India's Research output on Alzheimer's disease (1975-2016): A bibliographic analysis of using Scopus database

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Abstract
Literature output on any field normally measured using the bibliometric analysis. This paper presents bibliometrics analysis of the Indian literature output on Alzheimer's disease research. Alzheimer's disease research data has been downloaded from 'Scopus' data base. For this study, publications commencing from 1970-2016 (47 years) has been downloaded from the database. A total of 2676 data have been identified. The objectives of the study are: To ascertain the global research output and the Indian research production on Alzheimer's disease; to examine the collaborating countries with Indian authors in research production in Alzheimer's disease; To identify the Indian organizations conducting the research in Alzheimer's disease; To compare and measure the growth rate of literature published and To identify the top source titles of journals and contributors who publish research articles on Alzheimer's disease. The major findings of the study are: research productivity at the global level and at Indian level reveals the linear trend; India stands 15th position at the global level in the research contribution in the Alzheimer's disease; there is no much productivity from India during 1976 to 1981 in the field of Alzheimer's disease; there exists fluctuation by year after year as far as RGR and Dt is concerned; Indian authors have collaborated with more scientists from United States followed by United Kingdom and Saudi Arabia and awareness on research on Alzheimer's disease seems to be effective since 2009 onwards.

Keywords: Alzheimer disease, Indian contribution, Bibliographic analysis, Relative growth Rate, Doubling time.

Introduction
Alzheimer's disease is a significant loss of cognitive functions such as memory, judgment, attention, and abstract thinking. Alzheimer's the most common form of dementia, is a progressive brain disease. Alzheimer's disease is a progressive degenerative disease of the brain from which there is no recovery. The disease slowly attacks nerve cells in all parts of the cortex of the brain and a person's abilities to govern emotions, recognize errors and patterns coordinate movement and remember. The changes in the brain may begin to develop more than 20 years before symptoms develop. Ultimately, a person with Alzheimer disease loses memory and many other mental functions.

Alzheimer Disease
An Overview: Alzheimer's disease is suspected, the diagnosis is usually confirmed with tests that evaluate behaviour and thinking abilities, often followed by a brain scan if available however, examination of brain tissue is required for a definitive diagnosis. The disease advances, symptoms can include confusion, irritability, aggression, mood swings, trouble with language, and long-term memory loss, ultimately leading to death. Since the disease is different for each individual, predicting how it will affect the person is difficult. The disease develops for an unknown and variable amount of time before becoming fully apparent, the life expectancy following diagnosis is approximately 7 years. Fewer than 3% of individuals live more than 14 years after diagnosis. Alzheimer's disease is classified as a neurodegenerative disorder. The cause and progression of the disease are not well understood; it is associated with plaques and tangles in the brain. Current treatments only help with the symptoms of the disease. There are no available treatments that stop or reverse the progression of the disease. As of 2012, more than 1,000 clinical trials have been or are being conducted to test various compounds in Alzheimer's disease. Mental stimulation, exercise, and a balanced diet have been suggested as ways to delay, but there is no conclusive evidence supporting an effect. Alzheimer's disease cannot be cured and is degenerative the affected person increasingly relies on others for assistance. The role of the main care giver is often taken by the spouse or a close relative. Alzheimer's disease is known for placing a great burden on care givers; the pressures can be wide ranging, involving social, psychological, physical and economic elements of the caregiver's life. In developed countries, Alzheimer's disease is one of the most costly diseases to society.

Literature Review
Kayalvizhi, Devika and Nageswara Rao (2017)[2] conducted a bibliometric analysis of research output on Alzheimer's disease at the global level covering 47 years from 1970 to 2016 using Scopus database. Newton and Gomathi (2017)[3] analysed the research output performance of scientists on Dengue disease at the global level covering 2005-2014 by using

