

## A Bibliometric Analysis of Comparison of Google Scholar and Pubmed Databases for Oral Health Related Keywords

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**Abstract:** Google Scholar has been met with both enthusiasm and criticism since its introduction in 2004. However, several authors suggest that Google Scholar should not be the first or sole choice when searching for patient care information, clinical trials, or literature reviews. Thorough review and testing of Google Scholar are necessary to better understand its strengths and limitations. PubMed, utilize search interfaces that offer a greater variety of advanced features. These additional features, while powerful, often lead to a complexity that may require a substantial investment of time to master. To assess and compare the literature retrieved from Google Scholar and PubMed database using oral health related keywords. A cross-sectional observational study was carried out. The official home pages of PubMed and Google Scholar were searched using ten oral health related keywords to identify and extract information regarding the various characteristics of these databases. All the keywords were searched with use of parentheses (“ ”) as a Boolean operator to limit the search to required area of focus. The results included were those published between January 2015 to January 2016 to limit the number of results retrieved. In nine of the ten searches, Google Scholar returned larger retrieval sets than PubMed. Most items retrieved by Google Scholar were journaled articles. Items in other formats included: journal article, book citation, book reviews, and others. These results yielded few gray literature items. Google Scholar does not appear to be a replacement for PubMed, though it may serve effectively as an adjunct resource to complement databases with more fully developed searching features.

**Keywords:** Google Scholar, PubMed, Oral Health.

### INTRODUCTION

Google Scholar has been met with both enthusiasm and criticism since its introduction in 2004. This search engine provides a simple way to access "peer-reviewed papers, theses, books, abstracts, and articles from academic publishers' sites, professional societies, preprint repositories, universities and other scholarly organizations". The familiarity of Google may allow librarians and educators to ease students into the scholarly searching process by starting with Google Scholar and eventually moving to more complex systems. Felter noted that "as researchers work with Google Scholar and reach limitations of searching capabilities and options, they may become more receptive to other products"[1].

PubMed is a free search engine accessing primarily the MEDLINE database of references and abstracts on life sciences and biomedical topics. The United States National Library of Medicine (NLM) at the National Institutes of Health maintains the database as part of the Entrez system of information retrieval. PubMed, first released in January 1996, ushered in the era of private, free, home- and office-based MEDLINE searching [2]. The PubMed system was offered free to the public in June 1997, when MEDLINE searches via the Web were demonstrated, in a ceremony, by Vice President Al Gore [3]. The beta version of Google Scholar (GS) has attracted worldwide attention from health professionals and librarians since its launch in November 2004. Though it purports to "locate scholarly literature across all disciplines in many formats" and to

offer “the best scholarly search experience for users”, GS has generated considerable debate in library circles about its usefulness. Google Scholar is a freely accessible web search engine that indexes the full text or metadata of scholarly literature across an array of publishing formats and disciplines [4]. Released in beta in November 2004, the Google Scholar index includes most peer-reviewed online academic journals and books, conference papers, theses and dissertations, preprints, abstracts, technical reports, and other scholarly literature, including court opinions and patents [5]. The most relevant results for the searched keywords will be listed first, in order of the author's ranking, the number of references that are linked to it and their relevance to other scholarly literature, and the ranking of the publication that the journal appears [6]. The search of literature in google scholar and PubMed are different in term of the material accessed. The present study highlights to assess the differences in the databases and the kind of literature accessed in relation to oral health.

- To assess kind of literature with Google scholar database search using oral health related keywords
- To assess kind of literature search using Pubmed with use of oral health related keywords.
- To compare Google scholar and Pubmed database using oral health related keywords.

#### MATERIAL AND METHODS

A cross-sectional observational study was carried out. The official home pages of PubMed and Google Scholar were searched to identify and extract information regarding the various characteristics of these databases. The date of the official inauguration, content, coverage, number of keywords allowed for each search, uses, updating, owner, and characteristics and quality of citations were the focus for the analysis of PubMed and Google Scholar. Furthermore, the utility of these databases in retrieving information on a particular subject by using a specific keyword referring to oral health was evaluated.

Ten searches were performed in PubMed using a variety of available search features. The searches were repeated in Google Scholar to approximate a user's approach to those same topics in that search engine. The searches, performed between February and March 2016, were by topic, author, title, journal name, and/ or combinations of those fields (Appendix online). Topics included for each search, the citations received via Google Scholar and PubMed were examined to determine a variety of characteristics including format, date, Medical Subject Headings (MeSH) where appropriate, uniqueness, duplications, and full-text availability from the author's institution. Most searches were narrowed by date to produce sets of a reasonable size to allow comparison of unique items retrieved by each system. The search results were analyzed to determine possible reasons for the retrieval of unique

items in each resource and together information on the general features of the Google Scholar results.

