(International Print/Online Journal)

SJIF IMPACT FACTOR: 6.829
PUBMED-National Library of Medicine ID-101739732

ISSN (Print): 2209-2870
ISSN (Online): 2209-2862

International Journal of Medical Science and Current Research (IJMSCR)
Available online at: www.ijmscr.com
Volume 9, Issue 4, Page No: 133-141
July-August 2026

IJMSCR

Questionnaire To Evaluate Awareness and Acceptability Amongst Dental Practitioners Regarding the Use of LASERS In Dental Practices

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Type of Publication: Original Research Paper
Conflicts of Interest: Nil

Abstract

Introduction: The innovation of LASERs has encouraged people beyond aesthetics. Laser is one such technology that has emerged as a high-tech instrument and a very useful tool in all areas of our lives. Lasers have been used for soft-tissue procedures such as gingivectomy, frenectomy, and biopsies for several years. It is essential for dentists to have a thorough understanding of laser physics, laser operation, different types of lasers, and which type of laser is suitable for each case to use laser safely and effectively in various dental disciplines.

Methodology: An online questionnaire-based survey was carried out among dental professionals of India. A questionnaire was developed using Google Forms and shared with respondents via WhatsApp and mail. Collected data were analyzed using Stata Version 16 software. A total 400 dental practitioners were involved in the study.

Results: The results conclude that the majority of dental practitioners (over 95%) are aware of use of LASER use in dentistry and recognize its benefits. Most participants showed high willingness to undergo training, adopt LASER in daily practice and recommend it to colleagues and patients.

Conclusion: Lasers in dentistry are still a new technology; therefore, experience and understanding are minimal. However, although the majority of dental practitioners in this study are interested in using lasers, only a few practitioners use this equipment. Lasers need comprehensive training in both theoretical and applied.

Keywords: LASERs, Questionnaire, Awareness, Acceptability, India

Introduction

Laser technology has significantly transformed the field of dentistry over the past few decades, offering enhanced precision, reduced patient discomfort, and improved clinical outcomes. Since 1960s, lasers have evolved to become a valuable adjunct in a wide range of dental procedures, including soft tissue surgeries, hard tissue ablation, periodontal therapy, endodontic disinfection, and aesthetic treatments.[1] Despite these advances, the widespread acceptance of lasers in routine dental practice remains confined due to a combination of factors such as cost, training requirements, awareness, and clinical acceptability among practitioners.

The term LASER, an acronym for "Light Amplification by Stimulated Emission of Radiation," refers to devices that emit a concentrated beam of monochromatic and coherent light. This property allows for precise interaction with dental tissues, making lasers suitable for minimally invasive procedures and promoting faster healing .[2] Various types of lasers—such as diode, Nd:YAG, Er:YAG, CO_2, and ErCr:YSGG—are currently used depending

on the clinical indication and tissue target. [3] It is essential to have a thorough understanding of laser physics, laser operation, different types of lasers, and which type of laser is suitable for each case to use laser safely and effectively in various dental disciplines. [4]

Despite these technological advancements, several studies have indicated a knowledge gap regarding the use and benefits of lasers in dental practice, especially in developing countries. Many practitioners remain hesitant due to inadequate exposure during undergraduate training, concerns about safety, procedural efficiency, and the high cost of laser equipment.[5] In addition, regulatory, institutional, and infrastructural limitations further impede their incorporation into everyday practice. According to Bordea *et al*., students' experience of laser use in dentistry needs to be upgraded and integrated. [6] In a recent survey in India, there is a need to educate and train dental professionals about dental lasers to fully leverage this new technology in future. [7]

Understanding the current level of awareness and acceptability of laser technologies among dental professionals is crucial for promoting evidence-based integration into practice. According to Bagheri and Purkhamene, general dentists in Ardabil have a low level of laser awareness, so raising awareness and informing about laser application is critical.[8] It also highlights areas where professional training and continuing education programs are needed to bridge existing gaps. This questionnaire-based study aims to assess the awareness, perceptions, and acceptability of lasers among dental practitioners, providing insights that can guide curriculum enhancements, training modules, and policy decisions to facilitate the adoption of laser-assisted dentistry.

Materials And Methods

This study was an observational cross-sectional survey aimed at evaluating the level of awareness and the degree of acceptability of LASERS among dental practitioners in India. The entire study was carried out over a 3-month period after approval from the Institutional Ethics Committee (IEC).

