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Bibliometric study on the literature related to dental research and education published in Journal of Pakistan Medical Association

Samira Adnan¹, Kamil Zafar², Farhan Raza Khan³, Rizwan Ullah⁴

Abstract

Objective: To analyse characteristics of literature related to dental research and education published in a single medical journal, The Journal of Pakistan Medical Association.

Method: The bibliometric study was conducted at the Sindh Institute of Oral Health Sciences, Jinnah Sindh Medical University from March till May 2020, and comprised electronic and hand search of scientific literature relevant to dentistry published in the Journal of Pakistan Medical Association from the first issue published in 1953 till March 2020. The selected articles were analysed for year of publication, field of study, type of article, institute and country of first author, number of authors and citation count. Keyword mapping was also carried out. Data was analysed using SPSS 19.

Results: Of the 159 articles identified, 117(73.6%) were contributed from Pakistan. The most common specialties were Oral and Maxillofacial Surgery and Epidemiology with 20(12.6%) articles each, followed by Operative Dentistry and Endodontics 19(11.9%). Majority of articles were Original / Research 87(54.7%). The highest number of articles were published in 2019 26(16.35%). The Aga Khan University, contributed the most publications 30(18.9%), followed by Dow University of Health Sciences, 11(6.9%). Majority of the articles were contributed by three authors 48(38.4%). The top cited article was found to have 113 citations, followed by articles with 103 and 91 citations.

Conclusions: The contribution of scientific papers related to dentistry and dental education in the Journal of Pakistan Medical Association was significant. With growth of dentistry as a discipline along with a parallel increase in the publication of dental research papers, it is imperative that a dedicated indexed journal for dental research be commenced.

Keywords: Bibliometric study, Dental literature, JMPA, J Pak Med Assoc. (JPMA 72: 84; 2022)

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Introduction

In order to identify the trends and development in a scientific field, it is essential that relevant publications be analysed and evaluated. Identifying the particular characteristics of articles related to a domain gives an overview of the types of publication and gradual development of research interests in the particular focus area. This information is crucial in recognising the facets where research is scant and further explorative initiatives can be undertaken.¹ The relevant data can be generated with the aid of bibliometric studies that are designed to provide quantitative information regarding research publications in different fields of science² and have been conducted in specialties like Endodontics,³ Orthodontics,⁴ Prosthodontics⁵ and Dental Trauma⁶ among many others. This methodology is also applicable to derive relevant data from publications within a specific journal.^{7,8}

The field of dentistry and dental sciences has seen a slow

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and gradual advancement in Pakistan. It is important to observe the trend of published research papers related to dentistry in order to develop pertinent educational policies and encourage the culture of research and innovation in dental sciences. To our knowledge, there has been no study undertaken to identify the trends and direction of research that has been conducted in Pakistan regarding dentistry. In the context of publishing scientific research, Pakistan has only four biomedical journals that are PubMed-indexed.⁹ These are the Journal of College and Physicians of Pakistan (JCPS), the Journal of Pakistan Medical Association (JPMA), the Pakistan Journal of Medical Sciences (PJMS) and the Journal of Ayub Medical College, Abbottabad (JAMC). The researchers in dentistry struggle to have their scientific findings published in any one of these local journals simply because of the enormous number of articles hailing from various health sciences that share the limited publication space. There are two local journals, the Journal of Pakistan Dental Association and the Pakistan Oral and Dental Journal, that exclusively cater to publishing dental literature, but, owing to the lack of PubMed indexation, fail to attract the majority of publications from the dental community.

In relation to bibliometric analysis, previously conducted studies have evaluated literature related to specialties like

medical education¹⁰ and pharmaceutical sciences¹¹ published in a particular journal. Bibliometric analysis of publications in the afore-mentioned PubMed-indexed biomedical journals of Pakistan has also been conducted¹²⁻¹⁵ but no separate study for dental literature published in these journals could be identified.

The JPMA is one of the leading publications in medical sciences in Pakistan. The current study was planned to identify dental literature published in the JPMA.

