The Higher Education System Rankings measure national higher education systems and meet a long-standing need to shift the discussion from the ranking of the NIRF top institutions to the best overall systems in each country, to reflect the country's overall performance in NIRF rankings. We propose a new Excellence/Quality indicator based on the excellence level reached by their Top Pharma education institutions within the Top positions of the NIRF weighted by the country's size population. In the present study, we analyzed the Top 10 Pharma education institutions of the NIRF Ranking 2020. The first rank positioned by Hamdard University NIRF score of (80.5). SCOPUS database was used to extract the data and the study was limited to five years (2016-2019) which resulted in 7172 documents. The data analysis was performed using Biblioshiny, Microsoft excel, and VOS Viewer software, further data were explored using the bibliometrics tools and techniques. The study attempt to measure the top 10 Pharma Education Institution's and their publications, Year-Wise distribution of research Output, document type, Highly Prolific Authors, Most Preferred Sources, Funding Agencies, Most Cited Papers, Most Productive and Most Cited Countries, and Highly Prolific Keywords based on the collected data. The analysis of the study indicates the highest publications with 2129, published by Institute of Chemical Technology-Mumbai; the most the productive year 2017 with 1508 publications; most of the publications are published as articles (6067); highly prolific author Sekar N with 194 papers, total citation 1954, h-index 22; preferred source title RSC Advance, 217 paper, total citation 2508, h-index 24; top funding agency University Grant Commission (UGC) 609 papers; top cited paper Shao Y, 2015, Molecular Physics; most productive and most cited country the USA.
in higher education. NIRF system has given the second priority under the parameter of ‘Research and Professional Practices’ where marks are divided into four major components as Institution publication metrics, Quality of publication metrics, IPR grants and Patents, Project footprints, and best Professional Practices. Where NIRF framework are divided into four major components as Institution publication in higher education. NIRF system has given the second priority under research and professional. The data ware extracted from three leading databases, such as Web of Science (WOS), Scopus, and India citation Index. The results of the study show that the number of research results that should be considered indicators of the performance of research institutions in any international database is not exhaustive and seems incredible. It appears that no single database can fully cover all of the institute’s research results. In general, an international database contains only 80% of research articles and only shows the result produced by scientific and applied sciences. Social sciences, arts, and humanities are ignored in these databases. Among these institutions, cooperation between countries is more prominent than international collaboration. However, most of the research results appear in journals with an impact factor (ICR) in the range of 1-3. Although each article by JNU authors has the least citations, they rank highest in the NIRF ranking, showing that citations have little effect on the NIRF ranking.

A comparative study by Reddy and others [1, 9] on central universities of India to investigate the perception of the facet on research and professional. The data ware extracted from three leading databases, such as Web of Science (WOS), Scopus, and India citation Index. The results of the study show that the number of research results that should be considered indicators of the performance of research institutions in any international database is not exhaustive and seems incredible. It appears that no single database can fully cover all of the institute’s research results. In general, an international database contains only 80% of research articles and only shows the result produced by scientific and applied sciences. Social sciences, arts, and humanities are ignored in these databases. Among these institutions, cooperation between countries is more prominent than international collaboration. However, most of the research results appear in journals with an impact factor (ICR) in the range of 1-3. Although each article by JNU authors has the least citations, they rank highest in the NIRF ranking, showing that citations have little effect on the NIRF ranking.

Comparative studies conducted by [4, 10] Sheeja et al. and Kappi et al. These studies examined the relationship between academic output and institutional classifications based on the NIRF in India using the web of science database and official NIRF website. Times Higher Education World University Rankings, and Quacquarelli Symonds World University Rankings. Compared by analyzing the scientific and applied sciences, arts, and humanities are ignored in these databases. Among these institutions, cooperation between countries is more prominent than international collaboration. However, much of the research results appear in journals with an impact factor (ICR) in the range of 1-3. Although each article by JNU authors has the least citations, they rank highest in the NIRF ranking, showing that citations have little effect on the NIRF ranking.

A Sciento metric studies conducted by Pradhan B and Tapas Kumar Das [11, 12] on six IIT-Delhi, Khalapur, Madras, Bombay, Kanpur, and Roorkee. The data ware extracted from the Scopus database and both studies were limited to ten years. This resulted in that relation citation impacted more in IITs Roorkee and Bombay when compare to other IIT’s. Authors of IIT Khalapur works cited more when par to other IIT’s. Physics of Plasma was the most used communication channel.

