

Prevalence of Fluorosis among Children aged 12 Years, Living in Urban and Peri-Urban Areas of Quetta District, Balochistan

1. Hammal Naseer Baloch 2. Nasrullah Mengal 3. Ashfaq Ahmed Khawaja Khail
4. Shoaib Aziz Kurd 5. Khalil Ahmed Alizai

1. Asstt. Prof. of Community and Preventive Dentistry 2. Asstt. Prof. of Orthodontics (Dental-Section)
3. Asstt. Prof. of Community and Preventive Dentistry 4. Demonstrator, Community and Preventive Dentistry
5. Senior Registrar, Dept. of Orthodontics (Dental-Section), Bolan Medical College Quetta

ABSTRACT

Fluorosis is a condition of structural disorder of the tooth surface during tooth development, which is denoted as enamel hypoplasia. The most common cause of dental fluorosis is the chronic exposure to excessive fluoride particularly in drinking water at the younger age.

Objectives: The aims of this study were to determine prevalence of fluorosis among primary school children in urban and peri-urban areas of Quetta district.

Study Design: Cross sectional study

Place and Duration of Study: This study was conducted at Bolan Medical College, Quetta for a period of one month from March to April 2009.

Materials and Methods: Clinical dental examination of schoolchildren aged 12 years was conducted for evidence of dental fluorosis using Dean's fluorosis index and the criteria mentioned in WHO oral health surveys methods 4th edition 1997.

A total of 153 schoolchildren aged 12 years, 78 (51%) boys and 75 (49%) girls, who have lived in urban and rural areas of Quetta sub district, were randomly selected from the four schools including boys and girls both.

Results: Fluorosis was found to be more prevalent in urban school children (60%) as compared with children living in peri-urban areas (47%) with OR .614 (.323, 1.166) and p-value .135. The boys had a slightly higher prevalence of fluorosis as compared with girls 56% and 52% respectively. OR .837 (.443, 1.582) and p-value .584 recorded which were not statically significant.

Conclusion: This study highlighted the high prevalence of fluorosis, more than half of the school children, in urban and rural areas of Quetta district Pakistan. Comparatively, fluorosis is more prevalent in urban areas than in rural.

Key Words: Fluoride, Dental Fluorosis, Schoolchildren.

INTRODUCTION

Fluorosis is a condition of structural disorder of the tooth surface during tooth development, which is denoted as enamel hypoplasia.¹The most common cause of dental fluorosis is the chronic exposure to excessive fluoride particularly in drinking water at the younger age.²⁻³Prevalence of dental fluorosis has been reported to be around 32% globally.⁴ Even though mild fluorosis can prevent dental caries, moderate to severe dental fluorosis can cause esthetic, medical, and dental problems. The people having severe fluorosis with brownish stains have been reported to have negative effects on oral health-related quality of life.⁵⁻⁶The source of drinking water in district Quetta is mostly from deep tube wells and it's supplied by pipe to residential areas in the city, but in rural areas pipeline system is not available so people get water for drinking and other needs direct from tube- wells and little bit from springs and karez (A path of deep wells connected each other by underground tunnel for water flow for agriculture and other needs).⁷According to a survey on

water quality status in Pakistan in 2004 conducted by Pakistan Council of Research in Water Resources, Ministry of Science & Technology; 29% of water samples collected from Quetta, showed excessive fluoride concentrations (more than 1.5 mg/l). The survey also concluded that severe problem of fluoride lies in three cities out of twenty-one cities i.e. Kasur, Loralai and Quetta.⁸Globally, WHO recommends water fluoride levels between 0.5 to 1.0 ppm and the recommended optimum fluoride water levels for Pakistan is 0.7ppm.⁹⁻¹⁰ As per clinical observation by the dentists in Balochistan, patients from these areas come with a mild to moderate fluorosis, however there has not been any specific study on fluorosis in urban and peri-urban areas of district Quetta.

The aims of this study were to determine prevalence of fluorosis among primary school children in urban and peri-urban areas of Quetta district.

