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JOURNAL OF CLINICAL BIOCHEMISTRY AND NUTRITION: A BIBLIOMETRIC ANALYSIS

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**JOURNAL OF CLINICAL BIOCHEMISTRY AND NUTRITION: A
BIBLIOMETRIC ANALYSIS**

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ABSTRACT

Journal of Clinical Biochemistry and Nutrition is a bi-monthly journal, currently published from Japan by the Society for free Radical Research. It publishes six issues in a year. The study examines the article published in the Journal of Clinical Biochemistry and Nutrition from 2007 to 2017. This paper aimed to assess growth pattern of research output, authorship pattern, degree of collaboration, ranking of authors based on productivity and h-index, most cited references, type of items produced, keyword wise distribution, most productive countries and most productive institutions, distributions of research output and also estimate the future growth of publications using straight line equation. There are 813 articles were published during 2007-2017(11 years). The highest number of 88 articles were published in 2009 and lowest number of 63 articles published in 2007. Majority of the contributions are more than five authors. There exists a higher level of collaborations between the authors. Naito Y is the most productive author ranked in first position and Suzuki H, Yoshikawa T

and Watanabe K are each of them having h-index score 9 who are placed in the first rank. this study also reveals the highly cited papers in Journal of Clinical Biochemistry and Nutrition. Most of the research outputs in the journal are articles. 'Induced' is the keyword which is mostly occurred in the journal. Nearly one-third of the articles were published in Japan. It is known that different institutions were involved in the publication of articles, from these top most productive institutions are listed. It is estimated that research output of the source journal may take slightly increasing future.

Keywords: Bibliometric, Clinical Biochemistry, Nutrition, Journal of Clinical Biochemistry and Nutrition, Quantitative analysis, Growth of publication, Citation, Authorship pattern

1. INTRODUCTION

Bibliometrics is a well-established research tool used by the librarians, teachers and information scientists to indicate the relationship between the cited and citing documents. The study is conducted to know authorship pattern, the degree of collaboration, year wise citations, most prolific authors, most cited journals etc., the study helps to determine the value of documents and their possibility of the addition to the library. The literature use pattern of scientists and research scholars have radically changed with the passage of time. They need the first-hand information which should be available to them instantly. In this regard, the bibliometric study is quite useful.

Journal of Clinical Biochemistry and Nutrition is a multidisciplinary journal associated with the field chemical, biochemical, physiological, pathological, toxicological and medical approaches to research on lipid peroxidation, free radicals, and nutrition. The journal currently published from Japan by the Society for free Radical Research. It is a bi-monthly journal publishing six issues in a year.

2. REVIEW OF LITERATURE

Review of related literature has been studied and most relevant studies are quoted and explained.

A bibliometric analysis on rural studies in human geography and related disciplines a study conducted by Wang, Jieyong, and Zhigao (2014). The required data retrieved from Social Science Citation Index-listed journals. The data analyzed using various bibliometric parameters and techniques. Results are made based on the objectives framed by the researchers. There are 501 highly cited articles are recognized by the researchers from 1956 to 2009 in 37 journals. It is identified that 26% of highly cited articles are published by MIS

Quarterly. 11 articles are known as the most productive contribution by the researcher. 13 most productive institutions are from USA and Canada. Harvard University is placed in the first position in the sum of highly cited articles. 67% of highly cited articles are received in the USA.

Bapte, Vishal Dattatray (2018) studied on a journal 'DESIDOC Journal of Library and Information Technology (DJLIT)' published from 2011 to 2015 reveals the distribution of citations, authorship pattern and degree of collaboration of authors contributions.

Barik, N., & Jena, P. (2013) stated in their study Bibliometric Analysis of Journal of Knowledge Management Practice, 2008-2012. During 2008-2012, a total number of 21 issues with 180 articles were published. Around the five years of the study period, the highest number of 42 (23.3%) of articles were published on 2010&2011. Nearly half of the contributions are done by single authors. Australia was produced the majority of the publications among all other countries. During the study period, there are 180 articles were received 3368 citations. Highest numbers of 933 citations were received in 2010. More than 50% of the publications are range from 11 to 20 pages.

Bladi, Z. H., & others (2018) analyzed the 'Pakistan Journal of Pharmaceutical Sciences' and the results show that India is the most prolific country in the production of Pharmaceutical Science research followed by Iran and Bangladesh.

Manoj Kumar and A.L. Moorthy (2011) conducted a bibliometric study on the journal, DESIDOC Journal of Library and Information Technology from the period 2001 to 2010. The findings of the study examines that the year wise distribution of papers, authorship pattern, Study references/citations, and sources of references, length of papers, special issues, institution wise distribution and major contributions. The study period is ten years (2001-2010) and the paper covers 271 articles. The main objective of this study is: to find out the year wise distribution of papers, to find out the authorship pattern, to find out the average number of reference per paper, to find out the average length of the paper, to find out the subject wise distribution of paper and institute-wise distribution of paper. The study reveals that the journals are most used by authors for their studies; universities/colleges are published 139 publications followed by government research institutes are published 104 publications. When considered major contributors B.M. Gupta is the major contributor to DJLIT journal published 20 articles with the first rank followed by S.M. Dhawan published 11 articles with the second rank.

Rajev, M. K. G., & Joseph, S. (2016) analyzed the publications of the journal "Malaysian Journal of Library and Information Science" during the study period 2007-2013

in their bibliometric study and Vijayanathan, R. made a bibliometric study of 25 articles was published in the Singapore Journal of Library and Information Management.

Roy, Sanku Bilas, and Basak, Moutusi (2013) in their research they found the facts of the articles published in Journal of Documentation for authorship pattern, the degree of collaboration, geographical distribution of papers and citation analysis. From this study that majority of papers are multi-authored. The degree of collaboration is found to be 0.51. The United Kingdom is the highest contribution from other countries. The average citations per paper are 43.

Singh, J. K. (2014) in his study “A Scientometric analysis of Indian Journal of Pure and Applied Physics (2006-2010): A study based on Web of Science” revealed that all types of document published in a source journal i.e. three types of items published in the source journal among these articles are having highest number of 640(97.41%) items published. Out of 657 publications highest of 144(21.918%), publications were published in 2007. 174(26.48%) contributions were done by double authors. Council of Scientific Industrial Research CSIR India has contributed most prolific institutions among others. 657 publications were received 1229 citations during the study period the highest number of 291(23.67%) citations was received in 2007 with 144 publications. Kumar R is placed in the first rank who produced the highest number counting 21(3.196%) publications. 394 publications are ranged from one to five pages. The average number of reference peer paper was maximum (19.92) in the year 2009.