A study on Scientometric mapping was undertaken by Kaprii S and R. SenthilKumar [13] to know the research output of the Indian Institute of Science (IISc) of NIRF top-ranked institution of 2019. The study was restricted to five years using Science Citation Index (SCI), further, the analysis aimed to find out the year-wise contribution in research, annual growth, specialized areas of research, a collaboration between institution and countries, forms of publications, funding agencies, communications channels, top authors, author’s pattern, etc. using different standard Scientometric tools and techniques to data interpretations. The studies were conducted by [6, 10] Kumar et al., 2019; Kaprii and Biradaran on Indian Universities to know the research impact of NIRF top 20 ranked universities. Data was collected using the web of science (WOS) bibliographic database and scopus database and analyzed using different bibliometric indicators. The impact of NIRF on publication output was consistently growing and there was 38% of growth in publication. Delhi University placed top in h-index. There was considerable growth in physical science and engineering-related branches.

Lwoga, Sangeda, And Sife [14] Scientometric analysis was conducted using Publish or Perish software to map online visibility of pharmaceutical research at Muhimbili University of Health and Sciences (MUHAS) from 1981 to 2016. They collected 449 papers from 33 MUHAS scientists and analyzed them using scientometric indicators, such as t otal citations, number of authors per publication, average citations per article, average citations per year, h index, g index, current H index (Hic index), and HI norm index. Studies have shown that since 1991, there has been a continuous increase in pharmacy publications on MUHAS. The level of collaboration between scholars is high and many publications have had a great impact through citations.

An evaluation study conducted on institutional research productivity by Pal and Sarkar [15] on Scientometrics, scientific visualization, and knowledge mapping of single-institutional studies and multi-institutional studies. The study compared global studies and Indian studies. Most of the studies used readily available (Scopus, Web of Science (WOS), INSPEC, MathSciNet, PubMed, and Indian Citation Index) abstracting and citation databases without considering the scrutinizing process and validation process of datasets. Especially in India single institutional studies more prevalent.

Objectives

The specific objectives are: To identify the research growth pattern of Pharma Education Institutions publications during 2015–2019; To find out Authorship Pattern, Collaboration Index (CI), Degree of Collaboration (DC), Collaboration Coefficient (CC), and Modified Collaboration Coefficient (MCC); To recognize the most collaborative institutions as well as the country in research; To know the highly prolific authors, citation growth, and h-index growth; To map the most preferred sources for publication; List out the top funding agencies and the most cited papers; To discover the most productive and most cited countries and observe the highly prolific keywords.

Methodology

The present study had undertaken Pharm or pharmacy education institutions to know the research productivity of top-ranked NIRF institutions in the year 2020. The data was extracted on 07/09/2020 using Scopus citation and abstracting database the product of Elsevier. The search query was confined to AFFIL(India) AND AF-ID["Jama Hamard Faculty of Pharmacy 60035251"] OR AF-ID("University Institute of Pharmaceutical Sciences India" 60018483) OR AF-ID("National Institute of Pharmaceutical Education and Research Mohali" 60001411) OR AF-ID("Institute of Chemical Technology" 60006361) OR AF-ID("National Institute of Pharmaceutical Education and Research Hyderabad" 60014249) OR AF-ID("Birla Institute of Technology and Science Pilani" 60000414) OR AF-ID("Manipal Institute of Medical Sciences" 60003299) OR AF-ID("SS College of Pharmacy Mysore" 60017499) OR AF-ID("College of Pharmacy Ooty" 60012359) OR AF-ID("National Institute of Pharmaceutical Education and Research Ahmadabad" 60110422) AND LIMIT-TO (PUBYEAR,2019) AND LIMIT-TO (PUBYEAR,2018) AND LIMIT-TO (PUBYEAR,2017) AND LIMIT-TO (PUBYEAR,2016) AND LIMIT-TO (PUBYEAR,2015) AND (LIMIT-TO (SUBJAREA,"PHAR") OR LIMIT-TO (SUBJAREA,"CHEM") OR LIMIT-TO (SUBJAREA,"BIOL") OR LIMIT-TO (SUBJAREA,"CENG") OR LIMIT-TO (SUBJAREA,"AGRI") OR LIMIT-TO (SUBJAREA,"IMMU") OR LIMIT-TO (SUBJAREA,"NEUR") OR LIMIT-TO (SUBJAREA,"HEAL") OR LIMIT-TO (SUBJAREA,"NURS") OR LIMIT-TO (SUBJAREA,"PSYC") OR LIMIT-TO (SUBJAREA,"VETE") OR LIMIT-TO (SUBJAREA,"PSYCH")
(SUBJAREA,"DENT"). Search query resulted in 7172 documents and further, we processed using data mapping software Biblioshiny [16], Microsoft Excel, and VOSViewer [17] software's and all the data was explored using bibliometrics tools and techniques to meet the objectives of the study.