Materials and Methods

The bibliometric study was conducted at the Sindh Institute of Oral Health Sciences, Jinnah Sindh Medical University from March till May 2020, and comprised electronic and hand search of scientific literature relevant to dentistry published in the JPMA from the first issue published in 1953 till March 2020. The search strategy employed key words like 'dental', 'dentistry', 'oral', 'oral cavity', 'teeth', 'dental procedures', 'dental students' and 'dental education'. Hand search was conducted at the publication office of JPMA in Karachi, while the online electronic search was conducted through the journal's website that archives issues published after January 1978. This was done by meticulously examining each published and uploaded article to retrieve those matching the area of interest. The electronic search was not only carried out using dentistry-related key words, but also by examining the content of each published article in order to decrease the possibility of leaving out any published material which could be relevant to the dental profession but may not necessarily have the pertinent key words. All such articles were retrieved from the official website of the journal (<https://www.jpma.org.pk>).¹⁶ The identified relevant literature (Annexure) was characterised based on the year of publication, field of study, type of article, institute and country of first author, and number of authors. The citation count of the included articles was also determined using Google Scholar. Most frequently occurring key words in the manuscripts were analysed using VOS viewer software version 1.6.16 developed by the Leiden University's Centre for Science and Technology Studies.¹⁷

Annexure:

List of articles relevant to dentistry published in the Journal of Pakistan Medical Association (JPMA) from 1953 till March 2020.

1. Karim, A.A., Inam, S. and Zaidi, A.B. Inadequate checks on smokeless tobacco usage in Pakistan: cultural heritage or policy neglect? 2020.
2. Ghafoor, S., Chaudhry, S. and Khan, J.S. Marital Status as a stress indicator in postgraduate dental students. 2020.
3. Abidi, S.Y.A., Azfar, M., Nayab, T., Shaukat, A., Hasan, M., Baig, N.N. and Abid, K. Accuracy of working length measurement with endo motor having built-in apex locator and comparison with periapical radiographs. 2020.
4. Alshahrani, I., Kamran, M.A., Asiry, M.A., Alshahrani, A., Almoammar, S. and Alhaizaey, A. Evaluation of cephalometric lip morphology in a Saudi sub population: A cross sectional study. 2020.
5. Iqbal, S., ur Rahim, A. and Hasan, A.A. Correction of hypoplastic mandible in non-syndromic temporomandibular joint ankylosis patients with distraction osteogenesis in Mayo Hospital Lahore: A descriptive study. 2020.
6. Shaikh, M.A. Tobacco use prevalence rates in fourth year medical, dental, and pharmacy students. 2020.
7. Rehman, A., Shah, S.M.A., Ali, S.A., Khokhar, N.H., Mehmood, S.J. and Ifrahim, A.F.K. Analysis of bristle design of commercially available tooth brushes by using scanning electron microscope. 2020.
8. Khan, F.R. Similarities and differences in specialty training of conservative dentistry and endodontics (India), operative dentistry (Pakistan) and restorative dentistry-endodontics (United Kingdom). 2020.
9. Habib, M. and Chew, H.P. Methods of assessment of early dentine erosion: a review. 2019.
10. Taqi, M., Razak, I.A. and Norintan, A.M. Comparing dental caries status using Modified International Caries Detection and Assessment System (ICDAS) and World Health Organization (WHO) indices among school children of Bhakkar, Pakistan. 2019.
11. Ejaz, I. and Ghafoor, S. WNT signalling pathway in oral lesions. 2019.
12. Chughtai, M.A., Jamil, B. and Mahboob, U. Developing and validating a questionnaire to Measure Ethical Sensitivity of Freshly Graduated Dentists. 2019.
13. Ahsan, S.H., Alali, S., AlIqadhi, A., Alnakly, Z., Al-Turki, M., Hassan, M.A. and Almarshd, A. A comparison of patient safety culture at two campuses of Riyadh based dental College. 2019.
14. Akram, A., Bashir, U., Yasmin, S., Sattar, K. and Meo, S.A. Integrated undergraduate dental curriculum. 2019.
15. Harman, M., Ovaolu, N. and Ovayolu, O. The effect of three different solutions on preventing oral mucositis in cancer patients undergoing stem cell transplantation: a non-randomized controlled trial: A Turkish study-NON-RANDOMISED TRIAL. 2019.
16. Giray, F.E., Peker, S., Yalcinkaya, S.E., Kargul, B. and Aps, J. Attitudes and knowledge of paediatric dentists' on digital radiography and cone beam computed tomography. 2019.
17. Aljabaa, A.H., Alqahtani, N.D., Aldrees, A.M., Alkofide, E.A., Al-Sahaibany, F.S. and Albarakati, S.F. Changes in the mandibular dental arch during the late mixed dentition stage: Experimental study. 2019.
18. Mahmood, H.N., Rahim, A.U. and Khan, W.U. Outcome of treatment of Zygomatic bone fracture by two point fixation versus three point fixation in Mayo Hospital Lahore. 2019.
19. Mozaffari, H.R., Sharifi, R., Raygani, A.V., Sadeghi, M., Nikray, S. and Naseri, R. Salivary Profile in Adult Type 2 Diabetes Mellitus Patients: A Case-control Study. 2019.
20. Ahmed, R., Malik, S., Khan, M.F. and Khattak, M.R. Epidemiological and clinical correlates of oral squamous cell carcinoma in patients from north-west Pakistan. 2019.
21. Baig, Q.A., Zaidi, S.J.A. and Alam, B.F. Perceptions of dental faculty and students of E-learning and its application in a public sector Dental College in Karachi, Pakistan. 2019.
22. Batra, S., Ochani, R.K. and Asad, A. Teething gels: are they worse than we think? 2019.
23. Sharif, F., Mahmood, F., Azhar, M.J., Asif, A., Zahid, M., Muhammad, N., Rehman, I.U. and Neil, S.M. Incidence and management of cleft lip and palate in Pakistan. 2019.
24. Firdous, S.N., Naqvi, S.M.Z.H. and Akhter, M. Factors affecting migration abroad of dental practitioners from Karachi: A cross-

