PREVALENCE OF DENTAL FLUOROSIS AMONG 6–14-YEAR-OLD SCHOOL CHILDREN OF BALIDIH INDUSTRIAL AREA OF BOKARO DISTRICT, JHARKHAND STATE, INDIA – A RETROSPECTIVE STUDY

Dr Jay Prakash Narayan¹, Dr Ritu Jha², Dr Nisha Kumari³
¹Department of Prosthetic Dentistry, Samaira Dental Care and Smile Centre, Bokaro, Jharkhand
²Department of Prosthetic Dentistry, Samaira Dental Care and Smile Centre, Bokaro, Jharkhand
³Department of Pedodontics and Preventive Dentistry, Samaira Dental Care and Smile Centre, Bokaro, Jharkhand

Abstract:
Dental fluorosis is a cosmetic condition that affects the teeth. It’s caused by overexposure to fluoride during the first eight years of life. This is the time when most permanent teeth are being formed. The present study seeks to investigate the prevalence of dental fluorosis among children in Balidih, Jharkhand, India. The study was a retrospective collection of data to evaluate the prevalence of dental fluorosis among 2495 children attending the Free Dental Camp under Indian Dental Association, Bokaro from 2015 to 2018, aged between six to fourteen years. Test of association was done using Pearson’s Chi Square test and Cramer’s V. The results showed that the prevalence of fluorosis was 14.54% in the observed population. There was no correlation of dental fluorosis found with particular sex. The present study gives an insight into the prevalence of dental fluorosis among school going children of Balidih, Jharkhand, India.

Introduction
Fluoride is one of the chemical compounds that are present in the water and soil. Fluoride in water is mostly of geological origin. Waters with high levels of fluoride content are mostly found at the foot of high mountains and in areas where the sea has made geological deposits. These fluorides are organic and inorganic compounds containing the element Fluorine.

Fluorosis is a pathological condition which results from an excessive intake of fluoride, usually from drinking water. Fluorosis is an important public health problem in 24 countries, including India, which lies in the geographical fluoride belt that extends from Turkey to China and Japan through Iraq, Iran and Afghanistan. Fluorosis is endemic in large areas of India, mostly rural. This is because more than 90% of the rural population in India ground water for domestic use, predominantly for drinking and cooking. Nearly 65 million people in 160 districts and 17 states across India drink water contaminated by excess fluoride (over 1.5ppm). Groundwater with high fluoride concentrations, diet rich in fish and tea, air-pollution from high fluoride coal, and use of fluoride toothpastes may contribute considerably to total exposure.

Dental fluorosis is a developmental disorder characterized by hypomineralization of tooth enamel caused by chronic ingestion of excessive fluoride during enamel formation most often affect permanent teeth. It appears as a range of visual changes in enamel causing degrees of intrinsic tooth discoloration, and, in some cases, physical damage to the teeth. The severity of the condition is dependent on the dose, duration, and age of the individual during the exposure.

The use of fluoride in dentistry is considered an important factor in the prevention and management of dental caries, inhibiting demineralization and stimulating remineralisation. Toothpastes for adults that are commercially available generally contain fluoride at concentrations ranging from 1000 to 1500 µg/g, whereas those designed for children contain 250 to 500 µg/g. The concentration of fluoride in mouth rinses varies with the recommended frequency of use from 230 to 1000 mg/litre. The safe level for daily fluoride intake is 0.03 to 0.05mg F/Kg/day. Ingestion in excessive doses ( > 1.5 mg/l according to WHO) poses the problem of their long-term toxicity.

The adequate diagnosis of fluorosis can be done by visual clinical examination. This requires inspection of
dry and clean tooth surfaces under a good lighting. The clinical manifestation of mild dental fluorosis is mostly characterised a snow flaking appearance that lack a clear border, opaque, white spots, narrow white lines following the perikymata or patches as the opacities may coalesce with an intact, hard and smooth enamel surface on most of the teeth. With increasing severity, the subsurface enamel, all along the tooth becomes more porous. Enamel may appear yellow/brown discolouration and or many and pitted white-brown lesions that look like cavities. They are often described as “mottled teeth”.

