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Analysis of Authorship Pattern in the Field of Lung Infection in Adult Literature

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ABSTRACT

This study helps a bibliometric analysis of the authorship pattern in the field of Lung Infection in adult literature in the MEDLINE database which covered in PubMed. The years i.e. from the year 2000 to 2019 considered for this study. A total number of 34308 papers were published in the study period. A total of 97.2% of papers are concealed by multi-authors' papers. The ratio of single and multi-authors' papers is 1:38 in the field of Lung Infection in adult. The year-wise Degree of Collaboration (DC) displays the ratio in-between 0.94 to 0.99 in the field of Lung Infection in adult. It shows that the multi-authors' papers are more in the field of Lung Infection in adult. The values of Co-Authorship Index (CAI) for single and two authored papers were higher in the first block and declined in the other three blocks in Lung Infection in adult literature. At the same time, the value of Co-Authorship Index (CAI) for more than two authors' papers was lower in the first block and higher in the fourth block period in Lung Infection in adult literature. The result of this study shows that the collaboration in the field of Lung Infection in adult research. It also shows that it is in an increasing trend in recent years. The average Collaborative Co-efficient (CC) has been reached at 0.64 which also shows large number of papers was by multiple authors.

Keywords: Bibliometrics, Lung Infection in adult, Degree of Collaboration (DC), Co-Authorship Index (CAI), and Collaborative Co-efficient (CC).

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1. INTRODUCTION

A lung infection can be affected by a virus, bacteria, and fungus. The most common types of lung infections are called pneumonia. Pneumonia affects the smaller air sacs of the lungs, is most often caused by contagious bacteria, but can also be caused by a virus.[1] The resources were published in the field of Lung Infection in adult were increased due to knowledge explosion since there are number of research in the field of Lung Infection in adult. So, this is appropriate time to evaluate quantitatively the literature in the field of Lung Infection in adult. There are different types of Bibliometric techniques

were used by researchers. But in this study the Bibliometric techniques i.e. Degree of Collaboration (DC), Co-Authorship Index (CAI), and Collaborative Co-efficient (CC) have been used. These bibliometric techniques support to examine of authorship pattern in the field of Lung Infection in adult. It was aimed to study the authorship pattern in the field of Lung Infection in adult with the help of bibliographic database namely MEDLINE which covered in PubMed. It is needed to focus in the area of authorship pattern to study the research materials in the field of Lung Infection in adult.

2. LITERATURE REVIEW

There are huge contributions on authorship pattern in the bibliometric analysis[2-7]. Among the studies only few studies discussed here. The Indian output on Air Pollution research was analysed by Parameswaran, Ramesh Babu and Gopalakrishnan (2003)[8]. Rajendran, Ramesh Babu and Gopalakrishnan (2005)[9] investigated the global output of "fiber optics" research. Chanda Arya (2012)[10] study was the authorship pattern and collaborative research in the field of veterinary medicine. Vishal Goyal, Girish Kumar Gupta and Ashok Kumar (2013)[11] analyzed in the field of Chemical Sciences. Velmurugan (2013)[12] considered the bibliometric analysis of 203 articles appearing in Annals of Library and Information Studies journal. Thavamani (2014)[13] examined the authorship trend in the "Chinese Librarianship: an International Electronic Journal (CLIEJ)". Navaneethakrishnan (2014)[14] studied to identify the authorship patterns and degree of collaboration of Sri Lanka in humanities and social science research. Thavamani (2014)[15] study was on Authorship Patterns and Collaborative Research in Malaysian Journal of Library and Information Science. Ramakrishnan, Ravisankar, and Thavamani (2017)[16] study was the authorship pattern and collaborative research in the field of Pediatric Vascular Surgery.

Ramakrishnan, Ravisankar, and Thavamani (2019)[17] attempt has been made to identify the publication growth and research in India on "Breast Cancer" literature. Thavamani (2018)[18] analyzed the various components of the articles published in the International Journal of Nursing Education from 2012 – 2016. Various quality aspects of the 655 research articles and 1651 authors were examined. Ramakrishnan, Meena and Thavamani (2020)[19] studied bibliometric study of Indian Publications in the field of Spinal Cord Injury covered in the bibliographic database.

3. AIM OF THE STUDY

- To discuss the authorship pattern. i.e. Single Vs. Multiple authors in the field of Lung Infection in adult literature.
- To study the collaboration research in the field of Lung Infection in adult literature with the help of Degree of Collaboration (DC).
- To examine the authorship pattern in the field of Lung Infection in adult literature and employ the Co-Authorship Index (CAI) for the same.
- To observe the collaboration of research in the different countries in the field of Lung Infection in adult literature and use the bibliometric technique i.e. Collaborative Co-efficient (CC).

