**Perception Of Knowledge And Practice Of Phytotherapy And Herbal Products Amongst Dental Students And Professionals In Delhi-NCR: A Cross-Sectional Survey**

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***Abstract***

***Objective-*** *The present study aimed to analyse the perception of knowledge and Practice of Phytotherapy and herbal products amongst dental students and professionals.*

***Materials and Methodology****- A total of 453 dental students and professionals were recruited for the study after ethical clearance from the institution. A self-administered questionnaire was circulated in the form of Google Forms and printed forms. The questionnaire consisted of questions pertaining to demographics, knowledge, attitude and practice of phytotherapy. To assess associations between demographic variables and participants' knowledge and practice of phytotherapy, Chi-square tests were performed, with the level of statistical significance set at p < 0.05.*

***Results-*** *The participants included were mostly of a younger age (18-25 years). For awareness assessment, there was a significant difference found for dental students and professionals for smear removal efficacy (p=0.001), also dental professionals were more aware about the use of herbal products in oral health (p=0.038), and their usage (p=0.0142). Dental professionals were keener to know about herbal products (p=0.001). For practical usage, dental professionals found it more effective as compared to dental students (p=0.0024). Cloves emerged as the most commonly known herb, recognized by 68.0% of respondents, followed by Cinnamon (50.6%) and Miswak (43.9%). When exploring the rationale for choosing herbal substitutes, cost-effectiveness was the most cited reason (63.4%).*

***Conclusion-*** *Encouraging a research-oriented and evidence-driven approach to the use of phytotherapeutic agents will enhance clinical decision-making and contribute to the safe and effective integration of herbal medicine into mainstream dental practice.*

***Keywords****- Phytotherapy, herbal products, herbal extracts, survey, dental professionals*

**INTRODUCTION**

In the 21st century, healthcare has grown increasingly diverse in its approaches, with people seeking not only conventional biomedical treatments but also exploring complementary, adjuvant, and traditional therapies. Rather than restricting themselves to a single mode of treatment, individuals are now more open to integrative approaches, one of the most emerging among them being **phytotherapy**, which utilizes plant-based remedies to support health and healing. The word ‘Phytotherapy’ is originally derived from the Greek words ‘Phyto’ and ‘Therapeia’, which means plant and treatment1. Rooted in ancient healing traditions, phytotherapy remains relevant even today, as individuals continue to look toward nature for prevention, treatment, and overall well-being.

There is a global shift toward natural and holistic approaches to medicine, and likewise toward **natural products as adjuvant therapies**—supplements used in conjunction with conventional treatments to support overall health outcomes. As a result, the overall demand for herbal products has surged in recent years. These products range from herbal teas and tinctures to capsules, oils, and powdered extracts, catering to an ever-increasing demand for alternatives perceived to be more natural and less invasive than conventional pharmaceutical drugs 2. The herbal supplements market in India brought in revenue of USD 3,796.2 million in 2024 and is projected to grow significantly, reaching USD 8,796.1 million by 2033 3. According to the World Health Organization (WHO), approximately 80% of the world’s population relies on some form of traditional medicine—including herbal remedies—for their basic healthcare needs 3. This statistic highlights the critical importance of understanding how people view and engage with phytotherapy in both developed and developing nations.

Herbal medicine is becoming more and more popular for a number of reasons. These include a general cultural or individual preference for natural remedies, high medical expenses, long-term management of chronic diseases, and dissatisfaction with conventional drugs because of side effects. The perception that herbal products are safer, more environmentally friendly, and more in line with the body's natural processes is what many find appealing about them 2. Furthermore, social media, online discussion boards, and wellness influencers have been crucial in introducing phytotherapy to younger generations by portraying it as a more secure and "authentic" type of medical treatment. The use of plant-based treatments, or phytotherapy, has become more and more popular in contemporary dentistry because of its many therapeutic advantages. The antibacterial and anti-inflammatory qualities of many medicinal herbs make them very beneficial for dental hygiene 4.