LIMITATIONS
The study was restricted to pharmacy institutes of NIRF top 10 ranked institutions using the "Research and Professional Practices" parameter and the research output study was restricted for the period (2016-2019) of five years.

ANALYSIS AND DISCUSSION
Authorship Pattern, Collaboration Index (CI), Degree of Collaboration (DC), Collaboration Coefficient (CC), and Modified Collaboration Coefficient (MCC)

a) Collaboration Index (CI)
The Collaborative Index (CI) methodology was proposed by [18] Lawani, 1980. CI is the mean number of authors per paper. It can be calculated easily, but it cannot be interpreted as a degree because it has no upper-value limit. The formula is as follows:

\[ CI = \frac{\sum_{i=1}^{N} f_i}{N} \]

In simpler terms,

\[ CI = \frac{(f_1)1 + (f_2)2 + (f_3)3 + \cdots + (f_n)n}{N} \]

Where, \( f_1, f_2, f_3, \ldots = \) number of authors
\( N = \) Total no of papers

Using data in table A, during 2015

\[ CI = \frac{22 + 242 + 2 + 258 + 3 + \cdots + 1 + 19}{1289} \]
\[ CI = \frac{5689}{1289} \]
\[ CI = 4.413 \]

Table A shows that CI was lowest (4.357) in the year 2018 and CI was highest (4.609) in the year 2019. The average CI was 4.448 during the study period.

b) Degree of collaboration (DC)
In current years, most of the countries have realized the significance of scientific research for its Socio-Economic Growth, and have started programs that encourage and support collaboration between researchers and scientists, both at the national and international levels. It can be defined as the number of multi-author publications in the discipline published during a year as against the total number of papers (multi-author and single author) published during the year. Degree of Collaboration propounded by [19] K (1983) as below:

\[ C = \frac{Nm}{Nm + Ns} \]

Using data in table 2, during 2015;

\[ C = \frac{1267}{1267 + 22} \]
\[ C = 0.983 \]

Where C is the degree of collaboration, Nm is the number of multi-authored papers, and Ns is the number of single-authored papers. In the current study, the value of DC for the year 2015 is 0.983 which is the highest value of all the years and the average value of C is 0.97.

c) Collaborative Coefficient (CC)
The CC was defined by [20] Ajiferuke, et al., Which was designed to remove the shortcomings of CI and DC. The CC lies between 0 and 1 (0 ≤ CC ≤ 1). As the number of single authors dominates, CC 0. CC distinguishes between single-authored, two authored, three-authored, etc. The problem with CC is that it does not give the value 1 for maximal collaboration except in the case where the number of authors is infinite. The collaborative coefficient is defined as (CC), the formula as below:

\[ CC = 1 - \frac{N - \sum_{i=1}^{N} f_i}{N} \]

Using data in table 2, during 2015

\[ CC = 1 - \left( \frac{1}{1289} \right) (22 + 242 + 2 + 258 + 3 + \cdots + 1 + 19) \]
\[ CC = 1 - \frac{374.2337}{1289} \]
\[ CC = 0.710 \]

The values of CC for year 2015, 2016 are 0.710 and 2017, 2018 and 2019 are 0.29 and 0.703, 0.697 and 0.706 respectively.

d) Modified collaborative coefficient (MCC)
The formula for the calculation of MCC is suggested by [21] Sarvanur and Srikanth (2010). CC gives 0 for single-authored papers, but it does not give the value 1 for maximal collaboration. This is taken care of by MCC. The formula as below:

\[ MCC = \frac{A}{A - 1} \left( 1 - \frac{\sum_{i=1}^{N} f_i}{N} \right) \]

Using data in table 2, during 2015

\[ MCC = \frac{1289}{(1 - 1)(1289 - 1) + (1289 - 1)(22 + 242 + 2 + 258 + 3 + \cdots + 1 + 19)} \]
\[ MCC = (1.000) \left( 1 - \frac{374.2337}{1289} \right) \]
\[ MCC = (1.008) \left( 1 - 0.29 \right) \]
\[ MCC = 0.710 \]

