GRADUATION PROJECT

Degree in Dentistry

DOES OPTICAL MAGNIFICATION IMPROVE PERCEIVED CLINICAL OUTCOMES IN ENDODONTICS ? A SURVEY-BASED STUDY

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RESUMEN:

Introducción: La endodoncia es uno de los sistemas quirúrgicos más complejos dentro del diente, que requiere una gestión precisa, una visualización adecuada y un manejo cuidadoso de los procedimientos médicos. Para mejorar la visualización, las características ergonómicas y la precisión de los procedimientos, se han utilizado cada vez más herramientas de magnificación óptica como las lupas y los microscopios operatorios. Sin embargo, su impacto en los resultados clínicos no está bien establecido. **Objetivo**: El objetivo es analizar si el uso de la magnificación óptica influye en los resultados clínicos en endodoncia. **Materiales y Métodos**: Se realizó un estudio observacional transversal mediante un cuestionario de 15 ítems distribuido en línea en inglés y español a odontólogos posgraduados que realizan procedimientos endodónticos. **Resultados**: Un total de 45 clínicos participaron. Solo el 33% informó utilizar dispositivos de magnificación, mientras que el 67% no los utilizaba. Las lupas dentales fueron los dispositivos más utilizados. La mayoría de los encuestados indicó mejoras en la localización de conductos y en la ergonomía. La mayoría (82,4%) consideró que la magnificación ayuda a mejorar los resultados clínicos, y el 88,9% recomendaría su uso. Sin embargo, el acceso al equipamiento, el coste y la curva de aprendizaje fueron mencionados como barreras. **Conclusiones**: Aunque la magnificación no se utiliza de forma generalizada, se considera una herramienta valiosa en la práctica endodóntica. Sus beneficios incluyen una mejor visualización, ergonomía y confianza del clínico, aunque los resultados clínicos a largo plazo siguen siendo desconocidos.

PALABRAS CLAVE:

Endodoncia; Magnificación óptica; Lupas dentales; Microscopio operatorio; Resultados clínicos; Ergonomía.

ABSTRACT:

Introduction: Endodontics is one of the most complex surgical systems within a tooth, requiring precise management, accurate visualization, and careful handling of medical procedures. To enhance visualization, ergonomic features, and procedural precision, optical magnification tools such as loupes and operating microscopes have been increasingly utilized. However, their impact on clinical outcomes is not well understood. **Objective**: The objective is to analyse if the use of optical magnification has an influence in the clinical outcomes in endodontics. **Materials and Methods**: A cross-sectional observational study was conducted using a 15-item questionnaire distributed online in English and Spanish to postgraduate dentists performing endodontic procedures. **Results**: A total of 45 clinicians participated. Only 33% reported using magnification devices, while 67% do not. Dental loupes were the most frequently used devices. The majority of respondents indicated improvements in canal detection and ergonomics. Most (82.4%) of respondents believe that magnification would help improving clinical outcomes, with 88.9% agreeing with the recommendations. However, access to equipment, costs, and the learning curve were mentioned as barriers. **Conclusions**: Although magnification is not commonly used, it is considered a valuable tool in endodontic practices. These benefits include enhanced visualization, ergonomics, and clinician confidence, yet long-term clinical outcomes remain unknown.

KEYWORDS:

Endodontics; Optical magnification; Dental loupes; Operating microscope; Clinical outcomes; Ergonomics.

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1. INTRODUCTION

One of the most challenging specialty in dentistry is endodontics. It requires an extremely precise technique, good hand-eye coordination, precision, excellent movements, and strong support. The root canal system is challenging to diagnose and can be characterized by a high number of complex internal anatomies. The canal often has fine, curved, and sometimes calcified structures with a fragile internal composition. All these anatomical issues lead to a higher risk for practitioners of perforations, fractures, instrument cracks, and incomplete fillings. The success of endodontic treatment is largely reliant on three aspects: identifying the canal orifices, cleaning and shaping the canal system, and final three-dimensional filling. The quality of vision seems to be a factor in clinical success in all of these phases (1-2-3). Hence, based on these issues, the development of accessible visualization of the operating field has increasingly become a priority. With these challenges, optical magnification has emerged as a central feature that revolutionized the landscape of contemporary endodontics (1,4,5).

Historically, the development of magnification devices in dental practice dates back to the mid-20th century, when binocular loupes were first adapted to the dental procedures. Originally introduced by oral surgeons to enhance visualization in sensitive procedures, they also played a beneficial role in restorative and periodontal work. They were introduced as a means of addressing the inherent limitations of the human eye where complex work is conducted in compact and poorly lit operative spaces (6,7).

