

## “Comparison of Associating factors of Dental Fluorosis in urban and rural children in Jaipur, (Raj) India.”

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### Abstract:

**Methodology:** A cross-sectional observational study was carried out on 1600 urban and 1600 rural school children of Jaipur in year 2011. Two blocks for urban areas and two Panchayat Samities for rural areas were selected randomly for the study. Socio-demographic data were collected from parents of children and thorough dental check-up of children was done by a dentist. Children with dental Fluorosis were identified. Data in details were collected on pre-designed proforma. Data collected were analysed and inferred with chi-square test.

**Result:** 34.5% of children were diagnosed as having dental fluorosis. Dental fluorosis was found significantly ( $P < 0.001$ ) more in rural than in the urban areas (43.94% v/s 25.06%). In rural areas dental fluorosis was found associated ( $p < 0.05$ ) with age, socio-economic status, dentist visit, mouth ringing frequency, teeth cleaning material and teeth cleaning frequency. Whereas in urban areas dental fluorosis was found associated ( $p < 0.05$ ) with age, sex, type of family, mother's education and mouth ringing frequency.

**Conclusion:** More than one third students were having Dental Fluorosis. Rural children were having significantly more dental fluorosis than urban. Age and mouth ringing frequency were found associated in urban as well as rural areas. In rural areas socio-economic status, dentist visit teeth cleaning material and teeth cleaning frequency but in urban areas sex, type of family and mother's education were different associating factors with dental fluorosis.

**Key words:** Dental fluorosis, Socio-demographic, chi-square Test, P Value

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### I. Introduction

Fluorosis is one of the common and major emerging diseases in the tropics. Upto a certain extent (as per WHO; 0.6 ppm) fluoride ingestion is useful for bone and teeth development, but excessive ingestion causes a disease known as Fluorosis. In several districts of Rajasthan people are consuming water with fluoride concentrations of up to 24 mg/l. It continues to be an endemic problem. Fluoride endemic areas are being discovered regularly in India.<sup>1</sup>

Endemic fluorosis is widely prevalent in China, India, Middle East, North Africa, Ethiopian rift valley and other parts of Africa. High incidence of endemic fluorosis in India is because of high level of fluorosis in water. Children of 0 to 12 years age group are the more prone to have fluorosis as their body tissues are in formative / growing stage.<sup>1</sup>

In India, Fluorosis problem has reached in alarming condition affecting more than 50 to 100 percent districts in 17 states (Andhra Pradesh, Tamil Nadu, Uttar Pradesh, Gujarat, Rajasthan etc.).<sup>1</sup>

In Rajasthan, all the 33 districts have been declared as fluorosis prone areas. Jaipur district is one of the worst affected district having Chaksu, Dudu, Phagi, and Sanganer as worst affected areas. In Rajasthan, fluorides in drinking water comes from indigenous rocks and ground water around the mica mines as this state is rich sources of mica.<sup>2</sup>

So the present study is designed to find out and compare the burden of dental fluorosis in school children of 5 to 16 years of age group in urban and rural area of Jaipur district.

### II. Materials and Methods:

The present cross-sectional analytic type of observational study was carried out in year 2010 on 1600 School going children aged 5-16 years from each of urban and rural areas. As per Department of Education, Jaipur District has four urban blocks; namely Jaipur East, Jaipur West, Jhotwara and Sanganer. Out of these Jaipur west and Jhotwara were selected randomly for the study. Likewise the rural area of Jaipur District is

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constituted by 13 Panchayat Samities, out of that two Amber and Jamwaramgarh were selected randomly for the study.

**Sample size:** Sample size was calculated 1600 subjects at 95% confidence limit with 10% allowable error assuming 20% prevalence of dental caries. So for the study purpose 1600 children from schools of rural areas and 1600 children from schools of urban areas was included in study.

