

Prevalence of Anterior Tooth Discoloration in South West coastal Population in India

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ABSTRACT:

Background: To determine the prevalence of discoloration of anterior teeth in the south west coastal population of India. The study was conducted on 2000 patients visiting the Department of Conservative Dentistry and Endodontics, ABSMIDS and Rural Satellite Centers of NITTE University.

Methods: Anterior discoloration was evaluated using a questionnaire based on WHO oral health survey 2013 which include age, gender, occupation, location, dietary habits etc.

Results: The study concluded that anterior discoloration was found more in 36-45 age groups, in males, in laborers, in rural population and in vegetarians.

Conclusion: It was observed that the tooth discoloration seem to be affecting more in the age group of 36-45 years. The rural population was seen to be affected more than the urban population; prevalence of tooth discoloration was observed more in the laborers and was seen high in mixed diet population.

Keywords: Anterior teeth discoloration, A.I – Amelogenesis Imperfecta, D.I –Dentinogenesis Imperfecta.

INTRODUCTION

Esthetic importance is of high concern to a number of people seeking dental treatment. There is a growing awareness in the public for the treatment of staining and discoloration of teeth.¹ The dentists should have the knowledge of the etiology of tooth discoloration in order to arrive at a diagnosis and thereby perform the required treatment.¹ Tooth discoloration leads to a broad spectrum of esthetic problems. The dentist and the public spend considerable amounts of time and money in an attempt to improve not just the appearance of the teeth, but also the confidence of a person.²

Several factors lead to tooth discoloration. These factors are mainly classified into four major groups: genetics,^{3,4} congenital factors,⁵ acquired or environmental factors,³ and iatrogenic factors.⁶

Basically, there are two types of tooth discolorations: those related to intrinsic factors and extrinsic factors.⁷ In the developing

dentition, discoloration of teeth is caused as a consequence of a number of metabolic disease and systemic factors.⁸ Amelogenesis imperfecta, dentinogenesis imperfecta, tetracycline staining, fluorosis, enamel hypoplasia, pulpal haemorrhagic products, root resorption, ageing,¹ local factors such as injury are also recognized.

Extrinsic discoloration lies on the tooth surface or in the acquired pellicle. The origin of the stain may be: Metallic or Non-metallic.¹

MATERIALS AND METHODS

The present study was conducted among 2000 patients within the duration of 6 months from June to November 2015. Out of which 1,190 patients were selected randomly from the department of conservative dentistry and endodontics and 810 from 3 rural satellite centers of A B Shetty Memorial Institute of Dental Sciences, Deralakatte, Mangaluru.

Anterior discoloration was evaluated using a questionnaire based on WHO oral health survey 2013 which include age, gender, occupation, location, dietary habits etc. The endogenous factors of tooth discoloration that were taken into considerations in the present study were Fluorosis, Tetracycline, Non Vital Teeth, Dental Caries, Trauma, Amelogenesis Imperfecta, Dentinogenesis Imperfecta. The exogenous factors which were included in the study were food/beverages stains, plaque/calculus, Chlorhexidine stain, chromogenic bacteria, smoking stain, tobacco chewing stain and pan chewing stain. Institutional Ethics clearance was obtained for the survey from the institutional ethical committee. With the patient's permission via written consent the study was done. All the patients were examined by a single clinician and the examination was carried out on a dental chair under good illumination, using sterile diagnostic instruments like a mouth mirror, straight probe, tweezers, cotton rolls. Patients with limited mouth opening, undergoing orthodontic treatment, individuals with recent maxillofacial trauma and physically or mentally challenged patients

were excluded from the study. Patients above the age group of 15 years were included.

The data obtained was statistically analyzed using IBM SPSS statistics²⁰. The results were subjected to statistical analysis by Chi-square test, Fisher's exact test to determine the P value of each criteria and the p value < 0.05 was considered to be statistically significant.

RESULTS

On the basis of the results obtained, it was observed that tooth discoloration was more prevalent in the age group of 36-45 years and males were more affected than females. Rural population was affected more than the urban. Increase in the incidence among laborers were seen and individuals with mixed diet. The results are further described in the tables given below.

DISCUSSION

The present study was conducted between the age group of 15 to 66 years. A high prevalence of endogenous and exogenous stains was seen to affect the age group of 36-45 years which was found to be statistically significant (Table-1).

