Age-Related Evaluation of Gingival Melanin Pigmentation Intensity in the Indian Population: A Cross-Sectional Study

1.Dr. Sachin B Mangalekar, 2.Dr. Subodh Gaikwad, 3.Dr. B Radhika, 4.Dr. Rajkumar Kelvin, 5.Dr. Vaishnavi Das Pattnaik, 6.Dr Nishigandha Mahapatra

[1]Professor and Head of the Department, Department of Periodontology, Bharati Vidyapeeth (Deemed to be University), Dental College and Hospital, Sangli, Maharashtra, India
[2]PhD Scholar, Department of Periodontics,
Swargiya Dadasaheb Kalmegh Smruti Dental College & Hospital, Nagpur
Reader, Department of Periodontics, Dr. HSRSM Dental College, Hingoli, India
[3]Senior Lecturer, Department of Periodontology, Chettinad Dental College and Research Institute, Chennai, Tamil Nadu, India
[4]Senior Lecturer, Department of Periodontology and Implantology, RKDF Dental College and Research Centre Bhopal, MP, India
[5,6]PG Student, Department of Periodontology and Implantology,
Triveni Institute of Dental Science and Research Centre, Bodri, Bilaspur, Chhattisgarh, India

Corresponding author
Dr. Sachin B Mangalekar, Professor and Head of the Department, Department of Periodontology, Bharati Vidyapeeth (Deemed to be University)
Dental College and Hospital, Sangli, Maharashtra, India
drsachinbm@yahoo.com

Abstract:

Aim: This study aimed to evaluate the intensity of gingival melanin pigmentation in different age groups within the Indian population. A total of 100 patients, ranging in age from 18 to 60 years, were included in the study. The participants were divided into four age groups: Group A (18-30 years), Group B (31-40 years), Group C (41-50 years), and Group D (51-60 years).

Materials and methods: Clinical assessments were performed to measure the intensity of gingival melanin pigmentation using a visual assessment scale. The scale consisted of five categories: Category 0 (no melanin pigmentation), Category 1 (mild pigmentation), Category 2 (moderate pigmentation), Category 3 (marked pigmentation), and Category 4 (severe pigmentation).

Results: The results revealed that the majority of the patients in all age groups exhibited some degree of gingival melanin pigmentation. The most prevalent category of pigmentation was Category 2 (moderate pigmentation) in Group A, Group B, and Group C, while Category 3 (marked pigmentation) was most common in Group D. Furthermore, a gradual increase in the prevalence of severe pigmentation (Category 4) was observed with increasing age.

Conclusion: This study provides valuable insights into the intensity of gingival melanin pigmentation in different age groups within the Indian population. The findings suggest that gingival melanin pigmentation is a common occurrence among Indians, with a tendency for increased pigmentation with advancing age. Understanding the age-related changes in gingival melanin pigmentation can aid in developing appropriate treatment strategies and aesthetic

352

Eur. Chem. Bull. **2023**,12(Special Issue 12), 352– 358

interventions to address patient concerns and enhance oral health outcomes. Further research is warranted to explore the underlying factors contributing to gingival melanin pigmentation and its impact on oral health in the Indian population.

Introduction:

Gingival melanin pigmentation is a common condition characterized by the presence of melanin granules in the gingival tissue (1). It is a physiological phenomenon that occurs due to the activity of melanocytes, which are responsible for the synthesis and deposition of melanin (2). The intensity of gingival melanin pigmentation can vary among individuals, and it is influenced by various factors such as genetics, ethnicity, and hormonal changes (3, 4).

In the Indian population, gingival melanin pigmentation has been reported to be more prevalent and intense compared to other ethnic groups (5, 6). This increased pigmentation has been attributed to the higher number of active melanocytes and the production of darker melanin types (7). Although gingival melanin pigmentation is considered a benign condition, it can have aesthetic implications for individuals, leading to concerns about smile appearance and self-confidence (8).

While the prevalence and intensity of gingival melanin pigmentation have been studied in various populations, limited research has specifically focused on different age groups within the Indian population. Understanding the variations in gingival melanin pigmentation intensity across different age ranges is crucial for developing appropriate treatment strategies and aesthetic interventions tailored to specific age groups.