Study Population and Sample Size

The target population included registered dental practitioners practicing across various regions of India. The total dentist population considered for this study was based on data from the Dental Council of India. To determine the appropriate sample size, Slovin's formula was used.

The resulting sample size was approximately 400 participants.

Sampling Method

The study used snowball sampling, wherein initial participants were requested to share the questionnaire with other eligible dental professionals. This approach was chosen to ensure wider geographic representation and maximal participation across specialties and experience levels.

Data Collection Tools and Procedure

A self-structured, close-ended questionnaire was used to collect data. The questionnaire was developed in English and formatted digitally using Google Forms (Google Inc., USA). The form was accessed through a unique link and shared with participants via email and WhatsApp.

The questionnaire consists of two sections:

1. Participant Information Sheet and Informed Consent – Clearly outlining the purpose, nature, and confidentiality of the study.
2. Survey Questions – Focused on evaluating participants awareness and acceptability of LASER usage in dental practice.

The questions were validated by a panel of experts from different dental specialties (Periodontology, Pedodontics, and Prosthodontics) to ensure clarity and relevance.

Inclusion and Exclusion Criteria

1. Inclusion Criteria:
    a. Registered dental practitioners in India.
    b. Willingness to participate and provide informed consent.
2. Exclusion Criteria:
    a. Practitioners who do not consent or do not complete the questionnaire.

Data Management and Statistical Analysis

Once data collection was complete, responses were downloaded and compiled into a Microsoft Excel spreadsheet for preprocessing and organization. The data was then be analyzed using SPSS version 20.0.

Volume 9, Issue 4; July-August 2026; Page No 133-141
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1. Quantitative variables (such as age or years of experience) was expressed as mean and standard deviation (SD).
2. Categorical variables (such as awareness or acceptance levels) was expressed as percentages and frequencies.

The results were used to identify patterns and correlations between practitioner demographics and their awareness or attitude toward LASERs.

Results

A total of 400 dental practitioners participated in the study. The sample consisted of 143 males (35.75%) and 257 females (64.25%). The age range of participants extended from 22 to 67 years, with a mean age of 28 ± 6.3 years, indicating that most respondents were relatively young practitioners. Table 1 provides a detailed distribution of participants across different age groups and genders. The table shows that the majority (329 practitioners; 82.3%) belonged to the 20–29-year age group, with females outnumbering males by more than twofold within this category. The 30–39-year group formed the next largest segment (12.3%), while practitioners above 40 years constituted only 5.5% of the sample. Figure 1visually represents this distribution, highlighting the strong predominance of young dental practitioners in the survey.

Regional characteristics of the study population are summarized in Table 2, which outlines the geographical areas where respondents practice. The data reveal that an overwhelming proportion of practitioners (86%) were from Gujarat. Smaller proportions represented Western India (other than Gujarat) at 5.3%, Northern India at 3.8%, Eastern India at 2.8%, Southern India at 1.5%, and Central India at 0.8%. This distribution, illustrated graphically in Figure 2, demonstrates that although the study included participants from various parts of India, the sample was largely Gujarat-centric. The regional concentration may reflect better accessibility or greater interest in LASER-related practices within this region.

Awareness levels regarding LASER use in dentistry are comprehensively presented in Table 3. The findings indicate extremely high general awareness: 99% of participants had heard about LASERs, and 96.3% were aware of their use in dental practice. Additionally, 93.8% acknowledged being aware of the added benefits associated with LASER use. However, familiarity with specific LASER treatment modalities showed a noticeable drop, with only 76.3% reporting adequate knowledge. This suggests that while dentists recognize the value and presence of LASERs in dentistry, gaps remain in their understanding of detailed applications. Figure 3 visually summarizes these awareness-related responses, clearly showing the slight decline in familiarity when moving from general awareness to specific procedural knowledge.

The acceptability of LASERs among dental practitioners was also evaluated through the parameters listed in Table 3, and the results were overwhelmingly positive. A majority expressed willingness to undergo training (95.5%) and incorporate LASERs into daily practice (95.8%). Similarly, 93.8% stated they were willing to invest in LASER equipment for their clinic. Practitioners also demonstrated strong confidence in patient acceptance, with 96.8% willing to educate and encourage patients to opt for LASER-assisted procedures. Furthermore, 96.5% indicated they would charge a premium for LASER-based treatments, reflecting a belief in their added clinical and commercial value. Additionally, 97.5% reported they would encourage colleagues to adopt LASER technology. These acceptability trends, illustrated in Figure 3, highlight an enthusiastic readiness among practitioners to integrate LASERs into contemporary dental care.

