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The prevalence of smoker's melanosis and racial pigmentation in Gingiva: A literature review

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Abstract

Objective: Gingival colour plays one of the most important parts in aesthetic dentistry. There are many reasons on why alteration of the gingival colour occurs, most commonly being racial pigmentation and smoker's melanosis.

Aims: To study the prevalence of smoker's melanosis and racial pigmentation in gingiva.

Materials and Methods: Previous articles, literature and research studies which studied the effects of race and smoking on gingival pigmentation were reviewed.

Results: Evaluating the results of previously conducted studies, the literature review revealed that there is a significant relationship between smoking and the presence of gingival pigmentation. Individuals who smoke exhibit a more pronounced and heightened gingival pigmentation as compared to those who do not smoke. Smoker's melanosis has been proven to be a very common complication in smoking. As for racial pigmentation, all studies reviewed indicate that the darker the skin tone within the same race or in comparison to other races, the higher the prevalence gingival pigmentation. This is due to the more active melanocytes as well as an increase in melanogenesis.

Conclusion: In conclusion, the two most common causes of gingival pigmentation stand to be racial pigmentation as well as smoker's melanosis. The presence of these factors shows to have a positive relationship with the prevalence of gingival pigmentation.

Keywords: Gingival pigmentation, smoker's melanosis, racial pigmentation, skin colour, smoking

Introduction

Gingival colour is described as "coral pink" ^[1]. Several contemporary studies suggest that there exists a considerable variation in gingival pigmentation among individuals, which is primarily attributed to their skin complexion. The typical hue of the gingiva is recognized to be coral pink or salmon pink, though it can exhibit variances resultant from the extent of keratinization, thickness, vascularization, the quantity and function of melanocytes, and the nature of submucosal tissue. Furthermore, variations within the level of melanin pigmentation can also be due to physiological differences. Melanin-induced gingival hyperpigmentation, also known as gingival pigmentation, manifests clinically as a brown or blue-black discoloration predominantly localized on the facial aspect of the attached gingiva. The variation in physiological pigmentation hue may result from the dispersal of melanin or exposure to exogenous stimuli that augment melanin accumulation. The manifestation of a blue hue discoloration may indicate the presence of melanin deposits situated within the connective tissue, whilst brown discoloration is frequently observed to arise due to superficial deposition within the epithelial layer. Melanin pigmentation of gingiva is common in dark-skinned individuals ^[2] Broadly, gingival pigmentation may be classified as physiological or pathological. Physiological gingival pigmentation, commonly referred to as ethnic or racial pigmentation, arises during the initial two decades of an individual's life and may not manifest to the patients' understanding until later. The aforementioned pigmentation is devoid of any symptoms and hence, does not necessitate any form of therapeutic intervention. Furthermore, the manifestation of color variation can present itself in various forms, including uniform, unilateral, bilateral, mottled, macular, or blotched.

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This discoloration may solely affect the gingival papillae or spread throughout the gingiva and other oral tissues. The pigmentation of the attached gingiva presents as the most common. Meanwhile, some of the major cause of pathological gingiva pigmentation includes [6-14] endocrine disorder, drug induced, smoking associated, oral melanocytic pigmentations, Kaposi sarcoma, heavy metals and others. All these pathological causes present with varied clinical appearance, but the one similarity they present is that they will alter the colour of the gingiva.

The present paper aims to direct its attention towards the physiological pigmentation of racial origin and the pathological pigmentation known as smoker's melanosis, given their widespread prevalence as the most common causes of gingival pigmentation.

Materials and Methods

Few criteria were constructed for the literature review.

Inclusion criteria were the following:

1. Studies investigating the etiology, clinical features, histology and classification of gingival pigmentation.
2. Studies investigating racial pigmentation
3. Studies investigating smoking and gingival pigmentation
4. Studies investigating passive smoking and gingival pigmentation
5. Studies which include both adult and child age groups
6. Studies which have been published in English
7. Method of data collection was self-report or observation.

