



KNOWLEDGE, ATTITUDE, AND PRACTICE SURVEY ON TECHNOLOGICAL ADVANCEMENTS IN ENDODONTICS AMONGST SPECIALIST

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Article History: Received: 12.12.2022

Revised: 29.01.2023

Accepted: 15.03.2023

Abstract

Introduction: The latest advancements in technology have a favorable prognosis in disease management. Innovative technology necessitates a thorough comprehension of the disease mechanism, which is a necessary prerequisite for mastering the art of learning. The purpose of this survey is to find out more about the knowledge, attitude, and practice on the awareness of technological advancements amongst specialists in the field of endodontics.

Materials and Methods: From November to January 2020 a cross-sectional survey was undertaken. Response was obtained from 220 participants. The questionnaire was distributed using the snowball sampling approach. There were 22 questions in the questionnaire. Eligibility criteria was endodontists and postgraduates pursuing MDS in Endodontics all over the country .

Results: Out of all, 78.5% of the specialists felt that technological advancements add a burden to the treatment cost of the patient, and 69.2% of them kept them away from upgrading their practice.

Conclusion: Majority of the endodontists were well aware of the technological advancements, but cost was a major factor for not upgrading their practice with the latest technologies.

Clinical Significance: To evaluate the knowledge and increase the understanding among advancements.

Keywords : Loupes, Endodontics, knowledge, attitude, practice, Microscope, Health, Education

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DOI: 10.31838/ecb/2023.12.s2.001

1. Introduction

Root canal therapy is the sole field of dentistry lacking a direct vision of the operative field and hence it solely depends on the experience of the clinician, radiographs and tactile perception. Endodontic practice level is an appropriate implementation or a desire for expert arbitration as set by expert organizations based on existing clinical and rational learning. Microscope revolutionized the quality and outcome of endodontic diagnosis and therapy.(1) (2) Till date, experimental evidence has been lacking in these technological advancements in the field and itself provide a more favorable long-term prognosis of root canal treatments.(2-4)

The advent of Cone Beam Computed Tomography in the field of endodontics helps in Endodontic diagnosis and origin, morphology of the root canals; root canal (fractures and trauma) assessment; externally or intra-root root analysis; invasive cervical resorption; presurgical design; extension of lesions; difficult anatomies; calcification of root canals; endodontic re-treatment; and iatrogenic errors such as perforations.(5-7)(8,9) Lasers have a wide range of application in the field of endodontics such as; Pulp vitality diagnostic, dentinal hypersensitivity treatment, pulp capping, and pulpotomy (vital pulp therapy), cleaning and shaping of root canal system and endodontic surgery .(10-14)

The latest advancements in advanced technology have a favorable prognosis, despite the fact that the innovative technology necessitates a thorough comprehension of the disease mechanism, which is a necessary prerequisite for mastering the art of learning the modern level of learning from the enhanced technology. The utilization of microscopy, loupes, CBCT represent improved innovation and the present an improved standard of training in endodontics.

The latest advancements in advanced technology have a favorable prognosis, despite the fact that the innovative technology necessitates a thorough comprehension of the disease mechanism, which is a necessary prerequisite for mastering the art of learning the modern level of learning from the enhanced technology. Previously our team had a rich experience in working on various research projects across multiple disciplines; (15-25)

As a result, the current research was conducted among endodontists to explore their insight, demeanor, and practice towards technological advancements in the field of endodontics and its utilization.

2. Materials and Methods

This cross-sectional survey was carried out in India between April and May 2020. Response from 220 participants was received. The Scientific Review

Board of Saveetha University gained ethical approval to conduct these studies. To spread the survey among the participants, the process of sampling used was snowball sampling. There were 22 questions including ethnicity, age and specialization. The questionnaire included 11 questions that are knowledge-based, 5 are attitude-based, and 6 are practice-based. 220 responses were evaluated and the output was tabulated in a clustered bar graph for each and every question.

Ethical Approval

The review board of the Institution of SIMATS, Chennai, India, gave the project ethical authorization and approval.

Eligibility Criteria

Registered endodontists and postgraduate students in the Conservative and Endodontics Department in India were included in the research population. The research did not include general dentists and specialists from other fields of dentistry .

