



The Use of Magnifying Loupes among Dental Professionals

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ABSTRACT

Aim: The study aims to determine the perspective of dental professionals towards magnifying loupes and the selection criteria used while purchasing them.

Materials and methods: In this regard, a close-ended questionnaire was structured and distributed among 111 dental professionals. The questionnaire was designed to obtain information regarding the usage of magnifying loupes in dental practices and procedures, limiting factors, and selection criteria for purchasing. The results obtained from this study were statistically analyzed with the help of SPSS.

Results: The findings illustrated that most respondents considered the use of magnifying loupes beneficial in dental practices. Also, 20.7% of them preferred "Through-the-Lens" magnifying loupes over "Flip-up" ones.

Furthermore, many of the respondents considered that price, magnification, and resolution are the main factors in terms of selection criteria.

Conclusion: Although, there is an immense growth seen in the usage of magnifying loupes in dentistry; still there is a need to increase the awareness of the dental professionals regarding the positive outcomes of magnification aids in dentistry.

Clinical significance: The study will help enlightening clinicians regarding the selection criteria while purchasing magnifying loupes for dental practices.

Keywords: Dentists, Loups, Magnification, Magnifying loupes, Vision.

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INTRODUCTION

The use of magnifying loupes is increasing among dental practitioners during their clinical work, and dental trainees are being trained to wear them during their practice as well. It is essential for dentists to have good-eye coordination with theoretical and clinical skill to restructure unsuccessful dentition with immense success. Thereby, a clear magnified field of vision, facilitating early detection of soft and hard tissue pathology is required for such inherent work. Innovation in endodontics excels with newer devices and borrowing operative devices from allied surgical fields.¹ Easier detection and accessibility is provided through a magnified field for difficult-to-find endodontic canals and to enhance the entire consequence of the dental treatment endowed.

Despite using high-powered loupes and microscopes by specialists in restorative and endodontic dentistry, it is essential to encourage the use of magnifying loupes among all dental professionals to enhance their clinical outcomes as well as posture. Certain benefits have been observed with the use of magnification devices in dentistry such as increased aided vision, improved quality of work, and better treatment outcomes. Similarly, the prevalence of musculoskeletal injuries among dental professionals is another immense concern. It is theoretically deemed that operating without loupes have shown a visual disadvantage and may put in chronic musculoskeletal issues due to poor posture.² Furthermore, there is a dearth of quantitative and evidence-based studies, embodying the use of magnifying loupes in dentistry.

Since vision and physiologic posture are two important reasons that show its significance in the dentistry; the novelty of this study aims to assess the extent of use of magnifying loupes among dental professionals. It will focus on the benefits and challenges experienced by dental practitioners in using magnifying loupes. Moreover, this study will assess the factors that influence the selection criteria while purchasing magnifying loupes among dental professionals.

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MATERIALS AND METHODS

A quantitative research design was adopted to assess the use of magnifying loupes among dental professionals. A self-structured questionnaire was designed to collect information from 111 dental professionals working in Jeddah city, Saudi Arabia governmental hospitals. The questionnaire extracted information about the use of magnifying loupes in dental settings, its preference, choice of selection and selection criteria. Data analysis was accomplished using the Statistical Package for Social Sciences (SPSS) version 20. A descriptive analysis was used for presenting the frequencies and demographics of enrolled participants. Similarly, paired sample t-test was also used to compare the differences between both male and female dental professionals toward the use of magnifying loupes.

RESULTS

For this study, data were collected from 111 dental professionals. The findings illustrated that 81.1% of these

professionals were less than 35 years of age. Whereas, only 14.4% of them aged between 35 to 50 years. Only five participants were above 50 years old of age. Also, 53.2% of the respondents were males and 46.8% were female dental professionals. In terms of education, 64.9% of the professionals were general dentists, whereas 18% of them were consultants, and 14.4% were postgraduate's trainee. There was a lower percentage of respondents, who were specialists. Furthermore, 60.4 % of the general dentists practice general dentistry whereas, two of them were working in the endodontic department as demonstrators and 3 were working as demonstrators in the esthetic and restorative department. 12.6% and 11.7 % practice endodontics and prosthodontics respectively (Tables 1 and 2).

