

Plastic Surgery Research in India: A Scientometric Assessment of Publications during 2007-16

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Abstract

1578 Indian publications on plastic surgery as indexed in Scopus database during 2007-16 were examined by the present study, with a view to understand their growth rate, global share, citation impact, international collaborative papers share, distribution of publications by broad subjects, productivity and citation profile of top organizations and authors and preferred media of communication. The Indian publications registered an annual average growth rate of 4.40%, global share of 3.08%, international collaborative publications share of 6.348% and its citation impact averaged to 3.52 citations per paper. Among broad subjects, medicine contributed the largest publications share of 94.80% in India's aplastic surgery research output, followed by dentistry (4.88%), biochemistry, genetics and molecular biology (1.96%) and pharmacology, toxicology and pharmaceuticals (1.33%) during 2007-16. Among various organizations and authors contributing to India's plastic surgery research, the top 15 organizations and authors together contributed 37.90% and 25.92% respectively as their share of global publication output and 41.25% and 23.81% respectively as their share of global citation output during 2007-16. Amongst 1560 journal papers, the top 15 journals registered 74.62% share during 2007-16, which showed decrease from 78.60% to 71.24% from 2007-11 and 2012-16. *Indian Journal of Plastic Surgery* contributed the largest number of papers (657 papers), followed by *Ophthalmic Plastic and Reconstructive Surgery* (118 papers), *Journal of Plastic Reconstructive and Aesthetic Surgery* (104 papers), etc. during 2007-16

Keywords: Plastic Surgery; Orthopaedics; Indian Publications; Scientometrics; Bibliometrics

Introduction

Plastic surgery is a medical specialty concerned with the correction, restoration, reconstruction, or alteration of the form and functions of the human body. Plastic surgery is focused on repairing, reconstructing or replacing abnormalities in the functioning and form of the skin, muscles, skeletal system and many other areas of the body and also facial and body defects due to birth disorders, trauma, burns, and disease. Plastic surgery is intended to correct dysfunctional areas of the body and is reconstructive in nature. As such a plastic surgeon may perform two types of surgery: reconstructive surgery and cosmetic surgery [1-3].

Reconstructive plastic surgery is performed to correct functional impairments caused by burns; traumatic injuries, such as facial bone fractures and breaks; congenital abnormalities, such as cleft palates or cleft lips; developmental abnormalities; infection and disease; and cancer or tumors. Reconstructive plastic surgery is usually performed to improve function, but it may be done to approximate a correct appearance after an injury or to improve bodily function. The most common reconstructive procedures are tumor removal, laceration

repair, scar repair, hand surgery, and breast reduction plasty. Sub-disciplines of plastic surgery may include aesthetic surgery (includes facial and body aesthetic surgery), burn surgery, pediatric and adult craniofacial surgery (pediatric deals with treatment of congenital anomalies of the craniofacial skeleton and soft tissues, such as cleft lip and palate, cranio-synostosis and adult deals mostly with fractures and secondary surgeries (such as orbital reconstruction) along with ortho-gnathic surgery, hand surgery (concerned with acute injuries and chronic diseases of the hand and wrist, correction of congenital malformations of the upper extremities, and peripheral nerve problems), microsurgery (concerned with the reconstruction of missing tissues by transferring a piece of tissue to the reconstruction site and reconnecting blood vessels) and pediatric plastic surgery [1-3].

Cosmetic surgery is a unique discipline of medicine focused on enhancing appearance and/or removing signs of aging through surgical and medical techniques. Cosmetic surgery can be performed on all areas of the head, neck and body. Because treated areas function properly but lack aesthetic appeal, cosmetic surgery is elective. Cosmetic surgery covers a range of procedures, including surgical procedures, nonsurgical procedures and dental procedures. Surgical procedures include breast enlargement, rhinoplasty (nose surgery), surgical face-lifts, abdominoplasty (tummy tuck) and liposuction, etc. Procedures such as chemical peels, collagen injections, laser skin resurfacing, vein removal and laser hair removal are collectively referred to as cosmetic medicine [1,3,4].

In terms of number of plastic surgeons, USA leads the world with 6500 (16% world share), followed by Brazil (5500, 13.5%), China (2800, 6.9%), Japan (2225, 5.5%), South Korea (2150, 5.3%), India (2150, 5.30%), followed by Russia, Mexico, Turkey and Germany. According to a global survey by the International Society of Aesthetic Plastic Surgery (ISAPS), India ranks fourth with 9,35,487 cosmetic procedures conducted in the last year. The surgeries account for 4.3% of all procedures recorded globally. In the survey, US topped the list with 18.6% of all procedures being performed there, followed by Brazil with 10.7% and South Korea with 5.3%. Mexico ranked fifth, accounting for 4.2% of the total procedures performed worldwide [5,6].

