Type of Manuscript: *KAP survey*

Assessment of Knowledge, Attitude and Practice based Survey on the Use of Ultrasonics in Endodontics among Practitioners

Mulumoodi Rama Sowmya[1], Pradeep.S[2], Adimulapu Hima Sandeep[3]

[1]Research Associate, Dental Research Cell, Department of Conservative Dentistry and Endodontics, [2]Reader, Department of Conservative Dentistry and Endodontics, [3]Senior lecturer, Department of Conservative Dentistry and Endodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-77, India.

Abstract

During the past few centuries, endodontics has benefitted from the latest technologies and new techniques, Ultrasonics being one of them. Ultrasonics in endodontics has been used for various purposes such as refining of access cavities, irrigation, removal of pulp stones/ metallic posts/ fractured instruments. It is also being used in surgical endodontics which include procedures such as root end resection and microsurgeries. Ultrasonics thus plays a key role in the successful outcome of endodontic therapy. The present survey was conducted among postgraduate students in endodontics, general dental practitioners and endodontists. The aim of the present survey is to assess the knowledge, attitude and practice regarding the use of ultrasonics in endodontics among practitioners. Questionnaire based survey comprising 19 questions divided into knowledge based, attitude based and practice based questions. The questionnaire was circulated via electronic media through mails. A 200 responses were received from the respondents,.The responses were viewed in M.S. office excel and the results were interpreted using graphs by SPSS 23.0 Version.39% of postgraduates in endodontics, 40% of Endodontist and 21% of general dentists participated in this survey.This survey enables the reader to get a better understanding of the precise and indispensable use of ultrasonics in endodontic practice. Within the limitations of the study, it shows that the knowledge with respect to ultrasonics in endodontics is moderate compared to attitude and practice among respondents.This survey indicated the need for educational intervention to improve the knowledge,attitude and practice on the use of ultrasonics in endodontics among dentists.

Key words: *Applications of Ultrasonics; Endodontics;Endosonics;KAP survey;Ultrasonics.*

Introduction

The use of ultrasonics or ultrasonic instrumentation was first introduced into dentistry for cavity preparation using an abrasive slurry, and its aids in thorough cleaning of teeth which helps in bonding of the laminates to tooth.[1]

Corresponding Author
Pradeep.S
Reader, Saveetha Dental College and hospitals,
Saveetha Institute of Medical and Technical Sciences,
Saveetha University, 162, Poonamallee High Road,
Chennai – 600077, Tamil Nadu, India
Contact no.: 9710404482
E- Mail: pradeeps@saveetha.com

However a different application was introduced in 1955, when Zinner reported its use to remove deposits on the tooth surface.[2] This was improved by Johnson and Wilson into an established tool in Periodontics, the ultrasonic scaler. The concept of ultrasonics in Endodontics was introduced by Richman in 1957. However, it was Martin et al, who demonstrated the ability of ultrasonically activated k files to cut dentin to use it in preparation of root canals. The term 'Endosonics' denotes the ultrasonic and synergistic system of root canal instrumentation and disinfection. It was coined by Martin and Cunningham.[3]

Ultrasound is sound energy with a range of frequency between 25kHz and 40kHz. There are two basic methods of producing ultrasound- magnetostriction and piezoelectric. [2] The two biophysical effects of

ultrasound are acoustic streaming and cavitation. Acoustic streaming is the rapid, turbulent and circular movement of the fluid around a vibrating file producing shear stresses arising from frictional forces. Cavitation can be described as the impulsive formation of cavities or bubbles in a liquid through tensile forces induced by high speed. These bubbles expand and rapidly collapse producing a focus of energy leading to intense sound and damage.[4]

There are various applications of ultrasonics in endodontics which are as follows: [5–7]

- Access refinement, negotiating calcified canals and removal of pulp stones.

- Removal of any obstructions within the canal such as separated instruments, root canal posts, fractured metallic posts [8].

- Increased action of irrigating solutions.

- Irrigation, disinfection.

- Ultrasonic condensation of gutta percha.

- Surgical endodontics: root end resection, refinement and placement of root end obturating material.[9]

- Root canal preparation.

There are contemporary endodontic ultrasonic machines and ultrasonic tips to perform all the functions related to endodontics. The current endodontic ultrasonic tips and attachments are [10]

- Access refinement and apical microsurgery tips:pro endo tips #1 to #8 designed by Clifford Ruddle.

- Microprojection tips.