The keywords that were employed in the search in our study were:

- Dental caries vaccine
- Atraumatic restorative treatment
- Peer Assessment Rating Index
- Pit and fissure sealants
- Fluoride tablet
- Fluoride stain
- Nursing Bottle caries
- Powered toothbrush
- Gingival massage
- Interdental cleaning aids

#### Inclusion criteria

- The totals of ten keywords were used to search the google scholar and pubmed databases respectively.
- The search was carried out for a period of one year between January 2015 to January 2016

#### Exclusion criteria

Search results not directing to the word of focus in parentheses.

#### Search strategy

All the keywords were searched with use of parentheses as a Boolean operator to limit the search to required area of focus. The results included were those published between January 2015 to January 2016 to limit the number of results retrieved.

#### RESULTS

Table 1 and graph 1 shows number of results retrieved from google scholar and PubMed. In nine of the ten searches, Google Scholar returned larger retrieval sets than PubMed. Remaining one search PubMed returned larger retrieval sets than google scholar. Table 2 and graph 2 shows characteristics of google scholar results shows the characteristics of the items retrieved by Google Scholar, Most items retrieved by Google Scholar were journal articles. Items in other formats included: journal article, book citation, book reviews, and others. These results yielded few gray literature items.

When the keyword dental caries vaccine was searched in google scholar the following results were retrieved.

- Journal article – 23
- Book citation- 2
- Book review- 0
- Others – 8

When the keyword Atraumatic Restorative Treatment was searched in google scholar the following results were retrieved.

- Journal article – 263

- Book citation- 14
- Book review- 0
- Others – 54

When the keyword Peer Assessment Rating index was searched in google scholar the following results were retrieved.

- Journal article – 32
- Book citation- 0
- Book review- 0
- Others – 21

When the keyword pit and fissure sealant was searched in google scholar the following results were retrieved.

- Journal article – 172
- Book citation- 10
- Book review- 0
- Others – 76

When the keyword fluoride tablet was searched on google scholar the following results were retrieved.

- Journal article – 19
- Book citation- 1
- Book review- 0
- Others – 7

When the keyword fluoride stain was searched on google scholar the following results were retrieved.

- Journal article – 2
- Book citation- 0
- Book review- 0
- Others – 0

When the keyword nursing bottle caries was searched in google scholar the following results were retrieved.

- Journal article – 38
- Book citation- 4
- Book review- 0
- Others – 22

When the keyword powered toothbrush was searched in google scholar the following results were retrieved.

- Journal article – 90
- Book citation- 7
- Book review- 0
- Others – 106

When the keyword gingival massage was searched on google scholar the following results were retrieved.

- Journal article – 12
- Book citation- 0
- Book review- 0
- Others – 14

When the keyword interdental cleaning aids were searched in google scholar the following results were retrieved.

- Journal article – 32
- Book citation- 3
- Book review- 1
- Others – 6

Table 3 and graph 3 shows characteristics of PubMed results provide information on PubMed retrieval sets.

When the keyword dental caries vaccine was searched in Pubmed the following results were retrieved.

- Journal article – 0
- Full text - 0

When the keyword Atraumatic Restorative Treatment was searched in Pubmed the following results were retrieved.

- Journal article – 31
- Full text - 12

When the keyword Peer Assessment Rating index was searched in Pubmed the following results were retrieved.

- Journal article – 2
- Full text - 0

When the keyword pit and fissure sealant was searched in Pubmed the following results were retrieved.

- Journal article – 13
- Full text - 7

When the keyword fluoride tablet was searched in Pubmed the following results were retrieved.

- Journal article – 2
- Full text - 1

When the keyword fluoride stain was searched in Pubmed the following results were retrieved.

- Journal article – 22
- Full text - 4

When the keyword nursing bottle caries was searched in Pubmed the following results were retrieved.

- Journal article – 1
- Full text - 1

When the keyword powered toothbrush was searched in Pubmed the following results were retrieved.

- Journal article – 9
- Full text - 3

When the keyword gingival massage was searched in Pubmed the following results were retrieved.