This study illustrated that only 32.4 % of the participants use magnifying loupes, 20.7% of the respondents preferred using "Through-the-Lens" loupes; whereas, 11.7% preferred the "Flip-Up" ones. However, 67.6% of respondents told that they do not use any magnification loops. 26.1% of the participants use 2.5x–3x magnification, while 14.4 % uses 3.5x–4x magnification. Moreover, 13.5% of participants started using loupes during general practice; whereas, 9.9% of them illustrated that they started using loupes during their postgraduate training. In addition, 22.5% respondents illustrated that they use magnifying loupes only when needed and 11.7% of them told that they use loupe all the time in dental practices (Table 3).

When the respondents were asked about inconvenience in terms of wearing magnifying loupes, 45% of them did not find the usage of dental loupes as an inconvenient practice whereas, 50.5% respondents did not give their opinion about it. In addition, 39.6% of them did not consider positional adjustment as a limiting factor; however, only 9.9% respondents thought that loupe

Table 1: Demographics

Age group	N	%
<35	90	81.1
35–50	16	14.4
>50	5	4.5
Gender		
Male	59	53.2
Female	52	46.8
Educational Level		
Consultant	20	18
Specialist	3	2.7
Postgraduate Resident	16	14.4
General Dentist	72	64.9
Specialty		
General Dentistry	67	60.4
Restorative Dentistry	8	7.2
Prosthodontics	13	11.7
Endodontics	14	12.6
Periodontics	7	5.4
Pediatric Dentistry	2	1.8

Table 2: Specialty practice

Specialty	Level of Education			
	Consultant	Specialist	Postgraduate resident	General dentist
	N 20	3	16	72
General Dentistry	67	0	0	67
Restorative Dentistry	8	3	2	0
Prosthodontics	13	7	0	6
Endodontics	14	6	0	6
Periodontics	7	2	1	4
Pediatric Dentistry	2	2	0	0

Table 3: Usage of loupes

Type of Loupe	N	%
Flip up	13	11.7
Through the lenses	23	20.7
Do not use any	75	67.6
Magnification		
2.5x – 3x	29	26.1
3.5x – 4x	16	14.4
5x - 6x	1	0.9
Missing	75	67.6
Start using Loupes		
During undergrad	9	8.1
During GP	15	13.5
During Specialty	11	9.9
After Specializing	2	1.8
Longevity of using Loupes		
All the time	13	11.7
Sometimes if needed	25	22.5

provides positional difficulty and 17.1% think that magnifying loupes are heavy in weight. Similarly, 34.2% of them did not think that dental loupes restrict field view; whereas, 50.5% of participants did not fill this field. Moreover, 46.8% of these respondents did not find magnifying loupes as a mean to impact neuromotor skills. Furthermore, 39.6% of these respondents revealed that they are not comfortable if Magnifying Loupes were combined with eyeglasses but only 9.9% of them illustrated that they are totally comfortable in wearing loupes with glasses (Table 4).

Besides, participants were asked about the reasons because of which they do not use magnifying loupes. Result demonstrated that 82.9% of the respondents did not consider weight as a factor for not using dental loupes; whereas, only 16.2% of them considered loupe weight to be of concern. Furthermore, 74.8% of respondents did not consider dental loupes as a mean of discomfort; however, 24.3% of these respondents considered wearing loupes discomforting. Also, 70.3% of these participants did not consider lack of training as a reason for not using magnifying loupes in their practices; whereas, 28.8% of them did think that lack of training is the key reason why they do not opt for dental loupes. Moreover, 22.5% of these respondents believed that dental loupes are expensive, but 76.6% of them did not consider cost a limiting factor. The findings also illustrated that, 78.4% of these respondents showed interest in trying them out whereas, 20.7% of them stated that they are not interested

in using magnifying loupes in their dental procedures. Furthermore, 94.65% of these respondents considered the usage of loupe as beneficial in terms of dentistry whereas, only 4.5% of them did not find them beneficial (Table 5).

