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## Oxygen Therapy: A Scientometric Mapping of Indian Publications

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# Oxygen Therapy: A Scientometric Mapping of Indian Publications

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## ABSTRACT

*The present study has been carried out to find out the research performance in the field of Oxygen Therapy in India during 1991-2021 as indexed in the Web of Science database. A total 1648 research publications have been found in the Web of Science during 31 years period of 1991-2021 and were downloaded for analyze with the help of Histcite, VosViewer and Biblioshiny. The study also provide comparative performance of different Scientometric parameters including total research productivity, yearly research output, authorship pattern, International collaboration, Institution wise concentration, Source wise distribution of publications, Subject wise publications, most prolific authors and highly Cited papers etc. The most collaborated countries are: United States with 177 (14699 Citations), Saudi Arabia with 54 (3235 Citations), UK with 52 (9432 Citations), Australia with 49 (8418 Citations), Canada with 46 (8666 Citations). The most productive Institutions are: Indian Institute of Science Bangalore with 106 publications and registered 3018 Citations followed by Indian Institute of Technology with 84 and registered 1815 Citations, All India Institute of Medical Science with 72 (3372 Citations), Bhabha Atom Res Centre with 41 (549 Citations), Postgrad Institute of Med Education & Research with 36(927 Citations). The most preferred journals were: RSC ADVANCES topped the list with 32 (496 Citations) articles followed by DALTON TRANSACTIONS with 25 (885 Citations) articles, MATERIALS SCIENCE & ENGINEERING C-MATERIALS FOR BIOLOGICAL APPLICATIONS with 21 (564 Citations) articles, JOURNAL OF PHOTOCHEMISTRY AND PHOTOBIOLOGY B-BIOLOGY with 20 (309 Citations) articles. The average number of publications published per year was 29.79 the highest number of papers 217, 166, 152 were published in 2020, 2019, 2018. Authorship and collaboration trend was towards multi-authored papers (1648) from 8575 authors. The collaboration Index is 5.19.*

**Keywords:** Oxygen Therapy, Medical Oxygen, Scientometrics, Highly Cited papers

## INTRODUCTION

Oxygen therapy is widely used in the management of a number of chronic and acute health conditions. The therapy may be used in a hospital setting or pre-hospital setting (e.g. in the ambulance) to manage emergency situations or

in the home setting to manage long-term health conditions. The mode of delivery and device used for oxygen therapy depends upon several factors including the patient's specific needs and the opinion of the medical professionals involved. **(Dr. Ananya Mandal, MD).**

Medical oxygen is an essential medicine in the treatment of COVID-19. Medical oxygen requires technology. It means that you have to be able to take the oxygen from the air, because we have oxygen in the air. About 21% of the air is oxygen. But we have to concentrate it into medical oxygen and that requires technology. So, that's one issue in some countries. The other challenge is actually distribution of medical oxygen. So, one is you concentrate the oxygen and you, you know, supply a hospital or supply a region. And the other thing is distributing. So, make sure that the oxygen that you have supplied, the one that you're producing, can get to the patients. Third challenge is knowing how to use the medical oxygen, meaning keeping the technology maintained, repairing what may be broken, making sure the piping is functional. **(Dr Janet Diaz, 2021)**

The human body requires oxygen to survive and to carry out various vital functions. The respiratory system works along with the circulatory system to provide oxygen to the body. When oxygen is inhaled, it goes to the lungs and then moves into the blood vessels and mixes with the blood. This oxygen-rich blood is then circulated in the cells and tissues of the body. However, due to inflammation and infection in the lungs, some people suffering from severe COVID-19 infection develop hypoxemia (low oxygen levels in the blood). These patients require medical oxygen to restore the oxygen saturation of the body.

India is currently suffering from a new variant of SARS-CoV-2, called B.1.617. Two mutations of this variant, E484Q, and L452R, have been found in India. Scientists and the health ministry of India have stated that this double mutant variant of the COVID-19 virus is more virulent. This new variant affects the lungs even more, resulting in increased demand for oxygen therapy. The present study has been carried out to find out the research performance in the field of Oxygen Therapy in India during 1991-2021 as indexed in the Web of Science database.

## **OBJECTIVES OF THE STUDY**

The main objectives of the study were to provide current status of Indian Institutions by measuring progress of research in India using publications output data. The recent couple of years have witnessed many scientometric and bibliometric studies in the field of Medical Science. Even some Doctors, Scientists and Scholars are also attracted towards the techniques of scientometrics especially citation analysis and have done important studies in the field. It is high time to analyse these publications with the following objectives using the Web of Science database:

- To find out the highly productive affiliated institutions;
- To identify the prolific authors in the field of Oxygen Therapy;
- To find the scattering of literature based on publication types;
- To list core journals communicated by the authors;
- To analyse the contents of the papers through Keywords;
- To present the Highly Cited paper;
- To depict the growth of literature; and
- To identify the International collaborated countries;

## **METHODOLOGY AND DATA SOURCE**

In this study to analyse the Indian research performance in Oxygen Therapy used Bibliometric/Scientometric method. The Web of Science database was used for drawing publications data on Oxygen Therapy. Web of Science database is an international multidisciplinary database indexing international peer reviewed journals. The study uses 31 years of publications data from 1991 to 2021. In addition, it used citations data for measuring quality and visibility of research output. The required data was searched from all types of documents e.g. papers, review, notes, conference proceedings etc. for the study period. Normal subject keyword search is adopted to retrieve literature related to Oxygen Therapy. The following are the search queries applied to elicit records pertaining to the present study: “Oxygen Therapy” or “Medical Oxygen” with topic field and limited to India with address field. Totally 1648 of records (83641 References)

with 49091 Citations were identified, downloaded and these records were analyzed according to the aim of the study. Histcite, VosViewer and Biblioshiny was also used to analyze the data and visualize the concepts.

## **DATA ANALYSIS AND INTERPRETATIONS**

### **India's Publication share and rank in World (1648 out of 64826)**

India ranks 13<sup>th</sup> in terms of publications in Oxygen therapy, with its global publications share of less than 3% (1648 publications, 49091 Citations, H-Index: 88, ACPP is 29.85) as computed from cumulative world publications data for 1989- 2021. The United States tops the list with its global publication share of 19021 publications, followed far behind are China (10630), Germany (4624), England (3806), Japan (3502), Italy (3392), France (2845), Canada (2712), Australia (2197), South Korea (2018), Spain (4808), Brazil (1720) and India 1654), Turkey (1651), Netherland (1453), Taiwan (1317), Switzerland (1137) and Poland (1113). The above countries that rank between 1<sup>st</sup> to 15<sup>th</sup> positions. It is noted than 18 countries with more than 1000 publications, 28 countries with more than 500 publications and 51 countries with more than 100 publications in the field of Oxygen therapy. It is also noted that 23320 publications are published in open access journals and India with 428 publications in open Access journals.

### **International Collaboration**

It is assumed that professional network and scientific collaboration have positive association with publication activities. Consequently, scientific collaboration and Coauthored publications are increasing. The analysis indicates that the most international collaborative papers with high impact. United States with 177 (14699 Citations), Saudi Arabia with 54 (3235 Citations), UK with 52 (9432 Citations), Australia with 49 (8418 Citations), Canada with 46 (8666 Citations) were the most collaborative countries in Oxygen Therapy. It is noted 26 countries with more than 10 publications (Publication range from 10-

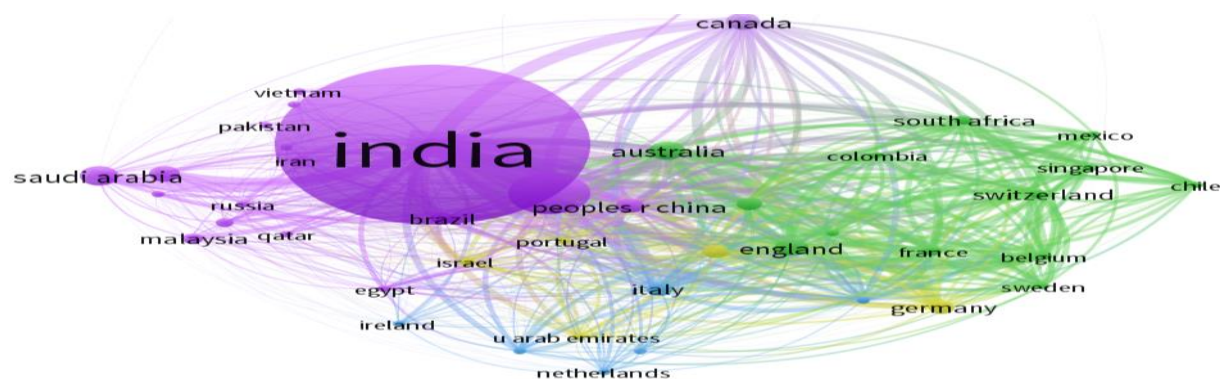
177), 9 countries with more than 30 publications and 95 countries with more than 1000 Citations. The collaboration Index is 5.19.

