

ORIGINAL ARTICLE

ESTHETIC PERCEPTION AND PSYCHOSOCIAL IMPACT OF VISIBLY DISCOLORED TEETH DUE TO FLUOROSIS AMONG ADOLESCENTS

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ABSTRACT:

Esthetics has become an important issue in modern society, as it seems to define one's behavior. In the past, functional demands were the main consideration in dental treatment. Today, with the decrease in caries prevalence, the focus has shifted toward dental esthetics. **Objectives:** The study was conducted to evaluate knowledge esthetic perception along with associated psychosocial impact of visibly discolored teeth due to fluorosis among adolescents aged 12-16 years in Bangalore city. **Method:** The study surveyed a population of 200 school children (mean age, 11-12 years) in Bangalore city. The informed consent was taken from the participants/parents/head of the institutions. Questionnaire regarding esthetic satisfaction with visibly discolored teeth and its psychosocial impact was assessed among students. Children from representative schools were surveyed using the Tooth Surface Index of Fluorosis (TSIF). Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. **Results:** The results of the present study showed that study group had fluorosis ranging from mild to severe. The knowledge about dental fluorosis was poor. Majority of the participants (69%) related discoloration to improper cleaning habit. Only 10.3% thought it is due to excess of some mineral in water. The appearance of teeth did not make any influence on the pleasing look of their teeth (18.3%). Considering psychosocial impact of fluorosis on the study population, 73.6% of severe fluorosis cases sometimes felt it is indeed a factor influencing their behavior. Only 8% of severe fluorosis cases felt discoloration does influence their psychosocial activity. **Conclusions:** The present study revealed that adolescent population suffered from varying degree of fluorosis. The knowledge of fluorosis and the cause was not known to many children. They attributed it to poor oral hygiene practices. The study group was not able to give a decisive conclusion with regard to the appearance of the teeth. The psychosocial impact of fluorosis was sometimes great in severely affected children. Many children had no influence of fluorosis on their routine behavior.

Keywords: Dental fluorosis, esthetic perception, psychosocial impact.

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INTRODUCTION

I“Beauty is in the eye of the beholder” can be trite; a large body of literature suggests that the dentist's eye does in fact see oral esthetics uniquely. This talent consists of the ability to identify and discern small deviations from the norm, using a view of esthetics developed over years of training and clinical experience. Several studies have examined differences in esthetic perception among dentists, dental students and laypeople. In general, dentists have a lower threshold for identifying deviations from the “ideal” than do laypeople.¹The authors found that non dentists had a stronger preference for white teeth than did dentists. Another author found that patients and dentists had different preferences for the correct proportions of maxillary teeth and types of symmetry in anterior teeth.²Dental fluorosis is a condition of altered enamel formation caused by excessive intake of fluoride only during tooth formation, with a wide range of severity. Mild fluorosis appears as opaque / white parchment enamel, while more severe fluorosis can be characterized by brown stains or pitting (or mottling) of enamel. The authors of an early epidemiological study commented

those very mild and mild fluorosis is difficult for untrained personnel to detect. However, findings from recent studies indicated that very mild and mild fluorosis can be noticeable conditions for some lay persons.³

Several authors have reported discrepancies between the treatment needs perceived by patients and those assessed by dental professionals. They reported that esthetic rather than functional factors determine a patient's subjective need to replace missing teeth.⁴Many patients find the six anterior teeth indispensable but will accept edentulous spaces in posterior regions. In our beauty conscious society, a smile has great impact.⁵When a patient's smile is destroyed by dental disease, the result often is loss of self-esteem and damage to his or her overall physical and mental health. Because most areas of dentistry deal increasingly with esthetics, they conducted this study to evaluate the factors that influence patients' satisfaction with dental esthetics and the impact of basic dental treatments on their satisfaction with their dental appearance. Numerous journal articles have reported on relationships between dental fluorosis prevalence and use

of different fluoride sources, including dietary fluoride supplements, fluoride dentifrice and fluoridated water.

