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Original Article

Prevalence of Dental Fluorosis among Population of Nawalparasi District of Nepal

Vanita Gautam[1*], Ashwini Dayma[2], Hemant Kumar Halwai[3], Venkat Raman Singh[4]

[1]Professor, Department of Conservative Dentistry & Endodontics, UCMS College of Dental Surgery, Bhairahawa, Nepal.
[2]Lecturer, Department of Community & Preventive Dentistry, UCMS College of Dental Surgery, Bhairahawa, Nepal.
[3]Professor, Department of Orthodontics & Dentofacial Orthopedics, UCMS College of Dental Surgery, Bhairahawa, Nepal.
[4]Lecturer, Department of Community & Preventive Dentistry, UCMS College of Dental Surgery, Bhairahawa, Nepal.

ABSTRACT

Background: Aim: *To assess the prevalence of dental fluorosis among population of Nawalparasai district of Nepal.*
Methods: *A total of 300 of population were examined for dental fluorosis through a random sampling technique from two villages of Nawalparsai district. Dean's Fluorosis Index was used to record dental fluorosis and information regarding the source of water till the age of 8 years.*
Results: *The overall prevalence of fluorosis is 18.6%. Maximum 31(26.05%) study sample below 20 years age with fluorosis. Also, shows maximum fluorosis study sample source of drinking water is hand pump and according to Dean's fluorosis index 16(28.5%) sample from very mild category. The result shows statistically significant result (p=0.001)*
Conclusions*: Dental fluorosis seemed to be a problem of medium public health significance. Presence or absence of dental fluorosis in permanent teeth was significantly associated with fluoride concentration in drinking water.*

Keywords: *Dental Fluorosis, Nepal, Prevalence.*

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***Corresponding Author**

Dr. Vanita Gautam,
Professor, Department of Conservative Dentistry & Endodontics,
UCMS College of Dental Surgery,
Bhairahawa, Nepal.

INTRODUCTION

Fluorine is a naturally occurring element found in various minerals. However, release into groundwater due to volcanic activity and weathering processes can cause elevated levels of fluoride in drinking water. Fluoride, although beneficial for the mineralization of hard tissues in the human body, can be toxic to humans with chronic exposure to elevated concentrations.[1]

Dental fluorosis is a specific disturbance in tooth formation caused by excessive fluoride intake during the development of teeth.[2] The degree of fluorosis, as well as plasma and bone fluoride levels, is directly related to the concentration of fluoride in drinking water.[3]

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Dean and others determined 1 ppm to be the optimal level of fluoridation for caries reduction while minimizing level of dental fluorosis. World Health organization (WHO) reported that a level of approximately 1 ppm fluoride in temperate climates decreases level of dental caries to maximum extent without causing any harmful effects on the community.[4]

Fluoride has always been known as a double-edged sword. When excess of fluoride is ingested during the years of tooth calcification, essentially during the first 7 years of life, it results in fluorosis. When mild or more severe forms of dental fluorosis are found prevalent in a community, steps should

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be taken to reduce fluoride ingestion during the ages of tooth development. Excessive levels of fluoride in the drinking water can lead to even more serious health problems than dental fluorosis, wherein it may progress to skeletal fluorosis. In its extreme form, skeletal fluorosis is a seriously debilitating disease. Because of excessive intake of fluoride in many parts of the world, skeletal fluorosis affects several millions of people today.[1] The scarce published literature on the prevalence of dental fluorosis among the Nawalparsai district of Nepal.

METHODS

A cross-sectional descriptive study was conducted among 300 population of Sukrauli ward, situated in Nawalparasai district in the Nepal to assess the prevalence of fluorosis. The study protocol was reviewed by the Institutional Review Board, and it was granted ethical clearance. Official permission was obtained from the concerned authorities. The examination was conducted during the month of October 2018. To select this population, a simple random technique was followed. Written informed consent was obtained from all the participants who fulfilled the eligibility criteria. The eligibility criteria are as follows: voluntary participation and patients who are not taking any medication, systemic healthy, and dentate.