**Table 1: International Collaboration (113)**

| #  | Country         | Records | Citations | Country         | Records | Citations |
|----|-----------------|---------|-----------|-----------------|---------|-----------|
| 1  | USA             | 177     | 14699     | Ukraine         | 3       | 2137      |
| 2  | Saudi Arabia    | 54      | 3235      | Brunei          | 2       | 2119      |
| 3  | UK              | 52      | 9432      | Cyprus          | 2       | 5372      |
| 4  | Australia       | 49      | 8418      | Estonia         | 2       | 2089      |
| 5  | Canada          | 46      | 8666      | Iraq            | 2       | 2071      |
| 6  | South Korea     | 38      | 3053      | Jordan          | 2       | 2218      |
| 7  | Peoples R China | 37      | 3827      | Kenya           | 2       | 2098      |
| 8  | Germany         | 33      | 8737      | Kuwait          | 2       | 2093      |
| 9  | Italy           | 30      | 5200      | Lebanon         | 2       | 2072      |
| 10 | Japan           | 29      | 9728      | Libya           | 2       | 2134      |
| 11 | Spain           | 29      | 3010      | Morocco         | 2       | 2134      |
| 12 | Brazil          | 25      | 8585      | Nepal           | 2       | 2097      |
| 13 | Malaysia        | 24      | 2526      | New Zealand     | 2       | 2089      |
| 14 | South Africa    | 20      | 2525      | Slovenia        | 2       | 2089      |
| 15 | Taiwan          | 19      | 2401      | Sri Lanka       | 2       | 2089      |
| 16 | France          | 17      | 8266      | Algeria         | 1       | 2071      |
| 17 | Switzerland     | 17      | 7949      | Anguilla        | 1       | 2071      |
| 18 | Singapore       | 16      | 2542      | Armenia         | 1       | 2071      |
| 19 | Israel          | 15      | 7943      | Azerbaijan      | 1       | 6         |
| 20 | Belgium         | 14      | 8257      | Bahrain         | 1       | 2071      |
| 21 | Iran            | 13      | 2619      | BELARUS         | 1       | 13        |
| 22 | Sweden          | 13      | 2571      | Benin           | 1       | 2071      |
| 23 | Russia          | 12      | 2449      | Bosnia & Herceg | 1       | 18        |
| 24 | Turkey          | 11      | 2725      | Cameroon        | 1       | 2071      |
| 25 | Denmark         | 10      | 2626      | Costa Rica      | 1       | 2071      |
| 26 | Egypt           | 10      | 2491      | Cuba            | 1       | 4         |
| 27 | Chile           | 9       | 2470      | DEM REP CONGO   | 1       | 2071      |
| 28 | Portugal        | 9       | 7622      | Ecuador         | 1       | 2071      |
| 29 | U Arab Emirates | 9       | 7826      | Ethiopia        | 1       | 2071      |
| 30 | Colombia        | 8       | 2618      | Georgia         | 1       | 18        |
| 31 | Greece          | 8       | 2800      | Ghana           | 1       | 2071      |
| 32 | Ireland         | 8       | 2231      | Iceland         | 1       | 2071      |
| 33 | Netherlands     | 8       | 2582      | Indonesia       | 1       | 2071      |
| 34 | Thailand        | 8       | 157       | Kyrgyzstan      | 1       | 2071      |
| 35 | Vietnam         | 8       | 2175      | Latvia          | 1       | 18        |
| 36 | Argentina       | 7       | 2386      | Liberia         | 1       | 2071      |
| 37 | Austria         | 7       | 2492      | Lithuania       | 1       | 18        |
| 38 | Mexico          | 7       | 2551      | Luxembourg      | 1       | 2071      |
| 39 | Qatar           | 7       | 2226      | Malawi          | 1       | 50        |
| 40 | Bangladesh      | 6       | 2147      | Mali            | 1       | 11        |
| 41 | Pakistan        | 6       | 2153      | Mauritius       | 1       | 7         |
| 42 | Bulgaria        | 5       | 2138      | Micronesia      | 1       | 2071      |
| 43 | Czech Republic  | 5       | 526       | Montenegro      | 1       | 63        |
| 44 | Finland         | 5       | 2163      | Mozambique      | 1       | 2071      |
| 45 | Hungary         | 5       | 755       | Myanmar         | 1       | 2071      |
| 46 | Oman            | 5       | 112       | Namibia         | 1       | 2071      |



| Country         | Documents | Citations | Total link strength |
|-----------------|-----------|-----------|---------------------|
| india           | 1639      | 46882     | 151386              |
| usa             | 176       | 12590     | 97597               |
| england         | 39        | 7119      | 64513               |
| australia       | 45        | 6245      | 58015               |
| france          | 14        | 6151      | 51059               |
| belgium         | 10        | 6084      | 48434               |
| switzerland     | 15        | 5875      | 46683               |
| canada          | 42        | 6493      | 43830               |
| japan           | 25        | 7555      | 42381               |
| italy           | 26        | 3027      | 41945               |
| germany         | 29        | 6564      | 36271               |
| peoples r china | 33        | 1654      | 35537               |
| scotland        | 7         | 712       | 30204               |
| spain           | 25        | 837       | 28428               |
| turkey          | 8         | 573       | 24176               |
| sweden          | 10        | 461       | 24111               |
| brazil          | 21        | 6412      | 22873               |
| singapore       | 13        | 432       | 21868               |
| south africa    | 16        | 352       | 21804               |
| colombia        | 5         | 508       | 20918               |



## Bibliographic Coupling

### Highly Cited papers

Of the top 10 highly cited papers, 9 were published during 2006-2014, one in 2018, 4 papers with more than 1000 Citations, 7 papers with more than 500 Citations and 73 papers with more than 100 Citations. The top ranking paper are: “Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock”, by Dellinger RP, Levy MM, Rhodes A, Annane D, Gerlach H, et al. from Indian Soc Crit Care Med, Bombay, Maharashtra, India, CRITICAL CARE MEDICINE. 2013 FEB; 41 (2): 580-637 with 5366 Citations and collaboration with more than 10 countries followed by “Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017” by James SL, Abate D, Abate KH, Abay SM, Abbafati C, et al. from Postgrad Inst Med Sci, Dept Gastroenterol, Lucknow, Uttar Pradesh, India., LANCET. 2018 NOV 10; 392 (10159): 1789-

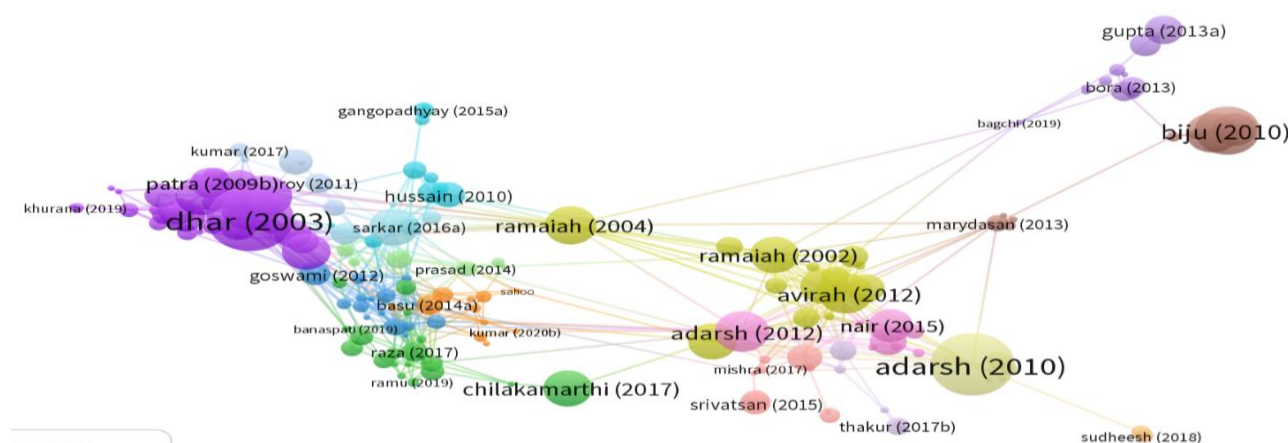
1858 with 2071 Citations and collaboration with 988 authors, third paper entitled on “Oxidative Stress and Neurodegenerative Diseases: A Review of Upstream and Downstream Antioxidant Therapeutic Options” by Uttara B, Singh AV, Zamboni P, Mahajan RT, CURRENT NEUROPHARMACOLOGY. 2009 MAR; 7 (1): 65-74 with 1796 Citations, fourth on entitled on “Biomaterials based on chitin and chitosan in wound dressing applications” by Jayakumar R, Prabakaran M, Kumar PTS, Nair SV, Tamura H, BIOTECHNOLOGY ADVANCES. 2011 MAY-JUN; 29 (3): 322-337 with 1040 Citations.

**Table 2: Highly Cited papers**

| #  | Date / Author / Journal                                                                                                                                                                                                                                                                                                                        | GCS  | CR  |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|
| 1  | 505 Dellinger RP, Levy MM, Rhodes A, Annane D, Gerlach H, et al., Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock: 2012<br>CRITICAL CARE MEDICINE. 2013 FEB; 41 (2): 580-637                                                                                                              | 5366 | 632 |
| 2  | 1175 James SL, Abate D, Abate KH, Abay SM, Abbafati C, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017, LANCET. 2018 NOV 10; 392 (10159): 1789-1858 | 2071 | 93  |
| 3  | 252 Uttara B, Singh AV, Zamboni P, Mahajan RT, Oxidative Stress and Neurodegenerative Diseases: A Review of Upstream and Downstream Antioxidant Therapeutic Options, CURRENT NEUROPHARMACOLOGY. 2009 MAR; 7 (1): 65-74                                                                                                                         | 1796 | 96  |
| 4  | 361 Jayakumar R, Prabakaran M, Kumar PTS, Nair SV, Tamura H Biomaterials based on chitin and chitosan in wound dressing applications, BIOTECHNOLOGY ADVANCES. 2011 MAY-JUN; 29 (3): 322-337                                                                                                                                                    | 1040 | 135 |
| 5  | 594 Bhattacharyya A, Chattopadhyay R, Mitra S, Crowe SE<br>OXIDATIVE STRESS: AN ESSENTIAL FACTOR IN THE PATHOGENESIS OF GASTROINTESTINAL MUCOSAL DISEASES<br>PHYSIOLOGICAL REVIEWS. 2014 APR; 94 (2): 329-354                                                                                                                                  | 765  | 339 |
| 6  | 562 Rahal A, Kumar A, Singh V, Yadav B, Tiwari R, et al. Oxidative Stress, Prooxidants, and Antioxidants: The Interplay<br>BIOMED RESEARCH INTERNATIONAL. 2014; 2014: Art. No. 761264                                                                                                                                                          | 680  | 215 |
| 7  | 238 Flora SJS, Mittal M, Mehta A, Heavy metal induced oxidative stress & its possible reversal by chelation therapy, INDIAN JOURNAL OF MEDICAL RESEARCH. 2008 OCT; 128 (4): 501-523                                                                                                                                                            | 504  | 218 |
| 8  | 163 Ratnam DV, Ankola DD, Bhardwaj V, Sahana DK, Kumar MNVR Role of antioxidants in prophylaxis and therapy: A pharmaceutical perspective, JOURNAL OF CONTROLLED RELEASE. 2006 JUL 20; 113 (3): 189-207                                                                                                                                        | 493  | 148 |
| 9  | 376 Flora SJS, Arsenic-induced oxidative stress and its reversibility<br>FREE RADICAL BIOLOGY AND MEDICINE. 2011 JUL 15; 51 (2): 257-281                                                                                                                                                                                                       | 452  | 400 |
| 10 | 413 Akhtar MJ, Ahamed M, Kumar S, Khan MAM, Ahmad J, et al. Zinc oxide nanoparticles selectively induce apoptosis in human cancer cells through reactive oxygen species, INTERNATIONAL JOURNAL OF NANOMEDICINE. 2012; 7: 845-857                                                                                                               | 417  | 61  |