For example, black tea (Camellia sinensis) and green tea both aid in lowering oral bacterial activity, and aloe vera is believed to reduce gingival inflammation. Bees create a resinous substance called propolis, which is frequently used to treat illnesses including oral candidiasis. Furthermore, traditional herbs like Azadirachta indica, or neem, are highly valued for their ability to prevent dental cavities, while Salvadora persica, also referred to as the toothbrush tree, is useful in reducing dental plaque 5,6.

However, the increased popularity of herbal products has also introduced a complex set of challenges, particularly regarding perception, level of knowledge, and practical usage in dentistry. Many healthcare professionals themselves lack formal education in phytotherapy and may feel ill-equipped to offer guidance 7, 8. This disconnect can lead to overlooked risks, missed opportunities for integrated care, and a fragmented understanding of the patient’s overall health behaviour.

Numerous surveys have shown that although herbal products impact positively in dentistry but dental professionals lack adequate knowledge of herbal medicines, they also express confusion or uncertainty regarding scientific evidence, correct usage, and product selection 9, 10. This highlights a critical need for targeted assessment of knowledge, awareness and practice to help dental professionals as well as students to make informed, safe, and effective decisions regarding phytotherapy. This survey article seeks to explore the perception of knowledge and practice regarding phytotherapy and herbal products among a defined population.

**MATERIALS AND METHODOLOGY**

A cross-sectional descriptive study was conducted to assess the perception, knowledge, and practice of phytotherapy and herbal products among dental students and professionals. The study was conducted in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. The institution's ethical clearance was obtained, Ref. no.

MRIIRS/MRDC/SDS/IEC/2025/30,and informed consent was obtained from all participants. The study was carried out at Faridabad, over a period of seven months, from May 2025 to September 2025. A pilot study for 60 participants was conducted to check the validity of the questionnaire, and accordingly, changes in the questionnaire were carried out. The study population included third-year BDS students, final-year BDS students, interns, postgraduate students, and dental professionals, both from within (insiders) and outside (outsiders) the institution.

*Sample Size Calculation*

The sample size was calculated with the following formula:

Formula

n=Z2 \* p \*(1−p)​ / d2

Where:

**n** = required sample size

**Z** = Z-score (1.96 for 95% confidence level)

**p** = expected population proportion (e.g., 40.16% = 0.4016)

**d** = margin of error (e.g., 5% = 0.05)

Hence, the Sample size was calculated based on the estimated prevalence of 40.16%, 5% precision level, 95% confidence level, and 80% power of the study. The minimum sample size was calculated as 370 participants.

Taking into consideration the nonresponsive rate, a total of 453 participants were recruited.

*Inclusion and exclusion criteria*

Participants were included in the study based on specific inclusion criteria, which comprised students currently enrolled in the third year, final year, internship, or postgraduate dental programs, and dental professionals working either within or outside the institution. Only those who voluntarily agreed to participate and provided informed consent were included. Individuals who were unwilling to provide informed consent or who came from non-dental backgrounds were excluded from the study.

*Data Collection*

Data were collected using a structured, validated questionnaire designed to evaluate four major domains: demographics (including age, gender, and academic level/professional status), knowledge regarding phytotherapy and herbal products, perceptions and attitudes towards herbal medicine, and practices concerning the use of phytotherapy in clinical or personal settings. The questionnaire was distributed both in printed form and via online Google Forms, ensuring broader outreach, particularly among external dental professionals. For online Google Forms, class representatives were approached, and a daytime limit was given. If not done, a reminder was sent to attain maximum participation. Google form submission was allowed only after complete filled questionnaire. Students and dental professionals were informed that study purpose is for research and also a brief background. Measures were taken to ensure complete confidentiality and anonymity throughout the study.

*Statistical Analysis*

The collected data were compiled and analyzed using Microsoft Excel and Statistical Package for the Social Sciences (SPSS) software. Descriptive statistics, including frequencies and percentages, were applied to summarize categorical variables. To assess associations between demographic variables and participants' knowledge and practice of phytotherapy, Chi-square tests were performed, with the level of statistical significance set at *p* < 0.05.

**RESULTS**

A total of 453 respondents were included, with a predominance of female participants (n = 312; 68.9%), compared to males (n = 141; 31.1%).

