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Review Article

The Role of Sesame and Selected Herbal Remedies in Alleviating Respiratory Manifestations

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Abstract:

Respiratory diseases are common health issues among the world, and the use of herbal remedies to treat the symptoms related to them is worldwide but their efficacy and safety not yet established.

The purpose of this review is to evaluate and support that literatures presented on the use of herbs in the management of symptoms related. Moreover, the frequency and route of their administration, in addition to their effectiveness and safety.

A lot of literature research was conducted using different databases from different websites, and many studies were included in the review of various herbal substances, e.g., sesame oil. Acacia pilotica and Arabic gum. The result of those studies concluded the effective ness of that herbal in reducing symptoms for example cough in bronchitis.

Although the effect of herbal substances was clearly noted, further researches are needed to support that outcome and also to establish efficacy and safety.

Keywords: sesame; herbal remedies; respiratory manifestations; thyme

Introduction

Many communities, especially in developing countries rely on alternative medicine and prefer using herbal medicine more than usual medicines prescribed by health care providers. Herbal Medicine Herbal medicine has long been utilized to treat respiratory symptoms; it has low-cost treatment for different local communities especially those who usually use the traditional method of treatment. Different parts of the plants are manufactured for treatment and relieving symptoms like leaves, seeds and roots: 27%of plants were seed extracted, 54%boiled from plant and among those 43% were used to elevate cough [1]. Over 35000 plants were used for medicinal purposes (2), particularly in communities that rely on plants treatment (like Sudan and other Arabic countries). Examples of these plants are sesame, acacia nilotica, thyme, Nigella sativa black seed, Zingiber officinale ginger, Citrus aurantiifolia lime and Syzygium aromaticum clove. These plants contain bio active compounds such as alkaloids, sugars, terpenes steroids and flavonoids [2]. Some kinds of plants exhibit synergistic effects when used in combination. Respiratory symptoms and diseases are common and many herbs extracted from plants are used to alleviate these symptoms because they have biological effects thus can act as anti-inflammatory, anti-viral and antiplatelet in addition to anti allergic and Aliant activities [3,4]. Sesame oil, acacia pods (Egyptian thron), acacia arabica gum and thyme are traditional substances that were and still are used by many communities in the middle east and north Africa as a medicine used to relieve respiratory symptoms. They serve as therapeutic agents by having multi-potential effects in addition to their antimicrobial activity. This review article is confined only to these three herbs and their role on alleviating respiratory symptoms because they are of the most commonly used remedies in our Arabic region and Sudan. In spite of their wide use, there is no enough researches or articles for their effectiveness and side effects from their use

particularly in vast communities that have less scientific dependence and have more traditional trust [5]. Our aim in this article is to discuss effectiveness of these three herbs in alleviating respiratory symptoms and establishing clinical evidence of their use (if any exist).