Ultrasonic action plays an important role in irrigation.[11] Basically, there are two types of irrigation-passive ultrasonic irrigation, ultrasonic irrigation and instrumentation/continuous ultrasonic irrigation. Passive ultrasonic irrigation is the technique of ultrasonic activation after the completion of instrumentation. The term passive implies only activating the irrigant but not contacting or cutting dentin.[6]

Continuous ultrasonic irrigation is achieved by simultaneously and continuously delivering irrigation during ultrasonic activation. It is more effective comparatively. The use of ultrasonics in endodontics is cropping up and many new techniques and machines have been put into use.[12]

The foray of ultrasonics into Endodontics has eased quite a few hiccups in clinical practice such as negotiating the calcified canals, removal of pulp stones or fractured instruments or dislodged posts within the canal. It has also uplifted the efficiency of the irrigation regime and ensured thorough irrigation of the root canal. This has improved the success rate of endodontics.The aim of this survey was to assess the knowledge, attitude and practice of ultrasonics in endodontics among endodontists, postgraduate students in endodontics and general practitioners.

Materials and Methods

The survey was conducted in May 2020 among General dentists, PG students in endodontics, Endodontists to assess the knowledge, attitude and practice regarding the use of ultrasonics in endodontics.

This questionnaire based survey consisted of 19 questions with multiple choice. The questionnaire was divided into demographic data, knowledge based and attitude based. The questionnaire was circulated via electronic media through mail.

Statistical analysis:The collected data was converted into excel sheets. Bar graphs and pie charts were used for pictorial representation of the result of the study.

Results and Discussion

200 responses were received from the respondents. Among the 200 responses received from the participants, 57% consisted of females and 43% males. 31.5% of the participants were of the age group 20-30 yrs. Majority of the participants were General Dentists [40%] followed by PGs in endodontics [39%] followed by Endodontists [21%]. 36% of the participants had a professional experience within 5 years whereas 64% of the participants had a professional experience of more than 5 years. (Table 1)

Based on the knowledge of the participants based on the usage of Ultrasonics in Endodontics, about 76.5% of participants are aware that both acoustic streaming and cavitation are the biophysical effects of Ultrasonics. Regarding the thread patterns used in ultrasonic units, 69.9% of participants are aware that both E&S thread patterns are the types of thread patterns. Regarding the frequency of ultrasonic irrigation it can be seen that there is lack of proper knowledge about it as 46.5% of participants find 10-15Hz as frequency of irrigation unit whereas only 30% of participants correctly knew that the frequency of irrigation was 25-30Hz [Figure 1]. Regarding the types of ultrasonic irrigation, 77.6% of participants are aware that both passive and continuous ultrasonic irrigation are the types of ultrasonic irrigation [Figure 2]. Based on the analysis done by Chi square test three responses have shown statistically significant difference between fields of practice and the responses based on their knowledge regarding ultrasonics [$p<0.05$], whereas one response has shown statistically insignificant difference [$p>0.05$].

Depending on the attitude of participants regarding the usage of ultrasonics in Endodontics, 46.6% of participants opted that sonic,subsonic,negative pressure and ultrasonic irrigation are the best adjuncts for irrigation. 69.8% of participants preferred ProEndo ultrasonic tips for access refinement. 41.5% of participants opined that ultrasonic tips aided in negotiating the calcified canals precisely [Figure 3]. 44% of the participants preferred continuous ultrasonic irrigation as the best over the others [Figure 4]. Based on the analysis done by Chi square test two responses have shown statistically significant difference between fields of practice and the responses based on their attitude towards ultrasonics [$p<0.05$], whereas two responses have shown statistically insignificant difference [$p>0.05$] .

Depending on the practice of Ultrasonics in Endodontics, 45% of participants recommended ultrasonics in pulp stone removal and locating calcified canals. 57% of the participants are aware that ultrasonic tips can be used in root end resection. 61.5% of the participants recommended ultrasonic tips in cases of access refinement and 50% of the participants recommended ultrasonic tips in root canal disinfection procedures. Regarding the types of ultrasonic tips in endodontics, 76.5% of the participants are aware of the types. 27 % of the participants recommended ProEndo #7&#8 tips for pulp stone removal and 18% of participants recommended ProEndo #1 & #2 tips for the same whereas 56% recommended both the types for pulp stone removal [Figure 5]. 84% of participants preferred ultrasonic tips in case of removal of metallic posts [Figure 6]. Most of the participants (82.6%) are willing to attend CDE programs on usage of Ultrasonics in Endodontics.Based on the analysis done by Chi square almost all responses have shown statistically significant difference between fields of practice and the responses based on their practice towards ultrasonics [$p<0.05$].

Table 1: Showing Demographic Data of participants: 39% of Postgraduates in endodontics, 40% of Endodontist and 21% of general dentists were participated in this survey, 36.5% were belong to 0-5 years of experience, 33.5% belong to 6-10 years of experience, 21% belong to 11-15 years of experience and 9% belong to >15 years of experience.