## Highly Cited Papers

| Document              | Citations | Links |
|-----------------------|-----------|-------|
| dhar (2003)           | 261       | 30    |
| saha (2009)           | 106       | 23    |
| ramaiah (1997)        | 94        | 22    |
| adarsh (2010)         | 250       | 21    |
| ramaiah (2004)        | 109       | 21    |
| adarsh (2012)         | 122       | 20    |
| avirah (2012)         | 120       | 19    |
| ramaiah (2002)        | 99        | 17    |
| raza (2017)           | 39        | 17    |
| flora (2008)          | 504       | 16    |
| karunakaran (2013)    | 60        | 16    |
| dhar (2006)           | 64        | 15    |
| bhattacharyya (2017a) | 30        | 15    |
| flora (2011a)         | 452       | 14    |
| saxena (2004)         | 78        | 14    |
| devi (2020)           | 4         | 14    |
| thomas (2012)         | 99        | 13    |
| roy (2007)            | 63        | 13    |
| misba (2016)          | 52        | 13    |
| ramu (2018)           | 29        | 13    |
| mukherjee (2016)      | 18        | 13    |



**Citation Network of Highly Cited papers**

## Most productive Institutions

A significant variation was observed among the Indian Institutions however, productivity of Tamilnadu Institutions comparable during 1991-2021. Indian Institute of Science Bangalore secured first position with 106 publications and registered 3018 Citations followed by Indian Institute of Technology with 84 and registered 1815 Citations, All India Institute of Medical Science with 72 (3372 Citations), Bhabha Atom Res Centre with 41 (549 Citations), Postgrad Institute of Med Education & Research with 36(927 Citations).

The top productive universities were Aligarh Muslim University with 34 (577 Citations followed by Banaras Hindu University with 31 (2676 Citations), University of Calcutta with 28 (566 Citations), Jawaharlal Nehru University with 27 (393 Citations), University of Delhi with 24 (565 Citations) and Panjab University with 22 (2419 Citations).

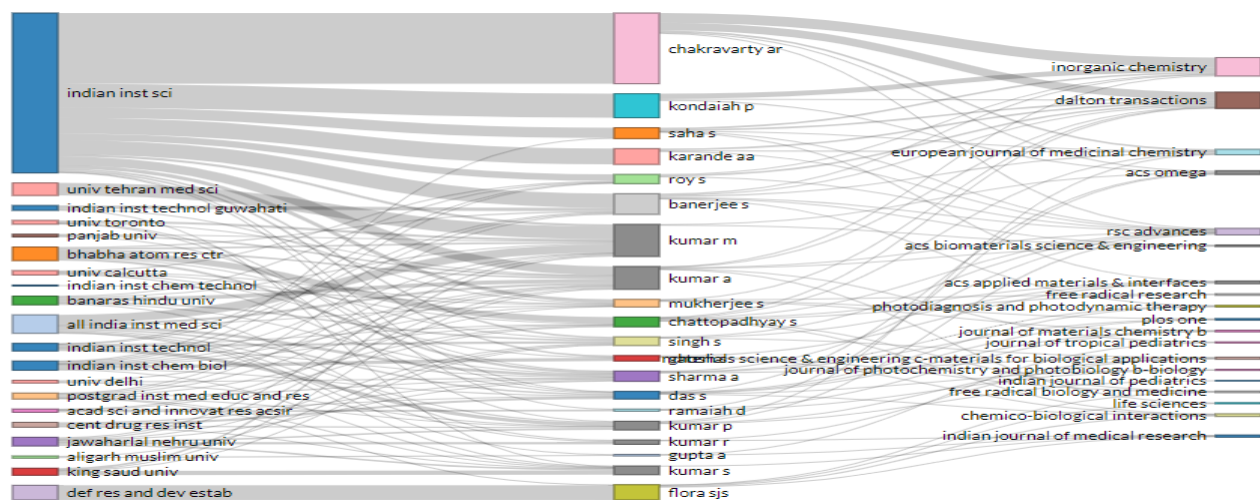
The top leading Institutions from Tamilnadu namely University of Madras, Chennai with 17 (455 Citations), Christian Med Coll & Hospital, Vellur with 15 (2331 Citations), Madurai Kamaraj University, Madurai with 14 (149 Citations), Bharathiar University, Coimbatore with 13 (271 Citations), Bharathidasan University, Tiruchirappalli with 11 (362 Citations), Annamalai University, Chidambaram with 9 (381 Citations) and Alagappa University, Karaikudi with 8 (58 Citations).

It is noted that 44 Institutions with more than 10 Publications, 50 Institutions with more than 5000 Citations and 672 Institutions with more than 1000 Citations. More over 3817 Institutions and 6097 Departments and Centres are involved in the research in Oxygen Therapy including collaboration Institutions.

**Table 3: Most productive Institutions (3817)**

| #  | Institution                                | Records | Citations |
|----|--------------------------------------------|---------|-----------|
| 1  | Indian Institute of Science – Bangalore    | 106     | 3018      |
| 2  | Indian Institute of Technology             | 84      | 1815      |
| 3  | All India Institute of Medical Science     | 72      | 3372      |
| 4  | Bhabha Atom Res Centre                     | 41      | 549       |
| 5  | Postgrad Inst Med Education & Research     | 36      | 927       |
| 6  | CSIR                                       | 35      | 992       |
| 7  | Aligarh Muslim University                  | 34      | 577       |
| 8  | Banaras Hindu University                   | 31      | 2676      |
| 9  | University Calcutta                        | 28      | 566       |
| 10 | Jawaharlal Nehru University                | 27      | 393       |
| 11 | Def Res & Dev Estab                        | 25      | 2445      |
| 12 | University Delhi                           | 24      | 565       |
| 13 | Acad Sci & Innovat Res AcSIR               | 22      | 210       |
| 14 | Panjab University - Panjab                 | 22      | 2419      |
| 15 | Bose Inst                                  | 17      | 345       |
| 16 | Indian Inst Chem Biol                      | 17      | 1021      |
| 17 | University of Madras – Tamilnadu           | 17      | 455       |
| 18 | Christian Med Coll & Hosp– Tamilnadu       | 15      | 2331      |
| 19 | Homi Bhabha Natl Inst                      | 15      | 53        |
| 20 | Indian Inst Chem Technology                | 15      | 524       |
| 21 | National Institute of Technology           | 25      | 303       |
| 22 | Sree Chitra Tirunal Inst Med Sci & Technol | 15      | 2339      |
| 23 | Jamia Millia Islamia                       | 14      | 211       |
| 24 | Madurai Kamaraj University – Tamilnadu     | 14      | 149       |
| 25 | Natl Inst Pharmaceut Educ & Res            | 14      | 211       |
| 26 | University of Lucknow                      | 14      | 914       |
| 27 | Bharathiar University – Tamilnadu          | 13      | 271       |
| 28 | Integral University                        | 13      | 116       |
| 29 | Rajiv Gandhi Ctr Biotechnol                | 13      | 392       |
| 30 | Manipal University                         | 12      | 2227      |
| 31 | Bharathidasan University – Tamilnadu       | 11      | 362       |

