Indian Journal of Information Sources and Services
ISSN: 2231-6094 (P) Vol.12, No.2, 2022, pp.37-49

DOI: https://doi.org/10.51983/ijiss-2022.12.2.3368

Bibliometric Analysis of Literature in the Field of Surgical Gastroenterology during 2010-2019

J. Ramakrishnan[1], G. Ravi Sankar[2] and K. Thavamani[3]
[1&2]S.G. Deputy Librarian, [3]Assistant Librarian,
Regional Medical Library, The Tamil Nadu Dr. M.G.R. Medical University, Chennai, Tamil Nadu, India
E-mail: dhanaram@yahoo.com, ravisankargovindan02@gmail.com, kottithavam@gmail.com
(Received 8 October 2022; Revised 28 October 2022; Accepted 16 November 2022; Available online 20 November 2022)

Abstract - **This paper presents a bibliometric analysis of literature in the field of Surgical Gastroenterology in MEDLINE data which are covered in PubMed during the study period i.e., from the year 2010 to 2019. It is observed that a total of 12917 records covered in the field of Surgical Gastroenterology. The maximum number of 2168 records was published in the year 2019. It is also observed that 51.63% of records are journal articles and 97.86% of records were in the English language. The United States has contributed the highest number of 4938 records in the study period. The Relative Growth Rate (RGR) has decreased, and the Doubling Time (Dt) has increased in the study period which reveals that the literature in the field of Surgical Gastroenterology is growing year after year. Indian efforts in Surgical Gastroenterology research are greater in 6 years out of 10 years of the study period. A total of 144 journals are identified as core journals in the field of Surgical Gastroenterology.**
Keywords: **Bibliometrics, Relative Growth Rate (RGR), Doubling Time (Dt), Activity Index (AI), and Bradford's Law of Scattering**

I. INTRODUCTION

Bibliometrics used to study the pattern of growth of literature, productivity, the pattern of collection building, authorship pattern, degree of collaboration, inter-relationship among different branches of knowledge, etc. Gastroenterologic surgery includes a variety of surgical procedures performed on the organs and conduits of the digestive system. There is a number of research works that are being published in the area of Surgical Gastroenterology. In these circumstances, it is necessary to study quantitatively the output of literature by applying the bibliometric techniques i.e., Relative Growth Rate (RGR), Doubling Time (Dt), Activity Index (AI), and Bradford's Law of Scattering. The Relative Growth Rate (RGR), and Doubling Time (Dt) help to study the growth rate of literature in the field of Surgical Gastroenterology. The Activity Index (AI) helps to compare India's performance with the world's performance in the field of Surgical Gastroenterology and Bradford's Law of Scattering helps to find core journals in the field of Surgical Gastroenterology.

II. REVIEW OF LITERATURE

Growth studies in scientific areas studied by a number of authors in their different studies. Ramesh Babu and Ramakrishnan studied in Hepatitis, Krishnamoorthy, Ramakrishnan and Devi studied in Diabetes and Ramakrishnan, and Thavamani studied in Hepatitis-C. They used Relative Growth Rate (RGR) and Doubling Time (Dt) to identify the growth rate.

Various studies compared the world's output *vs* Indian literature in their fields, and they used Activity Index to see how India's research activity changed during different years. Garg and Padhi studied Laser Patent Literature. Karki and Garg studied the Alkaloid Chemistry research in India, Karki, Garg, and Sharma studied the activity and growth of Organic Chemistry Research in India. Nagpaul studied the contribution of Indian Universities to the main-stream scientific literature.

Numerous studies conducted by different authors to identify core journals by using Bradford's Law of scattering. There are a number of studies on mapping and Bradford law in health sciences. Schloman studied mapping the literature of allied health. Kundra studied the behaviour of Bradford's Law towards citation data on the Indian Medical Journal. Patra and Prakash Chand studied HIV/AIDS research in India. They used Bradford's law of scattering to identify core journals.

Ramakrishnan and Thavamani studied the literature of Hepatitis C, and they identified 31 core Journals in the field of Hepatitis C with the help of Bradford's Law of Scattering. The review of the literature showed that so far no quantitative study in the field of Surgical Gastroenterology was conducted. Hence the present study.

III. OBJECTIVES OF THE STUDY

The objectives of this study are

1. To study the growth of literature in the field of Surgical Gastroenterology.
2. To compare the world's output *vs* Indian literature in the field of Surgical Gastroenterology research productivity.
3. To find the core journals in the field of Surgical Gastroenterology.

IV. METHODOLOGY

The records published from the year 2010 to 2019 in the field of Surgical Gastroenterology in MEDLINE data which are covered in PubMed were selected. The collected records were loaded in SPSS for the analysis. The keyword 'Surgical Gastroenterology' has been used to collect the number of records available in the above-said database. The data collected from the source database on the literary production of Surgical Gastroenterology has been analyzed by using the bibliometric techniques i.e., Relative Growth Rate (Hunt), Doubling time (Mahapatra), Activity Index (Frame), and Bradford's Law of Scattering.

A. Quantum of Literature Published in Surgical Gastroenterology

The research productivity in the field of Surgical Gastroenterology covered in the database is shown in Table I. It is observed from the table that a total of 12917 records were covered in the field of Surgical Gastroenterology. The year-wise distribution of literature in the field of Surgical Gastroenterology, it is found that the maximum number of 2168 records was published in the year 2019, followed by 2069 records in the year 2018 and 1877 records in the year 2017. On the whole, it is noticed that from the year 2010 onwards there is a gradual increase in Surgical Gastroenterology research productivity every year.

