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SURVEY RESEARCH: SIGNIFICANCE OF IRRIGATION IN ENDODONTIC PROCEDURES

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ABSTRACT

The success of an endodontic treatment depends upon how efficiently the microbes are eradicated from the root canal. Irrigation is a key part of successful root canal treatment, because it is the only way to reach and impact those areas of the root canal wall which cannot be processed with mechanical instrumentation. It fulfils several more important mechanical, chemical and microbiological functions: it reduces friction between the instrument and dentine, improves the cutting effectiveness of the files, dissolves tissue, cools the file and tooth, and furthermore, it has a washing effect and an antimicrobial/antibiofilm effect.

Aim: The purpose of this study was to investigate various types of endodontic irrigants used by general dental practitioners (GDPs) and specialists in the Balkans as well as their effectiveness in practice.

Methodology: An online questionnaire consisted of fifteen questions related to the irrigant used in root canal treatment.

Results: Sodium Hypochlorite (84%) was the most preferred irrigant. Activation of irrigant was not routinely employed among dentists.

Conclusion: The present study revealed that focus should be made on continuous educational programs to update the dentists with recent information and protocols.

Keywords: Irrigation, endodontic treatment, endodontic irrigants, sodium hypochlorite

Introduction

The complex morphology of the endodontic space, poly-infection and resistance of microorganisms are the reasons why endodontic instruments and mechanical treatment alone cannot be effective during endodontic therapy. Mechanical treatment of root canals achieves cleaning and shaping of the main root canal, while certain parts of the root canal system, such as lateral canals, communications and apical delta are completely inaccessible for mechanical treatment. Between 35% and 53% of canal wall of the lateral canals, communications and apical delta are completely inaccessible for mechanical treatment and remain un-instrumented [1].

Untreated parts of the endodontic space are places of accumulation of microorganisms and their products which must be eliminated for a successful outcome of endodontic treatment.

Irrigation is the only way to reach and treat those areas of the root canal that are not touched by mechanical instrumentation. Therefore, irrigation is a key part of successful root canal treatment as it fulfills several important mechanical, chemical and (micro) biological functions, including healing of periapical tissues. [2] The goals of irrigation are the removal of pulp tissue (vital and necrotic), the organic component of the root canal, the destruction and inactivation of microorganisms from the canal system, as well as the removal of the inorganic component or smear layer. [3-5] Furthermore, irrigation removes dentinal debris that occurs during instrumentation and provides wetting of the canal and lubrication instrument. The goals of irrigation are achieved by flowing irrigants through the endodontic space representing the mechanical effect of irrigants, and by dissolving the organic and inorganic contents of the canal and inactivating bacteria, which represents the chemical effect of irrigants. [6-8]

Aim

The purpose of this study was to investigate various types of endodontic irrigants used by general dental practitioners (GDPs) and specialists in the Balkans as well as their effectiveness in practice.

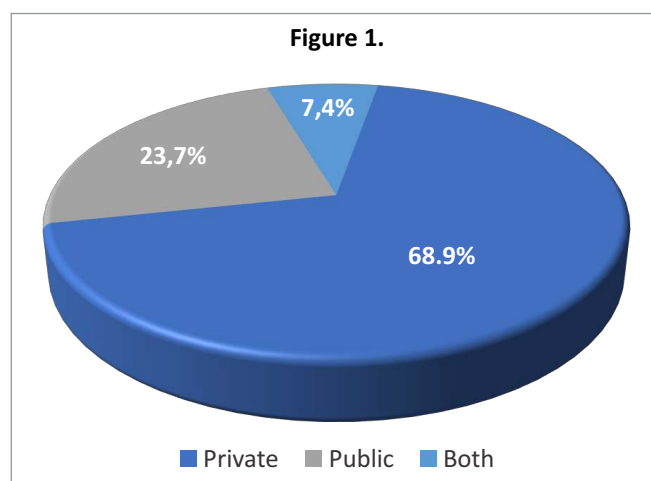
Materials and methods

An online questionnaire was sent to a total of 600 dentists registered in the West Balkans states. It consisted of 16 questions regarding the gender, years of experience, the irrigant used, the concentration of irrigant used, its volume, whether the choice of irrigation differs depending on the pulpal or periapical diagnosis, the addition of irrigation, the diameter of the needle during irrigation, depth of needle penetration, duration of irrigation along the root canal and smear layer removal.