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25. Alrafaa, A.A., Bilal, R. and Alshahrani, I. Does the antioxidant treatment affect the shear bond strength of orthodontic brackets: An in vitro study. 2019.
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 28. Fatima, R., Abid, K., Baig, N.N. and Ahsan, S.B. Association of cheek-biting and depression. 2019.
 29. Nazeer, M.R. and Khan, F.R. Evaluation of the root and canal morphology of mandibular first permanent molars in a sample of Pakistani population by cone-beam computed tomography. 2019.
 30. Fatima, F. and Fida, M. The association between morphological characteristics of palatal rugae and sagittal skeletal patterns. 2019.
 31. Hameed, M.H., Gul, M., Ghafoor, R. and Badar, S.B. Management of immature necrotic permanent teeth with regenerative endodontic procedures—a review of literature. 2019.
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- The identified articles were stratified into 10-year intervals according to the year of publication.
- Data retrieved from the selected articles was statistically analysed using SPSS 19.

Results

Of the 159 articles identified, the most common specialties were Oral and Maxillofacial Surgery and Epidemiology with 20(12.6%) each, followed by Operative Dentistry and Endodontics with 19(11.9%) articles. Majority of articles were Original / Research 87(54.7%), followed by case report/case series 25(15.7%) and reviews, including narrative and literature reviews 18(11.3%) (Table 1).

Table-1: Articles according to the fields of dentistry and type of publication. (n=159).

Fields of Dentistry	n (%)
Oral and Maxillofacial Surgery	20 (12.6)
Epidemiology	20 (12.6)
Operative Dentistry and Endodontics	19 (11.9)
Others (e.g. Ear Nose Throat [ENT], surgery)	16 (10.1)
Orthodontics	15 (9.4)
Oral Health and dental hygiene	15 (9.4)
Oral Pathology and Histopathology	14 (8.8)
Oral Medicine and Diagnosis	12 (7.5)
Dental Education	7 (4.4)
Prosthodontics	5 (3.1)
Periodontology	5 (3.1)
Oral Biology	4 (2.5)
Paediatric Dentistry	4 (2.5)
Dental Materials	3 (1.9)
Publication type	
Research/Original articles	87 (54.7)
Case reports/series	25 (15.7)
Review articles	18 (11.3)
Short communication	7 (4.4)
Letters to the editor	6 (3.8)
KAP study	5 (3.1)
Short reports	4 (2.5)
Innovation	2 (1.3)
Student's corner	2 (1.3)
Pilot study	1 (0.6)
Experimental study	1 (0.6)
Special communication	1 (0.6)

