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Original Article

Impact of Healthcare Awareness and Treatment on Dental Fluorosis in Boosting Academic Performance among School Students

Dr. K. Anbu
Principal, K. M. College of Education, Krishnagiri, Tamilnadu, India.
(Member of International Society for Fluoride Research from 10th February 2011)

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Address for correspondence:
Dr. K. Anbu
Principal
K.M College of Education,
Krishnagiri, Tamilnadu India
Email: anbu.adpc@gmail.com

ABSTRACT

This study examines the impact of dental fluorosis (DF) on elementary education in areas affected by endemic fluorosis. Previous research suggests that students living in such regions, where DF is prevalent, often suffer from mental retardation and scholastic backwardness. DF is caused by long-term ingestion of fluoride in amounts that exceed the World Health Organization's recommended limits. The study employed a purposive random sampling method and involved 30 primary school students from two regions: the control group from Melerikottai and the experimental group from Agasipalli. Both groups underwent pre-tests and post-tests to assess healthcare awareness and scholastic performance related to DF. The post-test was conducted after four months to evaluate the effects of an intervention aimed at raising awareness about DF treatment and improving academic outcomes. Results from the post-tests showed significant improvement in the experimental group, suggesting that reducing fluoride exposure by avoiding fluoridated water sources, such as groundwater, could benefit students. Additionally, the study highlighted the importance of providing a nutritionally rich diet, particularly one that includes calcium, Vitamin C, Vitamin E, and antioxidants, as a key strategy for mitigating the negative effects of DF in endemic areas. The findings underscore the potential for improving both health and educational outcomes in students affected by DF through targeted interventions.

Keywords: *Dental Fluorosis, endemic fluorosis, health care awareness, mental retardation, scholastic achievement.*

INTRODUCTION

Education is a liberating force that liberate people from ignorance, exploitation and it is also a democratizing force cutting across the barriers of health care issues. This research intends to highlight the realistic scenario of elementary education in regions like Krishnagiri district in Tamil Nadu plagued by endemic fluorosis and its consequential issue of mental retardation attributed to dental fluorosis. Numerous investigations underscore that students grappling with dental fluorosis in these endemic areas face challenges of mental retardation, academic backwardness, disorder of scholastic skills like reading, writing and arithmetic skills.

NEED FOR THE STUDY

The researcher is focused on students affected by dental fluorosis, which results from excessive fluoride consumption in drinking water. According to the World Health Organization, the guideline for fluoride content in drinking water is 1.51 mg/liter, and the upper limit for daily fluoride intake from food is 0.070 mg/kg of body weight.

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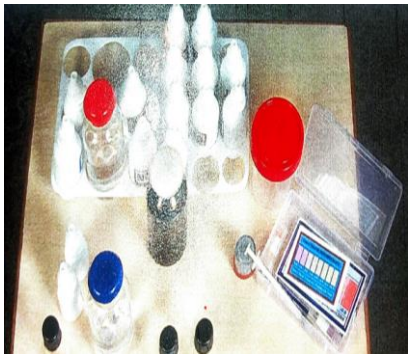
Excessive fluoride intake can lead to dental fluorosis. Therefore, the researcher aims to investigate the impact of healthcare awareness campaigns and treatments on dental fluorosis and how these interventions can enhance scholastic achievement among school students

STUDY OBJECTIVE

- To find out the Level of Healthcare Awareness and treatment on Dental Fluorosis among Control and Experimental Group.
- To find out the Perfection Level of DF among control and Experimental Group.
- To find out the Scholastic Achievement among control and Experimental Group.

METHODOLOGY:

The Study is an Experimental Research, as it deals with the Cause-and-Effect relationship and below image is the kit used for the experimentation.



