

Leading Medical Institutions of India: A Study of Open Access Publication in the field of Medicine

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Abstract— The main objective of this paper is to reveal the leading contributing institutions towards open access (OA) movement in the field of medicine in India. Elsevier's Scopus database indexed OA journals are used to identify India's share to OA movement in medicine. The study has taken data for five year period i.e. 2005 – 2009 to understand contribution of various institutions including universities, medical colleges, hospitals, clinics and other medical institutions of India to OA literature in medicine. The study worked at the article level to see the contribution in OA journals. The findings show Indian medicos contributed 10,410 papers during 2005-2009 in OA journals. The study further reveals that AIIMS is the main contributing institution to OA movement in India.

Index Terms— OA Journals, Open Access – Medicine, India, Open access - India, Medical institution-open access.

I. INTRODUCTION

The Open Access (OA) movement has been building for more than a decade. In 1992 just five journals offered open access to the material they published. Today, that number has grown to more than 8,000 journals. The online environment has brought about a revolution in scholarly publishing. Scholars now publish on the web, whether in an online journal or to their own web site [1]. Debates and discussions of open access (OA) have received increasing attention in the academic, scholarly research, and publishing communities around the globe. Though the concept of open access is still evolving, there are many aspects of the discussions. There are numerous definitions and interpretations of open access. The 2002 Budapest Open Access Initiative's definition on open access is quite comprehensive: Free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those

inseparable from gaining access to the internet itself. In essence, most open access proponents agreed that scholarly literature should be freely available online. The open access movement has continued gaining momentum from library and information associations, research funding agencies, scholarly societies, and institutions of higher education [2]. The OA debate has gained considerable momentum in recent years across many disciplines, both in sciences and humanities. The goal of "open access" (OA) is to grant anyone, anywhere and anytime, free access to the results of scientific research [3].

Like other advanced countries of the world India is also contributing a sizeable amount of literature to the open access movement. In India a number of internationally-reputed institutions are producing good amount of research outcome that are expanding the frontier of knowledge and scope for technological innovation. Poor access to international journals and the consequential low visibility of the papers are major problems facing Indian researchers. Open access is viewed as a solution to this problem. Open access to scholarly communications ensures global visibility and accessibility, resulting in increased global recognition. Open access to information and knowledge not only enables digital inclusion of common citizens, particularly under-privileged communities, but also bridges economic divide. In the information society, free flow of information is a fundamental principle for bridging the knowledge gaps between privileged and under-privileged communities. Social inclusion and economic empowerment are also achieved in a society where citizens have universal access to information and knowledge, ranging from public information to specialized or customized information related to one's profession, vocation or culture. Open access to information and knowledge is a key contributor in provisioning universal access to information and knowledge. In India concept of open access is taking its roots. The present study made an attempt to ascertain the trends in open access publishing in India. The study made an endeavour to assess the research contribution of India towards open access movement in the field of medicine.

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II. OBJECTIVE

To identify the top research and academic institutions in India that contributes research output to OA journals in medicine.

III. SCOPE

The scope of the present study is limited to research articles contributed by India from 2005 - 2009 to OA journals in the field of medicine. The study includes all the journals published in India as well as outside India. The articles from these journals were searched one by one to achieve the above mentioned objective of the study.

IV. METHODOLOGY

The present study worked at the article level to see the contribution of India to OA journals in medicine. For this Elsevier's Scopus database indexed OA journals were used to identify the India's contribution during year 2005 - 2009. Articles published were searched through Scopus to observe the contribution. Scopus maintains 47 million records, 70% with abstracts, covers over 19,500 titles from 5,000 publishers worldwide and includes over 4.9 million conference papers. It also includes 1,200 open access journals (www.scopus.com). Out of 1,200 journals 615 belong to field of medicine. In total 1, 81, 302 articles were considered for this study covering 550 (89.4%) journals of medicine published around the world. Random selection of journals was used as a method for the study. The research article output of each Indian institute was ascertained.

V. RESEARCH LIMITATIONS

The study used random sampling technique in which some important journals might have not been considered.