The true technological leap in technology came when the dental operating microscope (DOM) was introduced in the late 1980s and early 1990s. Based on its success in microsurgery, ophthalmology and neurosurgery, the DOM was initially integrated into endodontic procedures to optimize the accuracy of observation of canal orifices, micro-fractures and hidden anatomic characteristics during endodontic surgery (8,9). One such pioneer - Dr Gary Carr's work on microscopy for the practice of microendodontic surgery and retreatment, the ultimate milestone in the philosophy of endodontic practice - was groundbreaking (10). Continuous

improvements in optics, fiber-optic lighting and better ergonomics gradually made magnification devices more compact, reliable, and accessible to more practitioners.

The emergence of optical magnification in endodontics was directly associated with increased precision, predictability, and conservation of dental tissues. Conventional visualization approaches frequently restricted the clinicians' ability to locate accessory canals and detect the errors of the procedure in its earliest stages. Magnification has thus facilitated converting endodontics into a more precise and minimally invasive specialty (11,12). Magnification devices these days are tools that aid the visualization of dentistry, as well as serving a new role in dentistry, focusing on the accuracy and comfort and level of professionalism they convey (13).

An optical magnification device provides the following functions: enlarging the operating field and providing increased illumination at the imaging site. These devices are:

• Binocular loupes (typically between 2× and 6× magnification);

• 20× dental operating microscope (DOM) with coaxial illumination and increased depth of field;

• Electronic equipment (endoscopic cameras, digital microscopes) that can display procedures on a screen and collect information from them (4,14).

It improves the visibility of these concealed anatomical structures (such as accessory canals, micro-fissures, or broken instruments) (1,16,17). Moreover, they facilitate superior ergonomics: better ergonomic posture, less visual and muscular fatigue, and higher comfort during interventions (18,19). Nevertheless, there are drawbacks; these advantages come with high acquisition costs, a smaller field of view at high magnification, and the long learning time required to master them (20).

A key step toward further expansion lies in understanding how these principles can be applied in a clinical context, using clinical assessment data from hospital populations, private clinics, and research centers. A recent European study showed that only 26% of practitioners were using an operating microscope, while 33% worked with loupes, and 41% did not use any magnification device (21). Operating microscopes have found extensive application in highly specialized endodontics in Anglo-Saxon countries (9,13). Nonetheless, the extent of practice uptake is diverse, depending on training, specialization, and financial capacity across different disciplines. Many studies attribute this to a lack of training or high cost (23), which still act as major barriers to widespread use (20,24).

While the theoretical benefits of magnification are evident, empirical evidence is still limited. Observation of maxillary molars using the microscope revealed *in vitro* that the microscope enhances the detection of secondary mesiobuccal (MB2) canals by extending the use of the microscope in maxillary molars (16,17). However, other studies have observed no statistically significant difference in long-term treatment success rates between procedures performed with and without magnification (24). Systematic reviews clearly show that scientific evidence alone is not sufficient; however, subjective evidence of enhanced accuracy, comfort, and confidence is well documented and consistently reported (4,24).

Practitioner acceptance of new technology is less driven by clinical outcomes and more related to practitioners' perceptions. Perceived gains in visibility, accuracy, reduced workload, and ergonomics are important factors influencing investment decisions (21,23). The barriers are diverse: purchase price, maintenance, excessive weight, adaptation time, and the absence of continuing education (8)(18). These reasons explain the growing gap between younger practitioners, who are trained with magnification, and older dentists who received their education several decades ago.

Today, ergonomics is a major topic in the field of dentistry. Microscopy reduces the risk of musculoskeletal disorders among practitioners, such as spinal and neck problems (18,19). Moreover, the use of magnification in university programs can enhance long-term integration

and efficiency when introduced early in dental education (25). From an educational perspective, these devices allow for the exchange of clinical skills through joint observation via a monitor, image recording, and postoperative error assessment. Given these benefits, their implementation in endodontic education continues to develop.

Although magnification devices are gaining popularity, their real impact on clinical outcomes remains under-examined. Much research has focused on objective outcomes (radiographic success rate, apical healing), often neglecting subjective outcomes such as confidence, perceived accuracy, and comfort.This study is part of a broader effort to connect clinical perception with scientific evidence. It aims to:

• Support continuing education policies;

• Promote the rational use of magnification to improve the quality of care.

Alternative hypothesis (H1) : The use of optical magnification has an influence in the clinical outcomes in Endodontics.

Null hypothesis (H0) : The use of optical magnification has no influence in the clinical outcomes in Endodontics.