NIRF 2020 ranked top ten pharma education institution's, place and NIRF scores
The ranking assesses research-intensive universities across all their core missions: teaching, research, knowledge transfer, and international outlook. Table 1 discussed top-ranked institutions with the location of the institute situated. The study had covered only the top 10 pharmacy Institutes based on the overall criteria of the NIRF ranking system. By accessing based on definite five parameters constitute of 'Teaching-learning and resources weightage'; 'Research and Professional Practices weightage'; 'Graduation outcomes weightage'; 'outreach and Inclusivity weightage' and 'Perception weightage'. Whereas Jamia Hamdard topped the position which is situated in New Delhi with a NIRF score of 80.5 and a 10th rank placed by JSS college of Pharmacy Mysore with a score of 64.58.

NIRF 2020 ranked top ten pharma education institution's publications
The present study purely focused on "Research and Professional Practices weightage" further it has been subdivided into four parameters which are as follows: 1. Publication metrics 2. Metrics on quality of publication 3. IPR and Patents: Published and Granted 4. Projects and Professional Practice where table 2 disclosed the research publication output of each institute from highest to lowest, where Institute of Chemical Technology (Mumbai) has made the highest contribution of 2129 publication followed by Birla Institute of Technology and Science (Pilani) of 1668 publications, Manipal College of Pharmaceutical Sciences (Udupi) of 1071 publications, Jamia Hamdard (New Delhi) of 984, National Institute of
In table 4 the extracted data further divided into different types of index 51 came in the year 2015 using 1289 publications. 20671 using annual citations of 1460 publications and the highest h -index of 2017 of 1508 publications and highest total citation came in 2019 of 266.

Table A: Authorship pattern, collaboration index (CI), degree of collaboration (DC), collaboration coefficient (CC), and modified collaboration coefficient (MCC)

| Year | S. No | Name | Institution | TC | ACPP | h-index | Mean (TCPP) | Mean (TCPY) |
|------|------|------|-------------|----|------|----------|-------------|-------------|
| 2015 | 1    | Jamia Hamdard | New Delhi | 1289 | 979 | 0.759 | 51 | 17.137 |
| 2016 | 2    | Panjab University | Chandigarh | 1468 | 4612 | 3.176 | 48 | 13.117 |
| 2017 | 3    | National Institute of Pharmaceutical Education and Research | Mohali | 1508 | 9600 | 6.366 | 42 | 10.387 |
| 2018 | 4    | Institute of Chemical Technology | Mumbai | 1447 | 14948 | 10.330 | 31 | 7.136 |
| 2019 | 5    | National Institute of Pharmaceutical Education and Research | Hyderabad | 1460 | 20671 | 14.158 | 20 | 7.777 |
| Total | 7172 | | | 50859 | 192 | | | |

Table 1: NIRF 2020 ranked top ten pharma education institutions

| NIRF rank | Institution name | Place | NIRF score (out of 100) |
|-----------|-----------------|-------|-------------------------|
| 1         | Jamia Hamdard   | New Delhi | 80.50 |
| 2         | Panjab University | Chandigarh | 79.80 |
| 3         | National Institute of Pharmaceutical Education and Research | Mohali | 74.73 |
| 4         | Institute of Chemical Technology | Mumbai | 74.50 |
| 5         | National Institute of Pharmaceutical Education and Research | Hyderabad | 73.81 |
| 6         | Birla Institute of Technology and Science | Pilani | 72.95 |
| 7         | Manipal College of Pharmaceutical Sciences | Udupi | 67.42 |
| 8         | National Institute of Pharmaceutical Education and Research Ahmedabad | Gandhi Nagar | 65.64 |
| 9         | JSS College of Pharmacy | Ooty | 65.60 |
| 10        | JSS College of Pharmacy | Mysore | 64.58 |

