

Bibliometric analysis of highly cited papers on oral mucosal lesions in COVID-19: Trends and impact in medical literature

Namrata Sengupta, Gargi Sarode, Rahul Anand, Sachin C. Sarode*

Department of Oral Pathology and Microbiology, Dr. D.Y. Patil Dental College and Hospital, Dr.D. Y. Patil Vidyapeeth, Pimpri, Pune, 411018, India

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ABSTRACT

Objective: Bibliometric analysis of highly cited papers facilitates researchers in formulating strategic research possibilities and addressing gaps in specific domains. In this context, a bibliometric analysis was conducted to identify published papers on “oral mucosal lesions in COVID-19” within medical literature.

Methods: A comprehensive search was performed in the Scopus database in July 2023. Relevant articles were retrieved, reviewed, and data for the bibliometric analysis was recorded. Network visualization of authors, countries, and keywords was generated using VOSviewer software.

Results: The analyzed articles were published over the last three years, from 2020 to 2023, with the highest output observed in 2021. The citation count for individual papers ranged from 1 to 340, with a mean of 22.325 ± 58.93 citations. A total of 37 journals were involved in publishing papers on this topic, and five authors each contributed three papers. Notably, Brazil made the highest number of contributions with eight papers. Among the 40 papers, 19 were review papers and 16 were articles discussing various aspects of oral mucosal lesions in COVID-19 patients. Additionally, six papers were identified as systematic reviews, designated with a high level of evidence.

Conclusions: This study presents a comprehensive bibliometric analysis of papers published on “oral mucosal lesions in COVID-19.” The findings will assist researchers in identifying impactful papers, understanding the prevailing research trends, and guiding future research directions in this domain. The insights gained from this analysis can contribute significantly to advancing knowledge and improving patient care in this critical area of study.

1. Introduction

COVID-19 pandemic has impacted the healthcare system and the lives of million people in the past three years. It has mainly affected the respiratory health of individuals and led to a global health crisis.¹ SARS-COV-2, the causative organism, usually enters the body by attaching to the angiotensin-converting-enzyme 2 (ACE 2) receptors.² These receptors are highly expressed in the oral mucosal tissues of tongue, buccal, gingival, and salivary duct epithelium.² Thus, the oral mucosa becomes the potential entry point and the colonizing hub of the virus leading to various oral manifestations associated with this viral infection.

Altered taste sensation or loss of sense of taste has been a principal finding in majority of the affected individuals.³ Several other oral mucosal lesions have also been reported in COVID-19 patients. Oral

ulcers, erythematous plaques, blisters, mucositis, and gingivitis are few of the observed signs and symptoms till now.^{3,4} Reports of new variants of COVID-19 emerging quite often needs clinicians to be aware of and be up to date with their knowledge of several new signs and symptoms which can affect the oral cavity in COVID-19 patients. For this, researchers and clinicians have to be updated with different studies and research going on in this field.

Bibliometric analysis of the published articles highlights the research hotspot in a particular field. Moreover, the academic impact of the published works can also be measured with the help of citation analysis which is a common bibliometric tool. Such studies have been performed in various fields like forensic odontology, dental stem cells, oral sub-mucous fibrosis, ameloblastoma, endodontics, oral cancer, maxillofacial surgery, etc.^{5–11} To our knowledge a bibliometric analysis of the published papers on “oral mucosal lesions in COVID-19 patients” has not yet

* Corresponding author. Department of Oral Pathology and Microbiology, Dr. D.Y. Patil Dental College and Hospital, Dr. D.Y. Patil Vidyapeeth, Sant-Tukaram Nagar, Pimpri, Pune, 411018, Maharashtra, India.

E-mail address: drsachinsarode@gmail.com (S.C. Sarode).

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been carried out. Therefore, this study recognizes the distinguished and impactful papers published and the progress in research achieved in this field.

