

ANCIENT WISDOM MEETS MODERN SCIENCE: THE ROLE OF MEDICINAL HERBS IN ORAL CARE

Ahmić Amra,^{1*} Jakupović Vedran², Bajsman Anita¹.

¹ University of Sarajevo, Faculty of Dentistry with Dental Clinical Center

² University of Sarajevo, Faculty of Health Studies

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*Corresponding author

Amra Ahmić
University of Sarajevo,
Faculty of Dentistry with
Dental Clinical Center
Bolnička 4a
71000 Sarajevo
Tel: +38733442083
e-mail: aahmic@sf.unsa.ba

ABSTRACT

Herbal medicine has long been essential in preventing and treating oral health issues, dating back to prehistoric times. Over the centuries, different cultures have developed advanced herbal remedies for conditions such as toothaches, gingivitis, oral ulcers, and bad breath. Recent research highlights the therapeutic benefits of plants like sage, aloe vera, miswak, clove, neem, chamomile, and mint, many of which are now incorporated into modern oral care products. The combination of ancient wisdom with contemporary scientific research reinforces the ongoing role of phytotherapy in modern dental practice.

Keywords: phytotherapy, oral health, medicinal herbs, dentistry

1. Introduction

Medicinal plants have been used for thousands of years. Thanks to the research of bioarcheologists, paleo-odontologists, and paleo-pharmacologists, we now have valuable evidence that prehistoric humans were already aware of the healing properties of various plants. Natural remedies have been discovered preserved at archaeological sites. Studies suggest that even Neanderthals used medicinal plants. For example, Hardy et al. found fossilized molecules of yarrow and chamomile in the dental calculus of a Neanderthal from El Sidrón, Spain. In one female specimen with a dental abscess, traces of poplar were found—a plant that contains salicylic acid, a natural substance with anti-inflammatory and pain-relieving properties. [1]

Many ancient civilizations developed advanced medical practices in which medicinal herbs played a vital role. The use of healing plants has evolved over time and has been passed down through generations. Numerous studies have shown a strong connection between the modern use of herbs and the medicinal knowledge of ancient civilizations. [2] [3] [4]

The oldest known written medical document is a Sumerian clay tablet from Nippur. Dating back 5,000 years, it contains lists of medicinal plants such as myrrh, thyme, poppy, mandrake, coriander, and senna. Chewing fresh aromatic herbs was among the earliest remedies used for bad breath and maintaining gum health. [5] [6]

Evidence of ancient Egyptian medicine has been recorded in several papyri, most notably the Ebers Papyrus. This text contains information on over 850 medicinal plants, including garlic, juniper, cannabis, castor, beans, aloe, and mandrake. It also describes treatments for bad breath and toothache. For example, a mixture of vinegar and crushed fresh cloves was recommended for relieving toothache. Clove oil contains eugenol, an active compound that, when combined with zinc oxide, is still used in modern dentistry for its antiseptic and pain-relieving properties. [7] Another ancient remedy for toothache involved chewing anise seeds. A paste made from ground cumin, incense, and carob was also recommended for relieving dental pain. The earliest known recipe for toothpaste originates from ancient

Egypt and included a mixture of salt, pepper, mint leaves, and iris flowers. [8]

The physicians of ancient Greece inherited much of their knowledge of medicinal plants from the Egyptians. Theophrastus, a Greek philosopher and scientist, made significant contributions to the description and classification of medicinal plants. Through his works *De Causis Plantarum* and *De Historia Plantarum*, he laid the foundation for botanical science. These books offer a systematic study of plant descriptions and classifications, containing many of his own observations. He categorized over 500 known medicinal plants, including sage, cinnamon, basil, parsley, iris, rhizome, mint, pomegranate, and cardamom. Chewing the leaves of aromatic herbs such as hellebore or mint was recommended for combating bad breath. Mixtures of aromatic herbs with wine were used as mouthwashes to reduce oral odor, while gargling with rose water was also advised. For treating diseases of the oral mucosa, a blend of egg yolk, olive oil, myrtle, and honey was recommended. [9] [10]

Roman physicians built upon the medical knowledge of the ancient Greeks while also developing many new remedies. The renowned Roman medical writer Aulus Cornelius Celsus, in his work *De Re Medica*, described around 250 medicinal plants, including aloe, henbane, flax, poppy, pepper, cinnamon, gentian, cardamom, and false hellebore.

