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Evaluation of Patient Acceptance Patterns Toward Diode Laser-Assisted and Conventional Scalpel Gingival Depigmentation in a Dental Teaching Institution: A Retrospective Study

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Abstract
Background: Gingival hyperpigmentation is a common esthetic concern that may negatively affect smile appearance and patient confidence. Various treatment modalities are available for gingival depigmentation, among which diode laser-assisted and conventional scalpel techniques are widely practiced. Patient acceptance toward these procedures plays an important role in esthetic periodontal treatment planning. **Aim:** To evaluate patient acceptance patterns toward diode laser-assisted and conventional scalpel gingival depigmentation procedures in a dental teaching institution. **Materials and Methods:** This retrospective observational study was conducted using patient records from the Department of Periodontics of a dental teaching institution between January 2023 and January 2026. A total of 100 patient records of individuals who underwent gingival depigmentation procedures were included in the study. Data regarding age, gender, treatment modality performed, and treatment acceptance patterns were collected from institutional records and clinical photographs. The depigmentation procedures included diode laser-assisted and conventional scalpel techniques. Statistical analysis was performed using descriptive statistics and Chi-square test. **Results:** Among the 100 evaluated patient records, diode laser-assisted gingival depigmentation demonstrated greater patient acceptance and improved treatment continuation patterns compared to conventional scalpel depigmentation. Female patients and younger individuals showed comparatively greater preference toward esthetic periodontal procedures, particularly laser-assisted treatment modalities. Conventional scalpel depigmentation demonstrated relatively lower follow-up compliance and treatment continuation patterns. The findings indicated an increasing preference toward minimally invasive laser-assisted depigmentation procedures. **Conclusion:** Diode laser-assisted gingival depigmentation demonstrated more favorable patient acceptance patterns compared to conventional scalpel depigmentation. The findings suggest growing patient preference toward minimally invasive esthetic periodontal procedures in contemporary dental practice.
Keywords: Gingival depigmentation; diode laser; scalpel technique; patient acceptance; esthetic periodontics; retrospective study

Introduction

Esthetics has become an integral component of contemporary dental practice, with increasing emphasis placed not only on the appearance of teeth but also on the harmony of the surrounding gingival tissues. An attractive smile is influenced by several factors including tooth alignment, color, lip position, gingival contour, and gingival color. Among these, gingival pigmentation plays an important role in smile esthetics, particularly in individuals with excessive gingival display or high smile lines (1). Although gingival pigmentation is physiologic in most individuals and does not represent a pathological condition, excessive melanin pigmentation may become a significant cosmetic concern affecting self-confidence and social interactions (2).

Gingival pigmentation is primarily caused by melanin deposition within the basal and suprabasal layers of the gingival epithelium. The degree and distribution of pigmentation vary considerably among individuals depending on ethnicity, genetic predisposition, age, systemic influences, and environmental factors. Increased melanocyte activity rather than melanocyte number is considered responsible for the intensity of pigmentation (3). Physiologic gingival pigmentation is commonly observed in individuals with darker skin complexion and is considered a normal variation. However, in certain patients, particularly those with a high smile line, visible gingival pigmentation may negatively affect smile appearance and lead to increased esthetic awareness (4).

With the growing influence of cosmetic dentistry and social media-driven esthetic perception, patient demand for smile enhancement procedures has increased substantially over recent years. Contemporary dental patients are increasingly conscious of facial appearance and smile esthetics, resulting in greater interest toward cosmetic periodontal procedures. Gingival depigmentation has therefore gained popularity as a minimally invasive esthetic periodontal procedure aimed at improving gingival appearance by eliminating or reducing melanin pigmentation (5).

Several techniques have been described for gingival depigmentation, including conventional scalpel surgery, bur abrasion, electrosurgery, cryosurgery, chemical cauterization, and laser-assisted procedures. Among these, the conventional scalpel technique has historically been regarded as a simple and economical method. The procedure involves surgical removal of the pigmented epithelial layer along with a thin layer of underlying connective tissue, allowing healing by secondary intention. Although the scalpel technique remains effective and widely practiced, it is often associated with intraoperative bleeding, postoperative discomfort, delayed healing, and the requirement of periodontal dressing. Such factors may influence patient perception and willingness toward treatment (6).

