

# LASERS RELATED KNOWLEDGE AND PRACTICES OF DENTISTS IN RIYADH CITY: A SURVEY-BASED STUDY

Meshari Abdulaziz AlHumaidi<sup>1\*</sup>, Sultan Lafi AlJahdali<sup>1</sup>, Mohammed Khalid Mohammed AlGab<sup>1</sup>, Abdullah Ali Alrizqi<sup>1</sup>, Abdullah Nawaf AlShammeri<sup>1</sup>, Abdulaziz Abdullah AlQarni<sup>1</sup>

<sup>1</sup> Internship Training Department, Faculty of Dentistry, Riyadh Elm University, Riyadh, Saudi Arabia. MESHARY.A.ALHMAUIDI@student.riyadh.edu.sa

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## ABSTRACT

Use of lasers in health profession is not new as it dates back more than 100 years when this technology was first tested by Planck in 1900. Since then, there is no looking back, with these advancements being used in various sectors of health. The present study is a cross-sectional one, that utilized a close-ended questionnaire. The target of this study is the dental professionals of Riyadh city; hence, all dentists with the tendency to participate were required to complete the questionnaire.

After comparison of the responses based on designation, it was indicated that 47% of general practitioners were unsatisfied with their level of knowledge (p-value: 0.023), use of lasers increased with designations (p-value: 0.008), and 55% of consultants believed that not using anesthesia is one of the important reasons to use lasers (p-value: 0.007). Rest of the questions did not result in any significant comparison. Overall knowledge of dental practitioners on laser use was found to be on the lower side.

**Key words:** Knowledge, Dental professionals, Lasers, Dentistry, Practices.

## Introduction

Use of lasers in health profession is not new as it dates back more than 100 years when this technology was first tested by Planck in 1900. Since then, there is no looking back, with these advancements being used in various sectors of health. These include removal of kidney stones in 1960s, tumor ablation, and for the treatment of benign prostate hyperplasia [1, 2].

Dentistry is evolving with the increased incorporation of lasers in this field, with dental specialties such as restorative, endodontics implantology, periodontics and pediatrics being benefited mainly [3]. Several investigations in different parts of the world have been conducted in order to acquire the level of awareness and perception of dentists as far as the application of lasers is concerned. Adequate amount of knowledge was observed among the Indian dental professionals when inquired about the use of various types of lasers and they supported its use in several dental procedures. However, there was a significant difference in the knowledge level among low and high experienced dentists and an overall need of improved training was demanded by some of these study participants [4, 5]. On the other hand, the attitude of Iranian dentists was found to be mixed, as they were more inclined towards the traditional procedures as compared to laser technology [6].

A few other studies have been done to assess the knowledge of dental professionals regarding specific dental procedures. It was noted in one of these studies that the dental professionals although being highly aware of laser use,

showed lower level of attitude towards the use in endodontics. It is now a documented fact that the use of lasers in disinfecting root canals using laser photodynamic therapy is found to be affective [7, 8]. Finally, Brazilian dentists have also supported the efficiency of dental lasers used in detecting caries. Although the use of these measures is restricted to trained dental professionals only, the readiness of these dentists seem to be on the positive side [9].

### Study hypotheses

Dentists in Riyadh have a limited exposure to dental lasers and their knowledge is inadequate as well.

### Aims of the study

- To determine the current practice of Riyadh dentists towards the use of dental lasers
- To determine the knowledge of dentists in Riyadh about the different applications and types of dental lasers
- To compare the findings on the basis of work experience and professional designation
- To assess the factors associated with lack of laser use in dentistry

## Materials and Methods

### Study design

The present study is a cross-sectional one, that applied a close-ended questionnaire.

### Questionnaire design

The researchers constructed the questionnaire online by Google forms. The questionnaire started with questions about demographics, such as gender, educational level, professional designation etc. Moreover, about knowledge level of dental lasers questions were asked, that included various kinds of lasers and their clinical uses, factors influencing using or not using lasers in dental procedures etc.

