have a higher mean citation count than OA journal articles. Non-OA journal articles indexed in Scopus receive higher citations than those in OA journals.

A correlation has been demonstrated between the number of citations and the publication of articles in OA journals ([Lawrence, 2001](#)). Nevertheless, some studies have indicated that articles published in OA journals exert minimal or no influence on the number of citations ([Craig et al., 2007](#); [Basson et al., 2021](#)). Conversely, research has demonstrated that articles published in non-OA journals that are indexed by WoS or Scopus tend to have high average citation values within two years of publication.

Publishing articles in OA journals can increase visibility, but it does not always lead to an increase in citations or journal quality ([Erfanmanesh, 2017](#)). The number of citations is often influenced by the relevance and importance of the scientific work provided by other researchers in the field or subject ([Craig et al., 2007](#)).

Table 2. a cross-tabulation of journal access type, faculty, quartile, and number of articles.

Acces Journal	Faculty	Quartile				non Q	Total
		Q 1	Q 2	Q 3	Q 4		
non- OA	Pharmacy	5	4	10	1	1	21
		3,6%	2,9%	7,2%	0,7%	0,7%	15,1%



	Law	0	4	2	0	1	7
		0,0%	2,9%	1,4%	0,0%	0,7%	5,0%
	Business	10	3	5	2	0	20
	Economics	7,2%	2,2%	3,6%	1,4%	0,0%	14,4%
	Psychology	14	2	1	1	0	18
		10,1%	1,4%	0,7%	0,7%	0,0%	12,9%
	Engineering	29	12	3	3	1	48
		20,9%	8,6%	2,2%	2,2%	0,7%	34,5%
	Technobiology	4	10	4	2	0	20
		2,9%	7,2%	2,9%	1,4%	0,0%	14,4%
	Medicine	0	1	4	0	0	5
		0,0%	0,7%	2,9%	0,0%	0,0%	3,6%
	Total non-OA	62	36	29	9	3	139
		44,6%	25,9%	20,9%	6,5%	2,2%	100,0%
	Pharmacy	34	39	43	16	9	141
		9,1%	10,4%	11,5%	4,3%	2,4%	37,6%
	Law	1	1	2	2	8	14
		0,3%	0,3%	0,5%	0,5%	2,1%	3,7%
	Business	17	14	13	2	7	53
	Economics	4,5%	3,7%	3,5%	0,5%	1,9%	14,1%
	Psychology	4	2	3	1	4	14
		1,1%	0,5%	0,8%	0,3%	1,1%	3,7%
OA	Engineering	17	30	12	7	4	70
		4,5%	8,0%	3,2%	1,9%	1,1%	18,7%
	Technobiology	18	11	10	7	2	48
		4,8%	2,9%	2,7%	1,9%	0,5%	12,8%
	Creative	0	1	2	0	0	3
	Industry	0,0%	0,3%	0,5%	0,0%	0,0%	0,8%
	Medicine	4	5	9	9	5	32
		1,1%	1,3%	2,4%	2,4%	1,3%	8,5%
	Total OA	95	103	94	44	39	375
		25,3%	27,5%	25,1%	12%	10%	100,0%
	Total non-OA & OA	157	139	123	53	42	514
		30,5%	27,0%	23,9%	10,3%	8,2%	100%

In Table 2, it can be observed that the area of Engineering have 48 published articles, which accounts for 35% of the 139 non-OA journal articles. On the other hand, the area of Pharmacy has published the majority of articles in OA journals, with a total of 141 articles, accounting for 38% of the 375 OA journal articles. Additionally, authors from the area of Engineering have dominated publications in non-OA journals with Q1 status, with 29 articles, accounting for 21% of the 139 non-OA journal articles. Meanwhile, authors from Pharmacy tend to publish their articles in open access journals with Q3 status. This accounts for 43 out of 375 OA journal articles, or 12%.