Design of Study
Schematic Representation of the Experimental Design

Sl. No.	Type	Sources		
1	Nature of Experiment	Pre-test, Post-test, Parallel Group Experimental Design		
2	Variables	Independent Variable	Dependent Variable	Co-Variable
		Health Care Awareness Campaign Treatment	Level of Dental Fluorosis Scholastic Achievement	Gender Community Qualification of the Parent Income of the Family Fluoride Value of Habitation
3	Tools Used	Healthcare Awareness on Dental Fluorosis test prepared by the investigator Scholastic Achievement Test prepared by the investigator		
4	Size of the Sample Group	Control Group: 30	Primary School, Melerikottai in Krishnagiri District, Tamilnadu, India.	
		Experimental Group: 30	Primary School, Agasipalli in Krishnagiri District, Tamilnadu, India.	
5	Selection of Units	Entire Syllabus in Tamil, English, Maths, Science and Social Science in Std. V.,		
6	Duration of the Experiment	4 Months		
7	Statistical Techniques Used	Mean, Standard Deviation, P-value and Chi-Square test		

Selection of the Samples

The Sample selected for this Experimental Study was purposive random Sampling.

Objectives of Study

i) To find out the Level of Healthcare Awareness and treatment on Dental Fluorosis among Control and Experimental Group.

ii) To find out the Perfection Level of DF among control and Experimental Group.

iii) To find out the Scholastic Achievement among control and Experimental Group.

Collection of Data

The initial perfection Level of Dental Fluorosis were measured for both groups.

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Awareness Campaign and Treatment were conducted for four months to the Experimental Group. The Post-Test on Health Care Awareness and Scholastic Achievement conducted among Control Group and Experimental Group. The Pre-Test, Post-Test scores on Health Care Awareness and Perfection Level of Dental Fluorosis and Scholastic Achievement Test among control and Experimental Group were taken for Statistical Analysis.

Experimental Design

- Purposive random sampling recruited 30 students each in the control and experimental groups.
- Pre-tests assessed scholastic achievement and HCA knowledge, followed by DF severity evaluation.
- The experimental group received the HCA program, while the control group continued their usual routine.

Post-tests measured the impact of the intervention.

Data Analysis

Table-I
Healthcare awareness on Dental Fluorosis among the students

Variable	Category	Pre-Test			Post-Test		
		N	Mean	SD	N	Mean	SD
HCA on Dental Fluorosis	Control Group	30	19.8	4.7	30	21.4	2.57
	Experimental Group	30	21.4	2.57	30	42.1	10.2

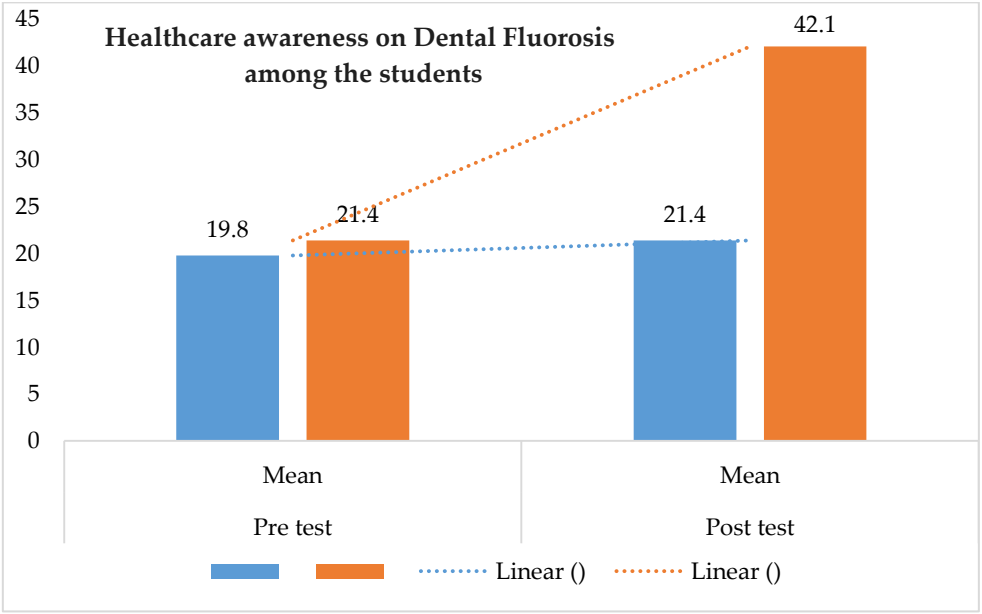

Table-II
Perfection Level of Dental Fluorosis of the Students

Variable	Category	Pre-Test			Post-Test		
		N	Mean	SD	N	Mean	SD
Perfection Level of Dental Fluorosis	Control Group	30	37.83	11.93	30	41.33	21.25
	Experimental Group	30	38.17	11.40	30	60.67	18.96

