

# Prevalence of Anterior Tooth Discoloration in Southwest Coastal Population

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## ABSTRACT

**Introduction:** To determine the prevalence of discoloration of anterior teeth in the southwest coastal population of India. The study was conducted on 1,000 patients visiting the Department of Conservative Dentistry and Endodontics, A.B. Shetty Memorial Institute of Dental Sciences and rural satellite centers of Nitte University, Mangaluru, Karnataka, India.

**Materials and methods:** Anterior discoloration was evaluated using a questionnaire based on World Health Organization Oral Health Survey, 2013.

**Results:** The study concluded that anterior discoloration was found more in 31 to 40 age groups, in males, in laborers, and in rural population.

**Conclusion:** It was observed that tooth discoloration seems to be affecting more in the age group of 31 to 40 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:** Amelogenesis imperfecta, Anterior teeth discoloration, Dentinogenesis imperfecta.

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## INTRODUCTION

Discoloration of the tooth is one of the frequent reasons why a patient seeks dental care. Tooth discoloration is esthetically displeasing and psychologically traumatizing. An understanding of the etiology of tooth discoloration is important to a dentist in order to make the correct diagnosis. The knowledge of the cause of discoloration will also help the dental practitioner to explain the exact nature of the condition to the patient.<sup>1</sup>

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.<sup>2</sup>

Basically, there are two types of tooth discolorations: those related to intrinsic factors and extrinsic factors.<sup>3</sup>

The intrinsic discoloration occurs when the chromogens are deposited within the bulk of the tooth, which may be of local or systemic origin.<sup>4</sup> Extrinsic discoloration is defined as discoloration located on the outer surface of the tooth structure and is caused by topical or extrinsic agents.<sup>5</sup>

In the developing dentition, discoloration of teeth is caused as a consequence of a number of metabolic disease and systemic factors.<sup>6</sup> Amelogenesis imperfecta, dentinogenesis imperfecta, tetracycline staining, fluorosis, enamel hypoplasia, pulpal hemorrhagic products, root resorption, aging, and 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 nonmetallic.<sup>1</sup>

## MATERIALS AND METHODS

The present study was conducted among 1,000 patients within the duration of 6 months from June to November 2016. The patients reporting to the outpatient department were selected randomly from the Department of Conservative Dentistry and Endodontics and from four rural satellite centers of A.B. Shetty Memorial Institute of Dental Sciences, Deralakatte, Mangaluru, India.

Anterior discoloration was evaluated using a questionnaire based on World Health Organization Oral Health Survey (2013), which includes age, gender, occupation, location, dietary habits, etc. The endogenous factors of tooth discoloration that were taken into consideration in the present study were fluorosis, tetracycline, nonvital teeth, dental caries, trauma, amelogenesis imperfecta, and dentinogenesis imperfecta. The exogenous factors which were included in the study were food/beverage stains, plaque/calculus, chlorhexidine stain, chromogenic bacteria, smoking stain, tobacco chewing stain, and pan chewing stain. Ethics clearance was obtained for the survey from the Institutional Ethics Committee. With the patient's permission via written consent, the study was completed. 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

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**Table 1:** Prevalence of anterior discoloration of teeth with respect to age

Age (years)	Discoloration	
	Absent	Present
<20	34 (10.7%)	54 (7.9%)
21–30	100 (31.3%)	174 (25.6%)
31–40	89 (27.9%)	199 (29.2%)
41–60	73 (22.9%)	194 (28.5%)
>60	23 (7.2%)	60 (8.8%)
Total	319 (100.0%)	681 (100.0%)

The chi-square value = 63.73 (5) showed a statistically significant difference among different age groups

**Table 2:** Prevalence of anterior discoloration of teeth with respect to gender

Gender	Discoloration	
	Absent	Present
Male	130 (40.8%)	385 (56.5%)
Female	189 (59.2%)	296 (43.5%)
Total	319 (100.0%)	681 (100.0%)

The chi-square value = 78.55 (1),  $p < 0.001$ , showed statistical significance in males

**Table 3:** Prevalence of anterior discoloration of teeth with respect to location

Location	Discoloration	
	Absent	Present
Urban	21 (6.6%)	136 (20.0%)
Periurban	76 (23.8%)	251 (36.9%)
Rural	222 (69.6%)	294 (43.2%)
Total	319 (100.0%)	681 (100.0%)

The chi-square value = 65.472 (a); the anterior discoloration of teeth when compared with the urban population showed a significance for the rural population,  $p = 0.002$

instruments like a mouth mirror, straight probe, tweezers, cotton rolls. Patients with limited mouth opening, crowns, 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. Exclusion criteria included having restorations, crowns, and orthodontic appliances.

