

Bibliometric Study of Publications of Arab Dental Universities in Indexed Journals between 2010 And 2020

Bennani Anas*, Bouzroud Hafssa and El Mdaghri Meriem

Department of fixed prosthodontics, Dental College, Mohamed 6 University of Health Sciences, Casablanca, Morocco.

*Correspondence:

Bennani Anas, professor, Head of Department of Fixed Prosthodontics, Dental College, Hassan II University, Casablanca, Morocco, Tel: +212661327303; ORCID ID: 0000-0003-4925-4485.

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ABSTRACT

Background: Bibliometric is the quantitative analysis of the characteristics of documents published by researchers.

Aim: The aim of this study is to make a bibliometric analysis of publications of Arab countries' universities in dentistry between January 2010 and December 2020 based on publications appeared in the indexed journals on PubMed.

Materials and methods: Our work is an exhaustive retrospective descriptive study.

Results: Out of 22 Arab countries, 17 have at least one university of dentistry.

Our study showed the following results:

- 1337 articles were published.
- 59 universities from 15 countries published, which represents 32.2%.
- 433 professors have published at least one article, which represents 15.58%.
- Saudi Arabia is in the lead with 524 articles, which represents 39.19%.
- The Saudi Pr. Sadeq Ali Al Maweri occupies the 1st place with 27 articles.
- The Moroccan Bourzgui Farid and Ousehal Lahcen from Hassan II University occupy the 11th place with 8 articles.
- The contribution of Moroccan authors is 4.11%, occupying the 8th position among Arab countries.
- Descriptive cross-sectional studies are at the top of the ranking with 30.96% of articles.
- Oral surgery is at the top of the ranking with 30.66% of articles

Conclusion: The results obtained showed that the rate of scientific production in dentistry at Arab dental universities has increased over the years; however, it is still far from that of European and American universities.

The infrastructure of research in the Arab world requires efforts from all those responsible.

Keywords

Arab dental publications, Arab dental universities, Indexed dental journals.

Introduction

Alan Pitchard coined the term bibliometrics in 1969.

Pitchard defined bibliometrics as the application of mathematics and statistical methods to shed light on the processes of written communication and on the nature and course of a discipline's development (in so far as this is displayed through written communication), by means of counting and analyzing the various facets of written communication [1].

Bibliometrics is the quantitative analysis of the characteristics of documents published by researchers [2].

Bibliometrics is the application of statistical or mathematical methods on sets of bibliographic references using univariate indicators where each element to be studied is subjected to a measurement according to a chosen dimension. The classification and comparison of the elements in relation to each other, according to this dimension are then possible.

Bibliometrics is used in a variety of evaluations, including the assessment of countries' fields of activity and the evaluation of researchers [3].

Bibliometrics has obvious advantages; it is simple to perform and provides information. It has the considerable disadvantage of summarizing the scientific production of researchers by numbers, in a potentially biased way, without taking into account the multiple and complex aspects of the appreciation of the originality and quality of a scientific work [4].

Bibliometric studies are rarely used, even less in dentistry. Those that are carried out in this sense concern only one or two countries, often in a short time interval [5-8].

The objective of this research work is to make a bibliometric analysis of publications in dentistry of Arab universities between January 2010 and December 2020, based on publications in journals indexed on PubMed.

Materials and Methods

Our work is a descriptive, retrospective, exhaustive study designed to perform a bibliometric analysis of scientific publications in dentistry, published between January 1, 2010 and December 31, 2020 by research professors at universities in Arab countries. We adopted the bibliometric technique to evaluate scientific productivity in dentistry. We started with the constitution of the corpus of scientific publications of the research professors of the universities of dentistry in the Arab countries. For this purpose, we listed the research professors, the scientific articles indexed in the PubMed database, then the metadata of each article (first author, title, affiliation, year of publication and key words).

Inclusion criteria

Included in the study are the scientific productions in dentistry indexed on PubMed of the first authors affiliated with dental universities in Arab countries between January 2010 and December 2020.

It should be noted that the articles in this study were found after careful searches on the websites of the ministries of education/higher education in each country, as well as the websites of each university/faculty. Through these websites, we were able to establish a list of names of the research professors, and to find the articles of each of these professors.