TABLE I QUANTUM OF LITERATURE PUBLISHED IN SURGICAL GASTROENTEROLOGY

Year	Frequency	%	Cumulative %
2010	533	4.13	4.13
2011	583	4.51	8.64
2012	629	4.87	13.51
2013	759	5.88	19.39
2014	1155	8.94	28.33
2015	1383	10.71	39.03
2016	1761	13.63	52.67
2017	1877	14.53	67.20
2018	2069	16.02	83.22
2019	2168	16.78	100.00
Total	12917	100	

B. Publication Types Distribution of Surgical Gastroenterology Research

Table II reveals that the distribution of the Surgical Gastroenterology research output according to various publication types of the MEDLINE database. It was found that 51.63% of records are journal articles, followed by Review 14.40%, Research Support, Non-U.S. Gov't 12.67%, Case Reports 4.50%, Video-Audio Media 2.71%, Systematic Review 2.28%, Multicenter Study 2.21%, Comment 1.54%, Randomized Controlled Trial 1.54%, Observational Study 1.51%, Research Support, N.I.H., Extramural 1.11%, and Letter 0.90%. The literature published in other Publication Types is 3%.

TABLE II PUBLICATION TYPES DISTRIBUTION OF SURGICAL GASTROENTEROLOGY RESEARCH

Publication Type	Total	%	Cumulative %
Journal Article	6669	51.63	51.63
Review	1860	14.40	66.03
Research Support, Non-U.S. Gov't	1636	12.67	78.69
Case Reports	581	4.50	83.19
Video-Audio Media	350	2.71	85.90
Systematic Review	295	2.28	88.19
Multicenter Study	286	2.21	90.40
Comment	199	1.54	91.94
Randomized Controlled Trial	199	1.54	93.48
Observational Study	195	1.51	94.99
Research Support, N.I.H., Extramural	143	1.11	96.10
Letter	116	0.90	97.00
Practice Guideline	75	0.58	97.58
Validation Study	55	0.43	98.00
Research Support, U.S. Gov't, Non-P.H.S.	52	0.40	98.41
Editorial	51	0.39	98.80
Published Erratum	48	0.37	99.17
Meta-Analysis	26	0.20	99.37
Research Support, U.S. Gov't, P.H.S.	15	0.12	99.49
Congress	13	0.10	99.59
Portrait	9	0.07	99.66
Introductory Journal Article	7	0.05	99.71
News	7	0.05	99.77
Retracted Publication	5	0.04	99.81
Webcast	5	0.04	99.85
Technical Report	4	0.03	99.88
Address	3	0.02	99.90
Research Support, N.I.H., Intramural	3	0.02	99.92
Book	2	0.02	99.94
Evaluation Study	2	0.02	99.95
Book Chapter	1	0.01	99.96
Comparative Study	1	0.01	99.97
English Abstract	1	0.01	99.98
Historical Article	1	0.01	99.98
Patient Education Handout	1	0.01	99.99
Pragmatic Clinical Trial	1	0.01	100.00
Total	12917	100.00	

C. Distribution of Languages in the Literature of Surgical Gastroenterology

Table III shows that the distribution of citations according to language during the study period i.e., from the year 2010 to 2019. The table shows that out of a total of 12917 records, 12641 of them were in English language forming 97.86% of the total followed by Chinese, Japanese, German, Portuguese, Spanish, Russian, Korean, and Other languages.

TABLE III DISTRIBUTION OF LANGUAGES IN THE LITERATURE OF SURGICAL GASTROENTEROLOGY

Language	No. of records	%	Cumulative %
English	12641	97.86	97.86
Chinese	81	0.63	98.49
Japanese	64	0.50	98.99
German	31	0.24	99.23
Portuguese	23	0.18	99.40
Spanish	23	0.18	99.58
Russian	13	0.10	99.68
Korean	12	0.09	99.78
French	9	0.07	99.85
Polish	4	0.03	99.88
Dutch	3	0.02	99.90
Hebrew	3	0.02	99.92
Hungarian	3	0.02	99.95
Czech	1	0.01	99.95
Danish	1	0.01	99.96
Croatian	1	0.01	99.97
Italian	1	0.01	99.98
Lithuanian	1	0.01	99.98
Serbian	1	0.01	99.99
Ukrainian	1	0.01	100.00
Total	12917	100.00	

D. Country-Wise Distribution of Surgical Gastroenterology Records

Table IV shows that the country-wise distribution of Surgical Gastroenterology records. It is observed that the United States has contributed the highest number of 4938 records in the study period i.e., from the year 2010 to 2019. Next major contribution covered by the countries i.e., England, Germany, Netherlands, Switzerland, Japan, India, Australia, China, Korea (South), Greece, Italy, Egypt, Canada, Romania, etc. India has the 7th position among the countries.

TABLE IV COUNTRY-WISE DISTRIBUTION OF SURGICAL GASTROENTEROLOGY RECORDS

Sl. No.	Country	Frequency	Percent
1	United States	4938	38.23
2	England	2509	19.42
3	Germany	1068	8.27
4	Netherlands	544	4.21
5	Switzerland	476	3.69
6	Japan	423	3.27
7	India	419	3.24
8	Australia	415	3.21
9	China	282	2.18
10	Korea (South)	213	1.65