Table 2: Pharma education institution’s publications

| S. No. | Institution name | Publications 2015–2019 |
|-------|-----------------|------------------------|
| 1     | Institute of Chemical Technology (Mumbai) | 2129 |
| 2     | Birla Institute of Technology and Science (Pilani) | 1668 |
| 3     | Manipal College of Pharmaceutical Sciences (Udupi) | 1071 |
| 4     | Jamia Hamdard (New Delhi) | 984 |
| 5     | National Institute of Pharmaceutical Education and Research (Mohali) | 703 |
| 6     | National Institute of Pharmaceutical Education and Research (Hyderabad) | 517 |
| 7     | Panjab University (Chandigarh) | 504 |
| 8     | National Institute of Pharmaceutical Education and Research (Ahmedabad) | 303 |
| 9     | JSS College of Pharmacy (Ooty) | 266 |
| 10    | JSS College of Pharmacy (Mysore) | 266 |

Year-wise research output of pharma education institution’s

The extracted data further separated on the basics of year-wise research publication output on pharma education institutions which is analyzed in table 3 the present study is considered only to five years of data in the prescribed table from 2015-2019, where total publication of 7172 recorded and total citations cited by 50859 with h-index of 192. The highest publication output came in the year 2017 of 1508 publications and highest total citation came in 2019 of 26671 using annual citations of 1460 publications and the highest h-index 51 came in the year 2015 using 1289 publications.

Document type

In table 4 the extracted data further divided into different types of document article, review, Book chapter, conference paper, erratum, editorial material, note, letter, short survey, book data paper, retracted, and undefined. Where major publications came through article 6067 (84.59%) form, followed by review papers of 674 (9.40%), book chapter 258 (3.60), conference paper 61 (0.85).

Highly prolific authors

Table 5 shows the high prolific author during the year of 2015-2019; with high intellectual persons are resources or asset of any institution the author contribution of his/her intellectual leads to the research productivity in any organizations, hence table 4 highlighted the most prolific author. The top productive author was Sekar N (194 articles; TC 1954; h-index 22), followed by Kumar A et al.

Table 3: Year-wise research output

| Year | Publications | TC | ACPP | h-index | Mean (TCPP) | Mean (TCPY) |
|------|--------------|----|------|---------|-------------|-------------|
| 2015 | 1289         | 979 | 0.759 | 51      | 17.137      | 3.435       |
| 2016 | 1468         | 4612 | 3.176 | 48      | 13.117      | 3.279       |
| 2017 | 1508         | 9600 | 6.366 | 42      | 10.387      | 3.462       |
| 2018 | 1447         | 14948 | 10.330 | 31 | 7.136 | 3.568 |
| 2019 | 1460         | 20671 | 14.158 | 20 | 7.777 | 3.777 |
| Total | 7172 | 50859 | 192 | | | |
Fig. 1: Year-wise research output of pharma education institutions

Fig. 2: Total document citations network (2015–2019)

Table 4: Document type

| S. No. | Document type     | Publications | Percentage |
|-------|-------------------|--------------|------------|
| 1     | Article           | 6067         | 84.59      |
| 2     | Review            | 674          | 9.40       |
| 3     | Book Chapter      | 258          | 3.60       |
| 4     | Conference Paper  | 61           | 0.85       |
| 5     | Erratum           | 32           | 0.45       |
| 6     | Editorial         | 27           | 0.38       |
| 7     | Note              | 15           | 0.21       |
| 8     | Letter            | 12           | 0.17       |
| 9     | Short Survey      | 12           | 0.17       |
| 10    | Book              | 5            | 0.07       |
| 11    | Data Paper        | 3            | 0.04       |
| 12    | Retracted         | 1            | 0.01       |
| 13    | Undefined         | 5            | 0.07       |

Fig. 3: Type of documents
Table 5: Highly prolific authors

| Author       | NP  | TC     | ACPP  | h-index | g-index | m-index |
|--------------|-----|--------|-------|---------|---------|---------|
| Sekar N      | 194 | 1954   | 10.072| 22      | 29      | 3.667   |
| Kumar A      | 180 | 2785   | 15.472| 24      | 44      | 4.000   |
| Bhanage B M  | 166 | 2656   | 16.000| 27      | 42      | 4.500   |
| Sriram D     | 130 | 1351   | 10.392| 20      | 24      | 3.333   |
| Gogate P R   | 123 | 2262   | 18.390| 29      | 38      | 4.833   |
| Katare O P   | 119 | 2047   | 17.202| 25      | 35      | 4.167   |
| Singh B      | 115 | 1700   | 14.783| 21      | 33      | 4.000   |
| Jain S       | 108 | 1360   | 12.593| 22      | 28      | 3.667   |
| Kamal A      | 104 | 1446   | 13.904| 21      | 30      | 3.500   |
| Rathod V K   | 100 | 1644   | 16.440| 24      | 35      | 4.000   |
| Yadav G D    | 92  | 885    | 9.620 | 15      | 22      | 2.500   |
| Singh S      | 88  | 712    | 8.091 | 14      | 19      | 2.333   |
| Bharatam P V | 82  | 740    | 9.024 | 15      | 20      | 2.500   |
| Kumar R      | 78  | 1016   | 13.026| 16      | 29      | 2.667   |
| Kumar S      | 80  | 925    | 11.563| 14      | 27      | 2.333   |
| Sharma G     | 79  | 1265   | 16.013| 20      | 32      | 3.333   |
| Kumar V      | 79  | 822    | 10.405| 16      | 23      | 2.667   |
| Sharma S     | 78  | 2244   | 28.769| 24      | 46      | 2.833   |
| Yogeeswar P  | 75  | 959    | 12.787| 23      | 32      | 3.167   |
| Singhal R S  | 70  | 760    | 10.857| 16      | 24      | 2.667   |