First: Acacia Nilotica

Acacia nilotica also known as prickly acacia is a tropical and subtropical tree that grows in some certain areas in the world. Its parts are well known of their medicinal values. Pods (fruits), seeds. Leaves. flower and bark with gum all of proven pharmacological effects. Babul, gum arabic tree, Egyptian acacia, prickly acacia, kikar, and thorn mimosa are some other names for Acacia nilotica. Additionally, it goes by numerous other names in various languages and geographical areas, including Sunt in Arabic, Acacia gomífera in Spanish, and gommier rouge in French. Acacia is rich in Gallic acid, illogic acid, quercetin and camferol, together with rutin and epicatechin [4]. All these are main active substances it can be used topically, by inhalation and orally to eluate the symptoms. It's usually infused into oils and teas or turned into pastes which can be cooked into biscuits or in form of vapor for inhalation, utilized as a form of astringent, emollient, antidiarrheal, and bite poison counteragent. Numerous ethno-pharmacological properties of Acacia species include antimicrobial, anti-inflammatory, antioxidant, antidiabetic, antidiarrheal, astringent, anthelmintic, analgesic, immunomodulatory, respiratory-supporting, hepatoprotective, anticancer, wound-healing, and antimalarial effects [7]. Acacia can alleviate respiratory symptoms by the anti-inflammatory effect of bark, gum or pods. The ways of applying it is numerous: Pods can be applied locally to chest (mixed with oils like sesame or alone), chewed, drunk (infusion or decoction i.e. tea) or to inhale its vapor after burning it (like bark also) Gum can be drunk with water as gel or powder. Many molecular docking studies confirm the anti-inflammatory effect of phytochemical constituents of Acasia which is being demonstrated in one study to be due to prostaglandin and leukotriene biosynthesis inhibition [8]. Two studies confirm Acacia can prevent the production of uric acid—which initiates a nonspecific inflammatory reaction—and the generation of superoxide radicals contribute to inflammation [9,10]. According to Shaukat, Acacia nilotica helps counter this response by suppressing the formation of inflammatory mediators through the inhibition of arachidonic acid pathways [11]. These predicted related mechanism of action are agreed with multiple in vivo studies using aqueous extract of pods [12] or leave [13] with comparable similar result with aspirin and diclofenac respectively. An in vitro study showed that niloticane (active constituent isolated from the bark) has inhibitory effect on COX similar to that of indomethacin [14]. An RCT testing the commercial gel containing Arabic gum in the treatment of plaque and gingivitis found significant reduction in gingivitis and plaque score compared to placebo Antipyretic effect of Acacia is explored by many studies and one affirm this effect although it was less potent than aspirin [12] and [13] confirmed its antipyretic, anti-inflammatory and analgesic effects. Antibacterial and antiviral are evident by many in vitro studies. Examples are: Three RCT studies provides its potency as an antiplaque agent and potentiality to be an alternative to chlorhexidine mouth wash (15) (16) (17) and its role in treatment of dental caries also approved by [18], All these studies support the use of this herb in traditional medicine to heal oral conditions by offering some scientific justification. Acacia extracts also appear to be effective against bacterial vaginosis with potency similar to metronidazole [19]. According to in vitro research, the bark extract in methanolic chloroform has antifungal and antibacterial properties against Bacillus subtilis and Pseudomonas fluorescens., E. coli was demonstrated with efficacy similar to ciprofloxacin, ketoconazole and griseofulvin [20[[21] thus there is good reason to consider Acacia nilotica as an alternative antibacterial approach because of its effectiveness in curing multidrug-resistant pathogens and low cost [17]. Antiviral effect of Acacia is evident by its ability to inhibit viral attachment and replication which was explored with hepatitis C and A virus [22], influenza virus [23], virus and herpes simplex virus [24]. Although there are no studies confined to role of Acacia nilotica in treating respiratory symptoms and diseases, after this brief presentation of the evidence of the antibacterial and anti-inflammatory effect of Acacia nilotica, it is now clear there is rational and justification for using it in the traditional medicine in Sudan and other Arabic countries.

Second: Sesame and sesame oil effect on respiratory disease and symptoms

Sesame is one of plants having role in multiple conditions, one of these conditions isrespiratory diseases and it is from the most commonly used herbs in treating respiratory symptoms in Arabic countries (19.8% of herbs) [25] (18.7% of herbs in other study [26]) Sesame plant is Sesamum herbaceou which contain lignans such as palmtic acid, palmitoleic acid, linoleic acid. All these have great role in suppression of respiratory symptoms through their inhibitory effect of viral proteins which are main causes of viral infections and subsequent symptoms.

Physiologic effects of sesame

Contemporary research has identified nearly 180 distinct phytochemical compounds in sesame, encompassing a wide range of bioactive substances such as lignans, polyphenols, phytosterols, phenols, anthraquinones, cerebrosides, fatty acids, vitamins, proteins, essential amino acids, and various sugars. These constituents are distributed throughout sesame seeds, their oils, and other plant structures. Key lignans—particularly sesamin and sesamol—exhibit diverse pharmacological activities that contribute meaningfully to human health. They have been utilized for multiple therapeutic purposes, including anti-inflammatory, antioxidant, anticancer, antimelanogenic, hearing-protective, anticholesterol, and anti-aging effects [27]. Although limited research has specifically explored the direct role of sesame in respiratory physiology and respiratory disorders, numerous studies have established the wide-ranging physiological actions of sesame lignans, especially sesamin and sesamolin. Their antioxidant, anti-inflammatory, antipyretic, and analgesic properties may contribute to the alleviation of respiratory symptoms through one or more of these mechanisms. For instance, Ruankham et al. demonstrated that sesamin possesses significant anti-apoptotic and antioxidant effects by inhibiting H_2O_2-induced reactive oxygen species (ROS) production in human neuroblastoma cells while enhancing the activity of antioxidant enzymes such as catalase (CAT) and superoxide dismutase (SOD), thereby protecting cells from oxidative stress. (28) These antioxidant findings were further supported by the work of Fan et al [29,30].

