

## **Relation Between Tea and Fluorosis - Bibliometric Analysis**

**Pulala Raghuveer Yadav<sup>1</sup>; Mitta Raghavendra<sup>2</sup>; Mallikarjuna C<sup>3</sup>**

Department of Biotechnology, Indian Institute of Technology Hyderabad, Kandi 502 284, Telangana State, India<sup>1</sup>; Department of Pharmaceutical Sciences, Vignan's Foundation for Science, Technology and Research (Deemed to be University), Vadlamudi, Guntur-522213, Andhra Pradesh, India<sup>2</sup>; Library, Indian Institute of Technology Hyderabad, Kandi 502 284, Telangana State, India<sup>3\*</sup>

*mallikarjuna.c@admin.iith.ac.in*

### **ABSTRACT**

*The study involved the analysis of best-cited articles published in the background of the relation between Tea and Fluorosis. The articles published from the year January 1967 to August 2020 in the context of the relation between tea and fluorosis were retrieved using the Scopus database. The 15 best-cited articles information concerning author names, institutional affiliation, the country of origin, source title, year of printing were analyzed. The average citations of the 15 best-cited articles were 35. The top three journals are Food and Chemical Toxicology (n=2), Journal of Fluorine Chemistry (n=2) and Fluoride (n=2). The recurrent first author and affiliation were Cao, J from the Central South University of China. The articles are of a major number of epidemiological studies. Most of the articles originated from China (n=10). The study provides the trend of research on the relation between tea and fluorosis.*

**KEYWORDS:** Bibliometric analysis, Citations, Tea, Fluoride, Scopus.

### **INTRODUCTION**

Tea tree gets the fluoride from the soil where it grows (1) and matured tea leaves have high fluoride concentration (2). There are different tea products based on manufacturing methods and different forms. Tea as a beverage when consumed in apt amount has health benefits (3). Among different types of tea, brick tea has a high F concentration. Fluoride used in appropriate amounts can prevent dental caries and osteoporosis. But chronic ingestion of brick tea containing high concentrations of fluoride as a beverage caused fluorosis among the Tibetans in Daofu County of China (4) and in Mongol, Kazak and Yugu population groups of Gansu province, China (5). A case of a 52-year-old American woman with Skeletal fluorosis affected by drinking 1-2 gallons of twofold-strength instant tea day-to-day all through adult life (6). Genetic studies had shown the candidate genes Glutathione S-transferase pi 1 (7), Matrix

metallopeptidase 2 (8), prolactin (9) and Vitamin D receptor (10) role in the risk of fluorosis among the brick tea type fluorosis individuals.

The objective of the work is to summarize the best cited papers published in the context of the relation between Tea and Fluorosis using bibliometric analysis.

## **MATERIALS AND METHODS**

### **Search Strategies**

In August 2020 a search was done using the Scopus database to categorize the best papers in the context of the relation between Tea and Fluorosis. We used the words Tea and Fluorosis for searching under Article Title, Abstract and Keywords. Thereafter, the data were screened for relevance to the objective after reading the full text, the best 15 cited articles were identified.

### **Data**

The following parameters are recorded for articles: article title, number of total citations, affiliation and country of origin of the corresponding author, year of publication, the journal of publication.

### **Results**

The search resulted in 210 articles, published between January 1967 till August 2020. Based on the above criteria the best 15 cited articles are tabulated along with the average number of citations per year. (Table 1).

The total 210 articles initially found were recorded to the search word Tea and Fluorosis from the Scopus database. The articles were listed by times cited from highest to lowest, thereafter 160 articles were included for finding the best 15 cited document types. In the next step, we excluded 145 articles after reading the full text as these needed to be more relevant to the objective. Finally, 15 best cited articles were included for bibliometric analysis.

