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SURVEILLANCE OF MORBIDITY OF HEAD INJURY IN INDIAN SCENARIO: A BIBLIOMETRICS STUDY

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ABSTRACT

Background:
Head injury is a morbid state, resulting from gross or subtle structural changes in the scalp, skull and / or the contents of the skull produced by mechanical forces. Here, we have analyzed the published articles with respect to author's contribution using some bibliometrics parameters.

Materials and Methods:
The published articles on head injury were retrieved from SCOPUS database from the year 2012 to 2016 for this study and analysis of documents were done in respect to year of publications, source title, types of documents, subject of documents and degree of collaboration etc. All the statistical analysis was carried out with the help of SPSS 20.

Results:
On analysis of all articles with Head injury, it was revealed that the highest number of open access articles was published in the year 2013 and least in the year 2016. Among all articles 678 documents are under Medicine, 108 documents are under Pharmacology, Toxicology and Pharmaceutics and 76 documents are listed under Biochemistry, Genetics and Molecular Biology.

Discussion and Conclusion:
Indian publications on Head injury during the year 2012 to 2016 showed interesting finding. The degree of collaboration "C" is 0.92 which means there is less work of single authors in comparison to multiple authors.

KEYWORDS : TBI, ASDH, EDH, Degree of collaboration, Bibliometrics

Introduction:
No form of craniocerebral injury is too trivial to be ignored or so serious as to be despaired off. According to the National Advisory Neurological Diseases and Stroke Council, "Head injury is a morbid state, resulting from gross or subtle structural changes in the scalp, skull and/ or the contents of the skull produced by mechanical forces". However it needs to be added that the impact to the head, that causes the injury, need not be applied directly to the head (Vij – 2011).[1] An indirect impact to the head can alsohave a similar outcome.

Trauma to the head, can be direct as well as indirect, leading in both cases to what is called Traumatic Brain Injury (TBI).The TBI can be defined as cerebral insult, not degenerative or congenital in nature, due to external mechanical force that possibly leads to permanent or temporary disabilities of cognitive, physical and psychological functions with or without altered level of consciousness.[2]

Intracranial hemorrhages in form of Epidural l hemorrhage (EDH), subdural hemorrhage (SDH), subarachnoid hemorrhage (SAH) and Intracerebral hemorrhage (ICH) are the major complication of Traumatic Brain Injury (TBI). Various studies show that (Acute SDH) is the major cause of morbidity among the intracranial hemorrhage, resulting from TBI.

The mapping and analysis of research materials, is to comprehend and analyze scientific domains[3] together with the development and fine-tuning of new techniques and tools to facilitate decision-making in areas of scientific policy and it reflects the "state of the art" of research at a given time. These processes, necessary for the evaluation of science [4, 5] are a responsibility that no country can elude [6] given the evident connections between advancement through research activity, economic growth and progress, and the enhanced well-being of society.[7] The number of scientific disciplines interrelated by head injury research lends it an interesting yet complicated character.[8] Its inter disciplinary nature presents a great challenge when delimiting and analyzing its thematic composition, demanding a very precise analysis. Precisely to face this challenge, bibliometrics has complementary tools that more recently include social network analysis[9] and the visualization of scientific domains[10, 11, 12]In this study, we have tried to evaluate the morbidity of Head injury incidents in Indian scenario. At the same time, we have documented and analyzed he basic concept of Head injury, the year wise contribution of Indian research output, authorship pattern of published articles, individual authorship of Indian researchers, publication of documents in various journals, documents published in different subjects and degree of collaboration of authors.

Method used for this study:
The analysis of pure science research papers involves the study of patterns, frequency and some other bibliometrics measures in articles. The study discusses the basic concepts underlying head injury and the published research work of Indian researchers in the area of head injury in journals indexed in Scopus database. All the relevant data were retrieved from SCOPUS database between the period from 2012 – 2016 for this study and an analysis was done regarding documents published in different year, source title, types of documents, subject of documents and degree of collaboration etc. Finally, the suitable collected data were sorted, tabulated and comprehended in a rational manner to draw assumptions in this present study using MS-Excel spread sheet and some statistical measure that are important to bibliometrics study.

Result:
This study indicates that 36.47% of total published document are available in open access during this five year of study (Table 1). The highest number of publication (175) in the year 2013 and less is in the year 2016 (Table 1). Types of document are very important in the field of research. It is found from this study that a total of 592 are published as original papers and other 162 documents are listed under review, letter, conference paper, book chapter etc. (Table 2). The published documents are indexed under different subject areas, where 678 documents are under Medicine, 108 documents are under Pharmacology, Toxicology and Therapeutics and 76 documents are listed under Biochemistry, Genetics and Molecular Biology (Table 3).