2. Materials and methods

2.1. Data source

Data retrieval was done from Scopus database. It included the citation information of the published papers on oral lesions in COVID-19. Data was accessed on 12th July 2023 and thus, the citation related matrices were of this time point. Data retrieval search used the medical terms “oral mucosal lesions” and “COVID-19”. These terms were searched in keywords, titles, and text options of Scopus database. The relevant articles which were selected were arranged in a decreasing order based on their number of citations received. Even citation density was calculated (total number of citations received divided by number of years passed after publication). This matrix is used where papers receive same number of citations. The citation data was also cross matched with Google Scholar citations. Title and abstract screening were done to evaluate the relevancy of the papers to the topic. There was no limitation for time, language, and type of article.

2.2. Data extraction

Two independent authors analyzed the selected articles. The bibliometric analysis data was noted. This included article title; publication year; number of citations and citation density; journal name, category, impact factor and quartile; author details and country; type of document; affiliations and funding sponsors; levels of evidence. Any disagreement between the two authors was solved by consulting the third author.

Collaboration of authors, organization and countries and keyword co-occurrence network was developed with the help of VOSviewer software (Version 1.6.13; Leiden University). Maximum number of authors, organizations, and countries for each document was set at 25. Minimum number of document for author and organization was set at 2 and for country 3. For co-occurrence analysis of keywords, minimum number of occurrence of keywords was kept at 8.

3. Results

The search yielded a total of 56 articles. After evaluating the titles, a total of 40 relevant articles were retrieved. These 40 articles had an h-index of 10 with and without self-citations. The selected papers were arranged in descending order of the number of citations received ([Supplementary File 1](#)).

3.1. Citation analysis

The 40 articles, discussing oral mucosal lesions associated with COVID-19, received a total of 893 citations. The number of citations had a range from 0 (article ranks 29–40) to 340 (top article) with a mean of 22.325 (SD = 58.93) citations per article. The article “SARS-CoV-2 infection of the oral cavity and saliva” received the highest citation of 340. Two articles titled “Oral mucosal lesions in a COVID-19 patient: New signs or secondary manifestations?” and “Oral Manifestations in Patients with COVID-19: A Living Systematic Review” received more than 100 citations. Three articles received more than 30 citations and the next three articles in the rank list received more than 20 citations.

The top cited article had the highest citation density (170). It was an article named “SARS-CoV-2 infection of the oral cavity and saliva” which was published by Huang N et al. in Nature Medicine journal in the year 2021. The second highest citation density (60) was received by a systematic review titled “Oral Manifestations in Patients with COVID-19: A Living Systematic Review” published by Amorim dos Santos J.

et al., in 2021 in Journal of Dental Research. A short survey titled “Oral manifestations of coronavirus disease-19: A mini-review” received the lowest citation density of 0.33. It was published in the journal Open Access Macedonian Journal of Medical Sciences in the year 2020 by Mortazavi H. et al. The article rank numbers 29–40 were published in the years 2021, 2022 and 2023 and received no citations till date. Hence, calculation of their citation density was not possible.

3.2. Journal analysis

Total 37 journals published the 40 articles related to oral lesions in COVID-19 ([Table 1](#)). The 3 journals “Journal of Dental Research”, “Oral Diseases” and “Reviews in Medical Virology” contributed two articles each in the selected list. The remaining articles contributed one article each.

Majority of the papers were published in the subject area of Medicine (n = 29) followed by Dentistry (n = 13) and Immunology and Microbiology (n = 3).

Out of all the 37 journals, 9 (24 %) journals were in the first quartile, 9 (24 %) in second quartile, 7 (19 %) in third quartile and 7 (19 %) in the fourth quartile. Quartile was not assigned for 2 journals [Journal of Pharmaceutical Negative Results and Open Access Macedonian Journal of Medical Sciences] and not available for 3 journals [Clinical Dentistry Russia, Infectious Medicine and Stomatologia].