Demographic variables	Categories	No. of respondents	Percentage%
Gender	Male	86	43
	Female	114	57
	Total	200	100
Age(years)	20-30 y	63	31.5
	31-40 y	59	29.5
	41-50 y	51	25.5
	>50 y	27	13.5

Cont... **Table 1: Showing Demographic Data of participants: 39% of Postgraduates in endodontics, 40% of Endodontist and 21% of general dentists were participated in this survey, 36.5% were belong to 0-5 years of experience, 33.5% belong to 6-10 years of experience, 21% belong to 11-15 years of experience and 9% belong to >15 years of experience.**

Field of practice	PG (Endodontics) Endodontist General Dentist	78 80 42	39 40 21
Years of experience	0-5 6-10 11-15 >15	73 67 42 18	36.5 33.5 21 9

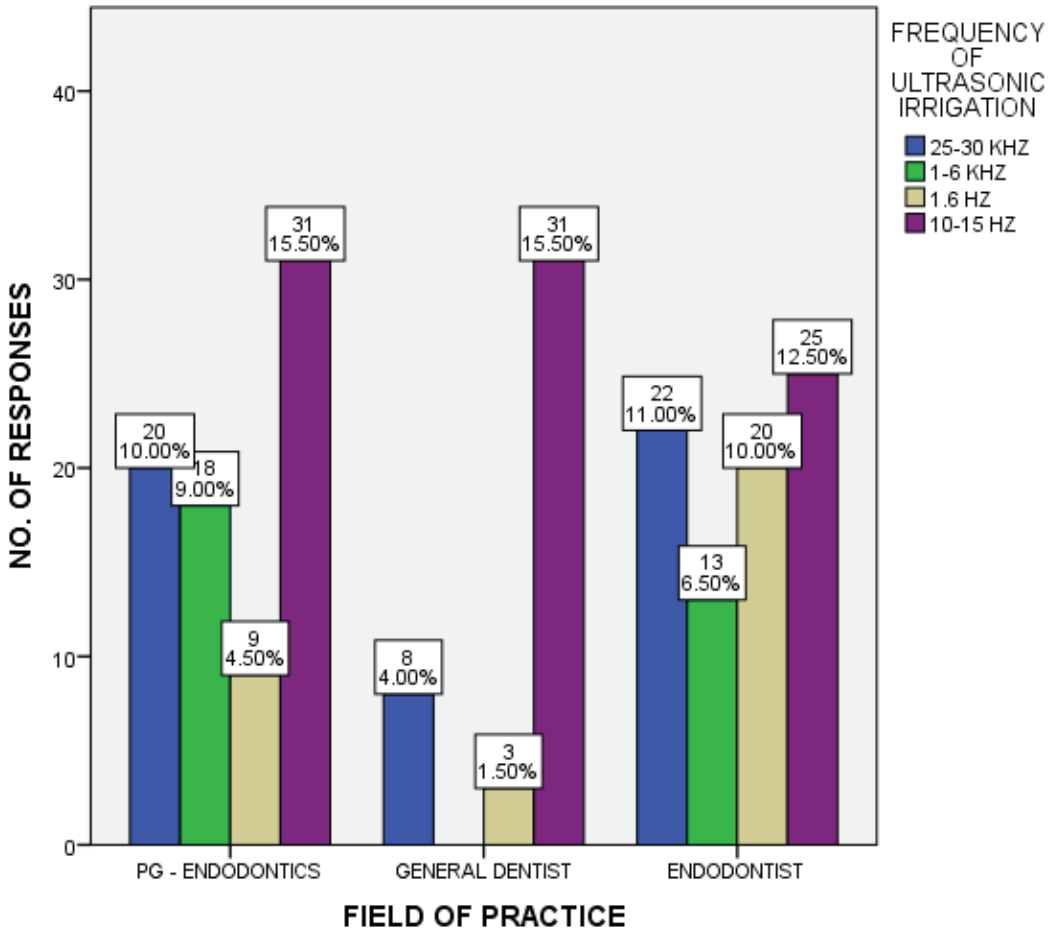

Figure 1: Bar graph showing the association between the field of practice of the participants and responses to the frequency of ultrasonic irrigation. X axis denotes the field of practice, Y axis denotes the number of responses, where blue denotes 25-30kHz, green denotes 1-6kHz, light brown denotes 1.6Hz and purple denotes 10-15 Hz. The association was analyzed using Chi square test and was found to be statistically significant,[chi square value =29.18; p value =0.00 (p<0.05)], proving that general dentists and postgraduate students have better knowledge regarding the frequency of ultrasonic irrigation compared to endodontists.