The patients were examined for anterior discolored teeth under good illumination. The scratch test was done to distinguish between extrinsic and intrinsic stains. Discolored teeth surfaces were scratched with care by using a dental explorer to assess the surface texture. Lightly scratching with any sharp instrument removes the weakly adherent stains which cause extrinsic discoloration. Intrinsic discoloration cannot be removed by using the scratch test.<sup>7</sup>

## RESULTS

Based on the results obtained, it was observed that tooth discoloration was more prevalent in the age group of 31

to 40 years (Table 1) and males were more affected than females (Table 2). Rural population was affected more than the urban one (Table 3). The results are further described in Tables 1 to 6.

## DISCUSSION

In this study, age group of 15 years and above was evaluated using a questionnaire.

Smoking was detected as significant exogenous factor responsible for the discoloration of teeth (Table 5). It was

**Table 4:** Prevalence of endogenous discoloration of teeth with respect to age

Age (years)	Tetracycline	Fluorosis	Nonvital	Enamel hypoplasia	Pink tooth	Dental caries	Trauma	AI	DI
<20	1 (5.6%)	11 (7.7%)	12 (9.9%)	1 (5.6%)	0 (0.0%)	9 (7.3%)	1 (1.6%)	0 (0.0%)	0 (0.0%)
21–30	1 (5.6%)	33 (23.2%)	32 (26.4%)	5 (27.8%)	0 (0.0%)	25 (20.2%)	21 (32.8%)	0 (0.0%)	1 (25.0%)
31–40	8 (44.4%)	39 (27.5%)	39 (32.3%)	5 (27.8%)	0 (0.0%)	33 (26.6%)	19 (29.7%)	2 (66.7%)	1 (25.0%)
41–60	4 (22.2%)	48 (33.8%)	32 (26.4%)	2 (11.1%)	2 (100.0%)	37 (29.8%)	20 (31.3%)	1 (33.3%)	2 (50.0%)
>60	4 (22.2%)	11 (7.7%)	6 (5.0%)	0 (0.0%)	0 (0.0%)	20 (16.1%)	3 (4.7%)	0 (0.0%)	0 (0.0%)
Total	18 (100.0%)	142 (100.0%)	121 (100.0%)	18 (100.0%)	2 (100.0%)	124 (100.0%)	64 (100.0%)	3 (100.0%)	4 (100.0%)

The chi-square value = 7.8609 (a),  $p = 0.30$ , showed no statistical significant difference between fluorosis and other endogenous factors

**Table 5:** Prevalence of exogenous discoloration of teeth with respect to age

Age (years)	Tea coffee	Tobacco	Pan	Smoking	Chromo bacteria	Chlorhexidine	Calculus	Soft drinks
<20	9 (6.6%)	18 (9.2%)	1 (16.7%)	24 (9.8%)	1 (25.0%)	1 (6.7%)	9 (8.5%)	8 (10.0%)
21–30	56 (41.2%)	51 (26.0%)	1 (16.7%)	72 (29.3%)	1 (25.0%)	2 (13.3%)	18 (17.0%)	37 (46.3%)
31–40	32 (23.5%)	55 (28.1%)	0 (0.0%)	60 (24.4%)	1 (25.0%)	5 (33.3%)	31 (29.2%)	15 (18.8%)
41–60	32 (23.5%)	49 (25.0%)	3 (50%)	64 (26.0%)	0 (0.0%)	7 (46.7%)	34 (32.1%)	14 (17.5%)
>60	7 (5.1%)	23 (11.7%)	1 (16.7%)	26 (10.6%)	1 (25.0%)	0 (0.0%)	14 (13.2%)	6 (7.5%)
Total	136 (100.0%)	196 (100.0%)	6 (100.0%)	246 (100.0%)	4 (100.0%)	15 (100.0%)	106 (100.0%)	80 (100.0%)