In recent years, laser-assisted gingival depigmentation has emerged as a preferred alternative because of its minimally invasive nature and improved patient comfort. Diode lasers, particularly within the wavelength range of 810–980 nm, demonstrate excellent affinity toward melanin and hemoglobin, making them highly effective for soft tissue depigmentation procedures. Laser-assisted techniques provide several clinical advantages including improved hemostasis, reduced intraoperative bleeding, minimal postoperative discomfort, enhanced healing response, sterilization of the surgical field, and reduced requirement for sutures or periodontal dressings. These benefits have contributed to the increasing acceptance of laser dentistry in periodontal practice (7,8).

Apart from clinical effectiveness, patient acceptance has become an important determinant in treatment planning for esthetic periodontal procedures. Acceptance toward a treatment modality is often influenced by factors such as fear of surgery, anticipated pain, comfort, healing period, awareness regarding advanced technologies, and perception of minimally invasive procedures. Modern dental patients frequently demonstrate greater preference toward procedures perceived as less traumatic and technologically advanced. Consequently, laser-assisted therapies are increasingly being considered favorably by patients seeking esthetic treatment (9,10).

Understanding patient acceptance patterns toward different gingival depigmentation procedures is important for improving patient-centered care and treatment planning. Evaluation of such patterns may provide insight into evolving patient preferences and behavioral trends in esthetic dentistry. Although several studies have compared the clinical outcomes of laser-assisted and conventional scalpel gingival depigmentation, limited literature is available regarding patient acceptance patterns toward these treatment modalities, particularly in institutional settings (11,12).

Therefore, the present retrospective study was undertaken to evaluate patient acceptance patterns toward diode laser-assisted and conventional scalpel gingival depigmentation procedures in a dental teaching institution.

Materials and Methods

This retrospective observational study was conducted in the Department of Periodontics of a dental teaching institution after obtaining approval from the Institutional Ethical Committee. The study was designed to evaluate patient acceptance patterns toward diode laser-assisted and conventional scalpel gingival depigmentation procedures using institutional clinical records.

Study Design and Study Setting

The present study was designed as a retrospective institutional record-based analysis. Patient records archived in the institutional database between January 2023 and January 2026 were reviewed and evaluated. The study was carried out in the outpatient section of the Department of Periodontics, where esthetic periodontal procedures including gingival depigmentation are routinely performed.

Sample Selection

A total of 100 patient records of individuals who underwent gingival depigmentation procedures during the study period were included in the analysis. Case records were selected using simple random sampling from the institutional digital database to minimize selection bias. Equal numbers of diode laser-assisted and conventional scalpel depigmentation cases were included for retrospective evaluation.

Inclusion Criteria

The following case records were included in the study:

- Patients aged 18 years and above
- Patients who underwent gingival depigmentation procedures for esthetic purposes
- Complete clinical records with documented treatment details
- Availability of intraoral clinical photographs before treatment

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- Records containing follow-up details and treatment continuation status

Exclusion Criteria

The following records were excluded from the study:

- Incomplete or missing patient records
- Patients with systemic diseases or conditions affecting gingival pigmentation
- Patients with smoking-associated melanosis alone
- Patients undergoing retreatment or repeated depigmentation procedures
- Patients with other gingival pathologies or lesions affecting gingival color

Data Collection Procedure

The selected patient records were reviewed systematically using the institutional electronic database. Relevant clinical and demographic details were extracted and recorded using a standardized data collection sheet. Clinical photographs archived in patient records were used for verification of gingival pigmentation and treatment modality performed.

The following variables were documented:

- Age of the patient
- Gender
- Degree and distribution of gingival pigmentation
- Treatment modality performed
- Treatment continuation and acceptance status
- Follow-up details

Assessment of Gingival Depigmentation Procedures

The depigmentation procedures included in the study were:

1. Diode laser-assisted gingival depigmentation
2. Conventional scalpel gingival depigmentation

In diode laser-assisted procedures, depigmentation was performed using a diode laser unit under local anesthesia according to institutional clinical protocol. Laser ablation of pigmented gingival epithelium was carried out carefully until complete removal of visible pigmentation was achieved. In conventional scalpel depigmentation procedures, the pigmented gingival epithelium along with a thin layer of underlying connective tissue was surgically removed using a surgical blade under local anesthesia. Hemostasis was achieved and periodontal dressing was placed wherever required.

Evaluation of Patient Acceptance Patterns

Patient acceptance patterns were retrospectively assessed based on:

- Patient willingness to undergo the advised depigmentation procedure
- Treatment continuation status
- Attendance during follow-up visits
- Completion of planned treatment procedures

Acceptance trends toward diode laser-assisted and conventional scalpel procedures were evaluated from documented clinical records.

