



ISSN 2278 – 0211 (Online)

## Awareness on Dental Fluorosis among School Leaving Children in an Endemic Fluoride Area of South East Indian State

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**Abstract:**

*Introduction: Dental fluorosis is a well known developmental enamel defect due to excessive fluoride ingestion during enamel formation, generally from chronic long term exposure to elevated levels of fluoride. Material and Methods: A cross sectional study was conducted among 920 school leaving children. After taking informed consent from their parents and legal representatives, an interview was conducted using a structured questionnaire to collect the data regarding demographic details and awareness of dental fluorosis. RESULTS: Study revealed that 77.3% of the study populations were having fluorosis. Awareness of dental fluorosis marks on their teeth according to private and government schools, in which 37.3% and 47.1% of government and private school children are aware of marks on teeth and difference observed was statistically significant ( $X^2 = 8.245; P=0.004$ ). Conclusion: Even though the prevalence of dental fluorosis is high, most of them are unaware of fluorosis stains on their teeth.*

**Keywords:** Dental fluorosis, school children, awareness, dean's fluorosis index

**1. Introduction**

For more than a century, fluorides have been used to prevent dental caries. Although it has been scientifically proven that small concentrations of fluoride can significantly reduce dental caries without any ill effects, the use of fluoride is still regarded as a controversial issue.<sup>1</sup>

Fluorosis has attained an alarming dimension all over the world. In India 19 states have been identified as endemic fluoride areas and Andhra Pradesh state is one among them which is facing serious health problems. The fluoride level in water in India ranges from 2-29ppm, where as the permissible level in drinking water according to WHO standard is 1.0-1.5ppm. High incidence of endemic fluorosis in India is due to fact that large area of the water supplies are having high level of fluoride.<sup>2,3</sup> In Andhra Pradesh state alone 17 districts are affected by fluorosis, among them Prakasham district is the second most severely affected district after Nalgonda district. The major water source in the district is Nagarjunasagar and Gundlakamma river<sup>4,5</sup>.

As there were no studies conducted in this area, even though it is severely affected with fluorosis, hence the present study was conducted to assess the awareness of dental fluorosis and to evaluate the prevalence of dental fluorosis.

**2. Materials and Methods**

A cross-sectional descriptive study was conducted among all school leaving children present during the study period in Podilimandal. Pilot study was done on a sample of 30 children in the month of July 2011 to determine the feasibility of the study. All school leaving children (n=920) residing in Podilimandal since their birth were included in this study. Children who are not present on the day of examination, with orthodontic braces and children who had migrated from some other place or who were not permanent residents of that particular area were excluded from the study. Informed consent was obtained from their parents and school authorities prior to the study.

Study was conducted in the month of August to September, 2011 by using a self administered pretested questionnaire to collect the demographic data and questions regarding awareness of dental fluorosis, followed by oral examination by using plane mouth mirror under natural day light to record Deans fluorosis index according to criteria stipulated by WHO (1997)<sup>6</sup>. Data processing and analysis were done using the statistical software programme, SPSS 17. Categorical data was analyzed using chi-square test.

### 3. Results

The study subjects comprised of 920 (438 boys and 482 girls) school leaving children with mean age  $14.6 \pm 0.682$ , residing since birth in Podilimandal, among them 497(54%) belong to private school and 423(46%) belong to government school.

Table 1 shows prevalence of dental fluorosis which is 77.4% in which 36.2% were boys and 41.2% were girls and distribution of fluorosis score was as follows normal 208(22.6%), questionable 131 (14.3%), very mild 230(25%), mild 151(16.4%), moderate 147(16%), severe 53(5.7%). Majority of children are affected with very mild fluorosis.

Fluorosis scores	Gender		Total
	Male	Female	
Normal	105(11.4%)	103(11.2%)	208(22.6%)
Questionable	44(4.8%)	87(9.5%)	131(14.3%)
Very mild	131(14.3%)	99(10.7%)	230(25%)
Mild	72(7.8%)	79(8.6%)	151(16.4%)
Moderate	61(6.7%)	86(9.3%)	147(16%)
Severe	24(2.6%)	29(3.1%)	53(5.7%)
Total	437(47.6%)	483(52.4%)	920(100%)

Table 1: Distribution of study subjects according to dental fluorosis score and gender ( $X^2 = 19.987$ ;  $P = 0.001$ )

Table 2 shows out of 920 study subjects, 392(42.6%) are aware of marks on their teeth, in which 51.4% are boys and 48.6% are girls.

