Nat. Volatiles & Essent. Oils, 2021; 8(5): 8621-8632

Knowledge, Awareness and Perception of General Population About Gingival Pigmentation - A Cross-Sectional Survey

[1]Kaviya. S, [2]Dr.Reshma Poothakulath Krishnan, [3]Dr. Sandhya Sundar

[1]Undergraduate student, Saveetha Dental College and Hospitals, Saveetha Institute of medical and technical sciences, Saveetha university,Chennai - 600077
Mail id:152001052.sdc@saveetha.com

[2]Senior lecturer, Department of Oral pathology, Saveetha Dental College and Hospitals, Saveetha Institute of medical and technical sciences, Saveetha university,Chennai - 600077
Mail id:reshmapk.sdc@saveetha.com

[3]Senior lecturer, Department of Oral pathology, Saveetha Dental College and Hospitals, Saveetha Institute of medical and technical sciences, Saveetha university,Chennai - 600077
Mail id:sandhyas.sdc@saveetha.com

ABSTRACT:

BACKGROUND: Cosmetic expectations have increased with time and speak volumes about gingival esthetics and smile designing in current trends.Gingival pigmentation especially on the labial aspect of anterior teeth has become an important component of general esthetics.

AIM: To assess the awareness and perception of gingival pigmentation among outpatients visiting a private dental hospital.

METHODS:The cross sectional study was conducted using a self administered questionnaire, analysed among outpatients having gingival pigmentation in a private dental college which were distributed through google forms.The data were analysed by using Statistical Package for the Social Sciences (SPSS) version 23.

RESULT: In this survey, the knowledge and awareness about gingival pigmentation was (51%) ,many have problems in their gums (67.11%) and knowledge about depigmentation procedure is also comparatively less(53.69%). Comparisons were made between habits and colour of gums, the p value is 0.002 which is <0.05 and it is statistically significant. Cross tabulations were made between gender and how people hesitate to smile because of their gingival pigmentation, the p value is 0.106 which is statistically insignificant.

CONCLUSION: The overall awareness about the gingival pigmentation was reasonably good among the general public. Gingival pigmentation, though not a major complication,yet it greatly affects the facial appearence. Creating awareness to the people may change their mindset and will lead a quality life.

KEYWORDS: Gingival pigmentation, Appearance, Awareness, Procedures, Social stigma, innovative technology, novel method

INTRODUCTION:

Facial appearance depends on several oral and extra oral factors.The gingiva is an important intraoral tissue which when affected particularly by pigmentation is mainly responsible for the unpleasant appearance.Health and appearance of gingiva are important parts of smile(1)(2).The colour of gingiva is different among different individuals The colour of gingiva varies from dark brown or black (3).The gingival colour depends primarily upon the number and size of vasculature,epithelial thickness,degree of keratinization and pigments with the gingival epithelium(4)

Gingival pigmentation is presented as a diffuse deep purplish discolouration or as irregular shape brown and light brown or black patches with strands.(4,5)It results from melanin granules,which are produced by melanoblast.Melanin pigmentation appears as early as 3 hours after birth in the oral tissue and in some cases is the only sign of pigmentation on the body .It is generally agreed that pigmented areas are present only when the melanin granules synthesized by melanocytes are transferred to the keratinocytes(6).The close relationship is known as epidermal melanin unit(7,8).Gingival health and appearance are essential components of an unattractive smile(9).

Oral melanin pigmentation is well documented in literature and is considered to be multifactorial whether,physiological/pathological and can be caused by a variety of local and or systematic factors including genetic,tobacco use, prolonged administration of certain drugs especially anti malarial agent and tricyclic antidepressants(10). The gingiva is most commonly affected by intraoral tissue responsible for an unpleasant appearance.Melanin pigmentation often occurs in the gingiva as a result of an abnormal deposition of melanin.The pigmentation may be seen across all the races. Its emphasises the psychology of the people who think that their gingiva are unattractive. Our team has extensive knowledge and research experience that has translate into high quality publications
(11,12),(13),(5),(14),(15),(16),(17),(18),(19),(20),(21),(22),(23),(24),(25),(26),(27),(28),(29),(30) The aim of this study is to assess the awareness and perception of gingival pigmentation among outpatients visiting a private dental hospital.

MATERIALS AND METHODS

A cross sectional study is conducted to evaluate whether the people think that their Gingival pigmentation is a social stigma or god's gift. Over 149 outpatients having gingival pigmentation in a private dental college were selected. This study had an easily accessible sample but can be generalized to a larger population of any geographical location. The data responses were tabulated and analyzed using SPSS Software version 23.0. The cross tabulation was done (chi-square test) between the presence of gingival pigmentation and various parameters such as gender, smoking habits, presence of gingival diseases, psychological hesitation to smile, perception of unattractive gums. A self constructed questionnaire was distributed to the outpatients that comprised 10 closed ended questions. The questionnaire was validated and later distributed to the participants. A web-based questionnaire was also developed using Google forms and was circulated. The participation of the subjects was kept voluntary and nobody was not obligated to fill the form. Questions were answered with "yes" or "no" or by marking the correct responses. Frequency analysis and percentage analysis were done with the obtained results. Comparison between the parameters were done using SPSS Software.

