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KNOWLEDGE AND PRACTICES OF DENTAL PROFESSIONALS TOWARDS LASERS IN RIYADH CITY: A SURVEY-BASED STUDY

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ABSTRACT

This cross-sectional survey aimed to assess the Knowledge and Practices of Dental Professionals towards the Use of Lasers in Riyadh City. The study subjects comprised general dentists and specialists/consultants with experience of 1-6 years or more than 6 years. Knowledge and Practices of Dental Professionals towards the Use of Lasers were measured using an eleven-item questionnaire. After ensuring the reliability of the questionnaire, differences across gender, clinical position, and clinical experience were seen using a statistical measure Chi-square through SPSS to determine the statistically significant differences (p<0.05). Findings revealed that 75.5% of participants were male, and 24.5% were female out of the total population. 88.2% of the sample was working as general practitioners and the rest as a specialist, 90% of participants have experience of 1-6 years, and only 10% have more than 6 years of experience. Findings revealed significant differences in knowledge about laser, use of laser, for hard and soft tissues preference. Males prefer GAALAS for hard tissues, while females prefer Ruby. For soft tissues, it was GAALAS and Excimer, respectively. Specialists with experience mark satisfactory knowledge but never used laser in practice as compared to general dentists.

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Introduction

The development of lasers was a significant turning point in dentistry, and many operations are now performed utilizing various types of lasers. Lasers are now used in everyday medical practice. Different criteria may be used to classify lasers, including tissue applicability, lasing medium-solid laser or gas laser, and wavelength. There are two kinds of lasers used in dentistry: those used solely for soft tissue applications and those used for soft and hard tissue applications. For the laser to interact with the particular tissue, a material known as chromophore must absorb the laser beam. Melanin and hemoglobin are chromophores present in tissues. Melanin and hemoglobin are chromophores in soft tissue; while, water, and hydroxyapatite are chromophores in hard tissue [1].

Because of the fast advancement of laser technology in dentistry, students have a practical and theoretical absence of understanding in this sector. According to Iacopino, most new practitioners are tempted to employ the technology they worked and learned throughout their dental training in their daily practice. Because our kids are now part of the millennial age, they must be well-trained to use all of these new technologies. To do this, the institutions that teach them must provide a thorough education by including all of these technologies into their curriculum [2].

There are hard lasers like carbon dioxide (CO2), Neodymium Yttrium Aluminum Garnet (Nd: YAG), an emergency room: YAG that have both hard and delicate tissue applications, however, are restricted by significant expenses and the danger of warm injury to the tooth mash, and cold or delicate lasers dependent on semiconductor diode gadgets that have both hard and delicate tissue applications yet are restricted by significant expenses and the danger of warm injury to the tooth mash. Lasers are recommended for a wide scope of dental and medical procedures because of their effortlessness, effectiveness,

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explicitness, solace, and decreased expense when contrasted with earlier modalities [1]. A few kinds of lasers are utilized in dentistry depending on their frequency reach and ingestion by natural chromophores like water, hemoglobin, melanin, etc. Water ingests CO2 and trauma center YAG lasers, bringing about the shallow entrance, speedy warming, and proficient delicate and hard tissue expulsion. CO2 lasers are usually utilized as laser surgical blades for delicate tissue growth expulsion and, in a defocused mode, for shallow tissue vaporization in the oral pit to treat precancerous sores.

Lasers are rapidly being utilized in dentistry for various treatments such as oral and maxillofacial surgery, pedodontics, periodontics, implant dentistry, conservative dentistry and endodontics, and prosthodontics. With the introduction of these advancements, dental graduates must have a theoretical and practical understanding of lasers. Cross-sectional descriptive research was recently conducted among 94 final-year dentistry students in Riyadh to examine their knowledge and level of education about laser applications [3].

Literature Review

A study in Saudi Arabia on dental students revealed that approximately 87 percent of those polled are familiar with the term "laser." Only 8.5 percent of them believed they had sufficient knowledge of dental lasers. Outside of college, around 11.7 percent have done dental procedures utilizing a dental laser. Most dental understudies are keen on dental lasers and need extra hypothetical and down-to-earth training in this field. Dentistry segments (0.74, 0.7, and 0.63, individually) and the most reduced was accounted for in Endodontic, trailed by Pediatric Dentistry and Periodontics areas (0.12, 0.14, and 0.33). The mean scores of all understudies for everything are displayed in slipping requests. Just 24% of them got P1 and had a proper wide comprehension of dental lasers. About a portion of them had adequate comprehension of the utilization of laser in the oral medical procedure, contrasted with 20% who had pertinent information on Pediatric Dentistry/Orthodontics [3].