Sushma, H. R. (2017) analyzed the publications of DESIDOC Journal of Library and Information Technology with the five years of the study period (2011-2015). There are five volumes of thirty issues (each volume six issues) have been published 294 articles. Out of 294 publications highest number 65(10.83%), articles were published in 2012. Nearly half of the contributions were produced by double authors. India is the major country to contribute with 251(85.38%) publications. B.M Gupta is the most prolific author to the DJLIT journal. Nearly one-third of the publications were range from six to ten pages. More than one-third of the contributions were from University/Colleges. Nearly half of the (45.72%) publications have used the journal for their references. Out of 294 articles, the highest number of 116 articles having 11-20 references.

Thangamani, T and Palaniappan, M (2018) conducted a study titled as “A Bibliometric Analysis of the Journal “Scientometrics” (2008-2017): A Study based on Web of Science”. From the study, the following results have been observed; there are ten years has been taken for the study period. Totally 2814 articles were published during the study period.

The year wise publication growth has been increased year by year. Majority of the articles are done by double authors. Glanze, W is the most prolific author in the source journal. There exist higher levels of collaboration between the authors. Most of the publications are the article in nature. Majority of the contributions are from China. The Katholieke University Leuven is the most prolific institution to the produced highest number of 112 (4.00%) articles. The word Science has frequently occurred in the journal.

Verma, A., Sonker, S. K., & Gupta, V. (2015) revealed in their study 'A Bibliometric Study of The Library Philosophy and Practice (E-Journal) For the Period 2005-2014' that majority of contribution were emanating from Nigeria as well as were single authored. There is a great fluctuation in number of publications during the period of 2005 to 2006. After 2006 consistent growth is seen until the year 2011, then again the number of the article were decreasing till 2014.

Verma, Manoj Kumar and Shukla, Ravi (2018) conducted a bibliometric study on LIBRARY HERALD journal during the study period 2008-2017(ten years) and found that a total number of the article published as 222. There 46-55 volumes have been taken for study and each volume has four issues. The authors are aimed to analyze the data and found results about volume and issue-wise article distribution, volume and issue-wise authorship pattern of articles separately, author productivity, degree of collaboration, geographical distributions, major contributors with pattern of authors, reference distribution, and State wise contribution of articles from India along with authorship pattern and so on.

3. OBJECTIVES

The present study has been undertaken with the following objectives to:

- ❖ Identify the quantitative annual growth and citations of the source Journal
- ❖ Study the year wise authorship pattern
- ❖ Find out the degree of collaboration
- ❖ Ranking the authors based on productivity and h-index
- ❖ Know the type of document published in the source journal
- ❖ Identify the most common keyword used
- ❖ Ranking the countries based on the number of contributions
- ❖ Shows the most productive Institutions
- ❖ Predict the future growth of publications.

4. METHODOLOGY

The required data were retrieved from Web of Science core collection database which is maintained by Clarivate Analytics. The period of study is eleven years (2007 to 2017). This research is based on the analysis of research articles published in Journal of Clinical Biochemistry and Nutrition during 2007-2017 which is analyzed by using various bibliometric techniques. Data collected from all volumes and issues during 2007-2017. There are 813 records from volume number 40 to 61(volumes including 40 and 61) were retrieved. Totally twenty-two volumes and sixty-six issues have been taken for the study. All volumes and issues of the journal are analyzed based on bibliographic data i.e. year wise growth of publications, authorship pattern, collaboration authors, the ranking of authors, countries, institutions etc. The analysis made with the help of HistCite, Bibexcel (both are the bibliometric software packages for analyzing bibliographic data) Web of Science Citation Reports, VOS Viewer (for representing network visualization) and MS-Excel.

5. DATA ANALYSIS AND DISCUSSIONS

The retrieved data has been analyzed and interpreted under following headings.

5.1. Annual Growth and Citations

Table-1 reveals that the total number of papers published and citations received during 2007 to 2017 in the “Journal of Clinical Biochemistry and Nutrition”. It is evident from the table-1 that there are twenty-two volumes, sixty-six issues and 813 records were published during the study period. Each volume has three issues. The highest numbers of 88 (10.82%) records were published in 2009 and a minimum number of 63(7.75%) records were published in 2007. Average of 81 articles/research output was published per year. The growth of publications was not in constant during the study period. When considering the citation, there are totally 9944 citations were received during the study period. Out of 9944, there are 1900 citations were received on 2007 which is highest and 75 citations were received in 2017 which is least during the study period. From the table-1 it is known that citations of the journal were gradually decreased during the study period.

Table-1 Annual Growth and Citations

| Sl. No. | Year | Vol. No | No. of Issues | Records | Cumulative number of records | % | No. of Citations | Average Citation per Item |
|---|------|---------|---------------|------------|------------------------------|-------------|------------------|---------------------------|
| 1 | 2007 | 40 | 3 | 63 | 63 | 7.75 | 1900 | 30.16 |
| | | 41 | 3 | | | | | |
| 2 | 2008 | 42 | 3 | 65 | 128 | 8.00 | 1138 | 17.51 |
| | | 43 | 3 | | | | | |
| 3 | 2009 | 44 | 3 | 88 | 216 | 10.82 | 1572 | 17.86 |
| | | 45 | 3 | | | | | |
| 4 | 2010 | 46 | 3 | 71 | 287 | 8.73 | 1287 | 18.13 |
| | | 47 | 3 | | | | | |
| 5 | 2011 | 48 | 3 | 81 | 368 | 9.96 | 1334 | 16.47 |
| | | 49 | 3 | | | | | |
| 6 | 2012 | 50 | 3 | 82 | 450 | 10.09 | 969 | 11.82 |
| | | 51 | 3 | | | | | |
| 7 | 2013 | 52 | 3 | 71 | 521 | 8.73 | 572 | 8.06 |
| | | 53 | 3 | | | | | |
| 8 | 2014 | 54 | 3 | 72 | 593 | 8.86 | 447 | 6.21 |
| | | 55 | 3 | | | | | |
| 9 | 2015 | 56 | 3 | 74 | 667 | 9.10 | 424 | 5.73 |
| | | 57 | 3 | | | | | |
| 10 | 2016 | 58 | 3 | 74 | 741 | 9.10 | 226 | 3.05 |
| | | 59 | 3 | | | | | |
| 11 | 2017 | 60 | 3 | 72 | 813 | 8.86 | 75 | 1.04 |
| | | 61 | 3 | | | | | |
| Total | | | 66 | 813 | - | 100% | 9944 | 12.23 |
| Average number of articles per year: 73.90 | | | | | | | | |