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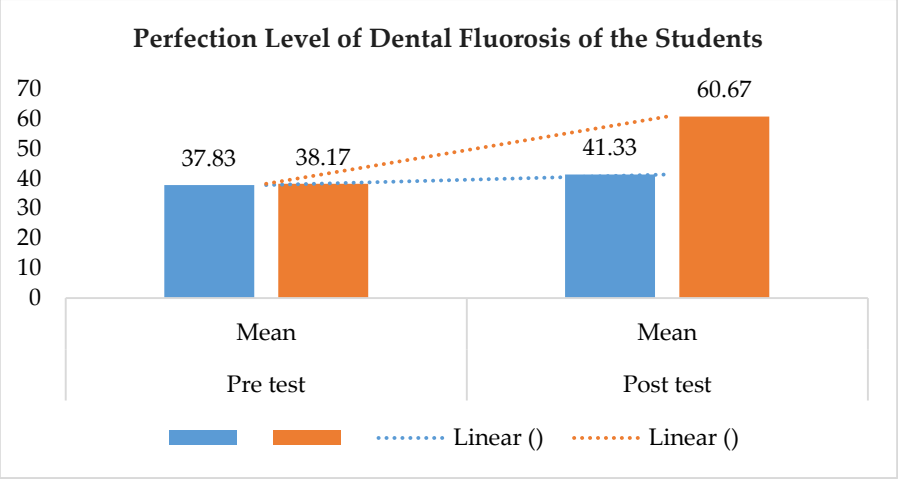
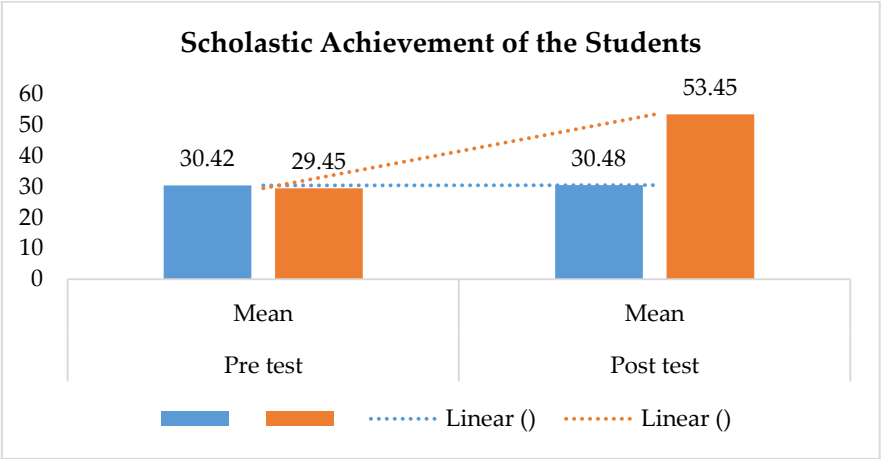


Table-III
Scholastic Achievement of the Students

Variable	Category	Pre-Test			Post-Test		
		N	Mean	SD	N	Mean	SD
Scholastic Achievement	Control Group	30	30.42	10.17	30	30.48	3.48
	Experimental Group	30	29.45	12.44	30	53.45	13.85



Outcome:

From the table I, II & III it is found that the Experimental Group exhibits an increase in healthcare awareness and treatment (mean score 42.1) during the post-test, leading to a concurrent rise in perfection levels (mean score 60.67). This heightened perfection within the Experimental Group corresponds to enhanced scholastic achievement in the post test (mean score 53.45). In contrast, the control Group's post-test mean score remains nearly the same as the pre-test in healthcare awareness, dental fluorosis perfection, and scholastic achievements. The enhancement of dental Healthcare awareness, coupled with fluoride-free drinking water by avoiding ground water and diet, contributes to elevated perfection levels in teeth and scholastic achievements among the Experimental Group of students.