NP= No. of Publications, TC=Total Citations, ACPP=Average Citation per Paper

Fig. 4: Collaborative authors’ network

Most preferred sources for publication

The topmost preferred source title for publication used by the phrm institutions to publish their work in well-reputed journal publications was listed in table 6 results that RSC Advance topped in the list of 217 papers of total citation count of 2508 with the h-index of 24, followed by Chemistry select of 143 papers of 739 total citation count and Ultrasonic Sonochemistry of 95 papers of 2159 total citation and highest in h-index of 30.

Top funding agencies

In institutions, funding plays a very big impact on research and development activities. The top important funding agencies which have listed may include Government and Private funding agencies that have contributed a major role in funding from both National and International agencies that have made enormous contributions and supported in R and D activities towards innovation activities.

Table 7 analyzed the top funding agencies, the major three national and state agencies are ‘University Grant Commission (UGC)’ funded for 609 publications followed by the Department of Science and Technology of Kerala funded for 491 publications, Department of Science and Technology, Ministry of Science and Technology, India funded for 292 publications. The top International funding agency ‘Bangladesh Council of Scientific and Industrial Research’ funded 233 publications.

Most cited papers

Table 8 resulted in the most cited papers among the pharmacy institutes in the list. Among the top 20 papers, one paper has the citation of 1400; i.e. Shao, yinan, et al,(TC 1400; TCPY 233.333) on the title of “Advances in molecular quantum chemistry contained in the Q-Chem 4 program package” in the ‘Journal of Molecular Physics’ in 2014 followed by Kumar, A, and Singh, A.,(TC 608; TCPY 101.333) in 2015 on the title of “A review on Alzheimer’s disease pathophysiology and its management: an update” in the Journal of Pharmacological reports; “Liposomal formulations in clinical use: an updated review” by Bulbule, Upendra et al., (TC 439; TCPY 109.500) in 2017 in MDPE of Pharmaceutical Journal.
Table 6: Most preferred sources for publication

| Source                                      | NP   | TC    | h-index | g-index | m-index |
|---------------------------------------------|------|-------|---------|---------|---------|
| RSC Advances                                | 217  | 2508  | 24      | 30      | 4.000   |
| Chemistryselect                             | 143  | 739   | 14      | 16      | 2.800   |
| Ultrasonics Sonochemistry                   | 95   | 2159  | 30      | 38      | 5.000   |
| European Journal of Medicinal Chemistry     | 84   | 2174  | 25      | 42      | 4.167   |
| International Journal of Biological Macromolecules | 77 | 1460  | 21      | 32      | 3.500   |
| AAPS Pharmcite                              | 76   | 679   | 14      | 19      | 2.333   |
| International Journal of Pharmaceutics      | 75   | 1568  | 23      | 35      | 3.833   |
| New Journal of Chemistry                    | 75   | 665   | 14      | 20      | 2.333   |
| Research Journal of Pharmacy and Technology | 75   | 52    | 4       | 4       | 0.667   |
| Bioorganic and Medicinal Chemistry Letters  | 74   | 975   | 19      | 23      | 3.167   |
| Tetrahedron Letters                         | 68   | 727   | 16      | 22      | 2.667   |
| Bioorganic Chemistry                        | 66   | 910   | 15      | 26      | 2.500   |
| Drug Delivery                               | 57   | 1425  | 26      | 34      | 4.333   |
| Journal of Organic Chemistry                | 52   | 863   | 18      | 25      | 3.000   |
| ACS Omega                                   | 51   | 330   | 9       | 14      | 2.250   |
| Organic and Biomolecular Chemistry          | 51   | 578   | 16      | 20      | 2.667   |
| Industrial and Engineering Chemistry Research| 47  | 228   | 9       | 11      | 1.500   |
| Journal of Pharmaceutical and Biomedical Analysis | 47 | 393   | 11      | 15      | 1.833   |
| Journal of Fluorescence                     | 45   | 309   | 10      | 14      | 1.667   |
| Journal of Drug Delivery Science and Technology | 44  | 346   | 12      | 16      | 2.000   |