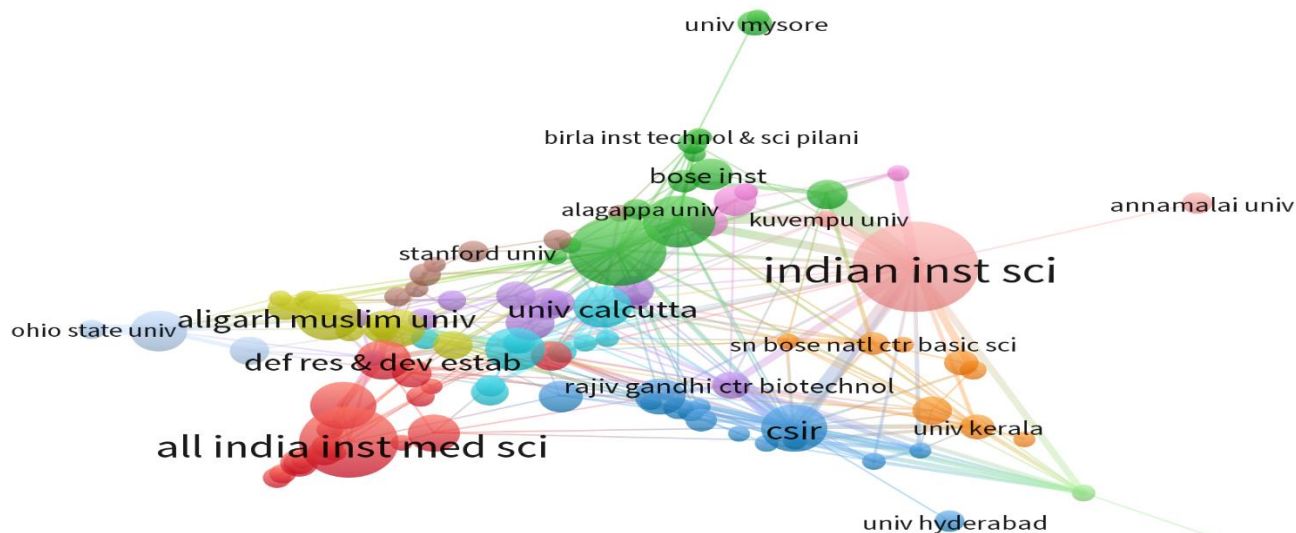
|    |                                     |    |      |
|----|-------------------------------------|----|------|
| 32 | Indian Assoc Cultivat Sci           | 11 | 124  |
| 33 | Jamia Hamdard                       | 11 | 277  |
| 34 | NIPER                               | 11 | 604  |
| 35 | Pondicherry University – Tamilnadu  | 11 | 194  |
| 36 | University Kerala - Kerala          | 11 | 613  |
| 37 | University Mysore - Karnataka       | 11 | 123  |
| 38 | Cent Drug Res Inst                  | 10 | 150  |
| 39 | Cent Leather Res Inst               | 10 | 361  |
| 40 | King Georges Med University         | 10 | 378  |
| 41 | PGIMER                              | 10 | 245  |
| 42 | SN Bose Natl Ctr Basic Science      | 10 | 134  |
| 43 | Tata Mem Hospital                   | 10 | 2239 |
| 44 | Vidyasagar University               | 10 | 253  |
| 45 | Annamalai University – Tamilnadu    | 9  | 381  |
| 46 | Chittaranjan Natl Cancer Institute  | 9  | 208  |
| 47 | CSIR Cent Drug Res Institute        | 9  | 92   |
| 48 | Jadavpur University                 | 9  | 53   |
| 49 | Manipal Academy of Higher Education | 9  | 58   |
| 50 | University of Hyderabad             | 9  | 152  |
| 51 | Alagappa University – Tamilnadu     | 8  | 58   |



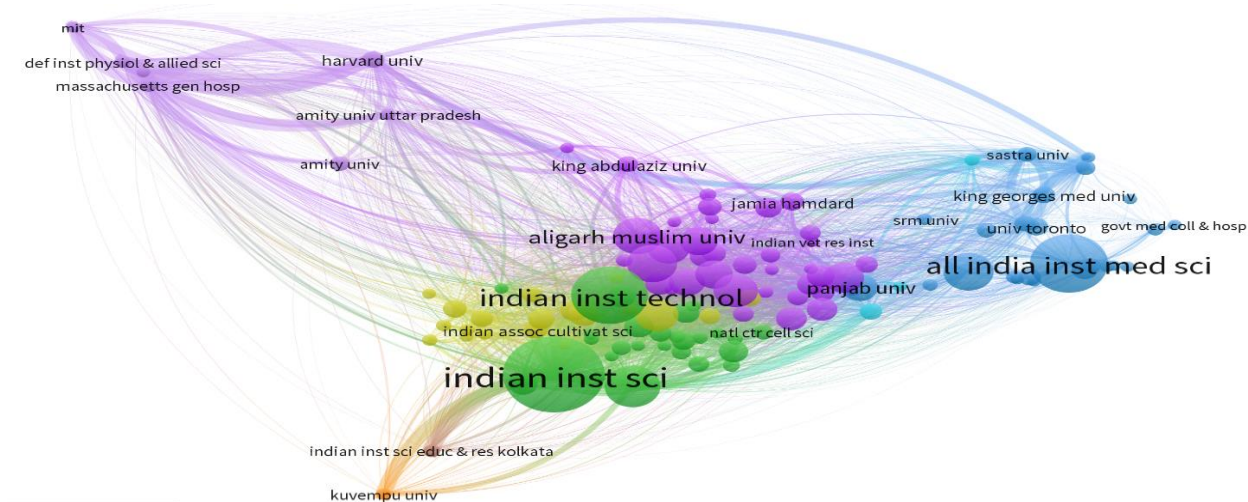
Activate Window

### Three Field Plot: Institutions, Authors and Sources

| Organization                             | Documents | Citations | Total link strength |
|------------------------------------------|-----------|-----------|---------------------|
| indian inst sci                          | 106       | 3018      | 158                 |
| csir                                     | 35        | 992       | 118                 |
| aligarh muslim univ                      | 34        | 577       | 65                  |
| rajiv gandhi ctr biotechnol              | 13        | 392       | 65                  |
| bhabha atom res ctr                      | 41        | 549       | 61                  |
| king saud univ                           | 23        | 786       | 58                  |
| indian inst technol                      | 68        | 1626      | 56                  |
| natl inst technol                        | 15        | 147       | 50                  |
| csir niist                               | 6         | 169       | 47                  |
| kuvempu univ                             | 6         | 76        | 38                  |
| pondicherry univ                         | 11        | 194       | 38                  |
| natl inst interdisciplinary sci & tec... | 6         | 361       | 36                  |
| jawaharlal nehru univ                    | 27        | 393       | 35                  |
| acad sci & innovat res acsir             | 22        | 210       | 31                  |
| univ kerala                              | 11        | 613       | 29                  |
| csir north east inst sci & technol       | 5         | 154       | 27                  |
| harvard univ                             | 10        | 1694      | 27                  |
| univ calcutta                            | 28        | 566       | 26                  |
| def inst physiol & allied sci            | 6         | 1122      | 25                  |
| massachusetts gen hosp                   | 7         | 1190      | 25                  |



**Citation Network of Institutions**



**Bibliographic Coupling**

## Document Type

It is noteworthy to analyse which is the most preferred medium of communication outputs of the research activities in the field of Oxygen Therapy. Out of 1648 publications, 1299 (78.8%) were published as journal articles, Review 277(16.8%), Article; Early Access 18(1.1%), Letter with 13, Article; Proceedings Paper with 11, Editorial Material and Meeting Abstract with 10 Publications respectively. It is note that publications are scattered in 11 forms.

**Table 4: Document type (11)**

| #  | Document Type              | Records | %    | Citations |
|----|----------------------------|---------|------|-----------|
| 1  | Article                    | 1299    | 78.8 | 35482     |
| 2  | Review                     | 277     | 16.8 | 13345     |
| 3  | Article; Early Access      | 18      | 1.1  | 1         |
| 4  | Letter                     | 13      | 0.8  | 16        |
| 5  | Article; Proceedings Paper | 11      | 0.7  | 147       |
| 6  | Editorial Material         | 10      | 0.6  | 28        |
| 7  | Review; Early Access       | 10      | 0.6  | 2         |
| 8  | Meeting Abstract           | 6       | 0.4  | 7         |
| 9  | Letter; Early Access       | 2       | 0.1  | 0         |
| 10 | Article; Book Chapter      | 1       | 0.1  | 0         |
| 11 | Review; Book Chapter       | 1       | 0.1  | 63        |

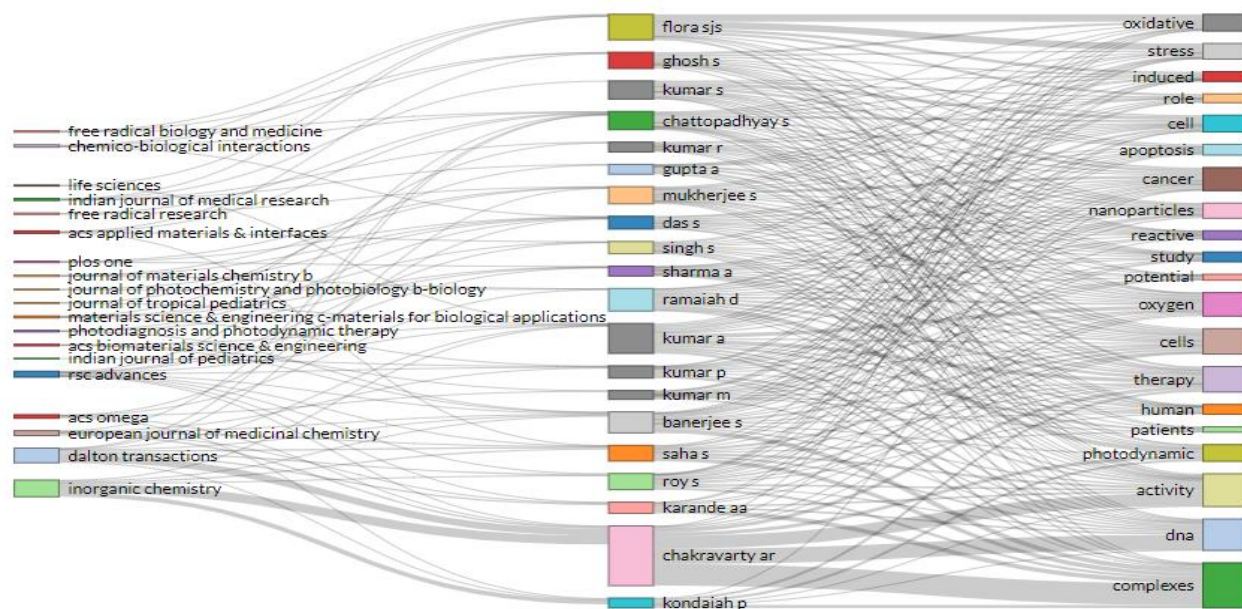
**Most preferred Journals**

The total number of 1648 articles related to Oxygen Therapy were scattered in 754 individual journals. The most preferred five journals were: RSC ADVANCES topped the list with 32 (496 Citations) articles followed by DALTON TRANSACTIONS with 25 (885 Citations) articles, MATERIALS SCIENCE & ENGINEERING C-MATERIALS FOR BIOLOGICAL APPLICATIONS with 21 (564 Citations) articles, JOURNAL OF PHOTOCHEMISTRY AND PHOTOBIOLOGY B-BIOLOGY with 20 (309 Citations) articles. The most cited journals are: CRITICAL CARE MEDICINE with 5373 Citations (Impact Factor: 7.442) for 3 articles followed by LANCET with 2071 Citations (Impact Factor: 60.392) for 1 article, CURRENT NEUROPHARMACOLOGY with 1796 Citations (IF: 4.668) for single publications and BIOTECHNOLOGY ADVANCES with 1358 Citations (IF: 10.744) for 4 articles. It is noted that 21 journals with more than 10 Publications, 14 journals with more than 500 Citations, 95 journals with more than 100 Citations and it shows high impact for Indian publications in the field of Oxygen Therapy.

