International Journal of Library Science;
Volume 18; Issue No. 1; Year 2020;
ISSN 0975-7546; Int. j. lib. sci.


# Indian Publications in The field of Spinal Cord Injury Literature (2008-2017): A Bibliometric Study

**Ramakrishnan. J*., Meena. M**., and Thavamani. Kotti*****

*Deputy Librarian and **S.G. Deputy Librarian, ***S.G. Library Assistant, Regional Medical Library,
The Tamil Nadu Dr. M.G.R. Medical University, Guindy,
Chennai – 600 032.
Email: kottithavam@gmail.com

**ABSTRACT**

This paper presents a bibliometric study of Indian Publications in the field of Spinal Cord Injurycovered in the bibliographic database namely MEDLINE which are covered in PubMed.The literature covered in the database for the period 2008-2017 was considered. MEDLINE covered the maximum of 602 records during the study period.Maximum records were covered by Journal Articles (79.40%). Out of a total 602 records, all of them were in English language forming 100% of the total. The Relative Growth Rate (RGR) hasshown in decreasing trend and the Doubling Time (DT) has shownanincreasing trend when calculated by year wise except few years where it is different. The results of the Activity Index showed that Indian efforts in Spinal Cord Injuryresearch were greater in 6 years out of 10 years of the study period. Only onejournalwas covered to supply one-third of the cited records for zone-1. Core Indian journals in the field of Spinal Cord Injurywereidentified. The most frequently cited journal articleswerecovered by Neurologysubject Journals with 43.75%,followed by General Medicine, Orthopedics and Surgery.

**Keywords:** Spinal Cord Injury, Bibliometrics, Relative Growth Rate (RGR), Doubling time (DT), Activity Index and Bradford's Law and Core journals.

**Library Education Research**: Z668-669.7

## 1. INTRODUCTION

Bibliometrics, the quantification of bibliographical data, evolved from the efforts of early twentieth-century documentalists to apply mathematical and statistical analysis to bibliographical units.Pritchard (1969)[1], suggested the word 'Bibliometrics'in preference to the statistical bibliography. Hence the term bibliometrics is of recent origin. It is a branch of Information Science and analyses quantitatively the published information based on bibliographic data. It is the study and measurement of the patterns of all forms of published knowledge. Its analysis is the quantitative study of a subject growth by using bibliometric techniques.In this paper, an attempt has been made to identify theIndian Publicationsin the field of Spinal Cord Injury(2008-2017) covered in MEDLINE database which iscovered in PubMed (2017).

## SPINAL CORD INJURY

A spinal cord injury (SCI) is damage to the spinalcord that causes temporary or permanent changes in its function.[2]

## 2. LITERATURE REVIEW

Several studies on mapping have analyzed allied health journal citations to determine lists of core journals in their fields.[3-15]Ramesh Babu andRamakrishnan alsostudied Growth of Literature, Bradford Law of Scattering and National Patterns of Research output and priorities in Hepatitis in their different studies.[16-19]Ramakrishnan andThavamani studiedthe Growth of Literature and Bradford Law of Scattering in Hepatitis-C and Lung Cancer. [20&21]

The review of the literature on bibliometricsstudies in the field of medicine showed that so far no quantitative study on "Indian literature on Spinal Cord Injury" was conducted. Hence the present study.

## 3. OBJECTIVES

The objectives of this paper are:

i. To examine the growth of Indian literature in the field of Spinal Cord Injury.

ii. To identify the publication types covered.

iii. To examine the languages covered by Indian literature.

iv. To identify the core Indian journals in the field of Indian literature on Spinal Cord Injury.

v. To identify the subject-wisecoverage of Journals in Spinal Cord Injury; and,

vi. The Activity Index used in this study to compare India's performance with the world's performance.

