

# Knowledge, Attitudes, and Practices of Tunisian Dentists regarding the Use of Herbal Medicine in Endodontic Practice: A Cross-Sectional Study

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## Abstract

**Aim:** This study aims to assess the knowledge, attitudes, and practices (KAP) of Tunisian dentists regarding the use of herbal products in endodontic practice.

**Materials and Methods:** A cross-sectional descriptive study was conducted from May 2022 to September 2022. A self-administered questionnaire was distributed to 360 dentists, stratified into general practitioners and endodontists.

**Results:** Endodontists exhibited a mean knowledge score of  $38.5 \pm 3.9$ , while general practitioners scored  $39.5 \pm 3.4$ , indicating comparable levels of knowledge in the application of phytotherapy in endodontics ( $p = 0.094 > 0.05$ ). However, a statistically significant difference was observed in the practice of herbal medicine between the two groups ( $p = 0.002 < 0.05$ ). General practitioners demonstrated a higher mean practice score ( $4.96 \pm 1.01$ ) compared to endodontists ( $4.45 \pm 0.82$ ). Attitude scores did not significantly differ between the two groups, with endodontists scoring  $8.4 \pm 1.7$  and general practitioners scoring  $8 \pm 1.6$ . The majority of participants were familiar with orange oil (87.5%), aloe vera gel (78.1%), green tea (74.7%), clove oil (70.3%), curcuma (69.2%), and lemon solution (68.1%). Furthermore, 97.2% of respondents expressed a desire to enhance their understanding of herbal medicine in dentistry. **Conclusion:** Tunisian dentists exhibited limited familiarity with herbal products that could be employed in endodontic practice. Both general practitioners and endodontists demonstrated similar levels of knowledge regarding phytotherapy in endodontics.

**Keywords:** Endodontics; Phytotherapy; Herbal products; Natural products; Herbal medicine; Root canal; Intracanal medicaments; Irrigants; E. faecalis; Survey

## Introduction

Over the past decade, there has been a growing interest in phytotherapy, which is the study of the use of extracts from natural origins as a form of medication to treat or prevent diseases [1-2].

Herbal products are employed in dentistry as anti-inflammatory, antibacterial, and analgesic agents. In endodontics, certain herbal products can be utilized as irrigants, intra-canal medicaments, retreatment agents, and even pulp capping agents [2]. The growing popularity of herbal products can be attributed to a number of factors, including their cost-effectiveness, availability, low toxicity, and lack of microbial resistance. Although these products are not entirely safe, they may have side effects and interact with other conventional drugs [3].

A paucity of data exists regarding the knowledge, attitude, and practice of phytodentistry among dentists in Tunisia. The objective of this study was to assess the knowledge, attitude, and practice (KAP) of Tunisian dentists regarding the use of herbal products in endodontics. The comparison of means was employed within the confines of its reliability to assess KAP scores. The results were deemed significant for a p-value of less than or equal to 0.05. An independent t-test was utilized for the comparison between endodontists and general dentists.

## Material and Methods

A cross-sectional descriptive epidemiological survey conducted on a representative sample of the population of dentists and specialists (endodontists) in private and public practice in Tunisia. It was conducted between May 2022 and September 2022.

It should be noted that this study did not include dental students or specialists in disciplines other than endodontics. A questionnaire was developed based on a previous study [4] that was adapted to align with the objectives of the present study. The questionnaire comprised four sections. The first section assessed sociodemographic variables, clinical practice variables and experience variables. The second section evaluated the participants' knowledge about phytotherapy. The third section included questions about the use of phytotherapy, while the fourth section assessed the participants' attitudes toward the use of herbal products in endodontics.

Two modes of questionnaire distribution were employed: A digital version of the questionnaire was made available via Google Forms on social media platforms, with the intention of reaching individuals and groups with an interest in dentistry in Tunisia. The digital version offers the advantage of reaching the largest number of dentists and endodontists. A paper version was distributed by visiting dentists and endodontists at their respective places of practice.