In summary, optical magnification represents a major advancement in modern endodontic practice. While its theoretical and ergonomic advantages are widely acknowledged, its actual influence on clinical outcomes; particularly from the practitioners' point of view — remains unclear. By exploring how clinicians perceive the impact of magnification on their daily work, this study aims to bridge the gap between technological innovation and clinical reality, ultimately contributing to evidence-based improvements in both dental education and patient care.

2. OBJECTIVE

The objective is to analyse if the use of optical magnification has an influence in the clinical outcomes in endodontics.

3. MATERIAL AND METHODS

This study was a cross-sectional observational survey designed to assess clinicians' knowledge of the use of optical magnification in endodontic practice. The aim of this study was to assess how magnification devices are adopted in endodontic practice, the clinical benefits and limitations perceived by clinicians, and the main barriers that affect their use.

A structured 15-item questionnaire was used to collect data, available in both English and Spanish to be accessible to dental professionals worldwide. This questionnaire, which included multiple-choice and multiple-answer questions, covered professional knowledge, magnification habits, clinical and ergonomic concerns, barriers, and interest in training. The survey was distributed electronically by professional associations, postgraduate societies, and endodontic societies. Information was obtained from the community of general dentists and other dental professionals. (View annexes)

Participants had to be able to read and respond to the survey in English or Spanish. They were required to be postgraduate dentists, either residents or certified practitioners, and to perform endodontic procedures as part of their clinical practice. In addition, they needed to have at least one year of dental experience within the previous ten years. These parameters established that participants were sufficiently clinically experienced prior to the study to provide a comprehensive picture of magnification devices in endodontics. Participants were excluded from the study if they had not completed endodontic treatments, if they were dental students, if they had no clinical experience in the past decade, if they could not complete the questionnaire in English or Spanish, or if they had submitted an incomplete questionnaire. These exclusion criteria were designed to address the reliability and consistency of the data.

General dentists and endodontists who met the inclusion criteria were included in the survey. Participation was voluntary and anonymous, and all completed questionnaires that met the inclusion and exclusion criteria were included in the final analysis. Data were collected via an online survey based on a secure digital platform (Microsoft Forms). Study participants were recruited through postgraduate academic networks, professional endodontist groups, private practitioner forums, and academic communications. No personal data were obtained from respondents (names, email addresses, or geographic locations).

The study followed the ethical guidelines specified in the Declaration of Helsinki. Participation was voluntary and anonymous, and informed consent was requested. This was a study that used only anonymous survey data and did not capture any patient information, and therefore, it was not reviewed by an ethics committee. All data were statistically processed using standardized preprocessing methods to ensure the credibility, validity, and consistency of the results.

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4. RESULTS

A total of 45 clinicians took part in the survey to evaluate the use of optical magnification in endodontic practice. Informed consent of all participants was provided prior to completing the questionnaire.

Regarding the country of practice, participants reported practicing in different country including Spain, France, UK and different countries across the world for a well-characterized sample of dental professionals.

Regarding the age distribution, most respondents were (71%) aged less than 30 years old. Participants aged 30 to 40 years represented 9% of the total sample, followed by 7% aged 41 to 50 years, and 13% aged more than 50 years.

In terms of professional background, the majority were general dentists (69%), 7% were endodontists and 24% reported working in other dental fields.

With regard to professional experience, 76% have less than five years experience in dentistry. A smaller percentage of participants had between 5 and 10 years of experience (2%). Same for an experience of 11 and 20 years, while 20% reported over 20 years of professional experience.

Most of the sample surveyed, however, had never used magnification in clinical practice, with 33% indicating that they currently use magnification and 67% saying they do not use magnification in their practice. (Figure 1)

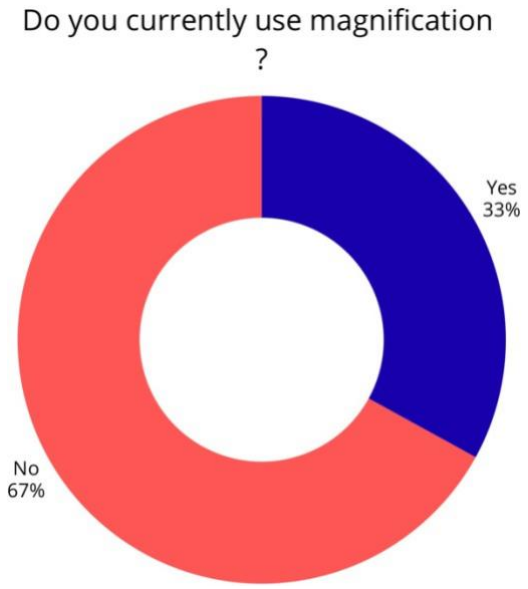


Figure 1. Use of optical magnification among surveyed clinicians

Among the practitioners that reported using a magnification device, dental loupes were the most commonly used, accounting for 80% of users. Microscopes were used by 13% of respondents, while 7% also reported use of both loupes and microscopes in their clinical practice. (Figure 2)