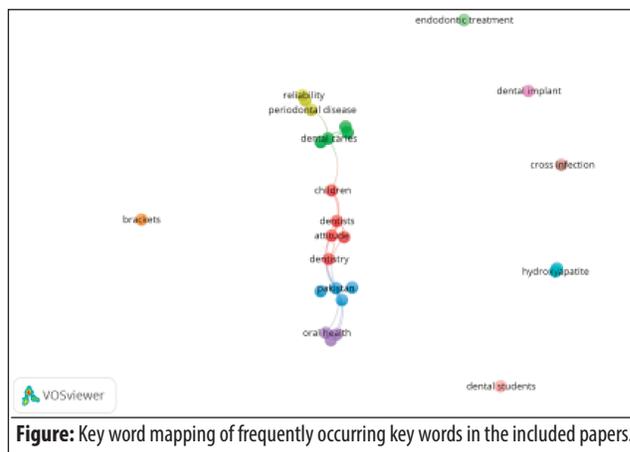
KAP: Knowledge, attitude and practice.

Table-2: Number of dental publications according to authors' geographical affiliation.

Country of Corresponding author	n (%)
Pakistan	117 (73.6)
Turkey	16 (10)
Saudi Arabia	12 (7.5)
India	4 (2.5)
Iran	3 (1.9)
Malaysia	3 (1.9)
China	1 (0.6)
Jordan	1 (0.6)
United Kingdom	1 (0.6)
Nepal	1 (0.6)
Total	159 (100)

The affiliation of the authors in terms of country showed the highest number of articles were from Pakistan 117(73.6%), followed by Turkey 16(10%) and Saudi Arabia 12(7.5%) (Table 2).

The Aga Khan University (AKU), Karachi, contributed the most publications 30(18.9%), followed by Dow University of Health Sciences (DUHS), Karachi, 11(6.9%), the Karadeniz Technical University, Trabzon, Turkey, 6(3.8%), Ziauddin University, Karachi, and King Saud University, Saudi Arabia, 5(3.1%) each and Jinnah Postgraduate Medical Centre



(JPMC), Karachi, 4(2.5%).

Majority of the articles were contributed by 3 authors 48(38.4%), followed by 4 authors 28(17.7%) and two authors 21(13.3%).

The top cited article was found to have 113 citations on Google Scholar, followed by articles with 103 and 91 citations.

The most commonly occurring key words were mapped, with the size of the node indicating the density of the key words in those manuscripts, and the clusters with interconnecting lines representing the key words shared by numerous manuscripts among the included studies. The most frequency occurring key words were found to be 'dental caries', 'oral health' and 'periodontal disease', indicating that articles related to these have been most frequently published in JPMA and authors have used these keywords so that their articles would turn up during relevant searches (Figure).

The highest number of included articles 26(16.35%) were published in 2019.

Discussion

The JPMA is considered one of the top-tier journals in health sciences of Pakistan, publishing a variety of research literature, including Original articles, case-reports, review articles and short communications. With an impact factor of 0.718 (Thomson Reuters/ISI Web of Science),¹⁸ this journal has one of the highest impact factor among Pakistani medical journals that are indexed by PubMed/MEDLINE indexed in Pakistan.^{10,20} This was the first journal from Pakistan to be MEDLINE-indexed. It is the official journal of the Pakistan Medical Association (PMA) and comprises scientific literature from a wide variety of medical, surgical and allied fields. It is also incorporated in the list of journals of the International Committee of

Medical Journal Editors (ICMJE) since 2010.²¹ In addition, it is included in the 'X' category of the Higher Education Commission (HEC) journals.²² Initially, from 1953 to 1957, JPMA was published quarterly, and started monthly publication in 1957. The journal's website became functional in 2003 and currently all the latest monthly issues are uploaded on it with free access.²³ This journal is peer-reviewed by a group of experts belonging to medical, surgical and dental specialties and sub-specialties.

