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Prevalence of Anterior Teeth Discoloration in South Canara Population

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Authors' contributions

This work was carried out in collaboration between all authors. Authors PS and RB designed the study, wrote the protocol and wrote the first draft of the manuscript. Author PS managed the literature searches and analyses of the study. Author MNH managed the experimental process. All authors read and approved the final manuscript.

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ABSTRACT

Background: Discoloration of teeth is a frequent dental finding linked to aesthetic and clinical issues. Information on discoloration and its severity forms the foundation for the magnitude and calibre of prevention programs and treatment needs in a population.
Aims: The aim of the present study was to evaluate the prevalence of discoloration in anterior teeth.
Materials and Methods: A survey was conducted on 2000 patients each in the years 2012 and 2014 reporting for treatment in A.B. Shetty Memorial institute of dental sciences and rural satellite centres. WHO criterion for detecting discoloration of teeth was followed.
Statistical Analysis Used: All the data was then coded and the prevalence of discoloured anterior teeth was evaluated according to age, gender, diet and location using the SPSS 15.0 software package for statistical analysis
Results: There was significant reduction in the prevalence of extrinsic and intrinsic stains between both the years, namely caries by 1.3%, fluorosis by 3.2%, tobacco by 12.2%, stains due to restorative materials by 0.7%. Also an increase of 3.8% was seen among individuals having

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tetracycline stains. However no significant differences were observed in individuals with chlorhexidine, plaque/calculus and food/beverage stains.
Conclusions: Due to the awareness created, reduction in the prevalence of stains due to caries, fluorosis, tobacco and restorative materials was seen. However more awareness needs to be created about stains due to tetracycline, chlorhexidine, plaque/calculus and food/beverages.

Keywords: Caries; discoloration; fluorosis; prevalence.

1. INTRODUCTION

Tooth discoloration; often aesthetically displeasing and psychologically traumatizing to the patient is one of the most frequent reasons, for a patient to seek dental care [1]. Any changes in the three distinct layers of the tooth; enamel, dentin and cementum is known to cause modification in the appearance of the tooth leading to a change in its light transmitting and reflecting properties [2] as the tubules are the predominant cause of light scattering in dentin and hydroxyl apatite crystals in the enamel [3].

Hence the present study aimed to determine the prevalence of discoloration in anterior teeth in the years 2012 and 2014 in the South Canara population.

2. MATERIALS AND METHODS

A survey was conducted on 2000 patients each in the years 2012 and 2014 to evaluate the prevalence of discoloration of anterior teeth in the patients reporting for first time to the outpatient department of A.B. Shetty Memorial Institute of Dental Sciences, Nitte University and to the rural satellite centres. The survey comprised of a semi-structured questionnaire on demographics and psychosocial effects which was researcher administered. Oral examination of the labial surfaces of the anterior permanent teeth was carried out by two examiners. Inclusion criteria included a willingness to provide informed consent, age from 14 to 70 years, having anterior teeth. Exclusion criteria included having restorations, crowns and orthodontic appliances.

Ethical clearance was taken from the central ethical committee of the institution under Nitte University. Materials used in the clinical examination mainly consisted of explorers, dental floss, cotton rolls, mouth mirror, wedges to separate the teeth and illuminating light [Fig. 1]. The patients were examined for anterior discoloured teeth under good illumination. The scratch test was done to distinguish between extrinsic and intrinsic stains. Discoloured 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 [4] [Fig. 2].

A WHO diagnostic criterion for clinical examination was followed [4]. All the data was then coded and the prevalence of discolouration in the anterior teeth in both the years 2012 and 2014 was evaluated according to age, gender, diet and location using the SPSS 15.0 software package for statistical analysis.

Table 1. Distribution of samples selected for the survey

Criteria	2012	2014
Age	15-25 yrs – 167	15-25 yrs – 155
	26- 35 yrs – 452	26- 35 yrs – 486
	36-45 yrs – 403	36-45 yrs – 384
	46 – 55 yrs – 387	46 – 55 yrs – 352
	56-65 years – 356	56-65 years – 342
	more than 65 – 235	more than 65 - 281
Sex	Males – 1163	Males – 1023
	Females – 837	Females - 977
Diet	Vegetarian – 659	Vegetarian – 734
	Non vegetarian – 1341	Non vegetarian – 1266
Location	Urban - 627	Urban - 684
	Rural - 742	Rural - 723
	Semiurban – 631	Semiurban - 593

Fig. 1. Intraoral examination

Fig. 2. Scratch test done to detect type of discoloration

3. RESULTS AND DISCUSSION

The following graphs represent the results from our survey.