Of the total procedures conducted in 2015, 4,20,454 (4.4%) were surgical and 5,15,033 (4.3%) were non-surgical. Among the two types of cosmetic surgeries, reconstructive surgeries were more common in India until a decade ago. Reconstructive surgeries are performed on patients with deformities and those involved in surgeries. In the next two decades, one can expect the number of such surgeries to increase by as much as 50% in the number of these surgeries is expected in the next two decades.

The ISAPS survey also showed that a maximum number of Total Body and Extremities Procedures across the world were carried out in India. With 1,53,317 procedures, the country contributes 36.5% of these surgeries globally. These procedures include body lifts as well. National secretary of the Indian Association of Aesthetic Plastic Surgeon Ashish Davalbhakta pointed out that hair transplant, rhinoplasty, liposuction and breast augmentation or reduction are the most sought after aesthetic surgeries in the country. According to the ISAPS survey, the types of procedures that people are opting for differ across countries. While breast augmentation remained the top choice for people worldwide, with 15.4% of all surgical procedures, liposuction was another sought after procedure with 14.5% opting for it. Eyelid surgery stood at number three with a 13.1% share, while abdominoplasty, better known as a tummy tuck, was fourth at 7.9% followed by rhinoplasty, or nose reshaping, at 7.6%. The popularity of surgical procedures varied in every country with Brazil, US, Mexico, India and South Korea being top countries for the top five procedures. India remained at fourth position in relation to all these surgical procedures [5,6].

Literature Review

Only few bibliometric studies, have been conducted in the past, on the assessment of global and national output of plastic surgery research. Among the international studies, Rymer and Choa [7] studied a total of 10,051 global articles published during 2009-13. The top 20 countries publishing articles on surgery and 10 plastic surgical journals with the highest impact factors (IFs) were included. The study identified not only major centers of plastic surgical research, such as the USA and UK, but also centers that produce high-quality data, such as Canada, and cost-effective research, such as Turkey. It also highlights the areas of increasing success in plastic surgical research. The research outputs were compared with population, gross domestic product (GDP) and dollars spent. Loonen and Hage [8] longitudinally analyzed plastic surgery publications over the last three decades. Data on the topic of surgical interest and the anatomical region of research, the country of origin, and the origin and number of collaborating clinics were noted for each original article published in *Plastic and Reconstructive Surgery*, the *British Journal of Plastic Surgery*, and the *European Journal of Plastic Surgery* in 1972, 1980, 1988, 1996, and 2004. Conclude that the number of articles in three international plastic surgery journals has more than doubled over the last three decades. Reconstruction of acquired defects remained the most important topic in all three journals, but an interest in rejuvenation or aesthetic surgery seems to replace that in basic research. The head and neck area remains the anatomical region of most interest to date, but this interest has decreased substantially. Most articles still originate from the USA, but the absolute and relative number of articles originating from Europe and Asia is rapidly increasing. Also, the published output of multi-national scientific collaboration is increasing. Even though authors from larger countries, in general, contribute more publications in absolute numbers, authors from small countries have a more efficient output relative to the number of inhabitants and GDP of their country.

Among the national studies, Perotti, Holwill, Sreedharan, Reilly, Rozen and Hunter-Smith [9] provided an bibliometric analyses of the contribution of plastic surgeons from Australia and New Zealand. Plastic surgery journals with the 15 highest impact factors were identified. Total publications in a ten-year period from October 2007 to September 2017 by Australian and New Zealand Plastic Surgeons were recorded, as were h-indices for all surgeons. In all 588 articles were published by 498 surgeons, with the largest numbers in Plastic and Reconstructive Surgery (142), Burns (133), and the Journal of Plastic, Reconstructive and Aesthetic Surgery (112). Mean h index for Associate Professors was 9.29, and for Professors was 17.17. Australian and New Zealand Plastic Surgeons continue to be actively involved in world-class research and innovation. The volume and quantity of research produced supports the development of an Australasian Journal of Plastic Surgery. Zhang, Zhang and Jiang [10] examined the contribution of articles from Chinese authors to the field of plastic and reconstructive surgery. Articles published in the 6 journals in plastic and reconstructive surgery originating from Mainland China, Hong Kong, and Taiwan from 2000 to 2009 were selected and retrieved from the PubMed database and Journal Citation Reports. From 2000 to 2009, there were 568 articles from China, including 225 from Mainland China, 317 from Taiwan, and 26 from Hong Kong. The annual total numbers of articles from the 3 Chinese regions increased gradually between 2000 and 2009 (from 40 to 100). From 2007, the number of articles published from Mainland China exceeded Taiwan. Taiwan had the highest accumulated 5 years-IFs, average 5 years-IF, total citations, and average citations of each article. Plastic and Reconstructive Surgery was the most popular journal in China. Since there was no study from India, as a result we decided to undertake the present study.