Additionally, the participants were asked about what factors they keep in consideration while purchasing magnifying loupes. The findings illustrated that 45.9% considered price as a reason before purchasing loupe; whereas, 52.3% of them did not find cost as a problem. Moreover, 73.9% of them stated that they do not keep the depth of field into consideration while going about purchasing dental loupes whereas, 24.3% of them consider the depth of field a requirement. Furthermore, 63.1% of the respondents consider magnification as a key term before buying dental loupes. However, 35.1% stated that they do not pay much attention to magnification. 43.2% of the respondents consider resolution check before purchasing magnifying loupes whereas, 55% do not. Lastly, the respondents were asked if they consider patient-dentist distance adjustment among various selection criteria. For which 66.7% of them stated that they do not consider patient-dentist distance before buying loupes but on the contrary, 31.5% did state that they consider patient-dentist distance before purchasing (Table 6).

Results obtained from t-test illustrated that male and female professionals with the standard deviation (SD) as 0.910 and 0.862, respectively, did not show significant association with usage of magnifying loupes, having

Table 4: Limitation of dental loupes

<i>Inconvenience</i>	<i>N</i>	<i>%</i>
No	50	45.0
Yes	5	4.5
Missing	56	50.5
<i>Position Difficulties</i>		
No	44	39.6
Yes	11	9.9
Missing	56	50.5
<i>Heavy Weight</i>		
No	36	32.4
Yes	19	17.1
Missing	56	50.5
<i>Restricted field of view</i>		
No	38	34.2
Yes	17	15.3
Missing	56	50.5
<i>Needs fine neuromotor Skills</i>		
No	52	46.8
Yes	3	2.7
Missing	56	50.5
<i>Not comfortable with eye glasses</i>		
No	44	39.6
Yes	11	9.9
Missing	56	50.5

Table 5: Reasons for not using dental loupes

<i>Heavy Weight</i>	<i>N</i>	<i>%</i>
No	92	82.9
Yes	18	16.2
Missing	1	0.9
<i>Discomfort</i>		
No	83	74.8
Yes	27	24.3
Missing	1	0.9
<i>Inadequate training</i>		
No	78	70.3
Yes	32	28.8
Missing	1	0.9
<i>Expensive</i>		
No	85	76.6
Yes	25	22.5
Missing	1	0.9
<i>Not interested</i>		
No	87	78.4
Yes	23	20.7
Missing	1	0.9
<i>Not Beneficial</i>		
No	105	94.6
Yes	5	4.5
Missing	1	0.9

p-value as 0.633. Also, male professionals with SD as 0.990 and female professionals with SD as 0.488 did not illustrate significant reliance on the longevity of using loupes with p-value as 0.151. However, male and female respondents, with SD as 0.503 and 0.414 respectively, showed significant association in regard of when to use magnifying loupes, having p-value as 0.008, at 5% level of significance (Table 7).

DISCUSSION

Over the last decade, magnifying loupes have been immensely popular among dental professionals. A study was conducted with a purpose to investigate the prevalence, attitude, and awareness regarding the use of magnification devices among dental practitioners in the state of Andhra Pradesh. The findings revealed that 91.1% of the respondents were aware of the usage of magnification devices in dentistry as well as they were well-informed about the different types of magnifying devices that are used in various dental procedures.³

Similarly in the current study, whereas, a lot more participants were aware of the usage of magnifying devices in dentistry, the actual implementation of these devices was very low. Only 32.4% of the participants actually use magnifying loupes. Thereby, it is important to identify and assess the factors influencing the selection criteria of dental professionals in using magnifying loupes.

Penmetsa et al. participants’ stated that they considered the devices to be very expensive.³ Farook et al. participants’ stated that price was the key factor before purchasing loupes. In the current study, magnification was the key factor to be considered by the participants followed by price before purchasing any magnifying loupe. Most of UK respondents, as well as Saudi respondents, opted for 2.5x. Whereas, both UK dental trainers and trainees as well as Saudi participants preferred through-the lens type.²

A study was conducted to determine the co-axial alignment of surgical loupes, which is responsible for the adjustment of several optical systems. Results revealed a higher prevalence of co-axial misalignment among dental professionals who wear Front-lens mounted. Through-the-lens surgical loupes are more likely to be out of co-axial alignment. Another reason to advocate the preference in using a through-the-lens type of magnifying loupes. The study further suggested that surgical magnification tends to help dental professionals in making more informed decisions.⁴