Out of 754 papers, the number of single authored paper is only 63 and the number of more than single author paper is 691 (Table 4). The journal "Indian Journal of Forensic Medicine and Toxicology" published 55 documents during this period of study and followed by "Journal of Indian Academy of Forensic Medicine" and "Medico-Legal Update" with 34 and 32 number of documents respectively (Table 5).. This study found that there is a statistical significance between single authored documents and multi authored documents with p value < 0.00001. The degree of collaboration "C" is 0.92 with 691 numbers of documents are more than single author (Table 6). B. S. Sharma of Dept. of Neurosurgery, AIIMS - New Delhi has the highest number of publications (12) and B. I. Devi of Dept. of Neurosurgery, National Institute of Mental Health & Neuro Sciences is in second position with 10 documents and K. K. Mukherjee, Dept. of Neurosurgery, Vellore has occupied the 10th position in the table with 6 documents during this five year study (Table 7).

Discussion:

Definition of SDH:

SDH is defined as an acute hemorrhagic collection in the space between the duramater and arachnoid membranes most commonly due to head trauma with laceration of cortical veins bridge crossing the subdual space and draining in to the dural sinus. Arterial rupture can also cause SDH, when there is injury to small cortical arteries with diameter of less than 1 mm. Among other less common cause of SDH is, rupture of a aneurysm, vascular malformation, or spontaneous hemorrhage with severe coagulopathy. [13]

Acute subdural hemorrhage (ASDH) is responsible for complications in up to 45% of causes of Traumatic Brain Injury (TBI).[14] ASDH happens to be a dominant cause of morbidity in comparison with Epidural hemorrhage (EDH) in TBI. The prevalence of ASDH is around 11% in comparison with EDH, which occurs in 2.7% to 4% of patients with TBI. [15]

Morbidity rates for patients with ASDH ranges from 40-68%, but the mortality rate rises, when associated with increasing age, and concomitant presence of other brain lesions. SDH in combination with EDH has a higher mortality rate, even with or without surgical intervention.[16] Apart from intracranial hemorrhages, resulting from TBI, several complications that are imperceptible like changes in thinking, feeling, language, emotions etc. can occur in TBI.

Injuries to the Brain proper in TBI:

Coup and Countercoup injuries of the Brain

The brain, being an incompressible structure and the fact that it is housed in the complex architecture of the cranial cavity – consisting of Anterior cranial Force, Middle Cranial Force and Posterior Cranial Force, and because it is compartmentalized by folding of the dura – i. e. the falx cerebri and tentorium cerebelli – makes it liable to suffer from coup and countre coup lesions. The "coup lesion" is one of maximum cortical damage, developing underneath / on the same side of impact on a mobile head. The "countercoup lesion" manifesting as cortical damage is one that develops at the opposite side to the site of coup lesion in a moving head that is suddenly decelerated as in case of a fall. (Vij – 5th ed. 2011, pp 281).

Cerebral Concussion (Commotio Cerebri):

TBI is certain cases, may result in a condition called "Cerebral concussion", where there is minimal structural damage to the substance of the brain, but can result in an immediate and transient loss of consciousness, associated with short period of amnesia.

The mechanism of loss of consciousness in concussion is believed to be a transient electrophysiologic dysfunction of reticular activating system in the upper midbrain caused by rotation of the cerebral hemispheres on a relatively fixed brain stress (Vij – 5th ed. 2011, pp 283).

The trend of publication shows the academic rigor of an educational organization. The position of any academic institution depends on the quality of teaching and also on the quality and quantity of research publications. An attempt was made to analyze the published documents in a year wise distribution. The open access documents are very useful, as it is retrieved without any fee. Some publishers also demand a nominal fee for this purpose. The electronic documents are easy to handle and can be safely stored for future utilization. While taking into comparison between the documents not available in open access and documents available in open access in this study period, the result is significant with the two tailed p-value being 0.000386.

The published documents are of various types. It is noticed that all the journals publish documents in their own standard. They accept manuscripts as original research paper, review paper, editorial, case report etc. This study finds that 78.5% of published documents are original research papers. The original research articles are very important in the scientific research field as well as for the academic development of faculty members.

