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Review Article

Role of wonder drug thyme in dentistry: A review

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ABSTRACT

Herbal products have been utilized for eons for the treatment of various ailments in indigenous healing practices around the world and their role in healthcare is extensively documented. They also have been used to manage varied odontogenic and nonodontogenic conditions such as toothache, caries and to maintain general orodental hygiene. One such herb is thyme. It is a perennial herb with culinary, medicinal and cosmetic uses & has long been considered as wonder drug. It is a powerful essential oil distilled from the leaves and flowering tops.

1. Introduction

Herbal therapies are used globally to treat health conditions since ancestral era. Cultural and religious traditions have influenced the use of herbal medicine for oral health purposes.[1] Varied herbs exhibit antiseptic, antibacterial, antimicrobial, antifungal, antiviral agents, antioxidant and analgesic and are of pervasive interest in dentistry. Indeed, throughout history, thyme and its essential oils have been utilized to alleviate upper respiratory tract infections, the symptoms of bronchitis, pruritis brought on by dermatitis, bruises and sprains. These days, it is frequently used in dentistry, as a disinfectant and as an expectorant for coughs brought on by colds. The properties of herbal medicine are used to treat toothache, canker sores, halitosis, gingivitis, and periodontitis, as well as dental caries. One such wonder drug is thyme.[2] The word "thyme" indeed originates from the Greek word thymos which means "to fumigate" or to "make a burnt offering".[3] Historically it has been used for its aromatic characteristics in fumigation and pleasant scents in purification rituals. It is the dried leaf from the Thymus vulgaris shrub and used for culinary purpose too.[4] The species name, vulgaris, is Latin for "common" or "widespread". Thyme is referred to by various names across different languages. It is called as Banajwain in Hindi, Marizha, Masho and Rangsbur in Punjabi, Hasha in Urdu, satr in Arabic, bai li xiang in Mandarin Chinese, thym in French, thymian in German, timo in Italian, tomillo in Spanish, thimari in Greek and ajwain ke phul in Hindi.[5] Thymus vulgaris (common thyme, German thyme, garden

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thyme or just thyme) is a floral species in the mint family Lamiaceae, originating from southern Europe from the western Mediterranean to southern Italy.[6] A German apothecary, Neumann, first isolated the essential oil and introduced it as a powerful antiseptic substance Thymol in 1785.[7]This was used as a disinfectant in hospitals at least until the First World War. It is used more in pharmaceutical dosage forms because it contains more essential oil.

There are several chemotypes of thyme, each with its unique advantages and drawbacks. They are named after the main constituent. Commercially produced thyme oils, for example, are extracted from the following seven chemotypes: Carvacrol, Thymol, Borneol, Ggeraniol, Linalool & Thujanol.[8] Additionally, the phenophase of the thyme plant directly influences the concentrations of different constituents found in thymol oil which in turn can result in variations in its properties. This variability highlights the importance of considering the stage of plant growth when extracting thymol oil for specific theraupetic applications. The chemical components of thyme essential oil include monoterpene alcohols, phenol derivatives, ketones, aldehydes, ethers and esters, among various chemical groups. The two isomeric phenolic monoterpenes thymol (2-isopropyl-5-methylphenol) and carvacrol (2-methyl-5-(1-methyethyl) phenol) constitutes the majority of thyme essential oils.[9] Two types are predominant in the market: the thymol chemotype (thymus vulgaris ct. thymool) and the linalool chemothyme (t.vulgaris ct. linalool). The later contains fewer toxic phenols and is safer to use, particularly for the skin and in blends for children.[10]

2. Discussion

Thyme can be used along with popular herbs and spices such as cloves, miswak, thyme, green tea, peppermint, rosemary, olive oil, myrrh, anise, sesame, ginger and garlic for making various formulations in managing oral health.[11] The aroma is both warmly sweet & pungently fragrant. Essential oils also known as volatile oils are the sources of natural products.[12] These are complicated mixtures of hydrocarbons and their derivatives, derived from oxygenation of two different isoprenoid pathways.[13] Essentially, these are aromatic oily liquids derived from different plant materials such as buds, seeds, herbs, twigs, wood, fruits, bark, roots, leaves and flowers.[14]