Data Collection

A structured and self-administered questionnaire was prepared. Five registered endodontists accepted the 13-item questionnaire for face validity. The questionnaire's validity was determined by surveying a small group (n = 10) of dentists who were not part of the research population but met the study's inclusion and exclusion requirements. Each participant took the survey twice, with a gap of 1.5 weeks. Cohen's kappa coefficient was evaluated to evaluate the reliability of each participant's answer to determine if answers were consistent over time. The kappa from test-retest ranged from a low of 0.12 to 1.00, with a median coefficient of 0.47.

This cross-sectional survey was carried out between November and December of 2020. A questionnaire with 22 questions was created. These questions were broken down into four sections: demographic awareness, attitude, and practice. The questionnaire was distributed online through Google Forms, and participants responded. The data for 22 questions was collected and depicted in charts by using data from Google Forms.

Sample Size

In comparison to previous analysis the determination of sample size was to be 220 with a 95% degree of confidence. A total of 240 online questionnaires were distributed. Of these, 17 did not complete the survey, and three were partial forms that were omitted. As a result, the overall number of participants was 220.

Table 1: Questionnaire

Demographic

1. Age

a) 23 -30 yrs

- b) 31-40 yrs
 - c) 40-50 yrs
 - d) Above 50 yrs
2. Gender
- a) Male
 - b) Female
3. Speciality
- a) Post Graduate Student (Endo)
 - b) Endodontist
4. Years of clinical experience
- a) Less than 5
 - b) 5-10
 - c) 10-20
 - d) Above 20
5. Type of Clinical practice
- a. Private
 - b. Cooperate
 - c. Academic organization

Knowledge

6. How do you update yourself about the newer endodontic advancements ?
- a. Workshops
 - b. Journals
 - c. Social media
 - d. Others
7. Do you think the use of microscopes will decrease the number of appointments required for a Root Canal Treatment?
- a. Yes
 - b. No
8. Do you think there are sufficient training programs for the use of Microscopes in Endodontics?
- a. Yes
 - b. No
9. What is the greatest advantage of using a microscope over loupes?
- a. Increased precision
 - b. Improved illumination
 - c. Increased magnification
 - d. Less time consuming
10. The total magnification of a microscope depends on
- a. Focal length of the Binocular
 - b. Focal Length of the Objective Lens
 - c. Power of the eyepiece
 - d. Magnification Factor of The Changer
 - e. All of the above
11. What are the uses of Healozone ?
- a. Areas which are difficult to access traditionally
 - b. Demineralization of decayed teeth
 - c. Removal of caries
 - d. Prevention of dental phobia

12. Is CBCT a better diagnostic adjunct than RVG in the field of endodontics?
- a. Yes
 - b. No
 - c. Not aware

Attitude

13. Which of the following technologies do you think is time consuming ?
- a) CBCT
 - b) Lasers for Root Canal Treatment
 - c) Healozone
 - d) Microscopes for Root canal Treatment
 - e) None of the above
14. Is it possible to use a microscope in an everyday endodontic practice?
- a) Yes
 - b) No
15. Healozone is better than conventional methods for caries removal
- a) Agree Strongly
 - b) Agree
 - c) Neither Disagree nor Agree
 - d) Disagree
 - e) Disagree Strongly
16. Do you think CBCT is a necessary adjunct for every root canal treatment?
- a. Always
 - b. Sometimes
 - c. Never

17. Do you think the presence of the latest equipment in a clinic influences the patient's decision of choosing a clinic?
- 1. Agree Strongly
 - 2. Agree
 - 3. Neither Disagree nor Agree
 - 4. Disagree
 - 5. Disagree Strongly

Practice

18. For what procedures do you use microscopes in your endodontic practice ?
- a. Complex canal anatomies
 - b. Broken instrument retrieval
 - c. Routine root canal procedures
 - d. Perforations and other complications
 - e. Endodontic surgery
19. Have you noticed any difference in the postoperative prognosis of a root canal treated tooth with or without the use of a microscope?
- a. Always
 - b. Sometimes
 - c. Never

