

Phytotherapy and oral health

Basma Ezzat Mustafa AlAhmad*

Department of Fundamental Dental and Medical Sciences, Kulliyah of Dentistry, International Islamic University Malaysia (IIUM), 25200, Kuantan, Pahang, Malaysia.

*Corresponding author:

Address:

Department of Fundamental Dental and Medical Sciences, Kulliyah of Dentistry, International Islamic University Malaysia (IIUM), 25200, Kuantan, Pahang, Malaysia.

Telephone: +609 5705487

Email address:

drbasma@iium.edu.my

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Phytotherapy is the use of extracts from natural origin as medicines or health-promoting agents. The use of medicinal herbs in the treatment of a variety of ailments is beneficial and efficient (Jaikaria *et al.*, 2016). Many different herbal plants can be used to extract phytotherapeutic chemicals, which are thought to offer a wide range of therapeutic effects and fewer adverse effects than synthetic medications. A significant contribution to pharmacotherapy has historically been made by natural compounds and their structural analogues. The World Health Organization (WHO) estimates that around 80% of people worldwide utilise traditional medicine, mostly plant extracts, for their healthcare. Due to cultural familiarity, accessibility, and price, traditional medicine has seen a resurgence in interest considering that it has been used to treat illnesses for thousands of years (Schuhladen *et al.*, 2019).

In addition to conventional treatment options, herbal agents have taken root into the oral care business in recent years owing to their physicochemical properties and therapeutic benefits, which include the ability to heal canker sores, gum inflammation, and tooth discomfort. The oral care sector has witnessed the emergence of oral hygiene products, particularly toothpaste, made with natural ingredients that are less toxic, more biocompatible,

sustainable, and at the same are having the desired therapeutic properties (Cheng *et al.*, 2019).

Many companies have started to use herbal ingredients in their products to provide additional therapeutic characteristics. Natural substances made from herbs and plant parts can be used singly or in combination to improve oral hygiene, prevent inflammation, and allergies, and even alleviate some autoimmune diseases. Due to their effective antifungal, antimicrobial, antiviral, and analgesic properties as well as their cheaper costs, availability, and low rate of side effects, these items are excellent alternatives to traditional medications (Teodoro *et al.*, 2022). Although much has been stated about the advantages of phytotherapy for oral health, there are still a lot of areas that need to be thoroughly investigated, particularly in terms of its effectiveness, mechanism of action, and potential interactions with the body and other medications.

For example, despite early attempts to identify prospective antimicrobial drugs from natural products, the actual efficacy and the precise mechanisms of action are still largely unknown because of the limitations of the assays employed. Such methods of evaluating antimicrobial activity, for instance, are somewhat troublesome for

a variety of reasons. First, bacteria in the oral cavity would never be exposed to a constant concentration of an exogenously introduced antimicrobial agent over a 24-hour period. Microorganisms in the oral cavity are rarely exposed to high concentrations of an antibiotic for longer than 30 seconds to a few minutes unless a chemical has an exceptional substantivity.

Second, the bacteria in classical Minimum Inhibitory Concentration/Minimum Bactericidal Concentration (MIC/MBC) assays are in suspension, whereas the oral bacteria associated with caries are enmeshed in the plaque biofilm matrix (Griffith *et al.*, 2022). Several studies have demonstrated that cells in biofilms are more resistant to antimicrobials than cells in suspension. It is therefore unlikely that reporting antibacterial activity against planktonic oral bacteria with continuous exposure to an antibiotic at a high concentration over the course of a day would accurately reflect how oral bacteria would react in the mouth (Jeon *et al.*, 2011).

Several natural products may exude potential in modulating the pathogenesis of dental caries, however very few *in vivo* investigations and even fewer clinical evaluations have been done. Although the evidence is not yet complete, it shows that novel and effective anticaries/antiplaque medicines may be developed using natural ingredients. More research must be done in order to assess the therapeutic effectiveness and safety of these drugs (Chen *et al.*, 2020).

Another challenging aspect of phytotherapy is the fact that it may be difficult to find new bioactive chemicals because of the intricacy of crude or semi-pure natural extracts and the chemical composition of its components (Thomford *et al.*, 2018). It is complicated to demonstrate the therapeutic efficacy of herbal medications because of their complicated chemical complexity. The relatively new idea of combining herbal medicines with allopathic entities to create the synergy of their therapeutic effects has drawn more and more attention in recent years. Moreover, the identification of the active components of an unusually complex

matrix sometimes necessitates purification and additional bioassays, which is tedious, difficult, and time-consuming. Furthermore, the geographical location, seasonal variations, and biological diversity all have an impact on the chemical composition of the natural products leading to uniformity issues which further requires more research on standardization to be done accordingly (Beutler *et al.*, 2019).

Despite so, it is apparent that the field of natural product research and pharmaceutical development related to dentistry is evolving quickly. The success rate of new therapeutic moieties could be increased through innovative drug development from natural products. Discovering new drugs from natural origin has the potential to help address numerous issues in oral health and advance the field. For the prevention and treatment of oral and dental issues, phytotherapy using extracts of natural origin as oral health-promoting agents can offer a viable and safe alternative to antibiotics and other synthetic drugs. Without understanding their pharmacokinetics and pharmacodynamics, the use of these products shouldn't be viewed as obsolete or ineffective. In fact, having a complete understanding of the benefits and drawbacks of these items will enable dental healthcare professionals to advise patients in the proper manner and help them achieve their goals in areas where modern oral healthcare methods are still limited.

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