## 4. METHODOLOGY

The records published during the year 2008 to 2017 in the field of Spinal Cord Injury in the MEDLINE data, which are covered in the PubMed (www.pubmed.com) was searched and bibliographic details were collected. The retrieved records were converted into FoxPro and loaded in SPSS for the purpose of analysis. The keyword 'Spinal Cord Injury' has used for extracting the number of records wereavailable in the above-said database. The following bibliometric techniques were used in this study: 1. The Relative Growth Rate (RGR),[22,]2. Doubling time (Dt)[23],3. Activity Index[24-29], and 4. Bradford's law.[30]

## 5. ANALYSIS AND DISCUSSION

A total of 602 records were covered in MEDLINE database about Indian literature in the field ofSpinal Cord Injuryhas been presented in Table 1 according to the year of publication. It was found that there was an increasing growth of literature in the subject of study by year after year except for a few years. The year 2015 has marked a maximum output of 16.94% out of total productivity in the study period. (Fig.1)

**Table 1 Quantum of Literature published in Spinal Cord Injuryby year wise**

| Year | No. of Records | % |
|---|---|---|
| 2008 | 9 | 1.50 |
| 2009 | 18 | 2.99 |
| 2010 | 19 | 3.16 |
| 2011 | 32 | 5.32 |
| 2012 | 74 | 12.29 |
| 2013 | 64 | 10.63 |
| 2014 | 86 | 14.29 |
| 2015 | 102 | 16.94 |
| 2016 | 101 | 16.78 |
| 2017 | 97 | 16.11 |
| **Total** | **602** | **100.00** |

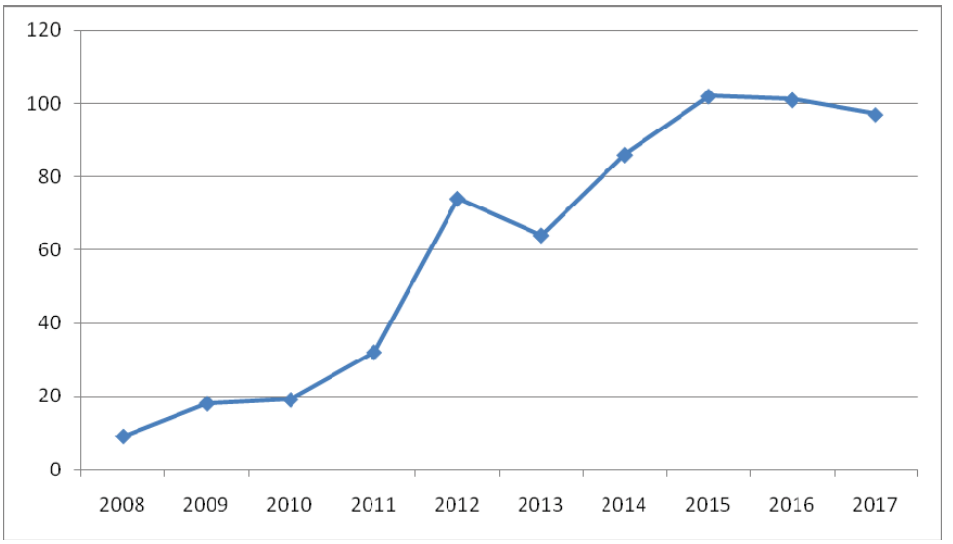


**Figure-1: Year-wise Distribution of Output**

Table-2 shows that maximum records were covered by Journal Article (79.40%) and other records wereReview (12.96%), Letter (3.32%), Research Support (1.99%), Comment (0.66%), Editorial(0.66%),Published Erratum (0.50%), Introductory Journal Article(0.17%),Multicenter Study (0.17%),Retracted Publication (0.17%)in the MEDLINE database.(Fig.2)

**Table–2: Distribution of Publication types in the literature of Spinal Cord Injury**

| S.No. | Pub. type | No.of records | % |
|---|---|---|---|
| 1. | Journal Article | 478 | 79.4 |
| 2. | Review | 78 | 12.96 |
| 3. | Letter | 20 | 3.32 |
| 4. | Research Support | 12 | 1.99 |
| 5. | Comment | 4 | 0.66 |
| 6. | Editorial | 4 | 0.66 |
| 7. | Published Erratum | 3 | 0.5 |
| 8. | Introductory Journal Article | 1 | 0.17 |
| 9. | Multicenter Study | 1 | 0.17 |
| 10. | Retracted Publication | 1 | 0.17 |
| **Total** | | **602** | **100.00** |