Table 3. a Cross-tabulation of journal access type, quartile, number articles, and number citations

Acces Journal	Quartile	Article	%	Citation	%	Mean
non-OA	Q1	62	45%	1.072	73%	17,29
	Q2	36	26%	267	18%	7,42
	Q3	29	21%	98	7%	3,38
	Q4	9	6%	20	1%	2,22
	non-Q	3	2%	2	0%	0,67
Total		139	100%	1459	100%	10,50
OA	Q1	95	25%	879	45%	9,25
	Q2	103	27%	581	30%	5,64
	Q3	94	25%	319	16%	3,39
	Q4	44	12%	109	6%	2,48
	non-Q	39	10%	63	3%	1,62
Total		375	100%	1951	100%	5,20
Total	Q1	157	31%	1.951	57%	12,43
	Q2	139	27%	848	25%	6,10
	Q3	123	24%	417	12%	3,39
	Q4	53	10%	129	4%	2,43
	non-Q	42	8%	65	2%	1,55
Total		514	100%	3.410	100%	6,63

Articles published in non-OA journals with Q1 status tend to receive higher citations, with an average citation value of 17.29 (see Table 3). Similarly, OA journals with Q1 status also receive higher citations, with an average citation value of 9.25. In contrast, although OA journal articles with Q2 status are dominant, accounting for 27% of the total number, their citation rate is lower than that of Q1 journals. Publications by authors affiliated with the Universitas Surabaya, published in both OA and non-OA journals with Q1 status, tend to receive a high number of citations, with an average of 12 citations per publication.

The number of citations is found to be contingent upon the reputation or quality of the journal in question (Bornmann et al., 2008). Publishing articles in highly reputable journals with a rigorous review process is believed to increase the number of citations. Impact factors and quartile rankings also affect the number of citations for both OA and non-OA journals (Koler-Povh et al., 2014). Therefore, articles published in Q1 journals tend to have higher citations.

Table 4. Cross-tabulation of faculty, quartile, and number citations

Area of Study	Q1		Q2		Q3		Q4		non-Q		Total	%
	Q1	%	Q2	%	Q3	%	Q4	%	-Q	%		
Pharmacy	243	12%	142	17%	194	47%	52	40%	18	28%	649	19%
Law	0	0%	10	1%	3	1%	1	1%	7	11%	21	1%
Business Economics	291	15%	253	30%	44	11%	4	3%	21	32%	613	18%



Psychology	113	6%	36	4%	7	2%	2	2%	1	2%	159	5%
Engineering	106	55%	223	26%	37	9%	9	7%	0	0%	1338	39%
Biotechnology	221	11%	130	15%	79	%	44	34%	16	25%	490	14%
Creative Industry	0	0	1	0%	0	0%	0	0%	0	0%	1	0%
Medicine	14	1%	53	6%	53	%	17	13%	2	3%	139	4%
$\Sigma$	195	100	100	100	10	100	100	100	100	100	100	100
	1	%	848	%	417	0%	129	%	65	%	3410	%

Articles published in journals with Q1 status tend to receive more citations than those published in journals with Q2, Q3, Q4, or non-Q status. According to Table 4, articles published in Q1 journals by authors from the Universitas Surabaya received the majority of citations, with 1951 citations or 57% of the total number of citations between 2018 and 2022. On average, each article by authors that published in a Q1 journal received 12 citations. In the Engineering science, the number of citations are mostly in Q1 journal, with 1069 citations or 55% of the total.

Table 5. Composition of Scopus-indexed journals by quartile and access type (Source: www.Scopus.com)

Q	OA	%	non-OA	%	Total	%
Q1	1.504	26%	6.756	33%	8.260	32%
Q2	1.628	29%	5.200	26%	6.828	26%
Q3	1.529	27%	4.489	22%	6.018	23%
Q4	1.041	18%	3.774	19%	4.815	19%
$\Sigma$	5.702	100%	20.219	100%	25.921	100%

Out of the 25,921 journal articles listed in Table 5, there are 8,260 or 32% articles have Q1 status, providing a significant opportunity for high citations. Q2 status is dominant among OA journals, with 1,628 or 29% of the total number of OA journals. Non-OA journals with Q1 status make up 6,756 or 33% of the total number of non-OA journals. The percentage of Scopus indexed journals with Q1 status that are non-OA is 26%, which is a dominant number out of 25,921 journals.





Table 6. Cross-tabulation of authorship, number of authors, collaboration, articles, and citations.