There can be possible negative effects of fluorosis, such as embarrassment from or being unhappy with appearance and hindering smiling, especially in cases of fluorosis involving staining or pitting characteristic of moderate to severe fluorosis. As a result, there has been an increased number of studies assessing aesthetic perceptions and / or impact of dental fluorosis. Individuals often were reported to notice and / or be concerned about the appearance of fluorosis.⁶

Quality of life aspects of general and oral health have also recently received more attention, and several specific tools for assessment of Oral Health-Related Quality of Life (OHRQoL) have been developed. Also, there now is greater appreciation of the importance of assessing the impact of fluorosis beyond just awareness / concern, acceptability and / or satisfaction regarding this condition. This is important because those studied previously who reported that they were aware, concerned, or dissatisfied with dental fluorosis might not have been having any problem with or impact on everyday life from it. Thus, several more recent studies have assessed the effect of dental fluorosis on OHRQoL/ psycho-social aspects of children.⁷

Fluorosis indexes do not focus on the child's or the parent's perception of the tooth's esthetics. This omission is unfortunate because esthetics is the only significant consequence of dental fluorosis at least within the levels of fluorosis commonly found in North America. Researchers often have assumed that the primary measure of significance was the presence or absence of any dental fluorosis. Although certain discrete levels are detectable to dentists, fluorosis itself does not necessarily translate into dissatisfaction with the appearance of the teeth, for either the professional or the layperson. Only in the last decade has the issue been expanded beyond normative assessments. Recognizing this paradox, researchers have started to examine patients' and their parents' perceptions of fluorosis.⁸

This study therefore aims to evaluate knowledge esthetic perception along with associated psychosocial impact of visibly discolored teeth due to fluorosis among adolescents aged 12-16 years school going children and to compare the oral health related quality of life of children with dental fluorosis.

MATERIALS AND METHODS:

The research work was a cross-sectional descriptive study conducted on a population of 200 school children to assess the knowledge esthetic perception along with associated psychosocial impact of visibly discolored teeth due to fluorosis among adolescents aged 12-16 years in Bangalore city. Initially a list of existing schools in South Bangalore was obtained through internet web search. As some of the schools were located far away from the city a total of fifteen schools were short-listed for the study and approached for the grant of permission. Due to administrative and constitutional reasons only ten schools granted permissions and students of this school were considered for the study. Ethical clearance was

obtained from the research ethical committee of AECS Maaruti College of Dental Sciences and Research Institute, Bangalore. The protocol for this study required obtaining informed consent from all participants. The Performa to be used for the research work was discussed and designed with the experts related to this field. Any modifications done and to be incorporated into the final Performa were discussed with the research guide before implementation. The Performa was also translated into local language (Kannada) with the help of professional Kannada translator and finally got approved by the research guide after discussions to suit the study population. For the calibration of examiner ten individuals aged 12-18 years visiting outpatient department (OPD) of AECS Maaruti College of Dental Sciences And Research Centre were requested and brought to the Department of Community Dentistry. The examination procedure to be followed in the study was applied on these patients. The investigator conducted these examinations for five consecutive days under direct supervision of research guide to get an estimate of diagnostic variability. The comparison was made between investigator and the research guide (gold standard). It was found that the agreement for assessment was 85% which is considered excellent (K- value = 0.82). After the calibration of the examiner a pilot testing was carried out by the investigator on 20 adolescents. The pilot test assessments were utilized for planning future course of the study. The duration of study was one month. The study protocol was discussed with the concerned administrative head and members of the institutions and reassured them that there would be no harm to the individuals by being a part of this study and also concerns regarding the benefits to the patients and confidentiality of the reports were discussed.

After recording questionnaire, further oral examinations were done. If the participant was not able to give informed consent, his/her teacher was approached for informed consent to carry out oral examinations. The appointments to meet the participants were scheduled in between their activities and after tea/ lunch breaks as per the convenience of the staff and participant, so that the investigation does not result in unnecessary discomfort to the participants. Inclusion criteria were the school students aged 12-16 years old with visibly discolored teeth due to fluorosis; Participants, who were able to read and answer the questions; Subjects whose medical condition does not restrict them to be the part of this investigation and Subjects who fulfilled the research criteria and ready to give the consent to participate were considered for the study. Subjects who were uncooperative for clinical examination during the study and subjects who were physically very weak due to medical problem were excluded from the study.

The specially designed study Performa consisted of three parts; the first part was the informed consent section describing the study, its title and objectives of the study. It also contained details of the investigator followed by the procedure of the study. There was a mention about the benefits of the study and since the study had no harm

the same was mentioned. It was made clear that the participant was always eligible to opt out of the research work at his will. Second part of the Performa was pertaining to the 18 items to assess their knowledge esthetic perception along with associated psychosocial impact of visibly discolored teeth due to fluorosis.As part of the study; demographic details, questionnaire were recorded and the scores of indices were recorded.