The majority of participants belonged to the 18–25 years age group (n = 324; 71.5%), followed by those aged 26–30 years (n = 105; 23.2%). A smaller proportion of respondents were in the 36–50 years age range (n = 22; 4.9%), while only 0.4% (n = 2) were aged 51 years and above, indicating that the sample was predominantly composed of younger individuals, likely in the early stages of their dental careers.

Regarding professional designation, the largest group comprised Third Year dental students (n = 173; 38.2%), followed by General Practitioners (n = 101; 22.3%), Interns (n = 74; 16.3%), Fourth Year students (n = 54; 11.9%), and Specialists (n = 51; 11.3%). This distribution reflects a study population with substantial representation from dental students and early-career professionals. [Table 1]

A significantly higher proportion of students (61.13%) saw fewer than 10 patients daily, whereas more professionals (19.74%) managed over 20 patients (p = 0.004, significant). This suggests a heavier clinical workload among professionals, likely due to their independent practice setups. [Table 2]

Regarding dentinal tubule penetration, propolis was the most recognized agent in both groups, though not significantly different (p = 0.1384). For antimicrobial efficacy, no significant preference was observed (p = 0.071), though Aloe Vera was more cited by students. Neem was significantly preferred (p = 0.001) by professionals for smear layer removal. Knowledge-wise, a significantly higher percentage of professionals knew about herbal uses (75.0% vs. 59.1%; p = 0.038), how to use them (68.4% vs. 54.2%; p = 0.0142), and expressed greater interest in learning more (88.2% vs. 68.1%; p = 0.001). The perceived effectiveness of herbal treatments was significantly higher among professionals (89.5% vs. 87.4%; p = 0.0024), while no significant differences were noted in past use, side effects, or preferences for future use. Most participants in both groups preferred herbal or traditional medicine, though this was not statistically significant (p = 0.059). Among herbal users, the most common reason was that herbal products are natural and side-effect free. [Table 3]

Both groups cited treatment and pain relief as major reasons. Although professionals reported a slightly higher percentage using herbs for treatment (36.2% vs. 28.9%), and students reported more use for disease protection (24.3% vs. 17.8%), these differences were not statistically significant (p = 0.278). [Table

***Awareness and Perception Regarding Herbal Substitutes in Dentistry***

Among the 453 participants, a substantial proportion demonstrated awareness of various herbal substitutes used in dentistry. Cloves were the most commonly recognized herbal agent, with 308 respondents (68%) indicating familiarity with its dental applications. This was followed by cinnamon, acknowledged by 229 participants (50.6%), and Miswak, a traditional chewing stick, reported by 199 participants (43.9%). Aloe vera, known for its anti-inflammatory and healing properties, was recognized by 193 respondents (42.6%). Garlic, with known antimicrobial properties, was identified by 139 participants (30.7%). Lesser-known substitutes included Mentha (mint), noted by 75 participants (16.6%), and coconut roots, which were acknowledged by 54 respondents (11.9%). These findings suggest varying degrees of awareness regarding herbal agents, with traditional and commonly used herbs being more widely recognized than regionally or culturally specific ones.

***Reasons for Using Herbal Substitutes***

When asked about the reasons for preferring herbal substitutes, 287 participants (63.4%) cited cost-effectiveness as a primary factor. Additionally, 247 respondents (54.5%) reported perceiving herbal products as more compatible with their physiology compared to synthetic alternatives. Easy availability was another frequently reported reason, indicated by 240 participants (53%). However, 85 respondents (18.8%) noted the decreased shelf life of herbal products as a concern, reflecting a limitation in their practical use. A minority of 39 participants (8.6%) reported none of the listed reasons as influencing their preference for herbal substitutes. These results reflect that economic, biological compatibility, and accessibility factors significantly contribute to the inclination towards herbal alternatives in dental care.