List of rural and urban schools in the selected area was procured from the office of Deputy Director of Education Department, Jaipur District. Schools were also selected randomly using the simple random technique from the procured list to achieve the desired sample size i.e. 1600 from rural and 1600 from urban areas. Every Institutional Head of identified school was informed about the purpose and methodology of the study and those who had consented were given the consent form and proforma for parents. 1st part of the designed proforma consisting general information about the child and his family was given to parents of the child through the respective class teachers. After the forms were duly filled up by the parents of the study subjects, it was subsequently collected from the class teachers. Identified Schools were visited on the mutually pre-decided date and time so as to examine the maximum number of study subjects by a dentist. Children were examined in the school premises at a suitable place in presence of respective class teachers with the subjects seated in ordinary chairs in natural day light for illumination, avoiding direct sunlight. Finally the screened students were examined thoroughly for dental diseases, after reassuring them and making them comfortable and taking all necessary aseptic precautions. Part second of the predesigned proforma was filled after examining each child. The same procedure was adopted in other identified schools till the sample size of 1600 students of rural and 1600 students of urban area were achieved. Dentition status and treatment need was assessed using Oral Health Assessment Form 2004<sup>3</sup> by a dentist. Only relevant information related with dental fluorosis along with general information was collected on predesigned proforma. Data thus collected was compiled, analyzed with Microsoft excel 2007.

### **III. Results:**

Out of total 3200 students (1600 rural and 1600 urban) surveyed in 20 identified schools in Jaipur district, dental fluorosis was found in more than one third (34.5%) students. Present study also revealed that rural children had significantly more ( $p < 0.001$ ) dental fluorosis than the urban children i.e. 43.94% v/s 25.06%.

Regarding associated factors in the present study Age and mouth rinsing frequency were found associated in rural as well as urban areas likewise religion, father's education and source of drinking water were not found to be associated with dental fluorosis in rural as well as urban areas.

Further it was revealed that maximum children with fluorosis were found in 11-13 years of age in both urban and rural areas. The difference in proportion in cases of dental fluorosis was found to be highly significant ( $P < 0.001$ ) in both urban and rural areas.

This study also observed that sex was not found to be associated ( $P > 0.05$ ) in rural areas but cases found significantly ( $p < 0.001$ ) more in urban areas.

Regarding type of family, it was found to be associated ( $P < 0.05$ ) with dental fluorosis in urban areas whereas in rural areas it was not. Cases of dental fluorosis were significantly less in three generation families in urban

Further it was found in this study that mother's education was found to be associated ( $p < 0.05$ ) with dental fluorosis in urban areas but not in rural areas. It was observed that as education increases proportion of dental fluorosis cases decreases in urban area.

Regarding socio-economic status, it was found to be associated ( $P = 0.013$ ) with dental fluorosis in rural areas whereas in urban areas it was not. Cases were significantly less in upper class.

Further it was found in this study that dentist visit, type of material used for teeth cleaning and frequency of teeth cleaning were found to be associated with dental fluorosis in rural areas but not in urban areas. Cases were found maximum in children who clean their teeth with tooth powder and either not clean their teeth at all or clean twice and more.

### **IV. Discussion:**

In the present study, significantly more cases were found in the rural than in the urban areas (43.94% v/s 25.06%). These observations were well supported by National Oral Health Survey & Fluoride Mapping 2004, India<sup>4</sup> and Baskaradoss, JK(2008)<sup>5</sup> This may be because of the fact in the rural belt that most of the students use ground water in comparison to urban areas. This ground water is untreated water. This fact is further supported with the observation that consumers of water from hand-pumps and tube wells had significantly ( $P < 0.001$ ) more dental fluorosis than consumers of tap water and well water although it was not found significant.

Variation in proportion of cases as per the age was also found to be highly significant ( $P < 0.001$ ) with maximum cases in 11-13 years of age in rural as well as urban areas. Almost similar findings were of Jain (1979)<sup>6</sup> Dhar et al (2007),<sup>7</sup> S Saravanan (2008)<sup>8</sup> Poornima Tiwari et al(2010),<sup>9</sup> Rajesh Kr. Yadav et al (2012).<sup>10</sup> This may attributed to the fact that most of the teeth in the 5 - 6 - year of age group are deciduous (primary teeth), and much of the mineralization process occurs in the intra-uterine phase, where the placenta serves as a partial barrier to the transfer of fluoride to the developing primary teeth.