20. Which of the following newer technologies would you want to get in your practice in the near future?

- a. Loupes
- b. Microscope
- c. CBCT
- d. Laser
- e. Healozone
- f. None of the above

21. Is the high cost of newer dental technologies keeping you from upgrading your practice ?

- a. Yes
- b. No

c. Maybe

STATISTICS

Completed questionnaires were coded using windows excel and were subjected to statistical analysis using Statistical Package for the Social Science Software version 21 (IBM SPSS) and for the obtained data, descriptive statistics such as number and percentage were produced. Chi-Square test, a non parametric test was used to find out the significant difference between gender and access the perception and knowledge about information technology and teledentistry among dental students.

3. Results

| Demographic variables | Categories | No. of respondents | Percentage % |
|-------------------------------------|--------------------------|--------------------|--------------|
| Gender | Female | 135 | 61.3 |
| | Male | 85 | 38.7 |
| Age (years) | 23 -30 yrs | 147 | 66.9 |
| | 31-40 yrs | 41 | 18.3 |
| | 40-50 yrs | 26 | 12 |
| | Above 50 yrs | 6 | 2.8 |
| Speciality | Post Graduate | 114 | 52.1 |
| | Student-Endo Endodontist | 106 | 47.9 |
| Years of clinical experience | Less than 5 | 137 | 62.7 |
| | 5-10 | 41 | 19 |
| | 10-20 | 24 | 10.6 |
| | Above 20 | 18 | 7.7 |
| Type of clinical practice | Private | 91 | 41.5 |
| | Cooperate | 116 | 52.8 |
| | Academic organization | 9 | 2.8 |
| | Social Welfare | 4 | 2.8 |

Table 1: Participants' demographic information is displayed, along with the number of replies expressed as a percentage.

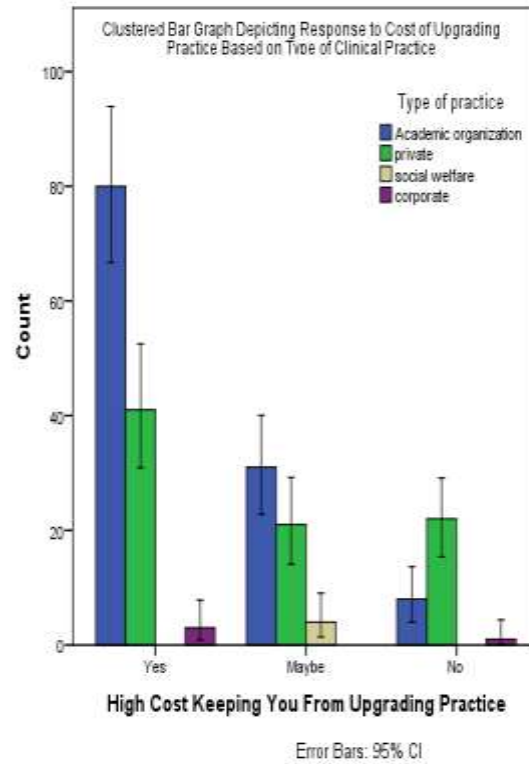


Figure 1: Clustered Bar Graph Depicting Response to cost of upgrading based on the clinical practice X axis showed the type of practice, whereas the Y axis showed the number of responses. Association among Academic organization(green) , Private practice (green),social welfare (Brown), corporate (purple) showed different variables found to be statistically remarkable with a Chi square value 28.257 and p value of 0.002($p < 0.05$)(Chi square test)

