

Bibliometric Analysis of Publications on Dental Caries and Dental Fluorosis from India

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Abstract

Introduction- Dentistry goes back to about 5000 BC when a “tooth worm” was believed to be the source of dental caries. Repeated processes of acid generation lead to the superficial degradation of calcified tissue in the tooth, and consequently cavitation. Work has shown that enamel demineralisation happens at a pH of 5.5 and below. World Health Organization (WHO) mission is Health for all. Fluoride containing drinking water and supplements such as tablets, gums, gel, and toothpastes are the major sources that could be responsible for increased fluoride consumption. At various periods of tooth growth, the ingestion of unnecessary fluoride may have a number of consequences on teeth, including the presence of white lines or streaks on enamel, yellow or brown streaks on enamel, and the general participation of enamel with white or dark chalky stains.

Material and method- A systematic Search Strategy was framed using the specific keywords related to Dental Caries and Dental Fluorosis. The Web of Science Database was accessed and Search Query was input as “KP= (“Dental Caries*” OR “dental fluorosis*” OR “school children 8-13 Years*” OR DMFT* OR “Dean’s fluorosis Index*”)”.

Result- Search output generated total 210 documents from 111 Sources (Journals, Books, etc.) Over the period from 1999 – 2020. Total Author’s Keywords (DE) were 664

Conclusion- Dental caries is genuinely a neurological disease whose nature primarily depends on the existence of fermentable sugar, host factors, cariogenic microbial flora and other related environmental conditions. Researchers have proposed numerous theories within the context of dental caries. Fluoride is among the relatively few contaminants that may cause significant public safety impacts in drinking water. Various types of exposure to fluoride have been found to influence systemic F material, thereby raising the likelihood of fluoride sensitive diseases.

Keyword- Dental Caries, Dental fluorosis, Publications

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Introduction

Dentistry goes back to about 5000 BC when a “tooth worm” was believed to be the source of dental caries. Around 1634 the expression “dental caries” first appears in the literature, which came from the Latin word “caries,” which stands for decay. Originally, the word was used to identify the gaps between the teeth. Dental caries have been reported to be among the earliest and

most common diseases that exist in humans. Dental caries is a common, chronic, transmissible disease that develops from specific bacteria that attach to the tooth, namely *Streptococcus mutans* that metabolize sugars to produce acid that demineralizes the tooth's surface

Dental caries is genuinely a neurological disease whose nature primarily depends on the existence of fermentable sugar, host factors, cariogenic microbial flora and other related environmental conditions. Researchers have proposed numerous theories within the context of dental caries. Another such hypothesis, suggested by W.D. in 1881. Miller is "chemo-parasitic theory," which explains the cumulative impact of bacteria that create acids and acids in the oral cavity, and is universally accepted with modification. Using this hypothesis as the basis, many models have been suggested to address the theoretical aetiology of dental caries, such as J.L Williams, Keyes and Fitzgerald's idea of plaque-causing dental caries to clarify the likely causal association of the involvement of different microorganisms such as lactobacilli, streptococci in dental plaque, and incidence of dental caries. A basic Venn diagram which consists of three circles and the motion of these circles will clarify the aetiology of dental caries. Two circles reflect fruit, plaque, or microbial charge, and in the sixth, the host takes position. Those three circles are intersected by caries. Recently a fourth "time" circle was added which determines the duration of the above circles' interaction. Plaque and nutritional influences interdepend with one another in the development of dental caries. Through contrast, the third circle, which represents the host, acts as a mechanism for transmitting these variables.¹ The initiation and progression of dental caries involve specific microorganisms. *Streptococcus mutans* (S. mutans) have main connections with the initiation of dental caries, and *Lactobacilli* has connections with the development of dental caries. The polymers for these microbes are fermentable sugars, as well as the reserve of biofilm carbohydrates generated by bacteria. When the bacteria metabolize these substrates they create the lactic acids and other acids. In accordance with host factors, lactic acid synthesis reduces the oxygen coefficient locally, which facilitates the occurrence and growth of dental caries. Repeated processes of acid generation lead to the superficial degradation of calcified tissue in the tooth, and consequently cavitation. Work

