

01. Title: Curbing the Crippling Challenge of Osteo-dental Fluorosis: Role of Domestic Defluoridation MethodKartik Laddha¹, Shakila Mulla²

¹ Final year MBBS student, Jhalawar Medical College, Rajasthan, India, ² Head of Department and Senior Professor, Department of Community Medicine, Jhalawar Medical College, Jhalawar, Rajasthan, India.

Background: Fluorosis is a chronic, irreversible condition resulting from prolonged ingestion of excess fluoride through drinking water. It manifests as dental and skeletal changes that significantly impair quality of life. In India, the problem is most pronounced in rural populations dependent on untreated groundwater. While the indigenous Nalgonda technique has been used for community-level defluoridation, there remains a need for simple, domestic solutions.

Aim: This study aimed to (i) estimate the prevalence of dental fluorosis in a rural endemic area, (ii) assess fluoride concentration and total dissolved solids (TDS) in drinking water samples, and (iii) develop a simplified, low-cost domestic defluoridation method (modified Nalgonda technique) and assess its efficiency by retesting water samples for fluoride levels.

Methods: A community-based quasi-experimental study was conducted across 350 families in a rural field practice area. Clinical examination identified cases of dental fluorosis across all age groups. Drinking water samples were collected and analyzed for fluoride and TDS levels. A defluoridation intervention (modified Nalgonda technique) using alum and lime was conducted for 8 liters of water at each household and efficiency of this method was evaluated.

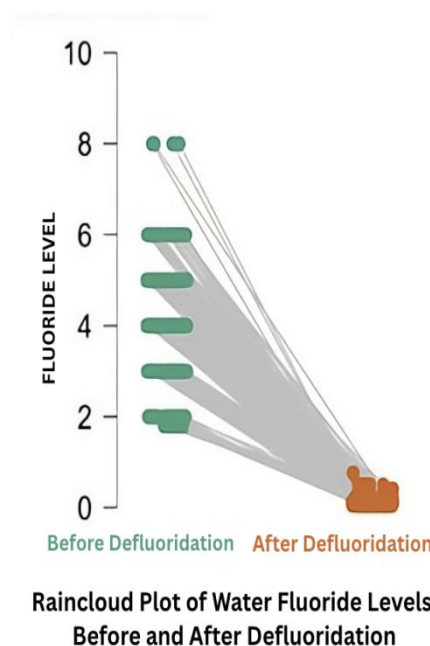
Results: Among the 1002 individuals examined, 354 (35.3%) showed varying degrees of dental fluorosis. The mean age of affected individuals was 12.99 ± 6.577 years (Mean $\pm$ SD). Among all age groups, adolescents were most affected by dental fluorosis and 6 cases were noted in deciduous dentition. Fluoride levels in 338 (96.5%) water samples exceeded permissible limits. The domestic defluoridation method substantially reduced fluoride concentrations by 97.3%, from 4.124 ± 1.189 mg/L to 0.110 ± 0.090 mg/L (Mean $\pm$ SD). Paired t-test confirmed a significant reduction in fluoride concentration after defluoridation ($p < 0.001$).

Conclusion: Fluorosis continues to burden fluoride-endemic villages. This study demonstrates that the domestic defluoridation method (modified Nalgonda technique) can effectively reduce fluoride levels in drinking water, offering a practical, low-cost way to curb fluorosis in rural communities.

Key Words: Fluorosis, Dental; Fluorides; Drinking Water; Water Purification (Source: MeSH-NLM).

Figure:

Figure 1- Raincloud Plot showing effective reduction in water fluoride levels after using domestic defluoridation method.



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ISSN 2076-6327

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