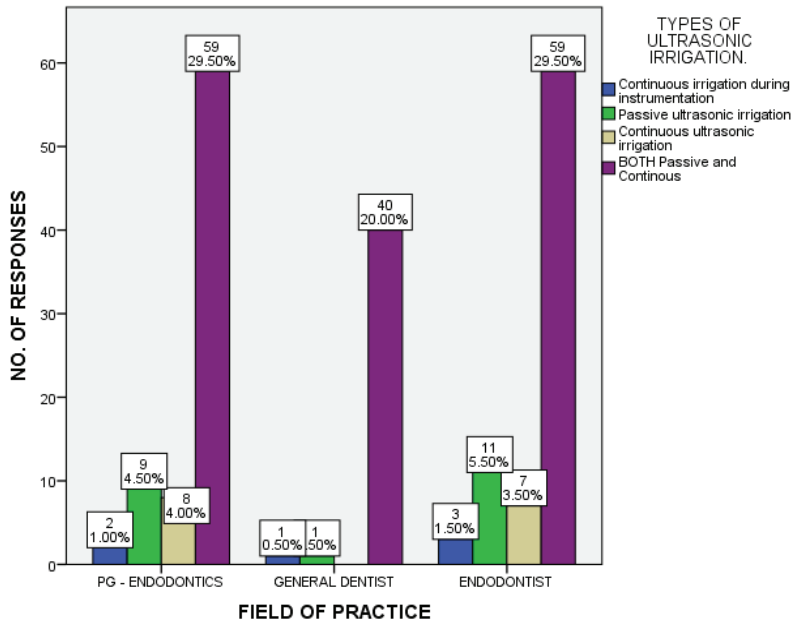

Figure 2: Bar graph showing the association between the field of practice of the participants and responses to the types of ultrasonic irrigation. X axis denotes the field of practice, Y axis denotes the number of responses, where blue denotes continuous irrigation during instrumentation, green denotes passive ultrasonic irrigation, light brown denotes continuous ultrasonic irrigation and purple both continuous and passive ultrasonic irrigation. The association was analyzed using Chi square test and was found to be statistically not significant, [chi square value=9.67; p value =0.13 (p>0.05)], proving that all the respondents have adequate knowledge regarding types of ultrasonic irrigation.

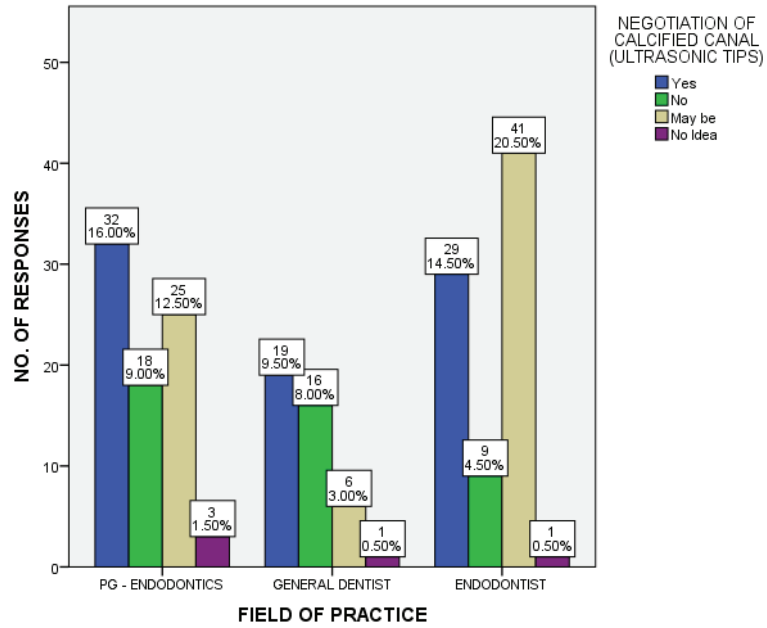

Figure 3: Bar graph showing the association between the field of practice of the participants and responses to the ultrasonic tips aiding in negotiation of the canal. X axis denotes the field of practice, Y axis denotes the number of responses, where blue denotes yes, green denotes no, light brown denotes maybe and purple denotes no idea. The association was analyzed using Chi square test and was found to be statistically significant, [chi square value=22.04; p value =0.00 (p<0.05)], endodontists (20.5%) have better awareness of ultrasonic tips aiding in negotiating the canal compared to postgraduate students and general dentists.