VI. REVIEW OF LITERATURE

Many investigations have been conducted by the researchers and scholars all around the world on open access concept. These studies are very helpful in understanding the modern dynamic and the growth of open access movement. As per [4], reveal that authors based in Asia, Africa, Eastern Europe and South America are about twice as likely to publish in OA journals compared to those based in Australia, US and Western Europe. As per [5], despite a significant growth in the number of research papers available through Open Access, principally through author self-archiving in institutional archives, it is estimated that only 20 per cent of the papers published annually are Open Access. Recent studies have begun to show that Open Access increases impact. Moreover the study found most of the articles in the sciences are currently Open Access and fewer articles in social sciences. However, according to [6] authors from developing countries are not more attracted to OA journals than authors from developed countries. Authors from developing countries do not publish more in OA journals than authors from developed countries and furthermore, authors from developing countries do not cite OA journals more than authors from developed countries. [7] revealed that PubMed Central database of the National Institute of Health is far the largest provider of open access full-text journal articles in medicine and the life

sciences. PubMed itself has been a mightily powerful open access indexing/abstracting database with links to open access articles. Of the new publishers, BioMed Central stands out by offering open access to full-text documents in more than 160 journals. There are many open access scholarly journal article and conference paper collections being built around the world. According to [8], among the top 25 publishing countries, India ranks 12th for the overall number of journals, but drops to 18th for journals with online content. Surprisingly, its position in the list of open access journals is fifth, well ahead of countries such as Netherlands, China, Germany, Australia, and so on which are higher in the list of online journals. Among the non-high income countries, India ranks second only to Brazil for the number of open access journals. Almost 50% of online journals from India are open access. A detailed study on the Academic staff members of two first generation universities in Nigeria is carried out by [9] open access initiatives adoption. According to their study only 30% of the respondents deposit their scholarly works as pre-prints 23.3% deposit their scholarly works as post-prints, while 35% publish their papers in open access journals. Besides 40% download and use pre-prints and post-prints from subject-based repositories, while 46.7% use academic papers published in open access journals. According to [10], in 2007 the library of the University of Konstanz conducted a survey including all university researchers (professors, postdocs and PhD-students), and inquired about their actual and estimated behaviour using literature and information. The study reveals that there is a broad basic knowledge about open access in the different departments. About 60.9% of the researchers stated that they use open access journals for their research. It is not surprising that this percentage is higher in the natural sciences (up to 75.4%) than in the arts (50-56.8 %) and the social sciences (50%-55.2%). Overall, more than half of the researchers reported reading open access publications. [11] found that out of 17,516 articles, 1367 (7.8%) are published in 245 open access journals with 884 (64.66%) published in 77 Indian open access journals and 483 (35.33%) articles published in 168 foreign open access journals. Collectively the 1,367 open access articles appeared in 184 journals with the average of 7.42 articles per journal. The overall trend of researchers is quite positive and it can be safely said that in near future most of research will be open access especially which is being carried out by public funds.

VII. ANALYSIS OF DATA

1 YEARWISE CONTRIBUTION

1.1 Top Contributing Institutions -2005

Out of a total of 1,733 publications being contributed by Indian Institutions in open access journals in the year 2005, All India Institute of Medical Sciences (AIIMS) is leading with 111 (6.41%) publications. Postgraduate Institute of Medical Education and Research (PGIMER) is ranked 2nd with 67 (3.87%) publications followed by Armed Forces Medical College (AFMC) with 62 (3.58%) and Seth G.S. Medical College, Mumbai/ King Edward Memorial (KEM) Hospital with 45 (2.6%) article publications occupying 3rd and 4th ranks respectively. The 5th and 6th biggest contributions to OA movement in medicine are made by Govt. Medical College, Jammu with 38 (2.2%) publications and Army Hospital Research and Referral, New Delhi with 30

(1.7%) publications. The other leading contributors are shown in Table 1.

TABLE 1: Leading Institutions in 2005 (N=1,733)

RANK	INSTITUTION	Output	%Age
1	All India Institute of Medical Sciences(AIIMS), Delhi	111	6.41
2	Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh	67	3.87
3	Armed Forces Medical College (AFMC), Pune	62	3.58
4	Seth G.S. Medical College, Mumbai	45	2.6
5	Govt. Medical College, Jammu(GMC, Jammu)	38	2.19
6	Army Hospital Research and Referral, New Delhi	30	1.73
6	Christian Medical College and Hospital, Ludhiana	30	1.73
7	Military Hospital Secunderabad	27	1.56
8	Sher-e-Kashmir Institute of Medical Sciences, (SKIMS) Srinagar	25	1.44
9	Christian Medical College (CMC) and Hospital / Vellore	24	1.38
9	University College of Medical Sciences (UCMS), New Delhi, Guru Teg Bahadur (GTB) hospital	24	1.38
19	Maulana Azad Medical College (MAMC), New Delhi	23	1.33
11	Government Medical College, Srinagar(GMC, Srinagar)	22	1.27
12	Kasturba Medical College (KMC) and Hospital, Manipal, Karnataka	19	1.1
13	Tata Memorial Hospital, Mumbai(TMh)	17	0.98
14	Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Thiruvananthapuram	17	0.98
14	Banaras Hindu University(BHU),	15	0.87