The chi-square value = 7.860 showed statistical significant difference between staining caused by smoking and other exogenous factors,  $p < 0.001$

**Table 6:** Prevalence of anterior discoloration of teeth with respect to occupation

Occupation	Discoloration	
	Absent	Present
Business	10 (3.1%)	48 (7.0%)
Service	20 (6.2%)	102 (15.0%)
Skilled labor	80 (24.8%)	90 (13.3%)
Nonskilled labor	51 (15.8%)	136 (20.1%)
Homemaker	92 (28.5%)	133 (19.5%)
Unemployed	70 (21.7%)	171 (25.1%)
Total	323 (100.0%)	677 (100.0%)

Chi-square value = 45.456 (a); nonskilled labor showed a statistical significance in anterior discoloration of teeth with respect to different occupations,  $p < 0.001$

seen affecting more in the age group of 41 to 60 years and more prevalent in males than females. Smoking is a major risk factor for general health and in the oral cavity it can lead to mucosal lesions, oral cancer, periodontal disease, and subsequent tooth loss. 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 with 15% in nonsmokers.<sup>8</sup> 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.

Among the various class of population studied, dental caries was observed as a predominant endogenous factor that was seen affecting the businessmen. The results showed statistical dental caries with respect to other endogenous factors (Table 4). According to various studies, melanin was suggested to be the cause of discoloration in carious teeth. Fusiyama et al described how the discoloration precedes bacterial penetration of demineralized dentin, thus it seems that the discoloration is caused by compounds diffusing ahead of the bacteria. Aerobic conditions are required for the production of melanin and fuchsin. It is thought that protein can react with small aldehyde under anaerobic condition to cause browning of teeth.<sup>10</sup> The study done by Fusayama et al<sup>11</sup> showed dental caries is the most common cause of tooth discoloration. Anterior discoloration of the teeth due to dental caries was observed more prevalent in the mixed diet population, but no statistical significant difference while analyzing other endogenous factor.

In south Canara population, it was observed that discoloration of the tooth due to fluorosis was more in the age group of 41 to 60 years (Table 2). The stains of fluorosis showed a significance of 44.4% in males and 55.6% in females. Individuals who were from rural areas were more prone to fluorosis as compared with those who live in urban areas. Underground drinking water in the rural areas had more fluoride content as compared with drinking water in urban areas. These results are in

accordance with the study conducted by Kotecha et al.<sup>12</sup>

Urist and Ibsen<sup>13</sup> reported that tetracycline and its homologs have the ability to form complexes with calcium ions on the surface of hydroxyapatite crystals within bone and dental tissues. Dentin is known to stain more than enamel.<sup>14</sup> In the present study, patients with tetracycline staining were seen in only 18 cases. Ill effects of tetracycline are seen on the mineralization of teeth, hence prescription of tetracyclines to feeding mothers and pregnant women as well in the infants is being avoided.

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.

In the study, amelogenesis imperfecta was noticed only in 3 cases (Table 2). 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 on 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.<sup>15</sup>

Out of 1,000 patients, dentinogenesis imperfecta was seen in only 4 cases (Table 4). Dentin defects occur genetically or through environmental influences. The condition related to dentin alone is dentinogenesis imperfecta. The teeth affected are usually bluish or brown in color and demonstrate opalescence on trans-illumination. Once the dentin is exposed, teeth rapidly show brownish discoloration presumably by absorption of chromogens into the porous dentin.<sup>15</sup>

Based on the geographic location studied anterior discoloration of the teeth was prevalent more in the rural population as compared with urban population, which showed statistical significant difference of dental caries with other endogenous factors (Table 3). 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. Among the various class of population studied, dental caries was observed as a predominant endogenous factor that was seen affecting the nonskilled labor (Table 6).

## CONCLUSION

The study revealed the risk of both endogenous and exogenous stain higher in males, in the age group of 31 to 40 years, in rural population, in laborers, and in mixed diet population. Generally, dentists' intervention

is essential for treating substantial tooth discoloration. In some cases, scaling and polishing the teeth will improve the situation; however, more extensive treatment is often needed to achieve a satisfying result. Treatment options include vital and nonvital bleaching, microabrasion, composite and porcelain veneers, and porcelain crowns. Sometimes, these treatments are combined for a more successful outcome.<sup>16</sup>

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