		Internasional			Nasional			Institusiion			Total		
		Article	Citation	Mean	Article	Citations	Mean	Article	Citation	Mean	Artcle	Citation	Mean
cA	≤ 3	10 23%	120 18%	12	22 20%	150 15%	7	13 33%	15 15%	1	45 23%	285 16%	6
	≥ 4	33 77%	557 82	17	89 80%	829 85%	9	26 67%	85 85%	3	148 77%	1471 84%	10
	Total	43 100%	677 100%	12	111 100%	979 100%	7	39 100%	100 100%	1	193 100%	1756 100%	9
1st	≤ 3	40 38%	319 38%	8	44 42%	145 44%	3	68 61%	373 77%	6	152 47%	837 51%	6
	≥ 4	65 62%	524 62%	8	61 58%	181 56%	3	43 39%	112 23%	3	169 53%	817 49%	5
	Total	105 100%	843 100%	8	105 100%	326 100%	3	111 100%	485 100%	4	321 100%	1654 100%	5
Σ	≤ 3	50 34%	439 29%	8,8	66 31%	295 23%	5	81 54%	388 66%	5	197 38%	1122 33%	6
	≥ 4	97 66%	1081 71%	11	150 69%	1010 77%	7	69 46%	197 34%	3	317 62%	2288 67%	7
	Total	148 100%	1520 100%	10	216 100%	1305 100%	6	150 100%	585 100%	4	514 100%	3410 100%	7

\*cA represents co-author; 1<sup>st</sup> refers to first author; ≤ 3 is number of authors less than 3; ≥ 4 represents number of authors more than 4; International refers to international collaboration; National stands for national collaboration; Institutional is a collaboration of colleagues at the Universitas Surabaya..

Table 6 illustrates the distribution of authorship roles at the Universitas Surabaya, delineating the contributions of first authors and co-authors. The first author, in particular, has produced a substantial body of work, comprising 321 articles and garnering 1,654 citations with an average score of five. In comparison, co-authors have collectively authored 193 articles and received 1,756 citations with an average score of nine. Notably, articles with Universitas Surabaya authorship, whether as first authors or as co-authors, have demonstrated a higher average citation score than articles solely attributed to first authors.

The number of authors exceeding four individuals tends to receive a greater number of citations than the number of authors comprising three individuals, with an average of seven citations per article. This is due to the fact that the number of authors on an article affects the number of citations ([Mingers & Leydesdorff, 2015](#)). Furthermore, other empirical evidence indicates that publications with multiple authors are more visible and impactful, resulting in higher citation rates than publications with a single author ([Abramo & D'Angelo, 2015](#)). Conclusion, articles with more than four authors are more likely to be cited.

The authors from the Universitas Surabaya collaborate with other authors from institutions both nationally and internationally to publish journal articles. The publication with international collaborators resulted in 148 articles and 1,520 citations, with an average citation value of 10. National collaboration resulted in 216 articles and 1,305 citations, with an average citation value of six. Local collaborations have produced 150 articles, which have been cited 585 times with an average citation score of four.

Research has widely investigated the importance of international collaboration on the number of citations. The results show a positive correlation or significant effect on the number of citations ([Alamah et al., 2023](#)). International collaborations with a high number of citations increase the visibility and interconnectedness of research. International collaborative publications have a higher average citation value than national and institutional collaborations ([Ibáñez et al., 2013](#)). The citation count for publications by authors from the Universitas of Surabaya is higher when there is international collaborators compared to those with national and institutional collaborators.

## Conclusion

The distinction between OA and non-OA journals pertains solely to the journal's business processes and has a negligible effect on the number of citations. In contrast, the number of citations is predominantly shaped by the prestige of the journal in question, the number of authors contributing to each article, and the nature of the collaboration involved in the publication process. The findings of this study have practical implications for Universitas Surabaya, offering insights into strategies to increase citations through policies that can enhance the quantity and quality of reputable international publications. This study also offers a theoretical contribution, indicating that articles published in Q1 journals and international collaborations involving more than four authors tend to receive higher citation rates. However, it is important to note that the scope of this study is limited to authors affiliated with the Universitas Surabaya. Consequently, further research should be conducted using a sample of OA and non-OA articles from various universities of national or international scope.

## Acknowledgments

We would like to acknowledge and thank all those who have given valuable contributions to this study.

## Authors' Contributions

All authors have contributed to the final manuscript. The contribution of all authors:



conceptualization, methodology, formal analysis, writing original draft preparation, writing review, and editing. All authors have read and agreed to the published version of the manuscript.

### Conflict of Interest

All authors have no conflict of interest related to this study.

### Funding

This study did not receive any funding.

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