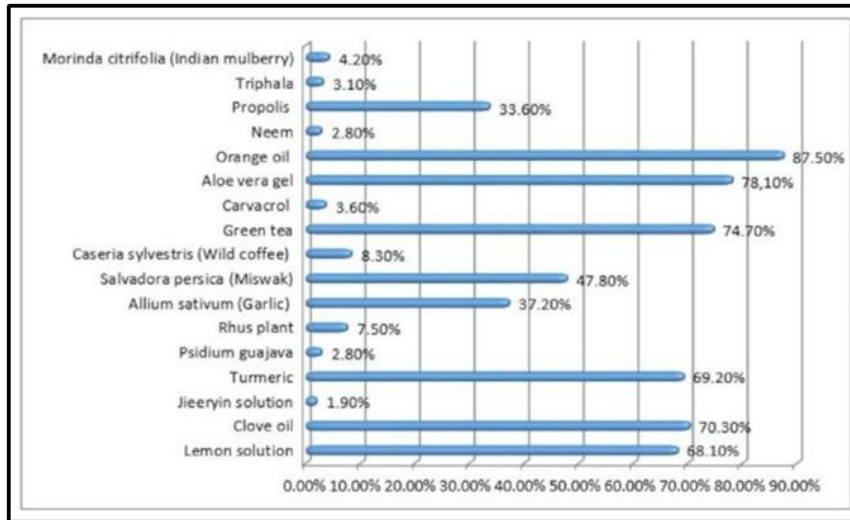
The questionnaire was designed for individuals who had volunteered to participate in the survey and had agreed to provide responses that were truthful and accurate. Each individual was guaranteed anonymity, and each person agreed to complete the questionnaire only once. Questionnaires that were not completed in full or with missing data were excluded from the input for statistical analysis. A total of 360 responses were retained.

The data analysis was conducted using the SPSS software program (Statistical Package for Social Science, Software Version 18, SPSS Inc., Chicago, IL, USA). All variables were presented as percentages. A p-value of less than 0.05 was considered statistically significant.

## Results

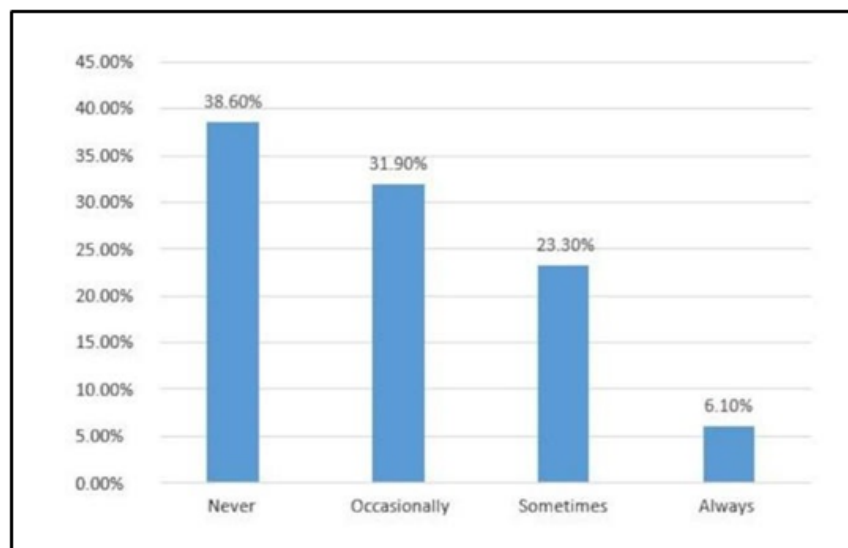
A total of 360 dentists completed the entire questionnaire, with 254(70.6%) identifying as female and 238(66.1%) falling within the age range of 25 to 35 years. The study sample consisted of 44 (12.2%) endodontists and 316 (87.8%) general dentists.

The majority of participants 191(53.1%) had less than five years of experience, while 80(22.2%) had over ten years of experience. In a survey of dentists, 228(63.3%) were aware of natural products with applications in endodontics. However, 262(72.8%) were unaware that these products might have side effects, and 263(73.1%) were unaware of possible interactions with conventional drugs. Orange Oil, Aloe Vera Gel, Green Tea, Clove Oil, Turmeric and Lemon Solution are the most common herbal products that dentists and endodontists have said know while *Morinda citrifolia*, *Azadirachta indica*, *Triphala*, *Carvacrol*, *Psidium guajava* and the *Jeeryin* solution are the least known (Figure 1).



**Figure 1:** Distribution according to familiarity with different herbal products

The majority of dentists 157(43.6%) cited the media as their primary source of information regarding herbal products. This was followed by advice from colleagues 145(40.3%), scientific journals 136(37.8%), and the college curriculum 74(20.6%). We noted that only 22(6.1%) of the population surveyed regularly use a herbal product in endodontic treatment while 139(38.6%) have never used a plant product in endodontic treatment (Figure 2).