Pedanius Dioscorides, a Greek botanist, pharmacologist, and physician who practiced in Rome, authored a five-volume pharmacopeia titled *De Materia Medica*. This influential work listed over 600 herbal remedies and served as a foundational medical reference for more than 1,500 years. Dioscorides also provided one of the earliest classifications of oral and dental diseases. He recommended over 120 natural treatments for toothache and conditions affecting the gums and oral mucosa. Various substances were used to relieve dental pain. Decoctions of vinegar combined with plants such as milkweed, cedar, hyssop, or mullein were used as mouthwashes. Chewing wild olives or freshly cut oregano was prescribed for treating aphthous ulcers and mouth sores. A mixture of honey with pomegranate flowers or olive leaves was also

used to treat aphthous conditions. [10] [11] Many of the herbs described possess therapeutic and potentially analgesic properties. Their leaves and roots contain powerful alkaloids such as scopolamine and hyoscyamine, which act as central nervous system depressants. When used as a mouthwash, these compounds may have provided some local pain relief. However, a significant number of the remedies recommended by Dioscorides would be considered ineffective by modern medical standards. [12]

Claudius Galen is one of the most influential physicians in medical history and was a strong advocate for the healing power of herbal remedies. He maintained a large garden to cultivate plants he believed could aid in treatment and carefully developed new medicines. As a skilled pharmacist, Galen systematized the preparation of drugs made from multiple ingredients, which later became known as galenicals. [12] The most commonly used medicinal plants for treating oral diseases and toothache included sage, garlic, cloves, mint, willow, chamomile, and calendula. [13] The Romans improved upon Greek toothpaste recipes by adding abrasives such as crushed bones or shells, along with flavoring agents. Galenicals continued to be used throughout the entire Middle Ages.

Meanwhile, herbal medicine has been an integral part of Traditional Chinese Medicine for thousands of years. [14] Ginseng is one of the most well-known herbs in traditional Chinese medicine. Recent clinical research suggests its potential benefits in treating periodontal disease, protecting against dental caries, and managing various types of stomatitis. [15]

Herbal medicine was also highly advanced in ancient Indian culture. Over the centuries, Ayurvedic practitioners developed numerous herbal preparations for treating oral and dental diseases. Ayurveda recommends chewing sticks made from neem, whose bark possesses antibacterial properties. Neem is especially effective for treating gum problems and maintaining oral health naturally. Neem twigs have traditionally been used as oral deodorants, toothache relievers, and natural teeth cleaners. Notably, neem oil is now an ingredient in some modern toothpastes and mouthwashes. Neem mouthwash is recommended for treating oral

infections, gingival bleeding, and promoting wound healing. A study by Jalaluddin et al. investigated the effectiveness of neem mouthwash on plaque and gingivitis, concluding that it can be a viable alternative to chlorhexidine mouthwash. [16]

In the early Middle Ages, dental treatment relied primarily on herbal remedies, prayers, and magical practices. Benedictine monasteries served as centers of medical knowledge and culture. Roman Emperor Charlemagne (742–814 AD) decreed that every monastery should maintain a “healing garden” where monks cultivated medicinal herbs. Treatments commonly used about 16 medicinal plants, including sage, mint, anise, chamomile, savory, iris, marshmallow, and tansy. [9] The monks prepared medicines following the prescriptions of ancient Greek and Roman physicians and herbalists. To prevent inflammation and bleeding gums, medieval monks would wrap a sage leaf around their finger and massage their teeth and gums. For bad breath, a paste made from crushed pepper, mint, and rock salt was recommended. [17] [18] [19]

The most famous figure associated with monastic medicine was the German Benedictine abbess Saint Hildegard of Bingen, who lived around the turn of the 11th and 12th centuries. She became well known for her healing abilities, especially through the practical use of herbs and tinctures. Hildegard left behind nearly 2,000 medicinal recipes. For bad breath, she recommended rinsing the mouth with a drink made from sage boiled in wine. [20] [21] Today, we know that sage possesses many beneficial medicinal properties, including anti-inflammatory, antiseptic, and antibacterial effects. [22] [23] [24]

The Schola Medica Salernitana is considered the oldest medical school in Europe. Trotula of Salerno, a physician and instructor at this school, was one of the most renowned medieval medical practitioners. While she primarily focused on women's health—covering pregnancy, childbirth, breastfeeding, and newborn care—she also wrote about cosmetics and oral hygiene. For maintaining oral hygiene and fresh breath, Trotula recommended chewing aromatic plants such as mint, eucalyptus, fennel, and parsley. To treat gingivitis and halitosis, she used a remedy made from fast lime nature sulfur, mineral orpiment, burnt pumpkin, and pepper seeds.