The intra oral examinations were conducted by a single examiner throughout the study and TSIF index was used to record dental fluorosis. The examinations were performed using sterile # 5 mouth mirror. The examination areas were well ventilated rooms; the subjects were seated on an ordinary chair and examined. The trained assistant was seated close to the examination area.

STATISTICAL ANALYSIS

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. The following assumptions on data are made, 1.Dependent variables should be normally distributed, 2.Samples drawn from the population should be random, and Cases of the samples should be independent. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups.

RESULTS:

The distribution of entire study population based on the age is presented in Table 1. The age group of the study population was ranging from 12-16years. For the sake of convenience the entire population was divided into 4 subgroups which are presented in the same table (Table 1). The study group consisted more females (105) compared to males who were about 95 in number. The subgroups 11-12 years consisted highest number of individuals (79) including both male and female. The individuals with moderate fluorosis are of highest frequency (90) followed by severe fluorosis (87).

Correlation of Knowledge on esthetic perception with levels of fluorosis (Q1-Q4)

Overall the knowledge of fluorosis was poor among adolescents. The correlation of knowledge on esthetic perceptions with levels of fluorosis is presented in Table 2. The table 2 contains four questions related to knowledge. The question 1 is regarding the cause of the fluorosis. The 69% subjects with severe fluorosis thought discoloration is due to improper cleaning.

Very few 10.30% thought of its actual cause due to excess of some mineral in water (Table 2).When they were asked about the treatment majority of severe cases 74.70% answered it can be corrected by proper tooth brushing while 17.8% knew about dental treatment for fluorosis (Table 2).

Majority of subjects (66.7%) gave the reason for not getting it corrected was not aware of any treatment for fluorosis. Very few 4.6% subjects were happy with the color of their teeth. The p value is 0.048which is statistically significant for this correlation.

Correlation of esthetic perception with levels of fluorosis (Q5-Q8)

The esthetic perception of fluorosis is presented in Table 3. The 78% of subjects suffered severely from fluorosis have no perception about the appearance of their teeth. 39% of mild cases were not happy with the discoloration of their teeth and 11.5% of severe fluorosis cases were happy with the color of their teeth. More of severe cases 71.3% were concerned or worried about their discolored teeth while 73.6% of cases thought they are not attractive because of the appearance of their teeth. When they were asked whether they look different from others because of their teeth color majority 77% disagreed with this statement.

Correlation of psycho-social impact on esthetic perception with levels of fluorosis (Q9-Q18)

The results concluded that subjects did not give any decisive conclusion about the psychosocial impact of fluorosis on their life.Among severe cases 75.9% subjects feel shy while smiling or talking to others sometimes because of the appearance of their teeth and 17.8% of moderate and mild cases always feel shy while smiling or talking. 18.4% of severe cases never felt the same. 72.4% of severe cases never neglected by other people because of their teeth while very few 10.3% were neglected by others because of the appearance of their teeth. Among mild 26.1% and moderate cases 23% were neglected by others sometime (Table 4).Among severe cases 73.6% were called or teased names by others for having displeasing appearance of their teeth while 18.4% never experienced the same. Among moderate and mild cases majority were called or teased by others (Table 4). The results are statistically significant when checked for the affect of stained teeth on their personality (Table 4). It was seen that few subjects (13.3%) feel nervous and conscious because of their displeasing teeth. Most of the subjects 72.4% never been nervous or conscious because of their discolored teeth. Social interaction is not a problem for the subjects with visibly discolored teeth and neither they get upset or uncomfortable by the questions being asked to them about their discolored teeth but the confidence level is low in social gatherings. The fluorosed teeth do not limit their academic performances and future prospects to some extent.