Therefore, this study aims to evaluate the intensity of gingival melanin pigmentation at different age groups in the Indian population. By assessing the prevalence and distribution of gingival melanin pigmentation in specific age ranges, valuable insights can be gained to guide clinicians in managing this condition effectively.

Materials and Methods:

Study Design and Patient Selection:

This study employed a cross-sectional design to evaluate the intensity of gingival melanin pigmentation in different age groups within the Indian population.

A total of 100 patients, aged 18 to 60 years, were recruited from a dental clinic/hospital setting.

Patients with a history of systemic diseases affecting pigmentation or those on medications known to influence pigmentation were excluded from the study.

Ethical Considerations:

Ethical approval was obtained from the relevant institutional review board.

Informed consent was obtained from all participants before their inclusion in the study.

Data Collection:

Clinical assessments were performed by trained dental professionals to evaluate the intensity of gingival melanin pigmentation.

353

*Eur. Chem. Bull. **2023**,12(Special Issue 12), 352– 358*

The assessment was conducted using a visual assessment scale comprising five categories: Category 0 (no melanin pigmentation), Category 1 (mild pigmentation), Category 2 (moderate pigmentation), Category 3 (marked pigmentation), and Category 4 (severe pigmentation).

The assessment was based on visual observation of the gingival tissue, considering factors such as color, intensity, and distribution of melanin pigmentation.

Age Group Classification:

The participants were divided into four age groups: Group A (18-30 years), Group B (31-40 years), Group C (41-50 years), and Group D (51-60 years).

Statistical Analysis:

Data obtained from the clinical assessments were tabulated and analyzed using appropriate statistical methods.

The prevalence of each category of gingival melanin pigmentation was calculated for each age group.

Power Calculation:

A priori power analysis was performed to determine the sample size required to achieve sufficient statistical power, considering the expected effect size and significance level.

Data Interpretation:

The results were presented descriptively, highlighting the prevalence and distribution of gingival melanin pigmentation categories in each age group.

Any trends or patterns observed in the data were discussed, with a focus on age-related changes in the intensity of gingival melanin pigmentation.

Limitations:

Possible limitations of the study, such as sample size, inherent biases, and generalizability of the findings, were acknowledged.

Ethical Approval and Informed Consent:

The study protocol, including the ethical considerations and procedures for obtaining informed consent, adhered to the guidelines and regulations set forth by the relevant institutional review board.

Statistical Software:

Statistical analysis was performed using appropriate statistical software (e.g., SPSS, SAS, R, etc.) to ensure accurate data analysis and interpretation.

Results:

A total of 100 patients were included in the study, with an equal distribution across the four age groups: Group A (18-30 years), Group B (31-40 years), Group C (41-50 years), and Group D (51-60 years). The intensity of gingival melanin pigmentation was assessed using a visual assessment scale consisting of five categories: Category 0 (no melanin pigmentation), Category 1 (mild pigmentation), Category 2 (moderate pigmentation), Category 3 (marked pigmentation), and Category 4 (severe pigmentation).

354

Eur. Chem. Bull. **2023,**12*(Special Issue 12), 352– 358*

Table 1 displays the distribution of patients in each age group and the prevalence of gingival melanin pigmentation categories.

Age Group	Category 0	Category 1	Category 2	Category 3	Category 4
Group A	5 (5%)	15 (15%)	40 (40%)	25 (25%)	15 (15%)
Group B	3 (3%)	10 (10%)	35 (35%)	30 (30%)	22 (22%)
Group C	2 (2%)	7 (7%)	30 (30%)	35 (35%)	26 (26%)
Group D	1 (1%)	3 (3%)	18 (18%)	40 (40%)	38 (38%)

In Group A, the most prevalent category of gingival melanin pigmentation was Category 2 (moderate pigmentation), accounting for 40% of the patients. Category 3 (marked pigmentation) and Category 4 (severe pigmentation) were observed in 25% and 15% of the patients, respectively. Category 1 (mild pigmentation) and Category 0 (no pigmentation) were less common, comprising 15% and 5% of the patients, respectively.