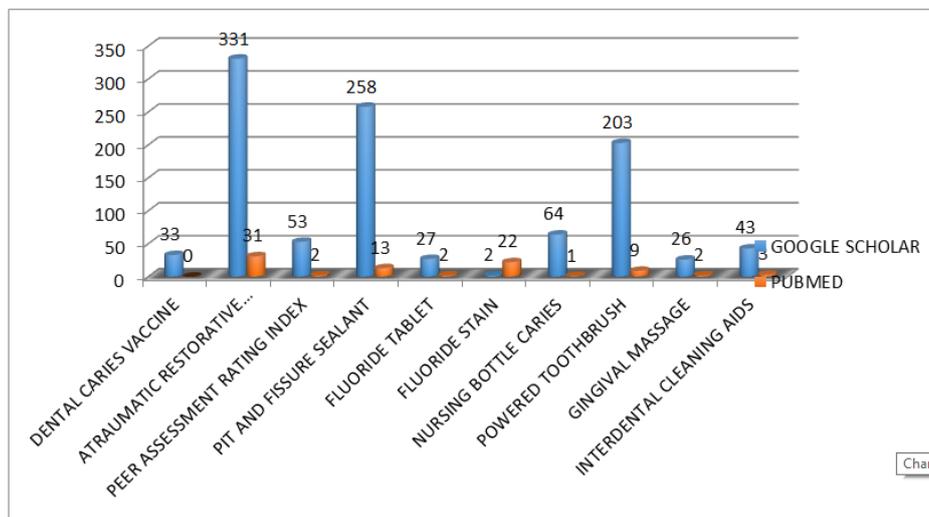
- Journal article – 2
- Full text - 0

When the keyword interdental cleaning aids were searched in Pubmed the following results were retrieved.

- Journal article – 3
- Full text – 1

**Table-1: Number of results retrieved from Google Scholar and Pubmed**

S.no.	Keywords searched	Retrieved results	
		Google scholar	Pubmed
1	Dental caries vaccine	33	0
2	Atraumatic Restorative Treatment	331	31
3	Peer Assessment Rating Index	53	2
4	Pit and fissure sealant	258	13
5	Fluoride tablet	27	2
6	Fluoride stain	2	22
7	Nursing bottle caries	64	1
8	Powered toothbrush	203	9
9	Gingival massage	26	2
10	Interdental cleaning aids.	43	3



**Fig-1: Number of results retrieved from Google Scholar and Pubmed**

**Table-2: Characteristics of Google Scholar results**

Keywords searched	Dental caries vaccine	Atraumatic restorative treatment	Peer assessment rating index	Pit and fissure sealant	Fluoride tablet	Fluoride stain	Nursing bottle caries	Powered toothbrush	Gingival massage	Interdental cleaning aids.
Results	Total number of results									
Journal articles	23	263	32	172	19	2	38	90	12	32
Book citation	2	14	0	10	1	0	4	7	0	3
Book review	0	0	0	0	0	0	0	0	0	1
Others	8	54	21	76	7	0	22	106	14	6

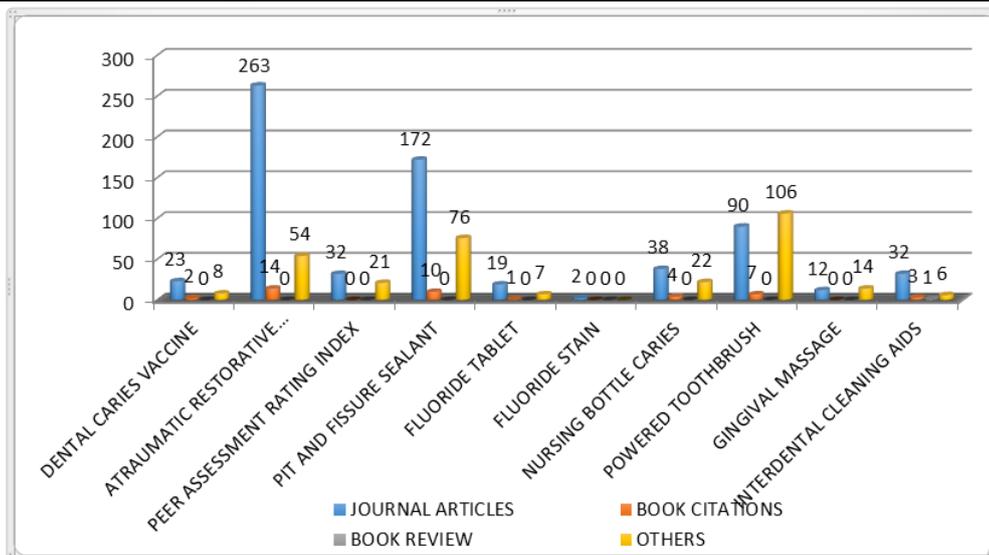


Fig-2: Characteristics of Google Scholar results

Table-3: Characteristics of Pubmed results

Keywords searched	Dental caries vaccine	Atraumatic restorative treatment	Peer assessment rating index	Pit and fissure sealant	Fluoride tablet	Fluoride stain	Nursing bottle caries	Powered toothbrush	Gingival massage	Interdental cleaning aids.
Results	Total number of results									
Journal articles	0	31	2	13	2	22	1	9	2	3
Full text articles	0	12	0	7	1	4	1	3	0	1