Exclusion criteria

Articles whose first author is not a research professor affiliated with an Arab dental university are excluded. Also excluded are duplicates, editorials, letters to the editor and authors' replies, announcements of scientific events and tributes to deceased scientific authorities.

Bibliometric analysis

The bibliometric indicators used concern 3 aspects: the author, the geographical origin and the categorization of the research work reported by the article.

- **Authors:** The first author of each article obtained was recorded and classified by department of affiliation and university.
- **Geographical origin of the article:** The geographical authorship and nationality of the article are also attributed to the first author.
- **Categorization of the research work reported in the article:** The different articles were classified according to their originality into: cross sectional descriptive study, prospective descriptive study, retrospective descriptive study, clinical trial, *in vitro* experimental study, literature review/ systematic review, meta-analysis and case report.

Results

There are 22 Arab countries, 17 of them have at least one dental university (Morocco, Tunisia, Egypt, Algeria, Saudi Arabia, United Arab Emirates, Iraq, Jordan, Kuwait, Lebanon, Libya, Oman, Palestine, Qatar, Sudan, Syria and Yemen). The remaining 5 countries (Mauritania, Djibouti, Somalia, Comoros Islands and Bahrain) which represents 22.73%, do not have dental universities. During the period from January 1, 2010 to December 31, 2020, 1337 articles were published in journals indexed on PubMed.

433 research professors from 59 Arab universities in 15 countries published the articles.

Distribution of Arab universities

There are 183 universities of dentistry in the 17 Arab countries:
- 103 public universities (56.28%) and 80 private universities (43.71%);
- 147 teach in English (80.33%), 21 in Arabic (11.47%) and 15 in French (8.2%). (Table 1)

Distribution of research professors

We were able to identify research professors from 108 university of dentistry, which represents 59.01% of the total number of Arab dental universities.

The teaching staff of these universities includes 2778 research professors. The number of those who have published between 2010 and 2020 is 433, which represents 15.58%.

At the top of the ranking, we find Pr. Sadeq Al Maweri from Saudi Arabia, with 27 articles, followed by the Egyptian Pr. Shaymaa Alsaka, and the Kuwaiti Pr. Arjuna Ellepola with 26 articles, then the Egyptian Pr. Mostafa Aboshlieb who occupies the 3rd place with 22 articles.

Table 1: Arab countries, universities, research professors and their publications.

| Country | Number of universities | Type of universities | Teaching language | Number of professors who published | Number of publications | Percent of publications | Rank by publications | Average number of articles per university | Rank by average |
|----------------------|------------------------|-------------------------|----------------------------|------------------------------------|------------------------|-------------------------|----------------------|---|-----------------|
| Algeria | 9 | Public | French | 0 | 0 | 0% | 15 | 0 | 16 |
| Saudi Arabia | 27 | 19 publics, 9 privates | English | 155 | 524 | 39.19% | 1 | 19.4 | 5 |
| Egypt | 29 | 15 publics, 14 privates | English | 53 | 172 | 12.86% | 2 | 5.93 | 9 |
| United Arab Emirates | 6 | 1 public, 5 privates | English | 28 | 97 | 7.25% | 5 | 16.16 | 6 |
| Iraq | 30 | 19 publics, 11 privates | English | 22 | 53 | 3.96% | 9 | 1.76 | 12 |
| Jordan | 2 | Public | English | 38 | 133 | 9.95% | 3 | 66.5 | 2 |
| Kuwait | 1 | Public | English | 22 | 92 | | 6 | 92 | 1 |
| Lebanon | 3 | 1 public 2 privates | English | 41 | 105 | 7.85% | 4 | 35 | 4 |
| Libya | 9 | 8 publics, 1 private | English | 2 | 4 | 0.3% | 13 | 0.44 | 13 |
| Morocco | 5 | 2 publics, 3 privates | French | 28 | 55 | 4.11% | 8 | 11 | 7 |
| Sultanate of Oman | 2 | Public | English | 8 | 11 | 0.82% | 11 | 5.5 | 10 |
| Palestine | 3 | Private | English | 8 | 18 | 1.35% | 10 | 6 | 8 |
| Qatar | 1 | Public | English | 2 | 3 | 0.22% | 14 | 3 | 11 |
| Sudan | 19 | 11 publics, 8 privates | English | 1 | 3 | 0.22% | 14 | 0.05 | 15 |
| Syria | 24 | 7 publics, 17 privates | 3 in English, 21 in Arabic | 3 | 9 | 0.67% | 12 | 0.37 | 14 |
| Tunisia | 1 | Public | French | 22 | 58 | 4.34% | 7 | 58 | 3 |
| Yemen | 12 | 4 publics, 8 privates | English | 0 | 0 | 0% | 15 | 0 | 16 |