**Table 5: Most preferred Journals (754)**

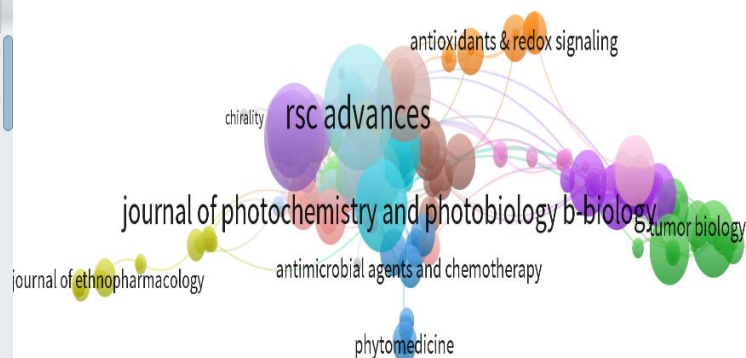
| # | Journal                                                                 | Records | TGCS |
|---|-------------------------------------------------------------------------|---------|------|
| 1 | RSC ADVANCES                                                            | 32      | 496  |
| 2 | DALTON TRANSACTIONS                                                     | 25      | 885  |
| 3 | MATERIALS SCIENCE & ENGINEERING C-MATERIALS FOR BIOLOGICAL APPLICATIONS | 21      | 564  |
| 4 | JOURNAL OF PHOTOCHEMISTRY AND PHOTOBIOLOGY B-BIOLOGY                    | 20      | 309  |
| 5 | INDIAN JOURNAL OF PEDIATRICS                                            | 19      | 219  |

|    |                                         |    |     |
|----|-----------------------------------------|----|-----|
| 6  | INORGANIC CHEMISTRY                     | 18 | 908 |
| 7  | ACS OMEGA                               | 17 | 123 |
| 8  | FREE RADICAL RESEARCH                   | 15 | 165 |
| 9  | PHOTODIAGNOSIS AND PHOTODYNAMIC THERAPY | 14 | 120 |
| 10 | FREE RADICAL BIOLOGY AND MEDICINE       | 13 | 623 |
| 11 | JOURNAL OF MATERIALS CHEMISTRY B        | 13 | 208 |
| 12 | MOLECULAR AND CELLULAR BIOCHEMISTRY     | 13 | 245 |
| 13 | CHEMICO-BIOLOGICAL INTERACTIONS         | 12 | 478 |
| 14 | LIFE SCIENCES                           | 12 | 817 |
| 15 | EUROPEAN JOURNAL OF MEDICINAL CHEMISTRY | 11 | 396 |
| 16 | INDIAN JOURNAL OF MEDICAL RESEARCH      | 11 | 772 |
| 17 | JOURNAL OF TROPICAL PEDIATRICS          | 11 | 137 |
| 18 | PLOS ONE                                | 11 | 205 |
| 19 | ACS APPLIED MATERIALS & INTERFACES      | 10 | 430 |
| 20 | ACS BIOMATERIALS SCIENCE & ENGINEERING  | 10 | 85  |
| 21 | INDIAN PEDIATRICS                       | 10 | 128 |



**Three Field Plot: Source, Author and Titles**

| Source                                 | Documents | Citations | Total link strength |
|----------------------------------------|-----------|-----------|---------------------|
| inorganic chemistry                    | 18        | 908       | 108                 |
| dalton transactions                    | 25        | 885       | 90                  |
| european journal of inorganic che...   | 9         | 71        | 39                  |
| inorganica chimica acta                | 5         | 180       | 34                  |
| photochemistry and photobiology        | 9         | 451       | 32                  |
| european journal of medicinal che...   | 11        | 396       | 30                  |
| rsc advances                           | 32        | 496       | 29                  |
| journal of inorganic biochemistry      | 7         | 245       | 25                  |
| journal of photochemistry and ph...    | 20        | 309       | 25                  |
| chemistryselect                        | 9         | 38        | 24                  |
| chemistry-a european journal           | 5         | 262       | 22                  |
| acs omega                              | 17        | 123       | 21                  |
| journal of materials chemistry b       | 13        | 208       | 19                  |
| photodiagnosis and photodynami...      | 14        | 120       | 10                  |
| acs applied materials & interfaces     | 10        | 430       | 9                   |
| anti-cancer agents in medicinal ch...  | 6         | 27        | 9                   |
| chemico-biological interactions        | 12        | 478       | 9                   |
| indian journal of chemistry section... | 6         | 84        | 8                   |
| acs biomaterials science & engine...   | 10        | 85        | 6                   |
| free radical biology and medicine      | 13        | 623       | 6                   |



**Citation Network for Sources**

## Year wise publication and Citation Impact

Table 6 shows the year-wise distribution of papers published by India authors in Web of Science for the years 1991-2021. The Scientists, Doctors and Scholars have published their papers in National and International journals constituting considerably increased percentage. from 0.2% in the year 1991 to 13.2 % in the year 2020. A conscious preference to publish papers in top-ranking foreign journals is seen. The most published year are: 2020 with 217 articles and registered 846 Citations, 2019 with 166 (1798 Citations), 2018 with 152 (4054 Citations). It is noted that the 2015 to 2020 with more than 100 publications and 2004-2018 publications are registered more than 1000 Citations.

**Table 6: Year wise publication and Citation Impact**

| #  | Publication Impact |         |           | #  | Citation Impact |         |           |
|----|--------------------|---------|-----------|----|-----------------|---------|-----------|
|    | Year               | Records | Citations |    | Year            | Records | Citations |
| 1  | 2020               | 217     | 846       | 1  | 2013            | 69      | 7890      |
| 2  | 2019               | 166     | 1798      | 2  | 2018            | 152     | 4054      |
| 3  | 2018               | 152     | 4054      | 3  | 2014            | 88      | 3913      |
| 4  | 2016               | 140     | 3200      | 4  | 2011            | 67      | 3859      |
| 5  | 2017               | 133     | 2428      | 5  | 2009            | 52      | 3800      |
| 6  | 2015               | 118     | 2741      | 6  | 2012            | 85      | 3249      |
| 7  | 2014               | 88      | 3913      | 7  | 2016            | 140     | 3200      |
| 8  | 2012               | 85      | 3249      | 8  | 2015            | 118     | 2741      |
| 9  | 2021               | 77      | 30        | 9  | 2017            | 133     | 2428      |
| 10 | 2013               | 69      | 7890      | 10 | 2010            | 43      | 1849      |
| 11 | 2011               | 67      | 3859      | 11 | 2019            | 166     | 1798      |
| 12 | 2009               | 52      | 3800      | 12 | 2008            | 32      | 1637      |
| 13 | 2010               | 43      | 1849      | 13 | 2007            | 34      | 1528      |
| 14 | 2007               | 34      | 1528      | 14 | 2005            | 25      | 1207      |
| 15 | 2008               | 32      | 1637      | 15 | 2006            | 27      | 1140      |
| 16 | 2006               | 27      | 1140      | 16 | 2004            | 20      | 1016      |
| 17 | 2005               | 25      | 1207      | 17 | 2020            | 217     | 846       |
| 18 | 2004               | 20      | 1016      | 18 | 1999            | 8       | 630       |
| 19 | 2003               | 12      | 546       | 19 | 2003            | 12      | 546       |
| 20 | 1997               | 10      | 253       | 20 | 2000            | 8       | 509       |
| 21 | 1999               | 8       | 630       | 21 | 2002            | 7       | 472       |
| 22 | 2000               | 8       | 509       | 22 | 1997            | 10      | 253       |
| 23 | 2001               | 7       | 130       | 23 | 2001            | 7       | 130       |
| 24 | 2002               | 7       | 472       | 24 | 1996            | 3       | 96        |
| 25 | 1991               | 4       | 21        | 25 | 1993            | 3       | 78        |
| 26 | 1998               | 4       | 69        | 26 | 1992            | 3       | 69        |
| 27 | 1992               | 3       | 69        | 27 | 1998            | 4       | 69        |
| 28 | 1993               | 3       | 78        | 28 | 2021            | 77      | 30        |
| 29 | 1994               | 3       | 19        | 29 | 1991            | 4       | 21        |
| 30 | 1996               | 3       | 96        | 30 | 1994            | 3       | 19        |
| 31 | 1995               | 1       | 11        | 31 | 1995            | 1       | 11        |

## Authorship Pattern

Table 7 shows the authorship pattern of research contributions published on Oxygen Therapy from the period of 1991 to 2021. It is noted that 150 papers with more than 10 authors and single author papers are only 32 out of 1648. The most collaborative papers are: White HD, Steg PG, Szarek M, Bhatt DL, Bittner VA, et al. Effects of alirocumab on types of myocardial infarction: insights from the ODYSSEY OUTCOMES trial EUROPEAN HEART JOURNAL. 2019 SEP 1; 40 (33): 2801-2809 with 1389 authors followed by James SL, Abate D, Abate KH, Abay SM, Abbafati C, et al., Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017, LANCET. 2018 NOV 10; 392 (10159): 1789-1858 with 988 authors.

