

Research Article

A Bibliometric Analysis of the Characteristics and Trends in Dental Research: A Survey of Research Articles Published in Selective Dental Journals between 2007 and 2013, Evaluating Three Dental Specialties

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Abstract

Objective: This literature review analyzes trends of research articles in three dental specialties: Endodontics, Periodontics, and Pediatric Dentistry. The parameters analyzed include: number of research articles per year, the countries of the first authors, and the contribution of research by geographical regions.

Methods: All research articles published in five major dental journals: Journal of American Dental Association, British Dental Journal, Journal of Endodontics, Journal of Periodontology and Journal of Dentistry for Children between January 2007 and December 2013 were tracked. Statistical analyses were made to note the changes and trends.

Results: A total of one thousand seven hundred eleven research articles were collected and bibliometric analysis indicated that there exist changes in the volume of publications amongst the three distinct specialties. A compounded growth rate of approximately 1% in Endodontics was noted; both Periodontics and Pediatric Dentistry saw a decrease of -4.0% and -13.6% respectively. An analysis of the first author by country for the overall number of research publications indicated that the United States had the most publications (19.75%), Brazil (17.94%) and China (8.36%). By specialty, for the first author by country, the United States (19.7%) had the most number of publications for Endodontics, Japan (16.25%) for Periodontology and Brazil (39.3%) for Pediatric Dentistry. By continents, Asia had the most contributions (37.58%), North America (23.14%) and South America (19.11%).

Conclusions: Overall, this bibliometric analysis of dental journals captures the shifting global interests in these three specialties over the past seven years. Our data highlights which regions of the world were the most prolific in publishing research, and which displayed the most rapid growth and decline in the volume published. It also provides insights into which dental specialty is generating the most interest in the academic community. Furthermore, looking at the trends of the volume of publications highlights notable changes, and suggests further investigations into reasons behind these shifts.

INTRODUCTION

Dental care is constantly transforming due to changes in factors such as access to care, cultural beliefs and technology. The interest in dental specialties such as periodontics and endodontics may have been impacted due to changes in dental needs throughout the years. In order to gain insight on the trends in dental care, bibliometric analysis was used in this paper to evaluate changes in the research for three dental specialties: endodontics, pediatric dentistry and periodontics. Bibliometrics are valuable to quantitatively analyze scientific literature and publications. The use of bibliometric analysis allows an evaluation of publication data to be viewed in an objective and

quantitative manner. Research publications can potentially be an indication of the current global interests. With the use of bibliometric methods, publications can be assessed to reveal trends in research within the dental community. Specifically, a literature review was performed to evaluate the shifts in global interests of these three specialties in different regions of the world. The collected data and bibliometric analysis was used as a basis to allow further investigation into the reasons behind these shifts in dental research publications.

METHODS

The dental journals were selected based on whether they

were impact factor journals [1] or journals of the specialty societies. Specific research articles published in the Journal of American Dental Association, British Dental Journal, Journal of Endodontics, Journal of Periodontology and Journal of Dentistry for Children were reviewed and collected between January 2007 through December 2013. The research articles that were included are as follows: JADA –Research Articles 2007-2013, British Dental Journal- BDJ Collections Research Articles for Endodontics, Periodontology, and Pediatric Dentistry, 2007-2013, Journal of Endodontics- Basic Research Articles 2007-2013, Journal of Periodontology- Discovery Articles 2007-2013, Journal of Dentistry for Children-Scientific Articles 2007-2013. Only original articles based on the contents of the online journals and identical to the printed version of JADA, British Dental Journal, Journal of Endodontics, Journal of Periodontics and Journal of Dentistry for Children were included in the analysis. Other forms of publication (technology, case report, society news, indexes, literature review, public health) were excluded from the analysis.

The analysis was based on the information abstracted from the number of research articles, the country of the first author, the contribution of dental research by geographical regions, and statistical analysis. All variables examined were presented with the trend over time.

To ensure consistency of the data, all the investigators initially reviewed the same articles independently. Disagreements were rare; however, any disagreements were resolved in a consensus meeting.

RESULTS AND DISCUSSION

A total of one thousand seven hundred eleven research articles were collected for three distinctive specialties during the years 2007-2013.

The Endodontic field was found to have a strong positive correlation of 0.89 between the number of international research publications and the total number of research publications. Over the seven year period from 2007-2013, 80% of the research publications were international and 20% were from the US (Figure 1). Figure 4 depicts a positive relationship between Japan and Brazil as compared to the total trend. US and UK have a negative relationship to the total trend.

The data collected for Periodontology shows a strong positive correlation of 0.96 between the number of international research publications and the total number of research publications. Over the seven year period from 2007-2013, 86% of the research publications were international and 14% were from the US (Figure 2). Figure 5 reveals a positive relationship between Brazil and Japan as compared to the total trend. US, China, and UK have a negative relationship to the total trend.