Table 1: Age distribution of adolescent studied

Age in years	Number of Adolescents	%
11-12 years	79	39.5
13 years	47	23.5
14 years	48	24.0
15-16 years	25	12.5
Total	200	100.0

Table 2: Correlation of Knowledge on esthetic perception with levels of fluorosis

Knowledge statements	Levels of Fluorosis			P value
	Mild (n=23)	Moderate (n=90)	Severe (n=87)	
1. What could be the cause for your discolored teeth?				
Hereditary factor	5(21.7%)	13(14.4%)	8(9.2%)	0.233
Improper cleaning	13(56.5%)	46(51.1%)	60(69%)	
Excess of some mineral in water	3(13%)	17(18.9%)	9(10.3%)	
Eating certain food	2(8.7%)	14(15.6%)	10(11.5%)	
Q.2 Brown stains or white spots on teeth can be corrected				
By dental doctor	2(8.7%)	16(17.8%)	6(6.9%)	0.085+
By proper tooth brushing	15(65.2%)	49(54.4%)	65(74.7%)	
By use of proper tooth paste	6(26.1%)	21(23.3%)	12(13.8%)	
As time passes it gets corrected	0(0%)	4(4.4%)	4(4.6%)	
Q.3What is the reason for not getting it corrected?				
Was happy with my color	1(4.3%)	17(18.9%)	4(4.6%)	0.048*
Treatment would be expensive	5(21.7%)	9(10%)	13(14.9%)	
No treatment is available	3(13%)	15(16.7%)	12(13.8%)	
Not aware of it	14(60.9%)	49(54.4%)	58(66.7%)	
Q.4 Is there any kind of dental treatment to correct your discolored teeth?				
Yes	5(21.7%)	19(21.1%)	11(12.6%)	0.130
No	5(21.7%)	18(20%)	10(11.5%)	
Don't Know	13(56.5%)	53(58.9%)	66(75.9%)	

Table 3: Correlation of esthetic perception with levels of fluorosis

Perception	Levels of Fluorosis			P value
	Mild (n=23)	Moderate (n=90)	Severe (n=87)	
Q.5 The appearance of your teeth is pleasing and looks good				
Agree	2(8.7%)	14(15.6%)	10(11.5%)	0.019*
Disagree	9(39.1%)	19(21.1%)	9(10.3%)	
Don't know	12(52.2%)	57(63.3%)	68(78.2%)	
Q.6 You are already concerned or worried about the color of your teeth				
Agree	6(26.1%)	27(30%)	16(18.4%)	0.090+
Disagree	4(17.4%)	17(18.9%)	9(10.3%)	
Don't know	13(56.5%)	46(51.1%)	62(71.3%)	
Q.7 You are not attractive because of your discolored teeth				
Agree	5(21.7%)	27(30%)	11(12.6%)	0.028*
Disagree	2(8.7%)	16(17.8%)	12(13.8%)	
Don't know	16(69.6%)	47(52.2%)	64(73.6%)	
Q.8 You look different from others				
Agree	2(8.7%)	13(14.4%)	9(10.3%)	0.115
Disagree	14(60.9%)	55(61.1%)	67(77%)	
Don't know	7(30.4%)	22(24.4%)	11(12.6%)	

Table 4: Correlation of psycho-social impact on esthetic perception with levels of dental fluorosis