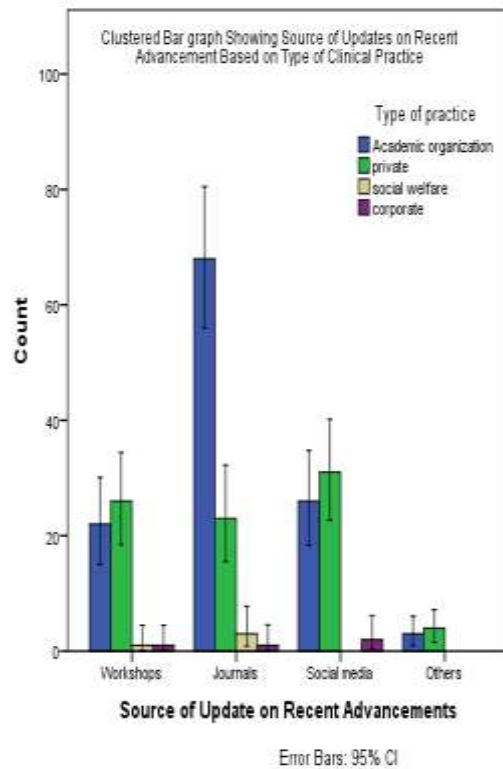


Figure 2: Clustered Bar Graph Depicting Response on how you upgrade yourself about the newer endodontic advancements. X axis showed type of practice and Y axis showed the number of responses from participants. Association among Workshops (blue) , Journals(green),Social media (Brown), Others(purple) different variables was found not statistically remarkable with a Chi square 14.174 and p value of 0.094 ($p < 0.05$)(Chi square test)

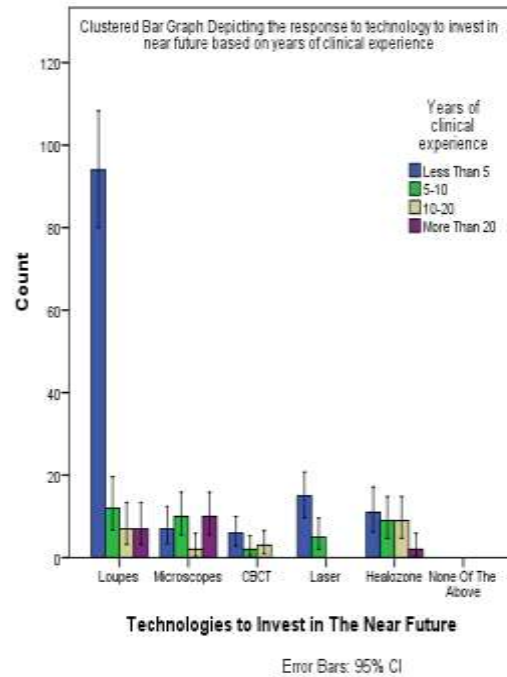


Figure 3: Clustered Bar Graph Depicting Response to technologies to invest in the near future X axis showed different technologies and Y axis showed the number of responses from participants. Association showed less than 5yrs (blue) , 5-10yrs (green),10-20yrs (Brown), More than 20yrs (purple) different variables (years of clinical experience) found no statistical changes with a Chi square 17.306 and p value of 0.0075($p < 0.05$)(Chi square test).

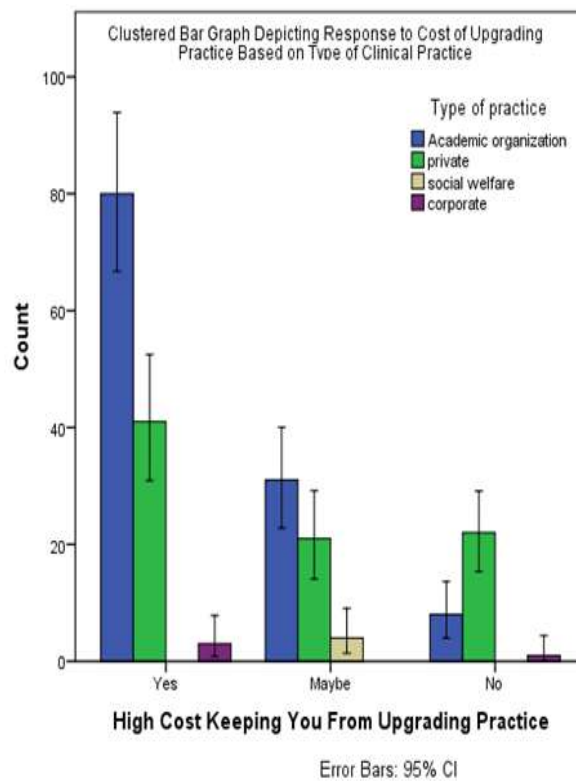


Figure 4: Clustered Bar Graph Depicting Response to cost of upgrading practice based on type of clinical practice. The X axis showed type of practice, and Y axis showed the number of responses from participants. The association between Academic organization (blue), Private practice (green), social welfare (Brown), corporate (purple) among the different variables found to be statistically remarkable with a Chi square 28.257 and p value of 0.002($p < 0.05$)(Chi square test)

4. Discussion

Technology is a fundamental change which is taking place in the current generation. It has not only revolutionized man's way of working but also his very own existence. The introduction of technology into health care has been playing a significant role in helping doctors and other health-care workers.