The anti-inflammatory potential of sesame lignans has also been well documented. Evidence shows that sesamin can:

1. Inhibit TNF-α-induced pro-inflammatory cytokine production in human primary synovial fibroblast cell lines. [31]

2. Exert immunomodulatory effects through catechol glucuronides—major metabolites of sesamin detected in human plasma after oral ingestion—which induce demyelination in macrophage-like J774.1 cells and downregulate the expression of interferon-β and inducible nitric oxide synthase [32].

Other physiological effect

Cardiovascular Protection Seeds like sesame seeds contain multiple bio active compounds including but not limited to phytosterols, lignans and vitamin E which can lead to it having a positive effect on blood pressure reduction [33] [34] [35] and it also has cholesterol lowering effect through reducing cholesterol absorption (36). Hypoglycemic effect was well established in randomized controlled trials [37]. Antitumor effect is thought to be due to its anti-proliferative, pro-apoptotic and anti-metastatic in addition to anti-angiogenic, and pro-autophagocytic activities. [46] Possible

mechanisms by which sesame seed can inhibit initiation and progression of clon cancer were studied by Cavuturu et al [38]. Respiratory impact are pro inflammatory effects in allergic reactions and allergic asthma and symptoms of bronchospasm by inhibiting cytokines effects and the effects of pulmonary infiltrations such as IL-6 and IL-1 both of which participated in the development of pulmonary edema and decrease level of IGE production which considered is the main pathology in in allergic reaction [39]. Sesame oil also has action on decrease nitric oxide expression and production that has role in secretion of pro-inflammatory product and cytokines and recruiting leukocyte inflammatory area [40].

Thyme

Thyme has been traditionally used to treat respiratory symptoms. recent studies have confirmed its efficacy. It can be used as an antibiotic; Antimicrobial Properties; A thyme's essential oils, particularly thymol, have antimicrobial properties that help combat respiratory infections [41]. Expectorant Properties; Thyme helps loosen and clear mucus from the lungs, making it an effective expectorant [42]. Anti-Inflammatory Properties; Thyme's flavonoids and terpenes reduce inflammation in the respiratory tract [43]. Some studies showed that thyme extract reduced coughing thus improving symptoms in patients with bronchitis [44] and other found that thyme essential oil reduced inflammation in patients with chronic obstructive pulmonary disease which leads to improving lung function (COPD) [45].

Conclusion

In most Arabic countries and Sudan, communities rely on traditional medicines and herbs. Unfortunately, concerns are raised about the safety of such practices due to the lacking of set regulations and monitoring of these practices and the lack of an “official herbal registry”. Prior to the usage of such medicine’s parties should weigh the risks and the benefits. As mentioned above sesame oil is being the most commonly used oil in alleviating cough and other respiratory symptoms and the aforementioned studies demonstrate physiological effects as general but there are no specific researches confined to its role in respiratory symptoms namely in Arabic countries. Regardless of the disease's underlying pathophysiology, it is clear that the Saudi community bases its usage of herbal medicines on its symptoms. Abnormal breathing and coughing are the most common signs of respiratory disease. For kids with acute bronchiolitis who received herbal oil from caretakers, this is a major cause for concern. This potentially troublesome area needs more research since there is a chance that acute bronchiolitis could be accompanied by lipoid pneumonia. The texture of the herbal oil itself and tachypnea during acute bronchiolitis may potentially increase the risk of aspirating such greasy items (46). It also applies to Sudan and the majority of Arab nations. So, we recommend more researches in these three herbs and other commonly used herbs to demonstrate their feasibility, effectiveness, possible side effect and the best route for application. Furthermore, comparatively little research has been done on the pharmacokinetics, bioavailability, and drug structure of these three plants' bioactive ingredients. The pharmacodynamics and pharmacokinetic such as negative or positive controls, maximum and minimum dose responses, and temporal responses are absent from several experimental investigations. These result in issues with the data's reproducibility and sustainability.

Consequently, more investigation is required to examine the biological activities of these plants.

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