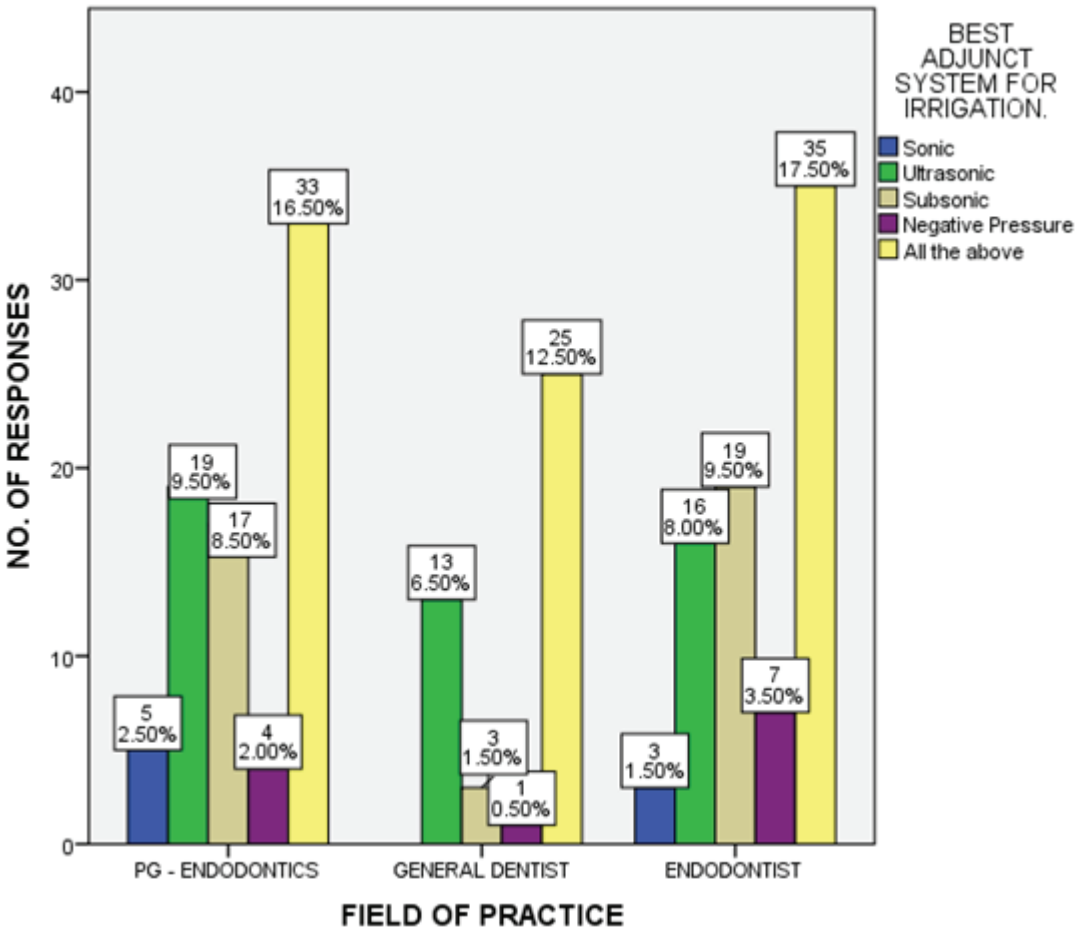

Figure 4: Bar graph showing the association between the field of practice of the participants and responses to the best adjunct for ultrasonic irrigation. X axis denotes the field of practice, Y axis denotes the number of responses, where blue denotes sonic irrigation during instrumentation, green denotes ultrasonic irrigation, light brown denotes subsonic irrigation and purple negative pressure irrigation and yellow denotes all. The association was analyzed usingChi square test and was found to be statistically not significant,[chi square value =12.43; p value =0.13 (p>0.05)], proving that all the respondents have adequate awareness about the adjuncts of irrigation.

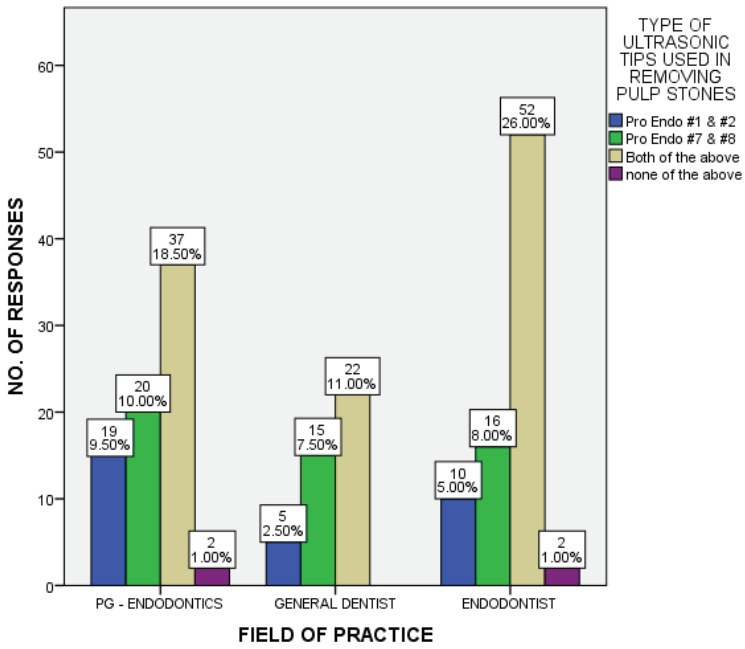

Figure 5: Bar graph showing the association between the field of practice of the participants on the usage of ultrasonic tips in case of removing pulp stones. X axis denotes the field of practice, Y axis denotes the number of responses, where blue denotes Pro Endo #1 & #2, green denotes Pro Endo #7 & #8, light brown denotes both and purple denotes none. The association was analyzed using Chi square test and was found to be statistically not significant' [chi square value=10.50;p value =0.12 (p>0.05)], proving that all the practitioners recommended both the types of ultrasonic tips in removing pulp stones.