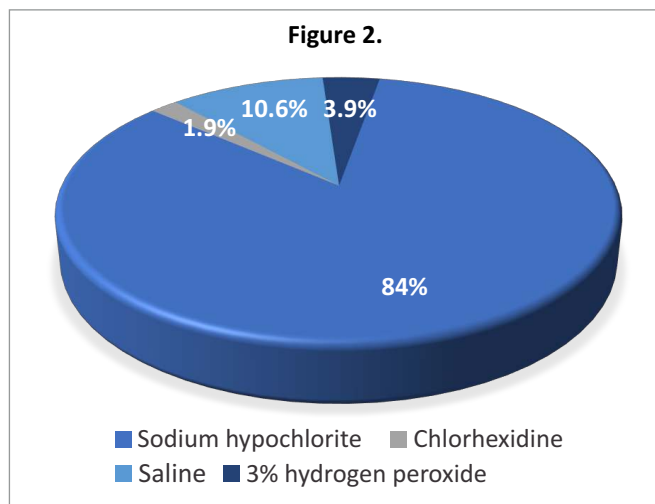
The survey was closed after 3 weeks. Blank or multiple answers were all treated as missing values; only single unequivocal replies were included in calculating frequencies and percentages.

Results

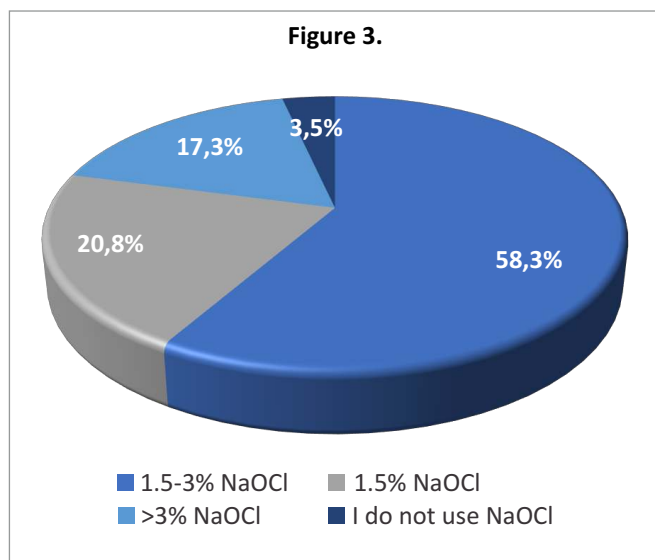
Out of 600 questionnaires mailed, 566 useable responses were received, of which almost 70% were answered by doctors of private practices (figure 1).



The results indicated that >84% of respondents were using sodium hypochlorite as their primary irrigant and 10% of respondents were preferring saline. (Figure 2).

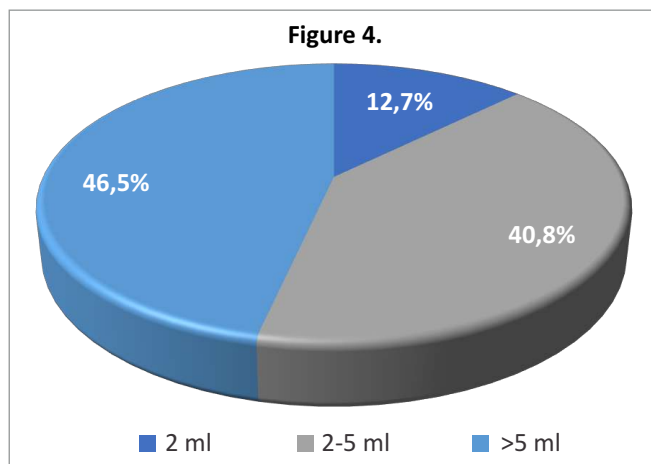


Most of the practitioners (58 %) use sodium hypochlorite (NaOCl) and only 3,5% of respondents have declared that they do not use NaOCl in their practice (Figure 3).

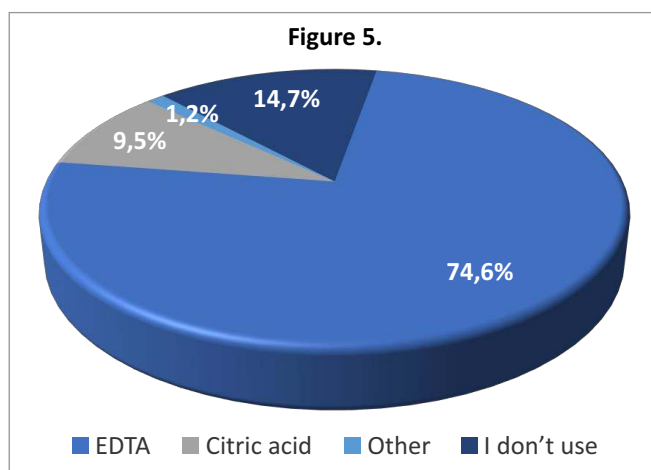


Concentration of NaOCl preferred by dentists is 1.5-3% NaOCl (58.3%), where 20% of them use 1.5 %.