**Table 7: Most Collaborative papers**

| # | Date / Author / Journal                                                                                                                                                                                                                                                                                                                         | GCS  | NA   |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|
| 1 | 1311 White HD, Steg PG, Szarek M, Bhatt DL, Bittner VA, et al., Effects of alirocumab on types of myocardial infarction: insights from the ODYSSEY OUTCOMES trial, EUROPEAN HEART JOURNAL. 2019 SEP 1; 40 (33): 2801-2809                                                                                                                       | 18   | 1389 |
| 2 | 1175 James SL, Abate D, Abate KH, Abay SM, Abbafati C, et al., Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017, LANCET. 2018 NOV 10; 392 (10159): 1789-1858 | 2071 | 988  |
| 3 | 1310 Agarwal A, Parekh N, Selvam MKP, Henkel R, Shah R, et al. Male Oxidative Stress Infertility (MOSI): Proposed Terminology and Clinical Practice Guidelines for Management of Idiopathic Male Infertility, WORLD JOURNAL OF MENS HEALTH. 2019 SEP; 37 (3): 296-312                                                                           | 63   | 91   |
| 4 | 505 Dellinger RP, Levy MM, Rhodes A, Annane D, Gerlach H, et al. Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock: 2012 CRITICAL CARE MEDICINE. 2013 FEB; 41 (2): 580-637                                                                                                                   | 5366 | 73   |
| 5 | 1277 Conte MS, Bradbury AW, Kolh P, White JV, Dick F, et al. Global Vascular Guidelines on the Management of Chronic Limb-Threatening Ischemia, EUROPEAN JOURNAL OF VASCULAR AND ENDOVASCULAR SURGERY. 2019 JUL; 58 (1): S1-+                                                                                                                   | 179  | 59   |
| 6 | 1571 McCullough PA, Alexander PE, Armstrong R, Arvinte C, Bain AF, et al., Multifaceted highly targeted sequential multidrug treatment of early ambulatory high-risk SARS-CoV-2 infection (COVID-19), REVIEWS IN CARDIOVASCULAR MEDICINE. 2020 DEC 30; 21 (4): 517-530                                                                          | 3    | 59   |
| 7 | 640 Sartelli M, Malangoni MA, May AK, Viale P, Kao LS, et al. World Society of Emergency Surgery (WSES) guidelines for management of skin and soft tissue infections WORLD JOURNAL OF EMERGENCY SURGERY. 2014 NOV 18; 9: Art. No. 57                                                                                                            | 48   | 43   |
| 8 | 1438 Chesnut R, Aguilera S, Buki A, Bulger E, Citerio G, et al.                                                                                                                                                                                                                                                                                 | 22   | 42   |

|    |                                                                                                                                                                                                                                                                                                             |    |    |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
|    | A management algorithm for adult patients with both brain oxygen and intracranial pressure monitoring: the Seattle International Severe Traumatic Brain Injury Consensus Conference (SIBICC)<br>INTENSIVE CARE MEDICINE. 2020 MAY; 46 (5): 919-929                                                          |    |    |
| 9  | 1516 Petersen MW, Meyhoff TS, Helleberg M, Kjaer MBN, Granholm A, et al., Low-dose hydrocortisone in patients with COVID-19 and severe hypoxia (COVID STEROID) trial-Protocol and statistical analysis plan, ACTA ANAESTHESIOLOGICA SCANDINAVICA. 2020 OCT; 64 (9): 1365-1375                               | 1  | 41 |
| 10 | 873 Cabral DA, Canter DL, Muscal E, Nanda K, Wahezi DM, et al. Comparing Presenting Clinical Features in 48 Children With Microscopic Polyangiitis to 183 Children Who Have Granulomatosis With Polyangiitis (Wegener's): An ARCHiVe Cohort Study<br>ARTHRITIS & RHEUMATOLOGY. 2016 OCT; 68 (10): 2514-2526 | 44 | 39 |

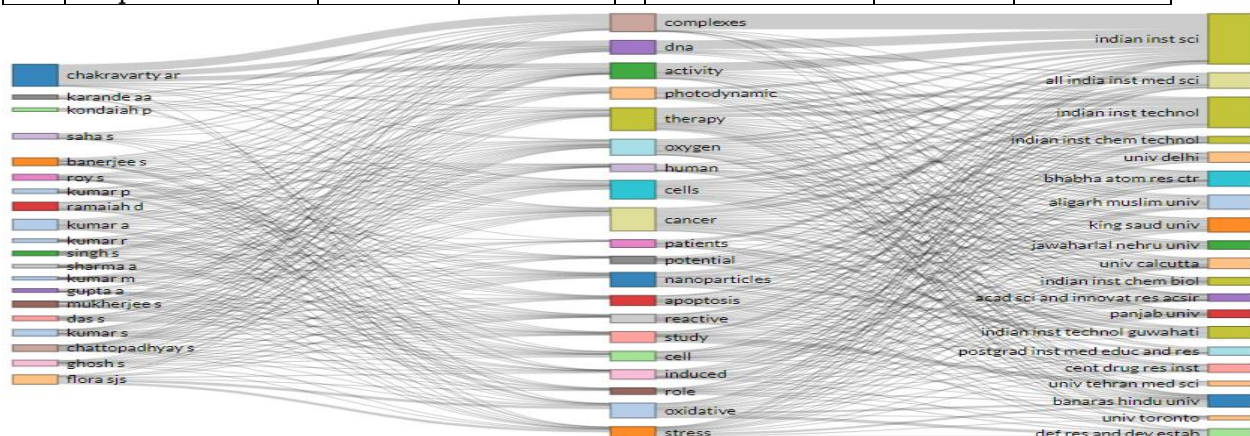
## Most Prolific and Cited Authors

Authorship and collaboration trend was towards multi-authored publications. There were a total of 1916 multi-authored publications, 31 single authored publications and a total of 8575 authorships found in 1648 publications. The most prolific authors are: Chakravarty AR from Indian Inst Sci, Dept Inorgan & Phys Chem, Bangalore 560012, Karnataka, India with 72 (2451 Citations), followed by Kumar from Indian Inst Sci, Dept Inorgan & Phys Chem, Bangalore 560012, Karnataka, India with 47 (1678 Citations), Banerjee S from Postgrad Inst Med Educ & Res, Adv Pediat Ctr, Dept Pediat, Paediat Emergency & Intens Care Unit, Chandigarh 160012, India with 30 (421 Citations), Flora SJS from Def Res & Dev Estab, Div Pharmacol & Toxicol, Gwalior 474002, India with 25 (2426 Citations) and Singh S from Indian Inst Sci, Dept Microbiol & Cell Biol, Bangalore, Karnataka, India. with 24 (552 Citations), Kondaiah P from Paturu] Indian Inst Sci, Dept Mol Reprod Dev & Genet, Bangalore 560012, Karnataka, India with 22 (390 Citations), Ramaiah D from INDIAN INST SCI, JAWAHARLAL NEHRU CTR ADV SCI RES, BANGALORE 560012, KARNATAKA, INDIA. With 22 (1252 Citations), Das S from NH Narayana Superspecial Hosp, Dept Pediat Cardiac Intens Care, Howrah, W Bengal, India with 21 (761 Citations) and Gupta A from All India Inst Med Sci, Jai Prakash Narayan Apex Trauma Ctr, New Delhi, India. With 21 (1305 Citations). It is noted that 30 authors with more than 10 Publications and 11 authors with more than 20 Publications. Among the top ten 50% of publications from Indian Institute of

Science Bangalore and it is one the premier research Institute in India in the field of Science research.

**Table 8: Most productive and Cited Authors (8575)**

| #  | Author          | Records | Citations | Author         | Records | Citations |
|----|-----------------|---------|-----------|----------------|---------|-----------|
| 1  | Chakravarty AR  | 72      | 2451      | Colombia       | 8       | 2618      |
| 2  | Kumar A         | 47      | 1678      | Greece         | 8       | 2800      |
| 3  | Banerjee S      | 30      | 421       | Ireland        | 8       | 2231      |
| 4  | Flora SJS       | 25      | 2426      | Netherlands    | 8       | 2582      |
| 5  | Singh S         | 24      | 552       | Thailand       | 8       | 157       |
| 6  | Kumar S         | 23      | 875       | Vietnam        | 8       | 2175      |
| 7  | Kondaiah P      | 22      | 390       | Argentina      | 7       | 2386      |
| 8  | Ramaiah D       | 22      | 1252      | Austria        | 7       | 2492      |
| 9  | Das S           | 21      | 761       | Mexico         | 7       | 2551      |
| 10 | Gupta A         | 21      | 1305      | Qatar          | 7       | 2226      |
| 11 | Saha S          | 21      | 528       | Bangladesh     | 6       | 2147      |
| 12 | Kumar P         | 19      | 326       | Pakistan       | 6       | 2153      |
| 13 | Mukherjee S     | 19      | 279       | Bulgaria       | 5       | 2138      |
| 14 | Chattopadhyay S | 17      | 443       | Czech Republic | 5       | 526       |
| 15 | Kumar M         | 17      | 2421      | Finland        | 5       | 2163      |
| 16 | Roy S           | 16      | 592       | Hungary        | 5       | 755       |
| 17 | Ghosh S         | 15      | 451       | Oman           | 5       | 112       |
| 18 | Karande AA      | 15      | 255       | Romania        | 5       | 2116      |
| 19 | Kumar R         | 15      | 422       | Croatia        | 4       | 2107      |
| 20 | Sharma A        | 15      | 206       | Norway         | 4       | 2134      |
| 21 | Sharma S        | 15      | 145       | Philippines    | 4       | 7518      |
| 22 | Ahmad A         | 14      | 306       | Poland         | 4       | 2319      |
| 23 | Garai A         | 14      | 210       | Serbia         | 4       | 2196      |
| 24 | Patra AK        | 14      | 799       | Slovakia       | 4       | 2097      |
| 25 | Gupta R         | 13      | 4361      | Tunisia        | 4       | 2145      |
| 26 | Nethaji M       | 13      | 960       | Zambia         | 4       | 2145      |
| 27 | Roy M           | 13      | 294       | Guatemala      | 3       | 268       |
| 28 | Bhattacharya S  | 12      | 195       | Peru           | 3       | 2100      |
| 29 | Ghosh SS        | 12      | 411       | Ukraine        | 3       | 2137      |
| 30 | Gupta S         | 12      | 95        | Brunei         | 2       | 2119      |