scientometric indicators authorship pattern, institution wise productivity etc. Vishnumaya and Humayoon Kabir (2017)[7] have conducted quantitative analysis on Oncology research in India based on PubMed database. It was found that oncology research performance in India has improved substantially during the last decade. However Indian contribution to oncology is very less when compared to with other countries. Collaborative trend in speech, language and hearing sciences has been analysed scientometrically based on the literature published in select journals by Ramkumar, Narayanasamy and Nageswara Rao (2016).[5] The scientometric tools such as authorship pattern, CAI, DC, CI, CC and MCC, LCI, DI and ICI have been listed in the analysis of data. The study reveals that there is no significant difference in collaboration in the domain of speech or language or hearing and local collaboration persist in the domain of speech or language or hearing. Saravanan and Dominic (2014)[6] highlighted qualitatively the research and development of literature in the field of ecology in terms of publication output using web of science. The study revealed that multiple authorship with collaboration of two and three authors was dominant. It also analysed DC, CC, CI and also the applicability of Lokta's law. Indian author's contributions to international conference on scientometrics, bibliometrics and informetrics from 1995 to 2009 have been analysed and the research performance are measured and compared with previous conferences by Rajendran, Ramesh Babu and Jeyshankar (2010).[4] This study indicates that the Indian contributions are good in these conferences.

Objectives

The objectives of the study are:

1. To ascertain the global research output and the Indian research production on Alzheimer's disease.
2. To examine the collaborating countries with Indian authors in research production in Alzheimer's disease.
3. To identify the Indian organizations conducting the research in Alzheimer's disease.
4. To compare and measure the growth rate of literature published.
5. To identify the top source titles of journals and contributors who publish research articles on Alzheimer's disease.

Hypotheses

The following hypotheses were formulated for this study.

1. There exists substantial increase of Indian literature on Alzheimer's disease research.
2. Growth of publications in Alzheimer's disease research is comparatively higher in developed countries when compared to India.
3. There exists domination of collaborative research in Indian Alzheimer's disease.

Source Database - Scopus: A Brief Note: Scopus is the largest abstract and citation database of peer-reviewed literature covering scientific journals, books and conference proceedings. It is a comprehensive database of the world's research output in the fields of science, technology, medicine, social sciences, and arts and humanities. As research becomes increasingly global, interdisciplinary and collaborative, one can make sure that critical research from around the world is not missed by using Scopus to keep track of what's happening in the research world. Content on Scopus comes from about 5,000 publishers and reviewed and selected by an independent content selection and advisory board (CSAB) and indexed in Scopus. (www.scopus.com)

Collection of Data: The study uses 47 years publications data covering 1970 to 2016 on Alzheimer's disease collected from Scopus database. A total of 167240 records were identified in the field of "Alzheimer's disease", of which 2676 records (1.60%) are directly related to Alzheimer's disease by Indian contributors. The following search strategy has been used to retrieve data. The search term used for retrieving the bibliographic records as follows

(Title-Abs-Key ("Alzheimer's disease") and pub year > 1970 and pub year < 2017.

These bibliographic records were downloaded for further analysis.

Analysis and Discussion: The research on Alzheimer's has been covered from 1970 to 2016. A total of 1,67,240 at published during the study period. In the year 1970 the research starts with 16 publications and since then it has gradually increased to 10074. Further it is stated that there is a linear growth of rate has been noticed, of course little fluctuation of growth during the study period (Table 1).

Table 1: Year wise distribution of publications on Alzheimer's disease

S.No.	Year	Publications	Percentage	Cumulative Publications	Cumulative Percentage	RoG
1	1970	16	0.01	16	0.01	1.00
2	1971	16	0.01	32	0.02	1.00
3	1972	19	0.01	51	0.03	1.19
4	1973	45	0.03	96	0.06	2.37
5	1974	79	0.05	175	0.11	1.76
6	1975	83	0.05	258	0.15	1.05