Figure-1 Screenshot of the journal citation report

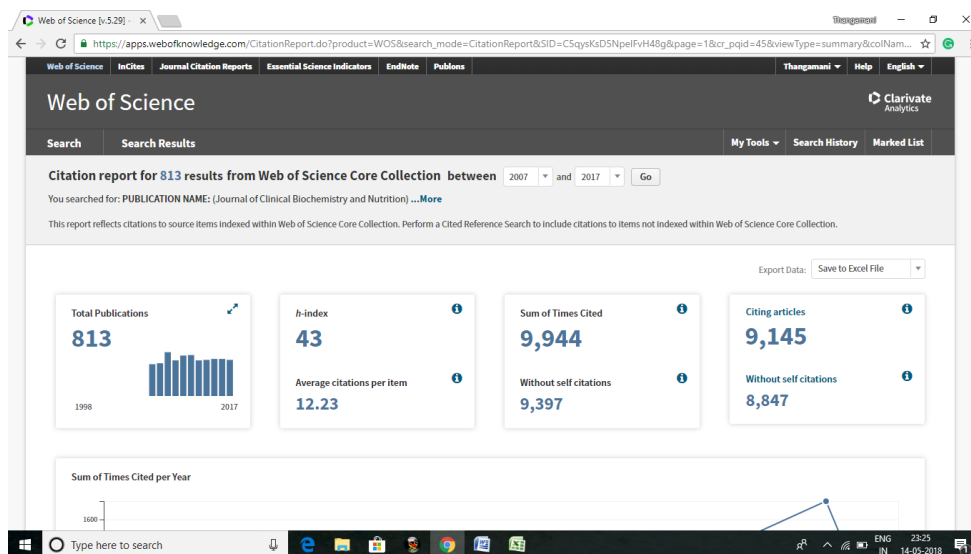
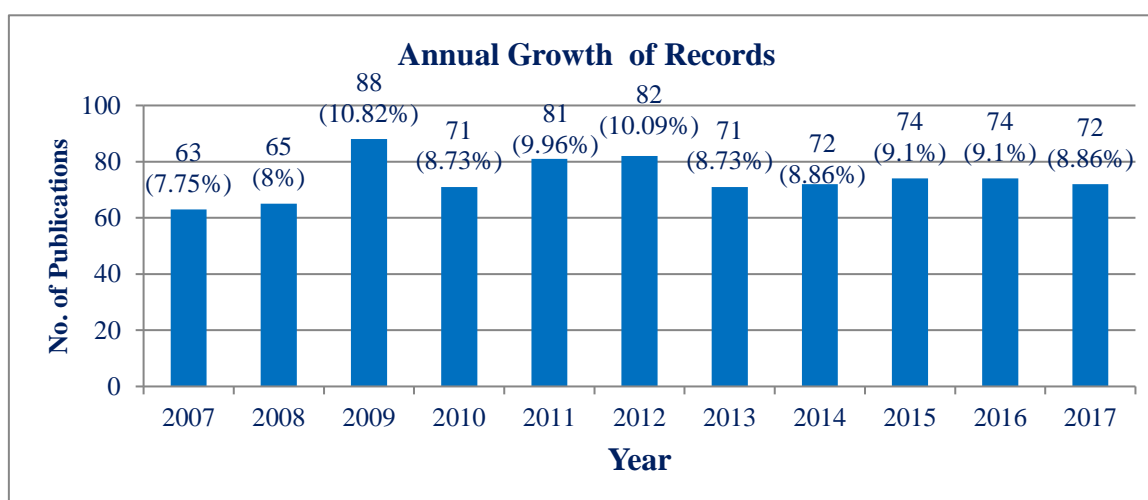


Figure-2 Annual Growth of Records



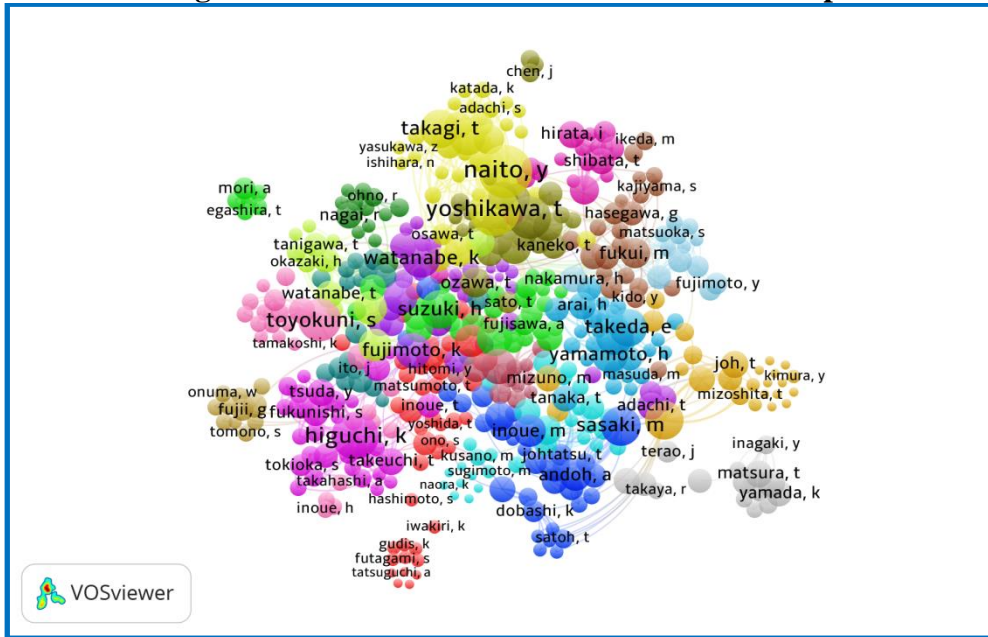
5.2. Year wise Authorship Pattern

Table-2 shows that the year wise authorship pattern of the papers published in Journal of Clinical Biochemistry and Nutrition during 2007-2017. The Maximum number of 433(53.26%) papers were from more than five authors, followed by five authored papers were 105(12.92%), four authored papers were 96(11.8%), three authored papers were 79(9.72%), two authored paper were 50(6.15%) and finally single authored paper 50(6.15%) published. Table-2 clearly shows that most of the articles were published by more than five authored and least of the articles were published by single and double authors.