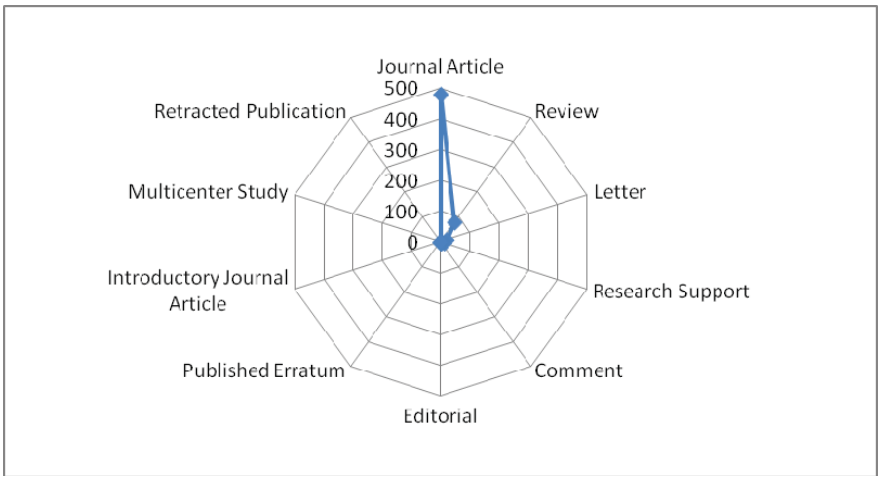


**Figure 2:Distribution of Publication types in the literature of Spinal Cord Injury**

Table-3 shows the distribution of citations according to language during the study period, out of a total of 602 records; all the 602 of them were in English language form 100% of the total.

**Table-3: Distribution of Language in the Indian literature onSpinal Cord Injury**

| Language | Total records |
|---|---|
| English | **602** |

## 6. RELATIVE GROWTH RATE (RGR) AND DOUBLING TIME (DT)

It is seen from Table-4 that there wasdecreasing in RGR from year wise. The RGR was decreasing from 2009 (1.10) to 2017 (0.18). Thus the RGR by year wise revealed a decreasing trend except for a few years (Figure 3).The Doubling Time (DT) has shown anincreasing trend when calculated by year wise. The DT increases from 0.63 in the year 2009 to 3.84 in the year 2017 except a few years where it wasdecreasing. (Figure 4)

**Table 4 RGR and DT for Spinal Cord InjuryResearch output in India**

| S.No. | Year | Quantum of Output | Cumulative Total of Output | $W_1$ | $W_2$ | $1 - 2^{\overline{R}^{(aa^{-1}\,year^{-1})}}$ RGR | Dt(a) |
|---|---|---|---|---|---|---|---|
| 1. | 2008 | 9 | 9 | | 2.20 | | |
| 2. | 2009 | 18 | 27 | 2.2 | 3.30 | 1.10 | 0.63 |
| 3. | 2010 | 19 | 46 | 3.3 | 3.83 | 0.53 | 1.31 |
| 4. | 2011 | 32 | 78 | 3.83 | 4.36 | 0.53 | 1.32 |
| 5. | 2012 | 74 | 152 | 4.36 | 5.02 | 0.66 | 1.04 |
| 6. | 2013 | 64 | 216 | 5.02 | 5.38 | 0.36 | 1.95 |
| 7. | 2014 | 86 | 302 | 5.38 | 5.71 | 0.33 | 2.10 |
| 8. | 2015 | 102 | 404 | 5.71 | 6.00 | 0.29 | 2.38 |
| 9. | 2016 | 101 | 505 | 6 | 6.22 | 0.22 | 3.09 |
| 10. | 2017 | 97 | 602 | 6.22 | 6.40 | 0.18 | 3.84 |