Table 2: Ranking of authors with 9 or more articles by university, type, department and country.

| | Author | Affiliate department | University | Type | Countries | Number of publications |
|----|---------------|-------------------------------------|-----------------------------|---------|----------------------|------------------------|
| 1 | Almaweri SA | Oral surgery | Vision/ Riad | Private | Saudi Arabia | 27 |
| 2 | Elsayed S | Basic sciences | Mansourah | Public | Egypt | 26 |
| 3 | Ellepola A | Basic sciences | Kuwait | Public | Kuwait | 26 |
| 4 | Aboshlieb NM | Basic sciences | Alexandria | Public | Egypt | 22 |
| 5 | Aoun G | Oral surgery | Lebanese | Public | Lebanon | 18 |
| 6 | Alansari A | Orthodontics/ Pedodontics | Imam Abdulrahman bin faisal | Public | Saudi Arabia | 15 |
| 7 | Elnaghy MA | Conservative dentistry/ Endodontics | Mansourah | Public | Egypt | 15 |
| 8 | Tarakji B | Oral surgery | Prince Sattam bin Abdulaziz | Public | Saudi Arabia | 14 |
| 9 | Pani CS | Orthodontics/ Pedodontics | Riadh elm | Private | Saudi Arabia | 13 |
| 10 | Alqerban A | Orthodontics/ Pedodontics | Prince Sattam bin Abdulaziz | Public | Saudi Arabia | 12 |
| 11 | Kaklamanos E | Orthodontics/ Pedodontics | Mohammed bin Rashid | Private | United Arab Emirates | 12 |
| 12 | Dar Odeh N | Oral surgery | Jordan | Public | Jordan | 12 |
| 13 | Madarati A | Conservative dentistry/ Endodontics | Tibah | Public | Saudi Arabia | 10 |
| 14 | AlHumaid J | Orthodontics/ Pedodontics | Imam Abdulrahman bin Faisal | Public | Saudi Arabia | 10 |
| 15 | Montasser BM | Orthodontics/ Pedodontics | Mansourah | Public | Egypt | 10 |
| 16 | Al Ekrish A | Oral surgery | King Saud | Public | Saudi Arabia | 9 |
| 17 | Binmadi ON | Oral surgery | King Abdulaziz | Public | Saudi Arabia | 9 |
| 18 | Al Shahrani I | Orthodontics/ Pedodontics | King Khalid | Public | Saudi Arabia | 9 |
| 19 | Farah R | Prosthodontics | Qassim | Public | Saudi Arabia | 9 |
| 20 | Daou E | Prosthodontics | Lebanese | Public | Lebanon | 9 |
| 21 | Dabbou S | Basic sciences | Monastir | Public | Tunisia | 9 |

In Morocco, Pr Bourzgui Farid and Pr Ousehal Lahcen share the lead with 8 articles published, in 2nd position we find Pr Bouziane Amal with 4 articles, followed by Pr Kissa Jamila in 3rd position with 3 published articles (Table 2).

Distribution of publications

Distribution according to Arab universities

- Saudi Arabia comes in 1st position among Arab countries with a total of 524 articles (39.19%), followed by Egypt with a total of 172 articles (12.86%), then Jordan in 3rd position with a total of 133 articles (9.95%). Algeria and Yemen (which represents 9.09% of the Arab countries) have no articles published between 2010 and 2020.
- Public universities published 1073 articles, which represents 80.25% of the total articles published, while private universities totaled 264 articles, which represents 19.75%. (Table 1)
- Regarding the average number of articles published per university, Kuwait occupied the 1st position with an average of 92 articles/ university, then Jordan in 2nd position with an average of 66.5 articles/ university, followed by Tunisia with an average of 58 articles/ university (Table 1).