***Indications for Dental Use of Herbal Products***

The indications for using herbal substitutes in dental care were diverse, with oral hygiene being the most commonly cited use, reported by 354 participants (78.1%). This was followed closely by management of bad breath or halitosis, noted by 323 participants (71.3%), and relief from dental pain, reported by 316 participants (69.8%). Herbal products were also used for treating gingival bleeding by 212 respondents (46.8%) and for teeth whitening by 191 participants (42.2%). A smaller proportion, 98 respondents (21.6%), reported using herbal agents for managing gingival enlargement. These findings suggest that herbal products are perceived to have multiple therapeutic roles in dentistry, particularly for routine oral care and minor pathological conditions. Cloves emerged as the most commonly known herb, recognized by 68.0% of respondents, followed by Cinnamon (50.6%) and Miswak (43.9%). Aloe Vera and Garlic also had considerable recognition, while Mentha and Coconut roots were less frequently reported. This suggests that traditional herbs with well-established oral health benefits, such as Clove and Miswak, are more familiar across the profession.

When exploring the rationale for choosing herbal substitutes, cost-effectiveness was the most cited reason (63.4%), followed closely by compatibility (54.5%) and easy availability (53.0%). These findings reflect a practical and economic inclination among dental professionals toward herbal options. Only a minority expressed concern about decreased shelf life (18.8%), and an even smaller proportion rejected all listed reasons (8.6%), indicating strong support for the integration of herbal substitutes.

In terms of therapeutic application, the most common indication was oral hygiene (78.1%), followed closely by managing bad breath (71.3%) and relieving tooth pain (69.8%). These findings align with the known antimicrobial and anti-inflammatory properties of herbs such as Clove, Neem, and Miswak. A substantial proportion also reported using herbal agents for gingival bleeding (46.8%) and teeth whitening (42.2%), while fewer respondents used them for gingival enlargement (21.6%). These results highlight the broad perceived applicability of herbal products in preventive and symptomatic dental care, especially in hygiene-related indications.

**DISCUSSION**

The present study explored the perception, knowledge, and practice of phytotherapy and herbal products among dental students and professionals. The results revealed a generally positive attitude toward herbal medicine across both groups, with professionals demonstrating greater awareness, confidence, and usage compared to students. The data emphasize both the popularity and perceived efficacy of herbal remedies in dental settings, especially for cost-effective, accessible, and compatible care. The results also point to a potential opportunity for expanding evidence-based herbal education and integration within dental practice.

In 2021, a Turkish study was conducted for patients, which revealed that the most commonly used plants for oral health were mint, clove, thyme, and black mulberry 11. The same products were found to be commonly known to dental graduates and professionals in our study. The study also suggested that the integration of phytotherapy in dental education can produce more diverse applications for patients, as patients showed interest in herbal products. Another study12

In 2023, Shinkai et al 9 conducted a cross-sectional survey on dental professionals and concluded that experienced dentists with post-graduation degrees in herbal medicine, and also those who have personally used the herbal products prescribed to the patients. In our study, the same results were reflected, as there was a significant difference in the knowledge and perception of phytotherapy in dental professionals as compared to dental students.

Another study, which was conducted in India in 2022 in dental professionals, concluded that clove is the most common herbal product that is used, similar to our study. Also, the dentists agreed that more research is required for the use of herbal products in dentistry 13.

In another study conducted in 323 Syrian dental students, only 47.4% of students priorly used it. 83.9% students were interested in learning more about herbs. Similar to previous studies 13, 14, they also concluded that an evidence-based approach should be formulated for the usage of herbal extracts in dentistry 15.

In another study conducted in Malaysia, dental personnel showed a poor level of practice for herbal products. The majority of responders used Miswak (82.4%), Mentha (52.9%), followed by Clove (38.2%), similar to our study. In the study, it was concluded that older residents had significantly higher knowledge (p=0.018) as compared to younger residents. These results were similar for the Indian population as well 16.

In terms of practical usage, a 2024 scoping review concluded that herbal mouthwashes often matched chlorhexidine in controlling oral health conditions, offering added benefits in terms of patient compliance and reduced side effects 17. They assessed that patients as well as professionals had a positive attitude regarding phytotherapy in terms of oral health-related quality of life. Studies included in the systematic review also concluded the matching results to our study that high cost and limited accessibility impair the healthcare choice about herbal products 17.