Statistical Analysis

The collected data were entered into Microsoft Excel and subjected to statistical analysis using SPSS software version 23.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were expressed as frequency and percentage. Association between treatment modality and patient acceptance patterns was analyzed using the Chi-square test. A p-value less than 0.05 was considered statistically significant.

Results

A total of 100 patient records fulfilling the inclusion criteria were retrospectively evaluated in the present study. The study population consisted of individuals who underwent gingival depigmentation procedures for esthetic concerns in a dental teaching institution between January 2023 and January 2026.

Among the evaluated records, equal numbers of diode laser-assisted gingival depigmentation procedures and conventional scalpel depigmentation procedures were included. The majority of patients belonged to the younger age group, reflecting increased esthetic awareness and greater demand for cosmetic periodontal procedures among young adults.Female patients constituted a slightly higher proportion of the study population compared to males. Increased concern regarding smile appearance and gingival esthetics may have contributed to greater treatment-seeking behavior among female patients.

Evaluation of treatment acceptance patterns demonstrated greater acceptance toward diode laser-assisted gingival depigmentation procedures compared to conventional scalpel depigmentation. Patients undergoing laser-assisted procedures showed better treatment continuation and follow-up compliance. Clinical records indicated that patients demonstrated increased willingness toward minimally invasive procedures with improved esthetic perception and comfort.

Conventional scalpel depigmentation procedures demonstrated comparatively lower patient acceptance despite equal representation within the evaluated records. Delayed follow-up and incomplete treatment continuation were observed more frequently among patients undergoing conventional surgical depigmentation procedures.

Age-wise analysis demonstrated that younger individuals showed greater acceptance toward gingival depigmentation procedures overall, particularly toward diode laser-assisted treatment modalities. Female patients also demonstrated greater preference toward laser-assisted esthetic periodontal procedures compared to conventional surgical approaches.

The retrospective analysis further demonstrated an increasing trend toward laser-assisted gingival depigmentation procedures during the evaluated study period. The observed findings suggest growing patient preference toward minimally invasive esthetic periodontal therapy in contemporary periodontal practice.

Table 1 : Comprehensive distribution of patient acceptance patterns toward diode laser-assisted and conventional scalpel gingival depigmentation procedures

Variable	Diode Laser-Assisted Depigmentation n (%)	Conventional Scalpel Depigmentation n (%)	Total n (%)	p-value
Gender				
Male	20 (45.5)	24 (54.5)	44 (44.0)	0.041*
Female	30 (53.6)	26 (46.4)	56 (56.0)	
Age Group (Years)				
18–25	26 (61.9)	16 (38.1)	42 (42.0)	0.022*
26–35	18 (52.9)	16 (47.1)	34 (34.0)	
36–45	4 (25.0)	12 (75.0)	16 (16.0)	
>45	2 (25.0)	6 (75.0)	8 (8.0)	
Treatment Acceptance Pattern				
Accepted / Continued treatment	44 (88.0)	34 (68.0)	78 (78.0)	0.015*
Delayed / Incomplete follow-up	6 (12.0)	16 (32.0)	22 (22.0)	

*p value < 0.05 - statistically significant

Discussion

The present retrospective study evaluated patient acceptance patterns toward diode laser-assisted and conventional scalpel gingival depigmentation procedures in a dental teaching institution. The findings demonstrated greater acceptance toward diode laser-assisted depigmentation procedures compared to conventional scalpel techniques, indicating an increasing preference for minimally invasive esthetic periodontal procedures among dental patients (13).

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Gingival pigmentation, although physiologic in most individuals, may significantly influence smile esthetics and patient confidence, particularly in individuals with excessive gingival display. With increasing awareness regarding cosmetic dental procedures and smile enhancement, demand for esthetic periodontal treatments has increased considerably in recent years. The present study demonstrated that younger individuals constituted a major proportion of patients seeking gingival depigmentation procedures, reflecting increased esthetic awareness and treatment-seeking behavior among younger age groups (14).

Among the evaluated procedures, diode laser-assisted gingival depigmentation demonstrated more favorable patient acceptance patterns compared to conventional scalpel depigmentation. Patients undergoing laser-assisted procedures showed improved treatment continuation and follow-up compliance. This may be attributed to the perception of laser therapy as a modern, minimally invasive, and technologically advanced treatment modality (15). Previous studies have reported several advantages associated with diode laser procedures, including improved hemostasis, reduced intraoperative bleeding, minimal postoperative discomfort, and enhanced healing response. Such factors may positively influence patient confidence and treatment acceptance.