Table-2 Year wise Authorship Pattern

| No .of Authors | Year | | | | | | | | | | | Total No. of Papers | % |
|----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---------------------|-------------|
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | | |
| 1 | 4 | 3 | 2 | 3 | 5 | 6 | 8 | 6 | 4 | 6 | 3 | 50 | 6.15 |
| 2 | 9 | 6 | 10 | 4 | 7 | 3 | 4 | 3 | 2 | 0 | 2 | 50 | 6.15 |
| 3 | 7 | 10 | 10 | 8 | 10 | 7 | 6 | 5 | 6 | 4 | 6 | 79 | 9.72 |
| 4 | 9 | 9 | 12 | 7 | 15 | 10 | 7 | 1 | 7 | 8 | 11 | 96 | 11.8 |
| 5 | 12 | 8 | 14 | 8 | 7 | 10 | 7 | 13 | 7 | 9 | 10 | 105 | 12.92 |
| Above 5 | 22 | 29 | 40 | 41 | 37 | 46 | 39 | 44 | 48 | 47 | 40 | 433 | 53.26 |
| Total | 63 | 65 | 88 | 71 | 81 | 82 | 71 | 72 | 74 | 74 | 72 | 813 | 100% |

Figure-3 Network Visualization of Co-authorship



5.3. Degree of Collaboration

The degree of collaboration is determined by using the following formula suggested by K. Subramaniam (1983).

$$c = Nm / (Nm + Ns)$$

Where,

c = Degree of collaboration

Nm = Number of Multiple Authored papers

Ns = Number of Single Authored papers

The degree of collaboration from 2007 to 2017 is measured and tabulated. The degree of collaboration range from 0.88 to 0.97. It is clearly known from the table-3, 93.84% of the articles are multi-authored. There are only 6.15% of the papers were by single-authored. The average degree of collaboration is 1.03 during 2007-2017 and it is clearly exposed that there exists a higher level of collaboration among authors in Journal of Clinical Biochemistry and Nutrition.

Table-3 Degree of Collaboration

| Year | Single | Multiple | Nm + Ns | DC |
|------|--------|----------|---------|------|
| 2007 | 4 | 59 | 63 | 0.94 |
| 2008 | 3 | 62 | 65 | 0.95 |
| 2009 | 2 | 86 | 88 | 0.97 |
| 2010 | 3 | 68 | 71 | 0.96 |
| 2011 | 5 | 76 | 81 | 0.94 |
| 2012 | 6 | 76 | 82 | 0.93 |
| 2013 | 8 | 63 | 71 | 0.88 |

| | | | | |
|--------------|-----------|------------|------------|------------------|
| 2014 | 6 | 66 | 72 | 0.92 |
| 2015 | 4 | 70 | 74 | 0.94 |
| 2016 | 6 | 68 | 74 | 0.92 |
| 2017 | 3 | 69 | 72 | 0.96 |
| Total | 50 | 763 | 813 | Mean 1.03 |

5.4. Most productive authors

The top ten most productive authors' of Journal of Clinical Biochemistry and Nutrition was determined and tabulated below. The top ranking authors with most productivity were ranked each according to their publication count. From the Table-4, it is found that Naito Y produced 30(3.7%) records with having 303 global citations, who is found to be the most prolific author among the contributors. The second rank was by Yoshikawa T produced 26(3.2%) records with 324 global citations, followed by Higuchi K 23(2.8%) with 179 global citations and Matsui H and Toyokuni S both of contributed with 19(2.3%) records having 215 and 117 global citations respectively. Sasaki M and others are contributed less than three percent of records.

Table-4 Ranking of Authors based on No. of Publications

| Rank | Author | Papers | % | TLCS | TGCS |
|-------------|---------------|---------------|----------|-------------|-------------|
| 1 | Naito Y | 30 | 3.7 | 24 | 303 |
| 2 | Yoshikawa T | 26 | 3.2 | 23 | 324 |
| 3 | Higuchi K | 23 | 2.8 | 25 | 179 |
| 4 | Matsui H | 19 | 2.3 | 29 | 215 |
| 4 | Toyokuni S | 19 | 2.3 | 14 | 117 |
| 5 | Sasaki M | 17 | 2.1 | 41 | 260 |
| 6 | Kamiya T | 16 | 2 | 12 | 157 |
| 6 | Suzuki H | 16 | 2 | 25 | 225 |
| 6 | Takagi T | 16 | 2 | 16 | 254 |
| 6 | Watanabe K | 16 | 2 | 12 | 160 |
| 7 | Takeda E | 15 | 1.8 | 8 | 121 |
| 7 | Taketani Y | 15 | 1.8 | 8 | 121 |
| 8 | Yamamoto H | 14 | 1.7 | 11 | 125 |
| 9 | Fujimoto K | 13 | 1.6 | 10 | 65 |
| 9 | Handa O | 13 | 1.6 | 16 | 163 |
| 9 | Kohno M | 13 | 1.6 | 14 | 188 |
| 9 | Yamamoto Y | 13 | 1.6 | 14 | 67 |
| 10 | Fujiwara Y | 12 | 1.5 | 19 | 108 |
| 10 | Suzuki K | 12 | 1.5 | 8 | 198 |
| 10 | Tamura M | 12 | 1.5 | 25 | 181 |