The Pediatric Dentistry field shows a strong positive correlation of 0.95 between the number of international research publications and the total number of research publications. Over the seven year period from 2007-2013, 68% of the research publications were international and 32% were from the US (Figure 3). There is a positive relationship between Brazil as compared to the total trend. Japan and UK have a negative relationship to the total trend (Figure 6). Tables 1 and 2 present the correlation analysis.

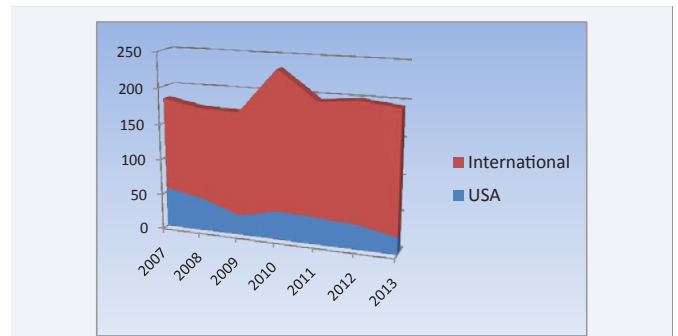


Figure 1 Annual Comparison of Endodontic Research Publications by Region.

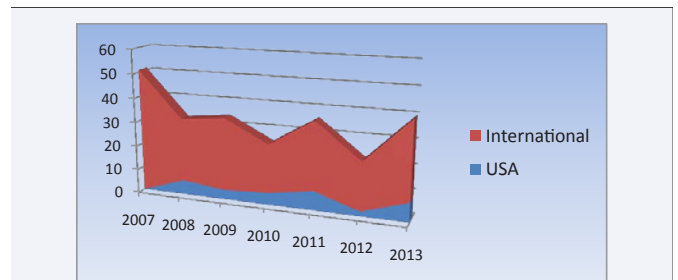


Figure 2 Annual Comparison of Periodontology Research Publications by Region.

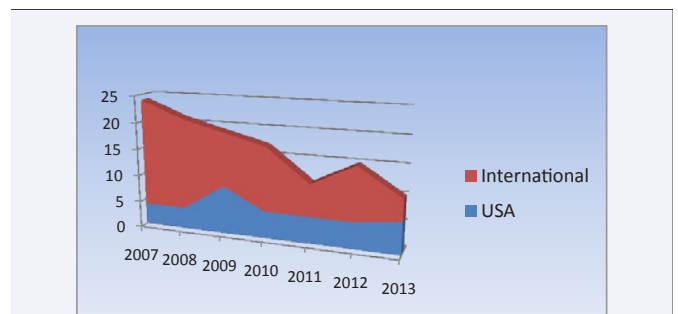


Figure 3 Annual Comparison of Pediatric Dentistry Research Publications by Region.

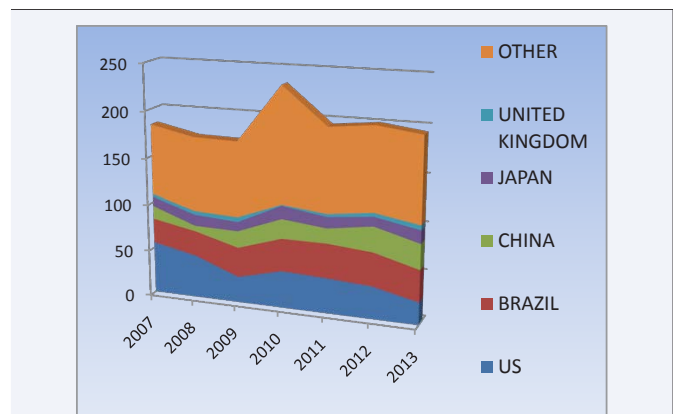


Figure 4 Comparison of Endodontic Research Publications from Leading Five Countries.

Based on the overall number of research publications from all three specialties by continent, Asia has the largest contribution (37.58%), North America (23.14%) and South America (19.11%). (Figure 7) The first author by country for most publications from total number of research publications is US (19.75%), Brazil (17.94%), China (8.36%). The first author for most publications by specialty Endodontics: US (19.7%), Periodontology: Japan (16.25%), Pediatric Dentistry: Brazil (39.3%).

The research literature represents recent advance knowledge, and new information in the form of original research articles. Bibliometric analysis employs statistical methods to aid the study of these publications and extract from it vital information regarding the prevalence and popularity of specific fields of studies [2].

In our survey, analysis was based on five major research journals, JADA, British American Journal, Journal of Endodontics, Journal of Periodontics, and Journal of Dentistry for Children. They were selected as important journals because of their high impact factors and specific dental focus. It is imperative for a bibliometric analysis to select journals that is representative of the subjects of interest, otherwise the study would lack in meaning and significance [3], and hence the aforementioned five journals were chosen.