	Varanasi		
15	Vardhaman Mahavir Medical College (VMMC)	14	0.81
15	Sanjay Gandhi Post Graduate Institute of Medical Sciences (SGPGIMS)	14	0.81

1.2 Top Contributing Institutions - 2006

Again during 2006, All India Institute of Medical Sciences (AIIMS) is the top contributing institution with 115 (5.95%) publications out of a total of 1,934 (15.53%) open access publications from India. Likewise Postgraduate Institute of Medical Education and Research (PGIMER) with 75 (3.88%) publications shares the 2nd spot followed by Maulana Azad Medical College (MAMC) with 41 (2.12%) publications and Govt. Medical College (GMC), Srinagar with 39 (2.02%) publications. A vivid picture of other top contributing institutions can be had from Table 2.

TABLE 2: Leading Institutions in 2006 (N=1,934)

RANK	INSTITUTION	Output	%Age
1	All India Institute of Medical Sciences(AIIMS), Delhi	115	5.95
2	Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh	75	3.88
3	Maulana Azad Medical College (MAMC), New Delhi	41	2.12
4	Government Medical College, Srinagar(GMC, Srinagar)	39	2.02
4	Seth G.S. Medical College, Mumbai/ King Edward Memorial (KEM) Hospital/King Edward VII Memorial Hospital	39	2.02
5	Kasturba Medical College (KMC) and Hospital, Manipal, Karnataka	32	1.65
5	Sher-e-Kashmir Institute of Medical Sciences (SKIMS), Srinagar	32	1.65
5	Sanjay Gandhi PostGraduate Institute of Medical Sciences (SGPGIMS), Lucknow	32	1.65
6	Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Thiruvananthapuram	31	1.60
7	Armed Forces Medical College, Pune (AFMC), Pune	30	1.55

7	Govt. Medical College, Jammu(GMC, Jammu)	30	1.55		and Hospital, Manipal, Karnataka		
8	Christian Medical College and Hospital, Ludhiana	28	1.45	2	Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh	55	2.67
9	Christian Medical College (CMC) and Hospital, Vellore	23	1.19	3	Armed Forces Medical College, Pune (AFMC), Pune	50	2.43
10	Himalayan Institute of Medical University Sciences (HIMS)	18	0.93	4	Government Medical College, Srinagar(GMC, Jammu)	34	1.65
11	University of Madras, Chennai	17	0.88	5	Sanjay Gandhi Post Graduate Institute of Medical Sciences (SGPGIMS), Lucknow	33	1.60
11	Sir Ganga Ram Hospital, New Delhi	17	0.88	6	National Institute of Mental Health and Neurological Sciences (NIMHANS), Bangalore	30	1.46
12	Banaras Hindu University(BHU), Varanasi	16	0.83	6	Seth G.S. Medical College, Mumbai	30	1.46
12	Tata Memorial Hospital(TMh), Mumbai	16	0.83	7	Maulana Azad Medical College (MAMC), New Delhi	29	1.41
13	University College of Medical Sciences, New Delhi	15	0.76	8	Tata Memorial Hospital, Mumbai(TMh)	26	1.26
13	Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER), Pondicherry	15	0.76	9	Military Hospital, Secunderabad	25	1.21
14	Chhatrapati Shahuji Maharaj Medical University (Erstwhile King George Medical University)	14	0.72	10	Army Hospital Research and Referral, Delhi	24	1.17
15	Aligarh Muslim University(AMU), UP	13	0.67	11	Christian Medical College and Hospital, Ludhiana	23	1.12
15	Army Hospital Research & Referral, Delhi	13	0.67	12	Christian Medical College (CMC) and Hospital, Vellore	22	1.07
				12	Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Thiruvananthapuram	22	1.07
				13	Government Medical College, Srinagar(GMC, srinagar)	20	0.98
				14	Banaras Hindu University(BHU), Varanasi	19	0.92
				15	Base Hospital, Delhi	18	0.87

