

## Navigating the Infodemic: Assessment and comparison of awareness and usage of magnifying loupes among Dental Students and Dental Practitioners – A Cross-Sectional Study

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## INTRODUCTION

Dental procedures are carried out within a confined and poorly illuminated operative field, making optimal visibility and illumination essential. These physically demanding tasks often result in compromised ergonomics, thereby increasing the risk of musculoskeletal disorders among dental professionals.[1] The use of magnification in dentistry helps improve ergonomics and, consequently, reduces the prevalence of musculoskeletal symptoms. The use of magnification in dentistry has been steadily increasing, with loupes being the most commonly used magnification devices. In addition to enhancing vision, they offer significant ergonomic advantages, thereby promoting the long-term health of clinicians. Compound and prismatic telescopic loupes are considered superior to simple diopter lenses due to their improved optical performance. Magnification is likely to become a standard of care in dentistry in the near future, as its long-term benefits outweigh minor limitations [2–9].

The primary advantage is the optical magnification, which enhances visual acuity and leads to improved outcomes in both diagnostic and procedural tasks. Additionally, dental magnification loupes (DMLs) are typically equipped with illumination systems that further enhance visibility and significantly improve the operator's ability to detect fine details in structures and materials. As a result of enhanced visualization of the operative field, dental professionals using DMLs have been found to maintain better seating posture. [2,5,8] The use of dental magnification loupes (DMLs) has been reported to improve procedural outcomes across various dental specialties, beginning with the diagnosis of lesions affecting the soft and hard tissues of the oral cavity. Compared with the unaided eye, a magnification power of 3.5× has been shown to significantly enhance the detection of oral mucosal diseases.[10]

A significant association has also been observed between DML use and dental specialization. Specialists are approximately 1.94 times more likely to use DMLs compared to general dentists. This may be partly attributed to an increased need for visual enhancement due to age-related visual changes. With the introduction of microsurgical principles in dentistry, many specialties have adopted these approaches to improve patient outcomes. Supporting this, Forgie et al. reported a significant relationship between DML use and the time since graduation from dental school.[21] The diagnosis of early carious lesions,[11] identification of demineralized tooth structure at preparation margins,[12] and detection of cracks can also be performed more reliably under magnification.[13] Dental extractions carried out with magnification tend to be more conservative and cause less trauma to the extraction site.[13] In periodontics, the use of 2.5× magnification has been shown to increase the effectiveness of both supra- and subgingival scaling and root planning compared with procedures performed with the naked eye.[16] Additionally, debonding procedures following orthodontic treatment have been reported to be more efficient and associated with less enamel damage when 2.5× DMLs are used.[18]

In endodontics, the use of DMLs with a magnification as low as 2.5× has been found to significantly reduce the time required to complete root canal treatments.[14] Furthermore, the ability to locate the second mesio-buccal canal improves with the use of 3.5× magnification.[15]. In this regard, various magnification devices such as surgical microscopes, endoscopes, and magnifying loupes provide significant advantages to operators by enhancing visualization. [23–25] Dental magnification loupes (DMLs) typically provide magnification ranging from 2.5× to 6×.[19]

Dentists' decisions to purchase and use DMLs are influenced by several factors, including cost, prior training, ergonomic considerations, features of the loupes, and individual practitioner characteristics. Additionally, the use of DMLs has been associated with reported musculoskeletal pain experiences.[19] The reasons for using or not using DMLs are mainly related to improved vision, patient care, clinical efficiency, and ergonomics. Enhanced vision is the most commonly cited reason for their use. Conversely, high cost is the primary reason for non-use, followed by factors such as wearing prescription glasses, insufficient training in DML use, and lack of interest among dentists. The high cost of dental magnification loupes (DMLs), combined with a lack of adequate training, can create uncertainty and hesitation among dentists when deciding whether to invest in them.[19] Understanding the level of awareness and attitudes of dentists and dental students toward magnification loupes is essential for promoting their integration into standard dental care. Hence the present was aimed to assess and compare the awareness and usage of magnifying loupes among dental students and dental practitioners.

## **MATERIALS AND METHODS:**

A cross-sectional survey was conducted among general dental practitioners, postgraduate students, and specialists using a structured 16-item questionnaire distributed via Google Forms. The questionnaire included sections on demographics, knowledge, attitude, practice, and barriers. Data were analyzed using descriptive statistics and Pearson correlation test.

### Study Design and Participants:

This cross-sectional survey was conducted among general dental practitioners, postgraduate students, and specialists.

### Data Collection Tool:

Data were collected using a structured, self-administered questionnaire distributed via Google Forms. The questionnaire consisted of 16 close-ended questions divided into five sections: demographic information, knowledge, attitude, practice, and barriers.

### Study Parameters:

The parameters assessed included awareness level, usage of dental loupes, reasons for non-use, and interest in training programs related to magnification tools.