11	Greece	212	1.64
12	Italy	204	1.58
13	Egypt	122	0.94
14	Canada	117	0.91
15	Romania	103	0.80
16	Poland	88	0.68
17	France	78	0.60
18	Turkey	74	0.57
19	Denmark	71	0.55
20	New Zealand	68	0.53
21	Brazil	65	0.50
22	Spain	54	0.42
23	Ireland	46	0.36
24	Iran	38	0.29
25	Singapore	38	0.29
26	Belgium	24	0.19
27	Mexico	24	0.19
28	United Arab Emirates	24	0.19
29	South Africa	23	0.18
30	Pakistan	21	0.16
31	Russia (Federation)	14	0.11
32	Scotland	14	0.11
33	Thailand	12	0.09
34	Croatia	9	0.07
35	Uganda	9	0.07
36	Israel	8	0.06
37	Peru	8	0.06
38	Austria	7	0.05
39	Bosnia and Herzegovina	5	0.04
40	Nepal	4	0.03
41	Serbia	4	0.03
42	Bangladesh	3	0.02
42	Czech Republic	3	0.02
43	Hungary	3	0.02
44	Malaysia	3	0.02
45	Norway	3	0.02
46	Saudi Arabia	3	0.02
47	Sweden	3	0.02
48	Other Countries	21	0.16
Total		12917	100.00

E. Relative Growth Rate (RGR) and Doubling Time (Dt)

The analysis of data on the literary output in the field of Surgical Gastroenterology has been done with parameters such as Relative Growth Rate (RGR) and Doubling Time (Dt). It is seen from Table V and Fig. 1 that the RGR has been decreasing from the year 2011 (0.74) to 2019 (0.19). The data in Table V reveals that Doubling Time (Dt) has increased from 0.94 in the year 2011 to 3.72 in the year 2019. The results of RGR and Dt reveal that the literary output in the field of Surgical Gastroenterology is growing year after year. (Fig 2)

TABLE V RGR AND DT FOR SURGICAL GASTROENTEROLOGY RESEARCH OUTPUT BY YEAR-WISE

Sl. No.	Year	Quantum of Output	Cumulative Total of Output	W_1	W_2	$1-2^{\overline{R}(aa^{-1}\ year^{-1})}$ RGR	Dt(a)
1	2010	533	533		6.28		
2	2011	583	1116	6.28	7.02	0.74	0.94
3	2012	629	1745	7.02	7.46	0.44	1.56
4	2013	759	2504	7.46	7.83	0.37	1.90
5	2014	1155	3659	7.83	8.20	0.37	1.85
6	2015	1383	5042	8.2	8.53	0.33	2.13
7	2016	1761	6803	8.53	8.83	0.30	2.35
8	2017	1877	8680	8.83	9.07	0.24	2.90
9	2018	2069	10749	9.07	9.28	0.21	3.26
10	2019	2168	12917	9.28	9.47	0.19	3.72

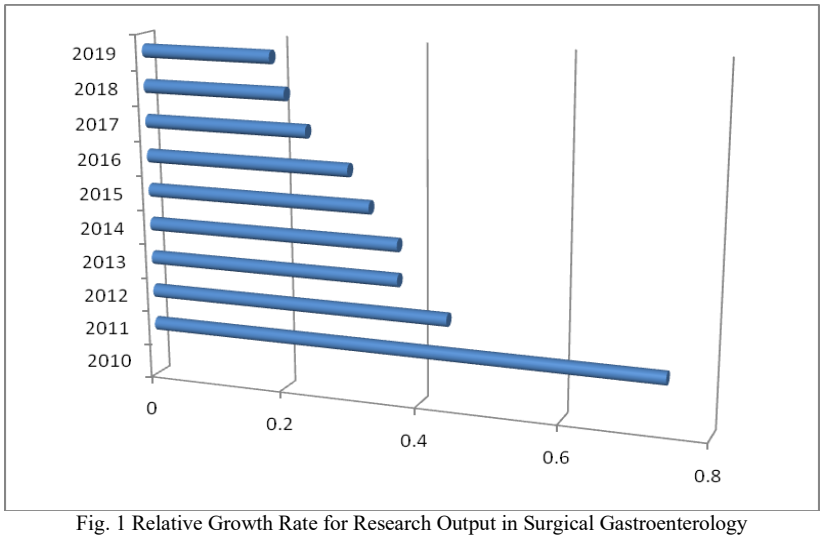

Fig. 1 Relative Growth Rate for Research Output in Surgical Gastroenterology

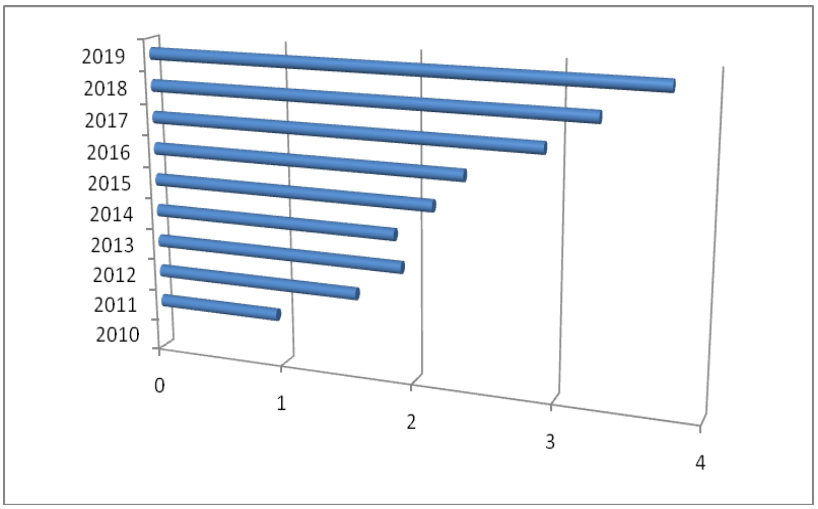

Fig. 2 Doubling time for Research output in Surgical Gastroenterology

V. ACTIVITY INDEX

It is seen from the Table VI that the Activity Index for India has been calculated to analyze India's research performance changes over different years. The data exposes that, Indian efforts in Surgical Gastroenterology research are greater in 6 years out of 10 years of study period i.e., from the year 2010 to 2019. The Activity Index is higher than 100 in the

first six years of the study period. It shows that the higher activity of Surgical Gastroenterology research than the World's average in those six years. In the other remaining four years, the Activity Index is less than 100, reflects the lower activity of Surgical Gastroenterology research than the world average. The Activity Index (AI) for India was a peak in the year 2012 (196.05).