7	1976	71	0.04	329	0.20	0.86
8	1977	81	0.05	410	0.25	1.14
9	1978	84	0.05	494	0.30	1.04
10	1979	119	0.07	613	0.37	1.42
11	1980	149	0.09	762	0.46	1.25
12	1981	197	0.12	959	0.57	1.32
13	1982	309	0.18	1268	0.76	1.57
14	1983	412	0.25	1680	1.00	1.33
15	1984	499	0.30	2179	1.30	1.21
16	1985	708	0.42	2887	1.73	1.42
17	1986	1044	0.62	3931	2.35	1.47
18	1987	1003	0.60	4934	2.95	0.96
19	1988	1226	0.73	6160	3.68	1.22
20	1989	1733	1.04	7893	4.72	1.41
21	1990	1871	1.12	9764	5.84	1.08
22	1991	1976	1.18	11740	7.02	1.06
23	1992	2123	1.27	13863	8.29	1.07
24	1993	2246	1.34	16109	9.63	1.06
25	1994	2756	1.65	18865	11.28	1.23
26	1995	2864	1.71	21729	12.99	1.04
27	1996	3309	1.98	25038	14.97	1.16
28	1997	3626	2.17	28664	17.14	1.10
29	1998	3872	2.32	32536	19.46	1.07
30	1999	3880	2.32	36416	21.78	1.00
31	2000	4320	2.58	40736	24.36	1.11
32	2001	4510	2.70	45246	27.05	1.04
33	2002	4952	2.96	50198	30.02	1.10
34	2003	5131	3.07	55329	33.08	1.04
35	2004	5920	3.54	61249	36.62	1.15
36	2005	6386	3.82	67635	40.44	1.08
37	2006	6746	4.03	74381	44.48	1.06
38	2007	6995	4.18	81376	48.66	1.04
39	2008	7093	4.24	88469	52.90	1.01
40	2009	7960	4.76	96429	57.66	1.12
41	2010	8780	5.25	105209	62.91	1.10
42	2011	9373	5.60	114582	68.51	1.07
43	2012	10270	6.14	124852	74.65	1.10
44	2013	10609	6.34	135461	81.00	1.03
45	2014	10813	6.47	146274	87.46	1.02
46	2015	10892	6.51	157166	93.88	1.01
47	2016	10074	6.02	167240	100.00	0.92
Total		**167240**	**100.00**			

For this study, the literature on Alzheimer's disease research data has been downloaded from 'Scopus', multidisciplinary online database, which is an international indexing and abstracting database, using the search term "Alzheimer's". For this study, publications commencing from 1975-2016 (42 years) has been downloaded from the database. A total of 167240 data has been identified. Out of which 2676 articles were published from India (Table 2).

Table 2: Global contribution – Country wise

S. No.	Name of the Country	Number of Papers	Percentage
1	United States	63022	37.68
2	United Kingdom	15454	9.24
3	Germany	10982	6.57
4	Japan	9712	5.81
5	China	9210	5.51

6	Italy	8815	5.27
7	France	8023	4.80
8	Canada	7778	4.65
9	Spain	5702	3.41
10	Australia	5001	2.99
11	Sweden	4721	2.82
12	Netherlands	4046	2.42
13	Switzerland	3293	1.97
14	South Korea	2968	1.77
15	India	2676	1.60
16	Belgium	2275	1.36
17	Brazil	2036	1.22

Nearly 57% of the outputs were provided by four countries namely USA, UK, Germany and Japan. USA contributes nearly 37.68%, followed by UK (9.24%), Germany (6.57%) and Japan (5.81%). Out of the top Seventeen countries in Alzheimer's disease research, India positions itself in the Fifteenth place with 2676 contribution (Table 2). Nearly 1.60% of total production has been made from India. This shows a low productivity on this area by the Indian scientists (Table 2).

Table 3: Year wise distribution

S No.	Year	Papers	Percentage	Cumulative Papers	Cumulative Percentage	RoG
1	1975	2	0.07	2	0.07	1.00
2	1976	0	0.00	2	0.07	0.00
3	1977	0	0.00	2	0.07	0.00
4	1978	0	0.00	2	0.07	0.00
5	1979	0	0.00	2	0.07	0.00
6	1980	0	0.00	2	0.07	0.00
7	1981	0	0.00	2	0.07	0.00
8	1982	1	0.04	3	0.11	0.00
9	1985	1	0.04	4	0.14	1.00
10	1988	1	0.04	5	0.18	1.00
11	1990	2	0.07	7	0.26	2.00
12	1991	1	0.04	8	0.29	0.50
13	1992	3	0.11	11	0.41	3.00
14	1994	5	0.19	16	0.59	1.67
15	1995	5	0.19	21	0.78	1.00
16	1996	8	0.30	29	1.08	1.60
17	1997	14	0.52	43	1.60	1.75
18	1998	8	0.30	51	1.90	0.57
19	1999	11	0.41	62	2.31	1.38
20	2000	19	0.71	81	3.02	1.73
21	2001	20	0.75	101	3.77	1.05
22	2002	19	0.71	120	4.48	0.95
23	2003	33	1.23	153	5.71	1.74
24	2004	48	1.79	201	7.51	1.45
25	2005	60	2.24	261	9.75	1.25
26	2006	67	2.50	328	12.25	1.12
27	2007	79	2.95	407	15.20	1.18
28	2008	89	3.33	496	18.53	1.13
29	2009	134	5.01	630	23.54	1.51
30	2010	179	6.69	809	30.23	1.34
31	2011	228	8.52	1037	38.75	1.27
32	2012	243	9.08	1280	47.83	1.07
33	2013	295	11.02	1575	58.85	1.21