4. METHOD USED FOR THIS STUDY

The papers published in the MEDLINE data from the year 2000 to 2019 in the field of Lung Infection in adult which are covered in the PubMed[20] were collected. The retrieved papers details were loaded in SPSS for the purpose of analysis. The keyword 'Lung Infection in adult' was used to save the papers details available in the above-said database. The papers details retrieved from the source database on the literary production of 'Lung Infection in adult' have been examined by using bibliometric techniques i.e. Degree of Collaboration (DC)[21], Co-Authorship Index (CAI) [22], and Collaborative Co-efficient (CC).[23]

5. RESULTS

5.1 LITERATURE PUBLISHED IN LUNG INFECTION IN ADULT

It is observed that the research productivity in the field of Lung Infection in adult covered 34308 of the papers in the MEDLINE database for a period of twenty years i.e. from the year 2000 to 2019. The year-wise papers of literature in the field of Lung Infection in adult are presented in Table-1. The maximum number of 2292 papers was published in the year 2016, followed by 2127 papers in the year 2018 and 2126 papers in the year 2017. It is also seen that from the year 2000 onwards there is a steady increase in Lung Infection in adult research productivity every year except few years. (Figure-1)

Table 1: Literature published in Lung Infection in adult by year-wise

Year	No. of Papers	%	Cumulative No. of papers	Cumulative %
2000	1258	3.67		
2001	1223	3.56	2481	7.23
2002	1228	3.58	3709	10.81
2003	1306	3.81	5015	14.62
2004	1415	4.12	6430	18.74
2005	1478	4.31	7908	23.05
2006	1485	4.33	9393	27.38
2007	1676	4.89	11069	32.26
2008	1553	4.53	12622	36.79
2009	1546	4.51	14168	41.30
2010	1718	5.01	15886	46.30
2011	1834	5.35	17720	51.65
2012	2149	6.26	19869	57.91
2013	1823	5.31	21692	63.23
2014	1980	5.77	23672	69.00
2015	2080	6.06	25752	75.06
2016	2292	6.68	28044	81.74
2017	2126	6.20	30170	87.94
2018	2127	6.20	32297	94.14
2019	2011	5.86	34308	100.00
Total	**34308**	**100.00**		

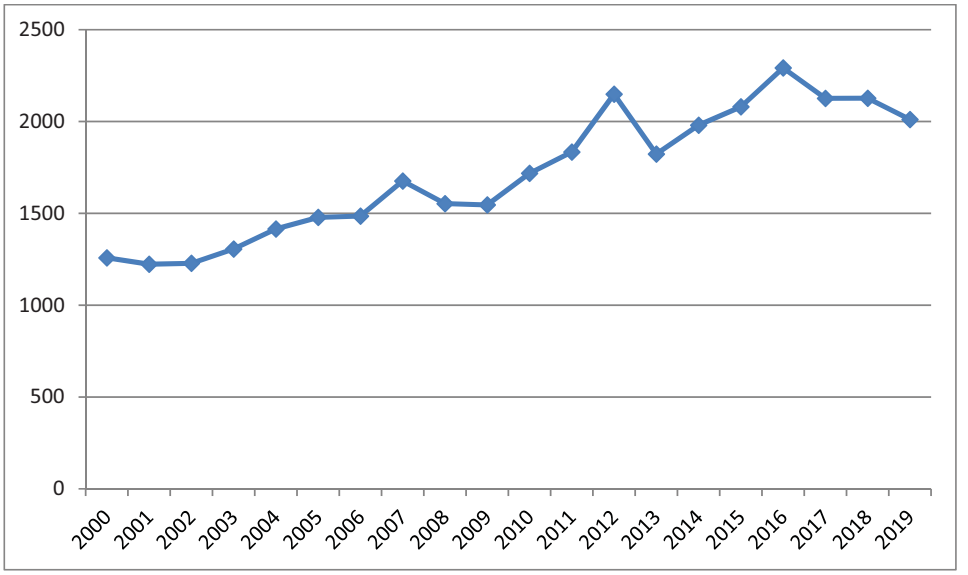

Figure 1: Literature published in Lung Infection in adult by year-wise

5.2 AUTHORSHIP PATTERN

This paper has attempted to study the level of authorship pattern. i.e. Single Vs. Multiple authors, Degree of Collaboration (DC), Pattern of Co-Authorship Index (CAI), and Collaborative Co-efficient (CC).

5.2.1 Single Vs Multiple Authors

For the analysis purpose the output has been presented in two groups of periods i.e. 2000-2009 and 2010-2019. The year-wise distribution of papers of Lung Infection in adult literature by authorship pattern is given in Table 2 and 3.

The output research of Lung Infection in adult literature has been presented in the table-2 from the year 2000 to 2009. The year-wise distribution of papers according to the number of authors is given. It is presented from the Table-2 that 3.97% of the papers were by single author papers. 95.65% represent two and more authors' papers, which expose that the collaborative research is evident in the Lung Infection in adult literature. Meager percentages i.e. 0.4% of papers represent anonymous authors in this study (Figure-2).

The output research of Lung Infection in adult literature has been given in the table-3 from the year 2010 to 2019. The year-wise distribution of papers according to the number of authors is presented. The Table-3 shows that 1.50% of the papers were by single author papers. 98.32% represent two and more authors' papers, which reveal that the collaborative research is evident in the Lung Infection in adult literature. Meager percentages i.e. 0.19% of papers represent anonymous authors in this study period (Figure-3).