It is seen from the graph (Fig. 3) that the world output in the field of Surgical Gastroenterology grew almost uniformly rate by year after year. Fig. 3 also shows that the peak year as per study was 2019. At the same time, the Indian output (Fig. 4) shows that the growth reaches in an inconsistent manner and reaches its peak in the year 2017. In other words, the year 2017 has marked the highest quantum of research output in India.

TABLE VI ACTIVITY INDEX OF SURGICAL GASTROENTEROLOGY RESEARCH

Sl. No.	Year	Worlds' Output	India's Output	Activity Index
1	2010	533	25	144.60
2	2011	583	20	105.76
3	2012	629	40	196.05
4	2013	759	40	162.47
5	2014	1155	42	112.10
6	2015	1383	50	111.45
7	2016	1761	53	92.78
8	2017	1877	57	93.62
9	2018	2069	48	71.52
10	2019	2168	44	62.57
Total		12917	419 (3.24)*	100.00**

Percentage of world output*, Average of Activity Index**

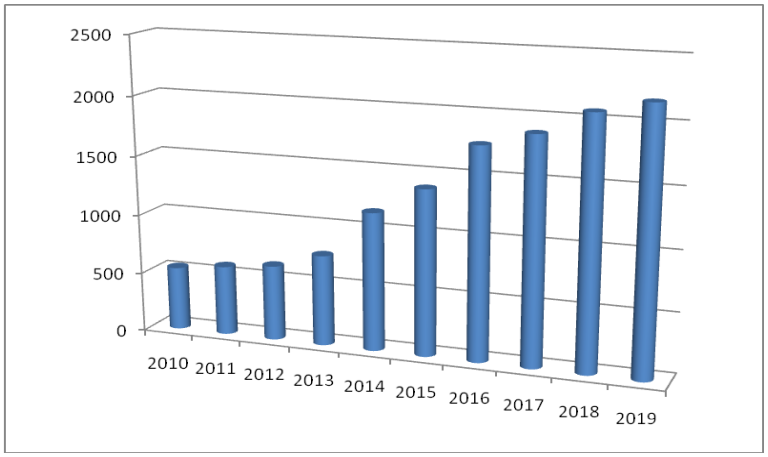

Fig. 3 World Output of Surgical Gastroenterology Research

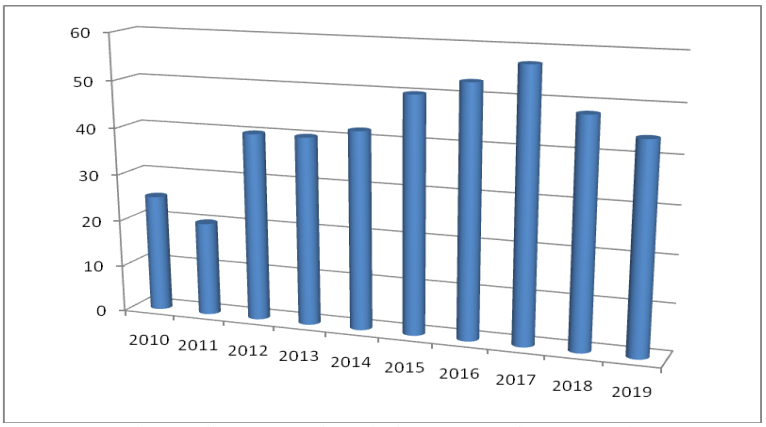

Fig. 4 Indian Output of Surgical Gastroenterology Research

A. Distribution of Journals in Surgical Gastroenterology Based on Bradford Law

As per the Bradford Law, the journal articles in this study are selected for this analysis. The journals are grouped into three zones producing a similar number of articles. The distribution of the journal by zone-wise is presented in Table VII. It is understood from Table VII that 31 journals grouped in zone-1 published 2300 journal articles accounting for one-third of the total output. Similarly, the second zone comprises of 113 journals published 2263 journal articles and 973 journals grouped in the third zone and published 2106 journal articles. A total of 144 journals in the Zone-1 and Zone-2 are identified as core journals in the field of Surgical Gastroenterology.

TABLE VII DISTRIBUTION BY ZONE OF CITED JOURNALS AND JOURNAL ARTICLES IN THE FIELD OF SURGICAL GASTROENTEROLOGY

Sl. No.	Zone	No. of Journals		No. of Papers		Cumulative No. of Papers
		No.	(%)	No.	(%)	
1	Zone 1	31	2.78	2300	34.49	2300
2	Zone 2	113	10.12	2263	33.93	4563
3	Zone 3	973	87.11	2106	31.58	6669
Total		1117	100.00	6669	100.00	

B. Core Journals in Surgical Gastroenterology Research

There are 144 journals in Zone-1 and Zone-2 are identified as core journals in the field of Surgical Gastroenterology. It is observed from the study that there are 1117 journals contributed 6669 journal articles. But only the core journals along with the country of origin during the study period have been presented in Table VIII. The highly productive journals upto ten ranks are as follows

1. 'Gastrointestinal Endoscopy' published in the United States with 206 contributions amounting to 3.09% of total contributions.
2. 'Surgical Endoscopy' published in Germany with 176 contributions amounting to 2.64%.
3. 'World Journal of Gastroenterology' published in the United States with 136 contributions amounting to 2.04%.
4. 'Endoscopy' published in Germany with 134 contributions amounting to 2.01%.
5. 'Digestive Diseases and Sciences' published in the United States with 88 contributions amounting to 1.32%.
6. 'BMJ Case Reports' published in England with 81 contributions amounting to 1.21%.
7. 'Digestive Endoscopy' published in Australia and also 'Endoscopy International Open' published in Germany with 79 contributions each amounting to 1.18% each.
8. 'Gastroenterology' published in the United States with 77 contributions amounting to 1.15%.
9. 'Scandinavian Journal of Gastroenterology' published in England with 74 contributions amounting to 1.11%.
10. 'Digestive and Liver Disease' published in the Netherlands and also 'Journal of Gastroenterology and Hepatology' published in Australia with 73 contributions each amounting to 1.09% each.