RESULTS:

The present study included 149 respondents. 57% of them were females and 42.3% were males (Fig 1). 47% of the participants were between the 26-30 years age group and 13.4% of them were 30 and above age group (Fig 2). The colour of the gums were pink, black and brownish in 48.3% ,19.5% and 24.2% of the study participants respectively . Many of the participants(62.4%) did not have the smoking/tobacco habits and 37.6% of them had the the habits of tobacco chewing or smoking. 67.1% of people feel that they do not have any problems in their gums and 37.6% of them consider the pigmentations on their gum to be a problem. 71.8% of people did not hesitate to smile while 28.2% hesitated to smile because of the pigmentations(Fig 3). Many people (67.8%) don't think that

their gums are unattractive.Many are not satisfied with their gums (51%) and some are satisfied with their gums (22.8%). Here, 32.21% of people think that their gums are unattractive and 67.79% of people don't think that their gums are unattractive(Fig 4). Many are not aware of depigmentation (53.7%) ,73.8% have not undergone depigmentation procedure(Fig 5)

Cross tabulations were made to associate the smoking habit with change in colour of the gums. participants without habits like smoking or tobacco had pink colour gums (30.20%) and participants with habits had (18.12%) pink colour gums. Although it was not statistically significant (chi square value =0.002). Cross tabulation was made between unattractive gums and depigmentation procedures. Pearson chi square should be <0.05 and the value is 0.241 which is statistically insignificant (Fig 6). Cross tabulations were made between gender and how people hesitate to smile because of their gingival pigmentation. Pearson chi square should be <0.05 and the value is 0.106 which is statistically insignificant (Fig 7). Cross tabulations were made between age and problems in gums. The pearson Chi square value is <0.05 and the value is 0.320. So it is not statistically significant (Fig 8)

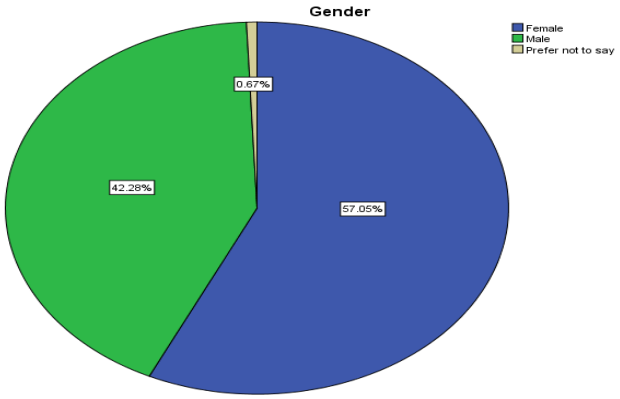

Fig 1: Pie chart represents the gender proportions of the study participants. Blue colour indicates female and green colour indicates male. 57.05% of the study participants were females, 0.67% of the study participants preferred not to say their gender and 42.28% of the study participants were males.

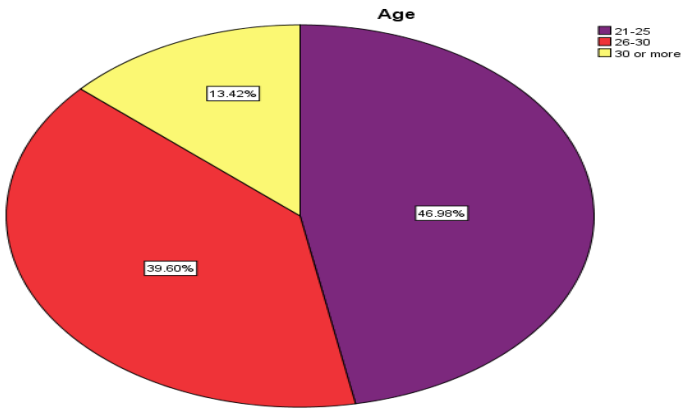

Fig 2: Pie chart shows the representation of age groups participating in the study. Violet indicates the age group between 21-25 years. Red indicates the age group between 26-30 years. Yellow indicates the age group between 30 or more years. 46.98% of the study participants were between the age

group of 21-25 years ,39.60% of the study participants were between the age group 26-30 years and the remaining 13.42% of the participants were between 30 or more years.

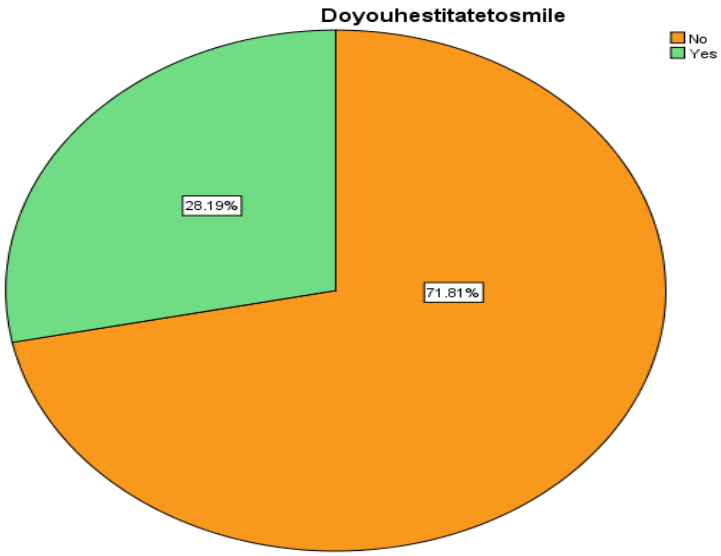

Fig 3: Pie chart represents the response of participants regarding their hesitation to smile on social occasions due to gingival pigmentation. Orange represents no and Light green represents yes.71.81% of study participants felt they showed hesitation to smile in the public due to gingival pigmentation whereas remaining 26.19% of the study participants did not show any hesitation to smile in the public due to gingival pigmentation.