This medicine was applied to diseased gums that had been washed beforehand with a solution prepared by cooking the root of the mullein plant in vinegar. An analysis of the therapeutic efficacy of the herbs used by Trotula reveals that many of these plants are still ingredients in modern toothpastes and mouthwashes. [25] [26]

Medieval Arab physicians and pharmacologists made significant advances in medicine and science. They adapted the ancient medicinal practices of Egypt, Greece, and Rome while introducing many new remedies and therapies. Their materia medica included plants such as aloe, ginger, strychnos, saffron, turmeric, pepper, cinnamon, and senna—many of which are still used today. Their pharmacies also contained numerous remedies of animal and mineral origin, often combined with medicinal plants.

One of the most renowned scholars in history is Ibn Sina, known in the West as Avicenna. His Canon of Medicine served as a key medical reference for centuries in both Western and Eastern countries. In this work, he summarized centuries of experience from Greek, Indian, and Central Asian medicine, including pharmacology, pharmacy, and pharmacotherapy. In the third book of the Canon, Avicenna discussed diseases of the oral cavity and dentistry. He addressed conditions such as trauma, taste disorders, ranula, halitosis, tooth sensation and various types of tooth pain, bruxism, attrition, gingival bleeding, recession, and hyperplasia. For managing these ailments, he introduced over 80 herbal remedies, many derived from plants rich in essential oils. [27] [28] [29]

Abu al-Qasim al-Zahrawi (Albucasis, 936–1013) recommended washing or gargling with mint decoctions to alleviate swelling and erosion of the mouth, tongue, and throat caused by the toxic effects of topically applied mercury, a substance already used in Islamic medicine [30]

It is important to note the long-standing tradition of using miswak as a natural toothbrush in the Arabic world. Miswak comes from the *Salvadora persica* plant. Numerous studies have confirmed its antiplaque, anticariogenic, antimicrobial, and antifungal properties. Scientific research has proven that miswak helps reduce plaque, prevent tooth

decay, eliminate bad breath, and promote healthy gums. [31] [32] [33] Because of these beneficial properties, miswak is included as an ingredient in some modern toothpastes and mouthwashes. [34] It is also used as a root canal irrigate. [35] A study by Almas compared the cytotoxicity of chlorhexidine gluconate and miswak extracts on mouse fibroblasts, finding that miswak extracts were less cytotoxic and demonstrated superior antimicrobial effects compared to chlorhexidine gluconate and sodium hypochlorite. [36] Although aloe vera has been used for thousands of years, Arab physicians placed great value on it. Today, its benefits are scientifically recognized. In modern dental practice, aloe vera is valued for its biological properties, including antimicrobial, immunomodulatory, anti-inflammatory, and antioxidant effects. Additionally, aloe vera promotes wound healing. [37] Therefore, aloe vera is commonly used to treat oral lesions, periodontal diseases, and alveolar osteitis. [38] [39] [40]

There were also many misconceptions about the use of herbs in medicine. One of the most famous is the "Doctrine of Signatures," which claims that a plant's shape, smell, or texture serves as a "signature" indicating its use in treating certain diseases. Although this idea dates back to ancient times, one of its most prominent advocates was the Renaissance physician and philosopher Paracelsus. According to this theory, the root of cut leaf (toothwort) was believed to be effective against toothache because it resembles a human tooth. Celsus, meanwhile, believed that everything needed for healing exists in nature, and that science's challenge is to discover it. [41] [42]

The study of medicinal plants and their properties intensified during the Renaissance and subsequent periods. Many books on medicinal herbs were written and printed, describing well-known plants and recipes, while also introducing new plants from Asia and the New World. With the advancement of chemical methods in the early 19th century, alkaloids were isolated from sources like poppies, quinine, and pomegranates. Numerous bioactive compounds—including glycosides, tannins, saponins, essential oils, and vitamins—were discovered in medicinal plants, paving the way for the development of scientific pharmacy. [43]

5. Conclusions

Numerous scientific and clinical studies confirm the effectiveness of ancient herbal medicines. Many plants used in traditional remedies continue to be applied today in treating oral diseases. Modern phytotherapy employs techniques such as active compound extraction and dose standardization, whereas traditional methods relied on empirical knowledge. Today, many commercial oral care products combine traditional herbal ingredients with modern formulations, demonstrating how science and tradition can work together to improve oral health.

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