

## Bibliometric Analysis of Indian Journal of Dental Research (2002-2004)

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### Abstract

This study analyzed the growth of the scientific literature in the dental area, as available from NCBI PubMed, using standard bibliometric techniques. Bradford's law of scattering was used to identify core journals and Lotka's law employed to analyze author's productivity pattern.

The bibliometric analysis of the journal "Indian Journal of Dental Research Studies' (2002-2004)" showed a trend of growth in contributions, and average number of contributions was 8.5 per volume. Majority of the dentists preferred to do collaborative research and contribute their papers jointly. Most of the contributions were Original Articles/ Research (79 out of 103 articles). The institutional and geographical distribution of contributions was calculated. Most of the contributions were from Karnataka followed by Tamil Nadu. Most of the contributions were with citations. Majority of the dentists cited journals in large numbers (452), while books came second with 150 citations. 'Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology & Endodontics' occupied the 1st rank and 'Journal of Periodontology' the 2nd rank in the ranked list of cited journals.

**Keywords:** Bibliometrics; Bibliometric technique; Citation analysis; Indian Journal of Dental Research; Dentists; Cited journals.

### Introduction

The term bibliometrics was first used by Alan Pritchard in 1969 to denote a new discipline where quantitative methods were employed to probe scientific communication process by measuring and analyzing various aspects of written documents. Bibliometrics is a type of research method used in library and information science. It utilizes quantitative analysis and statistics to describe patterns of publication within a given field or body of literature.

Bibliometrics is a set of methods used to study or measure texts and information.

Citation analysis and content analysis are commonly used bibliometric methods. While bibliometric methods are most often used in the field of library and information science, bibliometrics has wide applications in other areas. In fact, many research fields use bibliometric methods to explore the impact of their field, the impact of a set of researchers, or the impact of a particular paper.<sup>1</sup>

Historically, bibliometric methods have been used to trace relationships amongst academic journal citations. Citation analysis, which involves examining an item's referring documents, is used in searching for materials and analyzing their merit

Data from citation indexes can be analyzed to determine the popularity and impact of specific articles, authors, and publications. Using citation analysis to gauge the importance of one's work, for example, is a significant part of the tenure review process. Information scientists also use citation analysis to quantitatively assess the core journal titles and watershed publications in particular

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disciplines interrelationships between authors from different institutions and schools of thought and related data about the sociology of academia. Some more pragmatic applications of this information includes the planning of retrospective bibliographies, "giving some indication both of the age of material used in a discipline, and of the extent to which more recent publications supersede the older ones;" indicating through high frequency of citation which documents should be archived; comparing the coverage of secondary services which can help publishers gauge their achievements and competition, and can aid librarians in evaluating "the effectiveness of their stock".<sup>2</sup>

Researchers may use bibliometric methods of evaluation to determine the influence of a single writer or to describe the relationship between two or more writers or works. Bioinformatics is a multidisciplinary and comparatively new area of science that has made a significant impact within a short period. A systematic analysis of the rise in bioinformatics literature is, however, not available.<sup>3</sup>

#### *Source Journal*

Indian Journal of Dental Research (IJDR) is the official publication of the Indian Society for Dental Research (ISDR), India section of the International Association for Dental Research (IADR), published quarterly. Indian Society for Dental Research (ISDR) is the only society in India totally devoted to augmentation of Dental Research. The other specialty journals do their best for clinical and specialty academics. ISDR is an affiliated national society for the International Association of Dental Research in USA. ISDR was started in the year 1987. IJDR publishes scientific papers on well designed and controlled original research involving orodental sciences. Papers may also include reports on unusual and interesting case presentations and invited review papers on significant topics.

*The IJDR journal is indexed in*

- Index for Dental Literature (American Dental Association)
- National Library of Medicine (USA)
- Indian Medlars Centre (National Information Centre)
- Medlar using NICNET

#### *Objectives*

The main objectives of this study were:

1. To find out volume-wise distribution & average number of contributions per volume
2. To find out the authorship pattern
3. To study the various types of articles in the journal
4. To find out the statistics of distribution of contributions according to various designations of contributors
5. To determine the geographical distributions of contributions in the journal
6. To calculate the volume-wise distribution of citations
7. To calculate the number of citations per article
8. To prepare a ranked list of journals in Dentistry

#### *Scope*

The study covered 103 articles published in the year 2002-2004 of Indian Journal of Dental Research (IJDR). These research articles included 614 cited items, i.e. citations. The study indicated, on average, a research article included about 6 citations.