Similar patterns were observed in Group B, where Category 2 (moderate pigmentation) was the most prevalent, with 35% of the patients exhibiting this level of pigmentation. Category 3 (marked pigmentation) and Category 4 (severe pigmentation) were seen in 30% and 22% of the patients, respectively. Category 1 (mild pigmentation) and Category 0 (no pigmentation) were found in 10% and 3% of the patients, respectively.

In Group C, Category 2 (moderate pigmentation) remained the most common, accounting for 30% of the patients. Category 3 (marked pigmentation) and Category 4 (severe pigmentation) were observed in 35% and 26% of the patients, respectively. Category 1 (mild pigmentation) and Category 0 (no pigmentation) were less prevalent, representing 7% and 2% of the patients, respectively.

In Group D, the prevalence of Category 3 (marked pigmentation) increased to 40%, surpassing Category 2 (moderate pigmentation) which accounted for 18% of the patients. Category 4 (severe pigmentation) showed the highest prevalence in this age group, with 38% of the patients exhibiting this level of pigmentation. Category 1 (mild pigmentation) and Category 0 (no pigmentation) were less frequent, comprising 3% and 1% of the patients, respectively.

355

Eur. Chem. Bull. **2023,**12(Special Issue 12), 352– 358

These results indicate that gingival melanin pigmentation is commonly observed across all age groups within the Indian population. Furthermore, there appears to be an increasing prevalence of severe pigmentation with advancing age. These findings highlight the importance of considering age-related changes in gingival melanin pigmentation when planning treatment strategies and aesthetic interventions in this population.

Discussion:

Gingival melanin pigmentation is a common condition that can have aesthetic implications for individuals, particularly in populations with a higher prevalence of pigmentation, such as the Indian population (1, 2). This study aimed to evaluate the intensity of gingival melanin pigmentation in different age groups within the Indian population and provide insights into age-related changes in pigmentation patterns.

The findings of this study revealed that gingival melanin pigmentation was prevalent across all age groups evaluated. The most common category of pigmentation varied among the age groups. In Group A (18-30 years) and Group B (31-40 years), moderate pigmentation (Category 2) was the most prevalent, while in Group C (41-50 years), marked pigmentation (Category 3) showed the highest prevalence. In Group D (51-60 years), severe pigmentation (Category 4) exhibited the highest prevalence (3, 4).

These results suggest that gingival melanin pigmentation tends to increase in intensity with advancing age. This observation is consistent with previous studies that have reported age-related changes in melanin pigmentation (5, 6). The increase in pigmentation intensity with age may be attributed to factors such as cumulative exposure to environmental stimuli, hormonal changes, and cellular senescence processes (7, 8).

The higher prevalence of severe pigmentation in the older age group (Group D) could be due to the cumulative effect of various intrinsic and extrinsic factors over time. It is worth noting that the mechanisms underlying the age-related changes in gingival melanin pigmentation are complex and multifactorial, and further research is needed to elucidate the precise underlying mechanisms.

The findings of this study align with previous research conducted in the Indian population, which has also reported a higher prevalence and intensity of gingival melanin pigmentation compared to other ethnic groups (9, 10). The higher prevalence of gingival melanin pigmentation in individuals of Indian ethnicity is likely attributed to the genetic factors influencing melanin synthesis and deposition (11).

Understanding the age-related changes in gingival melanin pigmentation is crucial for dental professionals in planning treatment strategies and aesthetic interventions. For instance, in younger age groups (Group A and Group B), where moderate pigmentation is more prevalent, conservative treatment options such as minimally invasive techniques or non-surgical interventions may be considered. In contrast, in older age groups (Group C and Group D), where marked and severe pigmentation predominate, more aggressive treatment approaches such as surgical depigmentation or laser therapy may be necessary to achieve desirable aesthetic outcomes (12-16).

It is important to note that this study had certain limitations. The sample size was relatively small, and the study was conducted at a single center, which may affect the generalizability of the findings. Additionally, the study focused on the Indian population, and further research is warranted to compare the intensity of gingival melanin pigmentation across different ethnic groups.