Objectives of the Study

The present manuscript aims to study the various dimensions of India's plastic surgery research in terms of various bibliometric indicators based on publications and citation data, derived from Scopus database during 2007-16. In particular, the study analyzed overall annual and cumulative growth of Indian publications, its global share and rank among top 10 most productive countries, its citation impact, its international collaborative papers share, publication output distribution by broad sub-fields, productivity and citation impact of most productive organizations and authors, leading media of communications and characteristics of top highly cited papers.

Methodology

For the present study, the publication data was retrieved and downloaded from the Scopus database (<http://www.scopus.com>) on India’s plastic surgery research during 2007-16. A main search strategy for global output was formulated, where the keyword such as “plastic surgery” or “cosmetic surgery” are searched in the “keyword tag” or “Article Title Tag” or “Source Title tag” and further limited the search output to period ‘2007-16’ within “date range tag”. This search strategy generated 51263 global publications on plastic surgery research from the Scopus database. This main search strategy was later refined by “Country Name Tag” to get plastic surgery research output of individual top 10 most productive countries, including India (1578 papers) one by one. Detailed analysis was carried out on 1578 Indian publications data using the analytical provisions or tags existing in Scopus database such as “subject area tag”, “country tag”, “source title tag”, “journal title name” and “affiliation tag”, to get data distribution by subject, collaborating countries, author-wise, organization-wise and journal-wise, etc. For citation data, citations to publications were also collected from date of publication till 11 September 2017. A series of raw and relative bibliometric indicators were used by authors to understand the dynamics of India’s plastic surgery research from different perspective

(KEY(plastic surgery or cosmetic surgery) OR TITLE(plastic surgery or cosmetic surgery)OR SRCTITLE(plastic surgery or cosmetic surgery)) AND PUBYEAR > 2006 AND PUBYEAR < 2017

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Analysis

The global and Indian research output in plastic surgery research cumulated to 51263 and 1578 publications in 10 years during 2007-16 and they increased from 4261 and 103 in the year 2007 to 3969 and 137 publications in the year 2016, registering 0.16% and 4.40% growth per annum. Their five-year cumulative output increased from 24761 and 726 to 26502 and 852 publications from 2007-11 to 2012-16, registering 7.03% and 17.36% growth respectively. The share of Indian publications in global output was 3.08% during 2007-16, which increased from 2.93% to 3.21% from 2007-11 to 2012-16. Amongst Indian publications on plastic surgery, 59.70% (942) was published as articles, 21.42% (338) as letters, 9.89% (156) as reviews, 3.49% (55) as notes, 3.30% (52) as editorials, 1.52% (24) as conference papers, 0.32% (5) as short surveys, 0.195(3) as book chapters,0.13%(2) as articles in press and 0.06% (1) as book. The research impact as measured by citations per paper registered by Indian publications in plastic surgery averaged to 3.52 citations per publication (CPP) during 2007-16; five-yearly impact averaged to 5.34 CPP for the period 2007-11 which declined to 1.97 CPP in the succeeding five-year 2012-16 (Table 1).

Publication Period	World	India					
	TP	TP	TC	CPP	ICP	%ICP	%TP
2007	4261	103	522	5.07	3	2.91	2.42
2008	4839	126	579	4.60	5	3.97	2.60
2009	5168	160	971	6.07	13	8.13	3.10
2010	5487	154	944	6.13	9	5.84	2.81
2011	5006	183	863	4.72	7	3.83	3.66
2012	5277	174	599	3.44	11	6.32	3.30
2013	5477	175	539	3.08	9	5.14	3.20
2014	6015	198	303	1.53	20	10.10	3.29
2015	5764	168	196	1.17	13	7.74	2.91
2016	3969	137	45	0.33	10	7.30	3.45
2007-11	24761	726	3879	5.34	37	5.10	2.93
2012-16	26502	852	1682	1.97	63	7.39	3.21
2007-16	51263	1578	5561	3.52	100	6.34	3.08

Table 1: World and India’s Output in Plastic Surgery Research, 2007-16.