Distribution according to the type of article

Universities in Arab countries published mainly descriptive cross-sectional studies (414 articles; 30.96%), followed by experimental *in vitro* studies (347 articles; 25.95%) (Table 3).

Table 3: Participation of Arab dental universities in indexed journals according to the type of publication.

| Type of publication | Number | Percent |
|---|--------|---------|
| Descriptive cross-sectional study | 414 | 30.96% |
| Experimental <i>in vitro</i> study | 347 | 25.95% |
| Literature review and systematic review | 148 | 11.07% |
| Clinical trial | 126 | 9.42% |
| Case report | 117 | 8.75% |
| Retrospective study | 91 | 6.8% |
| Prospective study | 78 | 5.83% |
| Meta-analysis | 16 | 1.2% |

Distribution according to discipline

Arab universities were mainly interested in surgery (410 articles; 30.66%), followed by orthodontics/ pedodontics with 358 articles; 26.78% (Table 4).

Table 4: Participation of Arab dental universities in indexed journals according to authors' disciplines.

| Department | Number | Percent |
|-------------------------------------|--------|---------|
| Oral surgery | 410 | 30.66% |
| Orthodontics/ Pedodontics | 358 | 26.78% |
| Conservative dentistry/ Endodontics | 200 | 14.96% |
| Prosthodontics | 174 | 13.01% |
| Basic sciences | 174 | 13.01% |
| General dentistry | 21 | 1.57% |

Moroccan Universities

Distribution according to Moroccan universities

The total number of publications by Moroccan authors in PubMed indexed journals between 2010 and 2020 is 55 articles, which

represents 4.11% of the total number of articles published by universities in Arab countries.

Hassan II University in Casablanca come in 1st position with a total of 36 articles (2.69%), followed by Mohamed V University in Rabat with a total of 19 articles (1.42%).

Distribution according to the type of article

Moroccan universities published mainly descriptive cross-sectional studies (18 articles; 32.73%), then case reports with 12 articles (21.82%) (Table 5).

Table 5: Participation of Moroccan dental universities in indexed journals according to the type of publication.

| Type of publication | Number | Percent |
|------------------------------------|--------|---------|
| Cross-sectional study | 18 | 32.73% |
| Case report | 12 | 21.82% |
| Experimental <i>in vitro</i> study | 9 | 16.36% |
| Systematic and littérature review | 5 | 9.09% |
| Prospective descriptive study | 4 | 7.27% |
| Clinical trial | 3 | 5.45% |
| Retrospective descriptive study | 2 | 3.63% |
| Meta-analysis | 2 | 3.63% |

Distribution according to discipline

Moroccan universities were mainly interested in orthodontics (28 articles; 50.9%), then periodontology (12 articles; 21.81%) (Table 6).

Table 6: Participation of Moroccan dental universities in indexed journals according to authors' disciplines.

| Departement | Number | Percent |
|-------------------------------------|--------|---------|
| Orthodontics | 28 | 50.9% |
| periodontology | 12 | 21.8% |
| Conservative dentistry/ Endodontics | 6 | 10.9% |
| Surgical dentistry | 4 | 7.27% |
| Removable prosthesis | 2 | 3.63% |
| pedodontics | 2 | 3.63% |
| Fixed prosthesis | 1 | 1.82% |

Discussion

The Arab world is a historically established reality. The linguistic, religious and socio-cultural uniqueness constitutes a factor of perenniality of this socio-cultural block.

Bibliometric data, linked to the publication activity of scientific results, is a fundamental output of the research and innovation system. Indeed, when indexed in international reference databases, publication is considered as a validation of excellence [9].

Discussion of the protocol

We conducted our study on the PubMed database. This is the most widely used database for research in the medical and health sciences.

Our study lists scientific publications produced between January 1, 2010 and December 31, 2020 in all 22 Arab countries: Morocco, Algeria, Tunisia, Mauritania, Libya, Egypt, Saudi Arabia, United

Arab Emirates, Iraq, Jordan, Kuwait, Palestine, Lebanon, Oman, Qatar, Sudan, Syria, Yemen, Djibouti, Somalia, Comoros Islands and Bahrain.