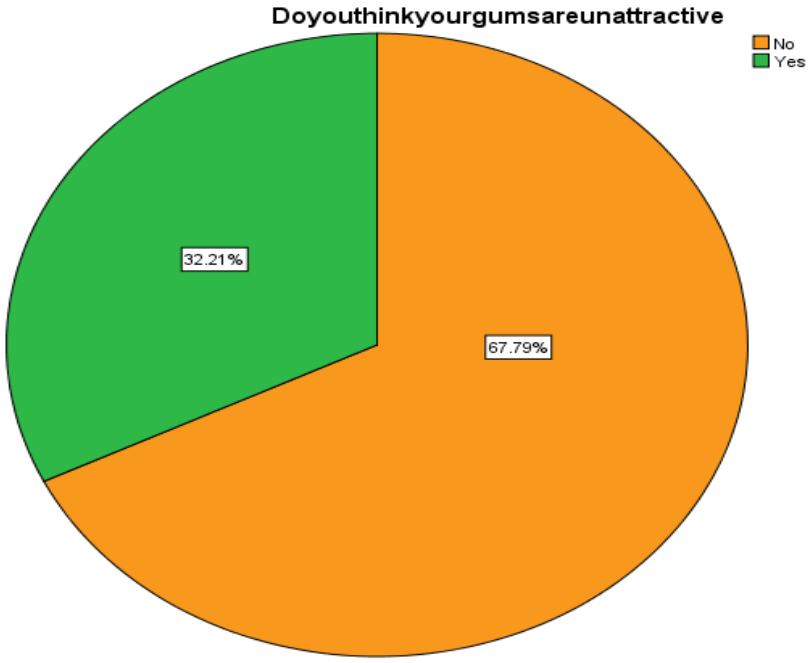

Fig 4: The pie chart shows the representation of people's thoughts about their gums. Orange represents no and Green represents yes. Here, 32.21% of the study participants felt that their gums are unattractive because of their gingival pigmentation and the remaining 67.79% of the study participants didn't think that their gums were unattractive due to gingival pigmentation.

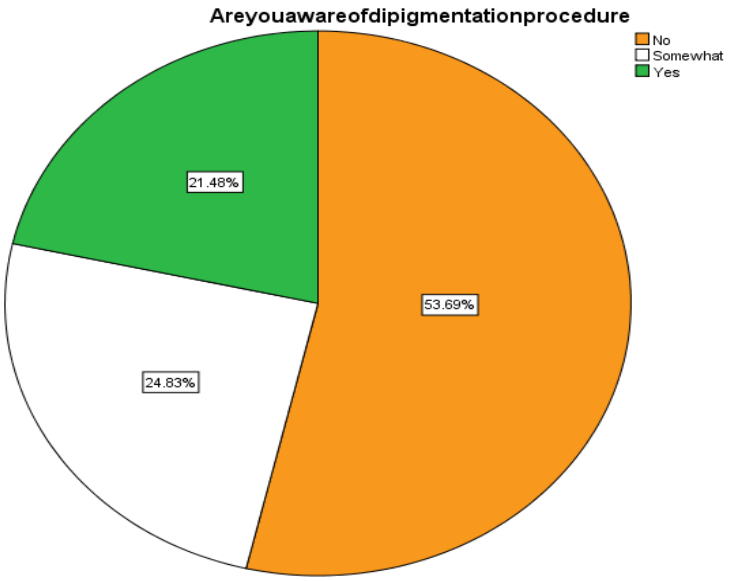

Fig 5: Pie chart shows the representation about the awareness of depigmentation procedure in the study. Orange indicates no, Green indicates yes and White represents somewhat. Here, 53.69% of the study participants were not aware of the depigmentation procedure, 24.83% of the study participants have some awareness about the procedure and the remaining 21.48% of the study participants were aware about the depigmentation procedure.