*Research sample*

The target of this study is the dental professionals of Riyadh city; hence, all dentists with the tendency to participate were required to complete the questionnaire. Totally, 500 Riyadh dentists were aimed to be involved in the present research. The survey was mainly sent by online communication such as social media.

*Validity and reliability of questionnaire*

The experts in research, that included a few faculty members of REU received the questionnaire to confirm its validity. Considering the reliability, a pilot study was performed using 20 online questionnaires completed haphazardly by university students. Cronbach’s coefficient alpha in the Statistical Package for Social Sciences (SPSS) version 19 was used to test the reliability.

*Statistical analysis*

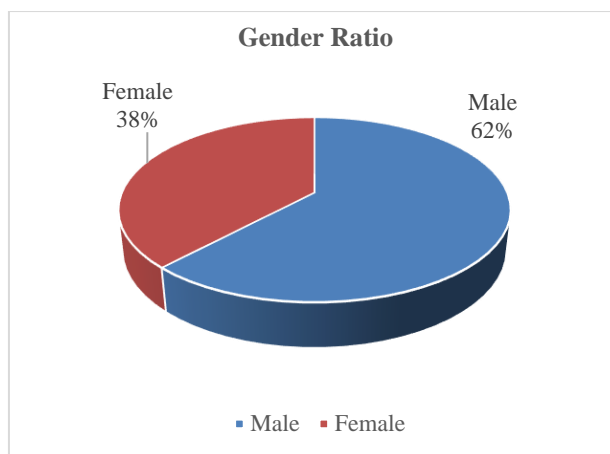
After collection, the data was transferred to SPSS version 19 from Google sheets, where inferential as well as descriptive statistics were carried out. With the significance value kept under 0.05, comparisons were made between the groups .

**Results and Discussion**

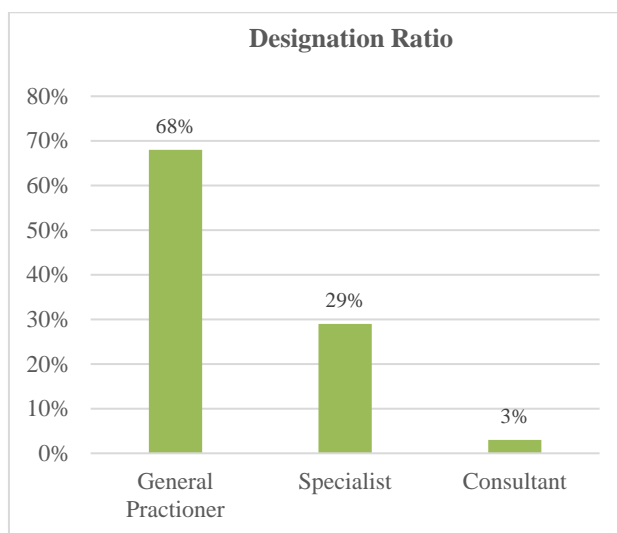
A total of 344 participants filled up the online survey. Grouping of the participants was done based on their gender, which indicated that 62% (n=214) were males and 38% (n=130) were females (**Figure 1**). The participants were also grouped on the basis of their designation, which demonstrated that 68% (n=233) are general practitioners, 29% (n=100) are specialists and 3% (n=10) are consultants (**Figure 2**). Grouping of the participants was also performed based on their experience, which showed that 78% (n=266) have 1-3 years of experience, 16% (n=54) have 4-6 years of experience, 5% (n=16) have 7-10 years of experience and 2% (n=13) have more than 10 years of experience (**Figure 3**). **Table 1** shows the comparison on the basis of gender, **Table 2** compares the specialties and **Table 3** the work experience.