Dental fluorosis becomes a cosmetic concern particularly if it affects the anterior teeth. Treatment option includes bleaching and microabrasion, composite restorations, Ceramic veneers and full crown. Most of them are aimed at masking the stains.

Bokaro district of Jharkhand state consists of areas with various levels of fluoride in drinking water. No study showing the prevalence of dental fluorosis has been conducted so far in this region; hence, a study was done with an aim to assess the prevalence of dental fluorosis in 6–14-year-old school going children of different regions of Bokaro in Balidih Industrial Area. The objectives of the studies were to assess prevalence of dental fluorosis in both primary and permanent dentitions according to various age group children in Balidih Industrial Area areas of Bokaro district.

Materials and Methods

Data collection was done retrospectively through outpatient registers recording clinical evaluation of children visiting the Free Dental Camp organised by Indian Dental Association, Bokaro in Balidih Industrial Area, Jharkhand, India. The records of clinical examination of the children attending the Dental Camp conducted by postgraduate dental surgeons of Indian Dental Association, Bokaro were assessed from 2015 to 2018. Any records indicating clinical presence of dental fluorosis was noted. Patients were divided into two groups Junior (6 to 9 years) and Senior (10 to 14 years). Data analysis was performed using SPSS (IBM, Chicago, Il.). Frequency distributions were produced. Pearson’s chi square test with Cramer’s V was used to as test of association. P value less than 0.05 was considered significant.

Result

A total of 2495 children aged between five to fourteen years presented from 2015 to 2018 of which males children (n=1457, 58.4%) were more in no. than females (n=1038, 41.6%). Higher number of children presented from the junior group (n=1527, 61.2%) than the senior group (n=968, 38.8%). Among male children, majority (n=801, 55.07%) belonged to 7–9-year-old age group and among female children, majority (n=545, 52.5%) belonged to 10–14 year-old age group. Prevalence of dental fluorosis was more in 6–9-year-old children (n=175, 11.5%) and less in 11–13-year-old children in primary dentition (n=10, 1.0%). The dental fluorosis in permanent dentition was found mostly in 11-14 year-old children (n= 178, 18.36%) and less in 7-9 year-old children (n=39, 4.7%).

Discussion

The severity of dental fluorosis assessed from noted symptom and treatment prescribed. Larger population with fluorosis were advised veneer and crown (n= 152, 85.2%) as treatment than bleaching (n=26, 4.8%) which indicate that cases of moderate to severe fluorosis were higher.

Dental fluorosis in primary dentition was more in 6–9 year-old children and it was low in 11–13year-old children. The probable reason could be the fact that most permanent teeth including permanent incisors and first molars undergo crown formation within the 1st five years of life.

The dental fluorosis in permanent dentition was found mostly in 9–10-year-old children (38.6%) similar to other study like in a study by Reddy et al. The result of actual prevalence of dental fluorosis, higher (38.36) in permanent than in primary dentition (13.5%), was similar to study done by Salman.

Mineralization of primary teeth occurs in intrauterine phase only. During this phase, placental barrier exists which prevents transfer of fluoride to the developing primary teeth. Hence, fluorosis is less prevalent in primary dentition. Moreover, the duration of exposure to fluoride of the enamel during formation of primary teeth is shorter. Other reasons are the thinner enamel of primary teeth as compared to permanent teeth and the rapid fluoride absorption in growing foetus, making it less available for primary teeth. On the contrary, the greater physical size and activity and kind of nutrients intake lead to a higher
intake of water and tea, and hence a higher prevalence in older age groups.21

In this study no correlation was made with the levels of fluoride in the water and the type of drinking water. Also the severity of dental fluorosis could not be accounted. So, there is a need for further epidemiological studies with wider geographical base and greater number of study subjects. Further studies are also required to analyse the association of other oral health disorders affecting childhood and the quality of life of the children affected with dental fluorosis.

Conclusion

Although dental fluorosis is an irreversible condition of the enamel of teeth, but can be prevented if the level of fluoride in water is optimum. Regular water testing, routine medical check-up camps, and continued health awareness program would certainly benefit the community residing in fluoride endemic areas. Major Ground Water Problems And Issues Of Ground Water I.E. Fluoride, Iron, Mn, Zn, Above Desirable Limit Around Industrial Area As Updated By Central Ground Water Board In Sept. 2013 .The overall prevalence of dental fluorosis was found to be 50.86% for permanent dentition. Adequate health education measures should be taken to inform the school children about the prevention of common oral diseases by providing suitable education materials and by engaging school children in health promotion activities.