Discusssion

The present questionnaire-based study assessed the awareness and acceptability of LASERs among dental practitioners across India. The demographic distribution shows that the sample predominantly consisted of young practitioners, followed by those aged 30–39 years. The gender distribution was also skewed, with a higher proportion of females compared to males. This demographic pattern is consistent with the increasing number of younger graduates entering dental practice and their inclination toward learning newer technologies such as LASERs. As also highlighted in the literature, newly trained dental professionals show a greater inclination toward adopting advanced clinical modalities, which may explain the high level of awareness seen in this age group.[9]

Volume 9, Issue 4; July-August 2026; Page No 133-141
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The regional distribution also indicates that the majority of responses were received from Gujarat, with remaining participants representing other Indian regions. This reflects the sampling method (snowball sampling) and likely high digital connectivity in the Western region. Although regionally skewed, the responses still provide meaningful insight into broader practitioner perceptions across the country. The presence of practitioners from North, Central, South, East, and other Western regions improve the external validity to a considerable extent.

A notable finding of this study is the exceptionally high level of awareness toward LASER technology in dentistry. This aligns with earlier literature, such as Mehdipour et al. (2020)[10] and Luke et al. (2019)[11], which emphasized that dental professionals acknowledge the usefulness of LASERs across various dental specialties. Awareness regarding specific clinical benefits and general LASER use in dental practice further reinforces this trend. However, awareness regarding the different LASER treatment modalities was relatively lower, indicating that while theoretical awareness is high, procedural and wavelength-specific understanding still needs improvement. This observation is consistent with previous studies done by Parthasarathy & Antony (2017)[9], which reported significant variation in practitioners' knowledge based on experience, specialty, and exposure to LASER-based continuing education.

The acceptability responses also demonstrated overwhelmingly positive trends. Most practitioners showed willingness to undergo special training, incorporate LASERs into their daily practice, educate patients about LASER benefits, and encourage fellow practitioners. Additionally, few practitioners expressed willingness to invest in LASER equipment, and few of them were comfortable charging a premium for LASER-based procedures. These findings, clearly reflect a high readiness to adopt LASER therapy in clinical practice.

A striking outcome of this study is the near-universal awareness among practitioners, with 99% of respondents having heard about LASERs and over 96% acknowledging their use in dental practice. Furthermore, a substantial proportion recognized the additional benefits offered by LASER-assisted procedures, such as precision, reduced postoperative discomfort, improved hemostasis, and enhanced healing outcomes. These findings reflect the growing penetration of advanced technologies into dental education and practice, especially among younger clinicians, who formed the majority of the study population.

Despite this encouraging level of awareness, few practitioners reported familiarity with different LASER treatment modalities, highlighting a critical gap between theoretical knowledge and practical understanding. This discrepancy suggests that while LASER technology is widely recognized, comprehensive training in wavelength-specific applications, tissue interactions, and procedural protocols is still insufficient. Such gaps may limit the effective and safe implementation of LASERs in routine clinical practice.

Several factors may explain this favorable attitude. The recent literature strongly supports LASER application in various domains—gingivectomy (Mahmoud et al. 2020)[12], depigmentation (Jha et al. 2017)[13], endodontic disinfection (Parthasarathy et al. 2017)[9], and socket preservation (Krizaj Dumic et al. 2021)[14]. The wide range of applications increases practitioner confidence and enthusiasm toward adopting LASERs. Moreover, young practitioners, who formed the majority in this study, generally show greater readiness to invest in and adopt modern technologies in dentistry.

Despite the high levels of awareness and acceptability, the study highlights subtle gaps that need attention. The lower awareness about specific modalities and wavelength-tissue interactions indicates the need for structured and standardized training programs. Earlier studies have stressed that inadequate exposure to LASER physics, safety measures, and practical handling reduces practitioners' confidence, even when they agree with the clinical advantages. Therefore, incorporation of LASER-focused modules in undergraduate and postgraduate curriculum, along with hands-on training, would address these gaps effectively.

Overall, the findings of this study confirm that Indian dental practitioners—especially younger clinicians—are highly aware and receptive toward LASER-assisted dentistry. The results align well with the existing literature supporting LASERs as an efficient, minimally invasive, and patient-friendly treatment

Volume 9, Issue 4; July-August 2026; Page No 133-141
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modality. The strong willingness to adopt LASERs suggests an optimistic future for LASER-integrated dental practice. However, improved structured training and increased access to certified educational programs are essential to bridge knowledge gaps and translate this positive attitude into routine clinical implementation.