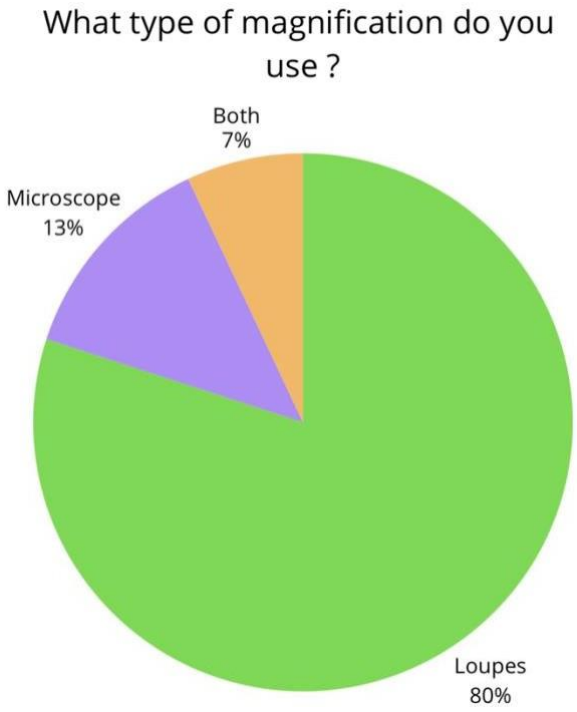


Figure 2. Type of magnification devices used in clinical practice

Regarding the level of magnification used, the most used level of magnification was 3.5× – 5× followed by 2× – 3× magnification. Then, a small proportions of practitioners used to work with 6x – 10x magnification and very few using 11x – 20x magnification, while no participants reported using magnification greater than 20x. No one reported using magnification ≥20×. (Figure 3)

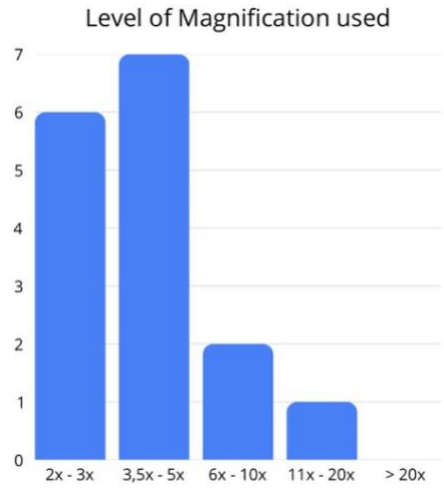


Figure 3. Levels of magnification used by practitioners

In relation to the frequency of the use of magnification, 37.5% indicated the use of magnification for each procedure. By way of contrast, 25% reported using magnification only for difficult cases and 18.8% were using magnification only for endodontic procedures. 18.8% of respondents also used magnification less than once weekly (Figure 4).

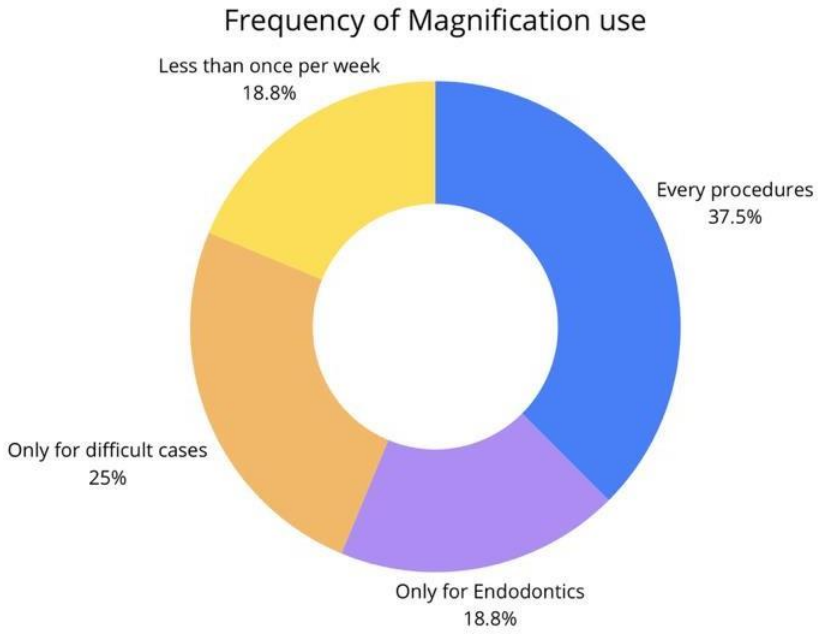


Figure 4. Frequency of magnification use in clinical practice

Participants also varied in the duration of magnification use. Most (70.6%) of the respondents indicated that they have used magnification for less than five years, followed by 11.8% of the subjects that reported between five and ten years, 5.9% of the individuals reported between eleven and twenty years, and 11.8% of the subjects who reported experience over twenty years with magnification devices (Figure 5).