has shown that enamel demineralisation happens at a pH of 5.5 and below. World Health Organization (WHO) mission is Health for all. Universal Declaration (1998), recognizes that all members of the human family have 'equal and inalienable rights.'² Dental caries is one of the common and most widespread illnesses of humans. While continuous efforts have been made to reduce its prevalence, it is still prevalent, especially in the lower socioeconomic groups. Globally, dental caries is a widespread problem of the disease. The prevalence of dental caries ranges from 49% to 83%, according to a recent survey by the Global Oral Health Data Bank. Regardless of age, almost all age groups are negatively impacted by dental caries. Data from different studies found that teenagers between the ages of 12 and 19 had the largest amount of dental caries accompanied by babies, and then adults. Kids are vulnerable to "rampant caries" or "nursing bottle caries" that mainly involve one or more decayed teeth in every primary dent between the birth date and 71 months of age.^{3,4} While dental caries is in decreasing patterns in many sections of the developed world, in most developing countries it is still a major public health concern, affecting 60-90 % of school children claim a World Health Organization (WHO) study. In a transition from norm to a more westernized lifestyle, cultural, social and political developments in the developed world have had a major effect on food and wellness. Instead, services are shown to be insufficient for some key prevention initiatives. In fact, lack of knowledge and enthusiasm in the area of public health appears to be significant contributors to the rise in dental caries.⁵ India ranks among the world's 25 nations, with ever-increasing increases in dental caries. There, dental caries continues as a charred disease that really has spread its tentacles widely into many regions where there have been insufficient dental care facilities, lack of public health awareness, motivation and increased usage of processed carbs.⁶ Dental caries is also a smoldering disease in developing countries such as India, which has extended its tentacles deep into regions where resources are inadequate for dental treatment, lack of medical awareness and incentive for increased consumption of carbohydrates.^{7,8} Low wages, weak oral hygiene, schooling for mothers, fluorosis, enamel deficiency, multiple low socioeconomic interventions, low level of parental education and cariogenic diet all influence caries risk.^{9,10} Approximately 60-65 % of the present

incidence of dental caries in India is rising day by day. Geographical area plays an important role in caries prevalence; this fluctuates with changing location. Caries incidence in India was 51.9 percent, 53.8 percent, and 63.1 percent, respectively, at 5, 12, and 15 years, according to the 2004 National Oral Health Survey¹¹. Present, in various regions of India. A varied image shows the frequency of dental caries in India including its accessible literature from 1940 to 1960.^{12, 13, 14}. Notwithstanding contradictory estimates, the incidence of dental caries was reported to be 55.5 per cent in India¹⁵ in 1940, and 68.4 per cent in 1960. Dental caries and dental fluorosis are double problems for school children in India, “fluoride is sometimes referred to as a double-edged weapon” – the effective and judicious usage of which provides optimum safety for caries, while unfair and unnecessary systemic intake will contribute to lingering fluoride toxicity, That manifests as dental fluorosis and skeletal fluorosis.¹⁶ In the literature, dental fluorosis was defined as a “developmental disruption caused by sustained exposure to high levels of fluoride during teeth development, resulting in the formation of enamel with reduced mineral content and increased porosity.”¹⁷ Fluoride (F-) is among the relatively few contaminants that may cause significant public safety impacts in drinking water.^{18, 19} Various types of exposure to fluoride have been found to influence systemic F material, thereby raising the likelihood of fluoride sensitive diseases.²⁰ Consumption of Fluoride has beneficial effects on small doses of teeth (< 1.0 mg / L), such as avoiding or reducing the likelihood of dental caries, which is one of the main worries among dentists. Such ion may deter new caries from developing, and could even cause some minor cavities to be retrieved. Increased ingestion of fluoride during enamel forming helps in enamel mottling this mottle enamel is also known as dental fluorosis. It causes visible differences in enamel (intrinsic tooth discoloration), which often contributes to actual injury to the teeth. The effect of the condition will vary according to the dosage, duration range and age of the individual during exposure. The esthetic portion of mild to extreme fluorosis is of significance as it allows the teeth to experience physical harm. Fluoride affects the dental caries forming cycle by three ways: enhancing the chemical enamel structure throughout its production and rendering it more immune to acid attack; promoting mineralization with increased