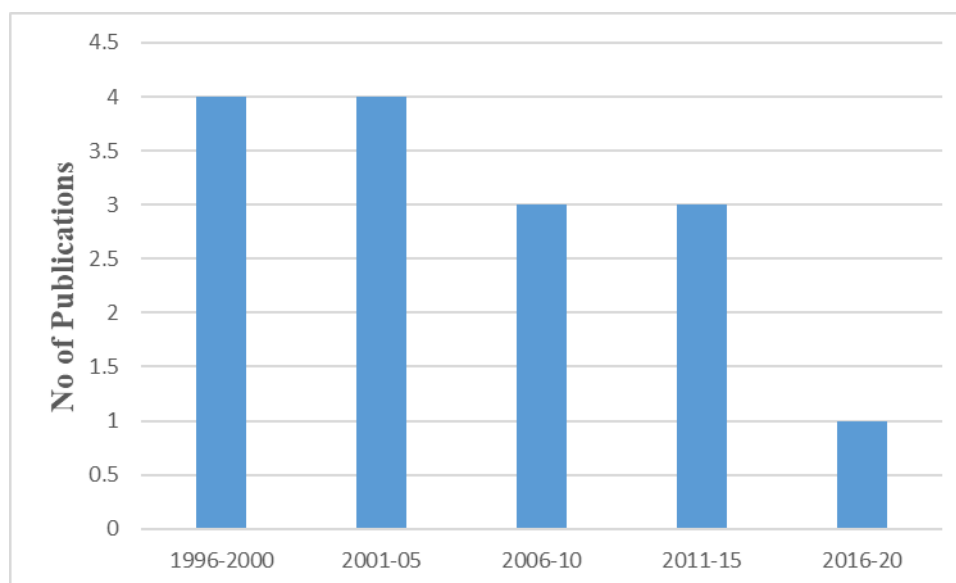
**Table 1.** List of the articles of the 15 most cited articles in the context of the relation between Tea and Fluorosis (January 1967– August 2020)

<b>S. No</b>	<b>Article</b>	<b>Total citations</b>	<b>Average no of citations per year</b>
1	Cao J et al., 2003 (11)	70	3.8
2	Cao J et al., 1997 (5)	62	2.58
3	Cao J et al., 1996 (12)	62	2.48
4	Whyte M P et al., 2005 (6)	56	3.5
5	Yi J and Cao J 2008 (13)	45	3.4
6	Whyte M P et al., 2008 (14)	37	2.84
7	Hallanger Johnson J E et al., 2007 (15)	36	2.57
8	Izuora K et al., 2011 (16)	29	2.9
9	Kakumanu N and Rao S D 2013 (17)	28	3.5
10	Jin C et al., 2000 (18)	27	1.28
11	Wu J et al., 2015 (7)	20	3.33

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12	Fan Z et al., 2016 (19)	16	3.2
13	Jin C et al., 2003 (20)	16	0.94
14	Cao J et al., 1996 (4)	12	0.48
15	Cao J et al., 2005 (21)	11	0.68

Thirteen articles were original research articles, review article and conference papers were one each. The articles published between 1996-2000 (n=4), 2001-2005 (n=4), 2006-2010 (n=3), 2011-2015 (n=3) and 2016-2020 (n=1) are shown in Figure 1.



**Figure 1:** The top 15 best cited articles distributed across various time periods according to year of publication

The journal, its impact factor and the number of articles published in the journal are listed in **Table 2**. The 15 best cited articles were contributed by multiple authors. The number of authors ranged between 1-14, with the average number of authors being 6. The most frequent first author was Cao J (n=7). The most frequent co-authors were Liu, Jianwei (n=6), Zhao, Yan T (n=4), Sangbu Danzeng.