*Validity and reliability of the questionnaire*

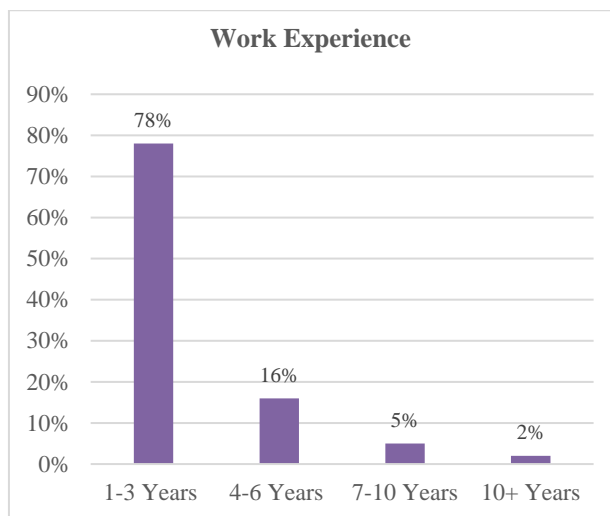
According to the experts in REU, we made minor changes to our questionnaire before we distributed it to the study participants. As far as the reliability is concerned, we performed Cronbach’s coefficient alpha in SPSS and the value retrieved was 0.80, which is acceptable to carry out the data collection after pilot study.



**Figure 1.** Distribution of Study Participants on the Basis of Gender



**Figure 2.** Distribution of Study Participants on the Basis of Designation



**Figure 3.** Distribution of Study Participants on the Basis of Work Experience

**Table 1.** Comparing the Research Participants Based on Gender

Item	Male	Female	P- Value
How do you rate your overall knowledge about dental lasers?	Highly Unsatisfactory 17%	Highly Unsatisfactory 11%	0.217
	Unsatisfactory 41%	Unsatisfactory 76%	
	Neutral 32%	Neutral 27%	
	Satisfactory 7%	Satisfactory 7%	
	Highly Satisfactory 3%	Highly Satisfactory 2%	
Have you been using dental lasers in your practice?	Never Used 80%	Never Used 82%	0.337
	Occasionally Used 14%	Occasionally Used 15%	
	Very Commonly Used 6%	Very Commonly Used 3%	
Have you received proper training to use dental lasers?	Yes 15%	Yes 5%	0.009
Are you aware of the functions of different types of lasers?	Highly Unaware 15%	Highly Unaware 11%	0.200
	Unaware 43%	Unaware 54%	
	Neutral 30%	Neutral 26%	
	Aware 11%	Aware 7%	
	Highly Aware 1%	Highly Aware 2%	
Which laser can be used for soft tissues?	GAALAS (Diode) 40%	GAALAS (Diode) 45%	0.048
	Excimer 17%	Excimer 7%	
	Ruby 16%	Ruby 16%	
	Argon 17%	Argon 15%	
	HO: YAG 10%	HO: YAG 16%	

Which laser can be used for hard tissues?	GAALAS (Diode) 34%	GAALAS (Diode) 29%	0.764
	Excimer 18%	Excimer 19%	
	Erbium 6%	Erbium 6%	
	Argon 20%	Argon 26%	
	Nd: YAG 22%	Nd: YAG 20%	
Lasers can remove caries better and conservatively than hand piece.	Strongly Disagree 10%	Strongly Disagree 3%	0.104
	Disagree 12%	Disagree 12%	
	Neutral 20%	Neutral 18%	
	Agree 53%	Agree 64%	
	Strongly Agree 5%	Strongly Agree 3%	
Lasers can be used as endodontic irrigation better than conventional methods.	Strongly Disagree 12%	Strongly Disagree 4%	0.061
	Disagree 60%	Disagree 65%	
	Neutral 15%	Neutral 21%	
	Agree 11%	Agree 9%	
	Strongly Agree 2%	Strongly Agree 1%	
Which of the following is a BEST REASON TO USE laser in dentistry?	Minimally Invasive 56%	Minimally Invasive 46%	0.053
	Not Harmful for Surrounding Tissues 23%	Not Harmful for Surrounding Tissues 21%	
	No anesthesia Needed 21%	No anesthesia Needed 33%	
Which of the following is the REASON NOT TO USE laser in dentistry?	Not Enough Information 29%	Not Enough Information 16%	0.020
	Procedure is Time Consuming 9%	Procedure is Time Consuming 8%	
	Expensive 62%	Expensive 76%	