***Table 2*: Authorship pattern of Lung Infection in adult literature (2000 - 2009)**

Authors	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	No. of Papers	%
Single Author	65	68	64	58	60	54	48	46	52	47	562	3.97
Two Authors	104	113	117	121	99	96	113	124	124	78	1089	7.69
Three Authors	174	148	167	139	170	181	161	199	183	169	1691	11.94
Four Authors	149	165	168	168	186	216	220	216	191	212	1891	13.35
Five Authors	210	167	180	188	211	223	199	211	228	212	2029	14.32
> Five Authors	550	549	528	621	684	706	740	877	771	824	6850	48.35
Anonymous	6	13	4	11	5	2	4	3	4	4	56	0.40
Total	**1258**	**1223**	**1228**	**1306**	**1415**	**1478**	**1485**	**1676**	**1553**	**1546**	**14168**	**100.00**

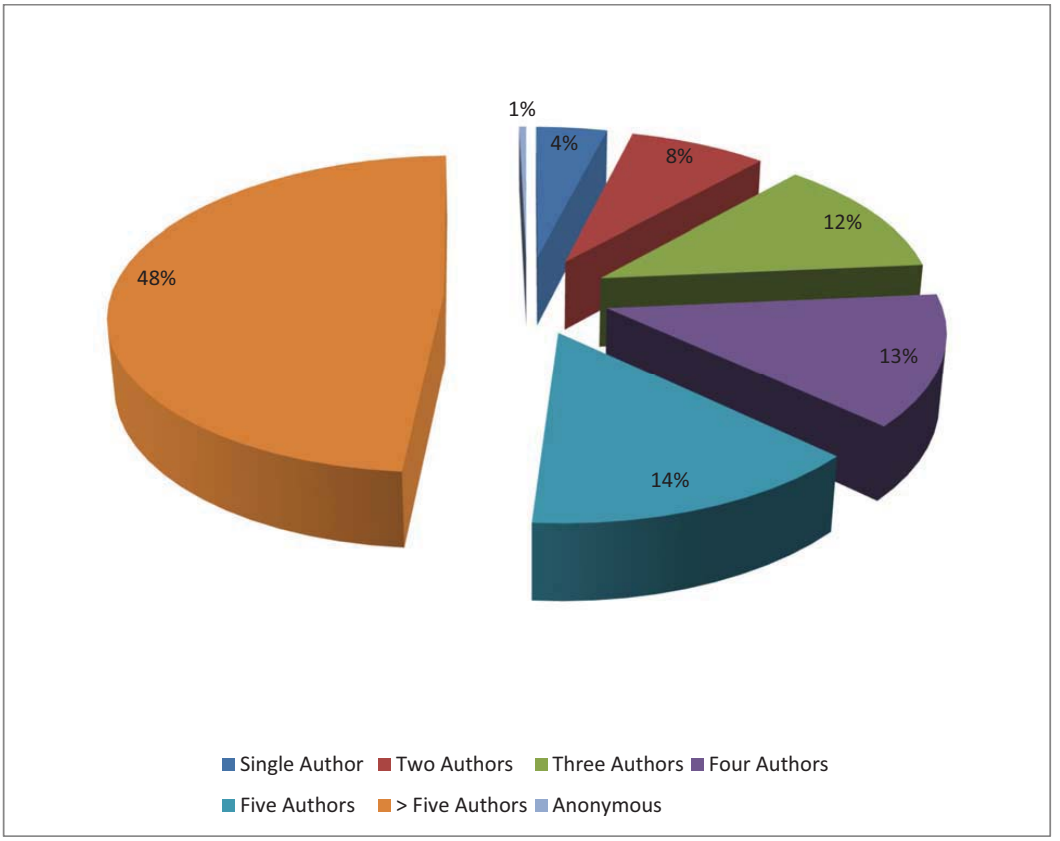

Figure 2: Authorship Pattern of Lung Infection in adult literature (2000 – 2009)

***Table 3*: Authorship pattern of Lung Infection in adult literature (2010 – 2019)**

Authors	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	No. of Papers	%
Single Author	41	51	41	31	25	24	24	26	21	18	302	1.50
Two Authors	103	118	137	89	98	105	104	108	99	76	1037	5.15
Three Authors	187	186	245	187	184	175	191	175	158	150	1838	9.13
Four Authors	222	232	270	235	232	261	261	279	207	215	2414	11.99
Five Authors	213	237	272	194	267	229	265	215	209	193	2294	11.39
> Five Authors	935	1004	1181	1085	1173	1284	1444	1321	1431	1359	12217	60.66
Anonymous	17	6	3	2	1	2	3	2	2	0	38	0.19
Total	**1718**	**1834**	**2149**	**1823**	**1980**	**2080**	**2292**	**2126**	**2127**	**2011**	**20140**	**100.00**