34	2014	353	13.19	1928	72.04	1.20
35	2015	384	14.35	2312	86.39	1.09
36	2016	364	13.61	2676	100.00	0.95
Total		**2676**	100			

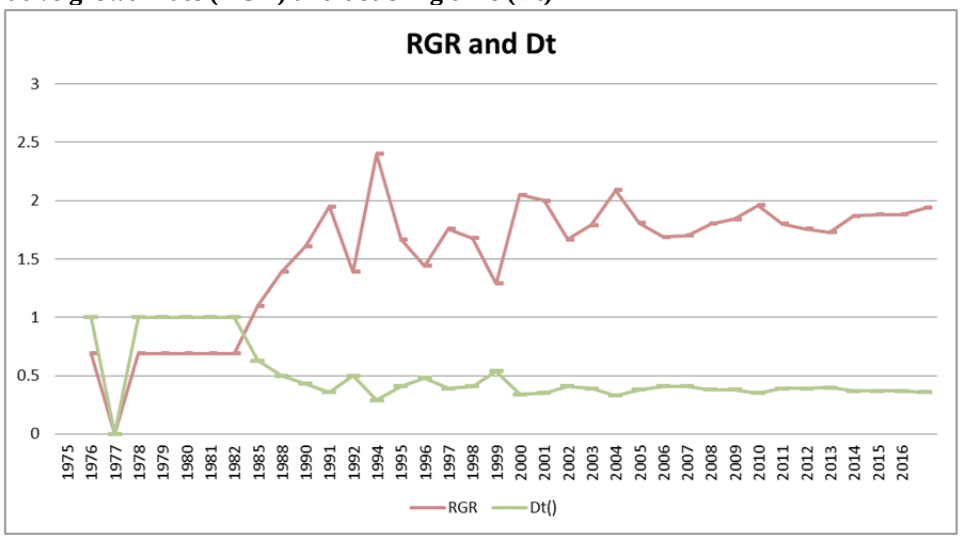
The research on Alzheimer's has been covered from 1970 to 2016. A total of 2676 articles have been published during the study period. In the year 1975 the research starts with 2 publications and since then it has gradually increased to 2676 except there is no publication found during the period 1976 to 1981. Further it is stated that there is a linear growth of rate has been noticed, of course little fluctuation of growth during the study period. (Table 3)

It can be seen from the table 3 that the Indian publications on Alzheimer's disease research seems to be in linear trend. During the last ten years, there is a substantial increase in the quantum of publications. This indicates that the awareness and importance of Alzheimer's disease has been in increasing trend.

Table 4: RGR and Dt()