Are you interested in receiving proper training of dental lasers?	Definitely, Yes 47%	Definitely, Yes 49%	0.893
	May Be 51%	May Be 49%	
	Definitely, No 2%	Definitely, No 2%	

**Table 2.** Comparing the Research Participants based on Speciality

Item	General Practitioner	Specialist	Consultant	P- Value
How do you rate your overall knowledge about dental lasers?	Highly Unsatisfactory 15%	Highly Unsatisfactory 17%	Highly Unsatisfactory 0%	0.023
	Unsatisfactory 47%	Unsatisfactory 42%	Unsatisfactory 30%	
	Neutral 30%	Neutral 29%	Neutral 50%	
	Satisfactory 6%	Satisfactory 9%	Satisfactory 0%	
	Highly Satisfactory 2%	Highly Satisfactory 3%	Highly Satisfactory 2%	
Have you been using dental lasers in your practice?	Never Used 86%	Never Used 70%	Never Used 80%	0.008
	Occasionally Used 10%	Occasionally Used 25%	Occasionally Used 20%	
	Very Commonly Used 4%	Very Commonly Used 5%	Very Commonly Used 0%	
Have you received proper training to use dental lasers?	Yes 9%	Yes 18%	Yes 10%	0.068
Are you aware of the functions of different types of lasers?	Highly Unaware 14%	Highly Unaware 13%	Highly Unaware 10%	0.520
	Unaware 49%	Unaware 43%	Unaware 30%	
	Neutral 28%	Neutral 27%	Neutral 50%	
	Aware 8%	Aware 13%	Aware 10%	
	Highly Aware 1%	Highly Aware 4%	Highly Aware 0%	

Which laser can be used for soft tissues?	GAALAS (Diode) 45%	GAALAS (Diode) 35%	GAALAS (Diode) 60%	0.372
	Excimer 13%	Excimer 15%	Excimer 0%	
	Ruby 15%	Ruby 20%	Ruby 10%	
	Argon 15%	Argon 19%	Argon 30%	
	HO: YAG 14%	HO: YAG 11%	HO: YAG 0%	
Which laser can be used for hard tissues?	GAALAS (Diode) 34%	GAALAS (Diode) 28%	GAALAS (Diode) 30%	0.104
	Excimer 15%	Excimer 25%	Excimer 20%	
	Erbium 6%	Erbium 7%	Erbium 0%	
	Argon 21%	Argon 24%	Argon 50%	
	Nd: YAG 24%	Nd: YAG 16%	Nd: YAG 0%	
Lasers can remove caries better and conservatively than hand piece.	Strongly Disagree 8%	Strongly Disagree 7%	Strongly Disagree 0%	0.351
	Disagree 11%	Disagree 14%	Disagree 10%	
	Neutral 18%	Neutral 25%	Neutral 0%	
	Agree 59%	Agree 49%	Agree 90%	
	Strongly Agree 4%	Strongly Agree 5%	Strongly Agree 0%	
Lasers can be used as endodontic irrigation better than conventional methods.	Strongly Disagree 10%	Strongly Disagree 8%	Strongly Disagree 10%	0.474
	Disagree 63%	Disagree 61%	Disagree 40%	
	Neutral 18%	Neutral 17%	Neutral 20%	
	Agree 9%	Agree 11%	Agree 30%	
	Strongly Agree 1%	Strongly Agree 3%	Strongly Agree 0%	
Which of the following is a BEST REASON TO USE laser in dentistry?	Minimally Invasive 53%	Minimally Invasive 55%	Minimally Invasive 0%	0.007
	Not Harmful for Surrounding Tissues 20%	Not Harmful for Surrounding Tissues 27%	Not Harmful for Surrounding Tissues 45%	