Table No. 1: Prevalence of Anterior Discoloration of Teeth with Respect to Age

AGE	DISCOLORATION		TOTAL
	PRESENT	ABSENT	
15-25	196(11.3%)	68(25.3%)	264(13.2%)
26-35	362 (20.9%)	62 (23.0%)	424 (21.2%)
36-45	436 (25.2%)	73 (27.1%)	509 (25.5%)
46-55	277 (16.0%)	40 (14.9%)	317 (15.9%)
56-65	288 (16.6%)	20 (7.4%)	308 (15.4%)
>66	172 (9.9%)	6 (2.2%)	178 (8.9%)
TOTAL	1731 (100.0%)	269 (100.0%)	2000 (100.0%)

The Chi square value = 63.73(5), showed a statistical significant difference among different age groups.

Fluorosis seemed to be a prevalent cause for the endogenous discoloration of teeth and was seen to affect more in the age group of 36-45 years, No Statistical significant difference

between fluorosis and other endogenous factors was seen.(Table-2).

Smoking, an exogenous factor showed prevalence for the anterior discoloration of the

teeth. It was seen affecting more in the age group of 36-45years. A statistical significant difference between staining caused by smoking and other exogenous factors (Table-3). These results can be correlated with the study done by **Wali A et al**, the study showed the prevalence of endemic fluorosis and enamel hypoplasia in the South Canara population; it was observed that discoloration of the tooth due to fluorosis was more in the age group of 14-27 years.⁹

In the present study, anterior discoloration of the teeth was seen more prevalent in males than in females, which showed statistical significant difference (Table – 4).

Dental caries was observed as an important endogenous factor causing anterior discoloration of teeth. It was seen more prevalent in males than in females, no statistical significant difference was detected (Table -5).

Table No. 2: Prevalence of Endogenous Discoloration of Teeth With Respect to Age

Age	Fluorosis	Tetracycline	Non vital Teeth	Dental caries	Trauma	A.I	D.I
15-25	38(9.8%)	23(11.9%)	27(9.1%)	28(6.3%)	38(10.0%)	0(0.0%)	3(42.9%)
26-35	88(22.8%)	31(16.0%)	44(14.9%)	68(15.3%)	84(22.1%)	1(33.3%)	1(14.3%)
36-45	97(25.1%)	54(27.8%)	66(22.3%)	93(21.0%)	95(25.0%)	2(66.7%)	2(28.6%)
46-45	69(17.9%)	40(20.6%)	57(19.3%)	78(17.6%)	63(16.6%)	0(0.0%)	1(14.3%)
56-65	61(15.8%)	30(15.5%)	63(21.3%)	83(18.7%)	72(18.9%)	0(0.0%)	0(0.0%)
>66	33(8.5%)	16(8.2%)	39(13.2%)	93(21.0%)	28(7.4%)	0(0.0%)	0(0.0%)
Total	386(100.0%)	194(100.0%)	296(100.0%)	443(100.0%)	380(100.0%)	3(100.0%)	7(100.0%)

The Chi square value = 6.03(5), p= 0.30, showed no Statistical significant difference between fluorosis and other endogenous factors.

Table No.3: Prevalence of Exogenous Discoloration of Teeth with Respect to Age

Age	Food/ beverages	Plaque/ calculus	Chlorhexidine stain	Chromogenic bacteria	Smoking stain	Tobacco chewing stain	Pan chewing stain
15-25	42(13.2%)	41(10.1%)	5(12.8%)	0(0.0%)	14(2.5%)	23(4.8%)	1(7.1%)
26-35	56(17.6%)	60(14.7%)	14(35.9%)	0(0.0%)	104(18.7%)	96(20.1%)	2(14.3%)
36-45	97(30.5%)	82(20.1%)	20(51.3%)	3(60.0%)	168(30.2%)	58(12.2%)	6(42.9%)
46-55	47(14.8%)	40(9.8%)	0(0.0%)	0(0.0%)	120(21.6%)	96(20.1%)	3(21.4%)
56-65	44(13.8%)	111(27.3%)	0(0.0%)	2(40.0%)	115(20.7%)	156(32.7%)	1(7.1%)
>66	32(10.1%)	73(17.9%)	0(0.0%)	0(0.0%)	35(6.3%)	48(10.1%)	1(7.1%)
Total	318(100.0%)	407(100.0%)	39(100.0%)	5(100.0%)	556(100.0%)	477(100.0%)	14(100.0%)

The Chi square value = 111.50(5), showed statistical significant difference between staining caused by smoking and other exogenous factors, p<0.001.