**Three Field Plot: Author, Titles and Affiliation**

## Author Impact

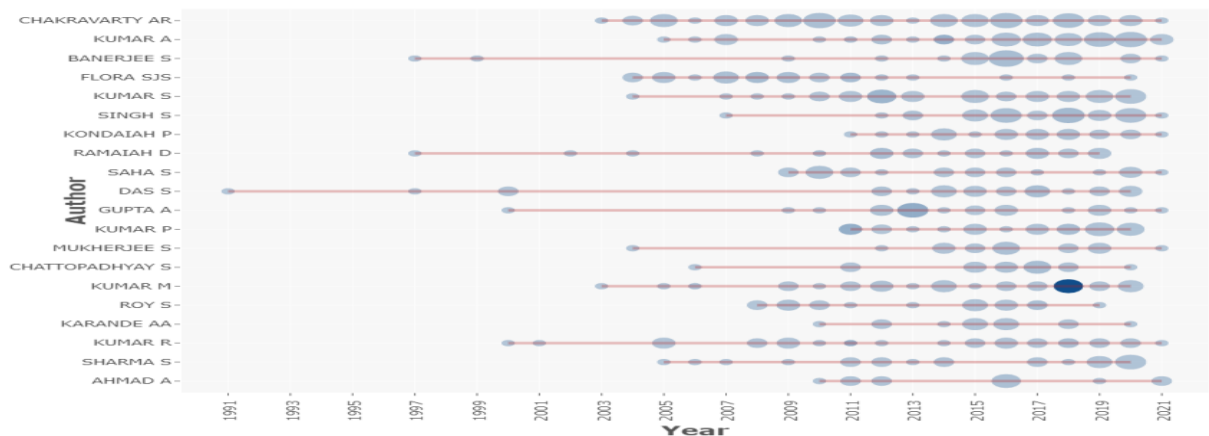
In terms of h-index Chakravarty AR with 29 (2451 Citations) is at the top followed by Kumar A with 17(1657 Citations), Banerjee S with 15(421 Citations), Flora SJS with 21(2426 Citations), Singh S (552 Citations) and Kumar S (875 Citations) with 11 publications respectively. Table provides h-index of the top Authors from India. It is noted that 2 authors with more than 10000 Citations, 71 authors with more than 5000 Citations, 1070 authors with more than 1000 Citations, 1100 authors with more than 500 Citations, 1123 authors with more than 400 Citations and 1624 authors with more than 100 Citations.

**Table 9: H-Index and G-Index of Authors**

| Author          | h_index | g_index | m_index | TC   | NP | PY_start |
|-----------------|---------|---------|---------|------|----|----------|
| CHAKRAVARTY AR  | 29      | 48      |         | 2451 | 72 | 2003     |
| KUMAR A         | 17      | 40      |         | 1657 | 44 | 2006     |
| BANERJEE S      | 15      | 19      | 0.6     | 421  | 30 | 1997     |
| FLORA SJS       | 21      | 25      | 1.167   | 2426 | 25 | 2004     |
| SINGH S         | 11      | 23      |         | 552  | 24 | 2007     |
| KUMAR S         | 11      | 23      | 0.917   | 875  | 23 | 2010     |
| KONDAIAH P      | 13      | 19      | 1.182   | 390  | 22 | 2011     |
| RAMAIAH D       | 14      | 22      | 0.56    | 1252 | 22 | 1997     |
| DAS S           | 12      | 21      |         | 761  | 21 | 1991     |
| GUPTA A         | 11      | 21      |         | 1305 | 21 | 2000     |
| SAHA S          | 14      | 21      | 1.077   | 528  | 21 | 2009     |
| KUMAR P         | 10      | 18      | 0.909   | 326  | 19 | 2011     |
| MUKHERJEE S     | 10      | 15      |         | 253  | 18 | 2004     |
| CHATTOPADHYAY S | 12      | 17      | 0.75    | 443  | 17 | 2006     |
| KUMAR M         | 10      | 16      | 0.769   | 2411 | 16 | 2009     |
| ROY S           | 12      | 15      | 0.857   | 555  | 15 | 2008     |
| GHOSH S         | 8       | 14      |         | 436  | 14 | 2007     |
| KARANDE AA      | 10      | 15      | 0.833   | 255  | 15 | 2010     |
| KUMAR R         | 8       | 15      | 0.364   | 422  | 15 | 2000     |
| SHARMA A        | 7       | 14      |         | 206  | 15 | 1997     |
| SHARMA S        | 6       | 12      | 0.462   | 145  | 15 | 2009     |
| AHMAD A         | 10      | 14      | 0.833   | 306  | 14 | 2010     |
| GARAI A         | 9       | 14      | 1.125   | 210  | 14 | 2014     |
| PATRA AK        | 11      | 14      | 0.647   | 799  | 14 | 2005     |
| GUPTA R         | 6       | 12      | 0.24    | 2290 | 12 | 1997     |
| NETHAJI M       | 12      | 13      | 0.632   | 960  | 13 | 2003     |

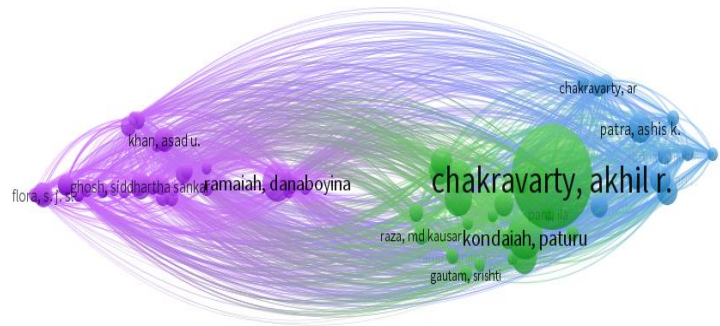
|                 |    |    |       |      |    |      |
|-----------------|----|----|-------|------|----|------|
| ROY M           | 8  | 13 | 0.533 | 294  | 13 | 2007 |
| BHATTACHARYA S  | 9  | 12 | 1     | 195  | 12 | 2013 |
| GHOSH SS        | 8  | 12 | 0.727 | 411  | 12 | 2011 |
| GUPTA S         | 6  | 9  |       | 95   | 12 | 1997 |
| AGARWAL R       | 7  | 11 | 0.389 | 265  | 11 | 2004 |
| DAS D           | 7  | 11 |       | 717  | 11 | 1999 |
| DIGHE RR        | 10 | 11 | 0.769 | 463  | 11 | 2009 |
| KHAN I          | 7  | 11 | 0.636 | 189  | 11 | 2011 |
| MAJUMDAR R      | 10 | 11 | 0.769 | 467  | 11 | 2009 |
| PRASAD R        | 8  | 11 | 0.421 | 163  | 11 | 2003 |
| SHARMA M        | 7  | 11 | 0.25  | 2357 | 11 | 1994 |
| SINGH A         | 6  | 11 |       | 404  | 11 | 2005 |
| SINGH V         | 8  | 11 | 0.889 | 2962 | 11 | 2013 |
| BHATTACHARYYA A | 8  | 10 | 0.727 | 929  | 10 | 2011 |
| CHAKRABORTY S   | 8  | 10 | 0.889 | 784  | 10 | 2013 |
| DIXIT A         | 6  | 10 | 0.857 | 100  | 10 | 2015 |
| GHOSH M         | 8  | 10 | 0.615 | 284  | 10 | 2009 |
| GUPTA P         | 7  | 10 | 0.778 | 144  | 10 | 2013 |

Top-Authors' Production over the Time



## Bibliographic Coupling of Authors

| Author                | Documents | Citations | Total link strength |
|-----------------------|-----------|-----------|---------------------|
| chakravarty, akhil r. | 62        | 1647      | 149241              |
| kondaiah, paturu      | 22        | 390       | 46518               |
| dighe, rajan r.       | 11        | 463       | 45488               |
| majumdar, ritankar    | 11        | 467       | 45054               |
| banerjee, samya       | 16        | 263       | 42036               |
| saha, sounik          | 10        | 415       | 38861               |
| karande, anjali a.    | 15        | 255       | 37694               |
| patra, ashis k.       | 13        | 688       | 34359               |
| garai, aditya         | 14        | 210       | 32786               |
| hussain, akhtar       | 9         | 244       | 32758               |
| roy, mithun           | 12        | 285       | 27225               |
| sasmal, pijus k.      | 7         | 415       | 26162               |
| roy, sovan            | 6         | 296       | 22270               |
| dixit, akanksha       | 8         | 93        | 20808               |
| bhattacharyya, smab   | 8         | 129       | 19193               |
| lahiri, debjoyoti     | 5         | 133       | 19023               |
| nethaji, munirathinam | 6         | 372       | 19001               |
| pant, ila             | 6         | 99        | 18882               |
| khan, imran           | 11        | 189       | 18813               |
| basu, uttara          | 6         | 110       | 18575               |



Bibliographic Coupling of Authors

## Subject Categories

It is worthy to note the subject categories to which more number of articles were contributed. The articles were categorised as per the Web of Science Classification. The study has observed 118 individual subject categories related publications in Oxygen Therapy in Web of Science database and they are listed in Table 10 with the number of articles falling in each category. 'BIOCHEMISTRY MOLECULAR BIOLOGY' with 232 (14.01%%) publications, 'PHARMACOLOGY PHARMACY' with 216 (13.04%) publications, 'CHEMISTRY MULTIDISCIPLINARY' with 169 (10.21%) publications, 'CELL BIOLOGY' with 99 (5.98%) publications, NANOSCIENCE NANOTECHNOLOGY with 91 (5.50%).