The impact factors (IFs) of 37 journals which contributed the relevant papers ranged from 0.01 to 87.244 (mean 4.626 ± 14.2438). The IFs of four journals [Clinical Dentistry Russia, Infectious Medicine, Journal of Orofacial Sciences and Stomatologia] were not available in SCI journal list. The journal which had the highest IF (87.244) was Nature Medicine. This journal contributed only a single article titled “SARS-CoV-2 infection of the oral cavity and saliva” which was authored by Huang N et al. and published in 2021. This article also received the highest number of citations (340). The journal with the lowest IF (0.01) was Acta Anaesthesiologica Belgica. It contributed one article titled “Clinical Manifestations of oral mucosa lesions in patients with SARS-CoV-2 infection” published in 2022 and authored by Manrikyan G.E et al. One journal (Reviews in Medical Virology) had IF above 10 and three journals (Frontiers in Medicine, Journal of Dental Research, International Journal of Infectious Diseases) had IFs above 5. Majority of the contributing journals (n = 17, 46 %) had an IF of 2 and below.

Out of 40, 36 articles were published in English language and the remaining 4 in different languages. These articles were published from the year 2020–2023 ([Table 2](#)). The maximum output was in the year 2021 which produced 21 papers followed by the year 2022 (n = 13). 4 papers got published in 2020 and 2 in 2023.

3.3. Authors and countries of origin

Total 160 authors were associated with publication of 40 papers on oral lesions seen in COVID-19. The number of authors associated with a particular paper ranged from one (2 papers) to fifty-two (1 paper). Five papers had two authors associated with them. Six papers had three authors and five had four authors associated with them. The remaining papers had 5 or more authors associated with them.

Of these 40 papers, five authors contributed 3 papers each ([Table 3](#)). Amorim dos Santos, J., Carvalho da Silva, R.L., Guerra, E.N.S., Normando, A.G.C. and Santos-Silva, A.R. were the five authors to contribute 3 papers each in the list of 40 papers. The authors Acevedo, A.C., De Luca Canto, G. and Sugaya, N. had a contribution of 2 papers each. The remaining authors contributed 1 paper each. For co-authorship network analysis, minimum document of an author was set at 2. Out of total 171 authors, eight authors met the threshold level. The total link strength, representing the cumulative number of joint publications between authors, was found to be 18 (Amorim dos santos j., Carvalho da silva r.l., Guerra e.n.s., Normando a.g.c., and Santos-silva a.r.) and 14 (Acevedo a.c., de luca canto g., and sugaya n.) ([Fig. 1](#)).

Table 1

Top journals with their individual contribution to the highly cited articles on oral mucosal lesions in COVID-19.