TLCS-Total Local Citation Score TGCS- Total Global Citation Score

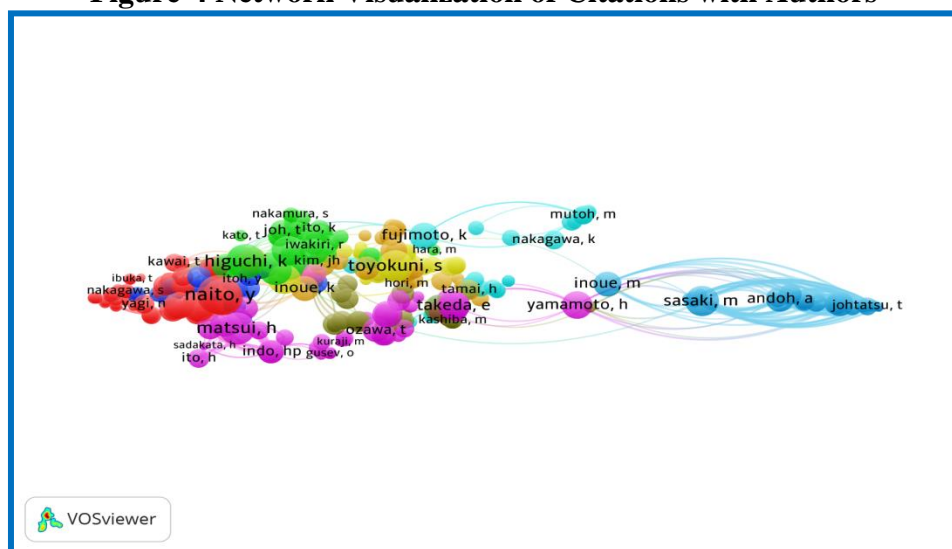
5.5. Ranking of Authors based on h-index

In the table-5 authors are ranked based on their h-index. Suzuki H, Yoshikawa T, and Watanabe K are the authors having h-index 9 three of them are getting the first rank. Hibi T, Naito Y, Takagi T, Sasaki M and Higuchi K are having h-index 8 and ranked as second place. Matsui H and others are having h-index score less than 8 and ranked according to their h-index.

Table-5 Ranking of Authors based on h-index

| Rank | Authors Name | h-index | Rank | No. of Contributions | No. of Citations | No. of Citations with in h-core |
|------|--------------|---------|------|----------------------|------------------|---------------------------------|
| 1 | Suzuki H | 9 | 1 | 16 | 225 | 196 |
| 2 | Yoshikawa T | 9 | 1 | 26 | 324 | 247 |
| 3 | Watanabe K | 9 | 1 | 16 | 160 | 135 |
| 4 | Hibi T | 8 | 2 | 8 | 187 | 187 |
| 5 | Naito Y | 8 | 2 | 30 | 303 | 228 |
| 6 | Takagi T | 8 | 2 | 16 | 254 | 223 |
| 7 | Sasaki M | 8 | 2 | 17 | 260 | 222 |
| 8 | Higuchi K | 8 | 2 | 23 | 179 | 131 |
| 9 | Matsui H | 7 | 3 | 19 | 215 | 178 |
| 10 | Inoue K | 7 | 3 | 11 | 140 | 127 |
| 11 | Ozawa T | 7 | 3 | 10 | 156 | 144 |
| 12 | Taketani Y | 7 | 3 | 15 | 121 | 97 |
| 13 | Yamamoto H | 7 | 3 | 14 | 125 | 103 |
| 14 | Suzuki K | 7 | 3 | 12 | 198 | 181 |
| 15 | Yamagami H | 7 | 3 | 9 | 118 | 110 |
| 16 | Takeda E | 7 | 3 | 15 | 121 | 97 |
| 17 | Kohno M | 7 | 3 | 13 | 188 | 162 |

Figure-4 Network Visualization of Citations with Authors



5.6. Most cited Papers

Table-6 shows that the highly cited papers in “Journal of Clinical Biochemistry and Nutrition”. From the result it is found that OHKAWA H, 1979, ANAL BIOCHEM, V95, P351 is the highly cited paper with 24(2.95%) records followed by REEVES PG, 1993, J NUTR, V123, P1939 with 23(2.82%) records, LOWRY OH, 1951, J BIOL CHEM, V193, P265 with 21 records and others are less than 20 records.

Table-6 Highly cited papers in Journal of Clinical Biochemistry and Nutrition

| Sl. No. | Author/Year/Journal | Records | % |
|---------|---|---------|------|
| 1 | OHKAWA H, 1979, ANAL BIOCHEM, V95, P351 | 24 | 2.95 |
| 2 | REEVES PG, 1993, J NUTR, V123, P1939 | 23 | 2.82 |
| 3 | LOWRY OH, 1951, J BIOL CHEM, V193, P265 | 21 | 2.58 |
| 4 | KAMIBAYASHI M, 2006, FREE RADICAL RES, V40, P1166 | 18 | 2.21 |
| 5 | FOLCH J, 1957, J BIOL CHEM, V226, P497 | 17 | 2.09 |
| 6 | BRADFORD MM, 1976, ANAL BIOCHEM, V72, P248 | 16 | 1.96 |
| 7 | Benzie IFF, 1996, ANAL BIOCHEM, V239, P70 | 12 | 1.47 |
| 8 | FRIEDEWALD WT, 1972, CLIN CHEM, V18, P499 | 11 | 1.35 |
| 9 | MATTHEWS DR, 1985, DIABETOLOGIA, V28, P412 | 11 | 1.35 |
| 10 | TOYOKUNI S, 1997, LAB INVEST, V76, P365 | 11 | 1.35 |

5.7. Publication Culture

Table-7 shows that journal articles were the most preferable form of communicating research results. Majority of contributions has been done in the form of journal’s articles with 673(82.8%) contributions followed by Review with 108(13.3%) contributions, Editorial Material with 11(1.4%), Correction and Letter with 10(1.2%) contributions and Article; Proceeding Paper with 1(0.1%) contributions. Among all type of documents, the article is having highest global citations. It is also shown in Figure-5.