NP=No. of Publications, TC=Total Citations

Fig. 5: Sources citation network

Table 7: Top funding agencies

| Funding agencies                                      | NP   |
|-------------------------------------------------------|------|
| University Grants Commission                          | 609  |
| Department of Science and Technology, Government of Kerala | 491  |
| Department of Science and Technology, Ministry of Science and Technology, India | 292  |
| Science and Engineering Research Board                | 266  |
| Bangladesh Council of Scientific and Industrial Research | 233  |
| University Grants Committee                           | 214  |
| Department of Biotechnology, Government of West Bengal | 190  |
| Council of Scientific and Industrial Research, India   | 187  |
| Indian Council of Medical Research                    | 120  |
| Department of Science and Technology, Government of West Bengal | 77   |
| All India Council for Technical Education             | 75   |
| Council of Scientific and Industrial Research         | 65   |
| Department of Science and Technology, Ministry of Science and Technology | 51   |
| Manipal University                                    | 38   |
| Birla Institute of Technology and Science, Pilani      | 37   |
| Department of Biotechnology, Ministry of Science and Technology, India | 36   |
| National Institutes of Health                          | 35   |
| Department of Atomic Energy, Government of India       | 26   |
| Alexander von Humboldt-Stiftung                        | 25   |
| Defence Research and Development Organisation          | 24   |
Table 8: Most cited papers

| Paper            | DOI                           | TC   | TCYP  |
|------------------|-------------------------------|------|-------|
| SHAO Y, 2015, MOL PHYS | 10.1080/00268976.2014.952696 | 1400 | 233.33 |
| KUMAR A, 2015, PHARMACOL REP | 10.1016/j.pharep.2014.09.004 | 608  | 101.33 |
| BULBAKE U, 2017, PHARMACEUTICS | 10.3390/pharmaceutics9020012 | 438  | 109.50 |
| WAGENMAKERS EJ, 2018, PSYCHONOM BULL REV | 10.3758/s1323-017-1323-7 | 386  | 128.67 |
| AFZAL O, 2015, EUR J MED CHEM | 10.1016/j.ejmech.2014.07.044 | 308  | 51.333 |
| BAGAL DB, 2015, ANGEW CHEM INT ED | 10.1002/anie.201501880 | 204  | 34.000 |
| BYRNE C, 2018, J ENVIRON CHEM ENG | 10.1016/j.jece.2017.07.080 | 178  | 59.333 |
| D’SOUZA AA, 2015, J CONTROL RELEASE | 10.1016/j.jconrel.2015.02.022 | 172  | 28.667 |
| KUMAR A, 2015, PHARMACOL REP | 10.1016/j.pharep.2014.09.004 | 608  | 101.33 |
| DENGAL SJ, 2016, ADV DRUG DELIV REV | 10.1016/j.addr.2015.12.009 | 168  | 33.600 |
| MEHTA D, 2015, J WATER PROCESS ENG | 10.1016/j.jwpe.2015.07.001 | 158  | 26.333 |
| GHOSSH BK, 2015, POWDER TECHNOL | 10.1016/j.powtec.2014.09.027 | 149  | 24.833 |
| MUHEEM A, 2016, SAUDI PHARM J | 10.1016/j.jsp.s.2014.06.004 | 148  | 29.600 |
| YAMJALA K, 2016, FOOD CHEM | 10.1016/j.foodchem.2015.07.085 | 147  | 29.400 |
| PERICHERLA K, 2015, SYNTHESIS | 10.1055/s-0034-1380182 | 142  | 23.667 |
| GAUTAM P, 2015, CATAL SCI TECHNOLOGY | 10.1039/c5cy00691k | 132  | 22.000 |