	No anesthesia Needed 27%	No anesthesia Needed 18%	No anesthesia Needed 55%	
	Not Enough Information 23%	Not Enough Information 27%	Not Enough Information 10%	
Which of the following is the REASON NOT TO USE laser in dentistry?	Procedure is Time Consuming 7%	Procedure is Time Consuming 12%	Procedure is Time Consuming 10%	0.322
	Expensive 70%	Expensive 61%	Expensive 80%	
	Definitely, Yes 52%	Definitely, Yes 40%	Definitely, Yes 40%	
Are you interested in receiving proper training of dental lasers?	May Be 47%	May Be 58%	May Be 50%	0.135
	Definitely, No 1%	Definitely, No 2%	Definitely, No 10%	

**Table 3.** Comparing the Research Participants based on Years of Experience

Item	1-3 Years	4-6 Years	7-10 Years	10+ Years	P- Value
	Highly Unsatisfactory 18%	Highly Unsatisfactory 4%	Highly Unsatisfactory 13%	Highly Unsatisfactory 0%	
	Unsatisfactory 49%	Unsatisfactory 39%	Unsatisfactory 19%	Unsatisfactory 0%	
How do you rate your overall knowledge about dental lasers?	Neutral 26%	Neutral 46%	Neutral 26%	Neutral 56%	0.000
	Satisfactory 5%	Satisfactory 9%	Satisfactory 31%	Satisfactory 14%	
	Highly Satisfactory 2%	Highly Satisfactory 2%	Highly Satisfactory 13%	Highly Satisfactory 30%	
	Never Used 88%	Never Used 60%	Never Used 56%	Never Used 30%	
Have you been using dental lasers in your practice?	Occasionally Used 9%	Occasionally Used 34%	Occasionally Used 25%	Occasionally Used 70%	0.000
	Very Commonly Used 3%	Very Commonly Used 6%	Very Commonly Used 19%	Very Commonly Used 0%	
Have you received proper training to use dental lasers?	Yes 8%	Yes 19%	Yes 38%	Yes 33%	0.000

Are you aware of the functions of different types of lasers?	Highly Unaware 15%	Highly Unaware 8%	Highly Unaware 6%	Highly Unaware 0%	0.000
	Unaware 52%	Unaware 38%	Unaware 18%	Unaware 0%	
	Neutral 25%	Neutral 40%	Neutral 36%	Neutral 43%	
	Aware 7%	Aware 12%	Aware 30%	Aware 43%	
	Highly Aware 1%	Highly Aware 4%	Highly Aware 6%	Highly Aware 14%	
Which laser can be used for soft tissues?	GAALAS (Diode) 45%	GAALAS (Diode) 33%	GAALAS (Diode) 36%	GAALAS (Diode) 29%	0.014
	Excimer 13%	Excimer 21%	Excimer 0%	Excimer 0%	
	Ruby 15%	Ruby 23%	Ruby 21%	Ruby 4%	
	Argon 17%	Argon 15%	Argon 7%	Argon 58%	
	HO: YAG 13%	HO: YAG 8%	HO: YAG 36%	HO: YAG 14%	
Which laser can be used for hard tissues?	GAALAS (Diode) 36%	GAALAS (Diode) 25%	GAALAS (Diode) 0%	GAALAS (Diode) 0%	0.003
	Excimer 16%	Excimer 25%	Excimer 29%	Excimer 33%	
	Erbium 5%	Erbium 6%	Erbium 21%	Erbium 33%	
	Argon 21%	Argon 28%	Argon 43%	Argon 17%	
	Nd: YAG 23%	Nd: YAG 16%	Nd: YAG 7%	Nd: YAG 17%	
Lasers can remove caries better and conservatively than hand piece.	Strongly Disagree 8%	Strongly Disagree 7%	Strongly Disagree 6%	Strongly Disagree 0%	0.712
	Disagree 11%	Disagree 19%	Disagree 12%	Disagree 0%	
	Neutral 18%	Neutral 22%	Neutral 31%	Neutral 15%	
	Agree 59%	Agree 48%	Agree 44%	Agree 70%	
	Strongly Agree 4%	Strongly Agree 4%	Strongly Agree 6%	Strongly Agree 15%	