Subject heading in indexing format is very important. It simplifies the search result of the requisite community. Subject heading helps the researcher to save their time and money in finding their much needed document in the present electronic environment. The entire Indexing database use different subject heading to distribute the published documents. The study also found that articles on head injury were incorporated in published work appearing in various medical spesialities like medicine, pharmacology, biochemistry, etc. and also non-medical subjects like social science environmental sciences etc. Medicine includes 678 research articles. Pharmacology, Toxicology and Pharmaceutics consists of 108 documents and Biochemistry, Genetics and Molecular Biology has 76 documents. It is also found that out of 754 documents, Veterinary, Material Science, Energy, Economics, Econometrics and Finance and Business, Management and Accounting includes 1 document each.

Degree of collaboration can be calculated with the number of documents published by single author and those are published by multiple authors. With application of Anova principle (statistical measure) to these documents (table-4), the year wise distribution of documents has significant result with p – value 0.05 where as the author wise distribution of documents have no significant result (table 4-a, table 4-b).

Selection of journal is also important to publish the manuscript. The researchers are also required to choose their relevant journal in their concerned field. This study reveals that total 754 numbers of articles are published in 305 numbers of journals. The year wise distribution of individual journals is shown in the table for better use of the researchers (table 5).

Degree of collaboration is a measurement of the prominent area of inquiry in scientific studies indicating the trend in patterns of single and joint authorship. It is examined in this study of the Indian publications on "Head Injury" during this five year period under study, as shown in Table-6. The degree of collaboration "C" is 0.92. It reveals that there is a significant relation between single authors and more than one author in the patterns of publications, single author publication author being negligible.

The extent of collaboration in research can be measured with the help of the formula:

$$C = \frac{N_M}{N_M + N_S}$$

Where, C= Degree of Collaboration

N_M = Number of multiple authors

N_S = Number of single authors

A comparative study between single author and multiple authors was taken and it was found statistically significant at $p < 0.00001$ in t test with t-value = -13.0 and degree of freedom = 8.

Conclusions:

Morbidity and mortality arising out of head injury in India, is a serious concern. Significant work has been done by Indian researchers in this field of study, as evident in the publication states in form of original article, case report, review article, book chapter etc. The publications on collaborative research work on head injury revealed more as compare to the single author. With degree of collaboration "C" It is revealed that there is a significant relation between single authors and more than one author.

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Table 1: year wise distribution of documents

Year	No. of document	Available in open access	Not Available in open access	Open access (%)
2012	149	54	95	36.24

2013	175	63	112	36.00
2014	157	60	97	38.22
2015	161	58	103	36.02
2016	112	40	72	35.71
Total	754	275	479	36.47

Table 2: Distribution of documents into different types

Type	No. of Document	Percent	Cumulative Percent
Article	592	78.51	
Review	52	6.90	78.51
Letter	49	6.50	85.41
Conference Paper	33	4.38	91.91
Note	13	1.72	96.29
Editorial	9	1.19	98.01
Book Chapter	4	0.53	99.20
Article in Press	2	0.27	99.73
Total	**754**	**100.00**	**100.00**

Table 3: Subject wise distribution of published documents

Name of the subject	No. of article	Percent	Cumulative Percent
Medicine	678	57.12	
Pharmacology, Toxicology and Pharmaceutics	108	9.10	57.12
Biochemistry, Genetics and Molecular Biology	76	6.40	66.22
Social Sciences	70	5.90	72.62
Neuroscience	68	5.73	78.52
Environmental Science	66	5.56	84.25
Engineering	25	2.11	89.81
Health Professions	17	1.43	91.91
Dentistry	15	1.26	93.34
Computer Science	11	0.93	94.61
Psychology	11	0.93	95.53
Nursing	9	0.76	96.46
Agricultural and Biological Sciences	7	0.59	97.22
Arts and Humanities	7	0.59	97.81
Physics and Astronomy	4	0.34	98.40
Immunology and Microbiology	3	0.25	98.74
Mathematics	3	0.25	98.99
Chemical Engineering	2	0.17	99.24
Multidisciplinary	2	0.17	99.41
Business, Management and Accounting	1	0.08	99.58
Economics, Econometrics and Finance	1	0.08	99.66
Energy	1	0.08	99.75
Materials Science	1	0.08	99.83
Veterinary	1	0.08	99.92
Total	**1187**	**100.00**	**100.00**

Table 4: Authorship pattern of published documents

Year	Single Author	Double Author	Triple Author	Four Authors	More than fourAuthors	Total
2012	15	15	28	43	48	**149**
2013	15	23	45	39	53	**175**
2014	14	21	37	41	44	**157**
2015	11	24	28	44	54	**161**
2016	8	23	31	22	28	**112**
Grand Total	**63**	**106**	**169**	**189**	**227**	**754**

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