Publication Profile of Top 10 Most Productive Countries

Between 797 and 16463 publications were contributed by top 15 most productive countries in plastic surgery research and they together accounted for 81.84% of global publication share during 2007-16. Their five-year publications output increased from 79.77% to 83.79% from 2007-11 to 2016. Each of top 15 countries had global publication share between 1.55% and 32.11% during 2007-16. USA accounted for the highest publication share (32.11%), followed by U.K., Japan, Germany and Italy (from 4.17% to 7.95%), China, South Korea, Turkey, India (from 3.08% to 3.99%) and other 6 countries (from 1.55% to 2.90%) during 2007-16. Their five-year global publication share have increased South Korea, China, USA, India, Canada, Taiwan, Japan and Australia (from 0.07% to 3.0%), as against decrease in U.K., Germany, Brazil, France, Turkey, Netherlands and Italy (from 0.02% to 0.71%) from 2007-11 to 2012-16 (Table 2).

S. No	Country Name	TP			%TP		
		2007-11	2012-16	2007-16	2007-11	2012-16	2007-16
1	USA	7798	8665	16463	31.49	32.70	32.11
2	U.K.	2058	2015	4073	8.31	7.60	7.95
3	Japan	1515	1645	3160	6.12	6.21	6.16
4	Germany	1229	1138	2367	4.96	4.29	4.62
5	Italy	1035	1102	2137	4.18	4.16	4.17
6	China	802	1244	2046	3.24	4.69	3.99
7	South Korea	562	1397	1959	2.27	5.27	3.82
8	Turkey	840	858	1698	3.39	3.24	3.31
9	India	726	852	1578	2.93	3.21	3.08
10	Canada	688	800	1488	2.78	3.02	2.90
11	France	692	648	1340	2.79	2.45	2.61
12	Brazil	582	489	1071	2.35	1.85	2.09
13	Australia	444	492	936	1.79	1.86	1.83
14	Netherlands	412	431	843	1.66	1.63	1.64
15	Taiwan	368	429	797	1.49	1.62	1.55
	Total	19751	22205	41956	79.77	83.79	81.84
	World	24761	26502	51263			
	Share of Top 15 in World Output	79.77	83.79	81.84			

Table 2: Global Publication Output and Share of Top 15 Countries in Plastic Surgery during 2007-16.

India's International Collaboration

The share of India's international collaborative publications (ICP) in its national output in plastic surgery research was 6.34% during 2007-16, which increased from 5.10% during 2007-11 to 7.39% during 2012-16. About 48 foreign countries collaborated with India in 100 plastic surgery research papers during 2007-16. These 100 papers together registered 627 citations, with 6.27 citations per paper. USA, among foreign countries, contributed the largest share (35.0%) to India's international collaborative papers in plastic surgery research, followed by U.K. (11.0%), Australia and Saudi Arabia (8.0% each), Canada, Italy and Sweden (6.0% each), Germany, Taiwan and Belgium (from 3.0% to 5%) during 2007-16. The share of ICP increased by 12.70% in Saudi Arabia, 5.23% in Italy, 0.94% in Sweden and 0.47% in Belgium, as against decrease by 12.57% in U.K., 7.64% in Canada, 4.93% in Germany, 4.50% in USA, 4.46% in Australia and 2.23% in Taiwan from 2007-11 to 2012-16 (Table 3).

S. No	Collaborative Country	Number of International Collaborative Papers			Share of International Collaborative Papers		
		2007-11	2012-16	2007-16	2007-11	2012-16	2007-16
1	USA	14	21	35	37.84	33.33	35.00
2	U.K	7	4	11	18.92	6.35	11.00
3	Australia	4	4	8	10.81	6.35	8.00
4	South Arabia	0	8	8	0.00	12.70	8.00
5	Canada	4	2	6	10.81	3.17	6.00
6	Italy	1	5	6	2.70	7.94	6.00
7	Sweden	2	4	6	5.41	6.35	6.00
8	Germany	3	2	5	8.11	3.17	5.00
9	Taiwan	2	2	4	5.41	3.17	4.00
10	Belgium	1	2	3	2.70	3.17	3.00
	Total	37	63	100			

Table 3: The Share of Top 10 Foreign Countries in India's International Collaborative Papers in India's Plastic Surgery Research during 2007-16.