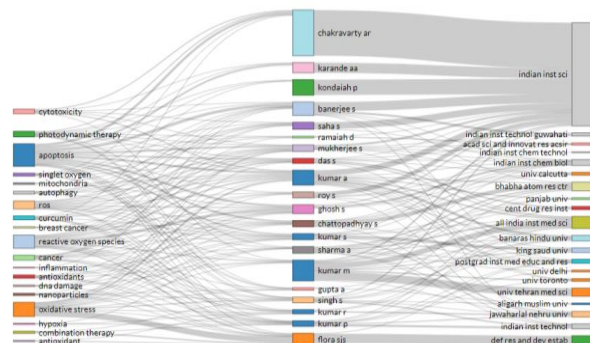
**Table 10: Subject Categories**

| <b>Web of Science Categories</b>    | <b>records</b> | <b>%</b> |
|-------------------------------------|----------------|----------|
| BIOCHEMISTRY MOLECULAR BIOLOGY      | 232            | 14.010   |
| PHARMACOLOGY PHARMACY               | 216            | 13.043   |
| CHEMISTRY MULTIDISCIPLINARY         | 169            | 10.205   |
| CELL BIOLOGY                        | 99             | 5.978    |
| NANOSCIENCE NANOTECHNOLOGY          | 91             | 5.495    |
| MATERIALS SCIENCE MULTIDISCIPLINARY | 86             | 5.193    |
| CHEMISTRY INORGANIC NUCLEAR         | 84             | 5.072    |
| MEDICINE RESEARCH EXPERIMENTAL      | 84             | 5.072    |
| TOXICOLOGY                          | 80             | 4.831    |
| MATERIALS SCIENCE BIOMATERIALS      | 77             | 4.650    |
| PEDIATRICS                          | 76             | 4.589    |
| ONCOLOGY                            | 74             | 4.469    |
| CHEMISTRY MEDICINAL                 | 72             | 4.348    |
| CHEMISTRY PHYSICAL                  | 64             | 3.865    |
| BIOPHYSICS                          | 62             | 3.744    |

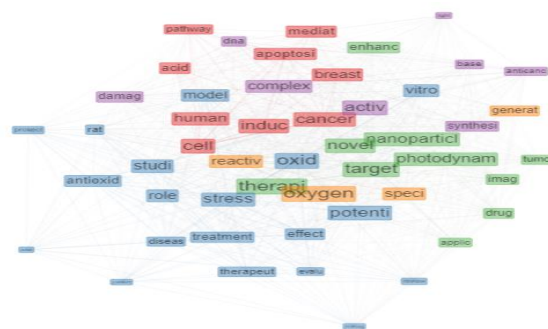
## Thematic Occurrences

Keywords of publications convey precisely the thought contents of the papers and to find out the growth of the subject. By analyzing the keywords appeared either in the title or assigned by the indexer or the author himself help in knowing in which direction the knowledge grows. The high frequency keywords will enable us to understand what are all the aspects that have been studied. In the current study the keywords appeared in the 'Keywords' field of Web of Science database were analysed for the purpose. The total number of keywords/descriptors appeared in the 4826 related publications in Oxygen

Therapy. A list of most frequently occurred keywords/descriptors (at least 50 times occurred) were given in Table. The highly occurred keywords were: photodynamic therapy with 177 times, therapy with 170, oxidative stress with 167, in-vitro (165), apoptosis (116). It is noted that 5 Keyboards are with more 100 times and 25 keywords are with more than 50 times.



Three Fields Plot: Keywords, Authors and Affiliations



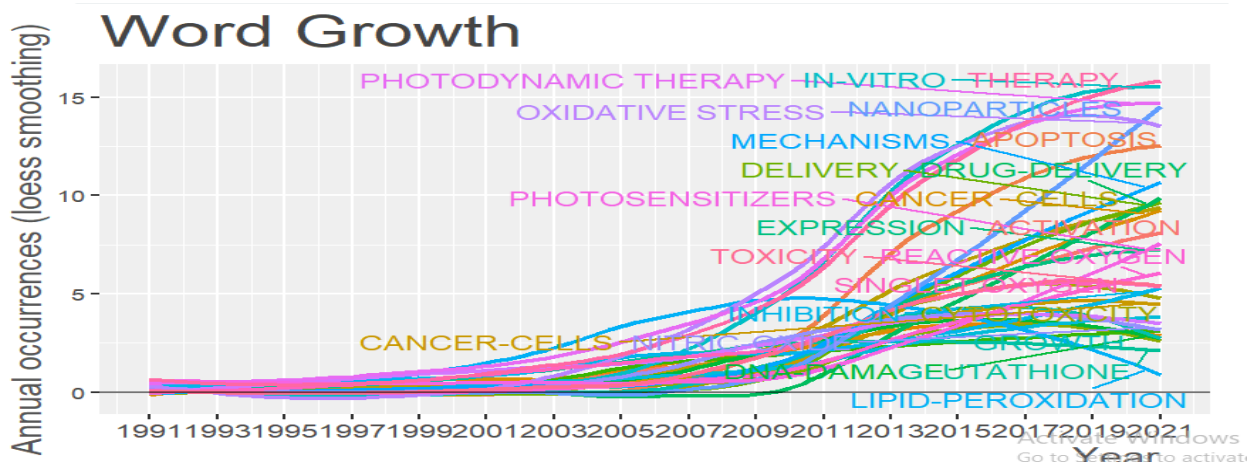
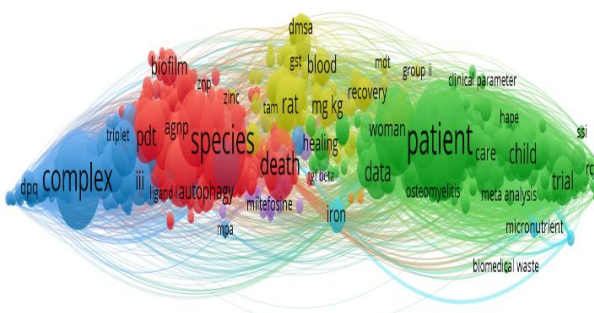
Thematic Map

Tale 11: Thematic Occurrences

| Occurrences | Words                | Cluster | Cluster_Label        |
|-------------|----------------------|---------|----------------------|
| 177         | photodynamic therapy | 1       | photodynamic therapy |
| 170         | therapy              | 2       | therapy              |
| 167         | oxidative stress     | 4       | oxidative stress     |
| 165         | in-vitro             | 3       | in-vitro             |
| 116         | apoptosis            | 2       | therapy              |
| 95          | nanoparticles        | 3       | in-vitro             |
| 93          | cells                | 2       | therapy              |
| 86          | mechanisms           | 2       | therapy              |
| 82          | cancer               | 1       | photodynamic therapy |
| 76          | singlet oxygen       | 1       | photodynamic therapy |
| 76          | activation           | 2       | therapy              |
| 76          | delivery             | 3       | in-vitro             |
| 73          | lipid-peroxidation   | 4       | oxidative stress     |
| 72          | expression           | 2       | therapy              |
| 64          | toxicity             | 3       | in-vitro             |
| 63          | oxygen               | 1       | photodynamic therapy |
| 63          | drug-delivery        | 3       | in-vitro             |
| 60          | inhibition           | 2       | therapy              |
| 58          | cytotoxicity         | 1       | photodynamic therapy |
| 57          | photosensitizers     | 1       | photodynamic therapy |
| 54          | nitric-oxide         | 4       | oxidative stress     |

|    |                 |   |                      |
|----|-----------------|---|----------------------|
| 52 | cancer-cells    | 1 | photodynamic therapy |
| 50 | binding         | 1 | photodynamic therapy |
| 50 | growth          | 2 | therapy              |
| 50 | reactive oxygen | 4 | oxidative stress     |

| Term                                | Occurrences | Relevance |
|-------------------------------------|-------------|-----------|
| 15d pgj2                            | 11          | 4.25      |
| experimental visceral leishmaniasis | 15          | 3.05      |
| doxycycline                         | 11          | 2.93      |
| promastigote                        | 19          | 2.78      |
| nrf                                 | 16          | 2.69      |
| microtubule                         | 13          | 2.59      |
| hct                                 | 16          | 2.48      |
| nox                                 | 23          | 2.39      |
| hamster                             | 17          | 2.39      |
| significant depletion               | 10          | 2.39      |
| i donovani                          | 13          | 2.39      |
| crocin                              | 17          | 2.31      |
| biochemical variable                | 18          | 2.28      |
| moderate certainty                  | 14          | 2.19      |
| thiol chelator                      | 11          | 2.16      |
| alad                                | 20          | 2.13      |
| conventional oxygen therapy         | 12          | 2.12      |
| eugenol                             | 10          | 2.12      |
| dimercaptosuccinic acid             | 20          | 2.11      |
| p aeruginosa                        | 17          | 2.09      |
| soft tissue                         | 16          | 2.04      |



## SUMMARY AND CONCLUSION

India is among the leading countries in Oxygen Therapy research, But the papers published by India are the least cited among the top 15 countries. The number of citations per publication shows the number of times a research paper has been cited in another research. They indicate the quality of the research. “The average citation per paper of 27.78 is supposed to be very good. United States, Saudi Arabia, UK, Australia, Canada, South Korea, China, Germany, Italy, Japan, were the leading collaborative countries having joint papers. The study has observed a gradual growth in number of publications and recent years have produced a good number of articles compared to the olden days. The most preferred five journals were: RSC ADVANCES topped the list with 32 (496 Citations) articles followed by DALTON TRANSACTIONS with 25 (885 Citations)

articles, MATERIALS SCIENCE & ENGINEERING C-MATERIALS FOR BIOLOGICAL APPLICATIONS with 21 (564 Citations) articles, JOURNAL OF PHOTOCHEMISTRY AND PHOTOBIOLOGY B-BIOLOGY with 20 (309 Citations) articles. The most collaborative paper is: Effects of alirocumab on types of myocardial infarction: insights from the ODYSSEY OUTCOMES trial EUROPEAN HEART JOURNAL. 2019 SEP 1; 40 (33): 2801-2809 by White HD, Steg PG, Szarek M, Bhatt DL, Bittner VA, et al. with 1389 authors. “Sometimes the research can be very good but not many people have cited it, sometimes the research could be bad but people are citing it because they want to correct it.” The most amount of research in this period was carried out in Covid-19, followed by Medical Oxygen and Covid-19 Vaccine, according to the Web of Science data.

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