Table No. 4: Prevalence of Anterior Discoloration of Teeth with Respect to Gender

GENDER	DISCOLORATION		TOTAL
	PRESENT	ABSENT	
MALE	1003 (57.9%)	78 (29.0%)	1081(54.1%)
FEMALE	728(42.1%)	191(71.0%)	919(46.0%)
TOTAL	1731	269	2000

Chi square value = 78.55(1), p<0.001, showed statistical significance in males.

Table No. 5: Prevalence of Endogenous Discoloration of Teeth with Respect to Gender

Gender	Fluorosis	Tetracycline	Non vital Teeth	Dental Caries	Trauma	A.I	D.I
MALE	200(51.8%)	105(54.1%)	160(54.1%)	235(53.0%)	216(56.8%)	3(100.0%)	3(42.9%)
FEMALE	186(48.2%)	89(45.9%)	136(45.9%)	208(47.0%)	164(43.2%)	0(0.0%)	4(57.1%)
Total	386(100.0%)	194(100.0%)	296(100.0%)	443(100.0%)	380(100.0%)	3(100.0%)	7(100.0%)

Chi square value = 0.23(1), the endogenous factors showed no significance for dental caries, p=0.63.

Smoking was detected as a significant exogenous factor that led to the discoloration of the teeth and was more prevalent in males than in females, which showed statistical significant difference (Table 6). These results can be correlated with the study done by **Wali A et al** which showed the prevalence of dental fluorosis and enamel hypoplasia which was more in males as compared to females.⁹ The study done by **Faezeh Khozimeh et al**, to determine the prevalence and etiology of tooth discoloration in female teenage students of Isfahan. The results of the study showed that dental caries were the most common cause of tooth discoloration which constituted 71.1%.¹⁰ In the present study, anterior discoloration of the teeth was observed to be prevalent in labourers, which showed a statistical significance in anterior discoloration of teeth with respect to different occupations (Table – 7).

Among the various class of population studied, dental caries was observed as an predominant endogenous factor that was seen affecting the housewives. The results showed Statistical dental caries with respect to other endogenous factors (Table -8). Melanin was suggested to

be the cause of discoloration in carious teeth according to various studies. **Fusijama et al** described how the discoloration precedes bacterial penetration of demineralised dentine, thus it seems that the discoloration is caused by compounds diffusing ahead of the bacteria. Aerobic conditions are required for the production of both melanin fuschin. It is thought that protein can react with small aldehyde under anaerobic condition to cause browning.¹¹

Smoking was detected as an important exogenous factor responsible for the discoloration of teeth, which showed Statistical significant difference of smoking stain compared to other exogenous factors (Table – 9). A cross sectional study done on the British adults showed that 20 % of smokers reported to have moderate and severe levels of tooth discoloration compared to 15 % in non-smokers.⁴

In the present study, based on the geographic location studied, anterior discoloration of the teeth was prevalent more in the rural population as compared to urban population, which showed statistical significant difference (Table -10).

Table No. 6: Prevalence of Exogenous Discoloration of Teeth With Respect to Gender.

Gender	Food/ beverages	Plaque/ calculus	Chlorhexidine stain	Chromogenic bacteria	Smoking stain	Tobacco chewing stain	Pan chewing stain
MALE	176(55.3%)	212(52.1%)	22(56.4%)	4(80.0%)	556(100.0%)	345(72.3%)	7(50.0%)
FEMALE	142(44.7%)	195(47.9%)	17(43.6%)	1(20.0%)	0(0.0%)	132(27.7%)	7(50.0%)
Total	318 (100.0%)	407(100.0%)	39(100.0%)	5(100.0%)	556(100.0%)	477 (100.0%)	14(100.0%)

Chi square value = 654.68(1), exogenous factors showed statistical significance for smoking, p<0.001.

Table No. 7: Prevalence of Anterior Discoloration of Teeth With Respect to Occupation.

OCCUPATION	DISCOLORATION		TOTAL
	PRESENT	ABSENT	
LABOURER	551(31.8%)	36(13.4%)	587(29.3%)
HOUSEWIFE	482(27.8%)	107(39.8%)	589(29.5%)
STUDENT	183(10.6%)	57(21.2%)	240(12.0%)
BUISNESS	147(8.5%)	28(10.4%)	175(8.8%)
OTHERS	368(21.3%)	41(15.2%)	409(20.5%)
TOTAL	1731(100.0%)	269(100.0%)	2000(100.0%)

Chi square value = 65.23(4), labour class showed a statistical significance in anterior discoloration of teeth with respect to different occupations, p<0.001.