For each of these 300 population, demographic data and Dean's Index were recorded. Examination was conducted under natural light conditions. Each participant was made to sit on a chair with the examiner standing in front of the chair and were assessed using Dean's Index (1942).[5,6] Teeth were not dried, but excess plaque was removed with gauze for a clear view for Dean's Index coding. Other demographic details such as the participant's name, age, sex and area of residence for the first 8 years, source of drinking water, for each participant were collected. Fluorosis Index (CFI) was calculated for the population of sukrauli ward. The data obtained were compiled systematically, transformed from a pre-coded proforma to a computer and a master table was prepared using Microsoft Excel program. The data were analysed using the Statistical Package for the Social Sciences version 21.0 software. Chi-square test was applied (P>0.05).

RESULTS

The overall prevalence of fluorosis is 18.6%. Maximum 31(26.05%) study sample below 20 years age with fluorosis. Also, shows maximum fluorosis study sample source of drinking water is hand pump and according to Dean's fluorosis index 16(28.5%) sample from very mild category. The result shows statistically significant result (p=0.001)

Table:-1 Distribution of fluorosis with different age group.

	Below 20 years	More than 20 years	Chi square test	p-Value
With dental Fluorosis	31(26.05%)	25(13.8%)		
Without dental fluorosis	88(73.9%)	156(86.1%)	6.3	0.06
Total	119	181		

Table:-2 Distribution of study population according to village in sukrauli ward.

	Sukrauli village	Ghinaha village	Chi-Square test	p-Value
With dental fluorosis	23(13.5%)	33(25.3%)		
Without dental fluorosis	147(86.4%)	97(74.6%)	6.06	0.06
Total	170	130		

Table:-3 Association between Dental fluorosis and the source of drinking water.

	Well	Hand Pump	Chi-Square test	p-Value
With dental fluorosis	17(10.4%)	39(28.4%)		
Without dental fluorosis	146(89.5%)	98(71.5%)	14.78	0.001
Total	163	137		

Table:-4 Association of Dean's fluorosis score with the source of drinking water

Source of water	Score						
	Normal	Questionable	Very mild	Mild	Moderate	Severe	Total
Well	0	6 (10.7%)	3 (5.3%)	4 (7.1%)	4 (7.1%)	0	17 (30.3%)
Hand Pump	0	9 (16.1%)	13 (23.2%)	11 (19.6%)	6 (10.7%)	0	39 (69.6%)
Total	0	15 (26.8%)	16 (28.5%)	15 (24.7%)	10 (17.8%)	0	56

DISCUSSION

The prevalence of dental fluorosis varied significantly with age. This was found to be in accordance with the study of Arif et al.[5] However, it was found to be in disagreement with the study of Sukhabogi et al.[6] Variation of dental fluorosis with age indicates change in the source of drinking water. In this study, ther children had higher grades of dental fluorosis. Earlier, hand pumps were the only source of water in sukrauli. However, in the recent years, well water supply is available. The prevalence of dental fluorosis was higher in the children who consumed water from the hand pump. This variation of dental fluorosis with the source of drinking water was found to be statistically significant. This finding was in agreement with two previously conducted studies.[7,8] On the other hand, Gopalakrishnan et al.[9] found no association between the source of drinking water and the occurrence of dental fluorosis.

Endemic dental flurosis is most prevalent in areas where the drinking water contains elevated levels of fluoride. Fluoride level depends primarily on the groundwater level; the deeper the underground level from where the water is derived, higher is the fluoride level. In our study, the prevalence of dental fluorosis in sukrauli ward of Nawalparasai district was recorded as 18.6%. This was in accordance with the findings of Srivastava et al.[10] and Naidu et al.[11] No significant difference was observed in the prevalence of dental fluorosis among both the genders. This finding was in accordance with the ones observed in other studies.[12-13] Universally, in the literature, no tendency towards developing dental fluorosis has been reported by either of the genders.

CONCLUSION

Presence or absence of dental fluorosis in permanent teeth was significantly associated with fluoride concentration in drinking water. The implications for further research would be an in-depth investigation on the geographical expansion of dental fluorosis prevalence in different regions considering all the confounding factors to provide a wide epidemiological outlook on different aspects of this issue.

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