S. No.	Year	Papers	%	Cum. Papers	Cum%	w 1	w 2	RGR	Dt()
1	1975	2	0.07	2	0.07		0.693147	0.69	1.00
2	1976	0	0.00	2	0.07	0.693147	0.693147	0.00	0.00
3	1977	0	0.00	2	0.07	0	0.693147	0.69	1.00
4	1978	0	0.00	2	0.07	0	0.693147	0.69	1.00
5	1979	0	0.00	2	0.07	0	0.693147	0.69	1.00
6	1980	0	0.00	2	0.07	0	0.693147	0.69	1.00
7	1981	0	0.00	2	0.07	0	0.693147	0.69	1.00
8	1982	1	0.04	3	0.11	0	1.098612	1.10	0.63
9	1985	1	0.04	4	0.14	0	1.386294	1.39	0.50
10	1988	1	0.04	5	0.18	0	1.609438	1.61	0.43
11	1990	2	0.07	7	0.26	0	1.94591	1.95	0.36
12	1991	1	0.04	8	0.29	0.693147	2.079442	1.39	0.50
13	1992	3	0.11	11	0.41	0	2.397895	2.40	0.29
14	1994	5	0.19	16	0.59	1.098612	2.772589	1.67	0.41
15	1995	5	0.19	21	0.78	1.609438	3.044522	1.44	0.48
16	1996	8	0.30	29	1.08	1.609438	3.367296	1.76	0.39
17	1997	14	0.52	43	1.60	2.079442	3.7612	1.68	0.41
18	1998	8	0.30	51	1.90	2.639057	3.931826	1.29	0.54
19	1999	11	0.41	62	2.31	2.079442	4.127134	2.05	0.34
20	2000	19	0.71	81	3.02	2.397895	4.394449	2.00	0.35
21	2001	20	0.75	101	3.77	2.944439	4.615121	1.67	0.41
22	2002	19	0.71	120	4.48	2.995732	4.787492	1.79	0.39
23	2003	33	1.23	153	5.71	2.944439	5.030438	2.09	0.33
24	2004	48	1.79	201	7.51	3.496508	5.303305	1.81	0.38
25	2005	60	2.24	261	9.75	3.871201	5.56452	1.69	0.41
26	2006	67	2.50	328	12.25	4.094345	5.793014	1.70	0.41
27	2007	79	2.95	407	15.20	4.204693	6.008813	1.80	0.38
28	2008	89	3.33	496	18.53	4.369448	6.206576	1.84	0.38
29	2009	134	5.01	630	23.54	4.488636	6.44572	1.96	0.35
30	2010	179	6.69	809	30.23	4.89784	6.695799	1.80	0.39
31	2011	228	8.52	1037	38.75	5.187386	6.944087	1.76	0.39
32	2012	243	9.08	1280	47.83	5.429346	7.154615	1.73	0.40
33	2013	295	11.02	1575	58.85	5.493061	7.362011	1.87	0.37
34	2014	353	13.19	1928	72.04	5.686975	7.564238	1.88	0.37
35	2015	384	14.35	2312	86.39	5.866468	7.745868	1.88	0.37
36	2016	364	13.60	2676	100.00	5.950643	7.892078	1.94	0.36

Graph 1: Relative growth rate (RGR) and doubling time (Dt)



The graph shows the relative growth rate and doubling time. It is seen from Table 4 that, there is a fluctuation in RGR by year wise. The RGR has been decreasing from 0.69 in the year 1975 to 1.95 in the year 1990. Since then it has shown fluctuation trending year after year. The Dt has also shown a fluctuation when calculated by year wise. Normally the Dt is always be in increasing trend. However, the data in Table 3 reveals fluctuation in different years over the study period.

Table 5: Document type

S. No.	Document Type	Number of Papers	Percentage
1	Articles	1679	62.74
2	Reviews	667	24.93
3	Conference Papers	130	4.86
4	Book Chapters	69	2.58
5	Letters	52	1.94
6	Editorials	39	1.46
7	Notes	21	0.78
8	Short Surveys	16	0.60
9	Erratum	2	0.07
10	Books	1	0.04
Total		**2676**	**100.00**

The research output on Alzheimer has been published in a variety of bibliographic forms. A total of 11 different types of bibliographic forms were identified in which the literature has been published. A majority of the publications (1679) were in the forms of Articles, followed by (667) were Reviews (Table 5).

Table 6: Collaborated countries

S. No.	Name of the Country	Number of Papers	Percentage
1	United States	320	11.96
2	United Kingdom	80	2.99
3	Saudi Arabia	62	2.32
4	Australia	51	1.91
5	Italy	46	1.72
6	Malaysia	41	1.53
7	Germany	37	1.38
8	Japan	33	1.23
9	South Korea	33	1.23
10	Singapore	30	1.12

11	France	24	0.90
12	Sweden	23	0.86
13	Canada	22	0.82
14	Spain	20	0.75

The Indian authors collaborated with 14 countries for their contribution. USA, UK, Saudi Arabia, Australia and Italy are the top five countries that were collaborated. (Table 6)

Table 7: Source title

S. No.	Source Title	Number of Papers
1	Journal of Alzheimer's Disease	44
2	International Journal of Pharmacy and Pharmaceutical Sciences	41
3	International Journal of Pharma and Bio Sciences	40
4	CNS and Neurological Disorders Drug Targets	39
5	Annals of Indian Academy of Neurology	37
6	Plos One	35
7	International Journal of Pharmaceutical Sciences Review and Research	30
8	European Journal of Medicinal Chemistry	25
9	Medicinal Chemistry Research	25
10	Molecular Neurobiology	25
11	Asian Journal of Pharmaceutical and Clinical Research	23
12	Bio organic and Medicinal Chemistry	21
13	International Journal of Pharmtech Research	21
14	Neurology India	21
15	Indian Journal of Pharmacology	19
16	Indian Journal of Psychiatry	19
17	Pharmacology Biochemistry and Behaviour	19
18	Research Journal of Pharmacy and Technology	17
19	International Journal of Alzheimer's Disease	16
20	Journal of Biological Chemistry	16
21	Neurochemical Research	16
22	Rsc Advances	16
23	International Psychogeriatrics	15
24	Neurochemistry International	15
25	Other Journals	Less than 15