P -Value Analysis:

1. **HCA on Dental Fluorosis**
   - **Pre-Test p-value**: 0.5441: Indicates no significant difference.
   - **Post-Test p-value**: 1.97×10^-16: Indicates highly significant difference.
2. **Perfection Level of Dental Fluorosis**
   - **Pre-Test p-value**: 0.9748: indicates no significant difference.

- **Post-Test p-value**: 0.0022: Indicates significant difference.

3. **Scholastic Achievement**

- **Pre-Test p-value**: 0.9913: indicates no significant difference.
- **Post-Test p-value**: 1.34×10^-13: Indicates significant difference.

These results suggest that the interventions had a significant impact on the experimental groups compared to the control groups in the post-test evaluations for all three variables.

Discussion and Conclusions of Findings

- Students with dental fluorosis (DF) in endemic areas exhibit lower scholastic achievement and potentially suffer mental retardation.
- A 4-month Health Care Awareness (HCA) program and treatment significantly improved academic performance and reduced DF severity in the experimental group compared to the control group.
- Drinking the fluoride free water and proper dietary interventions, including calcium, vitamin C, vitamin E, and antioxidants, can further bolster these positive outcomes.
- It is understood that the finds of the studies LiY(1994), Li Xs (1995), Wang G (1996), Zhao (1995), Lu (2000), Sun (2000), Jaqueline Calderon (2000), Wang (2004), Desai (2004), Susheela A.K. (2005), UNICEF reports (2005) are fall in to the results of present study.
- At the same time the Contrary findings were also observed from the studies Van Palestine Helderman (1997) and Zhao L.B. (1996). Hence, it may be concluded that influence of HCA Campaign on DF Enhances Scholastic Achievement among Students in the Endemic Fluorosis Area.

Educational Implication

- Education, equipped with HCA and targeted nutrition, can be a powerful tool against the detrimental effects of fluorosis.
- Empowering children with knowledge of drinking water without fluoride and providing essential nutrients can illuminate a brighter future for them, both in the classroom and beyond.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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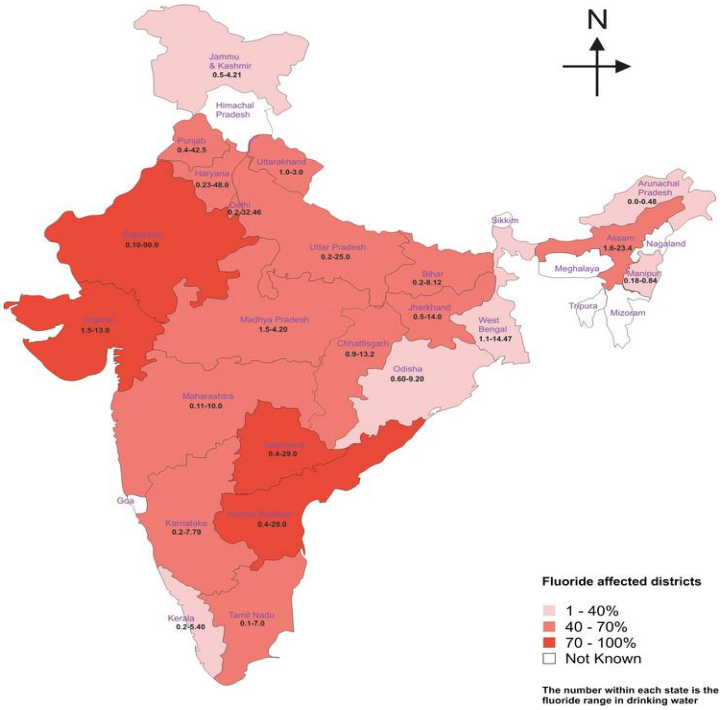
Appendix- Documentation-I

Fluoride contamination in Drinking Water



Documentation-II
Fluoride contamination in the World