In the present study, male preponderance was observed in rural as well as in urban areas but it was significant in urban areas only. In National Oral Health Survey and Fluoride Mapping 2004, India,<sup>4</sup> S Saravanan (2008),<sup>8</sup> Poornima Tiwari et al (2010),<sup>9</sup> found no significant difference. This may be attributed to excessive physical activity by males, thus resulting in more consumption of water and in turn more intake of fluorides.

No significant difference was found in the distribution of the disease according to source of drinking water in present study but Baskaradoss, JK (2008)<sup>5</sup> in his study at Tamilnadu found that the prevalence of dental fluorosis was higher in children who consumed pipe water as compared to children who consumed ground water.

Highly significant ( $P < 0.001$ ) difference was found in proportion of cases as per type of material used for cleaning teeth in rural as well as urban areas but it was significant in rural areas. Maximum cases were in those who used either tooth paste or tooth powder. These findings may be because of the tooth paste and tooth powder available in the market are having fluoride, therefore their dental use in children increase the chance of having dental fluorosis.<sup>11</sup>

### V. Conclusion:

More than one third students were having Dental fluorosis. It was found more in rural than urban areas. It was found associated with age, socioeconomic status, dentist visit, material used for teeth cleaning, teeth cleaning and mouth rinsing frequency in rural areas. In urban areas it was found associated with age, sex, type of family, mother’s education and mouth rinsing frequency. Dental fluorosis was also not found to be associated with religion, father’s education and source of drinking water supply in rural as well as in urban areas.

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**Table no. I: Dental Fluorosis in Rural and Urban Children according to various factors**

S. No.	Variables	Rural (N=1600)		Urban (N=1600)	
		With Fluorosis (n=703)	Without Fluorosis(n=897)	With Fluorosis (n=411)	Without Fluorosis (n=1189)
	<b>Age Group</b>				
1	5 to 7	79 (28.32)	200	52 (20.23)	405
2	8 to 10	236 (43.54)	306	135 (24.28)	727
3	11 to 13	326 (48.44)	347	201 (29.17)	835
4	14 to 16	62 (58.49)	44	13 (13.27)	129
	<b>Chi-square Test at DF</b>	50.101 at 3 DF	<b>P&lt;0.001 HS</b>	16.832 at 3DF	<b>P&lt;0.001 HS</b>
	<b>Sex</b>				
	Male	383 (44.85)	471	213 (27.45)	566

