

# Knowledge, Perceptions and Satisfaction towards Diode Laser as Adjunctive to Non-surgical Management of Periodontitis

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## Abstract

**Background:** Diode laser, when used in conjunction to conventional periodontal therapy in the management of periodontitis, is considered a new treatment modality. The outcome of oral health problem interestingly become a subject of significant research activity. The objective directed to evaluate the knowledge, perception, and satisfaction of Sudanese patients to laser therapy, when used in the management of periodontitis. **Materials and Methods:** Descriptive cross-sectional study conducted among 30 adults (males and females) treated by laser at Dental clinic, Al-Neelain University, Khartoum Sudan. A self-administered questionnaire, concerning patients' knowledge towards the laser, fear from radiation, safety and possible complication. At the same time, other items asked after completion of the treatment to evaluate postoperative status in terms of bleeding, pain on biting, malodor, and sensitivity. **Results:** Application of Diode laser as adjunctive to non-surgical periodontal therapy did not show complications such as bleeding, pain, tenderness, or bad odor. However, some expressed apprehension during diode laser application despite their idea about laser safety. The rate of the patients who accepted the treatment by laser was high (P value 0.001). Educated patients showed excellent knowledge of laser's safety and its complications (P value 0.018). Post-treatment findings revealed that 13 patients (43.3%) did not experience any pain during the treatment, and 27 patients (90.0 %) had no pain on biting. Bleeding was not detected on 14 participants (46.7%), while mild bleeding experienced by 12 patients (40.0%) and the lousy odor not detected by 24 candidates (80.0%). **Conclusion:** The Sudanese patients' knowledge of laser in dentistry found to be minimal among illiterates. All patients showed a positive response to laser therapy.

**Keywords:** Adjunctive therapy; Diode laser; Knowledge; Non-surgical treatment; Periodontal pockets

## Introduction

The diode laser is a semiconductor used in soft tissue surgery. It emits coherent monochromatic light of wavelength (810-900 nm). Periodontitis is an inflammatory response to the accumulation of microbial plaque, and calculus on teeth surfaces leads to the destruction of the tooth surrounding tissues. <sup>[1]</sup> Patient's perception played an essential role in the determination of provided health services. Patients based outcomes identified as research priority since (World Workshop on Emerging Science in Periodontology 2003). <sup>[2]</sup> Laser application in periodontics is limited in Sudan. This study aimed to evaluate the Sudanese patient's knowledge, perception, and satisfaction towards diode laser application in the management of periodontitis.

## Materials and Methods

A descriptive cross-sectional study conducted to 30 adult patients, males and females with an age range of (35-55) years, attended Alneelain University clinic and Khartoum Dental hospital - Khartoum Sudan received periodontal treatment from (August 2017 to May 2018). Candidates diagnosed with

generalized periodontitis stage III grade B <sup>[3]</sup> and received conventional periodontal therapy in conjunction to diode laser (980 nm), power one Watt, time 30 sec, and frequency 50 Hz). Ethical approval received from the Ministry of Health Khartoum Sudan No (4-7-19). All candidates signed a consent form needed for participation in this study. A self-administered questionnaire filled. It included closed-ended questions related to patients' knowledge of laser therapy and its possible complications. On the other hand, few questions investigated after completion of the treatment to evaluate the post-operative status and the acceptance of the treatment procedure. **Methods:** Assessment of patient's response to treatment performed through a structured self-administered questionnaire written in

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**How to Cite this Article:** Faragalla AI, et al. Knowledge, Perceptions and Satisfaction towards Diode Laser as Adjunctive to Non-surgical Management of Periodontitis. *Ann Med Health Sci Res.* 2020;10: 1070-1073.

English and translated into Arabic language using back-word for-word translation methods.

All participants filled a few questions that used to investigate knowledge towards the laser, fear from radiation, safety, and possible complication. Six questions asked after completion of the treatment evaluated post-operative treatment outcome in terms of bleeding, pain on biting, malodor, sensitivity, and acceptance of the laser therapy. The verbal rating scale (VRS) (Glossary Spine 2000), [4] used to assess pain and recorded it as four points scale no, mild, moderate, and sever. Halitosis confirmed by patients' self-assessment (hand on mouth technique). The severity of odor measured using Organoleptic test, which classified into various scales, such as a 0- to a 5-point scale (0: no odor, 1: barely noticeable, 2: slight but noticeable, 3: moderate, 4: strong, and 5: extremely strong). [5,6] At baseline and after treatment. Likert [7] of (1-5) that categorizes patients' response into 1 for strongly disagree, 2 for disagree, 3 for neither agree nor disagree, 4 for agree and 5 for strongly agree.