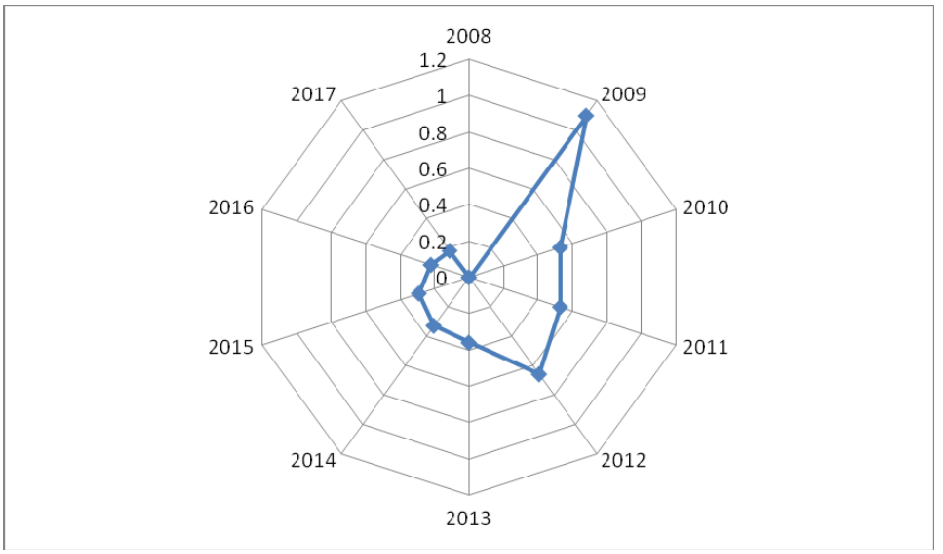


**Figure 3:Relative Growth Rate for Spinal Cord Injury Research output in India**

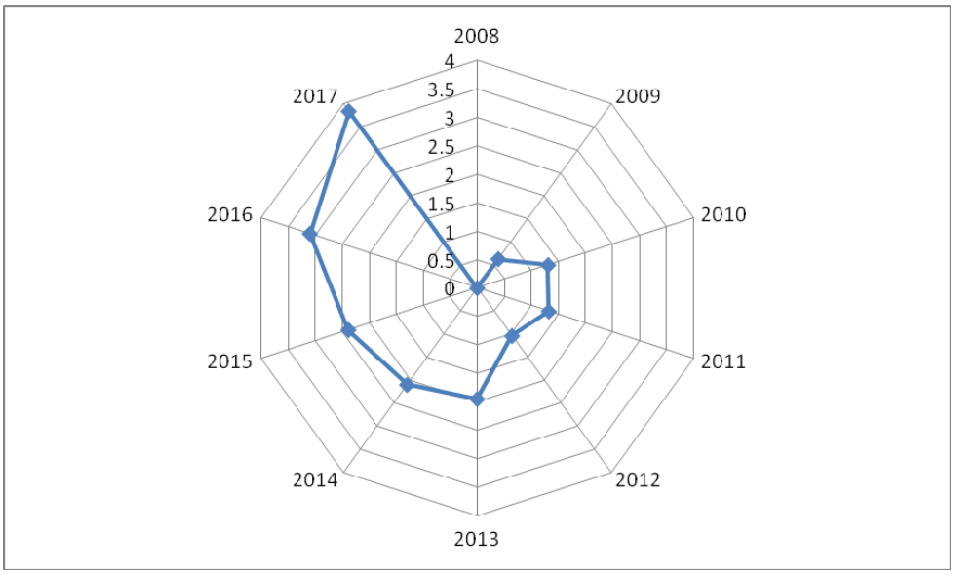


**Figure 4: Doubling time for Spinal Cord Injury Research output in India**

## 7. ACTIVITY INDEX

The Activity Index for India shows that Indian efforts in Spinal Cord Injuryresearch were greater in 6 years out of 10 years of study, since the Activity Index was higher than 100, in those 6 years, which reflects the higher activity of Spinal Cord Injuryresearch than the World's average. On

the years, where the Activity Index is less than 100, reflects the lower activity of Spinal Cord Injuryresearch than the world average. The Activity Index (AI) for India was peaking in 2015 (149.91) and it was lower in the year 2008 (19.24).(Table-5) As seen in the graph (Figure 5) which indicates that the world output,in the field ofSpinal Cord Injurygrew almost uniform rate by year after year and it was the peak in 2017. In the case of Indian output (Figure 6) the growth rate was an increasing trend except for few years and reaches its peak in 2015. In other terms, the year 2017 has marked the highest quantum of research output in world output and the year 2015 has marked the highest quantum of research output in Indian output.

**Table-5: World's Output vs. India's Output**

| Year | Worlds' Output | India's Output | Activity Index |
|---|---|---|---|
| 2008 | 2199 | 9 | 19.24 |
| 2009 | 2362 | 18 | 35.83 |
| 2010 | 2403 | 19 | 37.17 |
| 2011 | 2479 | 32 | 60.69 |
| 2012 | 2842 | 74 | 122.42 |
| 2013 | 2938 | 64 | 102.42 |
| 2014 | 3090 | 86 | 130.85 |
| 2015 | 3199 | 102 | 149.91 |
| 2016 | 3287 | 101 | 144.46 |
| 2017 | 3504 | 97 | 130.15 |
| **Total** | **28303** | **602 (2.13) *** | **100.00**** |