Volatile oils are comprised of different kind of biological efficacies such as antioxidant, antimicrobial, antibacterial, antiviral and insecticidal.[14] The key ingredient of thyme is its essential oil thymol. It provides immense analgesic effect for pain associated with chronic illness or associated with some medical procedure.[15]The use of antimicrobial agent such as thyme containing dentifrices and mouth rinses reduces and regulates microorganisms in plaque bio film.[16] Thymol containing mouth rinses are used to rinse oral cavity for eradicating micro organisms. It possesses excellent astringent properties, alleviates infection and prevents dental caries. Thymol can be used as an active component and prime element in mouthwash preparations such as Listerine. It is safe and makes it a promising effective antimicrobial mouthwash for children.[17]

The primary cause of dental caries is Streptococcus mutans. It initiates tooth decay by metabolizing sucrose to lactic acid, thus creating an acidic environment that increases the likelihood for tooth decay. Thyme has potent antimicrobial properties and acts by inhibiting the growth by decreasing lactic acid production and decreasing cellular glucose uptake.[18] The actual mode of action is unknown.[19] But some postulates suggest the biocidal properties of thymol are due to membrane disruption. Its anti-microbial attributes reported in vitro against several bacteria Salmonella typhimurium, Staphylococcus aureus and Helicobacter pylori. Activity against caries causing bacteria Steptococcus mutans and periodontopathogenic bacteria such as Porphyromonas gingivalis, Streptococcus Sorbinus, Selenomonas is due to perforation of cell membrane leading to intracellular components efflux.[20] Furthermore, thymol diminishes resistance of bacteria to common drugs such as penicillin through a synergistic effect with carvacrol.[21]

Enterococcus faecalis's survival and virulence factors include its ability to endure prolonged periods of nutritional deprivation, its ability to bind to dentin and effectively invade dentinal tubules, its ability to alter host responses, its ability to inhibit lymphocyte activity, and its possession of lytic enzymes, cytolysin, aggregation substance, pheromones, and lipoteichoic acid.[22] Anti bacterial efficacy of a novel material zinc oxide and thyme oil paste has shown promising antibacterial activity against Enterococcus faecalis. Indeed developing this combination can be developed as an alternative sealer to eugenol-based sealers in endodontic practice could offer several advantages, including potentially reduced cytotoxicity and improved antibacterial properties. Validating its relevant properties such as biocompatibility, sealing ability antimicrobial efficacy, would be crucial for ensuring its suitability and safety for clinical use.[23]Thymol-containing dental varnish was found to decrease the number of Streptococcus mutans in supragingival plaque surrounding orthodontic brackets in patients.It scavenges free radicals and is mainly accountable for anti-oxidative activity. It induces apoptosis, reduces cell proliferation, and increases reactive oxygen species and increases levels of the different proapoptotic factors in various carcinomas.[24] Thyme is an immune booster & is of great nutritional value. Its leaves are rich with nutrients like vitamin A, C, manganese, copper, iron and fiber to help build body's immunity. Thyme, in its various forms, holds immense antiviral potential. It exhibits antispasmodic, bactericidal, antiseptics, antioxidants, antihelminthic properties and

thereby contributes in inhibiting neoplastic proliferation.[25] Lipophilic property of thyme contributes to its antifungal effect by enabling interaction with the cell membrane, changing its permeability granting the loss of macro molecules.