There was significant reduction in the prevalence of extrinsic and intrinsic stains between both the years, namely caries by 1.3%, fluorosis by 3.2%, tobacco by 12.2%, stains due to restorative materials by 0.7%.

An increase of 3.8% was seen among individuals having tetracycline stains.

No significant differences were observed in individuals with chlorhexidine, plaque/calculus and food/beverage stains.

Tooth discolouration has been classified according to the aetiology of the stains as either intrinsic or extrinsic [5-7].

In the present study, 2000 patients were examined in the years 2012 and 2014 for discoloration due to intrinsic causes namely; caries, fluorosis, internal resorption, non vital teeth, stains due to restorative materials, tetracycline stains and extrinsic causes namely ; tobacco, chlorhexidine stains, plaque/calculus stains and stains due to food and beverages.

A significant decrease from 2012 to 2014 was seen in the stains which were caused due to caries, flourosis, restorative materials and tobacco.

A significant decrease of 12.2% of tobacco stains was found between 2012 and 2014. After the study in 2012, awareness was created among the population stating that 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 [8,9]. The decrease in the prevalence of these stains in 2014 can be attributed to the awareness.

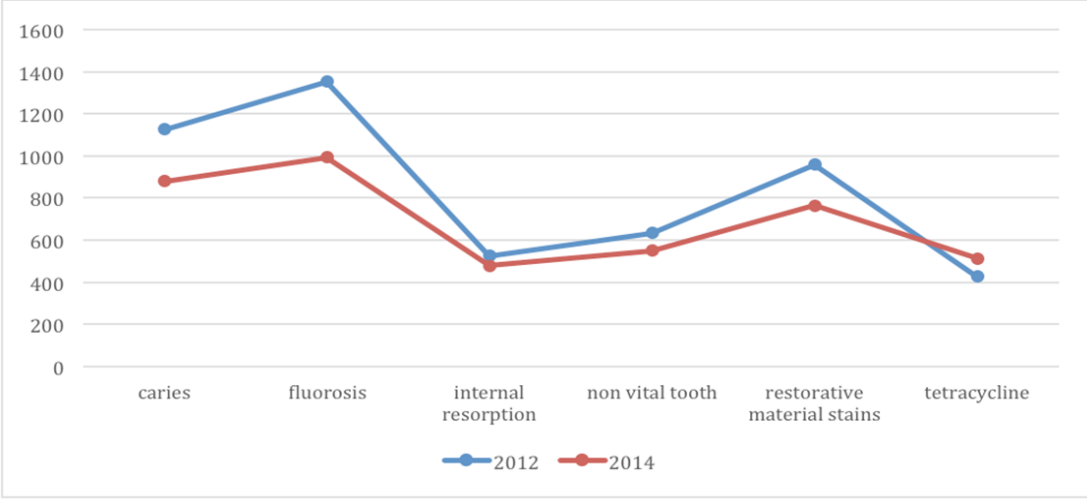

Fig. 3. The difference in the occurrence of intrinsic stains between 2012 and 2014