Conclusion

The present questionnaire-based study provides valuable insights into the awareness and acceptability of LASER technology among dental practitioners in India. The findings clearly indicate that while general awareness of LASERs in dentistry is exceptionally high, there remains a noticeable gap in in-depth knowledge regarding specific treatment modalities and clinical applications.

Acknowledgement

We would like to thank our colleagues for their support and helping us throughout the study. We are also grateful for the practitioners for being cooperative and filling up the questionnaire.

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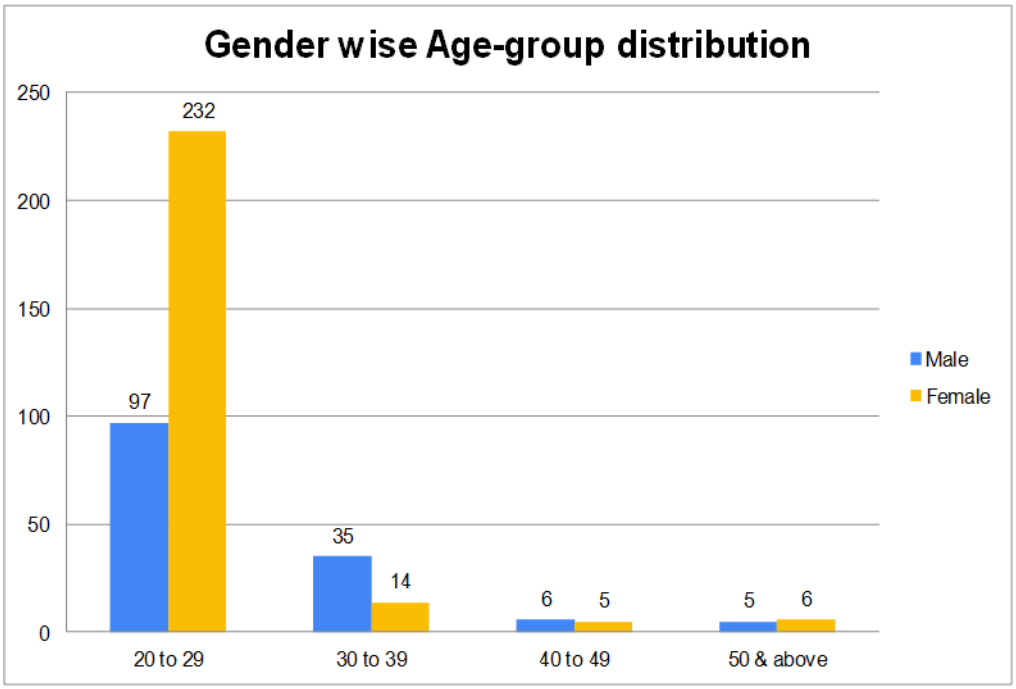
Table 1: Gender wise age group distribution of Dental Practitioners

Age Group (In years)	Male	%	Female	%	Total	%
20 to 29	97	*29.5*	232	*70.5*	329	*100*
30 to 39	35	*71.4*	14	*28.6*	49	*100*
40 to 49	6	*54.5*	5	*45.5*	11	*100*
50 & above	5	*45.5*	6	*54.5*	11	*100*
Total	143	*35.8*	257	*64.3*	400	*100*