* Percentage of world output

** Average of Activity Index

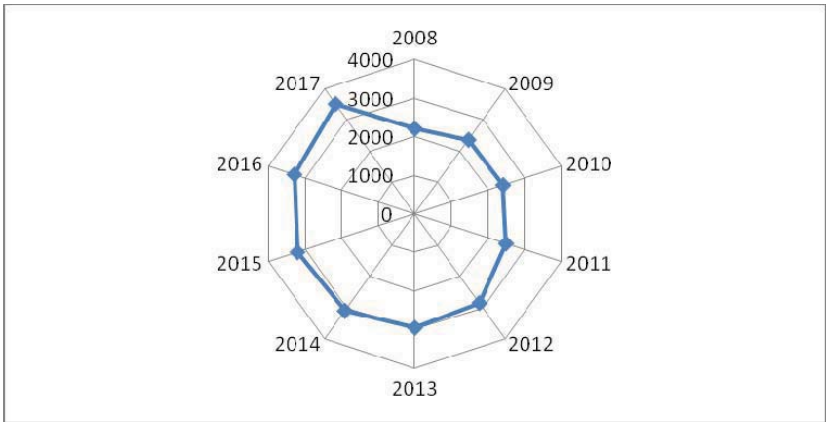


**Figure 5:World Output of Spinal Cord InjuryResearch**

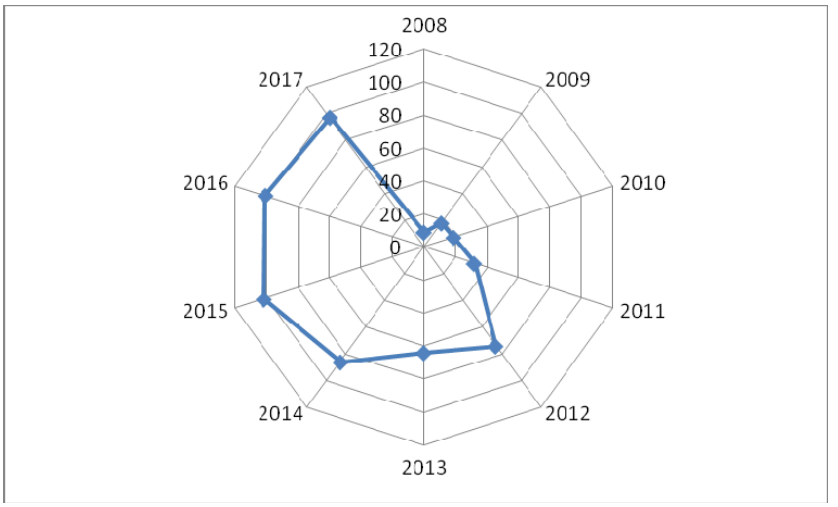


**Figure-6:Indian Output of Spinal Cord InjuryResearch**

## 8. BRADFORD'S LAW OF SCATTERING

As shown in table-6that there were478Indian Journal article records in the field ofSpinal Cord Injurycovered in the MEDLINE database selected for this study. The application of Bradford's Law of Scattering reveals the dispersion of the Spinal Cord Injuryliterature in Indian Journals in the MEDLINE database. Only onejournalwas needed to supply one-third of the cited records for zone-1. However, fifteen journals were required to produce the second grouping of records in Zone-2, and 43 journals to yield the records that constitute Zone-3. Zone-1 and Zone-2 journals, i.e. sixteen journalswere selected as core Indian journals in the field of Spinal Cord Injury. (Fig.7)

**Table-6: Distribution by Zone of cited Indian journals and Journal article**

| S.No. | Zone | Cited Journals | | Cited Journal article | |
|---|---|---|---|---|---|
| | | No. | (%) | No. | (%) |
| 1. | Zone 1 | 1 | 1.69 | 236 | 49.37 |
| 2. | Zone 2 | 15 | 25.42 | 160 | 33.47 |
| 3. | Zone 3 | 43 | 72.88 | 82 | 17.15 |
| **Total** | | **59** | **100.00** | **478** | **100.00** |