It is found that 24 major Journals of Alzheimer's disease has been identified with number of publications ranging from 15 to 44 articles. The highest number of articles (44) are published in Journal of Alzheimer's Disease, followed by 41 articles in International Journal of Pharmacy and Pharmaceutical Sciences and 40 articles in International Journal of Pharma and Bio Sciences (Table 7).

Although the literature has been communicated in a variety of languages across the globe yet 2672 of the total publications are in English language which is a common in the scholarly communication. It is interesting in a country like India which is a multilingual country, none of the publications are in Indian languages (Table 8).

Table 8: Language wise distribution

S. No.	Language	Number of Papers
1	English	2672
2	Italian	1
3	Japanese	1
4	Polish	1
5	Turkish	1
Total		**2676**

Table 9: Organisation which has more than 15 publications

S.No.	Organisation	No. of Papers
1	National Institute of Mental Health and Neuro Sciences, Bangalore	88
2	All India Institute of Medical Sciences, New Delhi	87
3	Punjab University, Chandigarh	87
4	Postgraduate Institute of Medical Education and Research, Chandigarh	76
5	University Institute of Pharmaceutical Sciences India, Chandigarh	65
6	Banaras Hindu University, Varanasi, U.P	59
7	National Institute of Pharmaceutical Education and Research India, Hyderabad.	47
8	Punjabi University, Patiala, Punjab	43
9	Central Drug Research Institute India, Lucknow, Uttar Pradesh	43
10	University of Delhi, New Delhi	40
11	Council of Scientific and Industrial Research India, New Delhi	39
12	Central Food Technological Research Institute India, Mysore	38
13	Jamia Hamdard University, New Delhi	35
14	Indian Institute of Science, Bangalore	34
15	Aligarh Muslim University, Aligarh, Uttar Pradesh	34
16	Guru Jambeshwar University of Science and Technology, Haryana	33
17	Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram, Kerala	32
18	Jawaharlal Nehru University, New Delhi	32
19	Central Leather Research Institute India, Chennai	30
20	University of Calcutta, Kolkata, West Bengal	30
21	Annamalai University, Chidambaram, Tamil Nadu	30
22	Indian Institute of Chemical Biology, Kolkata, West Bengal	29
23	National Brain Research Centre, Haryana	27
24	Tata Institute of Fundamental Research, Bangalore	26
25	University of Mysore, Mysore	25
26	Indian Association for the Cultivation of Science, Kolkata, West Bengal	25
27	Jamia Hamdard Faculty of Pharmacy, New Delhi	25
28	Amity University, Uttar Pradesh	25
29	King's College, Haryana	23
30	Institute of Human Behaviour & amp; Allied Sciences, Delhi	23
31	Mysore Medical College, Mysore	23
32	Bharathiar University, Coimbatore	22
33	Banaras Hindu University Institute of Medical Sciences, Varanasi, Uttar Pradesh	22
34	Institute of Genomics and Integrative Biology India, New Delhi	21
35	Jadavpur University, Kolkata	21
36	Birla Institute of Technology and Science, Pilani, Rajasthan	20
37	The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat	20
38	Anna University, Chennai	20
39	Indian Institute of Technology, Chennai	20
40	Alagappa University, Karaikudi, Tamil Nadu	19
41	Jamia Millia Islamia, New Delhi	19
42	Institute of Post Graduate Medical Education and Research, Kolkata	19
43	Dr B R Ambedkar Center for Biomedical Research, New Delhi	19
44	Vellore Institute of Technology, Vellore, Tamilnadu	18
45	Centre for Cellular and Molecular Biology India, Hyderabad	18
46	Indian Institute of Toxicology Research, Lucknow, Uttar Pradesh	18
47	Integral University, Dasauli, Uttar Pradesh	18