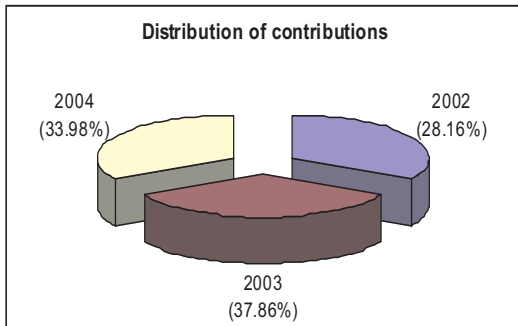
#### **Methodology**

Out of 12 issues, 10 issues of the Indian Journal of Dental Research (2002 to 2004) were taken for the study, because the remaining two issues were the missing in our library. The details regarding each published

article such as title of the article, number of authors, their institutional affiliations and addresses, number of references with list, etc., were recorded and analyzed for making observation. Tables were filled by tally mark system counting one, by one reference and other data. The data calculation is represented in the tables. The study did not take into consideration how far a certain piece of information is useful or a particular citation relevant to the central theme of the citing documents. The emphasis was largely on

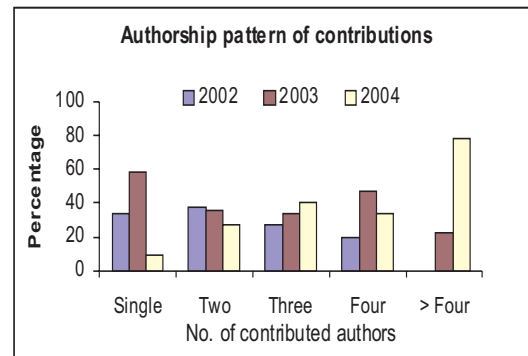
**Table 1: Volume-wise distribution of contributions**

Year	Vol. No.	No. of Issues	No. of Contributions	Percentage
2002	13	3	29	28.16
2003	14	3	39	37.86
2004	15	4	35	33.98
<b>Total</b>		<b>10</b>	<b>103</b>	<b>100</b>



**Table 2: Authorship pattern of contributions**

Year	Number of Authors Contributed					Total
	Single	Two	Three	Four	> Four	
2002	4 (33.33%)	14 (37.84%)	8 (26.66%)	3 (20.01%)	-	29 (28.15)
2003	7 (58.33%)	13 (35.14%)	10 (33.33%)	7 (46.66%)	2 (22.23%)	39 (37.86%)
2004	1 (8.34%)	10 (27.02%)	12 (40.01%)	5 (33.33%)	7 (77.77%)	35 (33.98%)
Total	12 (100%)	37 (100%)	30 (100%)	15 (100%)	9 (100%)	103 (100%)



**Data analysis & Interpretation**

*Distribution of Contributions*

Among 103 contributions, the majority of contributions (37.86%) were contributed in the year 2003, next in the year 2004 (33.98) and least in the year 2002 (28.15%) (Table-1).

The Table 2 shows that the trends in authorship pattern, such as multi-authored

**Authorship Pattern**

	Journal	%	Books	%	WHO Publ.	%	Thesis	%			
2002	29	130	28.76	30	20.00	03	30.00	01	50.00	164	26.71
2003	39	165	36.50	110	73.33	06	60.00	01	50.00	282	45.92
2004	35	157	34.73	10	06.66	01	10.00	-	-	168	27.36
<b>Total</b>	<b>103</b>	<b>452</b>	<b>100</b>	<b>150</b>	<b>100</b>	<b>10</b>	<b>100</b>	<b>02</b>	<b>100</b>	<b>614</b>	<b>100</b>

quality forms and age of citations rather than on the subject content and the degree of its relevance to the citing documents. The citations were counted by the type of document and volume wise. Based on the analysis, a ranked list of cited journal was prepared.

**Table 3: Type of Contributed Articles Guest Editorial**

	Guest Editorial	Original Articles/ Research	Case Report	Advances in Oro dental Research	Review articles	Total
2002	1	28	-	-	-	29
2003	1	38	-	-	-	39
2004	-	13	14	4	4	35
Total	2	79	14	4	4	103

papers, are lead in frequency of occurrence in the Indian journal of Dental Research throughout the study and, more interestingly, this growth is continuous which indicates about the future pattern in authorship. In multi-authored contributions, two authored and three-authored articles are maximum, compared with four-authored or more than four-authored articles.