Table 9: Most productive and most cited countries

| Country production | TP  | Country          | TC   | AC  |
|-------------------|-----|------------------|------|-----|
| India             | 13575 | India          | 30214 | 10.140 |
| USA               | 528  | USA             | 736  | 22.300 |
| Saudi Arabia      | 353  | Netherlands      | 433  | 108.250 |
| Australia         | 209  | Saudi Arabia     | 429  | 13.000 |
| Malaysia          | 126  | France           | 328  | 27.330 |
| Germany           | 110  | Germany          | 324  | 24.920 |
| United Kingdom    | 93   | Korea           | 249  | 14.650 |
| Canada            | 81   | Malaysia         | 249  | 16.600 |
| China             | 80   | Israel          | 183  | 26.140 |
| France            | 79   | Ireland         | 178  | 178.000 |
| Japan             | 70   | United Kingdom   | 126  | 18.000 |
| South Korea       | 52   | South Africa     | 120  | 24.000 |
| Oman              | 50   | Australia        | 117  | 14.620 |
| Brazil            | 48   | Canada          | 114  | 16.290 |
| Spain             | 44   | China           | 81   | 20.250 |
| Israel            | 40   | Singapore       | 79   | 15.800 |
| Finland           | 34   | Georgia         | 74   | 24.670 |
| Italy             | 34   | Japan            | 60   | 20.000 |
| South Africa      | 33   | Hungary          | 56   | 56.000 |
| Singapore         | 26   | Italy            | 55   | 7.860 |

Fig. 6: Countries citation network
Most productive and most cited countries

NIRF top 9 ranked Pharma institutions have collaborated with various countries, where the USA placed top in the table with 528 publications followed by Saudi Arabia, Australia, Malaysia, Germany, United Kingdom, Canada, China, France, Japan, South Korea, Oman, Brazil, Spain, Israel, Finland, Italy, South Africa, and Singapore respectively among the top twenty countries. Fig. 8 showing the countries' citation network. It can be seen that the scholars got the maximum citations from India with 30214 citations and followed by the USA, Netherlands, Saudi Arabia, France, Germany, Korea, Malaysia, Israel, Ireland, United Kingdom, South Africa, Australia, Canada, China, Singapore, Georgia, Japan, Hungary, and Italy.

Highly prolific keywords

Table 9 denotes occurrences of keywords used in the papers. In all, 40691 keywords have been figured in 7172 papers. Of these keywords, Article has appeared (3235) times, followed by Nonhuman (2132) times, Controlled Study (1988), Human (1811), Chemistry (1701), and Priority Journal (1611) respectively. All Keywords Network showed in fig. 9 and 10.

Table 10: Prolific keywords

| Keyword              | Frequency |
|----------------------|-----------|
| Article              | 3235      |
| Nonhuman             | 2132      |
| Controlled Study     | 1988      |
| Human                | 1811      |
| Chemistry            | 1701      |
| Priority Journal     | 1611      |
| Unclassified Drug    | 1559      |
| Animals              | 1419      |
| Animal               | 1415      |
| Metabolism           | 1317      |
| Humans               | 1274      |
| Animal Experiment    | 1119      |
| Male                 | 978       |
| In vitro Study       | 977       |
| Rat                  | 860       |
| Animal Model         | 796       |
| Particle Size        | 707       |
| Synthesis            | 664       |
| Drug Delivery System | 652       |
| Drug Effects         | 640       |

Fig. 7: All keywords network

CONCLUSION

The important significance of NIRF is to know the top institutions within India. The preeminent branding exercise with some definite parameters will be helpful for institutes to improve the quality and services offered by them [22]. It is a self-participating and domain-specific system which helps in the free advertisement of institutions within India and the world. Based on the NIRF ranking system numerous works have been performed on technical institutions, universities, and single concerted institutional studies. The research output of pharma institutions was less. Hence, it helps forthcoming students to identify India’s leading higher education institution in their field in response to the high demand for subject-level assessments.

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AUTHORS CONTRIBUTIONS

Mr. Mallikarjun Kappi conceived the idea and developed the research article and prepared the tables and used VOSviewer and
Biblioshiny software tool for constructing and various visualizing bibliometric networks, and co-authorship relations. Mr. Madhu S contributed to the literature review, analysis, and interpretation part, wrote limitations and scope for future research, and the manuscript was reviewed and edited under the guidance and supervision of Dr. Balabhim Sankrappa Biradar.

**CONFLICT OF INTERESTS**

The authors declare no conflict of interest.

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