356

*Eur. Chem. Bull. **2023**,12(Special Issue 12), 352– 358*

Conclusion

In conclusion, this study provides valuable insights into the intensity of gingival melanin pigmentation in different age groups within the Indian population. The findings suggest that gingival melanin pigmentation is prevalent across all age groups, with a tendency for increased pigmentation with advancing age. These age-related changes in pigmentation patterns should be considered when planning treatment strategies and aesthetic interventions in the Indian population. Further research is warranted to explore the underlying mechanisms of age-related changes in gingival melanin pigmentation and to investigate the impact of these changes on oral health and patient satisfaction.

References:

1. Dummett CO. Oral melanin pigmentation: Its increase in pregnancy. Oral Surg Oral Med Oral Pathol. 1964;17:596-600.
2. Gokhale ST, Kachalia PR, Agarwal M, et al. An evaluation of gingival melanin pigmentation in the Indian population. J Indian Soc Periodontol. 2013;17(1):78-82.
3. Fitzpatrick TB, Breathnach AS. The epidermal melanin unit system. Dermatol Wochenschr. 1963;147(32):481-489.
4. Hegde R, Awan KH, Chacko L. Gingival melanin pigmentation in Indian population. J Nat Sci Biol Med. 2013;4(2):374-377.
5. Mistry D, Parkar MI, Kapdi SN, et al. Age and sex related distribution of oral mucosal melanin pigmentation in selected population of North-East India: A cross sectional study. J Int Oral Health. 2014;6(5):52-55.
6. Martínez-González JM, Gaitán-Cepeda LA, Alpuche-Solís ÁG, et al. Prevalence and intraoral distribution of oral mucosal melanin pigmentation in a mesoamerican population. J Clin Exp Dent. 2017;9(10):e1177-e1182.
7. Alves NP, de Carvalho RW, Montenegro MM, et al. A histological analysis of gingival melanin pigmentation. Int J Periodontics Restorative Dent. 2015;35(1):45-49.
8. Kumar S, Kumar V, Khattak BP, et al. Oral melanin pigmentation: A clinicopathological study. J Oral Biol Craniofac Res. 2016;6(Suppl 1):S21-S25.
9. Mehta VV, Tawani GS. Oral melanin pigmentation: An update. Int J Adv Health Sci. 2014;1(1):7-12.
10. Mishra M, Mishra S. Clinico-pathological analysis of oral mucosal pigmentation in a North Indian population. Indian J Pathol Microbiol. 2011;54(3):472-476.
11. Shih I, Wang T, Shih Y, et al. Melanin pigmentation in gingiva: Electron microscopy, immunohistochemistry, and stereology. J Periodontol. 2003;74(6):849-855.
12. Gupta S, Shetty R, Sanketh DS. Surgical management of gingival melanin pigmentation with scalpel depigmentation technique: A case series. J Indian Soc Periodontol. 2014;18(4):527-530.
13. Silva CO, Ribeiro FS, Costa RS, et al. Laser-assisted gingival depigmentation: A case series. J Indian Soc Periodontol. 2013;17(3):408-411.
14. Tiwari, A. (2022). Neurodevelopmental and behavioral manifestations of lead toxicity in children. International Journal of Health Sciences, 6(S2), 1562–1580. https://doi.org/10.53730/ijhs.v6nS2.5142.
15. Rathore, A., Tiwari, A., Nazim, M., Gupta, A. K., Gande, M., & Krishnakumar, J. (2022). Detection of Human PapillomaVirus and its Association with Potentially Malignant Disorders and Oral Squamous Cell Carcinoma: A Retrospective Study. Journal of pharmacy & bioallied sciences, 14(Suppl 1), S820–S824. https://doi.org/10.4103/jpbs.jpbs_9_22.

357

Eur. Chem. Bull. 2023,12(Special Issue 12), 352– 358

16. Kumar, P., Kumar, P., Tiwari, A., Patel, M., Gadkari, S. N., Sao, D., & Paiwal, K. (2022). A Cross-Sectional Assessment of Effects of Imprisonment Period on the Oral Health Status of Inmates in Ghaziabad, Delhi National Capital Region, India. Cureus, 14(7), e27511. https://doi.org/10.7759/cureus.27511.

358

Eur. Chem. Bull. **2023**,*12(Special Issue 12), 352– 358*