Lasers can be used as endodontic irrigation better than conventional methods.	Strongly Disagree 8%	Strongly Disagree 9%	Strongly Disagree 25%	Strongly Disagree 0%	0.000
	Disagree 67%	Disagree 52%	Disagree 25%	Disagree 17%	
	Neutral 16%	Neutral 20%	Neutral 25%	Neutral 17%	
	Agree 7%	Agree 19%	Agree 13%	Agree 66%	
	Strongly Agree 1%	Strongly Agree 0%	Strongly Agree 12%	Strongly Agree 0%	
Which of the following is a BEST REASON TO USE laser in dentistry?	Minimally Invasive 52%	Minimally Invasive 56%	Minimally Invasive 40%	Minimally Invasive 43%	0.723
	Not Harmful for Surrounding Tissues 21%	Not Harmful for Surrounding Tissues 26%	Not Harmful for Surrounding Tissues 33%	Not Harmful for Surrounding Tissues 29%	
	No anesthesia Needed 27%	No anesthesia Needed 18%	No anesthesia Needed 27%	No anesthesia Needed 29%	
	Not Enough Information 23%	Not Enough Information 26%	Not Enough Information 31%	Not Enough Information 14%	
Which of the following is the REASON NOT TO USE laser in dentistry?	Procedure is Time Consuming 5%	Procedure is Time Consuming 22%	Procedure is Time Consuming 13%	Procedure is Time Consuming 29%	0.001
	Expensive 72%	Expensive 52%	Expensive 56%	Expensive 57%	
	Definitely, Yes 49%	Definitely, Yes 41%	Definitely, Yes 63%	Definitely, Yes 33%	
Are you interested in receiving proper training of dental lasers?	May Be 50%	May Be 56%	May Be 32%	May Be 67%	0.426
	Definitely, No 1%	Definitely, No 3%	Definitely, No 5%	Definitely, No 0%	

The present research targeted to determine the knowledge and use of laser technology among dentists in Riyadh city. We divided the study population on the basis of gender, designation and work experience. As far as gender comparison was concerned, statistically significant differences were found when inquired about receiving proper training to use dental lasers (p-value: 0.009), type of laser used for soft tissues (p-value: 0.048) and reason for not using lasers in dentistry (p-value: 0.020). All other responses were not statistically significant; therefore, overall no association of gender with laser use and knowledge can be determined. Similar findings were reported by Al-Jobair (2014) who observed no statistically significant relationship between gender and laser-related knowledge [10].

Furthermore, 12% of the study participants reported that they received training for the use of dental lasers. A study conducted by Yadav *et al.* (2018) revealed that 21% of

Indian dental practitioners had received laser treatment training [11]. Another investigation in Iran reported a small percentage of 3% dentists receiving training to use dental lasers [12].

After comparison of the responses based on designation, it was indicated that 47% of general practitioners were unsatisfied with their level of knowledge (p-value: 0.023), use of lasers increased with designations (p-value: 0.008) and 55% of consultants believed that not using anesthesia is one of the important reasons to use lasers (p-value: 0.007). Rest of the questions did not result in any significant comparison.

Finally, the work experience showed some significant differences when inquired about rating their own level of knowledge (p-value: 0.000), current usage of dental lasers (p-value: 0.000), receiving proper training (p-value: 0.000),

being aware of different lasers (p-value: 0.000), lasers for soft tissues (p-value: 0.014), lasers for hard tissues (p-value: 0.003), lasers being used for endodontic treatment (p-value: 0.000) and reason for not using (p-value: 0.001). Varying responses were noted from dentists having less and high work experience.

There is a need to increase the sample size of this study, which is the limitation as well.

### Conclusion

- Overall knowledge of dental practitioners on laser use was found to be on the lower side.
- Gender of the dentists was not associated with the level of knowledge.
- Work designation was also not associated with the level of knowledge.
- Dentists with moderate work experience showed better knowledge levels of laser use.

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**Ethics statement:** None

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