Our study had a few limitations. First, only five major journals were evaluated, and one should take into consideration that the sample of journals studied only represented a fraction of the

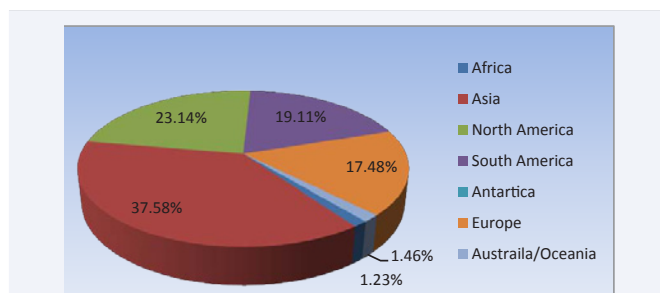


Figure 7 % Contribution of Research Articles by Continent.

Table 1: Correlation Analysis: Endodontics, Periodontics, Pediatric Dentistry.

ENDODONTICS	
USA	-0.05
International	0.89
PERIODONTOLOGY	
USA	-0.15
International	0.96
PEDIATRIC DENTISTRY	
USA	-0.17
International	0.95

Table 2: Correlation by Country: Endodontics, Periodontics, Pediatric Dentistry.

ENDODONTICS	
USA	-0.05
Brazil	0.89
China	0.49
Japan	0.58
United Kingdom	-0.77
PERIODONTOLOGY	
USA	-0.15
Brazil	-0.17
China	0.95
Japan	0.50
United Kingdom	-0.10
PEDIATRIC DENTISTRY	
USA	0.06
Brazil	0.84
Japan	-0.83
United Kingdom	-0.06

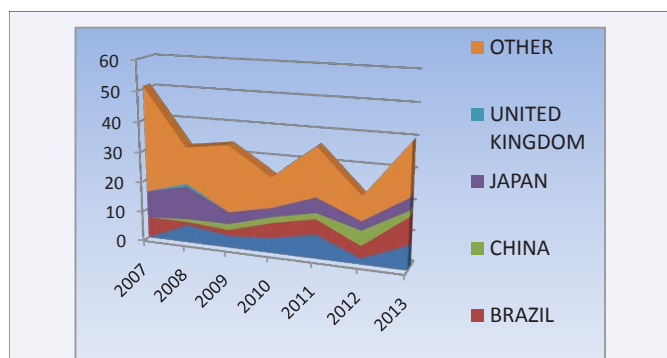


Figure 5 Comparison of Periodontology Research Publications from Leading Five Countries.

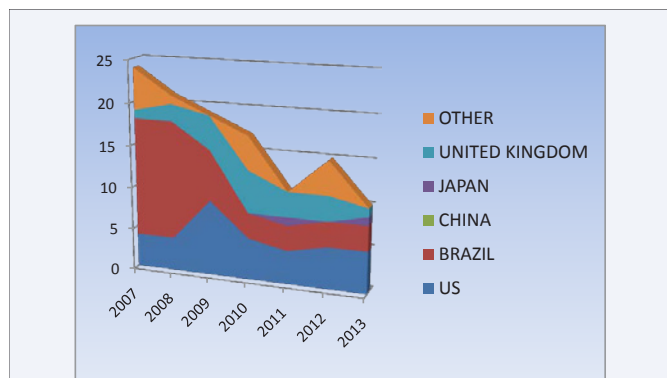


Figure 6 Comparison of Pediatric Dentistry Research Publications from Leading Five Countries.

global dental publications. Secondly, even though an objective analysis of the journal content and publishers was done by this study, there are confounding factors that exists within the original publication that was not possible to account for.

There are multitudes of factors that can influence the publication trends that were observed. The popularity of a dental specialty is inextricably tied to the volume of original research published in that field, and as such, an increasing trend

Table 3: Specialties by Trend.

Specialities	Slope	Trend	Growth Rate (CAGR)
Endodontics	3.7	Upward	0.90%
Periodontology	-1.8	Downward	-4.00%
Pediatrics Dentistry	-2.2	Downward	-13.60%

is indicative of a growing interest from the academic community. Similarly, when a decrease in publications is observed, such as the one that was observed for Pediatric Dentistry, it may indicate waning attention in that specialty. However, one must bear in mind the complexity behind the publication of research papers.

While the interest of the particular specialty plays a role, one cannot ignore other factors such as the availability of public and private funding for research and the magazines' own budget fluctuations. One must also keep in mind macroeconomic factors; for example high unemployment rates have been linked to higher numbers of professional school applicants [4,5] and consequently, the number of people involved in academic research.

Based on the seven year span from 2007-2013, the compounded growth rate for Endodontics is 0.9%. This upward slope projects that the number of publications for Endodontics will slightly increase in the future. (Table 3) Periodontology and Pediatric Dentistry have a compounded growth rate of -4.0% and -13.6% respectfully. This downward slope projects that the number of publications in Periodontology and Pediatric Dentistry will decrease in the future (Table 3).

CONCLUSION

The analysis of the three specialties was based on worldwide publication trends hence global factors such as "changes in the financial situation, the developmental status, or potentially the political climate from government of the emerging countries" [6] could affect the analysis. Such complex contributing factors deserve their own study, and are beyond the scope and focus of this bibliometric analysis. However, the data presented here serves as a starting point for future research.

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