Table-7 Journal of Clinical Biochemistry and Nutrition (2013-2017): No. Of Items Published (All Types)

| Sl. No | Document type | Records | % | TLCS | TGCS |
|--------------|---------------------------|------------|-------------|------------|-------------|
| 1 | Article | 673 | 82.8 | 441 | 6497 |
| 2 | Review | 108 | 13.3 | 98 | 3379 |
| 3 | Editorial Material | 11 | 1.4 | 0 | 13 |
| 4 | Correction | 10 | 1.2 | 0 | 1 |
| 5 | Letter | 10 | 1.2 | 2 | 26 |
| 6 | Article; Proceeding Paper | 1 | 0.1 | 2 | 28 |
| Total | | 813 | 100% | 543 | 9944 |

TLCS-Total Local Citation Score TGCS- Total Global Citation Score

Figure-5 Document Types

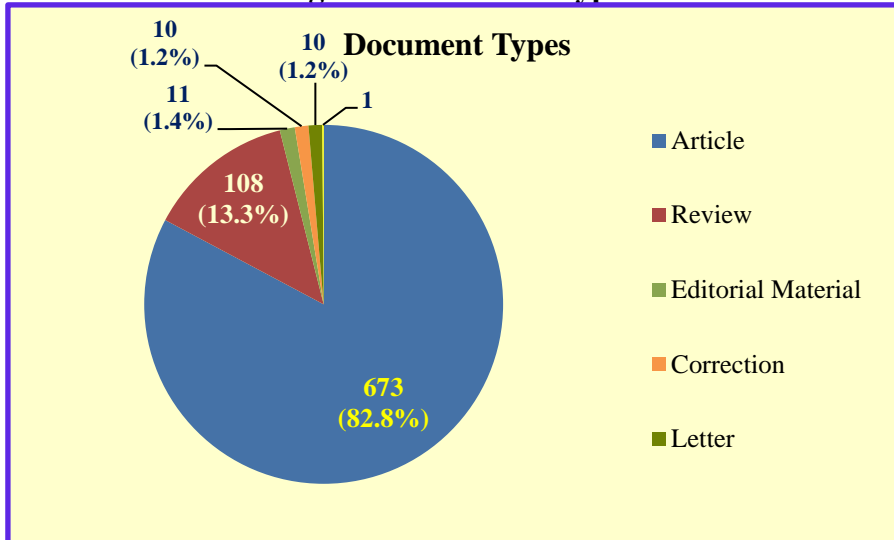
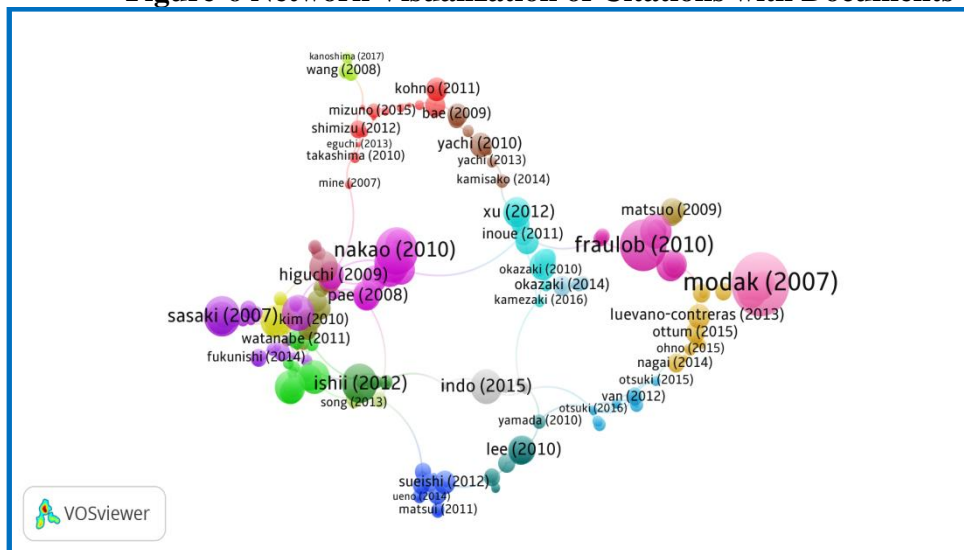


Figure-6 Network Visualization of Citations with Documents



5.8. Key Word Wise Distribution

Table-8 had clearly shown that the most frequent keyword. We have selected only most (Top Ten) used keywords for analysis. The result that the most productive keyword “Induced” has been used in 112(13.8%) records by the researchers with a global citation score of 1191 and local citation score of 100, followed by the word “Effects” used in 90(11.1%) records with global citation score 1070 and 48 local citation score, “Rats” used in 89 (10.9%) records with global citation score 1069 and 37 local citation score. Other keywords are used less than 10%.

Table-8 Distribution of keywords

| Sl. No | Keywords | Records | % | TLCS | TGCS |
|--------|-----------|---------|------|------|------|
| 1 | Induced | 112 | 13.8 | 100 | 1191 |
| 2 | Effects | 90 | 11.1 | 48 | 1070 |
| 3 | Rats | 89 | 10.9 | 37 | 1069 |
| 4 | Oxidative | 79 | 9.7 | 62 | 1460 |
| 5 | Acid | 78 | 9.6 | 24 | 1033 |
| 6 | Patients | 71 | 8.7 | 73 | 512 |
| 7 | Stress | 69 | 8.5 | 44 | 1252 |
| 8 | Effect | 67 | 8.2 | 34 | 545 |
| 9 | Cells | 64 | 7.9 | 35 | 563 |
| 10 | Mice | 63 | 7.7 | 32 | 707 |