| SR. NO. | JOURNAL NAME | IMPACT FACTOR (2022–2023) | QUARTILE | CATEGORY/IES | NUMBER OF ARTICLES |
|---------|--|---------------------------|--------------|--|--------------------|
| 1. | Journal Of Dental Research | 8.924 | 1 | Dentistry | 2 |
| 2. | Oral Diseases | 4.068 | 1 | Dentistry, Medicine | 2 |
| 3. | Reviews In Medical Virology | 11.043 | 1 | Immunology & Microbiology, Medicine | 2 |
| 4. | Acta Anaesthesiologica Belgica | 0.01 | 4 | Medicine | 1 |
| 5. | Acta Otorhinolaryngologica Italica | 2 | 2 | Medicine | 1 |
| 6. | Actas Dermo Sifiliograficas | 0.279 | 3 | Medicine | 1 |
| 7. | British Journal of Oral and Maxillofacial Surgery | 2.018 | 2 | Dentistry, Medicine | 1 |
| 8. | Clinical Dentistry Russia | NA | NA | NA | 1 |
| 9. | Clinics In Dermatology | 2.797 | 2 | Medicine | 1 |
| 10. | Dentistry Journal | 2.6 | 2 | Dentistry | 1 |
| 11. | Dermatologic Therapy | 3.6 | 1 | Medicine | 1 |
| 12. | Egyptian Journal of Otolaryngology | 0.42 | 4 | Medicine | 1 |
| 13. | Frontiers In Medicine | 9.927 | 1 | Medicine | 1 |
| 14. | Frontiers Of Oral and Maxillofacial Medicine | 0.47 | 3 | Dentistry, Medicine | 1 |
| 15. | Indian Journal of Otolaryngology and Head and Neck Surgery | 1.22 | 3 | Medicine | 1 |
| 16. | Infectious Medicine | NA | NA | NA | 1 |
| 17. | International Journal of Dentistry | 2.1 | 2 | Dentistry | 1 |
| 18. | International Journal of Environmental Research and Public Health | 4.614 | 2 | Environmental Science, Medicine | 1 |
| 19. | International Journal of Infectious Diseases | 6.7 | 1 | Medicine | 1 |
| 20. | International Medical Case Reports Journal | 0.248 | 3 | Medicine | 1 |
| 21. | Journal of Clinical and Experimental Dentistry | 0.403 | 2 | Dentistry | 1 |
| 22. | Journal of Clinical Medicine | 3.9 | 1 | Medicine | 1 |
| 23. | Journal of Datta Meghe Institute of Medical Sciences University | 0.166 | 4 | Medicine | 1 |
| 24. | Journal of Orofacial Sciences | NA | 4 | Dentistry | 1 |
| 25. | Journal of Pharmaceutical Negative Results | 0.128 | Not assigned | Pharmacology, Toxicology & Pharmaceutics | 1 |
| 26. | Medicina Lithuania | 2.948 | 2 | Medicine | 1 |
| 27. | Medycyna Pracy | 1.058 | 4 | Medicine | 1 |
| 28. | Minerva Dental and Oral Science | 2 | 3 | Dentistry, Medicine | 1 |
| 29. | Nature Medicine | 87.244 | 1 | Biochemistry, Genetics & Molecular Biology, Medicine | 1 |
| 30. | Open Access Macedonian Journal of Medical Sciences | 0.257 | Not assigned | Medicine | 1 |
| 31. | Photobiomodulation Photomedicine and Laser Surgery | 1.8 | 3 | Engineering, Medicine | 1 |
| 32. | Photodiagnosis and Photodynamic Therapy | 3.577 | 2 | Biochemistry, Genetics & Molecular Biology, Medicine | 1 |
| 33. | Plos One | 3.7 | 1 | Multidisciplinary | 1 |
| 34. | Polski Merkuriusz Lekarski Organ Polskiego Towarzystwa Lekarskiego | 0.203 | 4 | Medicine | 1 |
| 35. | Special Care in Dentistry | 0.418 | 3 | Dentistry | 1 |
| 36. | Stomatologija | NA | NA | NA | 1 |
| 37. | Stomatologija | 0.328 | 4 | Medicine | 1 |

The country of first authors of each article was searched and recorded. Based on this it was noted that authors from 22 countries participated in the research of oral lesions associated with COVID-19. Brazil contributed the highest number of papers ($n = 8$) followed by India ($n = 5$) and Poland ($n = 4$). Iran and Italy contributed 3 papers each (Table 2). For country-wise network analysis, minimum document of a country was set at 3. Out of 22 countries, 5 met the threshold value. Intriguingly only two countries (Italy and Poland) with 3 and 4 documents each showed total link strength of 1.

3.4. Type of document

The analysis of document type showed 19 review papers, 16 articles, 3 letters, 1 note and 1 short survey (Table 2).

3.5. Funding sponsors and affiliations

Four organizations funded 2 articles each. Conselho Nacional de Desenvolvimento Científico e Tecnológico, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior, Ministério da Educação and Universidade de Brasília were the four organizations in the top list to fund 2 articles each. Universidade de São Paulo, Universidade de Brasília and Universidade Estadual de Campinas affiliated 3 documents each.

Universidade Federal de Santa Catarina, Shahid Beheshti University of Medical Sciences and SBUMS School of Dentistry affiliated 2 documents each (Table 2). For organization network analysis, maximum number of organization per document was set at 25 and minimum number document of an organization was limited to two. Out of total 99 organization 3 (“Brazilian Centre for Evidence Based Research, Federal University of Santa Catarina, Brazil”, “Laboratory of Oral Histopathology, University of Brazilia, Brazil”, and “Stomatology Department, School of Dentistry, University of Sao Paulo, Brazil”) met the threshold values (Fig. 2.).