Bibliometric studies have been conducted on the published literature of many Pakistan-based journals. In fact, a study was conducted to analyse the characteristics of Original articles published in JPMA from 2009 till 2018,¹⁴ which revealed that a total of 11 such articles in the field of dentistry were published during that time period. Another study examined all the citable literature, including only Original articles and reviews, published in the JPMA from 1965 till 2018.²⁴ In these documents, the field of specialty was not mentioned. The current study was conducted in order to gain an overview of the articles published in JPMA regarding dentistry and dental education or other closely related fields which would be of interest to dental specialists and other healthcare professionals. All relevant literature was analysed to determine the various characteristics of dental and associated literature published in JPMA. Usually electronic search is considered more reliable and exhaustive when retrieving articles in bibliometric studies, but the current study found that not all the articles published in JPMA were uploaded onto the journal's website, which was especially true for very old issues. This made it imperative to conduct hand search also. The publication office of JPMA in Karachi was contacted for this purpose, and the management proved extremely cooperative in providing access to its archives to ensure that all published literature could be searched for relevant articles. Similarly, besides electronically retrieving articles based on pertinent key words, all other articles present on the journal's website were also manually scanned. This was done to prevent any relevant publication from being overlooked, since some authors may inadvertently use irrelevant or unrelated key words and hence their published paper would have failed to show up in electronic search. This also highlights the importance of using the correct key words by authors so that any study conducted for similar analysis would not miss out on pertinent literature. A combination of electronic and hand search made compilation of all the relevant data possible.

The highest numbers of articles relevant to dentistry were found to be published in 2019 (n=26). The trend of publishing dental literature seems to have gradually escalated from 2010 onwards, with dentistry-related

articles steadily gaining more coverage in JPMA. The reason could be an increased submission of relevant scientific literature to JPMA. It is an encouraging sign for the dental community if more articles and scientific literature related to dentistry is being submitted and accepted for publication in a prestigious journal, such as JPMA. This trend would improve the readership of JPMA within dental communities as well, and motivate dental researchers to submit their manuscripts for possible publication in this journal.

It was found that among all clinical specialties, research pertaining to Oral and Maxillofacial Surgery was published most frequently in JPMA. In this field, most of the studies published were Original articles (n=13), followed by case report/series (n=6). The post-graduate training in the discipline of Oral and Maxillofacial Surgery started much earlier than other dental specialties, resulting in a higher number of subject specialists. This could be the reason that scientific papers from this discipline exceeded other clinical specialties. In addition to oral and maxillofacial surgery, the other specialty with the highest number of articles was epidemiology, where the majority of research publications were Original articles also (n=11). Similarly, in operative dentistry and endodontics, Original articles comprised the highest number of publications (n=13). There were seven articles related to dental education, with varied themes, including dental curriculum, assessment and specialty training, learning environments and learning preferences of students. Majority of these articles were relatively recent having been published in 2018 or later, with five publications from Pakistan and two from Saudi Arabia. Since the field of dental education is still emerging and evolving compared to medical education, it can be expected that more publications related to dental education will be seen over time in JPMA. Articles from specialties like ear, nose and throat (ENT) and General Surgery, which were related to dentistry in any context, were also included and categorised as 'others' in the current analysis.

In terms of the institution from where most relevant literature was generated, the AKU ranked the highest. This university is considered one of the leading institutions in research and development in the field of health sciences. The fact that the most scientific publications related to dentistry, published in one of the top-ranking journals of medical sciences in Pakistan, have been contributed by this institution is laudable. This is a clear indication that dental investigators at this institution are at the forefront in terms of contributing towards evidence-based dentistry. Out of the 29 articles authored by AKU researchers, 10 were from the field of Operative Dentistry and Endodontics. A total of

16 Original/research articles and seven case reports/case series were authored by AKU researchers. The DUHS was the second institution with the highest number of research publications, with ten Original articles on various dental specialties.