Psycho-social impact	Levels of Fluorosis			P value
	Mild (n=23)	Moderate (n=90)	Severe (n=87)	
Q.9 You feel shy while smiling or talking to others because of the appearance of your teeth				
Always	4(17.4%)	16(17.8%)	5(5.7%)	0.019*
Sometimes	12(52.2%)	57(63.3%)	66(75.9%)	
Never	7(30.4%)	11(12.2%)	16(18.4%)	
Q.10 You are neglected by other people because of the appearance of your teeth				
Always	3(13%)	15(16.7%)	9(10.3%)	0.450
Sometimes	6(26.1%)	21(23.3%)	15(17.2%)	
Never	14(60.9%)	54(60%)	63(72.4%)	
Q.11 Have you ever been teased or called names by others for having displeasing appearance of your teeth				
Always	4(17.4%)	10(11.1%)	7(8%)	0.538
Sometimes	16(69.6%)	59(65.6%)	64(73.6%)	
Never	3(13%)	21(23.3%)	16(18.4%)	
Q. 12 Your stained teeth affects your personality				
Always	3(13%)	17(18.9%)	6(6.9%)	0.047*
Sometimes	18(78.3%)	53(58.9%)	67(77%)	
Never	2(8.7%)	20(22.2%)	14(16.1%)	
Q. 13 Do you feel nervous or self-conscious due to displeasing appearance of your teeth				
Always	1(4.3%)	12(13.3%)	6(6.9%)	0.184
Sometimes	9(39.1%)	24(26.7%)	18(20.7%)	
Never	13(56.5%)	54(60%)	63(72.4%)	
Q. 14 It is difficult to make friends because of the appearance of your teeth				
Always	1(4.3%)	7(7.8%)	4(4.6%)	0.853
Sometimes	6(26.1%)	17(18.9%)	18(20.7%)	
Never	16(69.6%)	66(73.3%)	65(74.7%)	
Q.15 Are you uncomfortable or upset with the questions being asked to you about your teeth				
Always	9(39.1%)	11(12.2%)	6(6.9%)	<0.001**
Sometimes	2(8.7%)	24(26.7%)	11(12.6%)	
Never	12(52.2%)	55(61.1%)	70(80.5%)	
Q.16 Do you avoid making new friends				
Always	2(8.7%)	14(15.6%)	9(10.3%)	0.001**
Sometimes	8(34.8%)	19(21.1%)	5(5.7%)	
Never	13(56.5%)	57(63.3%)	73(83.9%)	
Q.17 You are confident in social situations with other people of your age				
Always	4(17.4%)	25(27.8%)	16(18.4%)	0.018*
Sometimes	7(30.4%)	16(17.8%)	7(8%)	
Never	12(52.2%)	49(54.4%)	64(73.6%)	
Q.18 Discolored teeth limit your academic performance and future prospects to some extent				
Always	4(17.4%)	20(22.2%)	13(14.9%)	0.160
Sometimes	13(56.5%)	47(52.2%)	61(70.1%)	
Never	6(26.1%)	23(25.6%)	13(14.9%)	

DISCUSSION

The present study revealed that adolescent population suffered from varying degree of fluorosis. It was a questionnaire survey along with clinical examination to assess Dental Fluorosis. TSIF was used for evaluation of fluorosis since it provides information on esthetic status of the tooth. The knowledge of fluorosis and the cause was not known to many children. Majority of subjects attributed it to poor oral hygiene practices. Majority of the subjects (69%) felt that discoloration was because of improper cleaning. Only 17.8% thought its actual cause is due to some chemical in the water. As there are no studies available the results could not be compared for variations.⁶

Our study also revealed information on attitude of subjects with regard to dental esthetics. It was found that more female subjects (57.5%) gave importance for esthetics compared to males (42.5%). Severe fluorosis has been consistently reported in many studies to be evaluated less favorably and to have negative effects. Similar findings were reported by a study conducted in British Columbia, Canada by JayD Shulman where they found girls were more conscious about their looks compared to boys.

The question remains, what proportion of children with dental fluorosis actually perceive an aesthetic problem. The results presented here suggest that for some subjects with TSIF scores rating from “5” to “7”, aesthetic problems are of concern to subjects, whereas Clark DC, Hann HJ (2003) suggested that scores from “4” to “6” were perceived an aesthetic problem. The clinical distinction between our study and this study is not very significant as these scores do not have higher clinical difference. The psychosocial impact was greater in children with severe fluorosis (76%). In a study by Wim H Helderman WH 52% of children had negative psychosocial impact and showed feelings of embarrassment and shyness during social interactions.² As the study subjects belong to adolescent group their importance towards good looks is considerably high, the ugly sight of discolored tooth would have negative impact on their psychosocial behavior.

The study group was not able to give a decisive conclusion with regard to the appearance of the teeth. The psychosocial impact of fluorosis was sometimes great in severely affected children. Many children had no influence of fluorosis on their routine behavior. Girls were more critical of their tooth colour than were boys; however, parents and dentists were more critical of boys' tooth colour than of girls'. While younger subjects were more critical than older subjects, parents of younger subjects were less critical than those of older subjects. The study group was not able to give a decisive conclusion with regard to the appearance of the teeth. The psychosocial impact of fluorosis was sometimes great in severely affected children. Many children had no

influence of fluorosis on their routine behavior. Girls were more critical of their tooth colour than were boys; however, parents and dentists were more critical of boys' tooth colour than of girls'. While younger subjects were more critical than older subjects, parents of younger subjects were less critical than those of older subjects. In light of the current predictions on the safety and effectiveness of both systemic and topical fluorides, it is important for public health authorities to have appropriate and scientifically valid information from which to formulate public policy and plan disease prevention activities. Recognizing that the assessment and interpretation of data from dental fluorosis surveys are complicated and involved, it is vital that continued research in this area be forthcoming.

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