Exclusion criteria were the following

1. Studies that were letters to editors
2. Studies which were not published in English
3. Studies which were related to other pathological causes of gingival pigmentation (drug induced, chemically induced, neoplasms etc)
4. Studies where the full article was not available

The studies were searched from the electronic database using the following key words: gingival pigmentation, racial pigmentation, smoker's melanosis, gum pigmentation. The electronic databases used were Journal of the Pakistan dental

association, Research gate, PubMed, Allied academies, Journal of education and ethics in dentistry, ScienceDirect, NCBI, International Journal of Applied Dental Science, Dentistry and Medical Research, Journal of Dentomaxillofacial Radiology, Pathology, Surgery, Hindawi, PMC, Elsevier.

Subsequently, the researchers conducted a rigorous and independent assessment of the suitability of the titles and abstracts for inclusion in the study. The entire document was subsequently evaluated to ascertain alignment with the established eligibility criteria. The pertinent data extracted comprised fundamental information relating to general details, including the authors' names, country of origin, participant count, type of study, and objectives, in addition to outcome measures, represented as percentages of knowledge and attitudes. Subsequently, duplication inquiries were conducted by the researchers, whereby generated lists were scrutinized and revised accordingly. In instances where variance existed among researchers pertaining to the incorporation of a particular investigation, deliberations were conducted among the study's authors in order to address apprehensions and arrive at a consensus.

Results

Upon evaluation of previously conducted studies, the literature review evidenced a noteworthy association between smoking and the occurrence of gingival pigmentation. Individuals who engage in smoking exhibit a greater degree of gingival pigmentation that is more pronounced in nature as compared to those who do not partake in smoking. The occurrence of smoker's melanosis is widely acknowledged as a common complication associated with smoking. As for racial pigmentation, all studies reviewed indicate that the darker the skin tone within the same race or in comparison to other races, the higher the prevalence gingival pigmentation. This is due to the more active melanocytes as well as an increase in melanogenesis.

Smokers Melanosis

Smoking increases the prevalence of gingival pigmentation

Author	Place Of Study	Active Smoker	Passive Smoker	Positive	Negative
Takashi Hanioka, Keiko Tanaka, Miki Ojima, Kazuo Yuuki	Japan		✓	✓	
Shunichi Araki, Katsuyuki Murata, Koichi Ushio, Ryoji Sakai	Japan	✓		✓	
Suraj Multani	India	✓		✓	
Tomotaka Kato, Shinsuke Mizutani, Hiroya Takiuchi, Seiichi Sugiyama, Takashi Hanioka, Toru Naito	Japan	✓		✓	
T Axel, C A Hedin	Sweden	✓		✓	
Srirangarajan Sridharan, Kavita Gangier, Aparna Satyanarayana, Aparna Rahul and Sherya Shetty	India		✓	✓	
Jyothi Tadakamadia, Santhosh Kumar, Anad Nagori, Harish Tivedewai, Prabu Duraiswamy, Suhas Kulkarni	India	✓		✓	
Elahe Moravej-Salehi, Elham Moravej-Salehi, Farnaz Hajifattahi	Iran		✓	✓	
Hedin CA, Axell T	Thailand and Malaysia	✓		✓	
Deepa Ponnaiyan, Priyanka Chillara, Yuvasri Palani	India		✓	✓	
Unsal E, Paksoy C, Soykan E, Elhan AH, Sahin M	Turkey	✓		✓	
S Haresaku, T Hanioka, A Tsutsui, T Watanabe	Japan	✓		✓	