48	Institute of Nuclear Medicine and Allied Sciences India, Delhi	17
49	Saha Institute of Nuclear Physics, Kolkata	17
50	Bhabha Atomic Research Centre, Mumbai	17
51	Christian Medical College, Vellore	16
52	Guru Gobind Singh Indraprastha University, Delhi	16
53	Indian Institute of Technology, Bombay	16
54	Dr. Reddy,s Laboratories Ltd., Chennai, India	16
55	Manipal University Karnataka, Manipal, Karnataka	16
56	Dr Ram Manohar Lohia Hospital, New Delhi	15
57	Bharati Vidyapeeth University, Pune	15
58	Indian Institute of Technology, Delhi	15
59	C L Baid Metha College of Pharmacy, Chennai	15
60	Indo – Soviet College of Pharmacy, Punjab	15
61	Other Organisations	Less than 14

Table 9 reveals that there exist 60 research institutions that have published articles ranging from 15 to 88. The highest numbers of articles (88) have been published by National Institute of Mental Health and Neuro Sciences, Bangalore, followed by 87 each All India Institute of Medical Sciences, New Delhi and Punjab University, Chandigarh

Table 10: Highly contributed authors – top 50 authors

S. No.	Name of the Author	Number of Papers
1	Kumar, A	28
2	Parle, M	27
3	Kamal, M A	25
4	Tripathi, M	24
5	Singh, N	22
6	Dhikav, V	21
7	Mathuranath, P S	20
8	Rao, K S J	20
9	Mandal, P K	19
10	Prakash, A	18
11	Chakrabarti, S	17
12	Joshi, H	16
13	Anand, K S	15
14	Das, U N	15
15	Dey, S G	15
16	Gill, K D	15
17	Jayakumar, R	15
18	Subramanian, S	15
19	Kulkarni, S K	14
20	Maiti, S	14
21	Mukhopadhyay, D	14
22	Nath, C	14
23	Ramakrishanan, S	14
24	Thakur, M K	14
25	Varghese, M	14
26	Chopra K	13
27	Deshmukh, R	13
28	Islam, F	13
29	Shakil, S	13
30	Shankar, S K	13
31	Sharma, B	13
32	Jaggi, A S	12
33	Maji, S K	12
34	Rangappa, K S	12
35	Ali, J	11
36	Alladi, S	11
37	Baboota, S	11
38	Bharate, S B	11
39	Bharath, S	11
40	Fodale, V	11
41	Mahanand, B S	11
42	Obulesu, M	11
43	Chandra, V	10
44	Ganguli, M	10
45	Groverr, A	10
46	Manivasagam, T	10
47	Mukherjee, S	10
48	Shaji, K S	10
49	Sonawane, K D	10
50	Tiwari, M	10

Kumar, A. of Pharmacology Division, University Institute of Pharmaceutical Sciences, UGC Centre of Advanced Study, Punjab University, Chandigarh has contributed more than 28 publications, it is followed by Parle, M of Department of Pharmacology, Nandha College of Pharmacy, Koorapalayam Pirivu, Pitchandampalayam (PO), Erode-District, Tamil Nadu has contributed 27 publications (Table 10).

Major Findings

The following are the major Findings of the Study:

1. The research productivity at the Global level and at Indian level reveals the linear trend (Table 1 and Table 3).
2. The awareness on research on Alzheimer's disease seems to be effective since 2009 onwards (Table 1).

3. India stands 15th position at the global level in the research contribution in the Alzheimer's disease (Table 2).
4. There is no productivity from India during 1976 to 1981 in the field of Alzheimer's disease (Table 3)
5. It was found that there exists fluctuation by year after year as far as RGR and Dt is concerned (Table 4).
6. Indian authors have collaborated with more scientists from United States followed by United Kingdom and Saudi Arabia (Table 6).
7. A total of 24 Journals have been identified in which Indian authors published ranging from 15 to 44 articles (Table 7).

Conclusion

From the foregoing analysis of the various facets of Alzheimer's research output facilitates to form the following conclusions: This analysis indicated pattern of different peripherals of the study such as growth of research output, RGR and Dt, bibliographic forms, highly contributed journals, institutions and authors. This is the first attempt to apply quantitative analysis to analyse research output at the Indian context. However it is stated that more and more research is needed to evaluate Alzheimer research particularly at the country level in the Asian continent so as to analyse among the Asian countries. The research on Alzheimer's disease is an important aspect in the society. The authors are convinced that the research trends in Alzheimer's disease would broadly reflect trends in the dynamic discipline of Alzheimer's.

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