**Figure 2:** Diagram of frequency of use of herbal products in root canal treatment

The study found that 198(55%) of participants had used herbal products, with 154(77.8%) having used orange oil, 4(2%) eucalyptus oil and 2(1%) lemon solution during endodontic retreatment. Eugenol was also used as an inter-session medication by 34(17.1%) of the respondents.

The results of our study indicate that 54(88.8%) of dentists and endodontists who utilized a herbal product in endodontic treatment found their treatments to be effective, while 2(3.2%) reported adverse effects.

A total of 88(24.4%) of the participants indicated a preference for herbal products over conventional products. The reasons for this preference were as follows: 11(43.9%) of participants cited natural and no side effects, 6(24.4%) cited efficiency, and 3(12.2%) cited cost-effectiveness. A majority of participants 278(77.2%) expressed the view that herbal products were efficient.

A vast majority of the participants 350(97.2%) expressed a desire to enhance their understanding of the utilisation of phytotherapy in endodontics. The mean knowledge score among endodontists was determined to be  $38.5 \pm 3.9$ , whereas among general practitioners, it was  $39.5 \pm 3.4$ . Both groups exhibited similar levels of knowledge concerning the utilization of phytotherapy in endodontics ( $p = 0.094 > 0.05$ ). (Table.1)

A statistically significant difference was observed between the two groups under examination in their practice of herbal medicine ( $p = 0.002 < 0.05$ ). The mean practice score among endodontists was  $4.45 \pm 0.82$ , compared to  $4.96 \pm 1.01$  among general practitioners. (Table.1)

The mean attitude score among endodontists was  $8.4 \pm 1.7$ , while it was  $8 \pm 1.6$  among general practitioners. No statistical difference was observed in the attitude scores between the two groups. (Table.1)

Parameter	Practice	n	Mean $\pm$ SD	p-value
Knowledge	General dentist	316	$39.5127 \pm 3.43601$	0.094
	Endodontist	44	$38.5682 \pm 3.92012$	
Practice	General dentist	316	$4.9620 \pm 1.01033$	0.002
	Endodontist	44	$4.4545 \pm 0.81994$	
Attitude	General dentist	316	$8.0601 \pm 1.66558$	0.168
	Endodontist	44	$8.4318 \pm 1.73068$	

**Table 1:** KAP scores for endodontists and general practitioners.

SD: Standard deviation, KAP: Knowledge, Attitude, and Practice

## Discussion

The objective of this study was to assess the knowledge, attitudes, and practices (KAP) of Tunisian dentists regarding the use of herbal medicine in endodontics. The mean knowledge score for endodontists was found to be  $38.5 \pm 3.9$ , while that for general practitioners was  $39.5 \pm 3.4$ . The two groups demonstrated comparable levels of knowledge regarding the application of phytotherapy in endodontics ( $p = 0.094 > 0.05$ ). In contrast to a previous study conducted in Chennai, India in 2018, which found that endodontists had a better knowledge of the utilisation of herbal products in endodontics, the present study found that the two groups had a similar level of knowledge [5].

There was a statistically significant difference between the two groups studied in the practice of herbal medicine ( $p = 0.002 < 0.05$ ). The mean practice score for endodontists was  $4.45 \pm 0.82$  and  $4.96 \pm 1.01$  for general practitioners. This means that general practitioners use herbal products more than endodontists. This contrasts with Khandelwal's study, which reported a higher usage of herbal products among endodontists compared to general practitioners [5].

The mean attitude score for endodontists was  $8.4 \pm 1.7$  and  $8 \pm 1.6$  for general practitioners. There was no statistical difference in the attitude scores between the two groups.

The majority of participants 315(87.5%) were already familiar with orange oil, while 281(78.1%) were already aware of aloe vera gel, 269(74.7%) of green tea, 253(70.3%) of clove oil, 249(69.2%) of curcuma and 245(68.1%) of lemon solution.

Orange oil is one of the solvents most commonly employed in gutta percha retreatments. It exhibits comparable efficacy to chloroform, which, in contrast to orange oil, is cytotoxic [6]. Furthermore, an in vivo study conducted by Aminsobhani in 2022 demonstrated that orange oil and eucalyptus oil exhibited comparable antibacterial properties against *E. faecalis* biofilm to synthetic solvents (chloroform and xylene) during endodontic retreatment [7]. Aloe vera gel has been the subject of studies as a potential agent for pulpotomy in primary teeth, with a view to offering an alternative to bioceramics. This is on the grounds that the gel contains a number of bioactive components which have been demonstrated to stimulate wound healing, angiogenesis and cell proliferation [8].