Racial Pigmentation

The darker the skin colour the more prevalent the gingival

pigmentation

Author	Race Studied	Positive	Negative
Clifton O. Dummett	Negroes	✓	
Shulamit Steigmanx	Jewish	✓	
Meir Gorsky, Amos Buchner, Dan Fundoianu-Dayan, and Israel Aviv, Tel Aviv, Israel	Jewish	✓	
Erica Amir, Meir Gorsky, Amos Buchner, Haim Sarnat, MSd and Haim Gat, Tel Aviv	Jewish	✓	
Dosumu Oluwole O and Dosumu Elizabeth B	Negroes	✓	
Deepa Ponnaiyan1, L. Gomathy2, J. A. Anusha2	Indians	✓	
Nimisha Nandan., Prajakta Rao, Varsha Rathod, Aardra Patil, Rajeev Raman	Indians	✓	
Manaswini Eaturi, Krishnajaneya Reddy, Haritha Avula, Vijayalakshmi Bolla, Ashank mishra, Sai Krishna H.V.N	Indians	✓	
Aubrey Masilana, Razia A. G. Khammissa, Johan Lemmer, Liviu Feller	Negroes, Caucasians and Indians	✓	
Jerusha Santa Packyanathan and G. Lavanya	Indians	✓	

Discussion

For a more systematic and simple discussion we have divided the discussion into two parts:

- Smokers Melanosis (Pathological Pigmentation)
- Racial Pigmentation (Physiological Pigmentation)

Smokers Melanosis (Pathological Pigmentation)

100 % of the studies reviewed regarding smoking and the prevalence of gingival pigmentation indicate that the development of gingival pigmentation was much higher in tobacco users compared to no tobacco users [25, 30, 32, 34, 35].

The majority of previous research has aimed to examine the correlation between tobacco smoking and the prevalence of gingival pigmentation. The results of these studies have consistently demonstrated that tobacco smoking promotes an increased production of melanin by oral melanocytes, ultimately resulting in gingival pigmentation [25, 26, 27, 28, 30, 32].

Some studies were also done to correlate passive smoking and its effects on the colour changes in the gingiva. All results suggest that the exposure to passive smoking does indeed increase one's risk of gingival pigmentation [24, 29, 31, 33].

Conversely, an analysis of active smokers revealed inconclusive evidence regarding the relationship between the duration of smoking and the intensity of pigmentation [27]. The findings of this investigation suggest that individuals who engage in active or passive smoking are subjected to an increase risk of developing oral mucosal pigmentation.

Racial Pigmentation (Physiological Pigmentation)

The findings from previous research studies indicate that a notable correlation exists between skin color and the severity of gingival pigmentation [36-45].

100% of the literature reviewed concluded that there was a significant relationship between the skin tone of an individual and the prevalence of gingival pigmentation.

Majority of the studies have divided their samples into specific ethnicities for example Negroes [36], Jews [37, 38, 39], and Indians [44]. The acquired results all show regardless of the ethnicity, the sample with darker skin showed a greater intensity in gingival pigmentation. This signifies that there is an influence of ethnicity and genetics on gingival pigmentation. The acquired results suggest that skin tone can be an indicator for the intensity of gingival pigmentation [42, 45]. One article also demonstrates the influence of advancing age and an increase in gingival pigmentation intensity [43].

Conclusion

The presence of gingival pigmentation, while not typically

deemed a significant complication, can have a considerable impact on overall facial aesthetics. The medical and social history of the patient holds significant relevance in identifying the etiology of its condition.

Histopathological examination provides a conclusive determination of whether a physiological or pathological condition is present. An analysis of previously conducted studies has determined that the principal factors contributing to pigmentation of the oral mucosa are racial (specifically related to physiologic pigmentation) and smoker's melanosis [17-23].

All studies studying the relationship between smoking and the prevalence of gingival pigmentation show that there is a significant relationship between the two variables were compared to non-smokers. Smokers show a higher and more intense gingival pigmentation. These results suggest that smoker's melanosis is a very common complication in smokers. As for racial pigmentation, all studies indicate that darker the skin tones, show higher prevalence of gingival pigmentation, this is most probably due to more active melanocytes as well as an increase in melanogenesis. Almost all gingival pigmentation can be identical, so it is mandatory to identify the etiology behind the cause of gingival pigmentation to formulate a correct and appropriate treatment plan, be it whether it needs to be removed or not.

Acknowledgments

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