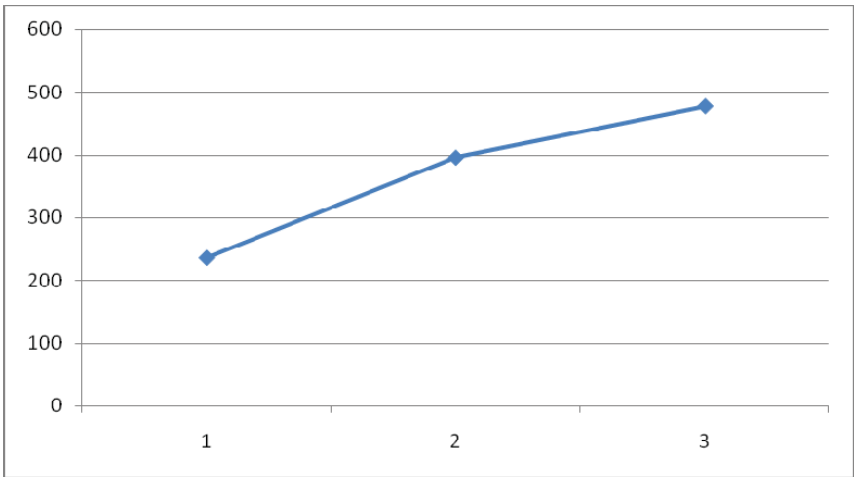


**Figure-7:Distribution of Journals by Zones**

The table-7 clearly shows that Neural Regeneration Researchcontributed 236journal articlesto the first position, followed by Surgical Neurology International (46) and Indian Journal of Orthopaedics (17) etc. (Fig.8)

**Table-7: Distribution of Journals Published in India on Spinal Cord Injury**

| S.No. | Name of Indian Journals | No. of records | % | Rank |
|---|---|---|---|---|
| 1. | Neural Regeneration Research | 236 | 59.60 | **1** |
| 2. | Surgical Neurology International | 46 | 11.62 | **2** |
| 3. | Indian Journal of Orthopaedics | 17 | 4.29 | **3** |
| 4. | Neurology India | 12 | 3.03 | **4** |
| 5. | Asian Journal of Neurosurgery | 11 | 2.78 | **5** |
| 6. | Journal of Craniovertebral Junction & Spine | 11 | 2.78 | **5** |
| 7. | Journal of Neurosciences in Rural Practice | 9 | 2.27 | **6** |
| 8. | The Journal of the Association of Physicians of India | 9 | 2.27 | **6** |
| 9. | Journal of Stem Cells & Regenerative Medicine | 7 | 1.77 | **7** |
| 10. | Journal of Clinical and Diagnostic Research: JCDR | 7 | 1.77 | **7** |
| 11. | Journal of Orthopaedics | 6 | 1.52 | **8** |
| 12. | Annals of Indian Academy of Neurology | 5 | 1.26 | **9** |
| 13. | Annals of Neurosciences | 5 | 1.26 | **9** |
| 14. | International Journal of Critical Illness and Injury Science | 5 | 1.26 | **9** |
| 15. | Journal of Emergencies, Trauma, and Shock | 5 | 1.26 | **9** |
| 16. | Journal of Research in Medical Sciences | 5 | 1.26 | 9 |
| | **Total** | **396** | **100.00** | |