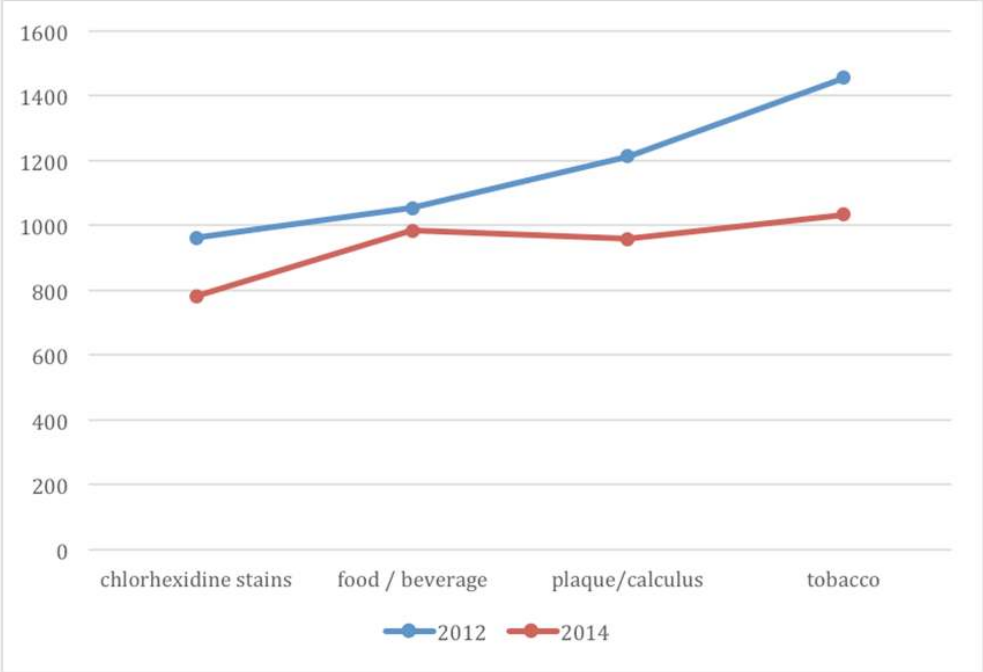

Fig. 4. The difference in the occurrence of extrinsic stains between 2012 and 2014

On applying the chi square test, a decrease of 1.3% was seen among the stains caused due to caries between the two years. Sea food forms the major component of diet in the South Canara population. Sea food, rich in fluoride which may have led to decreased caries prevalence in this population [10]. Neutralisation of acids produced by microorganisms is brought about by saliva acting on sugar substrates but when fermentable carbohydrates are not involved, putrefaction substitutes fermentation, alkalinity replaces acidity, and no decalcification is seen [11,12]. Also, putrefaction is the result of protein consumption, so the persons consuming protein rich food in comparison to carbohydrates are known to develop less amount of acid and relatively be protected from dental caries. In the study conducted in 2012, it was observed that increased caries could be due to lack of awareness for proper oral hygiene methods in these areas, after which community health and dental programs were conducted which could have possibly lead to the decrease in these stains.

The stains of fluorosis showed a significant decrease of 3.2% between the two years. Individuals who were from rural areas and who consumed borewell water were more prone to fluorosis as compared to the individuals who consumed municipality water and those who lived in urban areas. This can be attributed to the drinking water in their area. The underground drinking water in the rural areas had more fluoride content as compared to the drinking water in urban areas. In both the years, the males were more affected than the females. These results are in accordance with the study conducted by P.V. Kotecha et al. in [13].

The stains caused due to restorative materials showed a decrease of 0.7% between the two years. Individuals who were from rural areas were more prone to these stains as compared to the individuals who lived in urban areas. The stains seen involved the dark grey to black colour of dentine due to a longstanding amalgam, stains on the dentin due to the eugenol, phenolic compounds or the polyantibiotic pastes used during root canal therapy [14].

In contrary to these results a significant increase was seen in patients reporting due to tetracycline induced stains.

Tetracycline induced staining is the result of chelation of tetracycline with calcium ions in the molecular structure. This phenomenon occurs

only during the period of the calcification process, and for this reason such an effect on the teeth occurs only during the last trimester of pregnancy and in childhood.

Urist and Ibsen suggested that tetracycline and its homologues have the ability to form complexes with calcium ions on the surface of hydroxyapatite crystals within bone and dental tissues [15]. Dentin is known to stain more than enamel [16]. Potential ill effects of tetracycline is seen on the mineralization of teeth, hence prescription of tetracyclines to pregnant woman and feeding mothers as well in the early years of infants is being avoided. Despite the awareness created, an increase of 3.8% was seen among individuals possessing tetracycline induced stains in both the years. Also it was seen more in females than males and more in urban population than the rural population.

Chromogenic bacteria have been found responsible for the non metallic stains from plaque and food/ beverages which are adsorbed onto tooth surface deposits such as plaque or the acquired pellicle. Depending upon the oral hygiene status, specific types of stains are said to be associated, for instance, green and orange in patients with poor oral hygiene and black/brown stains in patients with good oral hygiene and low caries experience [17]. Stains from plaque, calculus, food and beverages were found to have a significant increase of 7.8% and 4.5% respectively. No significant changes were observed among gender and location.