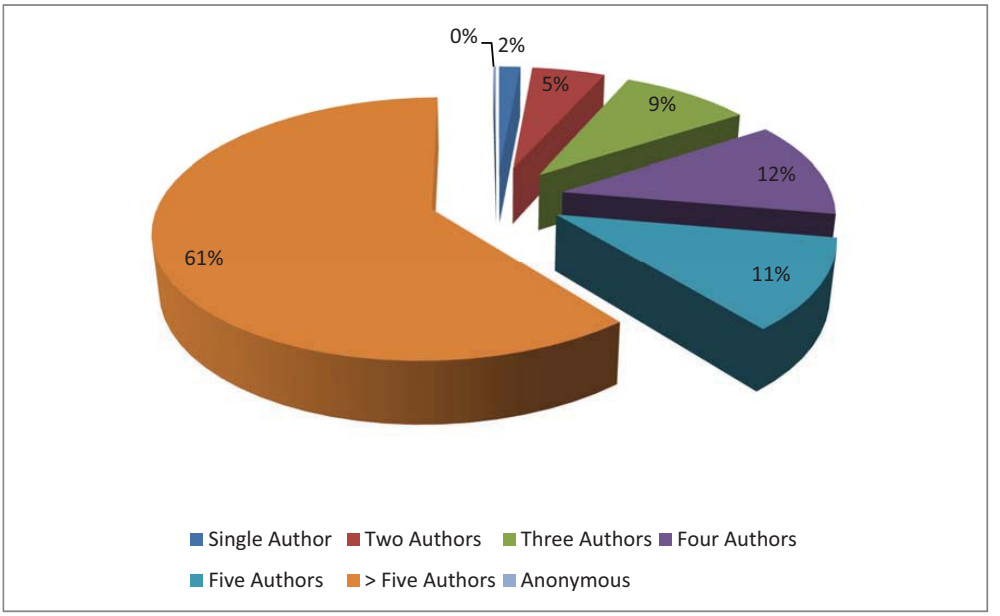

Figure 3: Authorship Pattern of Lung Infection in adult Literature (2010 – 2019)

Table-4 displays that the authorship pattern of research output of Lung Infection in adult literature. The multi-authors' papers found the major percentage in this study. It also shows that a total of 97.2% of papers are written by multi-authors. The ratio represents that the single and multi-authors' papers is 1:38 in the field of Lung Infection in adult. But, it was understood that meager percent (0.27%) represent anonymous authorship in this study. The high occurrence by multi-authors' papers is the phenomenon of scientific research which is proved by different researchers in their different studies. (Figures-4, and 5).

***Table 4*: Single Vs Multi Authored papers in Lung Infection in adult Research**

S.No.	Year	Anonymous		Single Authored		Multi Authored		Total	%
		Papers	%	Papers	%	Papers	%		
1.	2000	6	6.38	65	7.52	1187	3.56	1258	3.67
2.	2001	13	13.83	68	7.87	1142	3.42	1223	3.56
3.	2002	4	4.26	64	7.41	1160	3.48	1228	3.58
4.	2003	11	11.70	58	6.71	1237	3.71	1306	3.81
5.	2004	5	5.32	60	6.94	1350	4.05	1415	4.12
6.	2005	2	2.13	54	6.25	1422	4.26	1478	4.31

7.	2006	4	4.26	48	5.56	1433	4.30	1485	4.33
8.	2007	3	3.19	46	5.32	1627	4.88	1676	4.89
9.	2008	4	4.26	52	6.02	1497	4.49	1553	4.53
10.	2009	4	4.26	47	5.44	1495	4.48	1546	4.51
11.	2010	17	18.09	41	4.75	1660	4.98	1718	5.01
12.	2011	6	6.38	51	5.90	1777	5.33	1834	5.35
13.	2012	3	3.19	41	4.75	2105	6.31	2149	6.26
14.	2013	2	2.13	31	3.59	1790	5.37	1823	5.31
15.	2014	1	1.06	25	2.89	1954	5.86	1980	5.77
16.	2015	2	2.13	24	2.78	2054	6.16	2080	6.06
17.	2016	3	3.19	24	2.78	2265	6.79	2292	6.68
18.	2017	2	2.13	26	3.01	2098	6.29	2126	6.20
19.	2018	2	2.13	21	2.43	2104	6.31	2127	6.20
20.	2019	0	0.00	18	2.08	1993	5.98	2011	5.86
	Total	**94**	**100.00**	**864**	**100.00**	**33350**	**100.00**	**34308**	**100.00**