**Table 4.1: Geographical distribution - Country wise**

Name of the Country	No. of Contributions	%
India	99	96.12
Saudi Arabia	2	01.94
Hong Kong	1	00.97
Nepal	1	00.97
<b>Total</b>	<b>103</b>	<b>100</b>

The highest numbers of contributions in the category of single authorship were contributed in the year 2003 which is 7 out of 10 (58.33%), while in the category of multi-authored

**Table 4.2: Geographical distribution of contributions (India - State wise)**

Name of the State	No. of Contributions	%	No. of Contributors	%
Karnataka	43	41.74	110	41.66
Kerala	8	07.76	20	07.57
Tamil Nadu	32	31.06	81	30.68
Goa	2	01.94	7	02.65
Haryana	2	01.94	9	03.40
New Delhi	3	02.91	7	02.65
Punjab	2	01.94	4	01.51
Himachal Pradesh	1	00.94	2	00.75
Kolkata	2	01.94	5	01.89
Ahmedabad	2	01.94	4	01.51
Saudi	2	01.94	4	01.51
Hong Kong	1	00.94	2	00.75
Pondichery	2	01.94	6	02.27
Nepal	1	00.94	3	01.13
<b>Total</b>	<b>103</b>	<b>100</b>	<b>264</b>	<b>100</b>

papers, the highest number of contributions were contributed in the year 2004, having 34 out of 35 contributions.

Out of 103 articles, 79 articles were original research articles, and 14 articles were case reports of the patients, 4 articles on 'Advances in Oro-dental Research', 4 review articles and

**Table 5: Position / Designation-wise distribution of contributors**

Designations of the Authors	2002	2003	2004
Professor & Head	17	21	24
Professor Asst.	5	11	6
Professor Associate	20	13	6
Professor	5	19	4
Scientist	1	4	3
Reader	6	7	9
Lecturer	6	10	10
PG Student	7	13	28
Tutor	-	-	1
Internship Student	2	3	1
<b>Total</b>	<b>69</b>	<b>101</b>	<b>92</b>

2 Guest Editorials on topics related to dentistry. From Table 3, it is clear that Indian Journal of Dental Research gives much importance to the original research articles and also articles based on the case reports.

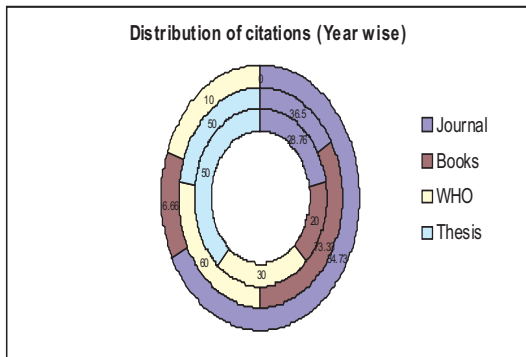
#### *Geographical Distribution-Country wise*

Table 4 shows that International contributions in the journal were very rare and merely 4 contributions were from abroad, while contributions from India constituted 96.12%, having 99 contributions out of 103. This shows that the coverage of Indian Journal of Dental Research is not very broad and its scope is confined to the Indian continent only.

Table 4.2 depicts the geographical distribution of contributions in three volumes of the journal. Out of 103 contributions, the highest number, i.e. 43 (41.74%) was contributed by Karnataka with 110 (41.66%)

**Table 6: Distribution of citations (Year wise)**

Year	No. of Contributions	No. of Citations	Total	%
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contributors. Tamil Nadu came second, having 32 (31.06%) with 81 (31.68%) contributors and Kerala third, having 8 (7.76%) contributions with 20 (7.57%) contributors.

Table 5 shows the distribution of authors according to the various positions that they held in their institutes. According to this, most of the articles were contributed by Professors. Therefore, the quality of the article should be high.

*Citation Analysis*

Another major area of bibliometric research uses various methods of citation analysis in order to establish relationships between authors or their work. When one author cites another author, a relationship is established. Citation analysis uses citations in scholarly works to establish links. Many different links can be ascertained, such as links between authors, between scholarly works, between journals, between fields, or even between countries. Citations both from and to a certain document may be studied. One of the very common uses of citation analysis is to determine the impact of a single author on a given field by counting the number of times the author has been cited by others. <sup>4</sup>

Table 6 shows that journals occupied 73.61% citations which were 452 out of a total of 614 citations. Books were 150 (24.42%), WHO Publications 10 (1.62%) and thesis 2

(0.32%). The above figure shows that the year 2003 had the highest number of share i.e. 282 (45.92%) of the total 614 citations received during the study. The least citations were recorded in the year 2002 with 164 (26.71%) citations. Total 614 citations have been recorded in 103 contributions; therefore, the average number of citations per contribution is 5.8.

*Ranked List of Cited Journals*

According to the citations, ranked list of cited journals was prepared. Table 7 shows that Oral Surgery, Oral Medicine, Oral Radiology & Endodontics are the leading referred journals i.e. 91 (11.87%); the second most referred journal is the Journal of Periodontology, having almost 53 (6.91%) citations. The Journal of Oral Pathology & Medicine, Journal of Dental Research; and Quintessence International are the 3rd, 4th and 5th ranked referred journals respectively.

**Results and Findings**

The following results and conclusions can be drawn from the bibliometric analysis of the journal "Indian Journal of Dental Research (2002-2004)".