Our work was carried out through careful searches of the websites of the ministries of education/higher education in the different Arab countries and the websites of the different universities in these countries, [10] which led to the establishment of a list of research professors in the different departments and which represents the focus of our search on PubMed.

After checking the obtained articles, they were classified according to university, first author, discipline and type of article. The strengths of our work are the inclusion of all Arab countries as well as the inclusion of all disciplines.

This work can be criticized for being limited to PubMed as a database and because only 108 universities' research professors were listed.

The number of publications could be higher if the search had been applied to other databases, if we had succeeded in listing the research faculty of all Arab universities, and if we had included all articles and not only those whose first author is a professor affiliated with an Arab dental university.

The difficulties encountered in the development of this work are:

- The absence of similar studies in the literature.
- The absence of an Arab organization that includes all universities of dentistry in the Arab countries.
- Lack of information about the universities in the Arab countries: number, geographical distribution, professors...
- The inability to access the websites of some universities.
- The unavailability of the lists of research professors in some universities.
- The availability of the list of research professors of some universities only in Arabic language.
- The absence of updating the list of professors of some universities over the years.

Discussion of the results

Our study showed that research professors from dental universities in Arab countries published 1337 articles on PubMed between 2010 and 2020. Saudi Arabia occupies the first position with 524 articles (39.19%), Egypt occupies the 2nd position with a total of 172 articles (12.86%), then Jordan in 3rd position with a total of 133 articles (9.95%). Morocco is in 8th position with 55 articles (4.11%).

In a study conducted by Ul Haq et al. in 2019 [11], the results showed that researchers from all dental health institutes in Arab countries published 6416 articles, Saudi Arabia occupies the 1st position with 37.83% of all publications, followed by Egypt in 2nd position with 20.03%, then Jordan in 3rd position with 11.19% of all publications.

Morocco is in 8th position with 2.29% of all publications.

This study also shows an absence of odontological production in the following countries: Djibouti, Somalia and the Comoros Islands. These results are consistent with the results of our study.

According to the literature, scientific research in the Arab world is concentrated in a few countries, those that have sufficient size and resources. This is because research activity implies both the existence of a critical mass (number of potential researchers, available financial resources) and a favorable environment (economic and social demand, awareness of the interest of this approach at the level of public authorities and private users).

The Arab region is not uniform; it is divided by gross domestic product per capita into 3 subgroups. The first subgroup includes the 6 Gulf countries: Saudi Arabia, the United Arab Emirates, Kuwait, Qatar, Oman and Bahrain with the highest gross domestic product per capita, the second subgroup consists of large countries such as Egypt, Algeria, Morocco, Iraq, Syria as well as Jordan, The third subgroup is characterized by the lack of natural resources and qualified human resources, with an extremely low gross domestic product, and includes Djibouti, Somalia, Mauritania, the Comoros Islands, Sudan and Yemen [9].

According to a study done by Boutracheh et al. et al. in 2014 [12], which analyzed the scientific production of 12 Arab countries on Scopus, the ranking regarding odontological production was as follows: Saudi Arabia in 1st position, Egypt in 2nd, Jordan in 3rd, United Arab Emirates in 4th and Morocco in 5th position. It should be noted that during the last decade, Tunisia precedes Morocco in terms of scientific production in dentistry according to the results obtained by our study.

A bibliometric study done by Bennani et al. in 2021 [13] showed that during the period between 2008 and 2018, 1213 articles were published by 15 African countries, Morocco occupied the 4th position after Egypt, South Africa and Nigeria.

The results also showed that African dental universities published mainly descriptive cross-sectional studies, as well as experimental *in vitro* studies, literature and systematic reviews, case reports and clinical trials. Lastly, there are prospective and retrospective descriptive studies and meta-analyses respectively. These results are consistent with the results found in our study.

It should be noted that Morocco, Algeria, Tunisia, Egypt, Libya, Mauritania, Somalia and Djibouti are both African and Arab countries, which explains the similarity of the results obtained by this study and those obtained by our study.

According to the same study, Moroccan dental universities have mainly published cross-sectional descriptive studies, as well as case reports, literature and systematic reviews, and experimental *in vitro* studies, clinical trials, meta-analyses and prospective descriptive studies.