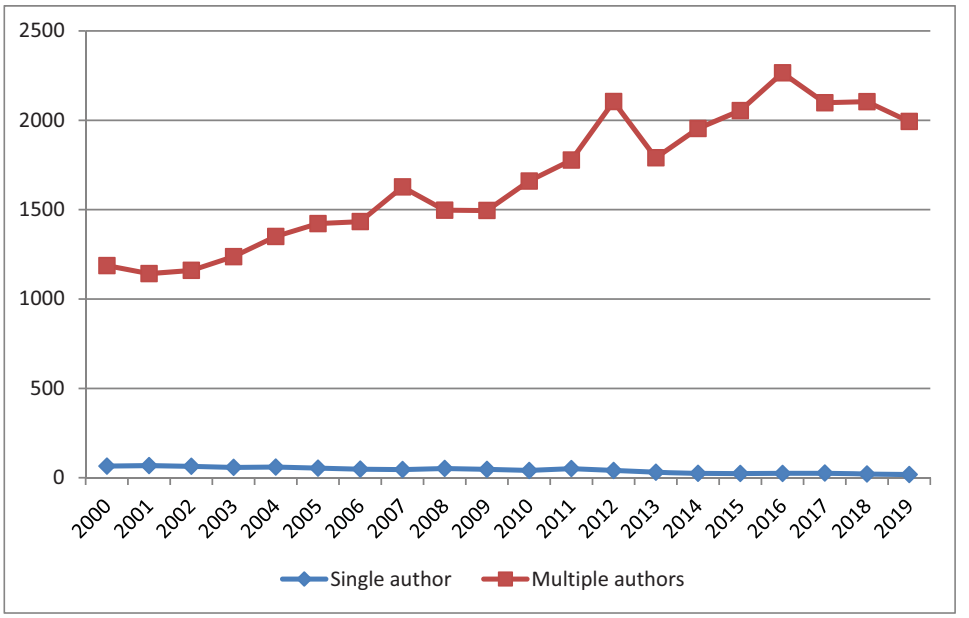

Figure 4: Single Vs. Multi authored papers in Lung Infection in adult Research

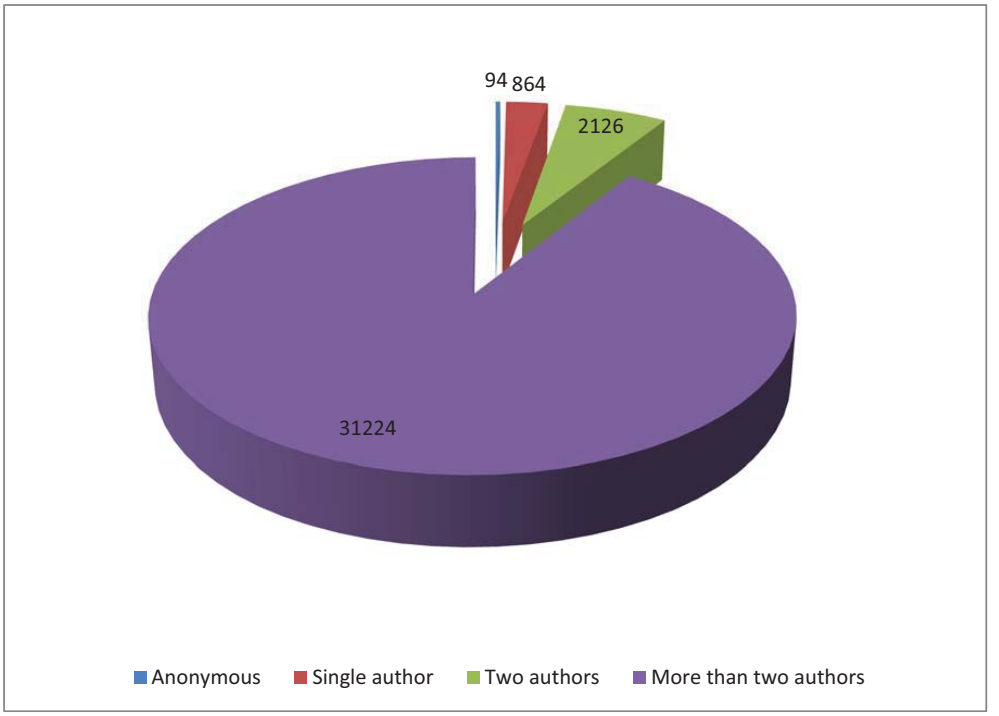

Figure 5: Authorship Pattern of Lung Infection in adult research

5.2.2 Degree of Collaboration in Lung Infection in adult Research:

The Degree of Collaboration of authors by year-wise is seen in Table-5. The Degree of Collaboration in the field of Lung Infection in adult has been calculated with the help of the formula made by K. Subramaniam. Consequently, the Degree of Collaboration has been calculated for the year 2000. It is given as follows:

$$C = \frac{1187}{1187 + 65} = \frac{1187}{1252} = 0.95$$

Correspondingly, the Degree of Collaboration is considered for every year and given in Table-5. It is presented from the table that the year-wise Degree of Collaboration displays the ratio in-between 0.94 to 0.99 in the study of the degree of collaboration in the field of Lung Infection in adult. (Fig.6) The year-wise Degree of Collaboration falls more than 0.5 and showing that the multi-authors' papers are more in the field of Lung Infection in adult.