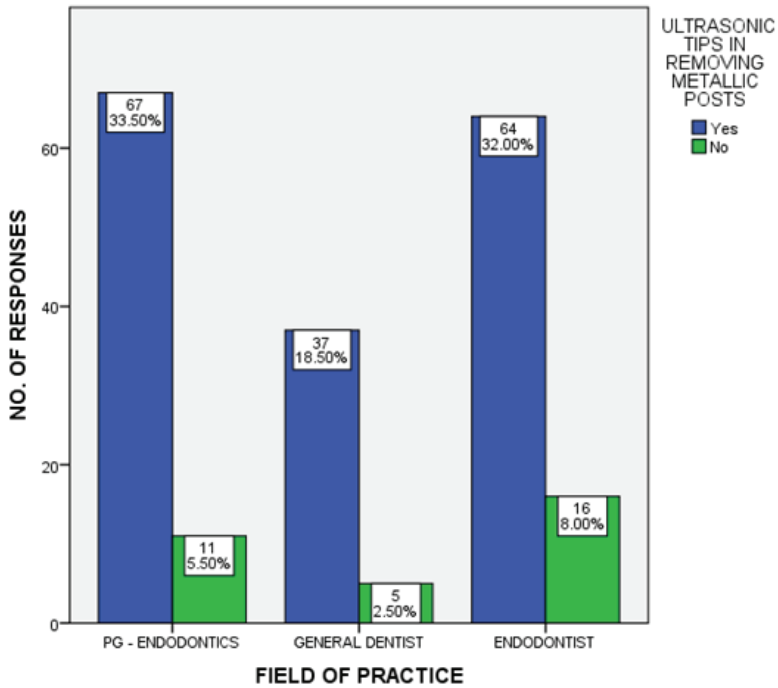

Figure 6: Bar graph showing the association between the field of practice of the participants and the recommendation of ultrasonic tips in removing metallic posts. X axis denotes the field of practice, Y axis denotes the number of responses, where blue denotes yes, green denotes no. The association was analyzed using Chi square test and was found to be statistically not significant' [chi square value=1.68;p value =0.43 (p>0.05)],proving that all the practitioners recommend ultrasonic tips in removing metallic posts.

The main objective of this study is to analyse the appropriate knowledge and usage of ultrasonics in clinical practice and dental institute among general dentists, post graduate students in Endodontics and Endodontists. This study discusses various applications and aspects of ultrasonics in Endodontics. According to literature review, ultrasonics were introduced in dentistry in conservative field to perform cavity preparation.[13] Later it was used in the field of Periodontics to perform scaling. The application of Ultrasonics in Endodontics is credited to Richman.[3] In a previous study conducted by Cesar de Gregario, he found that endodontists were more aware about disinfection with ultrasonics compared to general dentists. [14] Previous studies have reported the compromised efficacy of manual irrigation using conventional methods, as these methods could not reach the anatomical complexities and isthmuses to clean and irrigate effectively.[15,16] An in vivo study on ultrasonic irrigation in human molars conducted by Rubin Gutarts et al showed that the efficacy of Ultrasonic irrigation is superior compared to manual conventional methods.[17] He also showed that the isthmus cleanliness improved and the success rate ranges from 15 to 38%.[18] These results were in accordance with Lev et al, Goodman et al, Haidet et al,Metzler et al and Archer et al and confirmed that complete tissue removal from isthmus is impossible with hand/rotary cleaning and shaping alone. In our present study, 42.5% of the respondents also opine that ultrasonic irrigation is the best.[19,20]

In an in vitro study done by David E.Stamos et al, he compared the debridement ability of hand, sonic and ultrasonic instrumentation.[21,22] He said sonic and ultrasonic debridement was faster and superior compared to the hand/ conventional method. But he also reported that statistical analysis indicated no significant difference in canal and isthmus cleanliness at 3 mm level. However, he postulated that ultrasonics using 2.5% of NaOCl exhibited the treatest percentage of canal and isthmus cleanliness. [7,23]

In a study conducted by Anny Carine Barros et al, he demonstrated the effects of ultrasonic tips on intraradicular post removal. [24] He concluded that the most effective way in reducing force required for intraradicular post removal is to use ultrasonic vibration with elongated cylindrical shaped and activated tips. This was in accordance with the study conducted by Atiyeh Feiz et al, where he concluded that ultrasonics were effective in removal of prefabricated metal posts [24] which is in accordance with our survey where 84% of the respondents opine that ultrasonic tips are effective in removal of metallic posts.