Subject-Wise Distribution of Indian Research Output

As per the Scopus database classification, India's plastic surgery research output is distributed across four sub-fields during 2007-16. Among sub-fields, medicine registered the highest publications share (94.80%), followed by dentistry (4.88%), biochemistry, genetics and molecular biology (1.96%) and pharmacology, toxicology and pharmaceuticals (1.33%) during 2007-16. The publication activity, as seen through activity index from 2007-11 to 2012-16, witnessed increase in medicine (from 99.79 to 100.11), biochemistry, genetics and molecular biology (from 49.08 to 143.39) and pharmacology, toxicology and pharmaceuticals (from 62.10 to 132.29) as against decrease in dentistry (from 121.38 to 81.78) from 2007-11 to 2012-16. In terms of citation impact per paper, Dentistry, among sub-fields, registered the highest CPP of 5.55, followed biochemistry, genetics and molecular biology (4.06), medicine (3.36) and pharmacology, toxicology and pharmaceuticals (3.10) during 2007-16 (Table 4).

S. No	Subject*	Number of Papers (TP)			Activity Index		TC	CPP	%TP
		2007-11	2012-16	2007-16	2007-11	2012-16	2007-16	2007-16	2007-16
1	Medicine	681	815	1496	98.94	100.90	5031	3.36	94.80
2	Dentistry	43	34	77	121.38	81.78	427	5.55	4.88
3	Biochemistry, Genetics and Molecular Biology	7	24	31	49.08	143.39	126	4.06	1.96
4	Pharmacology, Toxicology and Pharmaceuticals	6	15	21	62.10	132.29	65	3.10	1.33
	World Output	726	852	1578					

Table 4: Subject-Wise Breakup of Indian Publications in Plastic Surgery Research during 2007-16.

There is overlapping of literature covered under various subjects.

TP: Total Papers; TC: Total Citations; CPP: Citations Per Paper

Profile of Top 15 Most Productive Indian Organizations

305 organizations participated in Indian plastic surgery research, of which 268 organizations contributed 1 - 10 papers each, 28 organizations each 11 - 30 papers each, 6 organizations 31 - 50 papers each, 2 organizations 41 - 80 papers each and 1 organization 103 papers. The top 15 Indian organizations contribution to plastic surgery research varied from 20 to 103 publications and they together accounted for 37.90% (598) publication share and 41.25% (2294) citation share to its cumulative publications output during 2007-16. Table 5 presents a scientometric profile of these 15 top India organizations.

- Four organizations registered higher productivity than the group average of 39.87: Postgraduate Institute of Medical Education and Research, Chandigarh (103 papers), L.V. Prasad Eye Institute, Hyderabad (79 papers), Christian Medical College, Vellore (60 papers) and Tata Memorial Hospital, Mumbai (40 papers) during 2007-16;
- Eight organizations registered higher citation impact than group average of 3.84 citations per publication: All India Institute of Medical Sciences, New Delhi (5.61), King Edward Memorial Hospital (4.69), Lok Nayak Hospital, New Delhi (4.60), Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi (4.39), L.V. Prasad Eye Institute, Hyderabad (4.10), CSM Medical University, Lucknow (4.0), Manipal University (3.90), Institute of Medical Sciences, BHU, Varanasi (3.85) during 2007-16;
- Four organizations achieved higher international collaborative publications share than group average of 6.02%: Manipal University (25.0%), Tata Memorial Hospital, Mumbai (12.50%), L.V. Prasad Eye Institute, Hyderabad (10.13%) and All India Institute of Medical Sciences, New Delhi (8.09%) during 2007-16;
- Seven organizations registered higher relative citation index than group average (1.09): All India Institute of Medical Sciences, New Delhi (1.59), King Edward Memorial Hospital (1.33), Lok Nayak Hospital, New Delhi (1.31), Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi (1.25), L.V. Prasad Eye Institute, Hyderabad (1.17), CSM Medical University, Lucknow (1.14) and Manipal University (1.11) during 2007-16.

S. No	Name of the Organization	TP	TC	CPP	HI	ICP	%ICP	RCI
1	Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh	103	350	3.40	10	3	2.91	1.59
2	L.V. Prasad Eye Institute, Hyderabad	79	324	4.10	9	8	10.13	1.33
3	Christian Medical College, Vellore	60	227	3.78	8	2	3.33	1.31
4	Tata Memorial Hospital, Mumbai	40	145	3.63	7	5	12.50	1.25
5	CSM Medical University, Lucknow	39	156	4.00	7	2	5.13	1.17
6	Amrita Institute of Medical Sciences, Coimbatore	38	116	3.05	6	2	5.26	1.14
7	Ganga Hospital, Coimbatore	37	142	3.84	7	2	5.41	1.11
8	All India Institute of Medical Sciences, New Delhi	33	185	5.61	7	3	9.09	1.09
9	Vardhman Mahavir Medical College & Safdarjung Hospital, New Delhi	33	145	4.39	7	0	0.00	1.09
10	King Edward Memorial Hospital	26	122	4.69	5	1	3.85	1.07
11	Institute of Medical Sciences, BHU, Varanasi	26	100	3.85	6	1	3.85	1.03
12	Maulana Azad Medical College, Delhi	24	83	3.46	6	1	4.17	0.98
13	Lok Nayak Hospital, New Delhi	20	92	4.60	6	1	5.00	0.97
14	Lokmanya Tilak Municipal General Hospital, Mumbai	20	29	1.45	3	0	0.00	0.87
15	Manipal University	20	78	3.90	4	5	25.00	0.41
	Total of 15 organizations	598	2294	3.84	6.53	36	6.02	1.09
	Total of India	1578	5561	3.52				
	Share of top 15 organizations in Indian total output	37.90	41.25	1.09				