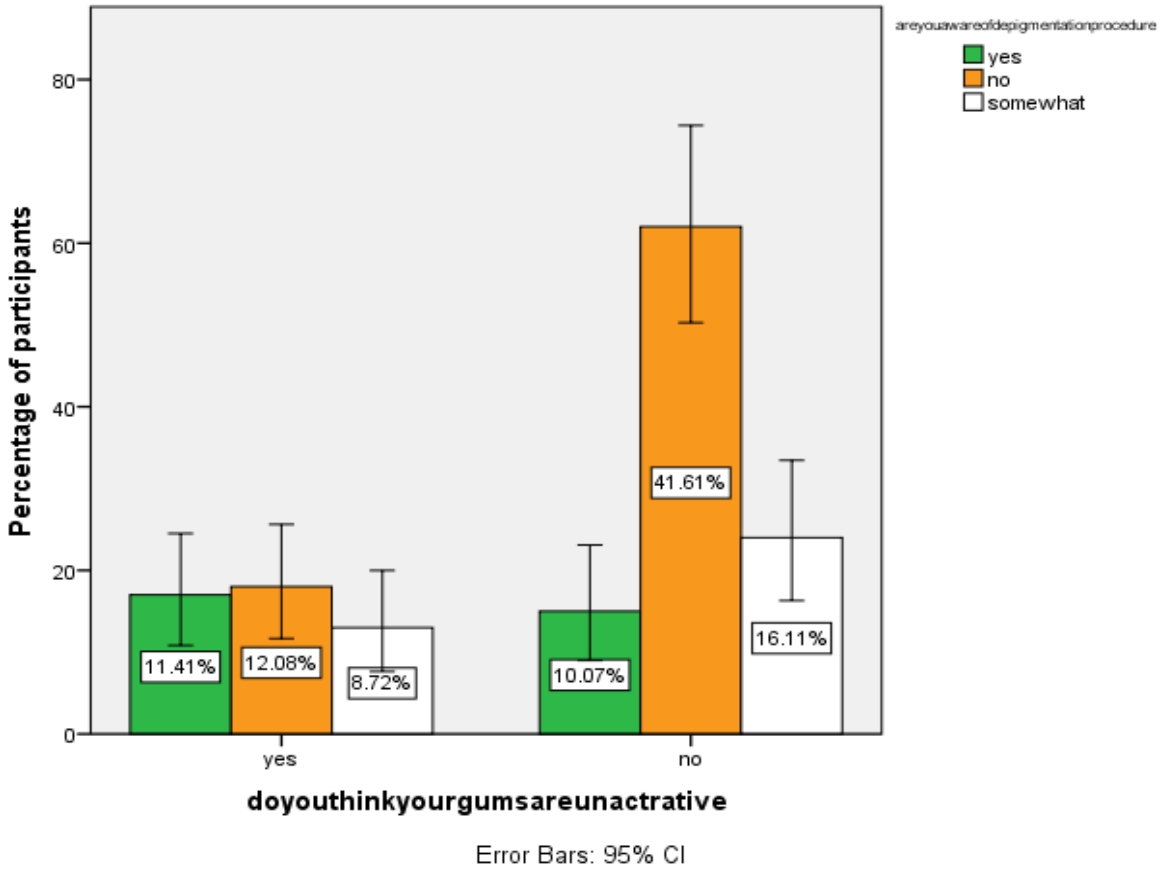

Fig 6: The bar graph represents the association between awareness about depigmentation procedure in people with unattractive gums..X axis represents participants with presence and absence of unattractive gums and Y axis represents awareness of the participants regarding the depigmentation procedure. Orange colour denotes no, White colour denotes somewhat and Green colour denotes yes. 12.08% of participants with unattractive gums were not aware of depigmentation procedure, whereas 8.72% of them were somewhat aware of the procedure and 11.41% of them were completely aware of the depigmentation procedure. The difference was statistically insignificant (Pearson chi square value =0.241).