An in vitro study on the success of ultrasonic technique in removing fractured instruments from the root canal was conducted by Hasan et al. He concluded that the success rate was 80%[25,26]. P.Jain et al conducted a study on using ultrasonic tips to remove pulp stone from the canal. In his study, he could successfully remove a 16 mm long pulp stone from the maxillary first molar.[27] But in our survey, only 45% of the respondents are aware and assume that ultrasonic tips aid in the removal of pulp stones which does not correlate with the percentage of success in the previous studies.

Ellen Paark et al said that wide array of ultrasonic tips that are currently available i.e., Pro Endo ultrasonic tips #1 # 8 are useful in access refinement and also microsurgery ultrasonic tips are effective in root end surgeries.[4,28] In our survey 57% of the respondents avail the benefits of microsurgery tips for root end resection and 61% of the respondents find ultrasonic tips better for access refinement.

However, there are certain limitations of ultrasonics [29,30] : The technique is operator dependent, Ultrasonics cannot be used for deeper structures in case of surgeries as the ultrasound waves could be potentially damaging, decreasing tactile sensitivity initially.

Surveys help in assessing the level of knowledge attained by the practitioners/participants and also enables the researchers to reach a wider group of population and assess the awareness, knowledge and practice of the practitioners especially regarding the recent advancements in the field of dentistry.

The limitations of our survey are:

- Confined to a smaller number of respondents.
- Cannot be generalized to a large population.
- Web based surveys are inaccessible to challenging respondents who may lack access to the survey.
- Sampling errors arise due to online surveys.

- Open ended questions and responses might lead to interviewer bias.

In future, a larger population, particularly for a certain speciality/age/ experience group among dentists should be studied.

Conclusion

This survey was done to assess the knowledge, attitude and practice regarding the use of ultrasonics in Endodontics. This survey enables the reader to get a better understanding of the precise and indispensable usage of Ultrasonics in Endodontic practice. Within the limitations of the study, it shows that knowledge with respect to ultrasonics in endodontics is moderate,compared to attitude and practice among respondents. It is recommended that CDE programs can be conducted for dentists to increase their awareness and to gain more knowledge about the usage of Ultrasonics in Endodontic practice.

Acknowledgements: We would like to acknowledge Mr. Arun's contribution (IT Department) for helping us to access the required data.

Conflicts of Interest: Nil.

Source of Funding: Self.

Ethical Clearance: It is taken from "Saveetha Institute Human Ethical Committee" (Ethical Approval Number- SDC/SIHEC/2020/DIASDATA/0619-0320)

References

1. Ravinthar K, Others. Recent Advancements in Laminates and Veneers in Dentistry. Research Journal of Pharmacy and Technology. 2018;11(2):785–7.
2. Plotino G, Pameijer CH, Grande NM, Somma F. Ultrasonics in endodontics: a review of the literature. J Endod. 2007 Feb;33(2):81–95.
3. Shahnaz N. Open Access Journal of Dental Sciences. Available from: https://www.academia.edu/download/57980114/ultrasonics_in_endodontics.pdf
4. Park E. Ultrasonics in endodontics. Endodontic Topics [Internet]. 2013; Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/etp.12044
5. Mozo S, Llena C, Forner L. Review of ultrasonic irrigation in endodontics: increasing action of irrigating solutions. Med Oral Patol Oral Cir Bucal. 2012 May 1;17(3):e512–6.
6. Gutarts R, Nusstein J, Reader A, Beck M. In vivo debridement efficacy of ultrasonic irrigation following hand-rotary instrumentation in human mandibular molars. J Endod. 2005 Mar;31(3):166–70.
7. Stamos DE, Sadeghi EM, Haasch GC, Gerstein H. An in vitro comparison study to quantitate the debridement ability of hand, sonic, and ultrasonic instrumentation. J Endod. 1987 Sep;13(9):434–40.
8. Jose J, Subbaiyan H. Different Treatment Modalities followed by Dental Practitioners for Ellis Class 2 Fracture–A Questionnaire-based Survey. Open Dent J [Internet]. 2020; Available from: https://opendentistryjournal.com/VOLUME/14/PAGE/59/FULLTEXT/
9. Janani K, Palanivelu A, Sandhya R. Diagnostic accuracy of dental pulse oximeter with customized sensor holder, thermal test and electric pulp test for the evaluation of pulp vitality: an in vivo study. Brazilian Dental Science. 2020;23(1):8.
10. Shahabi Nejad H, Ghassemi A, Pishbin L, Shahravan A. Success of Ultrasonic Technique in Removing Fractured Rotary Nickel-Titanium Endodontic Instruments from Root Canals and Its Effect on the Required Force for Root Fracture [Internet]. Vol. 39, Journal of Endodontics. 2013. p. 824–8. Available from: http://dx.doi.org/10.1016/j.joen.2013.02.008
11. Manohar M, Sharma S. A survey of the knowledge, attitude, and awareness about the principal choice of intracanal medicaments among the general dental practitioners and nonendodontic specialists [Internet]. Vol. 29, Indian Journal of Dental Research. 2018. p. 716. Available from: http://dx.doi.org/10.4103/ijdr.ijdr_716_16
12. Mayer BE, Peters OA, Barbakow F. Effects of rotary instruments and ultrasonic irrigation on debris and smear layer scores: a scanning electron microscopic study. Int Endod J. 2002 Jul;35(7):582–9.
13. Nandakumar M, Nasim I. Comparative evaluation of grape seed and cranberry extracts in preventing enamel erosion: An optical emission spectrometric analysis. J Conserv Dent. 2018 Sep;21(5):516–20.
14. de Gregorio C, Estevez R, Cisneros R, Heilborn C,