3.6. Topic-wise analysis and levels of evidence

Majority of the papers discussed about different oral mucosal lesions or oral manifestations of COVID-19. Two papers were case reports on a particular oral lesion. Two papers discussed about the different therapies employed and the management of oral lesions associated with COVID-19. There was 1 paper which reported oral lesions seen post COVID-19 vaccination. Level of evidence analysis of the papers showed 6 papers of high evidence level which included systematic reviews and 9 papers as case reports and case series which were assigned an evidence level of 4.

Table 2
Distribution of the top cited articles on oral mucosal lesions in COVID-19 according to year, country, document type and affiliations.

| ITEM | DESCRIPTION | NUMBER OF ARTICLES |
|--|--|--------------------|
| Year-wise distribution of papers | 2020 | 4 |
| | 2021 | 21 |
| | 2022 | 13 |
| | 2023 | 2 |
| Country | Brazil | 8 |
| | India | 5 |
| | Poland | 4 |
| | Iran | 3 |
| | Italy | 3 |
| Type of Document | Review | 19 |
| | Article | 16 |
| | Letter | 3 |
| | Note | 1 |
| | Short Survey | 1 |
| Institutions which affiliated 2 or more articles | Universidade de São Paulo | 3 |
| | Universidade de Brasília | 3 |
| | Universidade Estadual de Campinas | 3 |
| | Universidade Federal de Santa Catarina | 2 |
| | Shahid Beheshti University of Medical Sciences | 2 |
| | SBUMS School of Dentistry | 2 |

3.7. Keywords co-occurrence analysis

All keywords were considered for the analysis with minimum number of occurrence kept at 8 keywords. Out of total 530 keywords, 21 met the threshold level. A total of 21 keywords that formed three clusters were detected in the present analysis (Fig. 3). demonstrates the keyword co-occurrence relation. The most prominent node was “COVID-19” which emerged 35 times. This was followed by “Human” (31), “SARS-

CoV-2” (29), “corona disease 2019” (21) and “Humans” (23). Surprisingly, the keyword “oral mucosal diseases”, “mouth ulcer” and “agusia” appeared only a mere 14, 13 and 11 times respectively. Cluster 1 in red mainly included “mouth ulcer,” “mouth disease,” “mouth cavity,” “oral mucosal diseases,” “agusia” and “xerostomia”. It reflected the researchers’ focus on oral manifestation of COVID-19. Cluster 2 in green constituted “COVID-19,” “Human,” “SARS-CoV-2,” and “pandemic”. Cluster 3 in blue primarily covered “Adult,” “male,” and “female”. Cluster 3 indicated the oral manifestation of COVID-19 mainly in adult population (Fig. 3).

4. Discussion

Various bibliometric tools are employed by researchers to explore the impact of papers published and research progress in a specific field. Bibliometric analysis of papers helps to identify the significant research works, the impactful researchers and the high-impact research papers published.^{5,6} Citation analysis, a bibliometric tool, specifically highlights the significant papers published in a certain field.^{5,6} Papers receiving 100 or more citations are marked as classic papers.¹² This bibliometric study identified three papers which has received more than 100 citations and can be considered as classic research papers. To receive more than 100 citations in a span of 3 years shows the impact of these papers in the field and it even depicts the considerable amount of research going on related to COVID-19 and oral health. These classic papers support young researchers and clinicians to be well-acquainted with the existing and new knowledge.

High-impact factor journals are usually preferred by authors for publishing their research papers.^{7,13} The high IF journals also have a propensity to publish high quality papers.^{7,13} A positive correlation between citation frequency and IFs of journals has been observed in the previous bibliometric studies.^{14,15} However, the observation seen in this study is in contrast with that of the previous reports. Out of the 37 contributing journals, only 1 journal (Nature Medicine) had a very high

Table 3
Authors with at least 3 articles in the top list.

| SR. NO. | NAME OF AUTHOR | FIRST AUTHOR | CO-AUTHOR | LAST AUTHOR | TOTAL | CITATIONS | TOTAL LINK STRENGTH |
|---------|-------------------------|--------------|-----------|-------------|-------|-----------|---------------------|
| 1. | Amorim dos Santos, J. | 3 | – | – | 3 | 283 | 18 |
| 2. | Carvalho da Silva, R.L. | – | 3 | – | 3 | 283 | 18 |
| 3. | Guerra, E.N.S. | – | – | 3 | 3 | 283 | 18 |
| 4. | Normando, A.G.C. | – | 3 | – | 3 | 283 | 18 |
| 5. | Santos-Silva, A.R. | – | 3 | – | 3 | 283 | 18 |