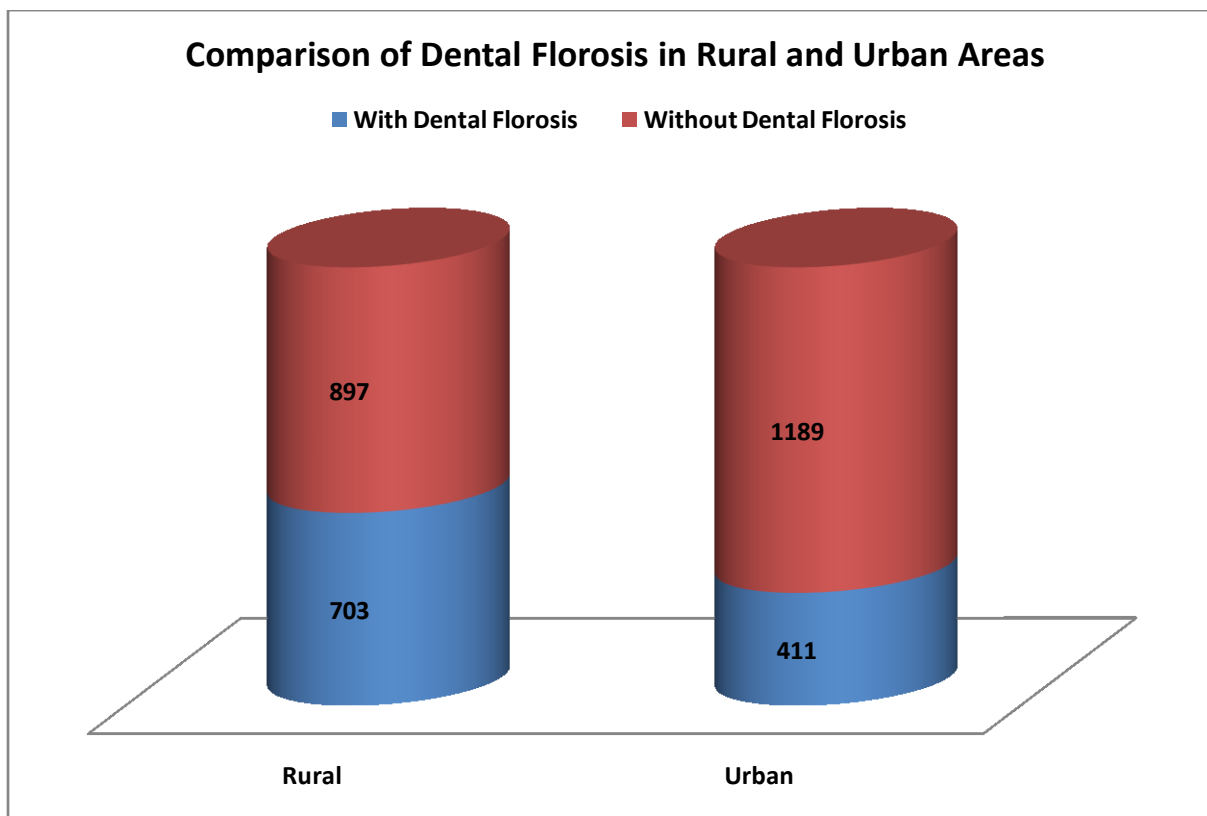
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	Female	320 (42.90)	426	191 (23.18)	633
<b>Chi-square Test at DF</b>		0.539 at 1 DF <b>P=0.463 NS</b>		11.908 at 1DF <b>P&lt;0.001 HS</b>	
<b>Socio-economic status</b>					
1	Upper	4 (28.57)	10	12 (26.67)	33
2	Upper middle	37 (44.58)	46	37 (21.02)	139
3	Lower middle	124 (45.76)	147	87 (23.97)	276
4	Upper Lower	364 (42.08)	501	199 (25.19)	591
5	Lower	174 (47.41)	193	66 (29.20)	160
<b>Chi-square Test at DF</b>		12.622 at 4 DF <b>P==0.013 S</b>		3.839 at 3DF <b>P=0.421 NS</b>	
<b>Religion</b>					
1	Hindu	677 (43.79)	869	368 (25.02)	1103
2	Muslim	24 (55.81)	19	23 (21.50)	84
3	Sikh	2 (40)	3	4 (44.44)	5
4	Christians	0	4	3 (42.86)	4
5	Others	0	2	3 (50)	3
<b>Chi-square Test at DF</b>		7.21at 4 DF <b>P=0.125 NS</b>		5.694 at 4 DF <b>P=0.223 NS</b>	
<b>Type of Family</b>					
1	Nuclear	316 (43.53)	410	269 (26.02)	765
2	Joint	293 (44.33)	368	112 (26.54)	310
3	Three generation	94 (44.13)	119	20 (13.89)	124
<b>Chi-square Test at DF</b>		0.094 at 2 DF <b>P=0.954 NS</b>		10.563 at 2 DF <b>P=0.005 S</b>	
<b>Father's education (upto)</b>					
1	Illiterate	191 (44.52)	238	68 (27.31)	181
2	Middle	268 (43.25)	352	168 (28.82)	415
3	Higher secondary	210 (43.66)	271	130 (20.83)	494
4	Graduation	25 (47.17)	28	29 (24.58)	89
5	Post graduation	9 (52.94)	8	6 (23.08)	20
<b>Chi-square Test at DF</b>		20.986 at 4DF <b>P=0.912 NS</b>		11.056 at 4 DF <b>P= 0.026 S</b>	
<b>Mother's education (upto)</b>					
1	Illiterate	523 (45.16)	635	209 (27.18)	560
2	Middle	126 (40.91)	182	141 (24.91)	425
3	Higher secondary	49 (42.98)	65	45 (19.40)	187
4	Graduation	3 (42.86)	4	6 (20.69)	23
5	Post graduation	2 (15.38)	11	0	4
<b>Chi-square Test at DF</b>		17.025 at 4 DF <b>P=0.002 S</b>		2.413 at 4DF <b>P=0.660 NS</b>	
<b>Dentist's Visit</b>					
1	Yes	112 (52.58)	101	109 (26.65)	300
2	No	591 (42.61)	796	292 (24.52)	899
<b>Chi-square Test at DF</b>		7.055 at 1DF <b>P=0.008 S</b>		0.628 at 1DF <b>P=0.428 NS</b>	
<b>Source of drinking water</b>					
1	Tap	386 (43.18)	508	363 (25.37)	1068
2	Hand-pump	126 (43.90)	161	14 (23.33)	46
3	Tube-well	177 (47.71)	194	24 (22.02)	85
4	Well	14 (29.17)	34	0	0
<b>Chi-square Test at DF</b>		6.604 at 3DF <b>P=0.112 NS</b>		0.704 at 2DF <b>P=0.703 NS</b>	
<b>Mouth Rinsing Frequency</b>					
1	Never	277 (40.56)	406	63 (24.23)	197
2	Sometime	389 (46.87)	441	264 (23.63)	853
3	Always after meals	37 (42.53)	50	74 (33.18)	149
<b>Chi-square Test at DF</b>		6.133 at 2 DF <b>P=0.047 S</b>		9.140 at 2 DF <b>P=0.010 S</b>	
<b>Teeth Cleaning Frequency</b>					
1	Zero	53 (31.74)	114	11 (30.99)	60
2	<1	30 (34.09)	58	13 (26)	37
3	Once	432 (6.85)	490	229 (23.80)	733
4	Twice	157 (44.35)	197	135 (28.48)	339
5	> Twice	31 (42.39)	53	13 (27.91)	36
<b>Chi-square Test at DF</b>		16.855at 4 DF <b>P=0.002 S</b>		7.482 at 4 DF <b>P=0.112 NS</b>	