**Table 2.** Journals with publication of the top 15 best cited articles

Journal	Impact Factor	Number of articles published in the journal
Food and Chemical Toxicology	3.39	2
Journal of Fluorine Chemistry	2.33	2
Fluoride	1.12	2
Environmental Health Perspectives	8.38	1
American Journal of Medicine	4.52	1
Journal of Bone and Mineral Research	5.85	1
Mayo Clinic Proceedings	6.94	1
Journal of Clinical Endocrinology and Metabolism	5.60	1

New England Journal of Medicine	74.6	1
PLoS ONE	2.74	1
Journal of Epidemiology	3.69	1
Ecotoxicology and Environmental Safety	4.87	1

The 15 best cited articles were originated from two countries one is China (n=10) and the other America (n=5). The corresponding author’s affiliations and no of articles published are tabulated in **Table 3**. The h-index of the author indicates the output of the publications of a researcher. The corresponding author h-index for Cao, Jin, Whyte, Michael P, Wermers, Robert A, Rao, Dhanwada Sudhaker, Yang, Yanmei, Gao, Yanhui and Sun, Dianjun are 11, 72, 23, 45, 25, 15 and 21 respectively.

**Table 3.** The corresponding authors institutions contributing to publications towards the top 15 best cited Articles

<b>Institutions</b>	<b>No of articles published</b>
Central South University, Changsha, Hunan 410078, China	08
Shriners Hospital for Children, St. Louis, MO 63131, United States	02
Harbin Medical University, Harbin 150081, Heilongjiang Province, China.	02
Washington Univ. Sch. Med. Barnes-J., St. Louis, Missouri, United States	01
College of Medicine, Mayo Clinic, 200 First St SW, Rochester, MN 55905, United States	01
Henry Ford Health System, Detroit, MI, United States	01

## **DISCUSSION**

The study involved the bibliometric analysis, identification and reexamining of the past research studies that are best cited articles in the context of the relation between Tea and Fluorosis. Which provides us to think and gives a direction for further research. The articles were derived using the Scopus database. Out of 15 best cited articles, 01 was a review, 13 were original research articles and 01 was a conference paper (09 on epidemiological studies, 05 on case reports). The analysis revealed the areas of research ongoing and directions for future research. In 2003 Cao et al. reported that among 111 adults age 30-78 in Naqu of Tibet, 74 % were found skeletal fluorosis. The fluoride intake was 12 mg, 99 % came from the brick tea-containing foods (11). Cao et al. investigated populations of Mongol, Kazak and Yugu populations in China for dental fluorosis and found that drinking milk tea made from brick tea water was the sole reason (5). The study was carried to know the connection between brick tea drinking and fluorosis in Tibetans of the Sichuan province of China. The results showed that the morbidities of dental fluorosis were 51.2% and 11.05% in Tibetan and Han children respectively. Skeletal fluorosis morbidity was 32.83% for Tibetan children and nil in Han children (12). Few probable genetic factors causing fluorosis were studied that are Glutathione S-transferase pi 1 gene (7); Matrix metalloproteinase 2 was studied in Tibetans and Kazakhs having brick tea-type fluorosis (8); PRL (prolactin) gene polymorphism (rs1341239) was investigated among the population of Tibetan, Kazakh and Mongolian of China consuming brick tea (9); and another study involved the population in China of Han, Tibetan, Kazakh and Mongolian of China who drinks brick tea and understood the relation of Vitamin D receptor gene (10) involved in causing fluorosis. The number of articles published in Food and Chemical Toxicology, Journal of Fluorine Chemistry and Fluoride was two each. China is the

top country among the best cited articles in the context of the relation between Tea and Fluorosis. This presents the focus of China towards the prevention and control of Fluorosis caused due to brick tea containing high fluoride through research and development.

### **CONCLUSIONS**

The bibliometric study could result in 15 best-cited articles regarding tea and fluorosis. The articles were published in premier journals. Most of the articles were original research articles. This study gives investigators and doctors information on past research areas and prospects for future worldwide researchers and their affiliations. The author Cao J was the principal investigator publishing in this area and was from Central South University, Changsha, Hunan 410078, China. Epidemiological studies are required in other parts of the world, as cases of fluorosis were reported in America and Europe due to tea. Along with identifying candidate genes influencing the fluorosis risk, they can act as indicators for managing fluorosis.

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