Table No. 8: Prevalence of Endogenous Discoloration of Teeth With Respect to Occupation

Occupation	Fluorosis	Tetracycline	Non vital Teeth	Dental caries	Trauma	A.I	D.I
Labourer	108(28.0%)	50(25.8%)	96(32.4%)	122(27.5%)	114(30.0%)	2(66.7%)	0(0.0%)
Housewife	123(31.9%)	62(32.0%)	92(31.1%)	148(33.4%)	108(28.4%)	0(0.0%)	3(42.9%)
Student	32(8.3%)	25(12.9%)	23(7.8%)	31(7.0%)	36(9.5%)	0(0.0%)	2(28.6%)
Buisness	33(8.5%)	18(9.3%)	22(7.4%)	33(7.4%)	33(8.7%)	0(0.0%)	1(14.3%)
Others	90(23.3%)	39(20.1%)	63(21.3%)	109(24.6%)	89(23.4%)	1(33.3%)	1(14.3%)
Total	386(100.0%)	194(100.0%)	296(100.0%)	443(100.0%)	380(100.0%)	3(100.0%)	7(100.0%)

Chi square value = 21.43(4), p<0.001, showed Statistical significance for dental caries with respect to other endogenous factors.

Table No. 9: Prevalence of Exogenous Discoloration of Teeth With respect to Occupation

Gender	Food/ beverages	Plaque/ calculus	Chlorhexidine stain	Chromogenic bacteria	Smoking stain	Tobacco chewing stain	Pan chewing stain
Labourer	111(34.9%)	109(26.8%)	11(28.2%)	1(20.0%)	309(55.6%)	233(48.8%)	2(14.3%)
Housewife	93(29.2%)	144(35.4%)	9(23.1%)	1(20.0%)	0(0.0%)	117(24.5%)	6(42.9%)
Student	43(13.5%)	38(9.3%)	6(15.4%)	0(0.0%)	16(2.9%)	9(1.9%)	1(7.1%)
Buisness	21(6.6%)	32(7.9%)	6(15.4%)	0(0.0%)	55(9.9%)	19(4.0%)	1(7.1%)
Others	50(15.7%)	84(20.6%)	7(17.9%)	3(60.0%)	176(31.7%)	99(20.8%)	4(28.6%)
Total	318(100.0%)	407(100.0%)	39(100.0%)	5(100.0%)	556(100.0%)	477(100.0%)	14(100.0%)

Chi square value = 509.08(4), p<0.001, showed Statistical significant difference of smoking stain with other exogenous factors.

Table No. 10: Prevalence of Anterior Discoloration With Respect to Location

LOCATION	DISCOLORATION		TOTAL
	PRESENT	ABSENT	
RURAL	1048(60.5%)	190(70.6%)	1238(61.9%)
URBAN	683(39.5%)	79(29.4%)	762(38.1%)
TOTAL	1731	269	2000

The Chi square value = 10.05(1), the anterior discoloration of teeth when compared to the urban population showed a significance for the rural population, p=0.002.

Based on different location illustrated, dental caries was observed more prevalent in the rural population than in the urban, which showed no Statistical significant difference of

dental caries with other endogenous factors (Table -11).

Smoking was observed as the main exogenous factor that caused the anterior discoloration of teeth and was observed to be more prevalent in rural population than in the urban population. Exogenous factors showed statistical significance for smoking (Table -12). Due to the lack of awareness about the cause of tooth discoloration, the rural population was seen to be affected more than the urban population.

In the present study, with respect to the various groups of diet under study, the anterior discoloration of the teeth was observed more prevalent in the mixed diet population, which showed no Statistical significance in the tooth discoloration between vegetarians and mixed diet population (Table -13).

Anterior discoloration of the teeth due to dental caries was observed more prevalent in the mixed diet population, no statistical significant difference while analysing other endogenous factor (Table -14).

Anterior discoloration of the teeth due to smoking stain was observed to be more prevalent in mixed diet population, the results there was no Statistical significant difference

of smoking stain with other exogenous factors (Table -15).

In our study of 2000 patients, amelogenesis imperfecta was noticed only in 3 cases. In hereditary condition, any change with regard to mineralization or matrix formation leads to the disturbance of enamel formation. Amelogenesis imperfecta are divided into 14 different subtypes. Their appearance depends upon the subtype varying from relatively mild hypomature ‘snow-capped’ enamel to more severe hereditary hypoplasia with thin, hard enamel which has a yellow to yellowish brown appearance.