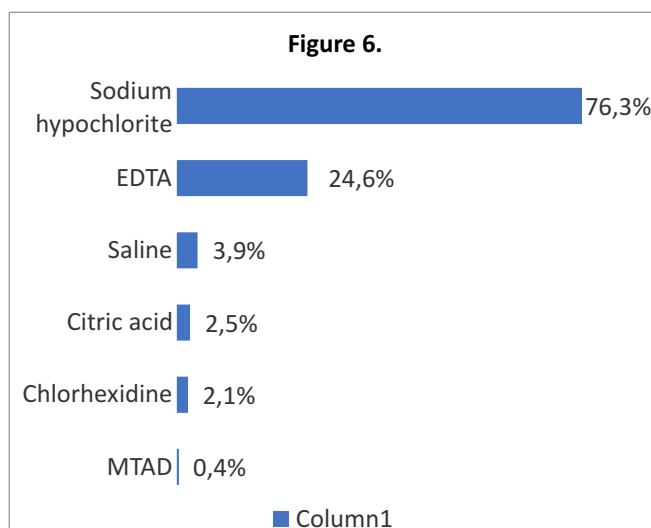
When rinsing one root canal, 46,5% of practitioners stated that they use more than 5 ml of irrigant (Figure 4).



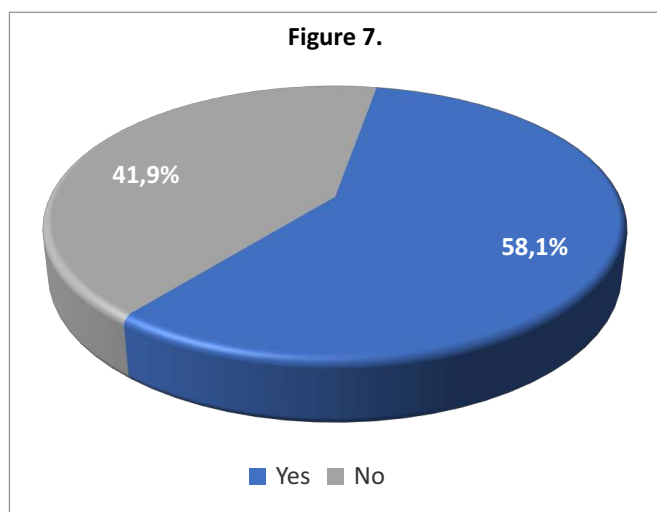
Almost 74,6% of respondents use EDTA as a chelator, and 10% use citric acid (Figure 5).



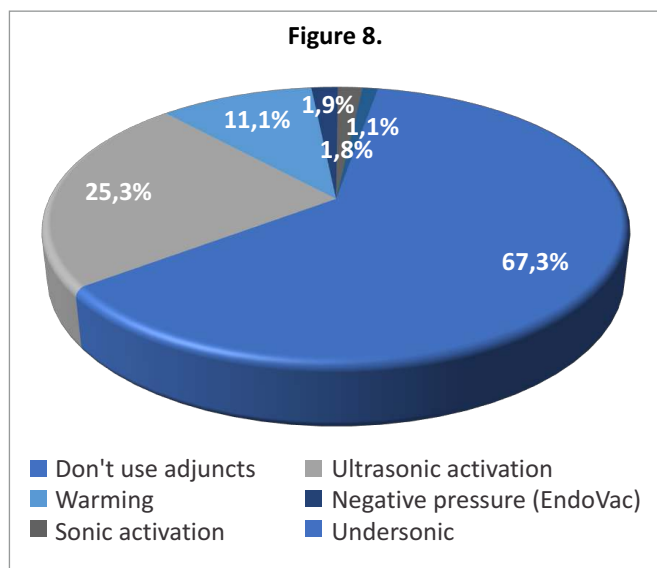
Most respondents (76,3%) considered NaOCl as the most effective at decomposing organic content, while 24,6% have chosen EDTA (Figure 6).



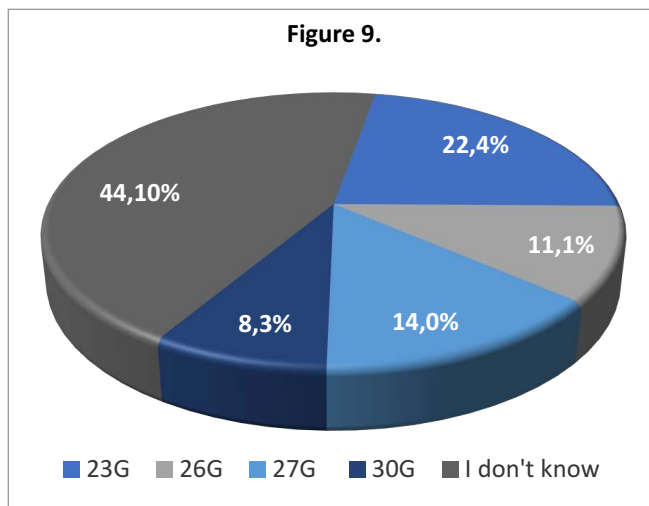
Less than 42% of respondents do not make a difference in the choice of irrigation depending on the pulpal or periapical diagnosis (Figure 7).