It is also a necessary component of cutting-edge patient care. Dentists must remain updated in this rapidly evolving environment in order to make sound technological decisions. The knowledge about the technological advancements and their use in the field of endodontics was assessed.

The aim of this study was to determine the degree to which dentists use new technology by examining the characteristics of dental practices and dentists. The findings of this study indicate that overall digital technology usage is reasonably common among dentists, although the degree of use varies. Majority of the population (43%) updated themselves about the newer technologies using Journals and were aware about the newer technological advancements in endodontics. The mean knowledge score for general endodontists was 2.80 ± 5.66 compared to 20.6 ± 2.62 of that of the postgraduate students. This means that endodontists have an overall better knowledge about the use of technological advancements in endodontics.

The vast majority of the population was aware of the advantages of the use of microscopes over loupes. But only 40% wanted to invest in a microscope for endodontic procedures due to the high cost of investment, and preferred investing in loupes as they were a more cost effective alternative. Most of the participants who had a clinical experience of less than 5 years thought that microscopes can be routinely used for endodontic procedures and were more aware about the training programmes present for the use of microscopes in endodontics.

One of the most cutting-edge technology available for usage is Healozone which is basically a device that generates ozone and applies it to a decayed tooth. This kills the bacteria rapidly and painlessly, with no drilling needed. Majority of the respondents were not aware of this outcome Chi square test [$p > 0.05$] which was statistically not remarkable.

Most respondents wanted to recommend digital dentistry for better clinical outcomes. The statistics revealed a highly remarkable outcome with $p = 0.001$. But, in upgrading the practice the cost was a major factor that was keeping them from expanding their practice. Patient affordability would be an important factor to be considered as, the cost of the treatment using these technological advancements would be higher than the conventional treatment procedures.

In our sample, high technology users were on average younger than low technology users. Many articles have been written on the subject of age classes and technological use. An common hypothesis proposes that younger people, dubbed "digital natives," are more technologically minded and more likely to embrace digital technology than older people, dubbed "digital immigrants." (26,27) This subject research is inconclusive, with few studies claiming that there is no strong generation impact and that the words used to describe these generational differences are too harsh. (26–29) An possible cause for age gaps in technological usage may be the familiarity of digital ways of practise acquired by younger dentists through their dental education. (30,31) Specialized dentists used high technologies more often than non-specialists. (32) Our team has extensive knowledge and research experience that has translate into high quality publications (33–42)

In this survey group, high technology users worked in large scale practices than low technology users. Technologies will provide more concrete outcomes if they can be used more often, on a larger patient population. Furthermore, funding is more probable in larger practices. As practices start to grow in developed countries, like India, we should expect the growing use of digital technology for dentists.

5. Conclusion

Majority of the endodontists were well aware of the technological advancements, but the cost was a major factor keeping them from upgrading the practice. Technological advancement is often a leading sector indicating the level of industrialization of a country. With industrialization, upgradation of the clinical practice would become more affordable and plausible.

Acknowledgement

We thank the staff of the Department of Conservative Dentistry and Endodontics, the Dental College of Saveetha and the participants in the study for their broad cooperation to help in the completion of the study.

Financial Support and Sponsorship

Nil

Overall Consensus

In agreement with findings of the study.

Limitations

The survey is based on self-reported data, and thus, subjects may under or over report about their KAP about herbal medicines. The method of sampling

used was snowball sampling, so the study population is unevenly distributed.

Future Scope

This research may be expanded to include a greater scale of population. The concerns should be based in future research on therapy results and patient satisfaction with the utilization of these recent developments.

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