James and Gilmour reviewed the well-documented medical literature for assessing the use of loupes in dentistry. They recommended dental practitioners to wear magnifying loupes for presenting better clinical outcomes, reduce eyestrain and musculoskeletal comfort. Moreover, they demanded more controlled studies to provide the profession with more evidence on which to base these recommendations.⁵ However, the adoption of magnifying loupes into practice requires an adjustment period. Therefore, Hayes et al. have asserted to adopt magnifying loupes during training.⁶ Nowadays, many dental schools worldwide are encouraging their undergraduates and postgraduates to use magnification tools whilst training without strong scientific evidence.⁷ A recent study was conducted to examine the usage of loupes among trainees and dental trainers and what

Table 6: Reasons to consider when purchasing a Dental Loupe

Price	N	%
No	58	52.3
Yes	51	45.9
Missing	2	1.8
<i>Depth of Field</i>		
No	82	73.9
Yes	27	24.3
Missing	2	1.8
<i>Magnification</i>		
No	39	35.1
Yes	70	63.1
Missing	2	1.8
<i>Width of field</i>		
No	80	72.1
Yes	29	26.1
Missing	2	1.8
<i>Resolution</i>		
No	61	55.0
Yes	48	43.2
Missing	2	1.8
<i>Patient-dentist distance</i>		
No	74	66.7
Yes	35	31.5
Missing	2	1.8

Table 7: Paired sample t-test analysis

	Gender	N	Mean	Std. deviation	Std. error mean	Significance
Start using loupes	Male	21	2.14	0.910	0.199	0.633
	Female	15	2.20	0.862	0.223	
Longevity of using loupes	Male	22	1.86	0.990	0.211	0.151
	Female	15	1.67	0.488	0.126	
When to use loupes	Male	22	1.59	0.503	0.107	0.008
	Female	15	1.80	0.414	0.107	

factors influence their choice of selection. The findings revealed that loupes are more common among dental trainers than trainees as well as in the current study. Only 1.8% of the participants stated using magnifying loupes after specialization. Both studies further suggested that the usage of loupe among both users is still low.² Reduction in price and training undergraduates and postgraduates to use magnification devices during practice could ensure enhancement in the number of loupes users.

Narula, et al. evaluated the effects of dental magnification loupes usage during class II cavity preparation in a preclinical setting on psychomotor skills. Chi-square analysis has indicated that magnifying loupes are beneficial for dental practitioners during teeth preparation. However, participants expressed difficulty in using magnifying loupes during the tooth preparation as it was used for the first time.¹

Corbella, et al. investigated the clinical and patient-centered consequences of supragingival scaling by using magnifying loupes and illumination. Full-mouth bleeding score and full-mouth plaque score percentage were measured for pre and post-treatment and the differences between the investigated parameters were measured through statistical analysis. The results have shown a reduction of full-mouth bleeding score and full-mouth plaque score percentage due to supragingival scaling. A significant difference was seen in the group where magnifying loupes and illumination were used than the control group.⁸

The usage of magnifying loupes in dentistry usually comes into being where higher visual performance is required. Dental practitioners are taking more interest in using magnifying loupes in their practices. A study determined the latest trends in technological armamentarium in endodontic treatment among Brazilian endodontists revealed that 67.38% of endodontists utilized magnification tools in which 23.66% of them use magnifying loupes in their practices.⁹ Wong et al. have compared the time needed for performing non-surgical endodontic therapy with or without a magnifying loupe. Ninety-six patients, who required non-surgical root canal treatment, were treated by two dentists from the University of Hong Kong and two dentists from Peking University. Results obtained from analysis of covariance (ANCOVA) revealed that several factors including the use of a magnifying loupe are associated with the treatment time.¹⁰ Jain et al. have emphasized the effectiveness of the removal of the broken instrument from the middle third of the root canal using ultrasounds and magnifying loupes. Therefore, the use of magnifying loupes in root canal treatment can be of immense importance for dental surgeons and practitioners.¹¹