Similarly, the patient's acceptance and satisfaction with the administered laser therapy, recorded in the proforma. The reliability of the questions tested using Cronbach's alpha. The calculated alpha indicated that the study was highly reliable in the measurement of study variables. Whereas, reproducibility of the questionnaire tested on five patients with periodontal pockets depth (4-6 mm) not related to the study. They answered the questions on two different occasions. Reproducibility was confirmed because the answers were similar in 90% of cases in different circumstances.

Statistical analysis: Statistical analysis conducted for each of the parameters used in the SPSS version (23.0). Patients' responses calculated—nonparametric methods used for analyzing the data. P value, less than (0.05), considered statistically significant. The data expressed as frequency distribution and percentages. Because the interpretation of qualitative data such as patients' responses is more meaningful when expressed in terms of frequency.

### Results

A total of thirty patients examined and received periodontal treatment with diode laser as adjunctive to non-surgical therapy. The frequency distribution of samples according to biographic and demographic variables showed in Table 1. Most of the participants were females. Nearly half of the female participants were housewives and non-educated. Table 2 showed descriptive statistics for questionnaire responses before applying laser therapy; 53% of participants did not hear about laser in dentistry and had no idea about the laser. Most patients 26, (86.7%), had a feeling that laser could be a safe tool for use. The same candidates' responses evaluated after laser therapy was applied, as shown in Table 3. Nine patients (30%) were afraid of laser application when they sat on the dental chair. However, 13 participants (43.3 %) did not complain of pain, and 14 hadn't experienced bleeding (46.7%) during the lasing procedure. Only one of the patients (3.1%) suffered moderate sensitivity. Two patients experienced pain on biting following laser application. Table 4 showed a comparative analysis of baseline parameters with

**Table 1: Frequency distribution table showing sample size, biographic & demographic variables.**

No	Variables	Responses	Frequency = Number (%)
1	Sample Size (n)		30
2	Gender	Male	13 (43.3)
		Female	17 (56.7)
3	Age	25 - 35 Yrs	5 (16.7)
		36 - 45 Yrs	16 (53.3)
		Above 45 Yrs	9 (30.0)
4	Education	Non educated	13 (43.3)
		Middle School	11 (36.7)
		High School	1 (3.3)
		College	5 (16.7)
5	Occupation	Private	2 (6.7)
		Government	6 (20.0)
		Agriculture/Labour	5 (16.7)
		Housewife	17 (56.7)
6	Income	No Income	4 (13.3)
		2000 – 5000 SR	16 (53.3)
		5001 – 10,000 SR	7 (23.3)
		Above 10,000 SR	3 (10.0)

Note: \*p value<0.05; € p value<0.01; p value <

**Table 2: Frequency distribution table showing Descriptive Statistics for Questioner responses – Before laser therapy.**

Questions	Response Number (%)	
	Yes	No
1 Do you hear about laser in dentistry?	14 (46.7)	16 (53.3)
2 Are you afraid from treatment by laser?	9 (30.0)	21 (70.0)
3 Do you know that laser may cause complication?	11 (36.7)	19 (63.3)
4 Do you know that laser is safe?	26 (86.7)	4 (13.3)

Note: \*p value < 0.05; € p value < 0.01; p value

responses to questionnaires before and after the intervention. Knowledge of laser safety was significant among females (P value 0.014) and non-educated participants (P value = 0.20). Detection of lousy odor using the hand-mouth technique was positive, with four candidates (13%) of cases, while two (6%) were not sure of the presence of a bad odor. Candidates who did not suffer any lousy smell were labor or worked in private sectors, statistically significant (P value = 0.006). Most patients, 27 participants (90.0%) were housewives or worked in private sectors. They showed statistically significant results (P value = 0.000) in accepting the treatment and satisfying the results in which the Diode laser used in conjugation with non-surgical therapy.