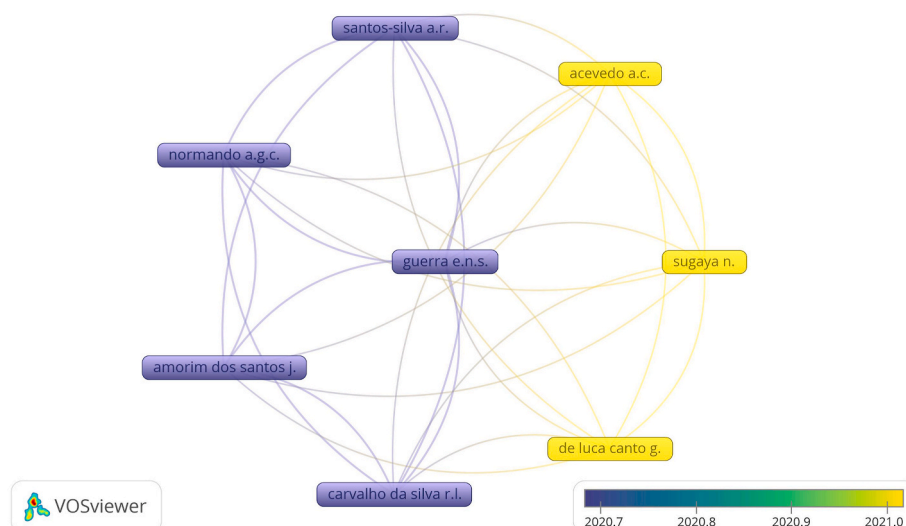


Fig. 1. Coauthor network analysis in the top-cited papers.

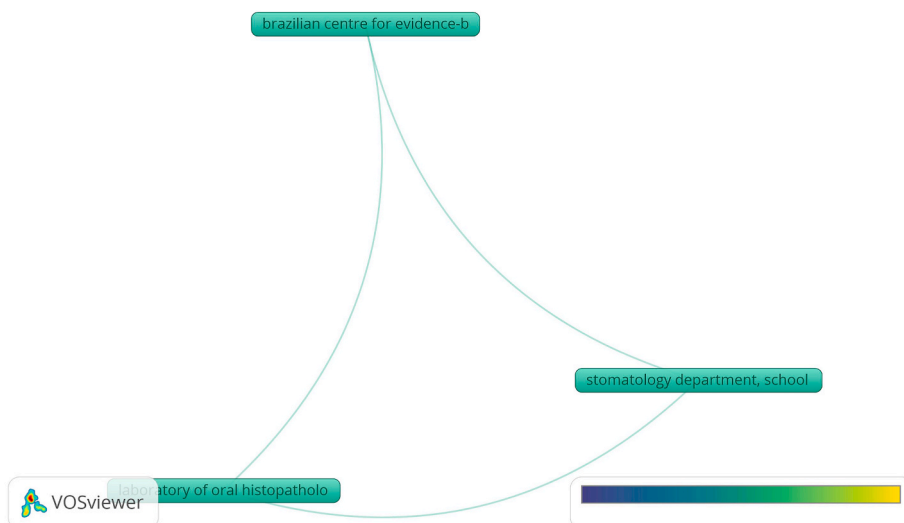


Fig. 2. Organization collaboration network analysis in top-cited papers.