The musculoskeletal disorder is considered an occupational health issue in accordance with dental care. The usage of magnifying loupes is often promoted as an ergonomic solution. Ludwig deliberately assessed the use of magnification loupes in dentistry to minimize posture injuries during instrumentation and to improve clinical outcomes. The findings have shown a significant difference in mean fluctuations while wearing loupes. It was determined by 67% participants that magnification loupes enhanced their posture.¹² Another study investigated the influence of magnification on the work posture of dentists. Results showed a significant contribution of magnification in the maintenance of ergonomic work posture in association with dentistry.¹³

Hayes et al. have investigated the impact of using magnifying loupes on neck disability and pain among dental hygienists. An exploratory pre-test and post-test design were used to compare musculoskeletal measures among dental hygienists using loupes. The results have shown minor improvements in the deep neck muscle and cervical range of motion due to the use of magnifying loupes.¹⁴

Wearing magnifying loupes tends to have both negative and positive outcomes in terms of physical well being.¹⁴ A study was conducted to determine the opinions of dental hygienists regarding wearing magnifying loupes. Accordingly, 71% of the respondents illustrated that wearing magnifying loupes enhances the quality of their work. Whereas, according to 50% of the respondents, magnifying loupes are not easily adjustable with limited vision, and result in vertigo and headache. The study further revealed that magnifying loupes are beneficial, but there are certain limitations as well.¹³ The current study revealed that the main limitation in using magnifying loupes is their heavyweight. Also, restricted field of view and positional difficulty are considered limiting factors.

CONCLUSION

The area of dentistry is evolving with the advancement in technology and therefore, there is an increased awareness among practitioners regarding new methods of treatment. However, complete adoption and implementation of these methods are still in its infancy. The study aimed to highlight the importance of using magnification loupes and increases awareness among clinicians to adopt magnification loupes in their daily practices. Magnifying loupes in dentistry tends to enhance visualization as it ensures proper decision making regarding dental procedure and practices.

Moreover, dental loupes tend to ensure maintenance of work posture among dental professionals. There is an immense growth seen in dentistry regarding wearing

magnifying loupes especially among qualified general practitioners and newly graduates. This study was conducted to determine different viewpoints of dental professionals in terms of the usage of dental loupes in their practices and what factors do they keep in mind before purchasing dental loupes. Similarly, it is also developed to attain information regarding their selection criteria. However, further research is required to find out the effectiveness of dental loupes in different areas of dentistry and its implementation during dental training

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Use of Magnification Tools Among Dental Society

1. Please mark your age group
 - < 35 years
 - 35-50 years
 - > 50 years
2. Gender
 - Female
 - Male
3. Are you a/an:
 - Professor
 - Associate professor
 - Consultant
 - Postgraduate resident
 - Interns
 - Assistant professor
 - Specialist
 - Demonstrator
 - General dentist
 - Undergraduate dental student
4. What is your specialty?
 - General dentist
 - Restorative dentist
 - Endodontist
 - Pedodontist
 - Orthodontist
 - Prosthodontist
 - Periodontist
 - Oral maxillofacial surgeon
5. What type of magnification do you use:
(choose more than one answer if applicable)
 - Magnification loupes
 - Magnification loupes with light source
 - None (if this is your answer, skip to Q11)
6. If you use loupes, what type do you prefer:
 - Flip up
 - Through the lens
7. What is the magnification of the loupes you use?
 - 2.5x - 3x
 - 3.5x- 4x
 - 5x -6x
8. When did you start using loupes?
 - During undergraduate training
 - During general dentist practice
 - During specialty
 - After specializing
9. If you use loupes, when do you use it?
 - All the time
 - Sometimes if needed
10. What are the limitations of using dental loupes?
(Choose more than one answer if applicable)
 - Inconvenience
 - Positional difficulties
 - Heavy weight
 - Restrict field of view
 - Needs fine neuro-motor skills
 - Not comfortable with eyeglass
11. What are the reasons of not using/ stopped using dental loupes?
(Choose more than one answer if applicable)
 - Heavy weight
 - Inadequate training
 - Not interested
 - Discomfort
 - Expensive
 - Not beneficial
12. If you have never used loupes, how likely will you have one?
 - Definitely
 - Likely
 - Less likely
13. What is the main reason to consider when purchasing a dental loupe?
(Choose more than one answer if applicable)
 - Price
 - Magnification
 - Resolution
 - Depth of field
 - Width of field
 - Patient-dentist distance