Another study in India reported that only 21.43 percent of dentists reported having utilized laser technology. The most often used laser was a diode laser (58.97 percent). The second most popular laser is the Nd: YAG laser, followed by the Er, Cr: YSGG laser. Even among practitioners who used the laser, it was only utilized monthly (26.09 percent) or less than once a month (39.13 percent). Almost two-thirds of respondents had not had any official training before utilizing lasers. The majority of practitioners (56.23 percent) have only 1–8 hours of training. In those who had gotten training, 89 % claimed it came through continuing education classes. In contrast, others said it came from an advanced dentistry program (8.70 percent) or information supplied by sales personnel (4.35 percent). Knowledge of many laser applications in several dental specialties. Periodontics had the highest mean score (0.49), followed by oral surgery (0.48) and operative/esthetic dentistry (0.48). (0.48). (0.41). Endodontics had the lowest rating (0.36), followed by laser safety and pedodontics/orthodontics (0.37) [4].

In India, another research reported that the most commonly recognized laser was Er: YAG, with a correct response rate of 63.7 percent, whereas about 54 percent of respondents were unaware of Er, Cr: YSGG, and 11.7 percent of students believed that diode laser was not a type of laser. When questioned about the types of lasers, 79.8 percent knew about soft tissue lasers, and 67.4 percent knew about hard tissue lasers. Concerning the use of lasers in various areas of dentistry, it was discovered that the applications of which the students were most acquainted were composite curing (72.9 percent), frenotomy (75.4 percent), and soft tissue curettage (75.4 percent). (70.3 percent). Children's behavior management (14.6 percent) and periodontal pocket disinfecting were the applications students had the least understanding (30.8 percent). When the sufficiency of knowledge was determined section by section, pediatric dentistry had the lowest adequacy of knowledge (0.3). In contrast, the students were the most knowledgeable about the applications in oral surgery (0.8). The level of understanding of laser advantages and safety was above satisfactory (>1). When computed per student, an adequate knowledge of laser kinds and advantages was discovered in 82.4 percent and 83.5 percent of pupils, respectively. However, when it came to the use of lasers in many disciplines of dentistry, it was discovered that awareness was insufficient for all other subjects [5].

Another study in Saudi Arabia reported that more than half of those polled agreed to laser technology in their clinics. Lasers are used in dental clinics by less than one-fifth of Taif's dentists. As a result, the use of lasers in dental treatments is uncommon in Taif at the moment. Personal factors such as extra dental credentials and dental specialists had a favorable association with dental lasers in clinical operations. The vast majority of dentists who utilized dental lasers were trained. Taif dentists lacked an in-depth understanding of laser use in dental treatments. The most significant impediment was a lack of educational and training opportunities. The most significant impediment was a lack of educational and training opportunities. In general, Taif practitioners were aware of the benefits of using lasers in dental treatments [6].

Aims of the Study

- To determine the knowledge of dental practitioners towards the use of laser
- To compare the findings based on gender, work experience, and qualification

Materials and Methods

Study Design and Sample: This cross-sectional study was conducted among the dental professionals in Riyadh using an online survey with the participation of 110 dentists

Study Instrument: The study instrument was an online questionnaire consisting of personal and demographic data questions, followed by questions linked to knowledge and perception towards laser use in dentistry.

Instrument Validity and Reliability: A pilot study was conducted by sending the survey to 20 participants. The data was inserted in SPSS version 22 to determine the reliability using Cronbach's coefficient alpha (value: 0.7752). The validity of the questionnaire was tested by sending it to experienced researchers in REU, but no changes were made.

Statistical Analysis: Collected data were analyzed using SPSS version 22, where descriptive and inferential statistics were conducted. A test for normality was conducted, which showed that the data was not normally distributed. Therefore the means were compared using the Mann-Whitney U test, and correlations were achieved using Spearman's correlation test.