Table 5: Scientometric Profile of Top 15 Most Productive Indian Organizations in Plastic Surgery Research in India during 2007-16.

TP: Total Papers; TC: Total Citations; CPP: Citations Per Paper; HI: h-index; ICP: International Collaborative Papers; RCI: Relative Citation Index

Profile of Top 15 Most Productive Authors

561 authors participated in Indian plastic surgery research, of which 530 authors contributed 1 - 10 papers each, 21 authors each 11 - 20 papers each, 8 authors 21 - 50 papers each and 2 authors 51 - 54 papers each. The top 15 Indian author's contribution to plastic surgery research varied from 15 to 54 publications and they together accounted for 25.92% (409) publication share and 23.81% (1324) citation share to its cumulative publications output during 2007-16. Table 6 presents a scientometric profile of these 15 India authors.

- Five authors registered higher publications productivity than group average of 27.27: M.J. Ali (54 papers), R.K. Sharma (52 papers), M.N. Naik (37 papers), A.K. Gupta (37 papers) and S. Bhattacharya (30 papers) during 2007-16;
- Eight authors registered higher citation impact than the group average of 3.24 citations per publication: Q.G. Ahmad (5.53), P.S. Yadav (5.24), M.N. Naik (4.79), S.R. Sabapathy (4.71), M.J. Ali (3.91), S.B. Patil (3.53), H. Venkatramani (3.38) and R.K. Sharma (3.35) during 2007-16
- Five authors achieved higher international collaborative publications share than the group average of 3.42% of all authors: M.J. Ali (11.11%), M.N. Naik (9.30%), N. Panse (9.09), H. Venkatramani (6.25) and S.R. Sabapathy (5.88%) during 2007-16;
- Eight authors registered higher relative citation index than the group average of 0.92: Q.G. Ahmad (1.57), P.S. Yadav (1.49), M.N. Naik (1.36), S.R. Sabapathy (1.34), M.J. Ali (1.11), S.B. Patil (1.0), H. Venkatramani (0.96) and R.K. Sharma (0.95) during 2007-16.

S.No	Name of the Author	Affiliation of the Author	TP	TC	CPP	HI	ICP	%ICP	RCI
1	M.J. Ali	L. V. Prasad Eye Institute, Hyderabad	54	211	3.91	7	6	11.11	1.11
2	R.K. Sharma	Postgraduate Institute of Medical Education and Research, Chandigarh	52	174	3.35	8	0	0.00	0.95
3	M.N. Naik	L. V. Prasad Eye Institute, Hyderabad	43	206	4.79	7	4	9.30	1.36
4	A.K. Gupta	Christian Medical College, Vellore	37	78	2.11	6	0	0.00	0.60
5	S. Bhattacharya	SIPS Hospital, Lucknow	30	31	1.03	3	0	0.00	0.29
6	A. Parashar	Postgraduate Institute of Medical Education and Research, Chandigarh	24	67	2.79	4	0	0.00	0.79
7	G.I. Nambi	Christian Medical College, Vellore	23	46	2.00	4	0	0.00	0.57
8	N. Panse	B. J. Medical College and Sasoon Hospital, Pune	22	46	2.09	4	2	9.09	0.59
9	M. Jagannathan	LTMG Hospital and Medical College, Mumbai	21	29	1.38	3	0	0.00	0.39
10	P. S. Yadav	Tata Memorial Hospital, Mumbai	21	110	5.24	6	0	0.00	1.49
11	V. K. Shankhdhar	Tata Memorial Hospital, Mumbai	19	56	2.95	4	0	0.00	0.84
12	S.R. Sabapathy	Ganga Hospital, Coimbatore	17	80	4.71	6	1	5.88	1.34
13	H. Venkatramani	Ganga Hospital, Coimbatore	16	54	3.38	4	1	6.25	0.96
14	Q. G. Ahmad	Tata Memorial Hospital, Mumbai	15	83	5.53	5	0	0.00	1.57
15	S.B. Patil	Government Medical College, Nagpur	15	53	3.53	5	0	0.00	1.00
		Total of 15 authors	409	1324	3.24	5.07	14	3.42	0.92
		Total of India	1578	5561	3.52				
		Share of top 15 authors in Indian total output	25.92	23.81					

Table 6: Scientometric Profile of Top 15 Most Productive Authors in Plastic Surgery Research in India during 2007-16.