1.3 Top Contributing Institutions-2007

India contributed a total of 2,058 open access publications in 2007. All India Institute of Medical Sciences (AIIMS) while maintaining the trend yet again contributes optimum research output 109 (5.3%), followed by Postgraduate Institute of Medical Education & Research (PGIMER) and Kasturba Medical College (KMC) & Hospital with 55 (2.67%) publications apiece. The Kasturba Medical College (KMC) & Hospital has improved contribution over previous year and jointly share 2nd rank with PGIMR. Similarly The Armed Forces Medical College (AFMC) has also increased the contribution of OA journals therefore improved its rating and turns to be 3rd biggest contributor for the year with 50 (2.43%) article. Govt. Medical College (GMC), Jammu with 34 (1.65%) publications retains the 4th spot and Sanjay Gandhi Postgraduate Institute of Medical Sciences (SGPGIMS) with 33 (1.6%) publications hold 5th positions respectively. Table 3 offers a clear picture.

TABLE 3: Leading Institutions in 2007 (N=2,058)

RANK	INSTITUTION	Output	%Age
1	All India Institute of Medical Sciences(AIIMS), Delhi	109	5.3
2	Kasturba Medical College (KMC)	55	2.67

1.4 Top Contributing Institutions -2008

All India Institute of Medical Sciences (AIIMS) retain the top position in 2008 as well with 93 (4.19%) publications out of a total of 2,231 open access publications contributed by India in this year. The 2nd and 3rd positions are taken by Postgraduate Institute of Medical Education and Research (PGIMER) with 81 (3.63%) publications and Kasturba Medical College (KMC) and Hospital with 64 (2.89%) publications respectively followed by Armed Forces Medical College (AFMC) seizing the 4th spot with 50 (2.24%) publications. Seth G. S. Medical College is holding 5th place with 41 (1.84%) publications. Table 4 provides and lucid view of other top contributing institutions of the year.

TABLE 4: Leading Institutions in 2008 (N=2,231)

RANK	INSTITUTION	Output	%Age
1	All India Institute of Medical Sciences(AIIMS), Delhi	93	4.19
2	Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh	81	3.63

3	Kasturba Medical College (KMC) and Hospital, Manipal, Karnataka	64	2.89
4	Armed Forces Medical College, Pune (AFMC), Pune	50	2.24
5	Seth G.S. Medical College, Mumbai	41	1.84
6	Government Medical College, Srinagar(GMC, Jammu)	35	1.57
7	Maulana Azad Medical College (MAMC), New Delhi	33	1.48
8	National Institute of Mental Health and Neurological Sciences (NIMHANS), Bangalore	30	1.34
9	Christian Medical College and Hospital, Ludhiana	26	1.17
10	Banaras Hindu University, Varanasi (BHU)	25	1.12
10	Chhatrapati Shahuji Maharaj Medical University	25	1.12
11	Christian Medical College (CMC) and Hospital, Vellore	23	1.03
11	Sanjay Gandhi PostGraduate Institute of Medical Sciences (SGPGIMS), Lucknow	23	1.03
11	Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Thiruvananthapuram	23	1.03
12	Military Hospital, Secunderabad	22	0.99
13	Sher-e-Kashmir Institute of Medical Sciences, (SKIMS) Srinagar	19	0.85
14	Tata Memorial Hospital(TMh), Mumbai	16	0.72
15	Army Hospital Research and Referral, Delhi	15	0.67
15	Amrita Institute of Medical Sciences and Research Center, Kochi	15	0.67

1.5 Top Contributing Institutions -2009

Perennially All India Institute of Medical Sciences (AIIMS) turns out to be the leading contributor towards open access (OA) movement in the field of medicine with 132 (5.30%) out of a total of 2,489 publications contributed by Indian institutions in 2009. Postgraduate Institute of Medical Education and Research (PGIMER) with 97 (3.9%) publications maintained its 2nd position followed by Kasturba Medical College (KMC) and Hospital with 53 (2.13%) publications while as Seth G. S. Medical College got the 4th rank with 37 (1.49%) article contributions. Further

information is available in Table 5.