***Table 5*: Degree of Collaboration in Lung Infection in adult Research**

Year	Anonymous	Single author	Two authors	Three Authors	Four Authors	Five Authors	More than Five author	Total	More than one author	Degree of Collaboration
2000	6	65	104	174	149	210	550	1258	1187	0.95
2001	13	68	113	148	165	167	549	1223	1142	0.94
2002	4	64	117	167	168	180	528	1228	1160	0.95
2003	11	58	121	139	168	188	621	1306	1237	0.96
2004	5	60	99	170	186	211	684	1415	1350	0.96
2005	2	54	96	181	216	223	706	1478	1422	0.96
2006	4	48	113	161	220	199	740	1485	1433	0.97
2007	3	46	124	199	216	211	877	1676	1627	0.97
2008	4	52	124	183	191	228	771	1553	1497	0.97
2009	4	47	78	169	212	212	824	1546	1495	0.97
2010	17	41	103	187	222	213	935	1718	1660	0.98
2011	6	51	118	186	232	237	1004	1834	1777	0.97
2012	3	41	137	245	270	272	1181	2149	2105	0.98
2013	2	31	89	187	235	194	1085	1823	1790	0.98
2014	1	25	98	184	232	267	1173	1980	1954	0.99
2015	2	24	105	175	261	229	1284	2080	2054	0.99
2016	3	24	104	191	261	265	1444	2292	2265	0.99
2017	2	26	108	175	279	215	1321	2126	2098	0.99
2018	2	21	99	158	207	209	1431	2127	2104	0.99
2019	0	18	76	150	215	193	1359	2011	1993	0.99
Total	**94**	**864**	**2126**	**3529**	**4305**	**4323**	**19067**	**34308**	**33350**	0.97

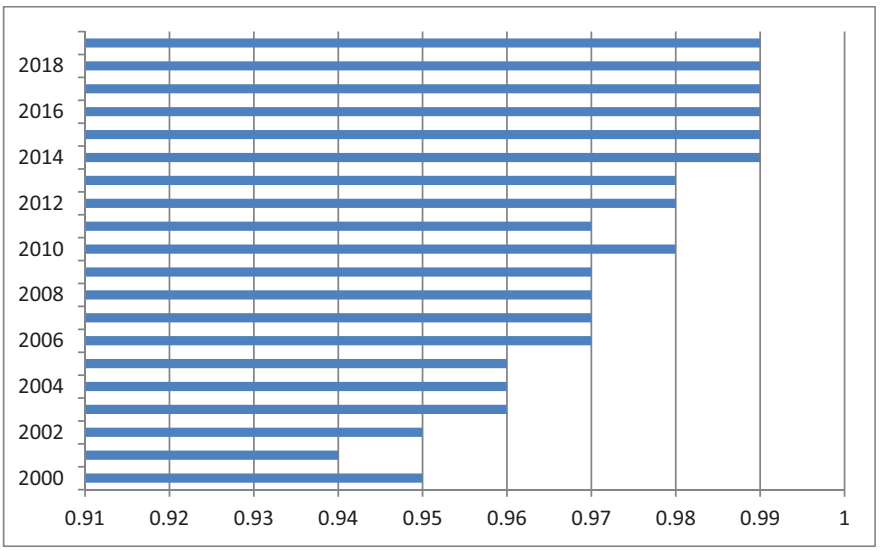

Figure 6: Degree of Collaboration in Lung Infection in adult Research

5.2.3 The Pattern of Co-Authorship Index (CAI)

To study the patterns of co-authors have changed in the field of Lung Infection in adult Research from the year 2000 to 2019, the formula of Co-Authorship Index (CAI) has been employed. For the purpose of measuring CAI the entire data set was divided into four blocks. Consequently, the Co-Authorship Index (CAI) has been considered for the single author (first block) as follows:

CAI = {(315 /6391) / (864/ 34308)} * 100

CAI = 195.71

Likewise, the Co-Authorship Index (CAI) is measured for every block and given in Table-6. For measuring the CAI, the entire papers were divided into four blocks as per the formula and the results of CAI are presented in Table-6. It is seen from the Table-6 that the value of CAI for single-author papers from the year 2000 to 2004 was higher (195.71) in the first block and declined in the other three blocks. Likewise, for two-author's papers, the CAI in the first block i.e. from the year 2000 to 2004 was 139.89 and declined in the other three blocks. The CAI for more than two authors' papers was lower (94.94) in the first block and enriched to 103.62 in the fourth block period i.e. from the year 2015 to 2019. This shows that the group of researchers worked together in the field of Lung Infection in adult research. It also shows that it is in an increasing trend in recent years. (Fig.7)

***Table 6*: Pattern of Co-Authorship Index (CAI) by Year-wise**

Sl.No.	Year	Single Author	Two authored	More than Two authors	Total
1	2000-2004	315 **(195.71)**	554 **(139.89)**	5522 **(94.94)**	6391
2	2005-2009	247 **(127.03)**	535 **(111.82)**	6939 **(98.75)**	7721
3	2010-2014	189 **(79.21)**	545 **(92.82)**	8741 **(101.37)**	9475
4	2015-2019	113 **(42.22)**	492 **(74.71)**	10022 **(103.62)**	10627
Anonymous					94
Total		**864**	**2126**	**31224**	**34308**