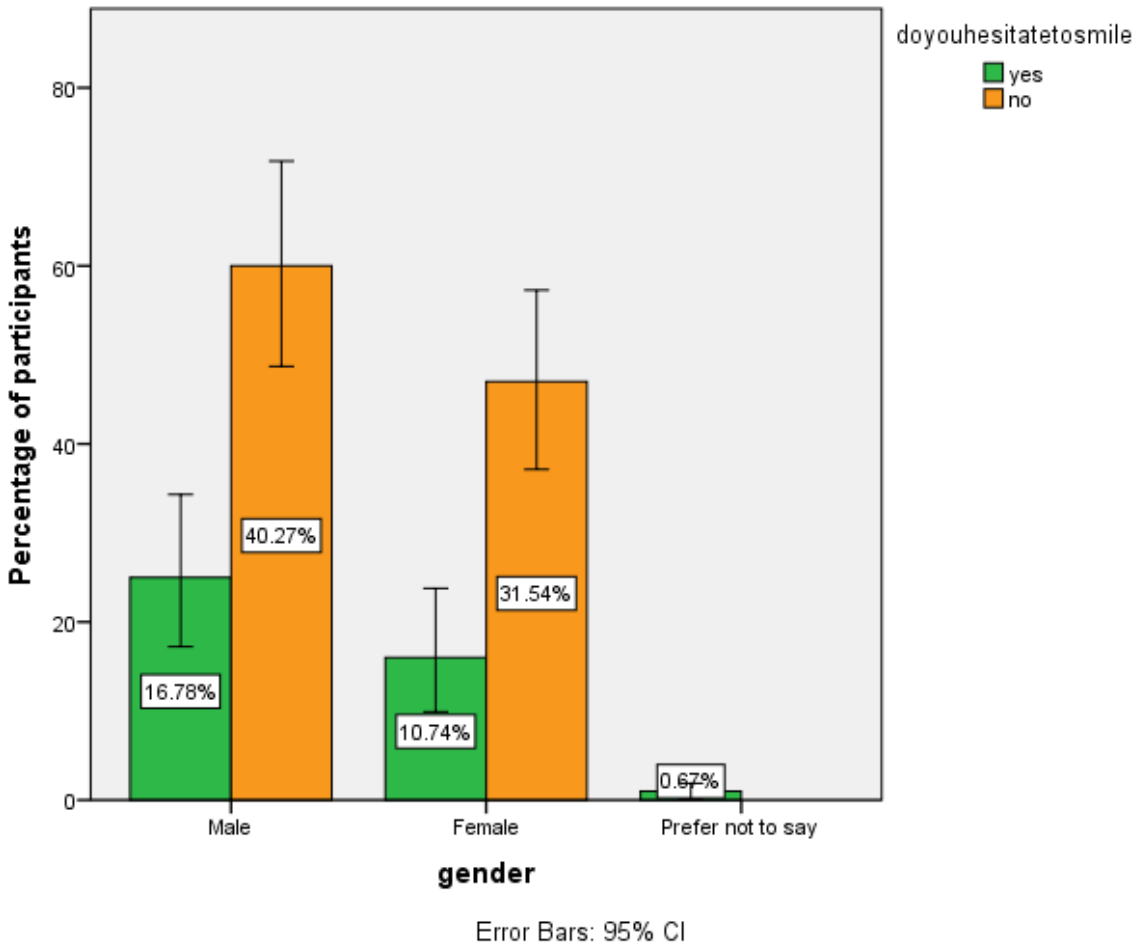

Fig 7: The bar graph represents the association between gender and hesitation shown by them to smile due to gingival pigmentation . The X axis represents gender and the Y axis represents the number of participants that hesitate to smile. Orange denotes no and Light Green denotes yes. Based on the comparison, we found that most of the mens(40.27%) hesitate to smile because of the gingival pigmentation than women. Pearson chi square value is 0.106($p<0.05$).Hence,It is statistically insignificant.

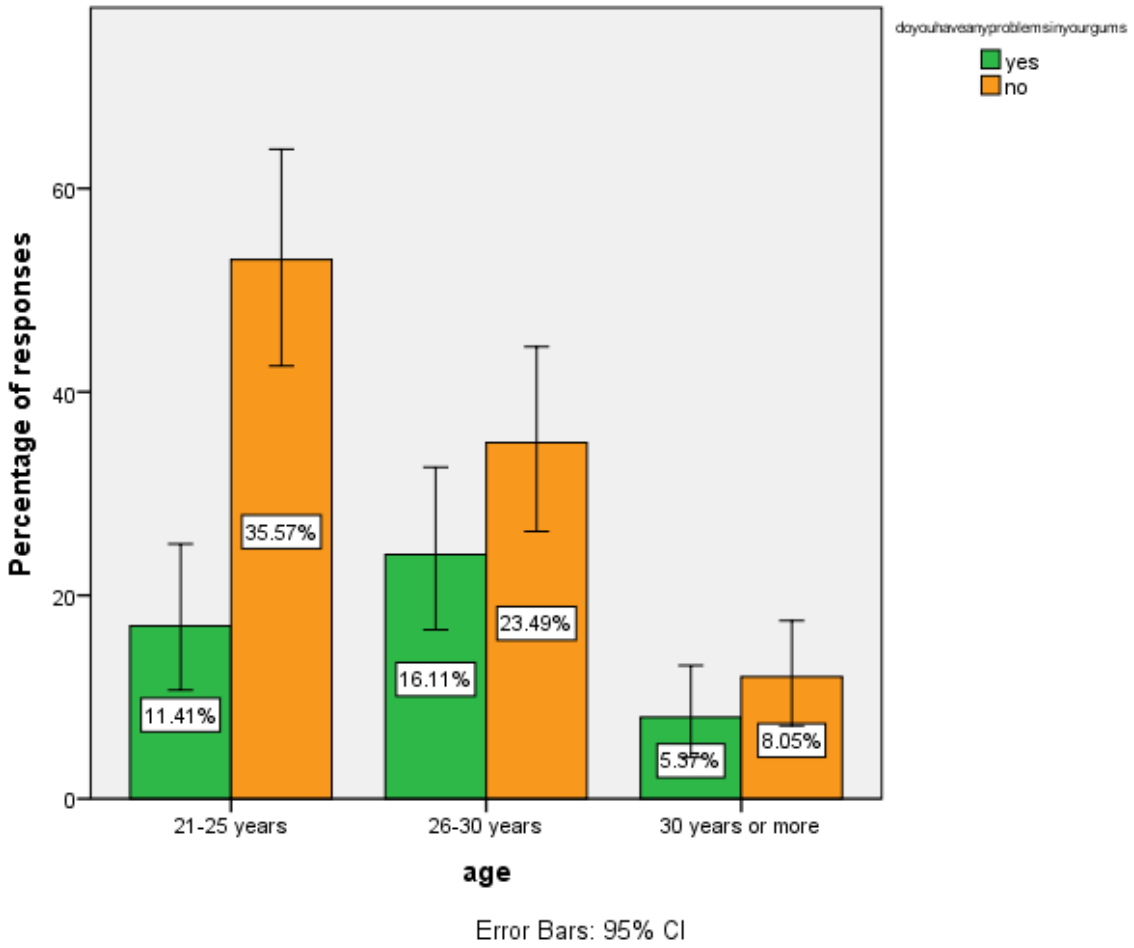

Fig 8: The bar graph represents the association between age and number of participants with problems in gums.X axis represents age and Y axis represents number of participants with problems in gums. Orange colour denotes no,Green denotes yes. Based on the comparison, we found that people between the ages of 26 to 30 have problems in their gums compared to the ages between 21 to 25 and 30 or more. Pearson chi square value is 0.320($p<0.005$). Hence, It is statistically insignificant.