	Type of Teeth Cleaning Material used				
1	Fingers	54 (39.71)	82	34 (30.06)	78
2	Tooth Paste	415 (45.01)	507	286 (24.01)	905
3	Tooth powder	70 (56)	55	60 (31.41)	131
4	Datun	94 (44.13)	119	7 (25.93)	20
5	Charcoal with finger	17 (45.95)	20	3 (37.50)	5
6	Don't Clean everyday	53 (31.74)	114	11 (15.49)	60
<b>Chi-square Test at DF</b>		19.960 at 5 DF <b>P=0.002 S</b>		10.603 at 5 DF <b>P=0.064 NS</b>	

Table no .II  
Associating factors of Dental Fluorosis in Rural and Urban Children

S. No.	Variables	Rural Area		Urban Area	
		P Value	Level of Significance	P Value	Level of Significance
1	Age	P<.001	HS	P<0.001	HS
2	Sex	P=0.463	NS	P<0.001	HS
3	Type of Family	P=0.954	NS	P=0.005	S
4	Religion	P=0.125	NS	P=0.223	NS
5	Father's Education	P=0.9	NS	P= 0.054	NS
6	Mother's Education	P=0.241	NS	P= 0.047	S
7	Socio-economic Status	P=0.013	S	P=0.421	NS
8	Drinking Water Source	P=0.112	NS	P=0.703	NS
9	Dentist's Visit	P=0.008	S	P=0.428	NS
10	Mouth Rinsing Frequency	P=0.047	S	P=0.010	S
11	Teeth Cleaning Materials	P=0.002	S	P=0.112	NS
12	Teeth Cleaning Frequency	P=0.002	S	P=0.064	NS



Chi-square test = 116.610 at 1 DF

P<0.001

LS=HS