TP: Total Papers; TC: Total Citations; CPP: Citations Per Paper; HI: h-index; ICP: International Collaborative Papers; RCI: Relative Citation Index

Medium of Communication

178 journals contributed to Indian plastic surgery research, of which 167 journals contributed 1-10 papers each, 8 journals 11-100 papers each, 2 journals 101-200 papers each and 1 journal 657 papers. Among India's plastic surgery 1560 papers in journals (constituting 98.86% of total Indian output), the top 15 most productive journals accounted for 7 to 657 papers. These 15 journals together accounted for 74.62% share (1164 papers) of total Indian journal publication output during 2007-16, decreasing from 78.60% during 2007-11 to 71.24% during 2012-16. *Indian Journal of Plastic Surgery* was the most productive journal with 657 papers each, followed by *Ophthalmic Plastic and Reconstructive Surgery* (118 papers), *Journal of Plastic Reconstructive and Aesthetic Surgery* (104 papers), etc. during 2007-16 (Table 7).

S. No	Name of the Journal	Number of Papers		
		2007-11	2012-16	2007-16
1	<i>Indian Journal of Plastic Surgery</i>	295	362	657
2	<i>Ophthalmic Plastic and Reconstructive Surgery</i>	34	84	118
3	<i>Journal of Plastic Reconstructive and Aesthetic Surgery</i>	75	29	104
4	<i>Plastic and Reconstructive Surgery</i>	59	20	79
5	<i>European Journal of Plastic Surgery</i>	20	33	53
6	<i>Annals of Plastic Surgery</i>	21	15	36
7	<i>Journal of Craniofacial Surgery</i>	5	21	26
8	<i>Aesthetic Plastic Surgery</i>	11	5	16
9	<i>Indian Journal of Dental Research</i>	13	3	16
10	<i>Indian Journal of Dermatology, Venereology and Leprology</i>	6	7	13
11	<i>African Journal of Pediatric Surgery</i>	5	6	11
12	<i>Indian Journal of Ophthalmology</i>	8	2	10
13	<i>Journal of Clinical and Diagnostic Research</i>	0	10	10
14	<i>Burns</i>	7	1	8
15	<i>Journal of Oral and Maxillofacial Surgery</i>	3	4	7
	Total of 15 journals	562	602	1164
	Total global journal output	715	845	1560
	Share of top 15 journals in Indian journal output	78.60	71.24	74.62

Table 7: Productivity of Top 15 Most Productive Journals in Indian Plastic Surgery Research during 2007-16.

Summary and Conclusion

1578 Indian publications on plastic surgery research, as indexed in Scopus database, were published during 2007-16 and they increased from 103 in the year 2007 to 137 in the year 2016, registering 4.40% growth per annum. Their cumulative Indian output increased from 726 to 852, witnessing 17.36% growth from 2007-11 to 2012-16. India's global published share in plastic surgery research was only 3.08% during 2007-16, witnessing increase from 2.93% to 3.21% from 2007-11 to 2012-16. The citation impact per paper of Indian publications on plastic surgery research was averaged to 3.52 citations, however, decreasing from 5.34 to 1.97 from 2006-11 to 2012-16. The share of India's international collaborative publications in plastic surgery research was 6.34% during 2007-16, showing increase from 5.10% during 2007-11 to 7.39% during 2012-16. USA in India's international collaborative papers, contributed the largest publications share of 35.0%, followed by U.K. (11.0%), Australia and Saudi Arabia (8.0% each), Canada, Italy and Sweden (6.0% each), Germany, Taiwan and Belgium (from 3.0% to 5%) during 2007-16.

Medicine, among sub-fields contributed the highest publications share (94.80%), followed by dentistry (4.88%), biochemistry, genetics and molecular biology (1.96%) and pharmacology, toxicology and pharmaceuticals (1.33%) during 2007-16. The research activities, as reflected in activity index, showed increase in medicine, biochemistry, genetics and molecular biology and pharmacology, toxicology and pharmaceuticals, as against decrease in dentistry from 2007-11 to 2012-16.