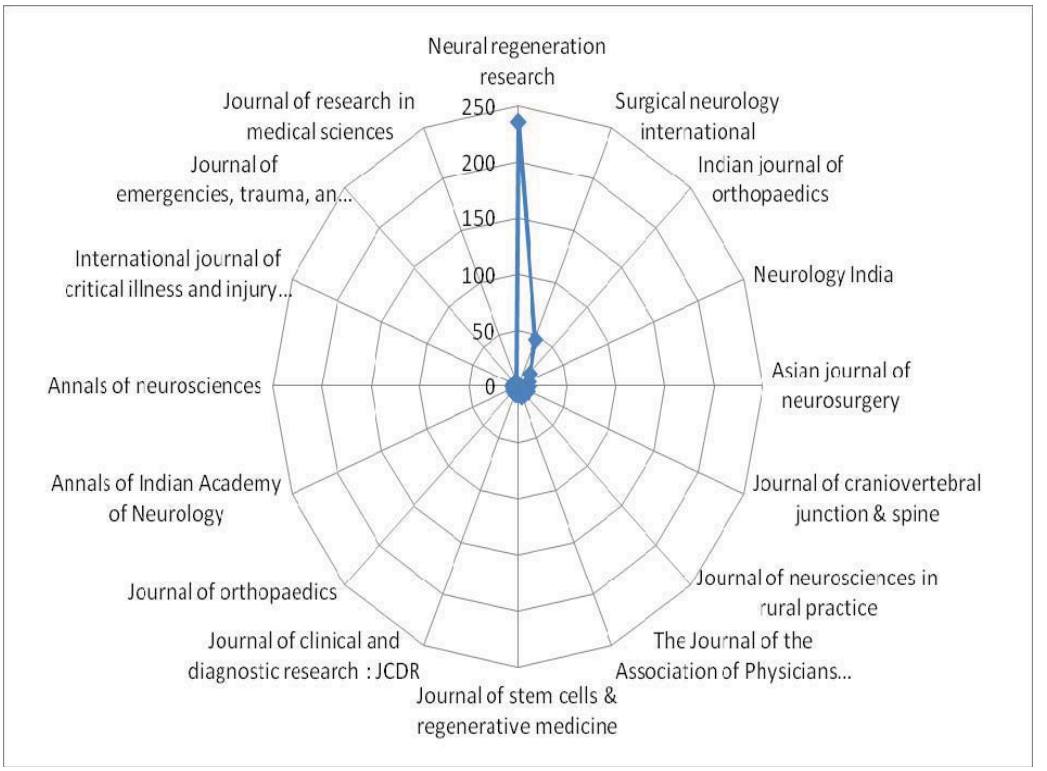


**Figure 8: Distribution of Journals Published in India on Spinal Cord Injury**

Table-8 shows that the most frequently cited journal articleswerecovered by NeurologyJournals with 43.75%. Of the 16Journals, 7Journals associated with Neurology, 4Journals associated with General Medicine, 2Journalseach associated with Orthopedics and Surgery and 1 Journal associated with Neurosurgery. (Fig.-9)

**Table-8: Subject wise coverage ofJournals in the field of Spinal Cord Injury**

| Subject | Frequency | Percentage |
|---|---|---|
| Neurology | 7 | 43.75 |
| General Medicine | 4 | 25 |
| Orthopedics | 2 | 12.5 |
| Surgery | 2 | 12.5 |
| Neurosurgery | 1 | 6.25 |
| **TOTAL** | **16** | **100.00** |

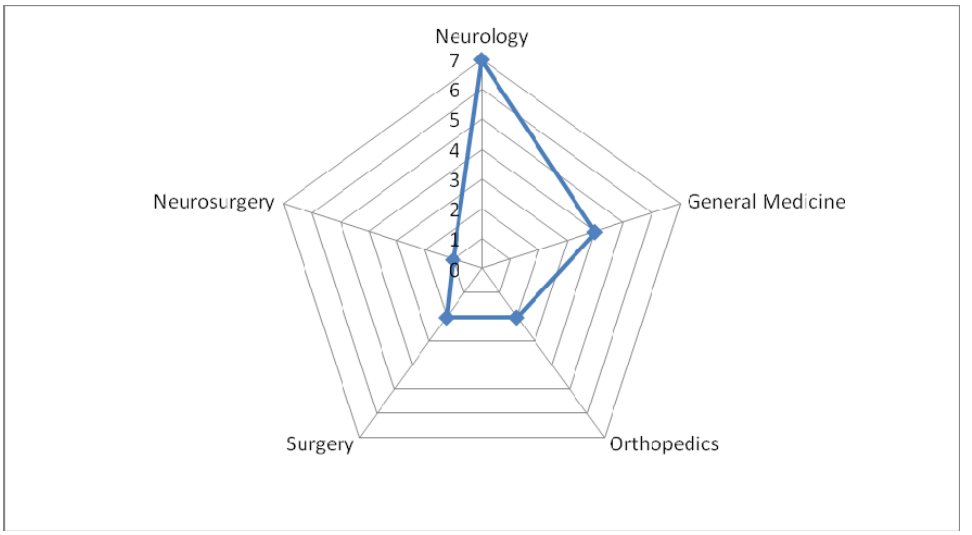


**Figure-9: Subject wise coverage ofJournals in the field of Spinal Cord Injury**

## 9. CONCLUSION

The result reveals that there is an increasing trend of literature on the subject of study by year after year except for a few years.English language papers are dominated in the field of Spinal Cord Injuryliterature in India. Indian efforts in Spinal Cord Injuryresearch are greater in 6 years out of 10 years of study.Neurology, General Medicine and Orthopaedics Journals covered a number of journal articles in the field of Spinal Cord Injuryliterature in India. Three journals, namely "Neural Regeneration Research","Surgical Neurology International" and "Indian Journal of Orthopaedics"have dominated the literature in the field ofSpinal Cord Injuryin India.Core Indian Journals are identified in the field of Spinal Cord Injury.