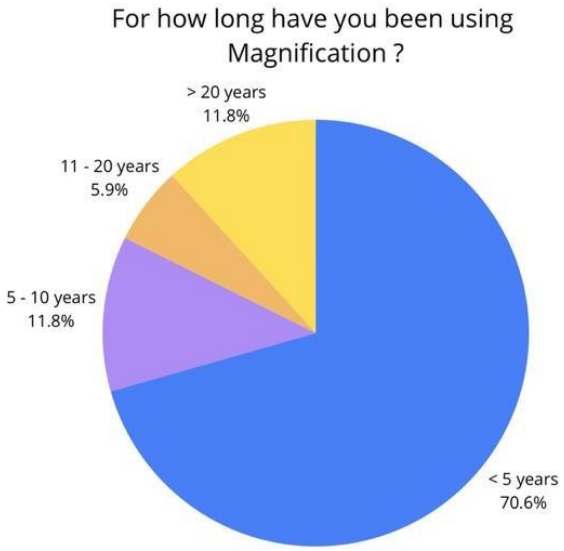


Figure 5. Duration of magnification use among clinicians

Participants were also asked which aspects of endodontic treatments were improved by magnification. Top-most reported responses were canal location (calcified canals or not) and ergonomics (postural improvements and fatigue reduction). Additional benefit reported included better management of perforations, better detection of fractures or cracks, better management of separated files and decreased work time (Figure 6).

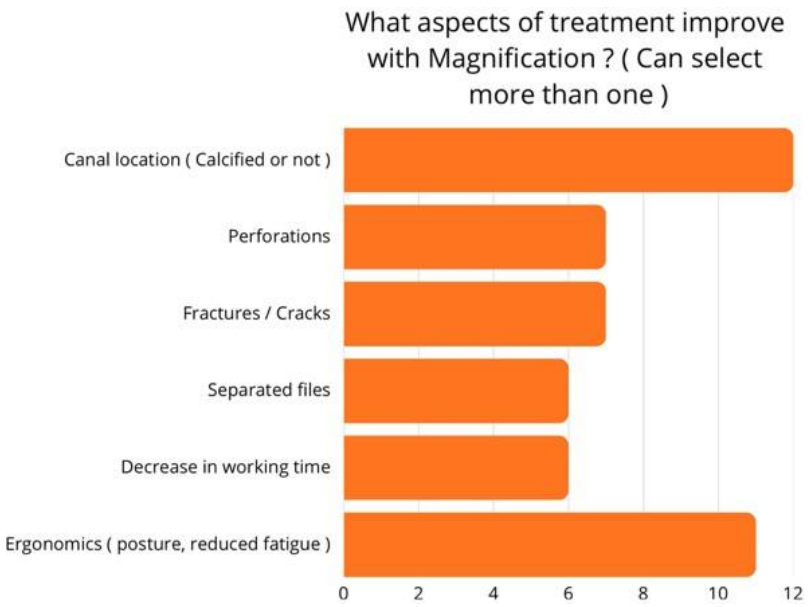


Figure 6. Perceived aspects of endodontic treatment improved by magnification

When asked whether magnification increases clinical outcomes during root canal treatment, 82.4% of respondents agreeed while 17.6% believed that magnification does not enhance clinical outcome. (Figure 7)

Likewise, 88.9% agreed that they would recommend the use of magnification, and 11.1% did not (Figure 8).

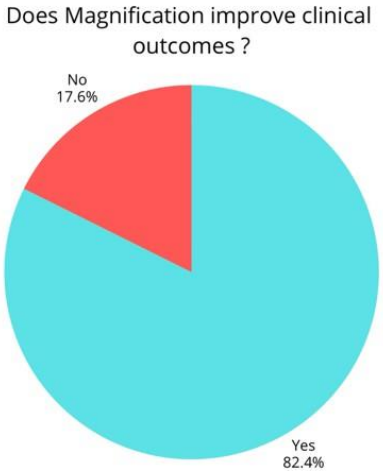


Figure 7. Clinicians' perception of the impact of magnification on clinical outcomes