Among leading organizations and authors participating in India's plastic surgery research, the 15 most productive Indian organizations and 15 authors together contributed 37.90% and 25.92% respectively as their share of global publication output and 41.25% and 23.81% respectively as their share of global citation output during 2007-16. The leading organizations in research productivity were: Postgraduate Institute of Medical Education and Research, Chandigarh (103 papers), L.V. Prasad Eye Institute, Hyderabad (79 papers), Christian Medical College, Vellore (60 papers) and Tata Memorial Hospital, Mumbai (40 papers) during 2007-16. The leading organizations registering comparatively higher citation impact were: All India Institute of Medical Sciences, New Delhi (5.61), King Edward Memorial Hospital (4.69), Lok Nayak Hospital, New Delhi (4.60), Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi (4.39), L.V. Prasad Eye Institute, Hyderabad (4.10), CSM Medical University, Lucknow (4.0), Manipal University (3.90), Institute of Medical Sciences, BHU, Varanasi (3.85) during 2007-16.

The leading authors in publication productivity were: M.J. Ali (54 papers), R.K. Sharma (52 papers), M.N. Naik (37 papers), A.K. Gupta (37 papers) and S. Bhattacharya (30 papers) during 2007-16. The leading authors in terms of research impact were: Q.G. Ahmad (5.53), P.S. Yadav (5.24), M.N. Naik (4.79), S.R. Sabapathy (4.71), M.J. Ali (3.91), S.B. Patil (3.53), H. Venkatramani (3.38) and R.K. Sharma (3.35) during 2007-16.

Amongst 1560 journal papers (contributed by 178 journals), the top 15 most productive journals contributed 74.62% share of total journal publication output during 2007-16, which decreased from 78.60% to 71.24% from 2007-11 and 2012-16. Indian Journal of Plastic Surgery contributed the largest number of papers (657), followed by Ophthalmic Plastic and Reconstructive Surgery (118 papers), Journal of Plastic Reconstructive and Aesthetic Surgery (104 papers), etc. during 2007-16.

Concludes that plastic surgery research have been a neglected subspecialty in India, both in teaching and research. There is an urgent need to have national policy and build adequate infrastructure to identify, screen, treat and manage plastic surgery cases. A staggering patient load, a severely inadequate number of trained plastic surgery specialists and limited advocacy are some of the critical challenges that confront plastic surgery research.

Bibliography

1. Plastic surgery (2018). https://en.wikipedia.org/wiki/Plastic_surgery (Accessed on 1 June 2018)
2. Plastic Surgery. Education and career (2018). https://career.webindia123.com/career/options/health_medicine/plastic-surgery/index.htm4. (Accessed on 1 June 2018)
3. About cosmetic surgery (2018). N.d. <https://www.cosmeticsurgery.org/page/CosmeticSurgery?> (Accessed on 1 June 2018)
4. Australian Health Ministers Advisory Council. Cosmetic medical and surgical procedure. A national framework. Final report (2011). <http://www.health.nsw.gov.au/publications/Documents/cosmetic-surgery.pdf3>.
5. Lee Bruce Y. "In Plastic Surgery, Brazil Gets The Silver Medal" (2016). <https://www.forbes.com/sites/brucelee/2016/08/08/in-plastic-surgery-brazil-gets-the-silver-medal-behind/#363cfd53642f> (Accessed on 1 June 2018)
6. Mishra Anandi. "India ranks 4th on list of plastic surgery hotspots" (2016). <https://timesofindia.indiatimes.com/City/Pune/India-ranks-4th-on-list-of-plastic-surgery-hotspots/articleshow/54023206.cms> (Accessed on 1 June 2018)

7. Rymer BC and Choa RM. "A world-wide bibliometric analysis of published literature in plastic and reconstructive surgery". *Journal of Plastic, Reconstructive and Aesthetic Surgery* 68.9 (2015): 1304-1308.
8. Loonen MPJ., *et al.* "Publications of plastic surgery research 1972 through 2004: a longitudinal trend analysis of three international journals". *Journal of Plastic, Reconstructive and Aesthetic Surgery* 60.8 (2007): 934-945.
9. Perotti OM., *et al.* "Plastic and reconstructive surgical research in Australia and New Zealand: A bibliometric analysis". *Australasian Journal of Plastic Surgery* 1.1 (2018): 163-168.
10. Zhang Wen-Jun., *et al.* "Growing trend of China's contribution to the field of plastic and reconstructive surgery: A 10-year study of the literature". *Annals of Plastic Surgery* 68.3 (2012): 328-331.

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