Out of the top ten ranks, the United States is covered in the four ranks. 7th rank shared by the countries i.e., Australia and Germany and also 10th rank shared by the countries i.e., the Netherlands and Australia.

TABLE VIII CORE JOURNALS IN SURGICAL GASTROENTEROLOGY RESEARCH

Sl. No.	Name of the Journal	No. of Records	%	Country of origin
1	Gastrointestinal Endoscopy	206	3.09	United States
2	Surgical Endoscopy	176	2.64	Germany
3	World Journal of Gastroenterology	136	2.04	United States
4	Endoscopy	134	2.01	Germany
5	Digestive Diseases and Sciences	88	1.32	United States
6	BMJ Case Reports	81	1.21	England
7	Digestive Endoscopy	79	1.18	Australia
8	Endoscopy International Open	79	1.18	Germany
9	Gastroenterology	77	1.15	United States
10	Scandinavian Journal of Gastroenterology	74	1.11	England
11	Digestive and Liver Disease	73	1.09	Netherlands
12	Journal of Gastroenterology and Hepatology	73	1.09	Australia
13	Journal of Gastrointestinal Surgery	70	1.05	United States
14	Journal of Crohn's& Colitis	65	0.97	England
15	Journal of Pediatric Surgery	65	0.97	United States
16	Clinical Gastroenterology and Hepatology	63	0.94	United States
17	Journal of Pediatric Gastroenterology and Nutrition	59	0.88	United States
18	Medicine	59	0.88	United States
19	International Journal of Surgery Case Reports	57	0.85	Netherlands

20	Clinical Journal of Gastroenterology	55	0.82	Japan
21	Indian Journal of Gastroenterology	55	0.82	India
22	Oncotarget	55	0.82	United States
23	Gastroenterology Research and Practice	51	0.76	Egypt
24	The Indian Journal of Surgery	51	0.76	India
25	Pancreatology	50	0.75	Switzerland
26	European Journal of Gastroenterology &Hepatology	46	0.69	England
27	Inflammatory Bowel Diseases	46	0.69	England
28	Annals of Surgery	45	0.67	United States
29	Colorectal Disease	44	0.66	England
30	International Journal of Colorectal Disease	44	0.66	Germany
31	Obesity Surgery	44	0.66	United States
32	Internal Medicine (Tokyo, Japan)	43	0.64	Japan
33	Oncology Letters	43	0.64	Greece
34	World Journal of Gastrointestinal Endoscopy	42	0.63	United States
35	Clinical Endoscopy	41	0.61	Korea (South)
36	United European Gastroenterology Journal	40	0.60	England
37	PloS One	39	0.58	United States
38	BMC Gastroenterology	38	0.57	England
39	International Journal of Surgery	37	0.55	England
40	Journal of Clinical Gastroenterology	37	0.55	United States
41	Surgical Laparoscopy, Endoscopy & Percutaneous Techniques	37	0.55	United States
42	Gastroenterology Research	36	0.54	Canada
43	Journal of Laparoendoscopic & Advanced Surgical Techniques. Part A	35	0.52	United States
44	Journal of Surgical Oncology	34	0.51	United States
45	Nihon Shokakibyo Gakkai Zasshi = The Japanese Journal of Gastro-Enterology	33	0.49	Japan
46	Annals of Surgical Oncology	32	0.48	United States
47	Journal of Minimal Access Surgery	32	0.48	India
48	Annals of Gastroenterology	30	0.45	Greece
49	Journal of Gastrointestinal and Liver Diseases	30	0.45	Romania
50	The Turkish Journal of Gastroenterology	30	0.45	Turkey
51	Diseases of the Esophagus	29	0.43	United States
52	Endoscopic Ultrasound	29	0.43	China
53	Revista Espanola De Enfermedades Digestivas : Organo Oficial De La Sociedad	29	0.43	Spain
54	The American Journal of Gastroenterology	29	0.43	United States
55	European Journal of Surgical Oncology	28	0.42	England
56	Gut and Liver	28	0.42	Korea (South)
57	Tropical Gastroenterology	28	0.42	India
58	Journal of Medical Case Reports	27	0.40	England
59	Journal of Hepato-Biliary-Pancreatic Sciences	26	0.39	Japan
60	The British Journal of Surgery	26	0.39	England
61	Digestion	25	0.37	Switzerland
62	BMC Cancer	24	0.36	England
63	Hepatology Research	24	0.36	Netherlands