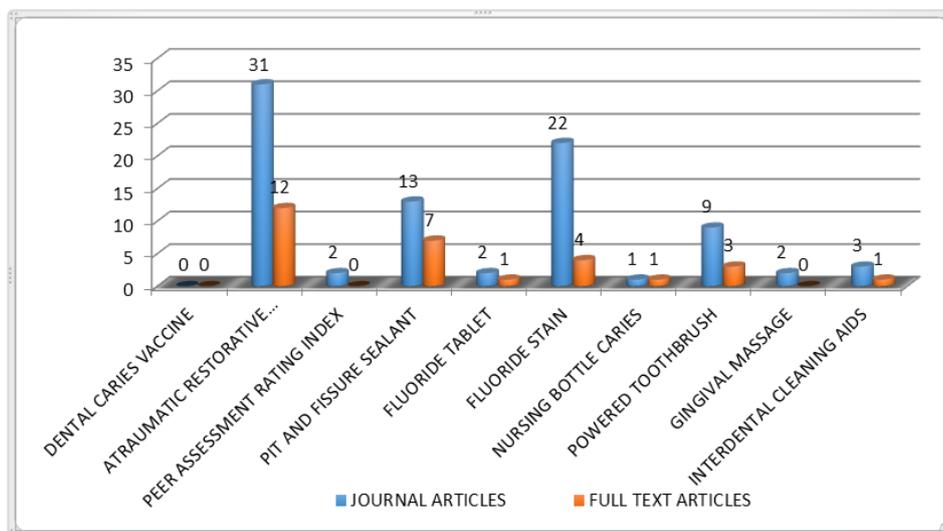


Fig-3: Characteristics of Pubmed results

**DISCUSSIONS**

The current version of Google Scholar focuses on Internet sites that contain information that is critically appraised, such as the peer-reviewed journal literature, or that are produced by reputable sources, such as universities. Through agreements with publishers, Scholar accesses the “invisible” or “deep” Web, that is, commercial Web sites the automated “spiders” used by search engines such as Google cannot

access [7]. Use of PubMed’s oral terminology search filter, with the “narrow, specific” subfilter, helps to explain PubMed’s higher specificity. Researchers from McMaster University developed the search strategies that the National Library of Medicine adopted for this filter. In a validation study of this filter, searches related to therapy, with the “narrow, specific” subfilter, yielded 93% sensitivity and 97% specificity for rigorously designed studies that were previously retrieved via

hand-searching 170 journals. In contrast to PubMed, Google Scholar searches a wide range of multidisciplinary topics and offers few options for filtering large amounts of information. It relies on an inherent algorithm to determine search results, and it lacks a filter similar to PubMed's Clinical Queries to search for rigorously designed studies. Google Scholar also lacks the capacity to map search terms to the MEDLINE Medical Subject Headings [8]. Given these inadequacies, Henderson concluded that Google Scholar is inappropriate as the sole alternative for clinicians [9]. Google Scholar is still labeled as a beta version; perhaps future upgrades will address the shortcomings. For now, the optimal application of Google Scholar may be as an adjunct resource, for known authors or articles, or perhaps for initial searches to quickly find a relevant article. The present study is a unique comparison of PubMed and Google Scholar for searches of oral health related topics. Our results are consistent with those of previous studies, which targeted various topics and used different methods, including PubMed search strategies other than the Clinical Queries filter. A study that targeted drug-information reviews and limited the comparison to the first 100 citations, determined that PubMed was more precise than Google Scholar [10].

#### **Limitations of the study**

The study results searched limited data only for the year 2015; the oral health related terms were only ten in number. As the internet data is dynamic source the number of searches might vary at the later period. Performing a direct and exact comparison between searches in Google Scholar and PubMed is not possible as the systems function in very different manners. For example, PubMed searches a well-defined set of journals, while Google Scholar includes resources beyond journals and the exact scope of coverage is not extensively described. Because the systems are not searching identical data, the results are often different.

#### **CONCLUSION**

Clinicians should understand the strengths and weaknesses of Google Scholar and be prepared to explain them to their users. For example, Google Scholar does not offer the number and extent of special searching and limiting features available in PubMed. However, Google Scholar provides some advantages in that it is an easy place to begin a search to find an initial retrieval of possibly worthwhile articles. One of the most advantageous features of searching PubMed is the ability to utilize the MeSH vocabulary, as Google Scholar does not currently implement controlled vocabulary searching mechanisms. PubMed also offers substantially more features that allow searchers to narrow their retrieval to citations from clearly identified sources, as detailed in NLM's List of Journals Indexed for MEDLINE and List of Serials Indexed for Online Users. Google Scholar does not appear to be a replacement for PubMed, though it may serve

effectively as an adjunct resource to complement databases with more fully developed searching features. It is important to note that both PubMed and Google Scholar are often upgraded with new features or with intended improvement of existing functions.

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