### Inclusion Criteria:

The study included licensed dental professionals who had completed BDS or MDS and were actively practicing, as well as postgraduate dental students enrolled in recognized institutions. Participants were required to provide informed consent and have access to an internet-enabled device to complete the survey.

### Exclusion Criteria:

Junior undergraduate students (BDS first to third year), incomplete or duplicate responses, non-consenting individuals, and participants unable to access the online survey were excluded from the study.

### Ethical Considerations:

Participation was voluntary, and informed consent was obtained electronically before the commencement of the survey. Confidentiality of all responses was strictly maintained, and no personal identifiers were recorded.

### Statistical Analysis:

Data were analyzed using descriptive statistics to summarize responses. Inferential statistics, specifically the Pearson correlation test, were applied to determine associations among knowledge, attitude, and practice variables. A p-value of <0.05 was considered statistically significant.

The correlation between knowledge, attitude, and practice can provide insights into whether increased awareness leads to improved clinical adoption. Addressing the identified gaps may enhance the integration of magnification tools into routine dental practice.

## **RESULT:**

A total of 154 participants responded to the questionnaire. The age distribution revealed that the majority of respondents were between 22 and 23 years. The highest proportion was observed among participants aged 22 years (22.7%), followed by those aged 23 years (22.1%). Participants aged 21 years constituted 18.2%, while 13.6% were 24 years old. Smaller proportions were observed in other age groups, including 20 years (6.5%) and 25 years (4.5%), with very few respondents

above 26 years, each contributing less than 3% of the total sample.

In terms of gender distribution, the majority of participants were females, accounting for 73.4% (n = 113), while males constituted 26.6% (n = 41). No participants identified under the “other” category.

Regarding educational qualification, most respondents were undergraduates, contributing 61.7% of the sample, followed by BDS graduates at 31.2%. Only a small proportion of participants were postgraduate students and MDS graduates.

**Table 1: Distribution of participants according to gender, awareness and usage of dental magnifying loupes'**

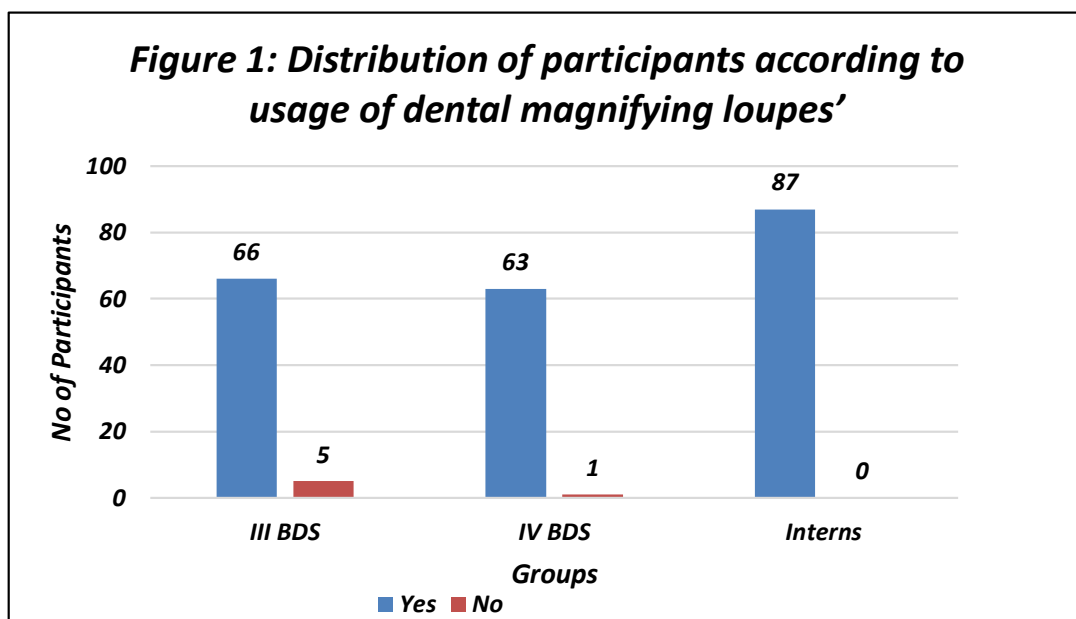
Parameters	Sub parameters	Interns (n = 71)	Postgraduate students (n = 64)	Dental practitioners (87)	$\chi^2$	P value
Gender	Males	39	46	49	11.671	0.068#
	Females	22	18	38		
Awareness of the dental magnifying loupes'	Yes	66	63	87	21.392	0.003**
	No	5	1	0		
Usage of dental magnifying loupes'	Yes	3	12	64	9.522	0.043*
	No	68	52	23		

\* - significant  
 \*\* - highly significant  
 # - not significant

**Table 2: Comparison between the interns, postgraduate students and dental practitioners regarding Knowledge, attitude and practices of dental magnifying loupes' using One way ANOVA test**

