

# A survey of general practitioners and endodontists' knowledge, attitude, and use of ultrasonics in endodontic therapy

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## ABSTRACT

During dentistry, the use of ultrasonics (US) has risen significantly. Due to the predicted prognosis and convenience of operation, the utilisation of US in endodontics has expanded significantly during the past few decades. The purpose of this survey was to determine the knowledge, practise, and attitude of US general practitioners, postgraduates, and endodontists on endodontics. A questionnaire with sixteen questions about the knowledge, attitude, and practise of US in endodontics was distributed to general dentists, postgraduates, and endodontists, and responses were gathered online. Using IBM SPSS, the data were statistically analysed. The survey was completed by 212 dentists (95 general dentists, 80 endodontists, and 34 postgraduates). Eighty-nine percent of them were aware of the use of ultrasound in endodontics, 36.1% preferred the use of ultrasound in the removal of pulp chamber calcifications, pulp stones, access refinement, and troughing of hidden canals, and 61.4% selected 3% sodium hypochlorite for root canal irrigation with ultrasound.

The cost of the ultrasonic unit and the generation of heat during procedures were viewed as the most significant limitations of US. The majority of dentists were aware of the use of ultrasound and its benefits in a variety of endodontic procedures, but they did not consistently

employ it in their practises. It has been observed that the use of ultrasound has significantly boosted the predictability of endodontic treatment.

**Keywords:** Calcification, endodontics, instrument retrieval, irrigation, piezoelectric, ultrasonics

## INTRODUCTION

In the past few decades, endodontics has had a tremendous technological advancement, which has enhanced the prognosis of the performed therapy. The mechanical device Ultrasonic energy is delivered to the cutting tips to generate microvibrations.[1,2] Recently, lowfrequency ultrasonics have been produced, although 20–45 Hz frequency is commonly utilised. [3,4]

US were firstly introduced in dentistry for cavity preparation using abrasive slurry, but they could not compete with high-speed handpieces [5]. Martin and Cunningham came up with Endosonics refers to the use of ultrasonic waves for root canal preparation and disinfection.[6,7] US is used for a variety of endodontic procedures, such as refining access and troughing canals that are calcified and preventing perforation and giving a better view of access, removing calcification, removal of separated instruments and posts, biomechanical preparation of root canal, intracanal activation of irrigants that destroy bacteria, and for retrograde root preparation and filling during surgery. [8-15]

This knowledge, attitude, and practise (KAP) survey attempts to determine the KAP of general practitioners, postgraduates, and endodontists in endodontics.

## MATERIALS AND METHODS

This cross-sectional study was conducted between November 2020 and January 2021. This study was approved by the Santosh university, Ghaziabad .A survey consisting of 24 items was developed.

The questionnaire was sent online using Google Forms, and participants provided responses. The sample size was determined with G power (RRID:SCR 013726) and a 90% confidence interval. General practitioners, postgraduate students, and endodontists who performed root canal

therapy and other endodontic operations received a total of 230 questionnaires. 28 individuals did not participate in the survey. Therefore, there were 202 participants in total. The information for 23 questions was gathered and exported to IBM SPSS version 20.

### **Statistical analysis**

The data were analysed using IBM SPSS version 20. For the collected data, descriptive statistics were computed. Using Chisquare tests, significant variations in the frequencies and percentages of the variables were discovered.

### **RESULTS**

A total of 250 electronic questionnaires were distributed via various social networking sites, of which 212 (general dentists = 95, endodontists = 80, and orthodontic specialists = 23) were returned. (postgraduates = 34) participants answered. Table 1 displays the participant's demographic data. 89.1% of participants were aware that ultrasound is utilised in endodontics.

#### **Table 1: Demographic data of subjects**

Demographic variables	Categories	Number of respondents, n (%)
Gender	Female	135 (64.4)
	Male	77 (35.6)
Age (years)	23-30	142 (68.8)
	31-40	38 (11.6)
	41-50	25 (7.3)
	Above 50	7 (2)
Specialty	General practitioners	95(30.4)
	Postgraduates	37 (10.9)
	Endodontists	80 (25.4)
Years of clinical experience	<5	117 (56.4)
	5-10	52 (24.3)
	10-20	26 (11.4)
	Above 20	17 (7.9)
Type of clinical practice	Private	118 (56.9)
	Cooperate	17 (6.9)
	Academic institute	68 (32.7)
	Social welfare	9 (3.5)