In the present study of 2000 patients, dentinogenesis imperfecta was seen in 7 cases. Dentine defects occur genetically or through environmental influences. The condition related to dentine alone is dentinogenesis imperfecta. The teeth affected are usually bluish or brown in color, and demonstrate opalescence on trans-illumination. Once the dentine is exposed, teeth rapidly show brownish discoloration presumably by absorption of chromogens into the porous dentine.

Table No. 11: Prevalence of Endogenous Discoloration of Teeth With Respect to Location

Location	Fluorosis	Tetracycline	Non vital Teeth	Dental caries	Trauma	A.I	D.I
RURAL	231(59.8%)	124(63.9%)	171(57.8%)	258(58.2%)	240(63.2%)	2(66.7%)	7(100.0%)
URBAN	155(40.2%)	70(36.1%)	125(42.2%)	185(41.8%)	140(36.8%)	1(33.3%)	0(0.0%)
Total	386	194	296	443	380	3	7

The Chi square value =3.23(1), p=0.07, Showed no Statistical significant difference of dental caries with other endogenous factors.

Table No. 12: Prevalence of Exogenous Discoloration of Teeth With Respect to Location

Location	Food / Beverages	Plaque / Calculus	Chlorhexidine stain	Chromogenic bacteria	Smoking Stain	Tobacco chewing stain	Pan chewing stain
RURAL	190(59.7%)	218(53.6%)	39(100.0%)	3(60.0%)	280(50.4%)	199(41.7%)	9(64.3%)
URBAN	128(40.3%)	189(46.4%)	0(0.0%)	2(40.0%)	276(49.6%)	278(58.3%)	5(35.7%)
Total	318	407	39	5	556	477	14

The Chi square value= 43.49(1), exogenous factors showed statistical significance for smoking, p<0.001.

Table No. 13: Prevalence of Anterior Discoloration of Teeth With Respect to Diet.

DIETRY HABITS	DISCOLORATION		TOTAL
	PRESENT	ABSENT	
VEG	317(18.3%)	53(19.7%)	370(18.5%)
MIXED	1414(81.7%)	216(80.3%)	1630(81.5%)
TOTAL	1731	269	2000

The Chi square value = 0.30(1), p=0.59, showed no Statistical significance in the tooth discoloration between vegetarians and mixed diet population

Table No. 14: Prevalence of Endogenous Discoloration of Teeth With Respect to Diet.

Dietary Habits	Fluorosis	Tetracycline	Non vital Teeth	Dental caries	Trauma	A.I	D.I
VEG	67(17.4%)	39(20.1%)	51(17.2%)	81(18.3%)	66(17.4%)	0(0.0%)	1(14.3%)
MIXED	319(82.6%)	155(79.9%)	245(82.8%)	362(81.7%)	314(82.6%)	3(100.0%)	6(85.7%)
Total	386	194	296	443	380	3	7

The Chi square value = 0.02(1), p=0.89, showed no Statistical significance was observed indental caries with respect to other endogenous factors.

Table No. 15: Prevalence of Exogenous Discoloration of Teeth with Respect to Diet.

Dietary Habits	Food / beverages	Plaque / Calculus	Chlorhexidine stain	Chromogenic bacteria	Smoking stain	Tobacco chewing stain	Pan chewing stain
VEG	55(17.3%)	81(19.9%)	7(17.9%)	0(0.0%)	111(20.0%)	90(18.9%)	0(0.0%)
MIXED	263(82.7%)	326(80.1%)	32(82.1%)	5(100.0%)	445(80.0%)	387(81.1%)	14(100.0%)
Total	318	407	39	5	556	477	14

Chi square value = 1.09(1), p=0.29 which showed no Statistical significant difference of smoking stain with other exogenous factors.

CONCLUSION

The present study revealed the risk of both endogenous and exogenous stain higher in the age group of 36-45 years, in males, in rural population, in labourers and in mixed diet population.

Amelogenesis imperfecta were observed only in 3 individuals and dentinogenesis imperfecta was reported in 7 individuals out of the 2000 patients examined.

Among the endogenous factors, dental caries showed highest prevalence; which was observed in the mixed diet population. Among the exogenous stains and calculus was high in the age group of 36-45 years followed by smoking stain, observed highest in the male population.

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