- This study shows a trend of growth in contributions published during 2002 to 2004 and average number of contributions per volume are 34
- Majority of the dentists prefer to contribute their papers jointly.
- Most of the contributions in this journal were from India (96.26%). Only 4 contributions were from abroad.
- Karnataka and Tamil Nadu are the biggest domestic contributors to the articles published in this journal.
- Most of the contributions are with citations.

**Table 8: Ranked list of cited journals**

Sl. No.	Name of the Journal	Rank	No. of Citations	%
1	Oral Surgery Oral Medicine, Oral Radiology & Endodontics	1	91	11.87
2	Journal of Periodontology	2	53	06.91
3	Journal of Oral Pathology & Medicine	3	50	06.52
4	Journal of Dental Research	4	42	05.48
5	Quintessence International	5	41	05.35
6	Journal of Oral & Maxillofacial Surgery	6	38	04.96
7	Journal of American Dental Association (JADA)	7	32	04.17
8	Journal of Prosthetic Dentistry	8	29	03.78
9	Operative Dentistry	9	25	03.26
10	Journal of Endodontics	10	23	03.00
11	British Dental Journal (BDJ)	11	22	02.87
12	Oral Surgery	12	18	02.34
13	British Medical Journal (BMJ)	13	17	02.21
14	International Journal of Oral & Maxillofacial Surgery	14	16	02.08
15	Community Dentistry & Oral Epidemiology	15	15	01.95
16	Dental Materials			
17	Journal of Oral Surgery	16	14	01.82
18	Journal of Dentistry			
19	Lancet	17	12	01.56
20	International Dental Journal			
21	Indian Journal of Dental Research			
22	Journal of American Medical Association (JAMA)	18	11	01.43
23	Cancer			
24	Journal of Clinical Periodontology	19	10	01.30
25	Plastic and Reconstructive Surgery			
26	American Journal of Physical Anthropology			
27	Journal of Pathology	20	9	01.17
28	American Journal of Orthodontics			
29	Archives of Oral Biology	21	8	01.04
30	International Journal of Prosthodontics			
31	Journal of Oral Pathology			
32	Journal of Periodontal Research			
33	Journal of Esthetic Dentistry	22	7	00.91
34	Laryngoscope			
35	Scandinavian Journal of Dental Research			
36	Oral Diseases			
37	Australian Dental Journal			
38	American Journal of Orthodontics & Dentofacial Orthopedics			
39	British Journal of Oral & Maxillofacial Surgery			
40	British Journal of Oral Surgery			
41	Community Dental Health			
42	Dental Clinics of North America	23	6	00.78
43	International Journal of Pediatric Dentistry			
44	Journal Of Indian Dental Association (JIDA)			
45	Journal of Oral Rehabilitation			
		Total	766	100

- Majority of the dentists have cited journals in large numbers (i.e. 452), while books comes second with 150 citations.

#### *Limitations*

There were also some limitations to the data collected from this type of citation analysis.

- They are often incomplete or biased; data was largely collected by hand (which is expensive), though citation indexes can also be used; incorrect citing of sources occurs continually, thus further investigation is required to truly understand the rationale behind citing to allow it to be confidently applied.
- This bibliometric study was based on data collected from volume 49 to volume 51 of the journal "Indian Journal of Dental Research". Therefore, its results may vary at different times for different journals.
- The nature of journal itself defines the boundaries of the aspects that come under its scope and coverage. Sometimes, author's designation and affiliations change which may cause a little deviation in actual results of institutional affiliations of contributions. The validity of the result depends upon the sample size; as this study was based on only 10 issues, it may not be fully representative in all the results but it gives a trend about what is happening in the publication area of dentistry.

#### **Conclusion**

The results of this type of citation analysis would appear to be of great potential value in the management of library journal collections. Measures of citation frequency and impact factor should be helpful in determining the optimum makeup of both special and general collection.

Recently, a new growth area in bibliometrics has been in the emerging field of webmetrics or cybermetrics, as it is often called. Webmetrics can be defined as using bibliometric techniques in order to study the relationship of different sites on the World Wide Web. Such techniques may also be used to map out (called "scientific mapping" in traditional bibliometric research) areas of the Web that appear to be most useful or influential, based on the number of times they are hyperlinked to other websites. The Indian Journal of Dental Research is indexed with Caspur, DOAJ, EBSCO Publishing's Electronic Databases, EMCARE, Expanded Academic ASAP, Genamics JournalSeek, Google Scholar, Health & Wellness Research Center, Health Reference Center Academic, Index Copernicus, InfoTrac One File, PubMed/Index Medicus, SCOPUS, SIIC databases, Ulrich's International Periodical Directory. The journal also has free online access through Internet. Because of all these factors, this can become a high impact journal in the world, provided it starts publishing high quality papers contributed by Indian and foreign authors.

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