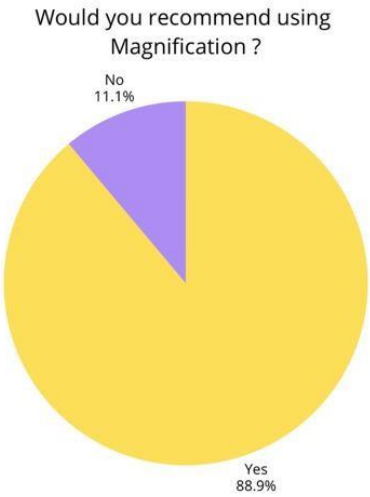


Figure 8. Recommendation of magnification use among dental practitioners

Among practitioners who did not use magnification, the most cited reason was that magnification equipment wasn't available at their workplace. Cost of equipment and learning curve associated with magnification devices were also significant barriers. Fewer respondents indicated that they did not consider it useful for their work (Figure 9).

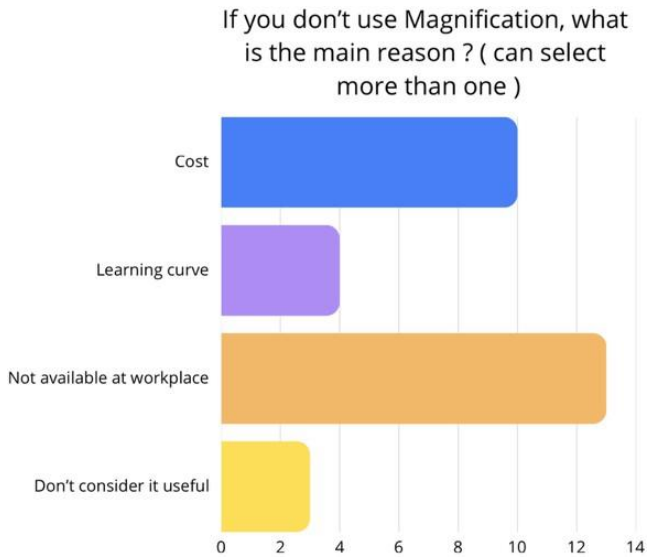


Figure 9. Main reasons for not using magnification devices

Finally, when asked about their interest in receiving training in magnification, 59.5% of respondents mentioned having an interest, 28.6% reported that they might be interested, and a further 11.9% indicated they had no interest in undertaking such training (Figure 10).



Figure 10. Interest in receiving training on optical magnification

5. DISCUSSION

The current study aimed to determine whether the introduction of optical magnification affects clinical outcomes in endodontic practice, as well as provide information about clinicians' views regarding its clinical utility, benefits, and limitations.

Recent findings indicate that dental practitioners are only adopting magnification devices to a small extent. With respect to clinical use of magnification devices, only 33% reported this practice, while the vast majority (67%) did not use any magnification device. Such observations are in agreement with studies that reported the importance of magnification and its associated advantages, but reported the usage of magnification in general dental practice is still very low. Radeva et al. (21) indicated that dental operating microscopes are routinely used by only a small number of practitioners whereas loupes are mainly used in clinical practice (21). Similarly, Penmetsa et al. (23) reported that while dentists generally recognized the importance of magnification devices in clinical practice, the practical application in everyday clinical scenarios remains low (22,23).

Among those clinicians who reported magnification, as seen in figure 2, dental loupes was the most widely used device, accounting for 80% of the respondents, while microscopes were used by only a small proportion of respondents. Related to this trend is the observation that loupes have since become more widely adopted in comparison to dental operating microscopes, which are more accessible, easier and user-friendly, and require less training than dental operating microscopes (4,7). Microscopic magnification and illumination are improved with operating microscopes but involve higher monetary cost and a longer learning curve (8,15,20).

As for magnification, most users reported maintaining moderate magnification levels between 3.5× and 5× in the majority of doctors. This observation of figure 3 aligns with the literature which recommends moderate magnifications are the best balance of the field of view, depth of field and clinical value to the system (18). More magnification level may provide more

visualization, but lower field of view and greater technical demands for clinical manipulation (20).

The frequency of use of magnification in the clinic was checked and was also evaluated in the current study. Some clinicians reported to use the magnification throughout the treatment and others only for advanced or endodontic use. The finding points to magnification as being considered highly applicable in technically complex applications like root canal treatment. Endodontics includes small anatomic features such as accessory canals and calcified canals that are more likely to be discovered with magnifications (1,16). Prior studies have shown that magnification significantly improved the detection of the second mesiobuccal canal (MB2) in maxillary molars, which may have implications for accurate and efficient root canal treatments (16,17).