Results and Discussion

Table 1. Frequency Table

Questions	Frequency	Percentage
Gender		
Male	83	75.5%
Female	27	24.5%
Work Position		
General Practitioner	97	88.2%
Specialist/consultant	13	11.8%
Clinical Experience		
1-6 years	99	90%
6+ years	11	10%
How do you rate your overall knowledge about dental lasers?		
Highly satisfactory	12	10.9%
Satisfactory	40	6.4%
Neutral	43	39.1%
Unsatisfactory	11	10%
Highly unsatisfactory	04	3.6%
Have you been using a dental laser in your practice?		
Very Commonly	04	3.6%
Occasionally Used	30	27.3%
Never used	76	69.1%
Have you received the proper training to use the dental laser?		
No	20	18.2%
Yes	90	81.8%
Are you aware of the functions of different types of laser		
Highly aware	02	1.8%
Aware	07	6.4%
Neutral	35	31.8%
Unaware	45	40.9%
Highly unaware	21	19.1%
Which laser can be used for hard tissues?		
GAALAS (Diode)	15	13.6%
Excimer	03	2.7%
Ruby	11	10%
Argon	02	1.8%
H.O.:YAG	04	3.6%
Do not know	75	68.2%
Which laser can be used for soft tissues?		
GAALAS (Diode)	15	13.6%
Excimer	08	7.3%
Nd: YAG	10	9.1%
Argon	03	2.7%
Erbium	01	0.9%
Do not know	72	66.4%
The laser can remove caries better and conservatively than hand pieces.		
Strongly agree	09	8.2%
Agree	34	30.9%
Neutral	37	33.6%

Disagree	26	23.6%
Strongly Disagree	04	3.6%
The laser can be used for endodontic irrigation better than conventional methods.		
Strongly agree	01	0.9%
Agree	14	12.7%
Neutral	58	11.8%
Disagree	29	18.2%
Strongly Disagree	08	20.9%
Which of the following is the BEST REASON TO USE laser in dentistry?		
Minimally invasive	53	48.2%
Not harmful for surrounding tissues	13	11.8%
No anesthesia needed	20	18.2%
Not sure	23	20.9%
Which of the following is a REASON NOT TO USE laser in dentistry?		
Not enough information	28	25.5%
The procedure is time-consuming	06	5.5%
Expensive	49	44.5%
Not sure	27	24.5%
Are you interested in receiving proper training in dental lasers?		
Definitely Yes	78	70.9%
May be	31	28.2%
Definitely No	01	0.9%

Table 2. Comparison across Gender

Questions	Male	Female	P-value
Work Position			
General Practitioner	72	25	.414
Specialist/consultant	11	02	
Clinical Experience			
1-6 years	77	22	.089
6+ years	06	05	
How do you rate your overall knowledge about dental lasers?			
Highly satisfactory	10	02	
Satisfactory	36	04	
Neutral	24	19	.001
Unsatisfactory	11	00	
Highly unsatisfactory	02	02	
Have you been using the dental laser in your practice?			
Very Commonly	03	1	
Occasionally Used	22	08	.949
Never used	58	18	
Have you received the proper training to use the dental laser?			.000
No	75	15	
Yes	08	12	
Are you aware of the functions of different types of laser			
Highly aware	01	01	
Aware	05	02	
Neutral	30	05	.290
Unaware	30	15	
Highly unaware	17	04	
Which laser can be used for hard tissues?			
GAALAS (Diode)	09	06	
Excimer	03	00	

Ruby	03	08	.001
Argon	01	01	
H.O.:YAG	03	01	
Do not know	64	11	
Which laser can be used for soft tissues?			
GAALAS (Diode)	08	07	
Excimer	01	07	
Nd: YAG	08	02	
Argon	02	01	
Erbium	01	00	.000
Do not know	63	10	
The laser can remove caries better and conservatively than the handpiece.			
Strongly agree	08	01	
Agree	25	09	
Neutral	28	09	.667
Disagree	20	06	
Strongly Disagree	02	02	
The laser can be used for endodontic irrigation better than conventional methods.			
Strongly agree	00	01	
Agree	08	06	
Neutral	42	16	.029
Disagree	27	02	
Strongly Disagree	06	02	
Which of the following is the BEST REASON TO USE laser in dentistry?			
Minimally invasive	39	14	
Not harmful for surrounding tissues	07	07	
No anesthesia needed	15	05	.021
Not sure	22	01	
Which of the following is a REASON NOT TO USE laser in dentistry?			
Not enough information	22	06	
The procedure is time-consuming	03	03	.495
Expensive	38	11	
Not sure	20	07	
Are you interested in receiving proper training in dental lasers?			
Definitely Yes	61	17	
May be	21	10	.441
Definitely No	01	00	