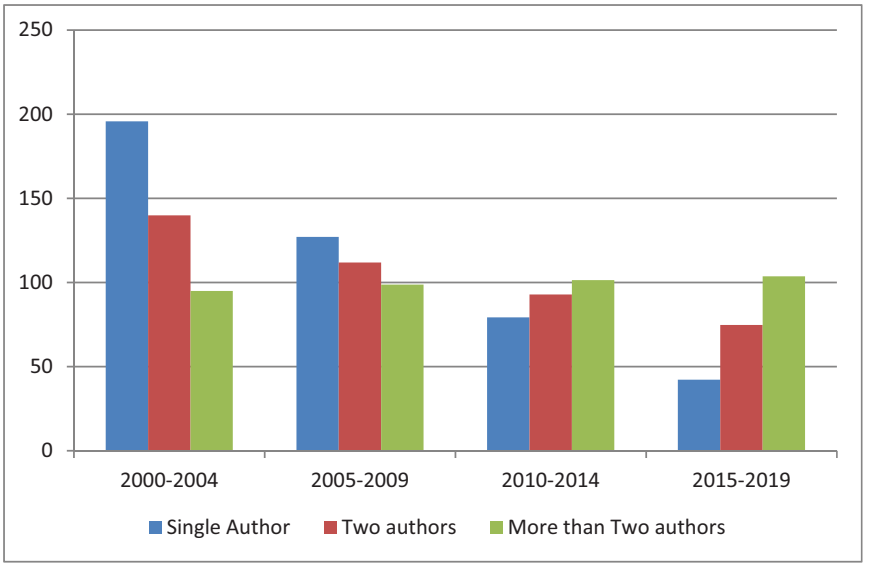

Figure 7: Pattern of Co-Authorship Index (CAI) by Year-Wise

5.2.4 Pattern of Co-Authorship among countries

To study the pattern of co-authorship among countries, the entire papers were divided into single, two and more than two authors for each country and the results are given in the Table 7. The pattern of co-authorship among different countries has been examined by making use of collaborative Co-efficient (CC) recommended by Ajiferuke. The formula employed for measuring CC is presented below:

$$CC = 1- \left[\sum_{j=1}^{k} (1/j) Fj / N \right]$$

F_j = the number of authored papers

N = total number of research published; and

k = the greatest number of authors per paper

CC = 1-[(258/7899) + ½ (617/7899) + 1/3 (7024/7899)]

= 0.63

According to Ajiferuke, the CC tends zero as single authored papers lead, and on the other hand if the CC is in increasing that results in multi authored papers. In other words, greater the value of CC, more the chance of multi authored papers in the field of Lung Infection in adult. In this study it

is seen that the average CC has been arrived at 0.64 which shows large share of papers were by multiple authors in the field of Lung Infection in adult.

The value of CC for Iran and Tunisia was highest (0.67 each) in this study followed by Ireland and Greece (0.66 each) and this is followed by France, Netherlands, China, Spain, Denmark, Brazil, Canada, Czech Republic, and Belgium (0.65 each). The other countries in the table-7 have also above the CC value of 0.50 except the country i.e. Ukraine (0.46) where the CC is below 0.5. In other words, the countries showing CC as more than the value of 0.5 indicates that those countries have better collaboration of research in comparison to the countries with less than 0.5 as exposed in the Table 7.

***Table 7*: Collaborative Coefficient (CC) Authorship Pattern**

Country	Single authored paper	Two authored paper	More than Two authors	Total	Collaborative Coefficient
United States	258	617	7024	7899	0.63
England	106	279	3781	4166	0.64
France	54	133	2760	2947	0.65
Japan	73	59	1606	1738	0.63
Germany	44	80	1306	1430	0.64
Netherlands	25	68	1327	1420	0.65
China	9	51	703	763	0.65
Spain	5	31	589	625	0.65
Australia	8	47	517	572	0.64
Russia (Federation)	52	80	367	499	0.57
Switzerland	15	31	409	455	0.63
Italy	16	30	402	448	0.63
Denmark	7	25	384	416	0.65
India	12	35	267	314	0.62
Poland	25	24	198	247	0.58
Ireland	1	6	236	243	0.66
Brazil	1	13	199	213	0.65
Turkey	5	8	171	184	0.64
Canada	2	7	136	145	0.65
Greece	0	3	91	94	0.66
Thailand	2	11	81	94	0.63
Singapore	2	8	82	92	0.64
Scotland	3	6	76	85	0.63
Romania	4	3	66	73	0.62
Pakistan	2	11	47	60	0.61
New Zealand	4	15	28	47	0.56
Egypt	4	6	35	45	0.59
Czech Republic	1	1	42	44	0.65
Argentina	1	2	35	38	0.64
Mexico	1	3	36	40	0.64

Serbia	1	3	36	40	0.64
Chile	1	7	29	37	0.62
Ukraine	10	5	21	36	0.46
Austria	1	3	30	34	0.63
Belgium	0	4	30	34	0.65
Saudi Arabia	2	7	25	34	0.59
China (Republic : 1949-)	3	3	25	31	0.59
Croatia	1	1	29	31	0.64
Hungary	1	1	29	31	0.64
Malaysia	0	7	21	28	0.63
Portugal	1	0	27	28	0.64
Iran	0	0	27	27	0.67
Tunisia	0	0	27	27	0.67
Korea (South)	1	3	22	26	0.62
Sweden	2	0	23	25	0.61
United Arab Emirates	3	5	17	25	0.55
Israel	2	3	18	23	0.59
Norway	2	1	17	20	0.59
Other countries	6	21	182	209	0.63
Not Mentioned	85	359	7588	8032	0.65
Anonymous				94	
Total	**864**	**2126**	**31224**	**34308**	**0.64**