TLCS-Total Local Citation Score TGCS- Total Global Citation Score

Figure-7 Zipf's law of keyword occurrence

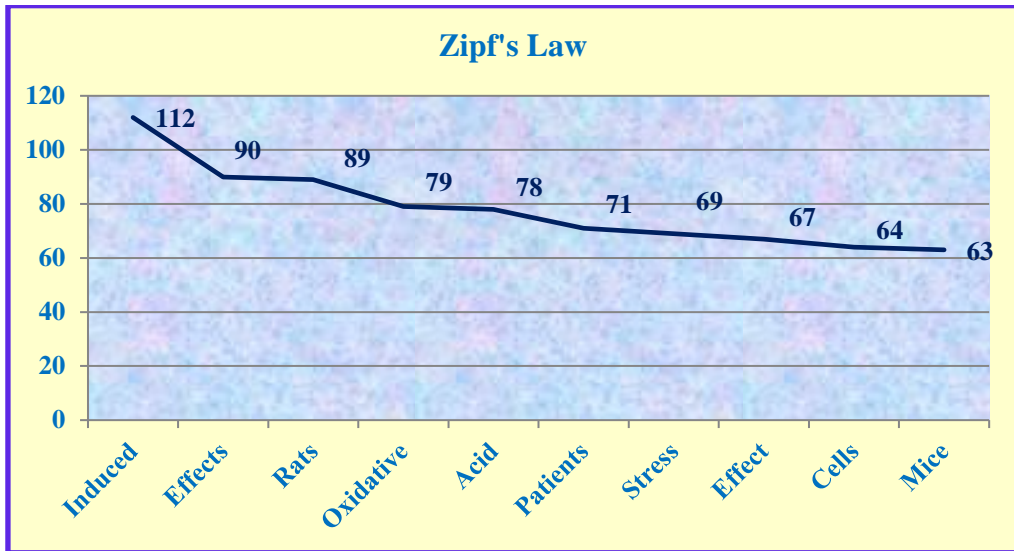
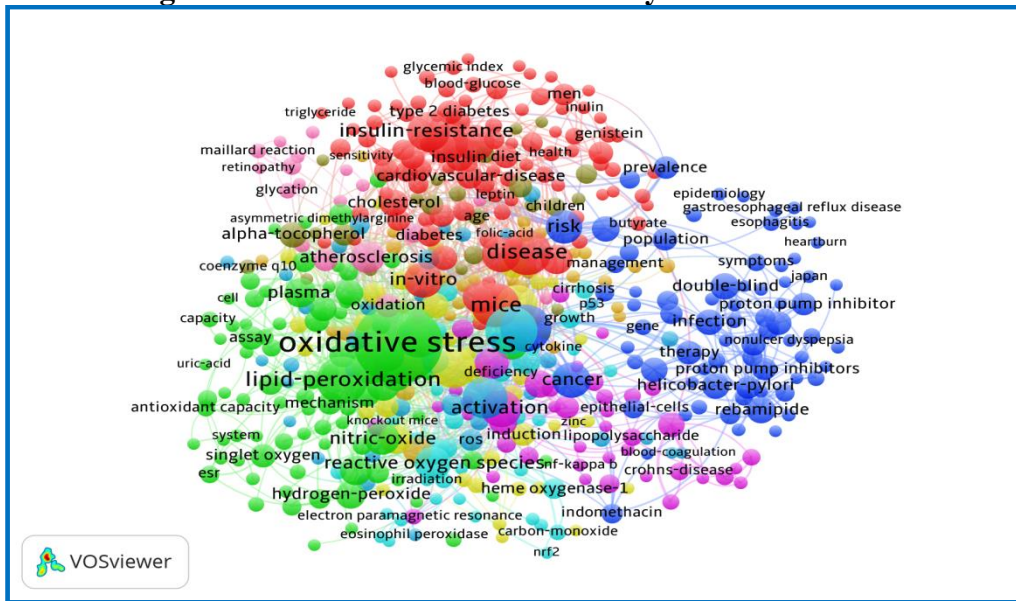


Figure-8 Network Visualization of Keyword Occurrence



5.9. Most Productive Countries

A total of 813 records were retrieved from Web of Science using the query discussed in the methodology. Table-9 gives the publication productivity of the top ten countries on Journal of Clinical Biochemistry and Nutrition from 2007 to 2017. It was found that Japan was the most productive country with 584(71.8%) of global share of publications on source journal with 5802 citations are received from Japan, followed by South Korea 56(6.9%) records with 694 global citations, Peoples R China 45(5.5%) records with 525 global citations USA 41(5%) with 883 global citations and remaining countries are produced less than five percent of records.

Table-9 Most Productive Countries and their Publications share on Journal of Clinical Biochemistry and Nutrition

| Sl. No | Country | Records | % | TLCS | TGCS |
|--------|-----------------|---------|------|------|------|
| 1 | Japan | 584 | 71.8 | 445 | 5802 |
| 2 | South Korea | 56 | 6.9 | 30 | 694 |
| 3 | Peoples R China | 45 | 5.5 | 21 | 525 |
| 4 | USA | 41 | 5 | 35 | 883 |
| 5 | India | 24 | 3 | 10 | 1196 |
| 6 | Unknown | 17 | 2.1 | 4 | 76 |
| 7 | Malaysia | 10 | 1.2 | 10 | 124 |
| 8 | Taiwan | 10 | 1.2 | 9 | 200 |
| 9 | Germany | 8 | 1 | 5 | 139 |
| 10 | Canada | 7 | 0.9 | 1 | 236 |
| 11 | Thailand | 7 | 0.9 | 13 | 172 |
| 12 | Brazil | 6 | 0.7 | 2 | 204 |
| 13 | Iran | 6 | 0.7 | 3 | 147 |
| 14 | Italy | 6 | 0.7 | 1 | 20 |
| 15 | Turkey | 6 | 0.7 | 4 | 69 |

TLCS-Total Local Citation Score TGCS- Total Global Citation Score

5.10. Institutions wise Distribution

Institution-wise contribution of researchers in Journal of Clinical Biochemistry and Nutrition during the years 2007-2017 is given in Table-10. As mentioned above, 813 papers were published during the study period. These came from various institutions. The top 10 institutions are listed in the Table-10. The most prolific publishing institution were 'Kyoto Prefectural University of Medicine' produced the highest number of 50(6.2%) records with 512 global citations, followed by 'University of Tsukuba' published 31(3.8%) records with 334 global citations, 'Nagoya University' and 'Osaka Medical College' produced 29(3.50%) records each with 230 and 186 global citations respectively and other institutions are contributed less than five percent of records.

Table-10 Research Output by Top Ten Institutions

| Sl. No | Institution | Records | % | TLCS | TGCS |
|--------|--|---------|-----|------|------|
| 1 | Kyoto Prefectural University of Medicine | 50 | 6.2 | 25 | 512 |
| 2 | University of Tsukuba | 31 | 3.8 | 40 | 334 |
| 3 | Nagoya University | 29 | 3.6 | 15 | 230 |
| 4 | Osaka Medical College | 29 | 3.6 | 27 | 186 |
| 5 | Okayama University | 27 | 3.3 | 28 | 402 |
| 6 | Osaka City University | 24 | 3.0 | 20 | 190 |
| 7 | University of Tokushima | 23 | 2.8 | 12 | 238 |
| 8 | Keio University | 18 | 2.2 | 27 | 244 |
| 9 | Tohoku University | 18 | 2.2 | 18 | 264 |
| 10 | University of Tokyo | 18 | 2.2 | 8 | 206 |

TLCS-Total Local Citation Score TGCS- Total Global Citation Score

5.11. Time serious analysis

Straight line equation is involved to estimate the upcoming growth rate with time serious analysis.