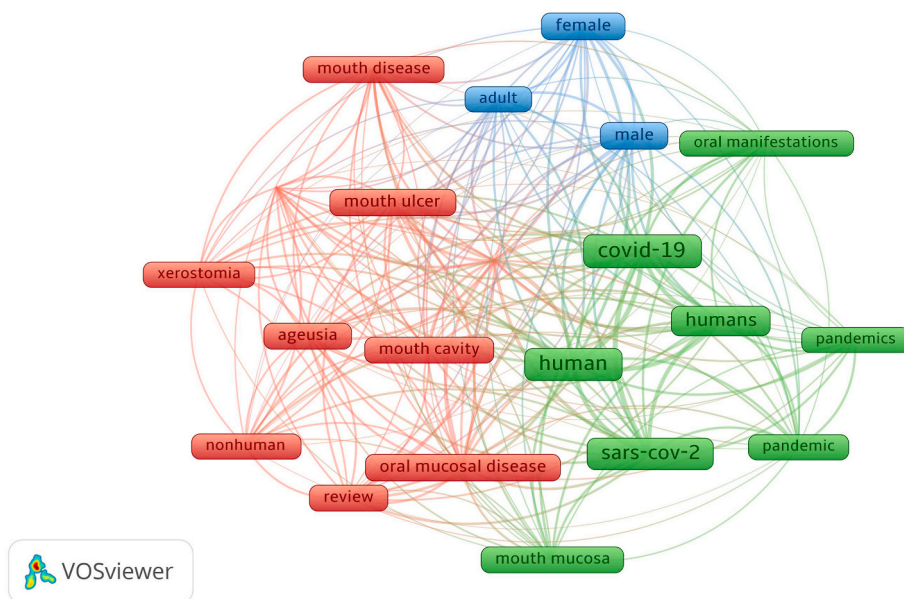


Fig. 3. Keyword co-occurrence map of the most-cited articles.

IF (87.244), and it published only paper which received the highest number of citations (340). One journal (Reviews in Medical Virology) had an IF above 10, which contributed 2 papers. Three journals (Journal of Dental Research, Frontiers in Medicine, and International Journal of Infectious Diseases) were of IF above 5. Among these 3 journals, 1 journal (Journal of Dental Research) contributed 2 papers and other 2 contributed 1 paper each. Majority of journals (n = 28) had an IF below 5. This finding depicts that authors prefer specialty journals rather than high-impact journals for publishing their high-quality research works.

The top 10 highly cited papers were published in 9 journals. Out of these 9 journals, only 5 had an IF of above 5. Journal of Dental Research (n = 2), Oral Diseases (n = 2) and Reviews in Medical Virology (n = 2) were the most preferred journals by the authors to publish their work. The two articles published by Journal of Dental Research were in the top 10 list of highly cited papers. Quartile rankings are usually calculated for journals in each subject category. This factor is quite in use in research evaluation because of incomparability across different research fields.⁵ In this analysis, majority of the journals and papers were in quartile I (Journals: 9, papers: 12) and quartile II (Journals: 9, papers: 9). Few

journals and papers were ranked in quartile III (Journals: 7, papers: 7) and quartile IV (Journals: 7 papers: 7).

COVID-19 pandemic commenced in the year 2020 and showed its catastrophic effects in the years 2020 and 2021. The effects gradually tapered down in the following years but is still an enigma amongst the world’s population. Researchers from all over the world engaged themselves in different kinds of studies related to the SARS-CoV-2 virus, its mechanism, the organs affected and all the disastrous effects and their management strategies.^{16,17} Initially the respiratory, gastrointestinal and nervous systems were found to be hugely affected by the virus and different treatment modalities were continuously under study and trial and was published progressively.¹⁸ As the initial times passed by novel variants of the virus evolved and new signs and symptoms were observed by clinicians and researchers.^{18,19} It fostered the need to widen the horizons of research in this field. Apart from the respiratory symptoms, oral lesions emerged as new signs of SARS-CoV-2 infection.^{3,4,19} Gradually the oral health, the oral lesions and pathologies due to the viral infection received mentions in the research work associated with COVID-19.^{19,20}

Maximum papers reporting “oral lesions in COVID-19” got published in the year 2021 (n = 21) followed by the year 2022 (n = 13). The initial year of 2020 published only 4 papers on this topic and the present year 2023 has contributed 2 papers till now. Citation analysis is usually associated with time bias. Older research papers get sufficient time to receive ample number of citations compared to recently published ones.^{5,6} The classic papers identified in this analysis were published in 2020 and 2021. The highest cited and third cited papers were published in 2021 and the second highest in 2020. The 12 papers, published on this particular topic, which did not receive any citation yet might have been impacted by the factor of time. Research in this specific field has been at its peak only in the last three years. The impact of time can be overcome in the future to create academic significance in this research field.