Chlorhexidine is found to denature the acquired pellicle to expose sulphur radicals leading to the formation of the pigmented sulphides of iron and tin. The exposed radicals would then be able to react with the metal ions to form the metal sulphide. Warner and co-workers have shown increased levels of iron in chlorhexidine treated individuals compared with water controls, no evidence was shown for tin. They concluded that the chromophore was not a sulphide but sulphur containing organic compound and metal ion complex and that chlorhexidine promoted the deposition of sulphate proteins [18]. No significant difference was however found among individuals with chlorhexidine stains among both the years.

The discolouration of teeth following severe trauma was considered to be caused by pulpal haemorrhage. Following trauma, haemolysis of the red blood cells would occur and release the haem group to combine with the putrefying pulpal tissue to form black iron sulphide [18,19]. No significant difference was found between both the years in regard to internal resorption and non vital teeth. No significant changes were seen among gender and location.

4. CONCLUSION

In the sample group studied, a strong decrease between the two years in the prevalence of caries, flurosis, stains from restorative materials and tobacco was observed. A strong correlation between age, location, type of diet and gender of the population was obtained in the group studied. Also an increase in the prevalence among individuals containing tetracycline stains and chlorhexidine stains was seen. However no significant changes were observed among the stains produced by internal resorption, non vital teeth, and stains from plaque/calculus and food/beverages.

CONSENT

All authors declare that written informed consent was obtained from the patient for publication of this case report and accompanying images.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Manuel ST, Abhishek P, Kundabala M Etiology of tooth discoloration- a review. Nig Dent J. 2010;18.
2. Watts A, Addy M. Tooth discolouration and staining: A review of the literature. Br Dent J. 2001;190(6):309-16.
3. Vaarkamp J, ten Bosch JJ, Verdonschot EH. Propagation of light through human dental enamel and dentine. Caries Research. 1995;29:8-13.

4. Kerr AR. 2008. Available:http://emedicine.medscape.com/article/1076389-overview (Retrieved online Jan 9, 2009)
5. Cleaton-Jones Peter, Fatti Paul. Dental caries trends in Africa. Community Dent Oral Epidemiol. 1999;27:316–320.
6. Hattab FN, Qudeimat MA, al-Rimawi HS. Dental discoloration: An overview. J Esthet Dent. 1999;11(6):291-310.
7. Sulieman M. An overview of tooth discoloration: Extrinsic, intrinsic and internalized stains. Dent Update. 2005; 32:463-47.
8. Preber H. Smoking and periodontal disease. Karolinska Institute, Stockholm; 1986.
9. Bergstrom J. Cigarette smoking as a risk factor in chronic periodontal disease. Community Dent Oral Epidemiol. 1989; 17:245-7.
10. Tinanoff N, Palmer CA. Dietary determinants of dental caries and dietary recommendations for preschool children. J Public Health Dent. 2000;60:197-206.
11. Bardow A, Moe D, Nyvad B, Nauntofte B. The buffer capacity and buffer systems of human whole saliva measured without loss of CO2. Arch Oral Biol. 2000;45:1-12.
12. Miller WD. The microorganisms of the human mouth. Philadelphia, PA: SS White and Co.; 1973. Reprinted: Basel; Karger: 1890.
13. Kotecha PV, Patel SV, Bhalani KD, Shah D, Shah VS, Mehta KG. Prevalence of dental fluorosis & dental caries in association with high levels of drinking water fluoride content in a district of Gujarat, India. Indian J Med Res. 2012;135(6):873-7.
14. Wei SH, Ingram MI. Analysis of the amalgam tooth interface using the electron microprobe. J Dent Res. 1969; 48:317.
15. Urist MR, Ibsen KH. Chemical reactivity of mineralised tissue with oxytetracycline. Arch Pathol (Chicago). 1963;76:484-496.
16. Wallman IS, Hilton HB. Teeth pigmented by tetracycline. Lancet 1962;1:827-829.
17. Theilade J, Slots J, Fejerskov O. The ultrasound of black stain on human primary teeth. Scand J Dent Res. 1973;81:528-532.
18. Warner RR, Myers MC, Burns J, Mitra S. Analytical electron microscopy of chlorhexidine induced stain in humans: Direct evidence for metal induced stain. J Periodont Res. 1993;28:255-265.
19. Grossman L. Root canal therapy. 2nd ed. pp 347-349. Philadelphia: Lea and Febiger; 1943.

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