DISCUSSION:

The normal physiologic colour attributed to gingiva is coral pink or salmon pink, with physiological variations of melanin pigmentation(31). Melanin pigmentation of gingiva is common in dark-skinned individuals(32). Melanin hyperpigmentation may possess a defensive role against progress of gingival inflammation(33) .Melanin is the most common endogenous pigment present in the body. It is a non hemoglobin-derived brown pigment produced by melanocytes and is also a powerful cation chelator. Melanocytes are dendritic cells of neuroectodermal origin.(34) They work independent of the surrounding epithelial cells and behave as unicellular exocrine glands that convert tyrosine to melanin protein (melanin), which is transferred to keratinocytes by way of melanosomes.(35) Thus, the melanin is deposited in the basal layer of the oral epithelium. Melanin hyperpigmentation may possess a defensive role against progress of gingival inflammation((32,36).These findings suggest that excessive pigmentation in the gingiva of children is

associated with passive smoking.The visible pigmentation effects in gingiva of children could be useful in terms of parental education.(37)

There was a certain pattern of oral pigment distribution specific to children of ethnic groups(38,39).The present findings suggested an age related difference in smoking induced gingival pigmentation.Gingival pigmentation due to smoking was more significant in younger patients than older ones.Esthetics and smile-enhancing treatments have become an integral part of the dentistry; people always consult with periodontist for obtaining acceptable gingival esthetics. In smile designing esthetics, the color of gingiva has a major role.(18) Although there is no gold standard technique for managing melanin hyperpigmentation, esthetic concerns have led to increasing awareness about different depigmentation procedures(40).Gingival hyperpigmentation is a major esthetic concern for many people. Although it is not a medical problem, many people complain of dark gums as anesthetic. Gingival depigmentation is a periodontal plastic surgical procedure, whereby the hyperpigmentation is removed or reduced by various techniques. For depigmentation of gingival, different treatment modalities have been reported, such as scalpel, cryosurgery, electrosurgery, lasers, etc., this article compares the management of three cases with scalpel and cryosurgery and also highlights the relevance of cryosurgery.(41) Gingival pigmentation may be unpleasant to some people Gingival pigmentations can occur as a consequence of local, systematic, environmental or genetic disorder. Various techniques are available with some advantages and some drawbacks. However, choice of the technique should be dependent on the individual preferences, clinical expertise and patients affordability. Information and knowledge about gingival pigmentation will improve people's thinking. Knowledge of this is important to lead a quality life.

This study provides knowledge and information to the people about the gingival pigmentation. Currently the number of researches based on gingival pigmentation is less and further study can be carried out in a large population. Various kinds of sampling techniques and testing methods can be used to validate the results.

CONCLUSION:

The overall awareness about the gingival pigmentation was reasonably good among the general public. It has been well accepted as a cause of social hesitation. Gingival pigmentation, though not a major complication,yet it greatly affects the facial appearence. It exists as taboo in some of the populations.Creating awareness to the people may change their mindset and will lead a quality life.

ACKNOWLEDGEMENT:

We would like to thank Saveetha dental college and Hospitals for their valuable support to conduct the study.

CONFLICT OF INTEREST

All the authors declare that there was no conflict of interest in the present study.

SOURCE OF FUNDING

The present study was supported by the following agencies

- Saveetha Dental College,
- Saveetha Institute of Medical and Technical Sciences,
- Saveetha University
- Prompt paper products private limited
- SK TRADERS

REFERENCES:

1. Moneim RAA, Abdel Moneim RA, El Deeb M, Rabea AA. Gingival pigmentation (cause, treatment and histological preview) [Internet]. Vol. 3, Future Dental Journal. 2017. p. 1–7. Available from: http://dx.doi.org/10.1016/j.fdj.2017.04.002

2. Altintas NA, Altintas NU, Sarica Yilmaz O, Akil M, Akdur Ozturk E, Unver A. Educational Intervention for the Awareness Improvement and Control Programme Design on Echinococcosis in Izmir, Turkey. Helminthologia. 2021 Jun;58(2):152–61.

3. Kumar S, Bhat GS, Bhat KM. Comparative Evaluation of Gingival Depigmentation using Tetrafluoroethane Cryosurgery and Gingival Abrasion Technique: Two Years Follow Up. J Clin Diagn Res. 2013 Feb;7(2):389–94.

4. Raghavendra RN, Ragul M, Nabeeh A-Q, Ravi KS, Tikare S, Pasupuleti MK. Clinical Effectiveness of Gingival Depigmentation Using Conventional Surgical Scrapping and Diode Laser Technique: A Quasi Experimental Study [Internet]. Vol. 9, Global Journal of Health Science. 2016. p. 296. Available from: http://dx.doi.org/10.5539/gjhs.v9n3p296

5. Sridharan G, Ramani P, Patankar S, Vijayaraghavan R. Evaluation of salivary metabolomics in oral leukoplakia and oral squamous cell carcinoma. J Oral Pathol Med. 2019 Apr;48(4):299–306.