Nations with better economic rankings usually contribute significantly to medical research, in aspect of quality and quantity.^{10,15} This has been observed in previous bibliometric studies, wherein United States and European countries were majorly involved in medical research.^{5,6} However, the finding in this analysis was contrary to the normal observation. Majority of the papers were contributed by Brazil (n = 8) followed by India (n = 5) and Poland (n = 4). Iran and Italy published 3 papers each, whereas United Kingdom and United States contributed 2 papers each. In respect to papers published by individual authors, 5 authors contributed the maximum papers (3 papers each) and all of them were from Brazil.

Bibliometric analysis in different fields has usually noted a propensity of review papers to get cited more often than other research works.^{5,21} This analysis also showed 19 review papers published in this field, out of which 15 review papers received citations. In the top 10 list of highly cited papers, there were 4 reviews. The third highly cited (120) paper on this topic was a systematic review paper.

Topic-wise analysis of the published papers showed that majority of the papers reported the various oral mucosal lesions or oral manifestations of COVID-19. The different therapies and the management of the oral lesions were discussed in 2 papers in the form of case report and case series. One paper reported oral lesions seen post COVID-19 vaccination. Level of evidence of research papers are usually analyzed to help make clinical decisions. Based on the classification system it is observed that clinical studies with clinical outcomes or associated with treatment strategies are classified as high level of evidence papers. Of the 40 papers published on this specific topic there were 6 papers of high evidence level in the form of systematic reviews.

This bibliometric study had some limitations. The citation data was retrieved from Scopus database. The Scopus citations and citation density were cross matched with Google Scholar citations and citation density. This could lead to exclusion of classic papers available on other databases. Scopus database usually excludes self-citations automatically which is the main reason for its preference in this study.⁵ Moreover, bibliometric analysis gives quantitative measure of the research paper rather than reflecting its quality. This is a major drawback in this kind of studies. The impact of time on the citation numbers of the research papers affects the bibliometric analysis of these papers. Older articles often have higher citation numbers than the recently published articles and hence new articles of high quality miss their position in the analysis list. Research on “COVID-19 associated oral mucosal lesions” has commenced and is continuing since the last three years. So, the papers published on this topic has been impacted by the factor of time. Despite these drawbacks this study gives a brief overview of the research conducted in this field and the characteristics of the papers published on “oral mucosal lesions in COVID-19”.

Various oral mucosal lesions have been reported and discussed in these published papers. Some researchers have attributed the etiology of these oral lesions to the viral infection of COVID-19.³ Few researchers have linked the oral manifestations in COVID-19 positive patients to compromised immunity.¹⁹ The immune system in these patients was affected due to the viral infection leading to other systemic comorbidities and also due to the treatment strategies.¹⁹ Many believe that the

oral lesions are secondary manifestations of the patient’s systemic health.¹⁸ Hence, healthcare professionals need to be aware of the possible association between COVID-19 and oral mucosal lesions. This bibliometric analysis projects the research work accomplished in this field and can guide further studies which are very essential to clearly understand the pathogenesis of oral mucosal lesions in COVID-19 patients.

5. Conclusion

In conclusion, this bibliometric analysis represents the first in-depth exploration of highly cited papers on “oral mucosal lesions in COVID-19” in medical literature. The study successfully highlights impactful research and trends in the field, providing valuable guidance to researchers for strategic planning and further investigation. The analysis covered articles published over the last three years, with a noticeable peak in output during 2021. Notably, one article received a remarkably high citation count, underscoring its significant influence on the subject. Our findings identify key contributing authors and countries, with Brazil standing out as a prominent leader in research on this topic. The analysis of journals involved in publishing on this subject reflects the interdisciplinary nature of the research. This bibliometric analysis offers critical insights into impactful research and research directions related to oral mucosal lesions in COVID-19, paving the way for future advancements in understanding and managing this aspect of the disease.

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Declaration of competing interest

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jobcr.2023.12.008>.

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