enamel crystal quality; and the plaque microorganisms’ capacity to generate acid.^{21,2,25} However, too much fluoride absorbed for longer times (higher than 1.5–2 mg / l) may induce dental fluorosis.^{21,22,24-26} Fluoride containing drinking water and supplements such as tablets, gums, gel, and toothpastes are the major sources that could be responsible for increased fluoride consumption.²⁷ At various periods of tooth growth, the ingestion of unnecessary fluoride may have a number of consequences on teeth, including the presence of white lines or streaks on enamel, yellow or brown streaks on enamel, and the general participation of enamel with white or dark chalky stains.²⁸ Children below the age of 13 have oral health as the object of several epidemiological studies carried out around the world.²⁹ According to the World Health Organization (WHO, 2013), the importance attributed to this age group is that it is the time that children leave primary school.³⁰⁻⁵⁰

Methodology

A systematic Search Strategy was framed using the specific keywords related to Dental Caries and Dental Fluorosis. The Web of Science Database was accessed and Search Query was input as “KP=(“Dental Caries*” OR “dental fluorosis*” OR “school children 8-13 Years*” OR DMFT* OR “Dean’s fluorosis Index*”)”. The results were refined by Countries/Regions for India. A list of total 210 articles was retrieved which was imported R-Studio application and analyzed for various categories as outlined in the results.

Results

Search output generated total 210 documents from 111 Sources (Journals, Books, etc.) over the period from 1999 – 2020. Total Author’s Keywords (DE) were 664. Main data revealed following details-

- Total Authors- 761
- Author Appearances- 912
- Authors of single-authored documents-9
- Authors of multi-authored documents-752
- Single-authored documents-18
- Documents per Author - 0.276

- Authors per Document- 3.62
- Co-Authors per Documents - 4.34
- Average citations per documents -12.89
- Collaboration Index- 3.92
- ARTICLE, BOOK CHAPTER-5
- ARTICLE, EARLY ACCESS-3
- EDITORIAL MATERIAL-2
- PROCEEDINGS PAPER-1

The types of published documents obtained from Web of Science Database were as follows-

- Journal ARTICLE- 161
- REVIEW-37
- REVIEW, BOOK CHAPTER-1

The trend of Annual Scientific Production was as below-

SN	Year	Articles
1.	1999	1
2.	2003	1
3.	2004	1
4.	2006	2
5.	2007	1
6.	2008	5
7.	2009	6
8.	2010	7
9.	2011	7
10.	2012	12
11.	2013	10
12.	2014	10
13.	2015	15
14.	2016	28
15.	2017	33
16.	2018	27
17.	2019	32
18.	2020	9

The Annual Percentage Growth Rate of publications was 11.03

Corresponding Author's Countries included India with highest (187) documents followed by United Kingdom (6), Saudi Arabia (5), USA (3), Malaysia (2) and Australia, France, Germany, Nigeria, Portugal with 1 author each.