References

1. Arlappa N, Aatif Qureshi I, Srinivas R. Fluorosis in India: An overview. Int J Res Dev Health 2013;1:97-102
2. Wong MC, Glenny AM, Tsang BW, Lo EC, Worthington HV, Marinho VC (January 2010). “Topical fluoride as a cause of dental fluorosis in children”. The Cochrane Database of Systematic Reviews (1) CD007693.
3. Bergc JH, Slayton RL (26 October 2015). Early Childhood Oral Health. John Wiley & Sons. p. 113. ISBN 978-1-118-79210-0.
4. Dean JA (10 August 2015). McDonald and Avery's Dentistry for the Child and Adolescent (10th ed.). Elsevier Health Sciences. p. 132. ISBN 978-0-323-28746-3
5. H. Whelton. DENTAL DISEASE | Fluoride in the Prevention of Dental Decay. Encyclopedia of Food Sciences and Nutrition (Second Edition) 2003, Pages 1754-1760
6. Marinho VCC, Chong LY, Worthington HV, and Walsh T. Fluoride mouthrinses for preventing dental caries in children and adolescents. Cochrane Database Syst Rev. 2016 Jul; 2016(7): CD002284
7. T. Aoba, O. Fejerskov, Crit. Rev. Oral. Biol. Med. 2002, 13, 155–170
8. V. Baelum, O. Fejerskov, F. Manji, M. J. Larsen, Tandlaegebladet. 1987, 91, 452–456.
9. Kanduti D, Sterbenk P, Artnik B. Fluoride: A Review Of Use And Effects On Health. Mater Sociomed. 2016 Apr; 28(2):133-7.
10. Manjunath S, Santhosh R, Raja S, Modi JV. Low-cost defluoridation of water using brick pieces. Int Sci J Sci Eng Technol 2014;17:354-63
11. Whelton H, Browne D, Felicia P, Whelton J. "E-training for Dean's Index Version 2". Oral Health Services Research Centre, University College Cork, Ireland. Archived from the original on 4 June 2016. Retrieved 12 November 2015.
12. Abanto Alvarez J, Rezende KM, Maracho SM, Alves FB, Celiberti P, et al. Dental fluorosis: exposure, prevention and management. Medicina Oral, Patología Oral y Cirugía Bucal. 14 (2): E103–7.
13. Ritter AV (2005). "Dental fluorosis". Journal of Esthetic and Restorative Dentistry. 17 (5): 326–7.
14. Sherwood IA. Fluorosis varied treatment options.J conserv Dent. 2010;13(1):47-53
15. Ramesh M, Narasimhan M, Krishna R, Chalakkal P, Aruna RM, Kuruvilah S. The prevalence of dental fluorosis and its associated factors in Salem district. Contemp Clin Dent 2016;7:203-8
16. Kola SR, Mallela MK, Puppala R, Kethenaeni B, Tharasingh P et al. Prevalence of dental caries and dental fluorosis among 6-12 years old school children in relation to fluoride concentration in an endemic fluoride belt of Mahabubnagar district, Telangana state, India. J indian assos. Public health dent. 2017;15(1):42-47
17. Salman FD. Prevalence of dental fluorosis among school children in Thammar–Yemen population. Al-Rafindain Dent J. 2007; 7:14-8.
18. Feltman R, Kosel G. Prenatal ingestion of fluorides and their transfer to the fetus. Science 1955; 122:560-1.
19. Thylstrup A. Distribution of dental fluorosis in the primary dentition. Community Dent Oral Epidemiol 1978; 6:329-37.
20. Thaper R, Tewari A, Chawla HS, Sachdev V. Prevalence and severity of dental fluorosis in primary and permanent teeth at varying fluoride levels. J Indian Soc Pedo Prev Dent 1989;7:38-45
21. Tanda RS. Observations on fluoride intake in Lucknow. J Indian Dent Assoc 1972;44:177-81