Cohenca N. Effect of EDTA, sonic, and ultrasonic activation on the penetration of sodium hypochlorite into simulated lateral canals: an in vitro study. J Endod. 2009 Jun;35(6):891–5.

15. Rajendran R, Kunjusankaran RN, Sandhya R, Anilkumar A, Santhosh R, Patil SR. Comparative Evaluation of Remineralizing Potential of a Paste Containing Bioactive Glass and a Topical Cream Containing Casein Phosphopeptide-Amorphous Calcium Phosphate: An in Vitro Study [Internet]. Vol. 19, Pesquisa Brasileira em Odontopediatria e Clínica Integrada. 2019. p. 1–10. Available from: http://dx.doi.org/10.4034/pboci.2019.191.61
16. Hussainy SN, Nasim I, Thomas T, Ranjan M. Clinical performance of resin-modified glass ionomer cement, flowable composite, and polyacid-modified resin composite in noncarious cervical lesions: One-year follow-up. J Conserv Dent. 2018 Sep;21(5):510–5.
17. Noor S. Chlorhexidine: Its properties and effects. Research Journal of Pharmacy and Technology [Internet]. 2016; Available from: http://www.indianjournals.com/ijor.aspx?target= ijor:rjpt& volume= 9&issue=10& article=052
18. Gu L-S, Kim JR, Ling J, Choi KK, Pashley DH, Tay FR. Review of contemporary irrigant agitation techniques and devices. J Endod. 2009 Jun;35(6):791–804.
19. Ramamoorthi S, Nivedhitha MS, Divyanand MJ. Comparative evaluation of postoperative pain after using endodontic needle and EndoActivator during root canal irrigation: A randomised controlled trial. Aust Endod J. 2015 Aug;41(2):78–87.
20. Ramanathan S, Solete P. Cone-beam Computed Tomography Evaluation of Root Canal Preparation using Various Rotary Instruments: An in vitro Study. J Contemp Dent Pract. 2015 Nov 1;16(11):869–72.
21. Teja KV, Ramesh S, Priya V. Regulation of matrix metalloproteinase-3 gene expression in inflammation: A molecular study. J Conserv Dent. 2018 Nov;21(6):592–6.
22. Teja KV, Ramesh S. Shape optimal and clean more. Saudi Endodontic Journal. 2019 Sep 1;9(3):235.
23. Siddique R, Sureshbabu NM, Somasundaram J, Jacob B, Selvam D. Qualitative and quantitative analysis of precipitate formation following interaction of chlorhexidine with sodium hypochlorite, neem, and tulsi. J Conserv Dent. 2019 Jan;22(1):40–7.
24. Feiz A, Barekatain B, Naseri R, Zarezadeh H, Askari N, Nasiri S. The influence of ultrasound on removal of prefabricated metal post cemented with different resin cements. Dent Res J . 2013 Nov;10(6):760–3.
25. Madarati AA, Qualtrough AJE, Watts DC. Endodontists experience using ultrasonics for removal of intra-canal fractured instruments [Internet]. Vol. 43, International Endodontic Journal. 2010. p. 301–5. Available from: http://dx.doi.org/10.1111/j.1365-2591.2009.01680.x
26. Kumar D, Antony S. Calcified Canal and Negotiation-A Review. Research Journal of Pharmacy and Technology. 2018;11(8):3727–30.
27. Jain P, Patni P, Hiremath H, Jain N. Successful removal of a 16 mm long pulp stone using ultrasonic tips from maxillary left first molar and its endodontic management. J Conserv Dent. 2014 Jan;17(1):92–5.
28. De Paolis G, Vincenti V, Prencipe M, Milana V, Plotino G. Ultrasonics in endodontic surgery: a review of the literature. Ann Stomatol . 2010 Apr;1(2):6–10.
29. van der Sluis LWM, Versluis M, Wu MK, Wesselink PR. Passive ultrasonic irrigation of the root canal: a review of the literature. Int Endod J. 2007 Jun;40(6):415–26.
30. Raja Keerthi R, Ms N. Natural Product as the Storage medium for an avulsed tooth--A Systematic Review. Cumhuriyet Dental Journal. 2019;22(2):249–56.