Gender	Yes	No	Total
Male	201(51.4%)	237(44.8%)	438(47.6%)
Female	191(48.6%)	291(55.2%)	482(52.4%)
Total	392(42.6%)	528(57.4%)	920(100%)

Table 2: Response of children regarding awareness of marks on their teeth according to gender ( $X^2 = 3.569$ ;  $P = 0.060$ )

Table 3 shows awareness of dental fluorosis marks on their teeth according to private and government schools, in which 37.3% and 47.1% of government and private school children are aware of marks on teeth and difference observed was statistically significant ( $X^2 = 8.245$ ;  $P = 0.004$ ).

Response	School		Total
	Government	Private	
Yes	158(37.3%)	234(47.1%)	392(42.6%)
No	265(62.7%)	263(52.9%)	528(57.4%)
Total	423(100%)	497(100%)	920(100%)

Table 3: Response of children regarding awareness of marks on their teeth according to school ( $X^2 = 8.245$ ;  $P = 0.004$ )

Table 4 shows distribution of study subjects according to fluorosis scores in relation to awareness of fluorosis stains on their teeth observed that 23.7%, 15.4%, 12.9% were not aware of very mild, mild and moderate forms of fluorosis respectively, the difference observed was statistically significant ( $X^2 = 36.203$ ;  $P = 0.00$ ).

Fluorosis scores	Yes	No	Total
Normal	72(18.4%)	136(25.7%)	208(22.6%)
Questionable	33(8.4%)	98(18.7%)	131(14.3%)
Very mild	105(26.8%)	125(23.7%)	230(25%)
Mild	70(17.9%)	81(15.4%)	151(16.4%)
Moderate	79(20.1%)	68(12.9%)	147(16%)
Severe	33(8.4%)	20(3.7%)	53(5.7%)
Total	358(100%)	482(100%)	920(100%)

Table 4: Comparison of fluorosis score and awareness of marks on their teeth by children ( $X^2 = 36.203$ ;  $P = 0.00$ )

Out of 920 study subjects, 859(93.3%) were unaware of fluoride content in their tooth paste and only 4% of private school children were aware of it and 46.1% of government school children and 45.4% of private school children were aware of fluoride content in tea and only 0.2% had no idea.

Out of 392 study subjects who were aware of marks on their teeth, only 31.7% of private school children said that they are treatable and 17.6% of government school children said that they have no idea.

#### 4. Discussion

Study sample comprised of 920 school leaving children (438 boys and 482 girls) with mean age of 14.6 years. Among them 54% belong to private schools and 46% belong to government schools.

In the present study the prevalence of dental fluorosis was 77.3%, in which 36.19% were boys and 41.9% were girls, which is differing from the study coded by Dahiya et.al. (2000)<sup>7</sup> showed prevalence of fluorosis is 92.73% in the village of Juai Kalan, Bhiwani district, Haryana and 100% prevalence in Nalgonda district a study coded by KM Sudhir et.al(2009)<sup>8</sup>. Not much information is available on prevalence of dental fluorosis in Podilimandal for direct comparison.

Study conducted by P Srinivas, V Sudhakar (2010)<sup>9</sup>, Saravanan et.al(2008)<sup>10</sup>, Gopalakrishnan et.al(1999)<sup>11</sup> showed prevalence of 55.14% (Khammam district), 31.4% (Chidambaram taluk) and 16.8% (Kerala) respectively, which is less when compared to present study.

Out of 920 study subjects, 392(42.6%) are aware of marks on their teeth, in which 51.4% are boys and 48.6% are girls.

47.1% of children from private schools are aware of dental fluorosis marks on their teeth, while only 37.3% of children from government schools are aware of dental fluorosis on their teeth.

42.6% of the children were aware of marks on their teeth that would not brush off, whereas 57.4% were not aware of any such marks on their teeth but a study conducted by Ethel Vento et.al. (2011)<sup>12</sup> in Gozo, Malta showed that 11% of the children were aware of marks on their teeth whereas 83% were not aware of any such marks.

According to fluorosis scores in relation to awareness of fluorosis stains on their teeth observed that 23.7%, 15.4%, 12.9% were not aware of very mild, mild and moderate forms of fluorosis respectively.

93.3% were unaware of fluoride content in their tooth paste and only 4% of private school children were aware of it and 46.1% of government school children and 45.4% of private school children were aware of fluoride content in tea and only 0.2% had no idea.

Out of 392 school students who were aware of marks on their teeth, only 31.7% of private school children said that they are treatable and 17.6% of government school children said that they have no idea.

#### 5. Conclusion

Even though the prevalence of dental fluorosis is high, most of them are unaware of fluorosis stains on their teeth. This study suggests that dental fluorosis is a major public health problem in Podili Mandal and is related to the high fluoride content of drinking water. Strategies must develop to reduce the fluoride levels in supplying drinking water to reduce the morbidity of dental fluorosis.

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