6. Website [Internet]. Available from: Surgical Gingival Depigmentation: A Case Report [Internet]. Vol. 3, The Internet Journal of Aesthetic and Antiaging Medicine. 2012. Available from: http://dx.doi.org/10.5580/2bf0

7. Surgical Gingival Depigmentation: A Case Report [Internet]. Vol. 3, The Internet Journal of Aesthetic and Antiaging Medicine. 2012. Available from: http://dx.doi.org/10.5580/2bf0

8. Chao CS, Tung DY, Wei J, Chang CY, Chaung CY, Wan WM, et al. Necrotizing soft tissue infection in heart transplantation recipients: two case reports. Transplant Proc. 1998 Nov;30(7):3347–9.

9. R H, Ramani P, Tilakaratne WM, Sukumaran G, Ramasubramanian A, Krishnan RP. Critical appraisal of different triggering pathways for the pathobiology of pemphigus vulgaris-A review. Oral Dis [Internet]. 2021 Jun 21; Available from: http://dx.doi.org/10.1111/odi.13937

10. Drug- and heavy metal-induced hyperpigmentation. J Am Acad Dermatol. 1981 Jul 1;5(1):1–18.

11. Clifton O. Dummett OPG. Estimating the Epidemiology of Oral Pigmentation. J Natl Med Assoc. 1964 Sep;56(5):419.

12. Princeton B, Santhakumar P, Prathap L. Awareness on Preventive Measures taken by Health Care Professionals Attending COVID-19 Patients among Dental Students. Eur J Dent. 2020 Dec;14(S 01):S105–9.

13 Mathew MG, Samuel SR, Soni AJ, Roopa KB. Evaluation of adhesion of Streptococcus mutans, plaque accumulation on zirconia and stainless steel crowns, and surrounding gingival inflammation in primary molars: randomized controlled trial. Clin Oral Investig. 2020 Sep;24(9):3275–80.

14. R H, Hannah R, Ramani P, Ramanathan A, Jancy MR, Gheena S, et al. CYP2 C9 polymorphism among patients with oral squamous cell carcinoma and its role in altering the metabolism of benzo[a]pyrene [Internet]. Vol. 130, Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology. 2020. p. 306–12. Available from: http://dx.doi.org/10.1016/j.oooo.2020.06.021

15. Antony JVM, Ramani P, Ramasubramanian A, Sukumaran G. Particle size penetration rate and effects of smoke and smokeless tobacco products - An invitro analysis. Heliyon. 2021 Mar 1;7(3):e06455.

16. Sarode SC, Gondivkar S, Sarode GS, Gadbail A, Yuwanati M. Hybrid oral potentially malignant disorder: A neglected fact in oral submucous fibrosis. Oral Oncol. 2021 Jun 16;105390.

17. Hannah R, Ramani P, WM Tilakaratne, Sukumaran G, Ramasubramanian A, Krishnan RP. Author response for “Critical appraisal of different triggering pathways for the pathobiology of pemphigus vulgaris—A review” [Internet]. Wiley; 2021. Available from: https://publons.com/publon/47643844

18. Chandrasekar R, Chandrasekhar S, Sundari KKS, Ravi P. Development and validation of a formula for objective assessment of cervical vertebral bone age. Prog Orthod. 2020 Oct 12;21(1):38.

19. Subramanyam D, Gurunathan D, Gaayathri R, Vishnu Priya V. Comparative evaluation of salivary malondialdehyde levels as a marker of lipid peroxidation in early childhood caries. Eur J Dent. 2018 Jan;12(1):67–70.

20. Jeevanandan G, Thomas E. Volumetric analysis of hand, reciprocating and rotary instrumentation techniques in primary molars using spiral computed tomography: An in vitro comparative study. Eur J Dent. 2018 Jan;12(1):21–6.

21. Ponnulakshmi R, Shyamaladevi B, Vijayalakshmi P, Selvaraj J. In silico and in vivo analysis to identify the antidiabetic activity of beta sitosterol in adipose tissue of high fat diet and sucrose induced type-2 diabetic experimental rats. Toxicol Mech Methods. 2019 May;29(4):276–90.

22. Sundaram R, Nandhakumar E, Haseena Banu H. Hesperidin, a citrus flavonoid ameliorates hyperglycemia by regulating key enzymes of carbohydrate metabolism in streptozotocin-induced diabetic rats. Toxicol Mech Methods. 2019 Nov;29(9):644–53.

23. Alsawalha M, Rao CV, Al-Subaie AM, Haque SKM, Veeraraghavan VP, Surapaneni KM. Novel mathematical modelling of Saudi Arabian natural diatomite clay. Mater Res Express. 2019 Sep

4;6(10):105531.

24. Yu J, Li M, Zhan D, Shi C, Fang L, Ban C, et al. Inhibitory effects of triterpenoid betulin on inflammatory mediators inducible nitric oxide synthase, cyclooxygenase-2, tumor necrosis factor-alpha, interleukin-6, and proliferating cell nuclear antigen in 1, 2-dimethylhydrazine-induced rat colon carcinogenesis. Pharmacogn Mag. 2020;16(72):836.