Perceived clinical benefits attributed to the intervention were related mainly to improve canal detection and ergonomics. These results are robustly corroborated by previous studies like in figure 6. Baldasso et al. (1) emphasized that magnification significantly improves the visualization of complex root canal anatomy, allowing clinicians to be more easily able to detect accessory canals, microfractures, and other anatomical abnormalities. Additionally, magnification devices have been found to make endodontic procedures more precise and easy to control, increasing the chances of minimizing procedural errors such as perforations or instrument separation (11,12).

Reported ergonomic benefits were also common among respondents in the current research. It is established that dental healthcare providers are at high risk of musculoskeletal disorders by long stay in static postures and repetitive work patterns. Magnification applications particularly loupes and microscopes, has been reported to improve posture, and reduce musculoskeletal stress (18,19). Aboalshamat et al. (19) found that dental practitioners who consistently use magnification devices can experience lower neck and back pain levels than dental staff who do not use magnification.

Not with standing these benefits of magnification devices, as seen in figure 9, the findings also indicate barriers to the implementation of magnification devices. With non-users the most frequently reported barrier was the absence of magnification equipment available at their workplace. Cost and the learning curve of magnification devices were also significant limiting factors. These results are in agreement with prior studies like Kersten A et al. (20) revealing that financial investment and training requirements are considered to be the biggest barriers preventing practitioners from the use of magnification technologies (20,23).

Interestingly, the overall study results also revealed that 82.4% of participants believe that magnification improves clinical outcomes in endodontics. In addition, 88.9% suggested that they would advise the use of magnification by other practitioners. These results indicate that even clinicians who don't use magnification are at least nominally aware that there is value in using it. Similarly, prior systematic reviews found comparable perceptions in dental professionals, noting that magnification devices were linked to overall increased confidence and procedural accuracy (4,24).

Nevertheless, the science is still mixed regarding its effect on long-term treatment outcomes. Del Fabbro et al. (24) reported that magnification, although enhancing visualization and fine-tuning is possible, studies have reported no statistically significant differences in endodontic treatment success rates at long-term, when either procedures are done with or without magnification (24). This means the clinical advantage of magnification on the apparent clinical benefits may be due more to improved operator performance and comfort with the procedure than on measurable differences in treatment outcomes.

The present study also found that most magnification users reported having less than five years of experience with these devices. This finding could reflect the growing embrace of magnification technologies in dental education. Sempere-Lucas et al. (25) reported that introducing magnification training during undergraduate dental education can greatly increase the probability for such technologies to be integrated in clinical practice. This pattern indicates that the use of magnification tools could potentially increase as the current generation of dentists will be educated in magnified dentistry by the new ones in the coming generations as well.

Several strengths of the current study are evident. First, it is relevant to clinicians' view of magnification devices in endodontic practice, which is an aspect that is relatively less investigated in the literature. Second, the participation of practitioners from diverse countries and professional affiliations enables a more comprehensive view on prevailing clinical behavior and attitudes to magnification technologies.

However, there are some limitations. The study had a limited overall sample size — a total of 45 participants took part in the survey. The findings may be generalized as a significant proportion of the respondents were young practitioners with little work experience. This study was based on self-reported perceptions rather than objective clinical outcome measurements. Therefore, the findings are probably just clinical opinion based rather than direct experimental observation of enhanced treatment efficacy.

Not with standing these limitations, the results of this study have clinical relevance. The relatively high engagement levels of magnification training among the respondents indicate that continuing education interventions may be the main means of facilitating the employment of magnification procedures in dental practices. One way to address some of the barriers seen in this study may be to increase access to training programs and increase the availability of magnification devices in clinical settings.

Future studies tought to examine the longer-term effects of magnification devices on endodontic treatment outcomes within a larger sample and with objective measurements within clinical context. Furthermore, more research is needed to assess the impact of educational initiatives which serve to educate dental professionals on magnification methods of care.

The overall results of this study are supportive of the increasing acceptability of optical magnification in contemporary endodontic practice. Though whether magnification has a positive clinical influence or not is disputed, magnification undoubtedly enhances visualization, ergonomics, and clinician confidence in clinical endodontic procedures. As these technologies

can and will mature and be more accessible, their inclusion in everyday dental practice might be beneficial to both clinical and patient care.

6. CONCLUSION

Results show a lack of widespread acceptance of magnification by clinicians but a high level of perceived benefit of magnification as a tool that enhances visualization, ergonomics, and clinical performance. Practitioners claim to agree that magnification has a positive effect on the quality of endodontic treatment and would recommend its use in daily practice. Moreover, the growing interest in such training reflects an awareness of its potential advantages.