Despite this perceived safety and popularity, concerns persist about the underreporting of side effects and a general lack of awareness regarding herb-drug interactions. Our study found that only 47.2% of participants researched herbal products before using them—highlighting a trend also noted in another study 11. The belief that 'natural means safe' persists and poses a risk without proper education.

Despite providing valuable insights into the knowledge, attitudes, and practices related to phytotherapy and herbal products among dental students and professionals, this study has several limitations. Using a convenient sampling method may have introduced selection bias. Additionally, since the study is cross-sectional, it captures information at one moment in time. This makes it hard to track changes in perception or behavior over time. Another limitation is that the study was done at a single institution. This may not accurately represent the views and practices of dental professionals in other regions or institutions with different educational backgrounds or cultural views on herbal medicine.

In order to guarantee that future practitioners have a solid understanding of herbal therapeutics, it is imperative that dental curricula include structured phytotherapy modules. Emphasis should be placed on promoting evidence-based use of herbal products, underpinned by rigorous clinical and pharmacological research. Additionally, it is essential to educate dental professionals on potential herb-drug interactions and associated safety concerns, as uninformed use may pose risks to patient health. These efforts would ensure that the use of herbal products in dentistry is safe, effective, and scientifically validated, thereby supporting the growing interest in integrative and holistic approaches to healthcare.

**CONCLUSIONS**

Considering the limitations of the study, incorporating phytotherapy into dental practice offers a promising supplement to traditional therapeutic approaches. Its adoption, though, needs to be done carefully and in accordance with scientific data. Encouraging a research-oriented and evidence-driven approach to the use of phytotherapeutic agents will enhance clinical decision-making and contribute to the safe and effective integration of herbal medicine into mainstream dental practice.

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Table 1: Demographic Distribution of Participants

|  |  |  |  |
| --- | --- | --- | --- |
| GENDER | Female | 312 | 68.9 |
| Male | 141 | 31.1 |
| AGE GROUP | 18-25 | 324 | 71.5 |
| 26-30 | 105 | 23.2 |
| 36-50 | 22 | 4.9 |
| 51 & above | 2 | .4 |
| DISTRIBUTION | Third Year | 173 | 38.2 |
| Fourth Year | 54 | 11.9 |
| Interns | 74 | 16.3 |
| General Practitioner | 101 | 22.3 |
| Specialists | 51 | 11.3 |

Table 2: Distribution of the Average number of patients in your dental setup

|  |  |  |  |
| --- | --- | --- | --- |
|  | Dental students (n=301) | Dental professionals  (n=152) | P value |
| <10 patients per day | 184 (61.13%) | 77 (50.66%) | 0.004\*, sig |
| >20 patients per day | 22 (7.31%) | 30 (19.74%) |
| 10-20 patients per day | 95 (31.56%) | 45 (29.61%) |

Chi square test, level of significance set at p < 0.05, \* sig- significant

Table 3: Knowledge, Perception, and Use of Herbal Substitutes Across Dental Professionals