For knowledge based inquiries regarding the preferred type in endodontics, working principle, and working frequency, 78.2% selected piezoelectric, 82.2% selected both cavitation and acoustic streaming, and 44.1% selected 25–30 kHz. Fifty percent of the participants agreed and 41.6% of the participants strongly agreed that ultrasonic activation of irrigants lowers bacterial biofilm compared to conventional irrigation. It shows that 52.5% of participants felt

that US was moderately efficient at retrieving broken instruments. 61.4% of participants chose for sodium hypochlorite concentrations of 3% or less as an irrigant, while 60.9% opted to activate irrigant for 1 minute. The majority of participants utilised US for pulp chamber decalcification/pulp stone removal (36,1%) and root canal irrigation (30%). 34.2% and 64.4% of the participants were concerned about the ultrasonic unit's heat output and price, respectively [Table 2]. 77.2 percent of dentists did not employ ultrasonic. There was no statistically significant difference ( $P > 0.05$ ) between general practitioners, postgraduates, and endodontists in the KAP .

## DISCUSSION

In recent years, the use of ultrasound has tremendously benefitted endodontics. In the present survey, we discovered that the vast majority of respondents were general practitioners. Postgraduates and endodontists have adequate knowledge of the functioning principle and type of endosonics utilised in endodontics, as well as the usage of ultrasonics in endodontics.

In dentistry, the majority of participants selected for a working frequency of 25–30 kHz. The majority of ultrasonic devices operate at a frequency between 25 and 42 kHz. 36.1% of patients selected for access cavity refinement, removal of calcifications and pulp stones, and canal troughing. In the root canal system, obstructions are common; the United States helps to eliminate them by direct or indirect contact.[17-20]

**Table 2: Limitation in using endosonics**

Limitation	Yes (%)	No (%)	Maybe (%)
Heat	31.2	24.5	44.3
Cost	62.3	33.2	4.5
Time	41.1	56.7	2.2

Thirty-four percent of the participants elected to use for root canal irrigation. 41% of responders strongly agreed irrigation decreases bacterial biofilm vs to conventional approaches.

Recent research shows demonstrated effectiveness in dirt and smear layer removal as well as bacterial biofilm reduction.[21] 60% of the dentists favoured activating the irrigants in the root canal for less than one minute. As an irrigant for US activation, general practitioners, postgraduates, and endodontists preferred sodium hypochlorite concentrations of 3% or less, followed by sodium chloride and concentrations of greater than 3% sodium hypochlorite. Cameron revealed in his investigation that the smear layer has been eliminated entirely in the United States. [12,13] 52.6% of respondents believed that the United States was moderately effective in recovering the broken instruments. [14-16]

### **Regarding the questions regarding disadvantages**

The cost of the US unit and tips was viewed by 64.4% as the most significant disadvantage, followed by the heat generated by the US while in operation. According to studies, the use of ultrasound, particularly in the absence of a coolant, to remove shattered instruments dramatically raises the temperature. [17,18] Recent US recommendations with water flow have shown to be a superior method for regulating temperature during US use. [19]

The present investigation demonstrates that dental practitioners were knowledgeable about endosonics. It also demonstrates that there is no statistically significant difference ( $P > 0.05$ ) between general practitioners, endodontists, and postgraduates regarding the KAP associated with the use of endosonics.[20-24] The majority of general practitioners and endodontists saw positive results with the use of US in root canal therapy, although the majority of them did not utilise it frequently.

The price of the ultrasonic unit and the heat it generates were deemed to be the most significant barriers to the use of US. Our team's research and expertise have resulted in publications of the highest quality.[25-28] The limited sample size is a limitation of the study. In addition, highquality clinical investigations are required to determine the efficacy of the most recent ultrasonic endodontic units.

## CONCLUSIONS

Eighty nine percent of dentists were familiar with the use of ultrasound and its benefits in various endodontic operations, such as root canal blockage clearance. They utilised it for irrigation, broken instrument retrieval, and endodontic procedures, but not consistently. This is due to the expense of the ultrasonic equipment and the heat produced. It has been observed that the use of ultrasound has significantly boosted the predictability of endodontic treatment. It is also a crucial component of the contemporary concept of minimally invasive dentistry.

## Conflicts of interest

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