25. Shree KH, Hema Shree K, Ramani P, Herald Sherlin, Sukumaran G, Jeyaraj G, et al. Saliva as a Diagnostic Tool in Oral Squamous Cell Carcinoma – a Systematic Review with Meta Analysis [Internet]. Vol. 25, Pathology & Oncology Research. 2019. p. 447–53. Available from: http://dx.doi.org/10.1007/s12253-019-00588-2

26. Zafar A, Sherlin HJ, Jayaraj G, Ramani P, Don KR, Santhanam A. Diagnostic utility of touch imprint cytology for intraoperative assessment of surgical margins and sentinel lymph nodes in oral squamous cell carcinoma patients using four different cytological stains. Diagn Cytopathol. 2020 Feb;48(2):101–10.

27. Karunagaran M, Murali P, Palaniappan V, Sivapathasundharam B. Expression and distribution pattern of podoplanin in oral submucous fibrosis with varying degrees of dysplasia – an immunohistochemical study [Internet]. Vol. 42, Journal of Histotechnology. 2019. p. 80–6. Available from: http://dx.doi.org/10.1080/01478885.2019.1594543

28. Sarode SC, Gondivkar S, Gadbail A, Sarode GS, Yuwanati M. Oral submucous fibrosis and heterogeneity in outcome measures: a critical viewpoint. Future Oncol. 2021 Jun;17(17):2123–6.

29. Raj Preeth D, Saravanan S, Shairam M, Selvakumar N, Selestin Raja I, Dhanasekaran A, et al. Bioactive Zinc(II) complex incorporated PCL/gelatin electrospun nanofiber enhanced bone tissue regeneration. Eur J Pharm Sci. 2021 May 1;160:105768.

30. Prithiviraj N, Yang GE, Thangavelu L, Yan J. Anticancer Compounds From Starfish Regenerating Tissues and Their Antioxidant Properties on Human Oral Epidermoid Carcinoma KB Cells. In: PANCREAS. LIPPINCOTT WILLIAMS & WILKINS TWO COMMERCE SQ, 2001 MARKET ST, PHILADELPHIA …; 2020. p. 155–6.

31. Basu TK, Temple NJ, Garg ML. Antioxidants in Human Health and Disease. Cabi; 1999. 450 p.

32. Eid HA, Syed S, Soliman ANMM. The Role of Gingival Melanin Pigmentation in Inflammation of Gingiva, Based on Genetic Analysis. Journal of International Oral Health : JIOH. 2013 Aug;5(4):1.

33. Redirect Notice [Internet]. [cited 2021 Aug 28]. Available from: https://www.google.com/url?q=https://www.google.com/url?q%3Dhttp://paperpile.com/b/QBpXzk/6H1en%26amp;sa%3DD%26amp;source%3Deditors%26amp;ust%3D1630162163161000%26amp;usg%3DAOvVaw3VdBWe8y753sLQcBP2dHf8&sa=D&source=editors&ust=1630162163172000&usg=AOvVaw11epo1uIPZlAayLMsVxwrJ

34. Sarode SC, Gondivkar S, Gadbail A, Sarode GS, Yuwanati M. Oral submucous fibrosis and

heterogeneity in outcome measures: a critical viewpoint [Internet]. Vol. 17, Future Oncology. 2021. p. 2123–6. Available from: http://dx.doi.org/10.2217/fon-2021-0287

35. Warnakulasuriya S, Greenspan JS. Textbook of Oral Cancer: Prevention, Diagnosis and Management. Springer Nature; 2020. 452 p.

36. Cryosurgical treatment of gingival melanin pigmentation with tetrafluoroethane. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 2007 Apr 1;103(4):452–7.

37. Hanioka T, Tanaka K, Ojima M, Yuuki K. Association of melanin pigmentation in the gingiva of children with parents who smoke. Pediatrics. 2005 Aug;116(2):e186–90.

38. Steigmann S. THE RELATIONSHIP BETWEEN PHYSIOLOGIC PIGMENTATION OF THE SKIN AND ORAL MUCOSA IN YEMENITE JEWS. Oral Surg Oral Med Oral Pathol. 1965 Jan;19:32–8.

39. Kato T, Mizutani S, Takiuchi H, Sugiyama S, Hanioka T, Naito T. Gingival Pigmentation Affected by Smoking among Different Age Groups: A Quantitative Analysis of Gingival Pigmentation Using Clinical Oral Photographs. Int J Environ Res Public Health [Internet]. 2017 Aug [cited 2021 Mar 9];14(8). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5580584/

40. Website [Internet]. [cited 2021 Mar 9]. Available from: https://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwiSoMbj3qLvAhW683MBHc4lCt8QFjAPegQIIxAD&url=https%3A%2F%2Fwww.ijmdent.com%2Farticle.asp%3Fissn%3D2229-6360%3Byear%3D2016%3Bvolume%3D6%3Bissue%3D2%3Bspage%3D87%3Bepage%3D92%3Baulast%3DRakhewar&usg=AOvVaw2BsbRSufuVdkwlF4qLG_VJ

41. Patil KP, Joshi V, Waghmode V, Kanakdande V. Gingival depigmentation: A split mouth comparative study between scalpel and cryosurgery. Contemp Clin Dent. 2015 Mar;6(Suppl 1):S97.