The results also showed that the first 2 Moroccan authors, Bourzgui Farid and Ousehal Lahcen occupy respectively the 4th and the 9th position among the African authors. While they both occupy the 11th position among the Arab authors.

In a bibliometric study done by Boutracheh et al. in 2012 [14] which analyzed the scientific production of 6 African countries between 2000 and 2010: Nigeria, South Africa, Morocco, Algeria, Tunisia and Egypt, the results concerning the dental production showed that Egypt occupies the top position followed by Morocco, Nigeria, South Africa, Tunisia and Algeria.

The results of our study between 2010 and 2020 concerning the 4 Arab countries (Morocco, Algeria, Tunisia and Egypt) showed that Egypt and Algeria still occupy the top and bottom of the ranking, while Morocco lost its position to Tunisia, this relative decline of Morocco was observed in the field of Moroccan scientific production in general between 2013 and 2017, according to Azirar and Boutracheh [9].

According to another study done by Bouhalba and al in 2019 [15] which analyzed the national scientific production of Morocco in comparison with other countries between 2013 and 2017, the ranking regarding the number of publications in the field of dentistry was as follows: Saudi Arabia in the lead, Morocco in 2nd position, Tunisia in 3rd position, Kenya in 4th position and Algeria in 5th position.

It should be noted that this study analyzed all publications without any restriction, which explains the high number of publications.

In another bibliometric study conducted by Montoya et al. in 2006 [16] analyzing the articles published by 41 of the most productive countries in the world between 1992 and 2003, the results showed a total of 19904 articles, with the United States leading the way with 6779 articles. The United Kingdom in 2nd position worldwide. Saudi Arabia and Jordan are the only Arab countries that appear among the 41 countries studied, occupying the 31st and 32nd position respectively. The results of our study, as well as the results obtained by Ul Haq [11] and Boutracheh [12] showed that Jordan lost its 2nd place to Egypt which has experienced a progress in the field of odontological research during the last decade.

Ul Haq et al. in their study in 2019 [11] reviewed the global odontological publications in 2017, 12528 papers were published worldwide. The United States led with 2299 (18.35%) publications. Followed by Brazil with 1824 (14.55%) publications. The Arab countries produced 940 publications (7.5%). Nearly half of the publications from Arab countries are produced by Saudi Arabia (456; 3.63%), which ranks 12th in global dental research output in 2017. It is worth noting that Saudi Arabia has evolved very well in the field of odontological research in recent years, it has moved from the 31st position in the world between 1992 and 2003 according to Montoya et al. [16] to the 12th position in the world in 2017.

According to a bibliometric study done by Asiri, Kruger et al. in 2020 [17] analyzing the dental publications in the world in the PubMed database between 2009 and 2019, the total number of published articles in dentistry in the world is 104975 articles. No Arab country is included in the ranking of the 10 most productive countries in dentistry, which shows the low contribution of Arab countries in odontological production, these results are consistent with the results obtained by Ul Haq et al. [11] who showed that the first Arab country (Saudi Arabia) occupied the 12th position worldwide in 2017.

According to a quantitative analysis done by Shaban et al. in 2003 regarding the number of biomedical publications produced by 20 Arab countries between 1987 and 2001, Saudi Arabia and Egypt had the highest number of publications together with 58.4% of the total published articles.

Rossi and Waast in their bibliometric study in 2007 [18] analyzed the research in natural sciences in eight Mediterranean countries. The results showed that medical research in Morocco, Algeria, Tunisia, Egypt, Lebanon, Jordan and Syria remains very modest, compared to research in the exact sciences, which is more marked.

Conclusion

Research in the Arab world in general, and in Morocco in particular, remains a modest contributor to the field of universal dentistry due to various factors, especially economic and political (related to the wars that some Arab countries have undergone, affecting research activity). Despite the efforts made, Arab universities remain far from European and American universities in the field of research.

Concrete efforts by ministries of education are needed to promote research and thereby improve the number of publications in dentistry, including:

- The establishment of a national and Arab research policy;
- International collaboration and formation of highly organized interdisciplinary global networks to develop research activities with clearly beneficial results;
- Providing considerable financial support to education, especially higher education;
- Increase the number of research institutions to improve the quality and quantity of dental research;
- To further encourage the private sector to join in the efforts.

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