TABLE 5: Leading Institutions in 2009 (N=2,489)

RANK	INSTITUTION	Output	%AGE
1	All India Institute of Medical Sciences(AIIMS), Delhi	132	5.3
2	Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh	97	3.9
3	Kasturba Medical College (KMC) and Hospital, Manipal, Karnataka	53	2.13
4	Seth G.S. Medical College, Mumbai	37	1.49
5	University College of Medical Sciences, New Delhi	36	1.45
6	Armed Forces Medical College, Pune/AFMC, Pune	35	1.41
7	Christian Medical College and Hospital, Ludhiana	30	1.21
8	National Institute of Mental Health and Neurological Sciences (NIMHANS), Bangalore	28	1.12
9	Sanjay Gandhi PostGraduate Institute of Medical Sciences (SGPGIMS), Lucknow	26	1.04
10	Christian Medical College (CMC) and Hospital ,Vellore	25	1.00
11	Banaras Hindu University, Varanasi (BHU)	24	0.96
12	Govt. Medical College, Jammu(GMC, Jammu)	23	0.92
12	Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Thiruvananthapuram	23	0.92
13	Maulana Azad Medical College (MAMC), New Delhi	22	0.88
14	Tata Memorial Hospital(TMh), Mumbai	21	0.84
15	Command Hospital Air Force Bangalore	20	0.80

2. CUMULATIVE SHARE OF TOP CONTRIBUTING INSTITUTIONS (2005-2009)

Analysis of data showed that a good number of publications (10,410) have been contributed by Indian institutions towards the open access movement in the field of medicine for a period of 5 years from 2005 to 2009. All India Institute of Medical Sciences (AIIMS), Delhi is the premier institute from India contributing the highest 560 (5.38%) publications in open access journals published around globe. The Indian institution with 2nd highest 375 (3.6%) publications in open

access journals is Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh followed by Armed Forces Medical College (AFMC), Pune occupying 3rd spot with a contribution of 227 (2.18%) open access publications. Kasturba Medical College (KMC) and Hospital, Manipal with 223 (2.14%), Seth G. S. Medical College, Mumbai with 192 (1.84%) and Govt. Medical College (GMC), Jammu with 160 (1.54%) publications occupied the 4th, 5th and 6th spots respectively. This is shown in Table 6.

TABLE 6: Top 10 Institutions from 2005-2009 (N=10,410)

RANK	INSTITUTION	Output	%AGE
1	All India Institute of Medical Sciences(AIIMS), Delhi	560	5.38
2	Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh	375	3.6
3	Armed Forces Medical College, Pune (AFMC), Pune	227	2.18
4	Kasturba Medical College (KMC) and Hospital, Manipal, Karnataka	223	2.14
5	Seth G.S. Medical College, Mumbai	192	1.84
6	Government Medical College (GMC, Jammu)	160	1.54
7	Maulana Azad Medical College (MAMC), New Delhi	148	1.42
8	Christian Medical College and Hospital, Ludhiana	137	1.32
9	Sanjay Gandhi PostGraduate Institute of Medical Sciences (SGPGIMS), Lucknow	128	1.23
10	Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Thiruvananthapuram	116	1.11
11	Sher-e-Kashmir Institute of Medical Sciences (SKIMS), Srinagar	112	1.08
12	National Institute of Mental Health and Neurological Sciences (NIMHANS), Bangalore	105	1.00
13	Government Medical College, Srinagar (GMC, Srinagar)	103	0.99
14	Banaras Hindu University(BHU), Varanasi	99	0.95
15	Military Hospital, Secunderabad	98	0.94

VIII. CONCLUSION

The OA movement is gaining ground in all fields of knowledge with special reference to Science and Technology. But it very surprising the movement is still in its infancy stage

in India. India is expected to give impetus to OA movement due to its growing economy and increasing investment in education and research. It is an accepted fact that 21st century belongs to Asia. In Asia, India and China are expected to accelerate investment in R&D which augurs well for OA movement. In India the OA movement among medicos seems to be more popular among famous institutions and medicos from small states and institutions are yet to yield the benefits of OA journals. This assertion is backed by the fact that AIIMS is the leading contributor throughout the study period followed by institutions which are well reputed at national level. Therefore, the urgent need of the hour is to educate medicos from smaller states and institutes about the fruits of OA, which can have positive impact on the growth of OA movement. Library and Information Science professionals in all research institutions need to make efforts in this regard so that Open Access literature is known to all the users. They need to get fully acquainted first themselves to this important area of research. They should strive hard so that they come to know about OA literature in various fields. Later, it becomes their responsibility to motivate users to use OA literature more and more and to publish in OA journals so that interests of common man are fulfilled.

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