The majority of articles published from Pakistan were Original / research articles, followed by case reports / case series and reviews. Although not many publications related to dentistry were contributed by foreign authors, perhaps this trend will gradually change as the impact factor of the journal and its readership increases. It is still a positive progressive sign that articles from authors belonging to countries other than Pakistan have been published in JPMA. This indicates a wide readership of JPMA, and interest of foreign researchers in getting their original researches published in this journal.

Based on the number of citations received in Google Scholar, there were three articles that had the highest number of citations; two of them achieving the status of a classic article with 100 citations. The top cited article was a review on probiotics, mentioning the positive effects of probiotics on different aspects of oral health.²⁵ The next most cited article was regarding the benefits of chewing sticks for oral hygiene from a pharmacological perspective.²⁶ Even though this article can be considered archaic since it was published in 1981, its relevance can be ascertained by the fact that it is receiving recent citations. The third most cited article was a review of commonly occurring oral problems in pregnancy, and put forth guidelines for gynaecologists and other relevant healthcare providers for the prevention and management of such conditions.²⁷ The citation counts were observed using Google Scholar since JPMA is easily accessible through this search engine, and therefore these articles are widely available to be read and cited.

The centre cluster of keywords indicates the most common topics that are discussed in the published manuscripts, with 'dental caries', 'oral health' and 'periodontal disease' being the most recurring key words. 'Pakistan' was also among one of the prominent key words present in the central cluster which indicates that majority of the studies were originating from Pakistan. The key words such as 'endodontic treatment', 'dental implants' and 'dental students' indicated the areas in which authors have started publishing and these areas were expected to grow in future, like the central cluster. It must be noted, however, that key word mapping was done for Original / research articles, reviews, knowledge, attitude and practice (KAP) studies and experimental studies, since key words were available for this type of articles only. Also, it was found that many studies had limited number of key words, or the key

words that were generic, like 'children' or 'attitude'.

All the articles published in JPMA were in the English language, and abstracts were not available in Urdu since there is no provision in JPMA for abstract or articles published in the local language. Perhaps this is an element that can be added in the publishing format of JPMA in order to impact a wider audience. For instance, all electronically available dental journals published in Iran have abstracts as well as full text of the almost all articles available in Farsi, which is their local language.²⁸

It was desirable to evaluate the academic level of the first author, but this information was not included in the publishing format of JPMA. Therefore, it was not possible to make an inference in this regard. A limitation of the present study is that the quality of evidence generated in the published dental literature was not evaluated. Although the majority of the articles published by JPMA related to dentistry were Original / research papers, individual studies were not scrutinised for the research methodology and the clinical usefulness of the evidence generated by these studies.

Dental literature from Pakistan is also published in other local and international PubMed-indexed journals as well as in local journals that are not indexed in PubMed, and hence this research is not exhaustive in determining the magnitude and type of dental research being conducted in the country. Other journals pertaining to medical sciences that are PubMed-indexed and publish dental articles need to be evaluated in a similar manner while focusing on dentistry. As a future research project, authors plan to compare all dental literature published in local PubMed-indexed medical journals of Pakistan.

Unfortunately, till date, there is no PubMed-indexed journal available in Pakistan that publishes articles related exclusively to dentistry. Hence, research in dentistry has to compete with other allied health sciences to find a niche in PubMed-indexed medical journals of Pakistan. This could be one of the reasons that researchers in dentistry may be inclined to send their scientific literature to international PubMed-indexed journals, which exclusively publish articles from various aspects of dentistry. Since these international journals may not be accessible to a vast majority of dental specialists and the dental community at large, a large body of local research work may remain unappreciated or unrecognised locally.

Conclusions

The various characteristics of scientific papers related to dentistry published in JPMA were identified and analysed. It is appreciable that in a journal catering to all medical and

allied sciences, literature from different disciplines of dentistry seems to have a significant presence. Considering the significant number of research publications hailing from dentistry, perhaps deliberation could be made to develop a journal exclusively publishing scientific literature from various sub-specialties of dentistry.

Disclaimer: The authors assume full responsibility and express regret if any relevant dentistry-related literature was inadvertently missed from inclusion, which would be solely due to the extensive number of publications that had to be searched.

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