64	Journal of Gastrointestinal Oncology	24	0.36	China
65	Hepato-Gastroenterology	23	0.34	Greece
66	HPB : The Official Journal of the International Hepato Pancreato Biliary	23	0.34	England
67	Surgery Today	23	0.34	Japan
68	World Journal of Surgery	23	0.34	United States
69	Anticancer Research	22	0.33	Greece
70	ANZ Journal of Surgery	22	0.33	Australia
71	Diseases of the Colon and Rectum	22	0.33	United States
72	Journal of Gastrointestinal Cancer	22	0.33	United States
73	Transplantation Proceedings	22	0.33	United States
74	Zhonghua Wei Chang WaiKeZaZhi = Chinese Journal of Gastrointestinal Surgery	22	0.33	China
75	Hepatobiliary& Pancreatic Diseases International : HBPD INT	21	0.31	Singapore
76	Molecular and Clinical Oncology	21	0.31	England
77	Surgery for Obesity and Related Diseases	21	0.31	United States
78	Pancreas	19	0.28	United States
79	Pediatric Transplantation	19	0.28	Denmark
80	Techniques in Coloproctology	19	0.28	Italy
81	American Journal of Surgery	18	0.27	United States
82	Gastroenterology &Hepatology	18	0.27	United States
83	Hepatology (Baltimore, Md.)	18	0.27	United States
84	The Journal of Surgical Research	18	0.27	United States
85	Clinics and Research in Hepatology and Gastroenterology	17	0.25	France
86	Gut	17	0.25	England
87	JOP : Journal of the Pancreas	17	0.25	Italy
88	Journal of Hepatology	17	0.25	Netherlands
89	Saudi Journal of Gastroenterology	17	0.25	Saudi Arabia
90	The American Journal of Case Reports	17	0.25	United States
91	Acta Cirurgica Brasileira	16	0.24	Brazil
92	Gastric Cancer	16	0.24	Japan
93	Langenbeck's Archives of Surgery	16	0.24	Germany
94	Neurogastroenterology and Motility	16	0.24	England
95	Surgical Case Reports	16	0.24	Germany
96	Case Reports in Gastrointestinal Medicine	15	0.22	United States
97	Scientific Reports	15	0.22	England
98	Videogie	15	0.22	United States
99	Zeitschrift Fur Gastroenterologie	15	0.22	Germany
100	Alimentary Pharmacology & Therapeutics	14	0.21	England
101	Annals of Hepatology	14	0.21	Mexico
102	European Journal of Pediatric Surgery: Official Journal of Austrian Association of Pediatric Surgery	14	0.21	United States
103	Frontline Gastroenterology	14	0.21	England
104	Journal of Neurogastroenterology and Motility	14	0.21	Korea (South)
105	South African Journal of Surgery. Suid-Afrikaanse Tydskrif Vir Chirurgie	14	0.21	South Africa
106	The Korean Journal of Gastroenterology = Taehan Sohwagi Hakhoe Chi	14	0.21	Korea (South)

107	Canadian Journal of Gastroenterology &Hepatology	13	0.19	Egypt
108	Clinical and Translational Gastroenterology	13	0.19	United States
109	Gastroenterology Report	13	0.19	England
110	Hernia : The Journal of Hernias and Abdominal Wall Surgery	13	0.19	France
111	Intestinal Research	13	0.19	Korea (South)
112	Minimally Invasive Therapy & Allied Technologies	13	0.19	England
113	Surgery	13	0.19	United States
114	The Journal of Pediatrics	13	0.19	United States
115	Ultraschallin Der Medizin (Stuttgart, Germany : 1980)	13	0.19	Germany
116	WideochirurgiaI Inne Techniki Maloinwazyjne = Videosurgery and Other	13	0.19	Poland
117	Arquivos Brasileiros De Cirurgia Digestiva	12	0.18	Brazil
118	Biomed Research International	12	0.18	United States
119	GE Portuguese Journal of Gastroenterology	12	0.18	Switzerland
120	Journal of Digestive Diseases	12	0.18	Australia
121	Journal of Medical Ultrasonics (2001)	12	0.18	Japan
122	Journal of the American College of Surgeons	12	0.18	United States
123	Liver International	12	0.18	United States
124	Liver Transplantation	12	0.18	United States
125	Przeglad Gastroenterologiczny	12	0.18	Poland
126	Scandinavian Journal of Surgery	12	0.18	England
127	Therapeutic Advances in Gastroenterology	12	0.18	England
128	World Journal of Gastrointestinal Surgery	12	0.18	United States
129	Acta Gastro-Enterologica Belgica	11	0.16	Belgium
130	Arab Journal of Gastroenterology	11	0.16	Egypt
131	BMC Surgery	11	0.16	England
132	Clinical Transplantation	11	0.16	Denmark
133	Digestive Surgery	11	0.16	Switzerland
134	Journal of Gastroenterology	11	0.16	Japan
135	Journal of Parenteral and Enteral Nutrition	11	0.16	United States
136	The Annals of Thoracic Surgery	11	0.16	Netherlands
137	Acta Chirurgica Belgica	10	0.15	England
138	Current Treatment Options in Gastroenterology	10	0.15	United States
139	European Radiology	10	0.15	Germany
140	Experimental and Therapeutic Medicine	10	0.15	Greece
141	Nutrients	10	0.15	Switzerland
142	World Journal of Hepatology	10	0.15	United States
143	World Journal of Surgical Oncology	10	0.15	England
144	Zhonghua Nei KeZaZhi	10	0.15	China

C. Distribution of Journals by Country-Wise in Zones in the Field of Surgical Gastroenterology

The distribution of journals by country of origin in zones-1 and 2 are presented in the Tables IX, X, and combined of Zone-1 & Zone-2 in Table XI respectively.

D. Distribution of Journals by Country in the First Zone in the Field of Surgical Gastroenterology

The United States with the major contributions, share 38.71% of output in zone-1 followed by England 19.35%, Germany 12.90%, Australia 6.45%, India 6.45%, Netherlands 6.45%, Egypt 3.23%, Japan 3.23%, and Switzerland 3.23%.