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Dental students (n=301) | Dental professionals  (n=152) | P value |
| Which herb substitutes have more penetration into the dentinal tubules | M. citrifolia | 30 (10.0%) | 8 (5.3%) | 0.1384, ns |
| MTAd | 26 (8.6%) | 9 (5.9%) |
| Propolis | 108 (35.9%) | 71 (46.7%) |
| Salvora persica | 35 (11.6%) | 16 (10.5%) |
| Not aware | 103 (34.2%) | 48 (31.6%) |
| Herbal substitute has more antimicrobial efficacy | Aloe Vera | 40 (13.3%) | 8 (5.3%) | 0.071, ns |
| Curcumin | 16 (5.3%) | 8 (5.3%) |
| M. citrifolia | 41 (13.6%) | 23 (15.1%) |
| Which herb substitute has more smear layer removal efficacy | Neem | 204 (67.8%) | 113 (74.3%) | 0.001\*, sig |
| Green herbal | 78 (25.9%) | 12 (7.9%) |
| Neem leaf extract | 91 (30.2%) | 95 (62.5%) |
| Orange oil | 41 (13.6%) | 13 (8.6%) |
| Sodium Hypochlorite | 91 (30.2%) | 32 (21.1%) |
| Do you know about any of the herbs that are used for oral health | Yes | 178 (59.1%) | 114 (75.0%) | 0.038\*, sig |
| No | 62 (20.6%) | 20 (13.2%) |
| Maybe | 61 (20.3%) | 18 (11.8%) |
| Do you know how to use any of these herbs | Yes | 163 (54.2%) | 104 (68.4%) | 0.0142\*, sig |
| No | 65 (21.6%) | 23 (15.1%) |
| Not Sure | 73 (24.3%) | 25 (16.4%) |
| Do you know about the effective ingredients of the herbs | Yes | 168 (55.8%) | 101 (66.4%) | 0.058, ns |
| No | 54 (17.9%) | 25 (16.4%) |
| Not Sure | 79 (26.2%) | 26 (17.1%) |
| Are you aware of safety concerns with herbal medicines? | Yes | 225 (74.8%) | 105 (69.1%) | 0.242, ns |
| No | 76 (25.2%) | 47 (30.9%) |
| Are you aware of safety concerns with herbal medicines or possibly | Yes | 161 (53.5%) | 84 (55.3%) | 0.368, ns |
| No | 64 (21.3%) | 38 (25.0%) |
| Maybe | 76 (25.2%) | 30 (19.7%) |
| Do you wish to know about these herbal products | Yes | 205 (68.1%) | 134 (88.2%) | 0.001\*, sig |
| No | 37 (12.3%) | 12 (7.9%) |
| Maybe | 59 (19.6%) | 6 (3.9%) |
| Have you ever used any herbs in the past | Yes | 185 (61.5%) | 108 (71.1%) | 0.787, ns |
| No | 74 (24.6%) | 32 (21.1%) |
| Maybe | 42 (14.0%) | 12 (7.9%) |
| Have you ever used herbal product as medicine | Yes | 167 (55.5%) | 80 (52.6%) | 0.634, ns |
| No | 134 (44.5%) | 72 (47.4%) |
| Was the treatment effective | Effective | 263 (87.4%) | 136 (89.5%) | 0.0024\*, sig |
| Ineffective | 38 (12.6%) | 16 (10.5%) |
| Any side effect observed | Yes | 47 (15.6%) | 8 (5.3%) | 0.838, ns |
| No | 254 (84.4%) | 144 (94.7%) |
| Have you done research before using herbal research | Yes | 142 (47.2%) | 74 (48.7%) | 0.624, ns |
| No | 159 (52.8%) | 78 (51.3%) |
| Will you recommend herbal research in your practice in future | Yes | 180 (59.8%) | 98 (64.5%) | 0.071, ns |
| Maybe | 95 (31.6%) | 42 (27.6%) |
| No | 26 (8.6%) | 12 (7.9%) |
| What is your preference for treatment | Allopathic Medicine | 100 (33.2%) | 71 (46.7%) | 0.059, ns |
| Herbal products or traditional medicines | 201 (66.8%) | 81 (53.3%) |
| If preference is for herbal products | They are natural with no side effects | 201 (66.8%) | 108 (71.1%) | 0.053, ns |
| They promote general well-being | 63 (20.9%) | 32 (21.1%) |
| Family tradition | 37 (12.3%) | 10 (6.6%) |
| Not applicable | 0 (0.0%) | 2 (1.3%) |

Chi square test, level of significance set at p < 0.05, Ns: non-significant, \*sig: significant

Table 4: Purpose of Herbal Product Use Among Dental Professionals

|  |  |  |  |
| --- | --- | --- | --- |
|  | Dental students (n=301) | Dental professionals  (n=152) | P value |
| Pain relief | 80 (26.6%) | 42 (27.6%) | 0.278, ns |
| Treatment | 87 (28.9%) | 55 (36.2%) |
| Support | 61 (20.3%) | 28 (18.4%) |
| Protection from the disease | 73 (24.3%) | 27 (17.8%) |

Chi-square test, level of significance set at p < 0.05, Ns: non-significant, sig: significant

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