### Discussion

Diode laser application to periodontal pockets is considered a new treatment modality among Sudanese patients with periodontal diseases. Perception of Sudanese patients to diode laser (980 nm), when used in conjugation to conventional therapy in the management of periodontitis through three months duration, investigated in this study. Diode lasers may reduce periodontal pockets; remove calculus, and granulation tissues, and con-tour the hyperplastic gingiva. [8] Over the past few decades, interest in the outcome of oral health problems becomes a subject of significant research activity. [9] It stated the

**Table 3: Frequency distribution table showing Descriptive Statistics for Questioner responses – After laser therapy.**

Questions	Response = Number (%)		
	No	Mild	Moderate
1 Did you feel pain during treatment?	13 (43.3)	15 (50.0)	2 (6.7)
2 Did you have bleeding?	14 (46.7)	12 (40.0)	4 (13.3)
3 Did you feel sensitivity in your gum?	25 (83.3)	4 (13.3)	1 (3.3)
	Disagree	Neutral	Disagree
4 Did you experience pain on biting?	27 (90.0)	1 (3.3)	2 (6.7)
5 Did you detect bad breath?	24 (80)	2 (6.7)	4 (13.3)
6 Did you accept the treatment?	1 (3.3)	2 (6.7)	27 (90.0)

Note: \*p value < 0.05; € p value < 0.01

**Table 4: Comparative Analysis of baseline parameters with the responses of Questions before & after the intervention. – Age with IHC Parameters – (p value).**

No	Variable	Gender	Age	Education	Occupation	Income
1	Do you hear about laser in dentistry?	0.431	0.915	0.85	0.602	0.071
2	Are you afraid from treatment by laser?	0.376	0.068	0.608	0.39	0.425
3	Do you know that laser may cause complication?	0.558	0.371	0.018*	0.020*	0.053
4	Do you know that laser is safe?	0.014*	0.887	0.031*	0.11	0.257
5	Did you feel pain during treatment?	0.93	0.716	0.343	0.283	0.445
6	Did you have bleeding?	0.733	0.161	0.329	0.751	0.71
7	Did you feel sensitivity in your gum?	0.657	0.25	0.857	0.176	0.104
8	Did you experience pain on biting?	0.665	0.818	0.894	0.879	0.578
9	Did you detect bad breath?	0.057	0.444	0.545	0.01 €	0.00 €
10	Did you accept the treatment?	0.28	0.459	0.351	0.000	0.578

patients-based outcome measures concerning the application of diode laser in the management of periodontitis by improving the clinical parameters. In this study, knowledge about laser and its safety investigated by a questionnaire, the results demonstrated poor ideas about the uses and protection of lasers among non-educated Sudanese participants. When used in conjugation to SRT, the patient’s acceptance of Diode laser, observed to be higher than using SRP therapy alone. This study is similar to the results of the systematic review conducted by Kotronoula [10] that reported patient-based outcome measures would be associated with improved symptom control, increased supportive care measures, and patient satisfaction. An interesting finding was that patients who have no idea about laser therapy, they did not feel afraid of its application. In the current study, pain assessed by recording the verbal rating scale (VRS), which demonstrated that most patients were accepting the treatment with laser and experienced little or no discomfort during and following the treatment procedures. These findings were similar to the results reported by V.S.M. Campanile et al. [11] and I. Cappunyns et al. [12] They stated that the level of pain following photodynamic therapy revealed a broader perspective and perception in agreement with Passanezi, [13] who conducted a study on tolerance and compliance of the patients following laser therapy to periodontal pockets. He concluded that since the power values provided are relatively low (3 W) and the energy supplied in pulsed mode, patients don’t experience intraoperative pain or discomfort nor re-quire, as a rule, the execution of loco-regional anesthesia.

Patient perception should be taken into consideration while evaluating the treatment out-come, especially in chronic illness like periodontitis. [14] Efficient removal of microbial biofilm and infected root cementum lead to successful therapy. [15,16] Different

types of lasers used in conjugation to conventional treatment of periodontitis to achieve more favorable therapeutic effects. [17] There is little evidence on how patients accepted aspects of other periodontal treatment procedures like photodynamic therapy. [18,19]

### Conclusion

Illiterate’s Sudanese patients showed minimal knowledge toward lasers and their uses in dentistry. However, the application of diode laser as adjunctive to nonsurgical periodontal therapy did not show complication in terms of bleeding, pain, sensitivity, or bad mouth odor. All most all patients showed a positive response towards laser therapy.

### Acknowledgment

Grateful acknowledgment extended to the College of Dentistry staff, Alneelain University, Khartoum Sudan, for their support. Thanks to Dr. Mudathir (Almudathir Dental Clinic, Khartoum), who provided the 980 Nm diode laser free of charge. Thanks to all participating patients for their patience and cooperation.

### Conflict of Interest

The authors declared that there is no any conflict of interest in this study.

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