Table 3. Comparison across Designation

Questions	General Practitioner	Specialist/ consultant	P-value
Gender			
Male	72	25	.414
Female	11	02	
Clinical Experience			
1-6 years	91	08	
6+ years	06	05	.000
How do you rate your overall knowledge about dental lasers?			
Highly satisfactory	12	00	
Satisfactory	34	06	
Neutral	38	05	.602
Unsatisfactory	10	01	
Highly unsatisfactory	03	01	
Have you been using a dental laser in your practice?			
Very Commonly	04	00	.037
Occasionally Used	30	00	

Never used	63	18	
Have you received the proper training to use a dental laser?			.781
No	79	11	
Yes	18	02	
Are you aware of the functions of different types of laser			.029
Highly aware	02	00	
Aware	06	01	
Neutral	26	09	
Unaware	42	03	
Highly unaware	21	00	
Which laser can be used for hard tissues?			.013
GAALAS (Diode)	13	02	
Excimer	01	02	
Ruby	09	02	
Argon	01	01	
H.O.:YAG	03	01	
Do not know	70	05	
Which laser can be used for soft tissues?			.008
GAALAS (Diode)	12	03	
Excimer	08	00	
Nd: YAG	07	03	
Argon	01	02	
Erbium	01	00	
Do not know	68	05	
The laser can remove caries better and conservatively than hand pieces.			.367
Strongly agree	07	02	
Agree	30	04	
Neutral	35	02	
Disagree	21	05	
Strongly Disagree	04	00	
The laser can be used for endodontic irrigation better than conventional methods.			.271
Strongly agree	01	00	
Agree	10	04	
Neutral	52	06	
Disagree	26	03	
Strongly Disagree	08	00	
Which of the following is the BEST REASON TO USE laser in dentistry?			.931
Minimally invasive	46	07	
Not harmful for surrounding tissues	13	01	
No anesthesia needed	17	03	
Not sure	21	02	
Which of the following is a REASON NOT TO USE laser in dentistry?			.304
Not enough information	24	04	
The procedure is time-consuming	06	00	
Expensive	41	08	
Not sure	26	01	
Are you interested in receiving proper training in dental lasers?			.916
Definitely Yes	69	09	
May be	27	04	
Definitely No	01	00	

Table 4. Comparison across Experience

Questions	1-6 years	6+ years	P-value
Gender			.089
Male	77	06	
Female	22	05	

Clinical Designation			
General practitioner	91	06	
Specialist/consultant	08	05	.000
How do you rate your overall knowledge about dental lasers?			
Highly satisfactory	11	01	
Satisfactory	37	03	
Neutral	39	04	.707
Unsatisfactory	09	02	
Highly unsatisfactory	03	01	
Have you been using the dental laser in your practice?			
Very Commonly	03	01	
Occasionally Used	28	02	.498
Never used	68	08	
Have you received the proper training to use the dental laser?			.001
No	85	05	
Yes	14	02	
Are you aware of the functions of different types of laser			
Highly aware	01	01	
Aware	06	01	
Neutral	33	02	.230
Unaware	39	06	
Highly unaware	20	01	
Which laser can be used for hard tissues?			
GAALAS (Diode)	13	02	
Excimer	03	00	
Ruby	07	04	
Argon	01	01	.011
H.O.:YAG	04	00	
Do not know	71	04	
Which laser can be used for soft tissues?			
GAALAS (Diode)	12	03	
Excimer	05	03	
Nd: YAG	10	00	
Argon	02	01	.023
Erbium	01	00	
Do not know	69	04	
The laser can remove caries better and conservatively than the handpiece.			
Strongly agree	09	00	
Agree	30	04	
Neutral	34	03	.636
Disagree	22	04	
Strongly Disagree	04	00	
The laser can be used for endodontic irrigation better than conventional methods.			
Strongly agree	00	01	
Agree	13	01	
Neutral	52	06	.040
Disagree	26	03	
Strongly Disagree	08	00	
Which of the following is the BEST REASON TO USE laser in dentistry?			
Minimally invasive	49	04	
Not harmful for surrounding tissues	10	04	
No anesthesia needed	19	01	.014
Not sure	21	02	
Which of the following is a REASON NOT TO USE laser in dentistry?			
Not enough information	26	02	.007