However, these studies had short follow-up periods and higher level of evidence is required to support its usage as pulpotomy agent for children [9-10]. Aloe vera gel also has antibacterial properties. A recent study conducted by Ghasemi et al. demonstrated that aloe vera gel eliminated 4th and 6th week biofilms and had antibacterial properties against *E. faecalis* biofilm in contrast to calcium hydroxide which recommended its usage as intracanal medicament [11].

Cloves oil (Eugenol) had long been used in dentistry for its analgesic and antimicrobial properties. When mixed with zinc oxide, it can be used as a filling material, dental cement and endodontic sealer [12]. Curcuma is known to have antimicrobial, anti-inflammatory and antioxidant activities [13].

A study by Purohit evaluating Turmeric Powder as a Pulpotomy medicament in primary teeth showed good clinical and radiographic success. However, further investigations are required to support its usage [14]. Curcuma can also be used as canal irrigant. Combined with photodynamic therapy, it has an active activity against gram (+) and gram (-) bacteria [15]. It has also been demonstrated that curcumin has significant anti-bacterial activity against *E. faecalis* [16].

Only one third 121(33.60%) of the participants were familiar with propolis that has antimicrobial, anti-inflammatory, anesthetic and cariostatic properties. It can be used as endodontic irrigant, intra-canal medicament, pulp capping material and storage media for avulsed teeth [2].

The majority of the participants were not aware of possible interaction between herbal products and conventional drugs 263(73.1%) nor for possible side effects of these products 262(72.8%).

However, drug interactions had been reported such as *M. chamomilla* and warfarin, *V. officinalis* and sedative drugs, *P. incarnata* and aminoglycoside antibiotics [1].

Herbal products are also not always safe and may cause allergies, gastro-intestinal effects and central nervous system effects [1].

Media, which is not always a reliable source of information regarding herbal products, was the major source of information regarding herbal products, whereas the least was the college curriculum. This is indicative of the importance of updating of the teaching program at the university in order to improve knowledge about herbal products.

Adverse effects had been reported by 2(3.2%) of the participants while using eugenol and orange oil. Only 22(6.10%) of the participants use herbal products on regular basis.

The majority of participants 278(77.2%), indicated their belief in the effectiveness of herbal products. Natural without side effects was the most common reason 11(43.9%) for participants' preference of herbal products. However, they are not always safe, eugenol for example is cytotoxic at high concentrations and can cause allergic reactions in sensitized patients [12].

According to the present study, almost all of the dentists surveyed 350(97.2%) were interested in updating their knowledge regarding the use of herbal medicine in endodontics. This indicates a necessity for the implementation of training programmes, workshops and seminars on the utilisation of herbal medicine in dentistry. Such programmes should provide guidance on the indications, potential risks, side effects and drug interactions associated with the use of herbal medicine in dentistry.

The therapeutic potential of medicinal plants in the treatment of oral and dental diseases, particularly endodontics, has been extensively investigated. The results of the in vitro and in vivo literature have demonstrated the efficacy of medicinal plants in a number of clinical applications, including as pulp capping or pulpotomy agents, root canal irrigants, intracanal medicines, conservation media for avulsed permanent teeth following trauma, gutta percha solvents during endodontic re-treatment, as sealing materials during canal obturation, and also as materials promoting bone and endodontic regeneration.

In the existing literature, there is evidence that herbal medicine may be of interest in endodontics. However, the results reported in our work should be treated with caution. The variety of methodological approaches employed in published in vitro and in vivo studies, including the method of preparation of plant extracts, the concentrations of extracts, the time of harvest and botanical origin, as well as the disparate methods of data analysis, render it challenging to propose specific recommendations for the utilisation of plant-based products in clinical practice.

## Limitations of the Study

The questionnaire was self-administered, this means that subjects may under or over report about their knowledge, attitudes, and practices (KAP) about herbal medicines.

## Conclusion

The findings of this study indicated that Tunisian dentists exhibited limited familiarity with herbal products that could be employed in endodontics. Moreover, they expressed a desire to enhance their understanding of phytodentistry, which is essential for the appropriate and secure utilisation of medicinal plants.

The existing literature on the potential side effects of herbal products is limited. Further research is therefore necessary, utilising current methodologies and techniques of the highest scientific quality, in order to evaluate the biocompatibility, efficacy, risk of tooth discolouration with extended use, and potential interactions with other products.

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