Parameters	Sub parameters	Interns (n = 71)	PG students (n = 64)	Dental practitioners (n= 87)	F	P value
Are you aware of the concept of magnification in dentistry?	Yes	66	63	87	22.91	0.002**
	No	5	1	0		
Which magnifying tools are you familiar with?	Dental loupes	61	64	87	31.11	0.034*
	Operating microscope	16	63	87		
	Endoscope	54	64	87		
	Intraoral camera	66	64	87		
Which magnifying tools you use frequently?	Dental loupes	1	12	64	3.681	0.045*
	Operating microscope	0	09	34		
	Endoscope	0	09	21		
	Intraoral	3	12	87		

	camera					
<b>Do you believe magnification enhances the quality of dental treatment?</b>	Yes	70	63	87	9.522	0.043*
	No	1	1	0		
<b>Would you consider investing in magnification tools for your dental practice?</b>	Yes	11	23	39	6.824	0.008**
	No	60	41	48		
<b>Would training or workshops encourage you to adopt magnification tools?</b>	Yes	25	53	74	8.324	0.042*
	No	46	11	13		
* - significant ** - highly significant # - not significant						



## DISCUSSION:

The present study evaluated the awareness and usage of magnification tools among dental professionals. The findings are expected to reflect varying levels of knowledge and adoption across different groups, consistent with previous studies. A high level of awareness regarding magnification in dentistry was observed, with 85.7% of participants reporting that they were aware of the concept, while 14.3% were unaware. Among the various magnification tools, dental loupes were the most familiar (68.2%, n = 103), followed by operating microscopes (47%, n = 71) and endoscopes (32.5%, n = 49). Awareness of extraoral cameras was notably low, with only 2% (n = 3) of respondents reporting familiarity.

When assessing knowledge of the ideal magnification range for dental loupes, 43.5% of participants were unaware of the appropriate range. Among those who responded, 31.8% identified the range of 2.5×–4.5×, while 20.1% selected 1.5×–2.5×. Only a very small proportion chose higher magnification ranges such as 5×–8×. Attitudinal responses indicated a strong positive perception of magnification in dentistry. Nearly half of the respondents (47.4%, n = 73) strongly agreed that magnification enhances the quality of dental treatment, while 44.8% (n = 69) agreed with this statement. A small proportion (9.1%, n = 14) remained neutral, and less than 1% disagreed or strongly disagreed. The responses indicate that magnification

is most commonly used in endodontic procedures, with 93 participants (60.4%) reporting its use. This was the highest among all categories, suggesting a strong reliance on magnification for procedures requiring precision and fine visualization.

Magnification was also moderately used in restorative dentistry and other procedures, each reported by 41 participants (26.6%). Similarly, surgical procedures showed notable usage, with 32 respondents (20.8%) utilizing magnification. In contrast, lower usage was observed in periodontics, with 28 participants (18.2%), and the least use was reported in prosthodontics, with only 11 participants (7.1%). Furthermore, 74.7% (n = 115) of participants expressed willingness to invest in magnification tools for their dental practice, while 22.7% (n = 35) were uncertain and selected “maybe.” Only 5.2% (n = 8) indicated that they were not interested in investing in such tools. Despite the high awareness and positive attitude, the actual usage of magnification tools in clinical practice was low. A majority of respondents (81.2%, n = 125) reported not using any form of magnification, whereas only 18.8% (n = 29) reported using such tools.

The primary barriers to the adoption of magnification tools were identified as cost (61.9%, n = 94), followed by lack of training (45.5%, n = 70), and discomfort associated with wearing the devices (20.1%, n = 31). Additionally, 12.3% (n = 19) reported other barriers, including lack of awareness of benefits. Encouragingly, a majority of respondents (71.4%, n = 110) expressed interest in attending training programs or workshops to adopt magnification tools in their practice. Meanwhile, 22.7% (n = 35) were uncertain, and only 6.5% (n = 10) indicated no interest in such training opportunities. A positive attitude toward magnification may not always translate into practice, often due to barriers such as high cost and insufficient training. The identification of these barriers highlights the need for incorporating magnification training into dental education and continuing professional development programs.

## CONCLUSION:

The present study highlights a high level of awareness regarding magnification in dentistry among participants, with the majority recognizing its importance in improving the quality of dental treatment. Despite this positive awareness and attitude, the actual usage of magnification tools in clinical practice remains considerably low. Dental loupes were the most familiar form of magnification, whereas knowledge regarding advanced tools and the ideal magnification range was limited among respondents.

The findings also reveal that cost, lack of training, and discomfort are the major barriers preventing the adoption of magnification tools. Encouragingly, a significant proportion of participants expressed willingness to invest in magnification devices and showed interest in attending training programs or workshops. Overall, the study indicates a gap between knowledge and practice, emphasizing the need for increased educational initiatives, hands-on training, and cost-effective solutions to promote the integration of magnification tools into routine dental practice

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