Country Collaboration Map

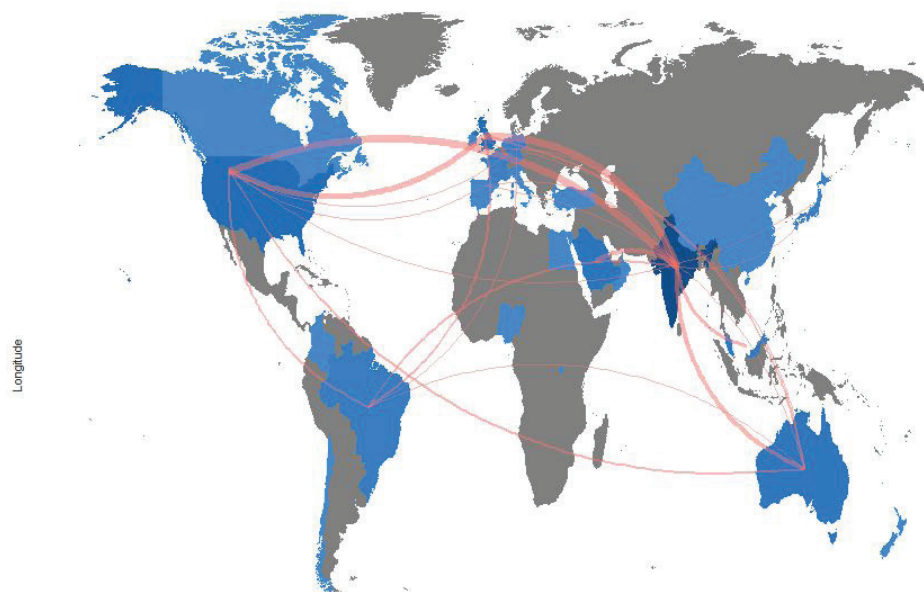


Fig.1: Country Collaboration Map

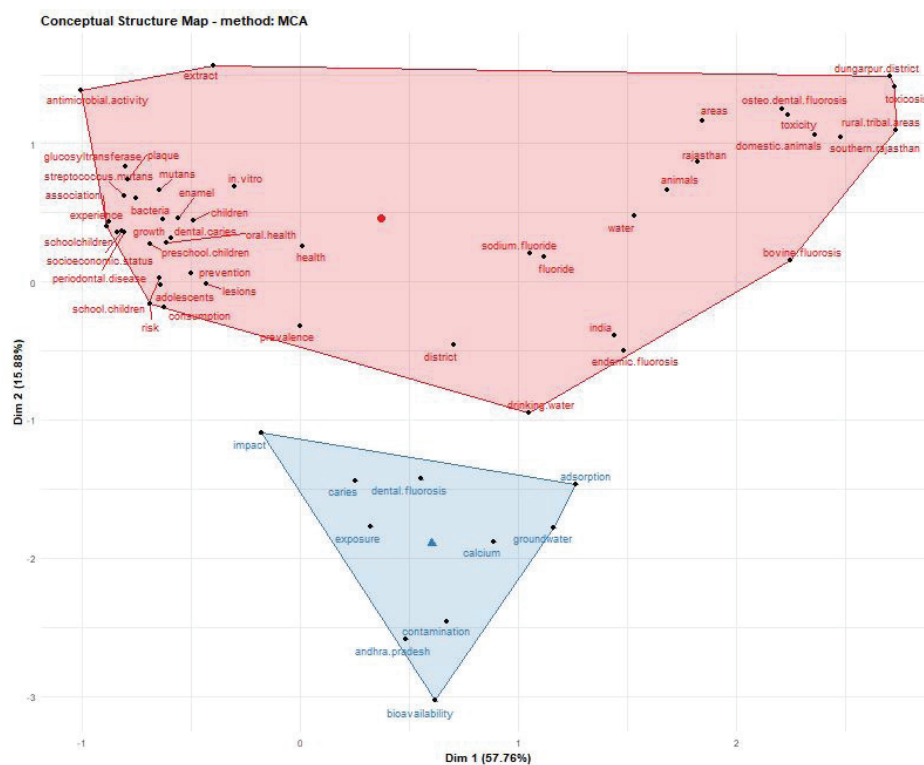


Fig.2: Conceptual Structure Map

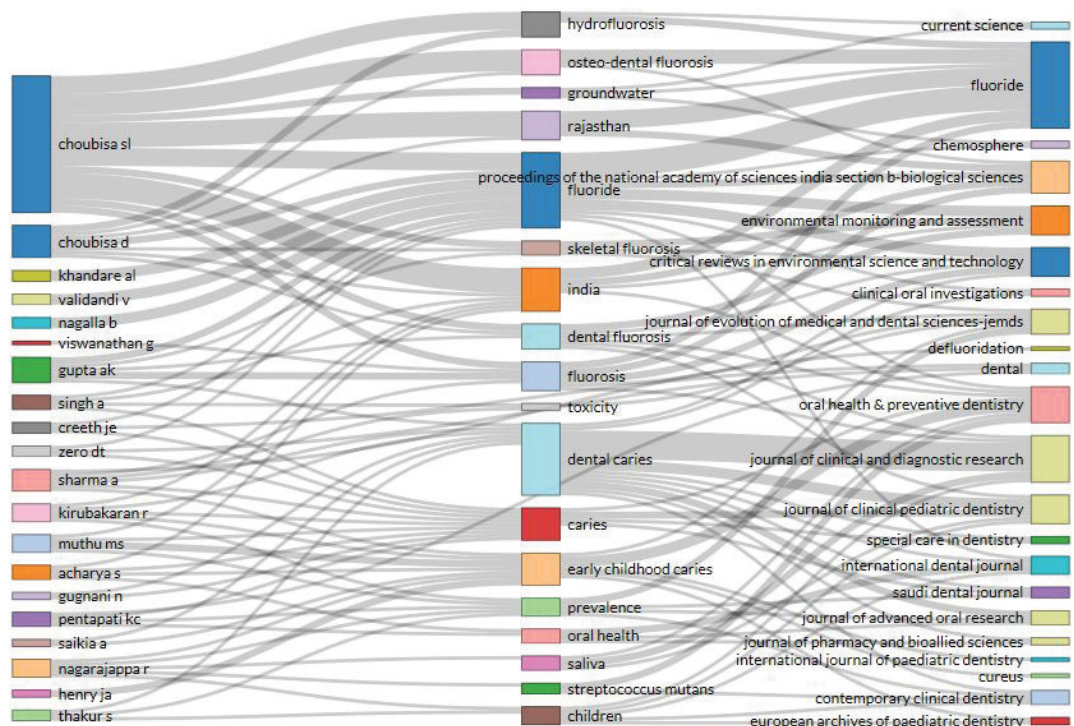


Fig.3: The 3 Field Plot

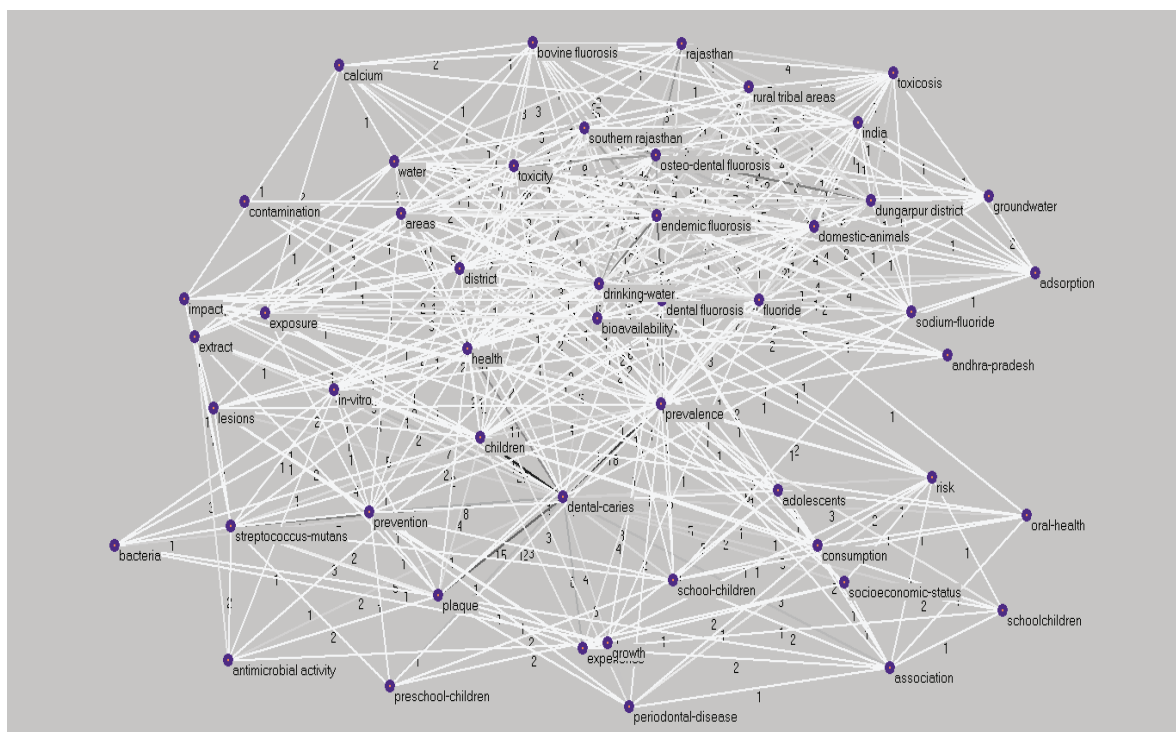


Fig. 4: Keyword Co-occurrence

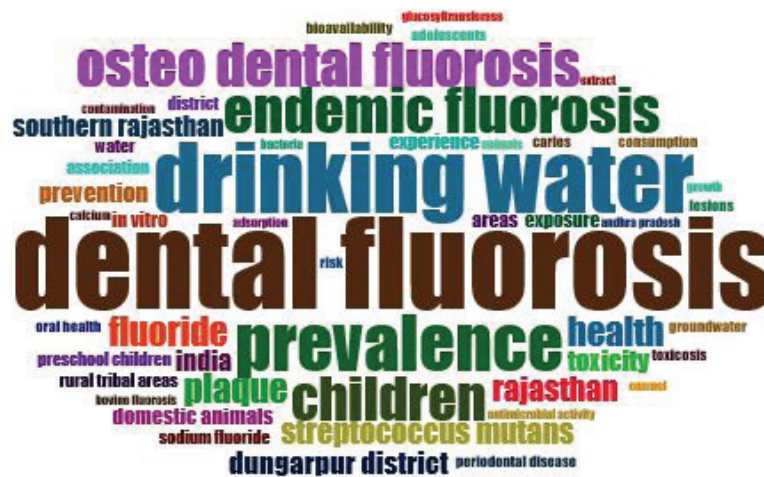


Fig. 5: Keyword Cloud

Discussion

The published materials of Health Sciences University show an increase in the year 2019 whereas the sum of total citations of published materials show a prominent rise in the year 2018. The sum of total citations of materials published in 2019 is expected to show sharp rise in the year 2020. Among all the published material Indian authors shows highest number of publication on the topic.

Conclusion

Dental caries is genuinely a neurological disease whose nature primarily depends on the existence of fermentable sugar, host factors, cariogenic microbial flora and other related environmental conditions. Researchers have proposed numerous theories within the context of dental caries. Fluoride is among the relatively few contaminants that may cause significant public safety impacts in drinking water. Various types of exposure to fluoride have been found to influence systemic F material, thereby raising the likelihood of fluoride sensitive diseases. Consumption of Fluoride has beneficial effects on small doses of teeth (< 1.0 mg / L), such as avoiding or reducing the likelihood of dental

caries, which is one of the main worries among dentists.

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