While performing antifungal researches by agar diffusion method, the thyme showed the strongest antifungal activity against the two chemo type isolates of Fusarium graminearum.The antiviral activity of an aqueous extracts of thymus vulgaris was analyzed against Herpes simplex viruses (type1, type 2 and an acyclovir-resistant strain of HSV-1) under in vitro clinical trials. Thyme extract was prepared by steeping 5 grams of dried leaves per 100 ml boiling water for 10 minutes and straining infusion.[26] Thyme is commonly consumed in foods. Gargling with thyme tea yields greater effectiveness compared to sipping or ingesting it. It is likely safe for short term medicinal use. Adverse effects in some individuals include hypersensitive reactions, light-headedness, dizziness, gastric distress and diarrhoea. There is insufficient credible data to determine if thyme is safe when used in larger quantities in pregnant or lactating women. Thyme might impede blood coagulation. This could raise the risk of additional bleeding during and after surgery. Dentist and general surgeons should take case history from patient about its consumption and prohibit patients from using thyme at least 2 weeks before a scheduled surgery. Thyme can boost chemical in the body called acetylcholine responsible for many bodily functions. Anti cholinergic drugs inhibit the effects of acetylcholine in the body. Some significant drug interactions include that taking thyme might decrease the effectiveness of anti cholinergic drugs. Thyme might mimic estrogen in the body. Using thyme in conjunction with estrogen could reduce effectiveness of estrogen.[27]

3. Conclusion

Thyme is a natural, safe and available plant making it a promising product in health care. Its medicinal properties have made it a valuable resource in traditional and alternative medicine practices. Incorporating thyme oil into dental materials could offer new avenues for combating oral pathogens and improving overall health. However, more clinical data is required to ascertain the benefits of herbal medicine for oral tissues and the prevention of oral diseases.

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5. Conflicts of Interest

None.

References

1. Niazi F, Kamran A, Naseem M, Alshahrani I, Frazt, Hosein M. Anti-plaque Efficacy of Herbal Mouthwashes Compared to Synthetic Mouthwashes in Patients Undergoing Orthodontic Treatment: A Randomised Controlled Trial. . *Oral Heal Prevent Dent*. 2018;16(5):1–8.
2. Ansari G, Tabari M, Kazemi B. Assessment of pathogens microorganisms of periapical abscess in primary teeth. *Beheshti Univ Dent J*. 2005;22(4):567–73.
3. Jaju S, Prashant P. Newer root canal irrigants in horizon: A review. *Int J Dent*. 2011;20:1–9.
4. Ouwehand AC, Tiihonen K, Kettunen H, Peuranen S, Schulze H, Rautonen N, et al. In vitro effects of essential oils on potential pathogens and beneficial members of the normal microbiota. *Veterinarni Med*. 2010;55(2):71–9.
5. Manou I, Bouillard L, Devleeschouwer MJ, Barel AO. Evaluation of the preservative properties of Thymus vulgaris essential oil in topically applied formulations under a challenge test. *J Appl Microbiol*. 1998;84(3):368–76.
6. Ramanoelina AR, Terrom GP, Bianchini JP, Coulanges P. Antibacterial action of essential oils extracted from Madagascar plants. *Arch Inst Pasteur Madagascar*. 1987;53:217–43.
7. Shapiro S, Guggenheim B. The action of thymol on oral bacteria. *Oral Microbiol Immunol*. 1995;10(4):241–6.
8. Underger U, Basaran A, Degen GH, Basaran N. Antioxidant activities of major thyme ingredients and lack of (oxidative) DNA damage in V79 Chinese hamster lung fibroblast cells at low levels of carvacol and thymol. *Food Chem Toxicol*. 2009;47(8):2037–80.
9. Palaniappan K, Holley RA. Use of natural antimicrobials to increase antibiotic susceptibility of drug resistant bacteria. *Int J of Food Microbiol*. 2010;140(2):164–72.
10. Sharangi AB, Guha S. Wonders of leafy spices: Medicinal properties ensuring Human Health. *Sci Int*. 2013;1:312–29.
11. Broucke VD, Lemli JA. Spasmolytic activity of the flavonoids from Thymus vulgaris. *Pharm Weekblad Sci*. 1983;5:9–14.
12. Segvic KM, Kosalec I, Mastelic J, Pieckova E, Pepeljnak S. Antifungal activity of thyme (Thymus vulgaris L.) essential oil and thymol against moulds from damp dwellings. *Lett Appl Microb*. 2007;44:36–42.
13. Kakehashi S, Stanley HR, Fitzgerald RJ. The effects of surgical exposures of dental pulps in germ-free and conventional laboratory rats. *Oral Surg Oral Med Oral Pathol*. 1965;20:340–9.
14. Siqueira JF. Aetiology of root canal treatment failure: Why well-treated teeth can fail. *Int Endod J*. 2001;34:1–10.
15. Saha S, Dhinsa G, Ghoshal U, Hussain A, Nag AN, Garg S, et al. Influence of plant extracts mixed with endodontic sealers on the growth of oral pathogens in root canal: Anin vitro study. *J Indian Soc Pedod Prev Dent*. 2019;37:39–45.
16. Kowalczyk A, Przychodna M, Sopata S, Bodalska A. Fecka, I. Thymol and Thyme Essential Oil-New Insights into Selected Therapeutic Applications. *Molecules*. 2020;25:4125.
17. Thosar N, Basak S, Bahadure RN, Rajurkar M. Antimicrobial efficacy of five essential oils against oral pathogens: An in vitro study. *Eur J Dent*. 2013;7(1):71–7.
18. Perez AP, Perez N, Lozano CMS, Altube MJ, De Farias M, Portugal RV. The anti MRSA biofilm activity of Thymus vulgaris essential oil in nanovesicles. *Phytomed*. 2019;57:339–51.
19. Kryvtsova MV, Salamon I, Koscova J, Bucko D, Spivak M. Antimicrobial, antibiofilm and biochemichal properties of Thymus vulgaris essential oil against clinical isolates of opportunistic infections. *Biosyst Divers*. 2019;27(3):270–5.
20. Tohidpour A, Sattari M, Omidbaigi R, Yadegar A, Nazemi J. Antibacterial effect of essential oils from two medicinal plants against Methicillin-resistant Staphylococcus aureus (MRSA). *Phytomedicine*. 2010;17(2):142–5.
21. Kumari P, Mishra R, Arora N, Chatrath A, Gangwar R, Roy P. Antifungal and Anti-Biofilm Activity of Essential Oil Active Components against Cryptococcus neoformans and Cryptococcus laurentii. *Front Microbiol*. 2017;8:2161.
22. Liggri PGV, Tsitsanou KE, Stamati ECV, Saitta F, Drakou CE, Leonidas DD, et al. The structure of AgamOBP5 in complex with