The procedure is time-consuming	03	03	
Expensive	44	05	
Not sure	26	01	
Are you interested in receiving proper training in dental lasers?			
Definitely Yes	74	04	
May be	24	07	.022
Definitely No	01	00	

In the present study, **Table 1** tells about the frequency percentage of the study; out of the total population, 75.5% of participants were male, and 24.5% were female. 88.2% of the sample was working as general practitioners and the rest as a specialist, 90% of participants have experience of 1-6 years, and only 10% have more than 6 years of experience. 39.1% rated their knowledge about laser as neutral, and only 10.9% rated it as highly satisfactory. Most of them never used a laser, and 27.3% use it occasionally. 81.8% of them have properly got training to use the laser, while 40.9% are unaware of the different functions of different laser types. 68.2% do not know which laser is used for hard and soft tissues, and 13.6% think GAALAS. 33.6% were neutral on the removal of caries better with laser, and for endodontic irrigation, 20.9% strongly disagree. The best reason to use a laser is minimally invasive for 48.2% of the participants, while being expensive is the best reason not to use it for 44.5% of the population. 70.9% of participants are interested in getting training about dental lasers. **Table 2** tells about gender differences as follows, the majority of participants from both gender were general practitioners having experience of 1-6 years. Male participants rated their knowledge about laser as satisfactory, while females rated it as neutral. Male occasionally used laser while females mostly never used it in their practice. The majority of both have received training about lasers. Both were unaware of different types of laser about their functions. Male thought GAALAS was the most appropriate choice for hard tissues while females thought Ruby was good. For soft tissues, males thought GAALAS and Nd: YAG beneficial while females think GAALAS and Excimer good. They were neutral about endodontic irrigation, and the best reason to use laser was minimally invasive for participants of both groups. The reason behind not using it is the expenses of laser, and both are interested in getting laser training. **Tables 3 and 4** explains differences across experience and designation.

The presentation aimed to examine dentists' knowledge and practice towards the use of lasers in dental practice. Descriptive statistics were used to check the findings using Chi-square as the main analysis, while frequency statistics were also checked. In the first Table, the frequency percentage of the study is reported. Results revealed that 75.5% of participants were male, and 24.5% were female. 88.2% of the sample was working as general practitioners and the rest as specialists, 90% of participants have experience of 1-6 years, and only 10% have more than 6 years of experience. 39.1% rated their knowledge about laser as neutral, and only 10.9% rated it as highly satisfactory. Most of them never used a laser, and 27.3% use it occasionally. 81.8% of them have properly got training to use the laser, while 40.9% are unaware of the different functions of different laser types. 68.2% don't know which laser is used for hard and soft tissues, and 13.6% think GAALAS. 33.6% were neutral on the removal of caries better with laser, and for endodontic irrigation, 20.9% strongly disagree. The best reason to use a laser is minimally invasive for 48.2% of the participants, while being expensive is the best reason not to use it for 44.5% of the population. 70.9% of participants are interested in getting training about dental lasers. A previous study reported that most dental students (91.5 percent) did not get enough dental laser training. In general, the majority (76%) of dental students lacked an understanding of the use of lasers in dentistry. Students' knowledge of dental laser applications in Oral Surgery and Operative Dentistry was superior to Periodontics, Pediatric Dentistry/Orthodontics, and Endodontics [3].