Figure 1: Gender wise age-group distribution



Volume 9, Issue 4; July-August 2026; Page No 133-141
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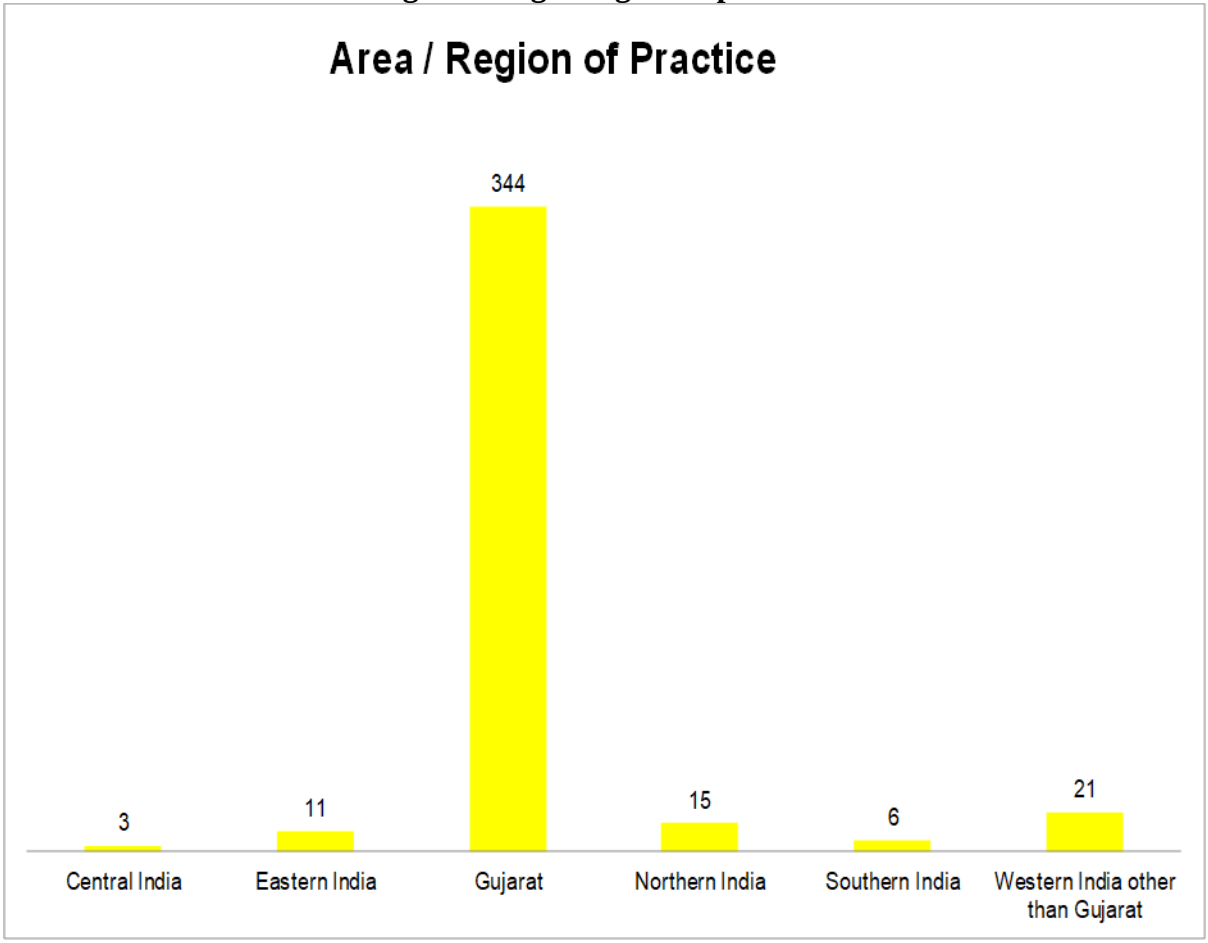
Table 2: Demographic information of Dental Practitioners

Demographic Information		N = 400	(%)
Area/ Region of practice	Central India	3	0.8
	Eastern India	11	2.8
	Gujarat	344	86.0
	Northern India	15	3.8
	Southern India	6	1.5
	Western India other than Gujarat	21	5.3

Figure 2: Age/ Region of practice.



Volume 9, Issue 4; July-August 2026; Page No 133-141
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Table 3: Awareness and Acceptability amongst Dental Practitioners regarding the use of LASERS in Dental Practices

Awareness and Acceptability amongst Dental Practitioners regarding the use of LASERS		N = 400	%
Have you ever heard about LASER?	Yes	396	*99.0*
	No	3	*0.8*
	Not Sure	1	*0.3*
Are you aware about the use of LASER in dental practice?	Yes	385	*96.3*
	No	14	*3.5*
	Not Sure	1	*0.3*
Are you aware of the added benefits of using LASER in dental practice?	Yes	375	*93.8*
	No	19	*4.8*
	Not Sure	6	*1.5*
Have you heard about different treatment modalities by laser?	Yes	305	*76.3*
	No	91	*22.8*
	Not Sure	4	*1.0*
Are you willing to undergo special training for the use of LASER?	Yes	382	*95.5*
	No	14	*3.5*
	Not Sure	4	*1.0*
Are willing to include LASER in your daily dental practice?	Yes	383	*95.8*
	No	9	*2.3*
	Not Sure	8	*2.0*
Are you willing to buy equipment required for treatment by LASER?	Yes	375	*93.8*
	No	15	*3.8*
	Not Sure	10	*2.5*
Will you encourage your patients about using LASER in the treatment?	Yes	387	*96.8*
	No	6	*1.5*
	Not Sure	7	*1.8*
Will you charge a premium for the same treatment after using LASER?	Yes	386	*96.5*
	No	10	*2.5*
	Not Sure	4	*1.0*
Will you encourage your colleagues to use LASER in their daily practice?	Yes	390	*97.5*
	No	2	*0.5*
	Not Sure	8	*2.0*