## REFERENCES

1. Pritchard, Alan. Statistical Bibliography or Bibliometrics, *Journal of Documentation*, 1969, 25(4), 348-349.
2. https://en.wikipedia.org/wiki/Spinal_cord_injury
3. Schloman B F. Mapping the literature of allied health: project overview. *Bulletin of Medical Library Association*, 1997, 85(3), 271-77.
4. Hook S A, Wagner C E. Mapping the literature of dental assisting. *Bulletin of Medical Library Association*, 1999, 87(3),277-82.
5. Stevens S R. Mapping the literature of cytotechnology. *Bulletin of Medical Library Association*, 2000, 88(2),172-77.

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

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

8. Haaland A. Mapping the literature of dental hygiene. *Bulletin of Medical Library Association*, 1999, 87(3),283-86.

9. Burnham J F. Mapping the literature of respiratory therapy. *Bulletin of Medical Library Association*, 1997, 85(3),293-96.

10. Slater L G. Mapping the literature of speech-language pathology. *Bulletin of Medical Library Association*, 1997, 85(3),297-302.

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

12. Burnham J F. Mapping the literature of radiologic technology. *Bulletin of Medical Library Association*, 1997, 85(3),289-92.

13. Reed K L. Mapping the literature of occupational therapy. *Bulletin of Medical Library Association*, 1999, 87(3),298-304.

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

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

16. Ramesh Babu, B and Ramakrishnan, J. Trends in the Growth of Literature on Hepatitis (1984-2003), *Journal of Korean Library and Information Science Society*, 2007, 38 (2), 31-50.

17. Ramakrishnan,J and Ramesh Babu, B. Literature on Hepatitis (1984-2003): A bibliometric analysis, *Annals of Library and Information Studies*, 2007, 54, 195-200.

18. RameshBabu B and Ramakrishnan J. Indian Contributions to the Field of Hepatitis (1984-2003): A Scientometric Study. In: Third International Conference on Webometrics, Informetrics, Scientometrics Science and Society & Eighth COLLNET Meeting. 2007. ICAR Symposium Hall, National Agriculture Science Complex; New Delhi (India). pp.22-32.

19. Ramesh Babu, B and Ramakrishnan, J. National Patterns of Research output and Priorities in Hepatitis: a Scientometric Analysis, *Journal of Information Management*, 2008, 39 (4),215-240.

20. Ramakrishnan J and Thavamani K. Growth of literature in the field of Hepatitis-C. *Library Philosophy and Practice (e-journal)* at University of Nebraska – Lincoln, 2013,Paper 944. http://digitalcommons.unl.edu/libphilprac/944

21. Ramakrishnan J and Thavamani K. Bibliometric Analysis of Growth Rate and Core Journals in the Literature on Lung Cancer (2010 - 2015): A Study.Asian Journal of Information Science and Technology,2017, 7 (7), 23-37.

22. Hunt, R. Plant growth analysis, 1978 London; Edward Arnold.

23. Mahapatra, M. On the Validity of the theory of Exponential Growth of Scientific Literature. Proceedings of the *15th IASLIC Conference*, Bangalore, 1985 pp. 61-70.

24. Frame J D. Mainstream research in Latin America and Caribbean. *Interciencia,*1977, 2, 143-148.

25. Price, D De Solla. The analysis of scientometrics for policy implications. *Scientometrics*, 1981, 3, 47-54.

26. Karki, M M S and Garg, K C. Bibliometrics of Alkaloid Chemistry research in India. *Journal of Chemical Information and Computer Science*, 1997, 37, 157-161.

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

28. BharviDutt, Garg, K.C and Anita Bali. Scientometrics of the international journal Scientometrics. *Scientometrics,*2003, 56 (1),81-93.

29. Garg, K.C and Padhi, P. Scientometric Study of Laser Patent Literature. *Scientometrics*, 1998, 43 (3),443-454.

30. Bradford S C. Documentation. Crosby, Lockwood, London,1948.