Table-11 Time serious analysis

| Year | No. of Publications (y) | x | x ² | xy |
|--------------|-------------------------|----------|----------------|-----------|
| 2007 | 63 | -5 | 25 | -315 |
| 2008 | 65 | -4 | 16 | -260 |
| 2009 | 88 | -3 | 9 | -264 |
| 2010 | 71 | -2 | 4 | -142 |
| 2011 | 81 | -1 | 1 | -81 |
| 2012 | 82 | 0 | | 0 |
| 2013 | 71 | 1 | 1 | 71 |
| 2014 | 72 | 2 | 4 | 144 |
| 2015 | 74 | 3 | 9 | 222 |
| 2016 | 74 | 4 | 16 | 296 |
| 2017 | 72 | 5 | 25 | 360 |
| Total | 813 | 0 | 110 | 31 |

Straight line equation:

$$Y_c = a + bX$$

$$\text{Since } \Sigma X = 0$$

$$a = \Sigma Y / N = 813 / 11 = 73.90$$

$$b = \Sigma xy / \Sigma x^2 = 31 / 110 = 0.28.$$

Estimated literature in 2020 is when $X = 2020 - 2012 = 8$

$$= 73.90 + 0.28 * 8 = 76.14$$

Estimated literature in 2025 is when $X = 2025 - 2012 = 13$

$$=73.90+0.28*13=77.54$$

The calculated value of literature out of Journal of Clinical Biochemistry and Nutrition for the year 2020 is 76.14 and output for the year 2025 is 77.54. With the application of the formula, the time serious analysis calculated from the results for the year 2020 and 2025, it is found that the future trend of Journal of Clinical Biochemistry and Nutrition research output may take slightly increasing for forthcoming years. The expectation from the calculations proved there is positive growth in research output of Journal of Clinical Biochemistry and Nutrition.

6. FINDINGS AND CONCLUSION

After the analysis of data derived from the Web of Science database for the period 2007 to 2017, here are presented following interesting facts, findings or we can say in more formal word results of the study that is given below:

- ❖ Every year the journal has the distinguished number of papers and every year the number of articles are found in increasing order except the year 2007. In the year 2009 the highest number of paper was contributed and in the year 2007 the lowest number of articles was contributed in the Journal of Clinical Biochemistry and Nutrition. For the period of 2007 to 2017 average, no. of the article are 73.90. The Maximum number of 1900 citations received in the year 2009, and least of 75 citations were received in 2017. For the period of 2007 to 2017 average no. of citations are 12.923. The numbers of citations have been gradually decreased year by year.
- ❖ More than five authored papers were 433 with the highest percentage (53.26%) in the whole period (2007-2017) or collaborative authorship is predominating among single-authored papers.
- ❖ The degree of collaboration in the Journal of Clinical Biochemistry and Nutrition is ranged from 0.88 to 0.97 during the period 2007 to 2017. An average rate of the degree of collaboration is 1.03.
- ❖ Naito Y was the most productive author (ranked in first position) to the Journal of Clinical Biochemistry and Nutrition with highest contribution of 30(3.7%) articles (with 303 global citations) to the source journal.
- ❖ Suzuki H, Yoshikawa T and Watanabe K are the influencing authors having highest of 9 h-index score among all other authors.

- ❖ OHKAWA H, 1979, ANAL BIOCHEM, V95, P351 is the highly cited paper with 24 articles and 1191 global citations.
- ❖ There are various types of documents published by the source journal like articles, review, editorial material etc. Among these types of documents, journal articles were the most preferable form of communicating research results. There are more than one-third of the contributions have been done in the form of journal articles with 673 (82.8%) contributions and 6497 global citations. The word “Induced” is most frequently appeared keyword in 112(13.8%) articles with 1191 global citations.
- ❖ The Journal of Clinical Biochemistry and Nutrition is enriched with the scholarly contribution of 39 countries across the world. These 39 Countries only Japan, South Korea, China USA, and India have the good number of the contribution of articles. Japan was the most productive country with 584(71.8%) global share of publications to the source journal with 5802 citations, followed by South Korea 56(6.9%) records with 694 global citations, Peoples R China 45 (5.5%) records with 525 global citations and remaining are less than five percent of records.
- ❖ The most prolific contributed institution were ‘Kyoto Prefectural University of Medicine’ produced the highest number of 50(6.2%) records with 512 global citations, followed by ‘University of Tsukuba’ published 31(3.8%) records with 334 global citations, ‘Nagoya University’ and ‘Osaka Medical College’ produced 29(3.6%) records with 230 and 186 global citations respectively.
- ❖ The future trend of growth of Journal of Clinical Biochemistry and Nutrition research output may take slightly increasing for forthcoming years. The expectation from the calculations proved there is positive growth in research output of Journal of Clinical Biochemistry and Nutrition.

7. Conclusion

The Journal of Clinical Biochemistry and Nutrition is an internationally reputable peer-reviewed open access interdisciplinary journal in its quality, currently published from Society for free Radical Research, Japan and hold quite reliable publishing authority. The Journal of Clinical Biochemistry and Nutrition (published in print as well as online), has short history of 11 years (2007 to 2011 present), but in this small history, it has shown notable development in all aspects – it is increasingly receiving contribution from different countries across the globe (39 countries have contributed during the period of 2007 to 2017). In the study, the cumulative numbers of articles are increased each year, for an average of 73

articles is published in eleven years (2007 to 2017). Although single authorship is foremost authorship trend but also two authored articles have shown a good number of contributions with the 1.03 mean rate of the degree of collaboration. This type of study is useful for researchers, readers for scholarly communication to choose right journal for research, study etc., in the concerned field. On the other hand, this study also serves as a feedback to the publishers and editors of the journals and helps them to improve the rank, quality of the journal, so that they can survive before their competitors.

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