Volume 9, Issue 4; July-August 2026; Page No 133-141
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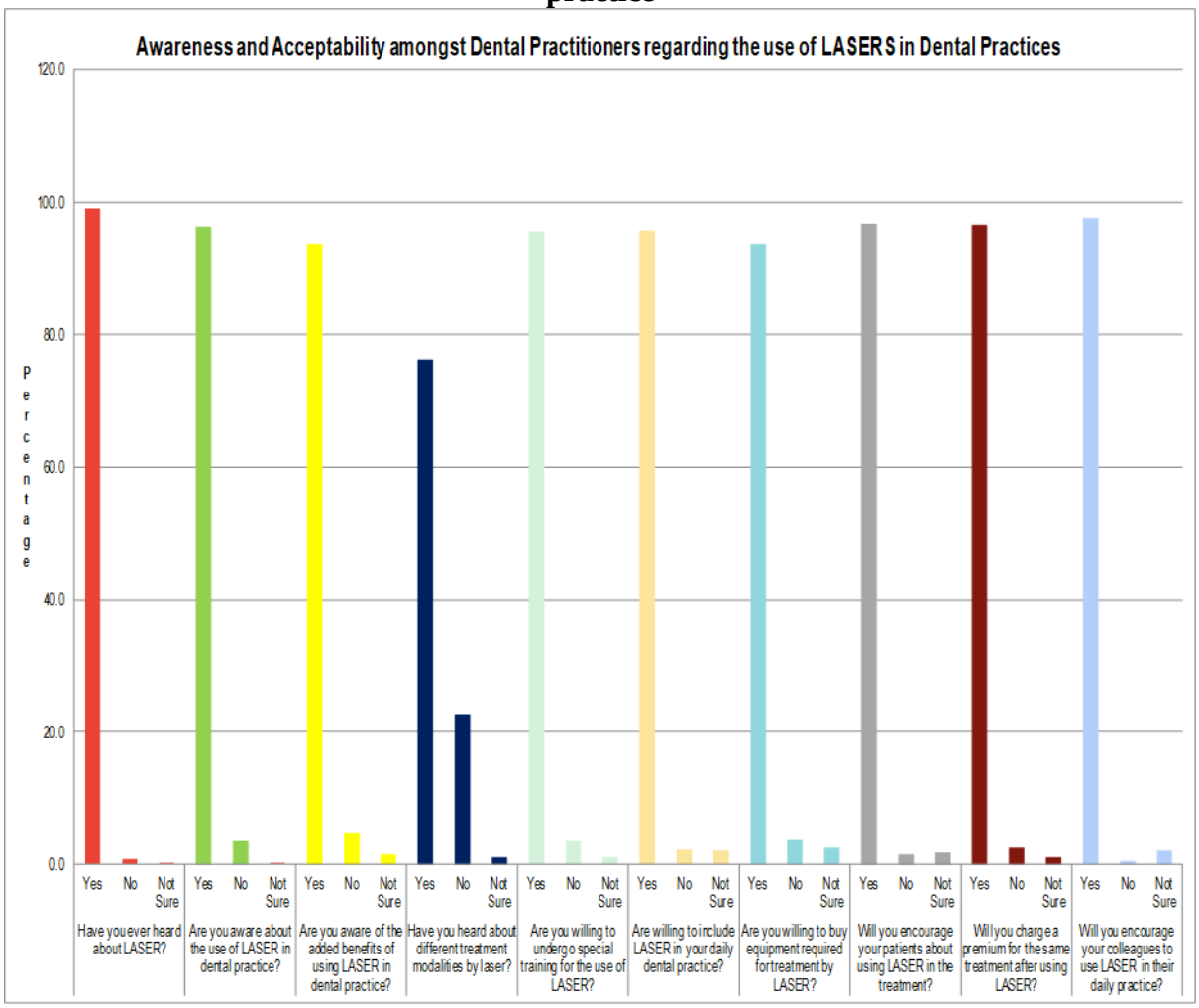
Figure 3: Awareness and acceptability amongst dental practitioners regarding use of lasers in dental practice



Volume 9, Issue 4; July-August 2026; Page No 133-141
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