TABLE IX DISTRIBUTION OF JOURNALS BY COUNTRY IN THE FIRST ZONE

S. No.	Country of origin	Total No. of Journals	%
1	United States	12	38.71
2	England	6	19.35
3	Germany	4	12.90
4	Australia	2	6.45
5	India	2	6.45
6	Netherlands	2	6.45
7	Egypt	1	3.23
8	Japan	1	3.23
9	Switzerland	1	3.23
Total		31	100.00

TABLE X DISTRIBUTION OF JOURNALS BY COUNTRY IN THE SECOND ZONE IN THE FIELD OF SURGICAL GASTROENTEROLOGY

Sl. No.	Country of origin	Total No. of Journals	%
1	United States	34	30.09
2	England	21	18.58
3	Japan	7	6.19
4	Germany	5	4.42
5	Greece	5	4.42
6	Korea (South)	5	4.42
7	China	4	3.54
8	Switzerland	4	3.54
9	Netherlands	3	2.65
10	Australia	2	1.77
11	Brazil	2	1.77
12	Denmark	2	1.77
13	Egypt	2	1.77
14	France	2	1.77
15	India	2	1.77
16	Italy	2	1.77
17	Poland	2	1.77
18	Belgium	1	0.88
19	Canada	1	0.88
20	Mexico	1	0.88
21	Romania	1	0.88
22	Saudi Arabia	1	0.88
23	Singapore	1	0.88
24	South Africa	1	0.88
25	Spain	1	0.88
26	Turkey	1	0.88
27	Total	113	100.00

E. Distribution of Journals by Country in the Second Zone in the Field of Surgical Gastroenterology

The distributions of journals by country of origin in zones-2 are presented in the Tables X. In zone-2, the United States published 34 journals out of 113 journals followed by England published 21 journals in the second position followed by Japan, Germany, Greece, Korea (South), China, Switzerland, Netherlands, Australia, Brazil, Denmark, Egypt, France, India, Italy, Poland, Belgium, Canada, Mexico, Romania, Saudi Arabia, Singapore, South Africa, Spain, and Turkey.

F. Distribution of Journals by Country in Core Journals in the Field of Surgical Gastroenterology

The distribution of journals by country of origin in zone-1 and zone-2 combined are presented in the Tables XI. These journals are identified as core journals in the field of Surgical Gastroenterology.

TABLE XII DISTRIBUTION OF JOURNALS BY COUNTRY IN CORE JOURNALS IN THE FIELD OF SURGICAL GASTROENTEROLOGY

Sl. No.	Country of origin	Total No. of Journals	%
1	United States	46	31.94
2	England	27	18.75
3	Germany	9	6.25
4	Japan	8	5.56
5	Greece	5	3.47
6	Korea (South)	5	3.47
7	Netherlands	5	3.47
8	Switzerland	5	3.47
9	Australia	4	2.78
10	China	4	2.78
11	India	4	2.78
12	Egypt	3	2.08
13	Brazil	2	1.39
14	Denmark	2	1.39
15	France	2	1.39
16	Italy	2	1.39
17	Poland	2	1.39
18	Belgium	1	0.69
19	Canada	1	0.69
20	Mexico	1	0.69
21	Romania	1	0.69
22	Saudi Arabia	1	0.69
23	Singapore	1	0.69
24	South Africa	1	0.69
25	Spain	1	0.69
26	Turkey	1	0.69
27	Total	144	100.00

It shows that the United States published 31.94% of core journals followed by England 18.75%, Germany 6.25%, Japan 5.56%, Greece 3.47%, Korea (South), 3.47%, Netherlands 3.47%, Switzerland 3.47%, Australia 2.78%, China 2.78%, India 2.78%, Egypt 2.08%, Brazil 1.39%, Denmark 1.39%, France 1.39%, Italy 1.39%, Poland 1.39%, Belgium 0.69%, Canada 0.69%, Mexico 0.69%, Romania 0.69%, Saudi Arabia 0.69%, Singapore 0.69% South Africa 0.69%, Spain 0.69%, and Turkey 0.69%.

It reveals that these countries are the core producers of literature in the field of Surgical Gastroenterology. The trend may be interpreted as the research in the field of Surgical Gastroenterology may be intensive in these countries. Probably MEDLINE database has covered more journals published from these countries.

VI. MAJOR FINDINGS OF THE STUDY

The following are the major finding of this study

1. There is a gradual increase in Surgical Gastroenterology research productivity year after year.
2. The maximum number of 2168 records was published in the year 2019.
3. 51.63% of records were journal articles.
4. 97.86% of records were in the English language.
5. The United States has contributed the highest number of records.
6. India has the 7th position among the countries and was published 419 records.
7. The Relative Growth Rate (RGR) has decreased, and Doubling Time (Dt)has increased which reveals that the literary output in the field of Surgical Gastroenterology is growing year after year.
8. The Activity Index data exposes that, Indian efforts in Surgical Gastroenterology research is greater in 6 years out of 10 years of the study period compared to the world.
9. 144 journals are identified as core journals in the field of Surgical Gastroenterology.
10. The United Statespublished31.94% core journals followed by England 18.75%, Germany 6.25%, Japan 5.56%, etc.

VII. CONCLUSION

The results show that the literature in the field of Surgical Gastroenterology is growing year after year. It also shows that the maximum number of records covered by journal articles in the field of Surgical Gastroenterology. The United States has contributed to the highest number of records in the study. India has the 7th position among the countries. Indian efforts in Surgical Gastroenterology research are greater in 6 years. Core journals were identified in the field of Surgical Gastroenterology.

REFERENCES

[1] Bharvi Dutt, Garg, K. C. & Anita Bali. (2003). Scientometrics of the International Journal Scientometrics. *Scientometrics, 56*(1) 81-93.

[2] Blackman, V.H. (1919). The compound interest law and plant Growth, *Annals of Botany,* 33, 353-360.