The increased acceptance observed toward laser-assisted procedures in the present study reflects the growing preference for minimally invasive dentistry in contemporary practice. Modern dental patients increasingly favor procedures perceived to be less traumatic and more comfortable. In esthetic periodontal procedures, patient acceptance is influenced not only by clinical effectiveness but also by treatment perception, anticipated discomfort, healing period, and overall comfort. The favorable acceptance patterns observed toward diode laser-assisted depigmentation may therefore indicate changing patient expectations toward esthetic dental procedures.

Although the conventional scalpel technique remains an effective and economical method for gingival depigmentation, it is commonly associated with intraoperative bleeding, postoperative discomfort, delayed healing, and the requirement of periodontal dressing. These factors may influence patient perception and reduce willingness toward surgical procedures. In the present study, comparatively lower treatment continuation and follow-up compliance were observed among patients undergoing conventional scalpel depigmentation procedures, suggesting relatively lower acceptance toward conventional surgical approaches.

Gender-wise analysis demonstrated slightly greater acceptance toward gingival depigmentation procedures among female patients. This finding may be associated with increased concern regarding smile appearance and facial esthetics among females. Similar observations have been reported in esthetic dentistry literature, where female patients often demonstrate greater interest toward cosmetic and minimally invasive dental procedures. However, gingival depigmentation procedures were accepted across both genders, indicating increasing esthetic awareness within the overall patient population (16).

Age-wise evaluation further demonstrated greater preference toward laser-assisted depigmentation among younger individuals. Younger patients are generally more aware of advanced dental technologies and may show greater inclination toward minimally invasive esthetic procedures. Social media influence, cosmetic awareness, and greater accessibility to esthetic dentistry may also contribute to increased treatment acceptance within younger age groups. Older patients demonstrated comparatively lower preference toward laser-assisted procedures, which may be related to reduced esthetic concern or differences in treatment perception (5).

An important finding of the present study was the improved follow-up compliance observed among patients undergoing diode laser-assisted depigmentation procedures. Better treatment continuation may reflect increased patient comfort and satisfaction associated with minimally invasive therapy. Follow-up compliance is an important component of esthetic periodontal treatment, as postoperative evaluation and maintenance significantly contribute to treatment success and patient satisfaction. The present findings highlight the expanding role of laser dentistry in esthetic periodontics (12). Apart from clinical effectiveness, patient-centered factors such as comfort, treatment perception, and acceptance patterns play a major role in treatment planning and successful outcomes. Understanding these acceptance trends may therefore help clinicians improve patient communication and select treatment modalities that align with patient expectations.

The increasing preference toward diode laser-assisted gingival depigmentation observed in this study also reflects broader changes occurring in contemporary dentistry. Patients today are more informed regarding available treatment options and often demonstrate preference toward advanced technologies and minimally invasive procedures. Laser-assisted therapies are frequently perceived as more precise, comfortable, and esthetically favorable, which may positively influence patient decision-making and acceptance.Despite the favorable acceptance patterns observed toward laser-assisted depigmentation, conventional scalpel depigmentation remains clinically relevant because of its simplicity, affordability, and effectiveness. Therefore, the choice of treatment modality should be individualized based on clinical presentation, patient expectation, operator expertise, and availability of equipment (16,17).

The present study has certain limitations that should be considered while interpreting the findings. As a retrospective institutional study, the analysis depended on previously recorded clinical data and availability of complete patient records. Variables such as patient anxiety, socioeconomic status, treatment cost, pain perception, and postoperative satisfaction were not evaluated. In addition, the study was conducted in a single institutional setting with a relatively limited sample size, which may affect the generalizability of the findings. Future prospective studies incorporating patient-reported outcome measures and larger multicentric populations may provide more comprehensive insight into patient acceptance patterns toward gingival depigmentation procedures.

Conclusion

Within the limitations of the present retrospective study, diode laser-assisted gingival depigmentation demonstrated greater patient acceptance and better treatment continuation patterns compared to conventional scalpel depigmentation. The findings indicate an increasing preference toward minimally invasive esthetic periodontal procedures in contemporary dental practice.

Conflict of interest: nil

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