MATERIALS AND METHODS

A Cross sectional survey was conducted to determine the prevalence of fluorosis in urban slums of Quetta district, Pakistan. Teeth of children were examined for evidence of dental fluorosis using Dean's index and the criteria mentioned in WHO oral health surveys methods 4th edition 1997.

Study population: A total of 150 schoolchildren aged 12 years were randomly selected from the four schools including boys and girls both.

Inclusion criteria: The 12 year's old school children in urban slums of Quetta district Balochistan who have lived in the mentioned city from birth were included in the study and were examined clinically as described elsewhere. Data on fluorosis were based on clinical findings only.

Exclusion criteria: Students whose parents did not consent to take part in the study and those who had migrated from other areas to Quetta district during last three years.

Data collection: Oral health examination was performed as recommended in Oral Health Survey Basic Methods of WHO (1997) and Dean's fluorosis index was used for scoring, all teeth were examined. Sterilized Instruments for Oral examination including Instruments tray, mouth mirror, explorer, gloves, mouth mask, WHO recommended CPI probes and table cloth were used. The survey team consisted of 3 examiners, 3 recorders and 1 dental assistant. Students were examined in a resting position by lying down on the table, with the examiner standing in 12 o'clock position behind the student's head. The recorder sat close to the examiner for the ease of data recording and in order to avoid error while recording. Standardization and calibration for oral examiners was performed at the department of community & preventive dentistry, Sandman Provincial Hospital with Kappa score of 0.90.

Data analysis: Descriptive statistics were used for general characteristics and fluorosis status by number, percentage, mean, and standard deviation. Chi-square test and crude OR by binary regression with 95% CI were used to demonstrate the association. p-value less than 0.05 was accepted as statistically significant.

Ethical considerations: A written permission from school authorities was asked and process of asking for the consent from parents was performed before conducting the survey.

RESULTS

This study was cross-sectional and was carried out among schoolchildren aged 12 years old in urban and peri-urban areas of district Quetta, in an attempt to assess the dental fluorosis status among the

schoolchildren. Oral examination of 153 students from was carried out with 78 (51%) boys and 75 (49%) girls. Majority (52.3%) from them was living in urban areas (Quetta city) and others (47.7%) were from a peri-urban area of district Quetta (Kuchlak sub-tehsil). (Table 2)

The results of study show that children without fluorosis were mostly girls (28.1%) as compared with boys (26.9%). According to Dean's index, very mild fluorosis status was recorded higher, which was 30.8% in boys and 29.4% in girls. Mild fluorosis status recorded in boys and girls was 14.1% and 13.7% respectively. Moderate fluorosis and severe fluorosis status were same in boys and girls.

Less than half (39.7%) of children in rural areas had no evidence of fluorosis as compared with those who lived in urban settings (17.5%). Very mild fluorosis status was found to be higher (35.0%) in urban and (23.3%) in rural settings. Mild fluorosis status (13.3%) was evenly distributed in rural and urban locations. Moderate fluorosis status was recorded 6.3% in urban and 4.1% in rural area. Moreover, severe fluorosis status was 5.2% in urban and 6.8% recorded in rural area. (Table 3).

Association between gender, location and fluorosis showed that boys had higher fluorosis to compare girls 56% and 52% respectively and were not statically significant (p-value 0.584). The children who lived in urban location had greater (60%) than rural location (47%) with OR .614 (.323, 1.166) and p-value 0.135 measured which were not statically significant. (Table 4)

Table No.1: Codes for fluorosis condition

Code	Status
0	Normal
1	Questionable
2	Very mild
3	Mild
4	Moderate
5	Severe

Dean's fluorosis index

Table No.2: General characteristics of 12 years old school children residing in urban and peri-urban areas of district Quetta

Variable	Number	Percentage
Gender		
Boys	78	51.0%
Girls	75	49.0%
Location		
Urban	80	52.3%
Rural	73	47.7%

Table No.3: Distribution between fluorosis with gender and location among 12 years old schoolchildren of Quetta district