67,3% of practitioners answered that they do not use adjuncts for irrigation, 11,1% chose to warm the irrigation, and less than 26% use an ultrasonic activation (Figure 8).



The efficacy of irrigation depends on the proximity of the needle to the working length. When asked what diameter of the needle they use for root canal irrigation, less than 44,10% of respondents answered that they do not know what the diameter of the needle is, while 22,4% use a 23G needle (figure 9). When asked how deep the penetration depth of the needle they use for



irrigation, 31% answered 4mm, 30% 3mm, 27% 2mm and 13% answered 1 mm from the apical opening.

Discussion:

The aim of root canal treatment is to clean the root canal by considering biological, chemical and mechanical objectives. Irrigation plays a vital role in removing microbes and debris from the canals. It has several important functions which may vary according to the irrigant used: it reduces friction between the instrument and dentine, improves the cutting effectiveness of the files, dissolves tissue, cools the file and tooth and it has a washing effect and an antimicrobial/antibiofilm effect.

There is no single irrigating solution that alone sufficiently covers all of the functions required from an irrigant. Optimal irrigation is based on the combined use of two or several irrigating solutions, in a specific sequence, to predictably obtain the goals of safe and effective irrigation.

In a survey conducted in North Jordan, it was found that only 32.9% of general dentist respondents used sodium hypochlorite and 33.6% used hydrogen peroxide during root canal treatment. In this study, it was found that 84% of participants preferred Sodium hypochlorite solution while 10.6% of respondents used saline. [9]

Although 58.1% of respondents in this study stated that their choice of irrigant might change on the basis of pulpal and periapical diagnosis, their primary irrigant was still overwhelmingly sodium hypochlorite.

When asked about adjuncts used for irrigation, participants were given choices including ultrasonic activation, sonic activation, subsonic activation, negative pressure and irrigant warming. In this study 67% opted for the option none.

In this study it was found that almost 44% GPDs do not know do not know what the diameter of the needle they use during irrigation.

Conclusion

Irrigation definitely plays a key role in successful endodontic treatment. It is impossible to set a universal irrigation protocol because it depends on many factors and especially on the basic diagnosis. The basic guideline would be that it is necessary to combine irrigants in order to achieve the full effect of removing organic tissue, eliminating microorganisms as well as removing the remaining smear layer. [10]

Root canal rinses should be non-toxic, antibacterial, lubricating and dissolve organic and inorganic tissues removing the residual layer. Currently, no remedy meets all the requirements, so the solution to overcome the shortcomings of currently available irrigants is to use a combination of chemicals to rinse root canals with the activation of irrigation.

More similar studies should be conducted to know more about the irrigation preferences in root canal treatment and focus should be made on continuous educational programs to update the dentists with recent information and protocols.

References

1. Peters OA, Laib A, Göhring TN, Barbakow F. Changes in root canal geometry after preparation assessed by high-resolution computed tomography. *J Endod.* 2001;27:1–6.
2. Haapasalo M, Shen Y, Qian W, Gao Y. Irrigation in endodontics. *Dent Clin North Am.* 2010; 54(2):291-312.
3. Konjhodžić A, Jakupović S, Tahmiščija I, Korać S, Hasić-Branković L, Džanković A. *Endodontic propaedeutics*, 1 ed. Sarajevo: Faculty of Dentistry with Clinics; 2017.
4. Basrani B., *Endodontic irrigation: chemical disinfection of the root canal system*. Cham, Switzerland: Springer International Publishing AG, 2015.
5. Schäfer E. Irrigation of the root canal. *ENDO.* 2007;1(1):11-27.
6. Gu LS, Kim JR, Ling J, Choi KK, Pashley DH, Tay FR. Review of contemporary irrigant agitation techniques and devices. *J Endod* 2009;35(6): 791–804
7. Sharma S., *Role Of Irrigation In Root Canal Treatment-* 10.13140/RG.2.2.27721.98406, 2020
8. Kaur P., *Role of Irrigants in Endodontics.* *J Dent Probl Solut* 7(2): 100-104. DOI: 10.17352/2394-8418.000093, 2020)
9. Tarek Rabi. Irrigation protocol among Palestinian General Dental Practitioners. Al Quds University, Palestine, *International Journal of Dental and Health Sciences*, 2005.
10. Prada I, Micó-Muñoz P, Giner-Lluesma T, Micó-Martínez P, Muwaquet-Rodríguez S, Albero-Monteagudo A. Update of the therapeutic planning of irrigation and intracanal medication in root canal treatment. A literature review. *J Clin Exp Dent.* 2019 Feb 1;11(2):e185-e193.