the natural insect repellents Carvacrol and Thymol: Crystallographic, fluorescence and thermodynamic binding studies. *Int J Biol Macromol*. 2023;237:124009.
23. Saha S, Dhinsa G, Ghoshal U, Hussain A, Nag AN, Garg S, et al. Influence of plant extracts mixed with endodontic sealers on the growth of oral pathogens in root canal:Anin vitro study. *J Indian Soc Pedod Prev Dent*. 2019;37:39–45.
24. Gunaseelan S, Balupillai A, Govindasamy K, Muthusamy G, Ramasamy K, Shanmugam M, et al. The preventive effect of linalool on acute and chronic UVB-mediated skin carcinogenesis in Swiss albino mice. *Photochem Photobiol Sci*. 2016;15:851–60.
25. Altinoz E, Oner Z, Elbe H, Uremis N, Uremis M. Linalool exhibits therapeutic and protective effects in a rat model of doxorubicin-induced kidney injury by modulating oxidative stress. *Drug Chem Toxicol*. 2022;45(2):2024–30.
26. Gonçalves JC, De Meneses D, De Vasconcelos A, Piauilino CA, Almeida FR, Napoli EM. Essential oil composition and antinociceptive activity of Thymus capitatus. *Pharm Biol*. 2017;55:782–6.
27. Sabogal-Guáqueta AM, Hobbie F, Keerthi A, Oun A, Kortholt A, Boddeke E, et al. Linalool attenuates oxidative stress and mitochondrial dysfunction mediated by glutamate and NMDA toxicity. *Biomed Pharmacother*. 2019;118:109295.

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