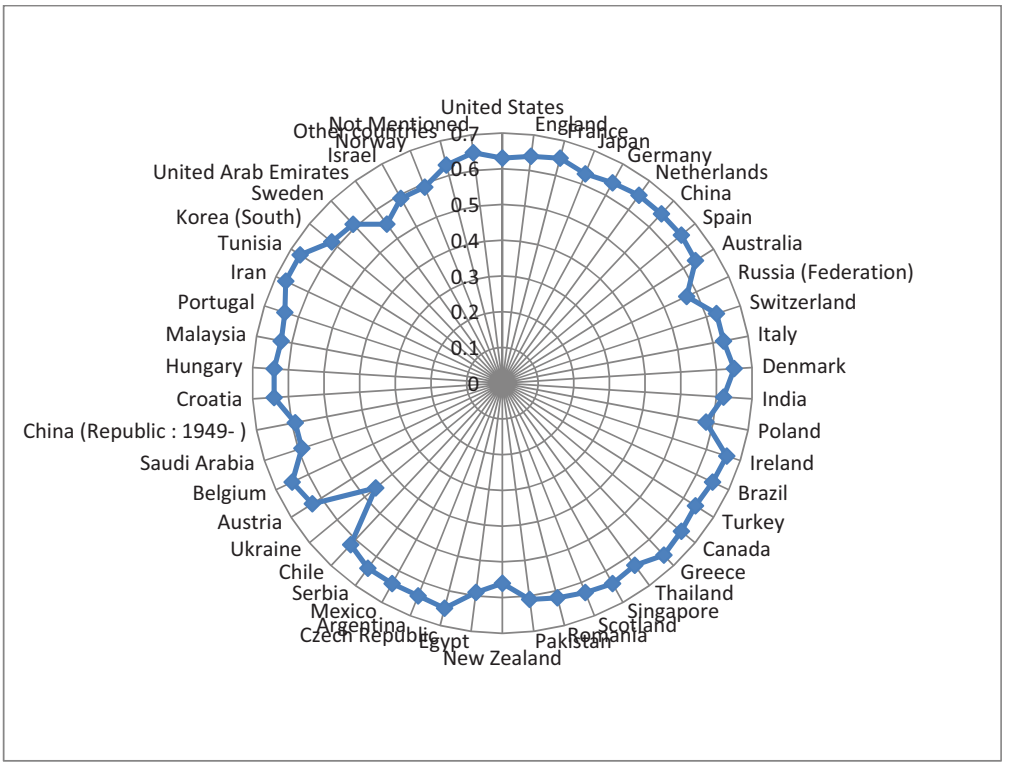

Figure 8: Collaborative Coefficient (CC) Authorship Pattern

6. DISCUSSION

A total of 34308 of papers in the field of Lung Infection in adult literature were found. The highest number of 2292 papers was published in the year 2016 in the field of Lung Infection in adult literature. A total of 0.4% of papers represents anonymous in the first ten years i.e. 2000-2009 and a total of 0.19% of papers represents anonymous authorship in the second ten years i.e. 2010-2019 in the field of Lung Infection in adult literature. A total of 95.65% of papers from the year 2000 to 2009 and 98.32% of papers from the year 2010 to 2019 were two and more authors' papers in this study. A total of 97.2% of papers are written by multi-authors in the field of Lung Infection in adult literature from the year 2000 to 2019. The ratio of single and multi-authors' papers is 1:38 in the field of Lung Infection in adult literature. The year-wise Degree of Collaboration shows the ratio in-between 0.94 to 0.99 in the field of Lung Infection in adult literature. The value of CAI for single-author papers was 195.71 in the first block i.e. from the year 2000 to 2004 was higher and declined in the other three blocks. Similarly, for two author's papers, the CAI was 139.89 in the first block i.e. from the year 2000 to 2004 was higher and declined in the other three blocks. The CAI for more than two authors' papers was less (94.94) in the first block and enhanced to 103.62 in the fourth block period i.e. from the year 2015 to 2019. The average CC has been arrived at 0.64 which indicates large number of papers was by multiple authors. The total study exposed that the multi-authors' papers are lead in the field of Lung Infection in adult literature. It also shows that the collaboration in Lung Infection in adult research is in an increasing trend in recent years.

7. CONCLUSION

There are 34308 of papers were found in the field of Lung Infection in adult literature in the study period. A total of 97.2% papers represent collaborative research. The average value of Degree of Collaboration (DC) has arrived at 0.97. The value of the Co-Authorship Index (CAI) for single-author and two authors' papers show a declining trend from one block year period to another block. But, for more than two authors' papers, the Co-Authorship Index exposes an increasing trend. It displays that the recent years the collaboration of authors was increased. The average of collaborative Co-efficient (CC) has been reached at 0.64 which shows large share of papers were by multiple authors.

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