Nonetheless, while these perceptions are positive, the scientific evidence is not yet clear as to how it affects long-term clinical outcomes. Thus, the advantages of magnification seem to be mostly about improved precision, operator comfort, and confidence rather than clear differences in treatment success.

Optical magnification is an important advancement in modern endodontics. Its progressive integration into dental education and clinical practice may contribute to improving both practitioner performance and the overall quality of patient care.

7. SUSTAINABILITY

Implementing optical magnification in endodontic practice has relevant economic, environmental, and social consequences for sustainability. Economically, whilst the upfront cost of magnification devices may be high, their use may increase clinical accuracy and decrease procedural errors, reducing the need for retreatments and related costs over time. This makes healthcare resources far more optimal in terms of use.

Environmental perspectives show that, for endodontic procedures, more precise results may generate less waste of material, resulting from less endodontic instruments or filling material, and resulting in fewer procedural errors. More importantly, reduced retreatments and clinical failures may reduce resource consumption and clinical waste generation.

Socially, magnification increases quality of care and patient outcomes by increasing diagnostic accuracy and efficacy of treatment. It also contributes to better working conditions for clinicians to reduce musculoskeletal disorders by means that make ergonomics more effective.

Overall, optical magnification's adoption is in accordance with several Sustainable Development Goals—notably SDG 3 (Good Health and Well-being) and SDG 12 (Responsible Consumption and Production)—and contributes to high-quality, efficient, and responsible dental care.

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8. ANNEXES

Survey :

1. Do you give your consent to participate in the survey as a volunteer for the results to be used in the Final Degree Project Does Optical Magnification improved perceived clinical outcomes in Endodontics? / ¿Da su consentimiento de participación en la encuesta como voluntario/a para que los resultados de la encuesta se utilicen en el Trabajo Fin de Grado ¿Mejora la magnificación óptica los resultados clínicos percibidos en endodoncia?

°Yes / Sí
°No

2. Country of practice / País donde ejerce :

3. Age / Edad :

°< 30
°30 - 40
°41 - 50
°> 50

4. Current work / Trabajo actual :

°General dentist / Odontólogo general
°Endodontist / Endodoncista
°Other / Otro

5. Years of experience in Dentistry / Años de experiencia en Odontología :

°< 5 years / < 5 años
°5 - 10 years / 5 - 10 años
°11 - 20 years / 11 - 20 años
°> 20 years / > 20 años

6. Do you currently use magnification ? / Utiliza actualmente dispositivos de magnificación óptica ?

°Yes / Sí
°No (Go to question 14) / No (Ir a la pregunta 14)

7. What type of Magnification do you use ? / Qué tipo de magnificación utilizas ?

°Loupes / Lupas
°Microscope / Microscopio
°Both / Ambos

8. Level of Magnification used / Nivel de magnificación utilizado :

°2x - 3x
°3,5x - 5x
°6x - 10x
°11x - 20x
°> 20x

9. Frequency of Magnification use / Frecuencia de uso de la magnificación :

°Every procedures / Todos los procedimientos
°Only for Endodontics / Solo para Endodoncia
°Only for difficult cases / Solo para casos difíciles
°Less than once per week / Menos de una vez por semana

10. For how long have you been using Magnification ? / Cuánto tiempo lleva utilizando magnificación ?

°< 5 years / < 5 años
°5 - 10 years / 5 - 10 años
°11 - 20 years / 11 - 20 años
°> 20 years / > 20 años

11. What aspects of treatment improve with magnification ? (Can select more than one) / Qué aspectos del tratamiento mejoran con la magnificación ? (Se puede seleccionar más de una opción)

°Canal location (calcified or not) / Localización del canal (Calcificado o no)
°Perforations / Perforaciones
°Fractures, cracks / Fracturas, grietas
°Separated files / Limas separadas
°Decrease in working time / Reducción del tiempo de trabajo
°Ergonomics (posture, reduced fatigue) / Ergonomía (postura, reducción de la fatiga)

12. Does Magnification improve clinical outcomes ? / La magnificación mejora los resultados clinicos ?

°Yes / Sí
°No

13. Would you recommend using magnification ? / Recomendaría el uso de magnificación ?

°Yes / Sí
°No

14. If you don't use Magnification, what is the main reason ? (Can select more than one) / Si no utiliza la magnificación, cuál es la razón principal ? (Se puede seleccionar más de una opción)

°Cost / Precios
°Learning curve / Curva de aprendizaje
°Not available at workplace / No disponible en el lugar de trabajo
°Don't consider it useful / No lo considero útil

15. Are you interested in receiving training ? / Te interesa recibir formación ?

°Yes / Sí
°No
°Maybe / Quizás