Fluorosis	Gender		Location	
	Boys	Girls	Urban	Rural

	n (%)	n (%)	n (%)	n (%)
Normal	21 (26.9%)	22 (28.1%)	14 (17.5%)	29 (39.7%)
Questionable	13 (16.7%)	14 (17.6%)	18 (22.5%)	9 (12.3%)
Very Mild	24 (30.8%)	21 (29.4%)	28 (35.0%)	17 (23.3%)
Mild	11 (14.1%)	10 (13.7%)	11 (13.8%)	10 (13.8%)
Moderate	5 (6.4%)	3 (6.4%)	5 (6.3%)	3 (4.1%)
Severe	4 (5.1%)	5 (5.1%)	4 (5.2%)	5 (6.8%)

Table No.4: Association between gender, location and fluorosis among 12 years old school children in Quetta district

Variable	Number of fluorosis	%age	X ²	OR (95% CI)	p-value
Gender					
Boys	44	56%	0.3	.837 (.443, 1.582)	.584
Girls	39	52%			
Location					
Urban	48	60%	2.235	.614 (.323, 1.166)	.135
Rural	35	47%			

DISCUSSION

Fluoride is an essential part of oral health promotion and is considered the corner stone in reducing dental carries, both in children and adults.¹² Fluoride is known to inhibit bacterial enzymes and demineralization of teeth and at the same time it promotes remineralization. Naturally, occurring fluoride in drinking water in majority areas of Pakistan has as similar effect on dental carries as artificially fluoridated water.¹³

This cross sectional study was carried out to assess the prevalence fluorosis among 12-years old schoolchildren in urban and peri-urban areas of district Quetta.

So far, there is no national data available in Pakistan on dental fluorosis; therefore the results are compared among urban and rural areas of the district and some studies of other countries. The survey showed that the fluorosis rate is 54.2%, if the questionable cases are excluded, the percentage (28.1%) shall decline to some extent. Very mild fluorosis was seen in 29.4% and mild 13.7% moderate and sever status are same with 5.2%, these results are similar to a study conducted by Ibrahim YE in Sudan.¹⁴ We observed that boys had slightly higher fluorosis (56%) than girls (52%) these results are supported by a similar study conducted by Ramezani GH in Dayer city Iran.¹⁵ Another survey by A.I. Ismail et al report the same results as in this study in 7-12 years old children in Northern Newfoundland and Forteau, Labrdor with 71% very mild fluorosis.¹⁶

These results of our study give a variation in prevalence of fluorosis, the prevalence of fluorosis is higher among urban school children as compared with rural children. This variation may be because of eating behaviors of urban children, who have access to canned foods and drinks which are rich in fluoride and mothers of children in urban areas usually use infant formula milk

to feed their infants.¹⁷ Another possible reason for this is the variation in temperature; the peri-urban areas have slightly lower temperatures because of fruit orchards and open valleys. The consumption of drinking water among children in urban areas may be high because of high annual mean temperature of 22 Celsius and could contribute towards the severity of fluorosis in urban areas.^{18, 19, 20}

CONCLUSION

District Quetta is included among cities of Pakistan with high fluoride content in water. This study highlighted the high prevalence of fluorosis, more than half of the school children, in urban and rural areas of Quetta district Pakistan. Comparatively, fluorosis is more prevalent in urban areas than rural.

Recommendations:

Increase the coverage of dental health services and oral health education programs in the communities, especially to schoolchildren with an emphasis on changing unhealthy feeding habits, such as infant formula milk and canned foods. There is a need for continued monitoring of fluorosis and further investigation into the fluoride intake from all sources. Controlling fluoride levels in community water supply schemes.

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Address for Corresponding Author:**Dr.Hammal Naseer Baloch**

Assistant Professor of Community and Preventive Dentistry, Bolan Medical College Quetta.

Address for correspondence: Shafiq Medical Centre, Fatima Jinnah Road Quetta.

Cell No. 0333-7855060, 0313-2806660

Email: drhammal@yahoo.com