[3] Bogaert, J., Rousseau, R. & Vanhecke, P., (2000). Percolation as a model for informetric distributions: Fragment size distribution as a model for informetric distributions: Fragment size distribution characterized by Bradford Curves, *Scientometrics, 47*(2), 195-206.

[4] Bradford, S. C. (1934). Sources of Information on specific subjects, *Engineering,* 137, 85-86.

[5] Burnham J. E., (1997). Mapping the literature of radiologic technology, *Bulletin of Medical Library Association, 85*(3), 289-92.

[6] Burnham J. E., (1997). Mapping the literature of respiratory therapy, *Bulletin of Medical Library Association, 85*(3), 293-96.

[7] Delwiche, F. A., (2003). Mapping the literature of clinical laboratory science, *Bulletin of Medical Library Association, 91*(3), 303-10.

[8] Feicheng, M. & Rui, C. (1999). Study on the laws of scattering distribution analysis from document level to content level (II): Scattering distribution of document unit by Frequency-rank analysis of Bradford's Law, *Journal of the China Society for Scientific and Technical Information, 18*(2), 171-182.

[9] Frame, J. D. (1977). Mainstream research in Latin America and Caribbean. *Interciencia, 2,* 143-148.

[10] Garg, K. C. & Padhi, P. (1998). Scientometric Study of Laser Patent Literature. *Scientometrics, 43*(3), 443-454.

[11] Hall, E. E., (1999). Mapping the literature of perfusion, *Bulletin of Medical Library Association, 87*(3), 305-10.

[12] Heine, M. H. (1998). Bradford ranking conventions and their application to a growing literature, *Journal of Documentation, 54*(3), 303-331.

[13] Retrieved from https://www.surgeryencyclopedia.com/Fi-La/Gastroenterologic-Surgery.html

[14] Hunt, R. (1978). Plant growth analysis: London: Edward Arnold.

[15] Karki, M. M. S. & Garg, K. C. (1997). Bibliometrics of Alkaloid Chemistry research in India. *Journal of Chemical Information and Computer Science, 37*, 157-161.

[16] Karki, M. M. S., Garg, K. C. & Sharma, P. (2000). Activity and Growth of Organic Chemistry Research in India During 1971-1989', *Scientometrics, 49,* 279-88.

[17] Lamb, G. H. (1971). The coincidence of quality and quantity in the literature of mathematics. (Ph.D. dissertation, Case Western Reserve University), *Dissertation Abstracts International, 32*(06-A), 33-40.

[18] Mahapatra, M. (1985). On the validity of the *theory of exponential growth of scientific literature. Proceedings of the 15th IASLIC Conference;* Bangalore (India), 61-70.

[19] Maheswarappa, B. S. and Ningoji, M. M. (1992). Growth of literature in the field of Science and Technology in India, *International Information Communication and Education, 11*(2), 186-197.

[20] Nagpaul, P. S. (1995). Contribution of Indian Universities to the main-stream scientific literature: A bibliometric assessment. *Scientometrics, 32,* 11-36.

[21] Patra, S. K. & Prakash Chand. (2007). HIV/AIDS Research in India: A bibliometric study, *Library and Information Science Research,* 29, 124-134.

[22] Price, D. De Solla. (1981) The analysis of scientometrics for policy implications. *Scientometrics*, *3*, 47-54.

[23] Ramakrishnan, J. & Thavamani, K. (2012). Bibliometric Analysis of the Literature of Hepatitis C. In: Role of Medical Libraries in Global Health Initiatives MLAI 2012. National Convention, Northeastern Indira Gandhi Regional Institute of Health & Medical Sciences; Shilog (India).

[24] Ramakrishnan, J. & Thavamani, K. (2014). Growth rate of literature on Leptospiroisis (2006-2013). In: Managing Medical Libraries in the Changing Information Society MLAI 2014. National Convention on Medical Library Association of India, Rabindra Nath Tagore Medical College; Udaipur (India), 8-25.

[25] Ramesh Babu, B. & Ramakrishnan J. (2007). Trends in the growth of literature on hepatitis (1984-2003), *Journal of Korean Library and Information Science Society, 38*(2), 31-50.

[26] Ramesh Kundra *et al.,* (1999). Behavior of Bradford's Law towards citation data on Indian Medical Journal. In: *International Conference on Scientometrics and Informetrics Proceeding,* Colima; Mexico, 580.

[27] Ravichandra Rao, I. K. (1998). An analysis of Bradford multipliers and a model to explain law of scattering, *Scientometrics, 41*(1-2), 93-100.

[28] Reed K. L. (1998). Mapping the literature of occupational therapy, *Bulletin of Medical Library Association*, *87*(3), 298-04.

[29] Schloman, B. E. (1997). Mapping the literature of allied health: project overview, *Bulletin of Medical Library Association, 85*(3), 271-77.

[30] Schubert, A. & Braun, T. (1986). Relative indicators and relational charts for comparative assessment of publication output and citation impact. *Scientometrics, 9*, 281-291.

[31] Slater, L. G. (1997). Mapping the literature of speech-language pathology, *Bulletin of Medical Library Association*, *85*(3), 297-02.

[32] Smith, A. M. (1999). Mapping the literature of dietetics, *Bulletin of Medical Library Association, 87*(3), 292-96.

[33] Steven, S. R. (2000). Mapping the literature of cytotechnology, *Bulletin of Medical Library Association, 88*(2), 172-77.

[34] Wakiji, E. M. (1997). Mapping the literature of physical therapy, *Bulletin of Medical Library Association*, *85*(3), 284-88.

[35] Walcott, B. M. (1999). Mapping the literature of diagnostic medical sonography, *Bulletin of Medical Library Association*, *87*(3), 287-91.

[36] Retrieved from www.ncbi.nlm.nih.gov.