In **Table 2**, gender differences are reported and revealed that most participants from both genders were general practitioners with experience of 1-6 years. Male participants rated their knowledge about laser as satisfactory, while females rated it as neutral. Male occasionally used laser while females mostly never used it in their practice. The majority of both have received training about lasers. Both were unaware of different types of laser about their functions. Male thought GAALAS was the most appropriate choice for hard tissues while females thought Ruby was good. For soft tissues, males thought GAALAS and Nd: YAG beneficial while females think GAALAS and Excimer good. About endodontic irrigation, they were neutral, and the best reason to use laser was minimally invasive for participants of both groups. The reason behind not using it is the expenses of the laser, and both are interested in getting laser training. A previous study held in India reported that approximately 21.43 percent of dentists reported utilizing laser technology. The most often used laser was a diode laser (58.97 percent). The second most popular laser is the Nd: YAG laser, followed by the Er, Cr: YSGG laser. Even among practitioners who utilized laser, it was only used once a month (26.09 percent) or less than once a month (39.13 percent). Almost two-thirds of those polled had received no formal instruction before using lasers. The majority of practitioners (56.23 percent) have only 1–8 hours of training. In those who had attended the training, 89 percent said they had acquired it through continuing education classes.

In contrast, others said they had received it through an advanced dentistry program (8.70 percent) or information supplied by sales personnel (4.35 percent). Approximately 60.9 percent of respondents felt there was a need for laser education in India, and 40.11 percent said combining dental laser education with undergraduate courses might be useful. Approximately 42.3

percent of practitioners thought that theoretical and practical approaches should be used concurrently to teach and raise knowledge about dental lasers, understanding the different applications of lasers in dentistry's numerous specializations [4].
In subsequent analysis, differences across clinical designation were examined and reported in **Table 3**. Findings revealed that general practitioners and specialists both have 1-6 years of experience. Specialist rates their knowledge as satisfactory, while general dentists hold a neutral view about this. Specialists have never used a laser in their career, while general dentists have used it occasionally, and a few used it very commonly. Both groups have received training, and a few are aware of different types of the laser and their functions, while most of the general dentists are unaware, but specialists are aware of it. Specialists do not know which laser is good for hard tissues and soft tissues, but general dentists think GAALAS is a good choice for both types of tissues. Specialists do not agree that laser can remove caries better, and general dentists have a neutral view. On endodontic irrigation, both have a neutral opinion. Specialists think no need for anesthesia makes laser a good choice to use, while other groups believe minimally invasive is the reason. According to both groups, being expensive is a bad side of a laser, and they are interested in getting training. Bordea *et al*. carried out research in 2016 to assess the knowledge of 219 dental students. In that study, which was performed through the distribution of a questionnaire identical to the one used in Al-study, Jobair's the same questions as in the current study were asked, including numerous types of lasers, education on fundamental laser principles, and the negative effects of using lasers. Similar findings to the current study were found [7, 8].
In the last analysis, differences across clinical experience were tested and mentioned in **Table 4**. Findings reported that those with higher experience rated their knowledge as neutral while lesser experienced reported as satisfactory. Most highly experienced participants never used a laser in their practice, while others occasionally used it. Most of the participants from both groups were unaware of the different functions of the laser. At the same time, GAALAS was the choice of the lesser experienced group and Ruby of other groups. Both groups thought minimally invasive and not harmful to other tissues as the best reason and expensive for not using it. Both agree on getting training further. Previous research reported that the most often used laser was a diode laser (58.97 percent). The second most popular laser is the Nd: YAG laser, followed by the Er, Cr: YSGG laser. Even among practitioners who used the laser, it was only utilized monthly (26.09 percent) or less than once a month (39.13 percent). Almost two-thirds of respondents had not had any official training before utilizing lasers. The majority of practitioners (56.23 percent) have only 1–8 hours of training. In those who had gotten training, 89 % claimed it came through continuing education classes. In contrast, others said it came from an advanced dentistry program (8.70 percent) or information supplied by sales personnel (4.35 percent). Knowledge of many laser applications in several dental specialties. Periodontics had the highest mean score (0.49), followed by oral surgery (0.48) and operative/esthetic dentistry (0.48). (0.48). (0.41). Endodontics had the lowest rating (0.36), followed by laser safety and pedodontics/orthodontics (0.37) [4].

Conclusion

The present study was aimed to assess the knowledge and practice of dentists towards the use of lasers. Chi-square was used as the main analysis tool through SPSS. Findings reported that most participants were male, practicing as general dentists and having experience of 1-6 years. Results revealed significant differences in knowledge about laser, use of laser, for hard and soft tissues preference. Male prefer GAALAS for hard tissues while females prefer Ruby. For soft tissues, it was GAALAS and Excimer, respectively. Specialists having experience mark satisfactory knowledge but never used laser in practice as compared to general dentists.

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