

MEDICAL SCIENCES

HARNESSING NATURE'S REMEDIES: MEDICINAL PLANTS FOR TREATING AND PREVENTING INFECTIONS AND INFLAMMATION IN COLD-INDUCED AILMENTS

Mammadova C.

*Lecturer of the Department of Pharmacy and Biochemistry,
Nakhchivan State University*

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Abstract

The common cold, an infectious ailment primarily affecting the upper respiratory tract, targets the respiratory mucosa in areas such as the nose, throat, sinuses, and larynx. Manifesting signs and symptoms within two days of viral exposure, the condition encompasses manifestations like coughing, sore throat, runny nose, sneezing, headache, and fever. Typically, recovery occurs within seven to ten days, although certain symptoms may persist for up to three weeks, with a potential for pneumonia development in individuals with pre-existing health conditions.

The common cold is attributed to over 200 virus strains, with rhinoviruses prevailing as the most common causative agents. Transmission transpires through airborne particles in close contact with infected individuals or indirect exposure to contaminated environmental surfaces, subsequently transferred to the mouth or nose. Risk factors encompass attendance at child care facilities, sleep deprivation, and psychological stress. Notably, symptoms result primarily from the immune response rather than direct viral tissue destruction. Comparatively, influenza symptoms parallel those of the common cold but are generally more severe and less prone to include nasal discharge.

With its prevalence marked by symptoms such as cough, rhinorrhea, nasal congestion, sore throat, myalgia, fatigue, headache, and dyspepsia, the common cold lacks specific treatment. Although numerous alternative and Chinese herbal remedies are purported to alleviate symptoms, existing scientific evidence is insufficient to substantiate their efficacy. In this context, ethnopharmacological and ethnobotanical studies aim to identify medicinal plants employed in treating the common cold.

Keywords: Common cold, Rhinoviruses, Ethnopharmacology.

The common cold, a pervasive and recurrent viral infection, remains an enduring challenge in the realm of global health. This ubiquitous ailment, characterized by its impact on the upper respiratory tract, continues to afflict individuals across diverse demographics and geographical regions. Its clinical manifestations, encompassing a spectrum of symptoms such as nasal congestion, sore throat, coughing, and systemic effects like headaches and fever, contribute to its widespread impact on individuals and communities.

The complexity of the common cold lies in its etiological diversity, with over 200 virus strains implicated in its causation. Predominantly, rhinoviruses emerge as the primary culprits, orchestrating a diverse array of symptoms that not only affect the respiratory mucosa but also evoke systemic responses. The intricate interplay between the virus and the host's immune system underlines the dynamic nature of this infectious process, wherein symptoms are often a manifestation of the body's defense mechanisms rather than direct viral-induced tissue damage.

Despite the apparent familiarity of the common cold, its management remains predominantly symptomatic, as specific antiviral therapies are notably absent. While the majority of individuals experience resolution of symptoms within a week to ten days, the persistence of symptoms in certain cases and the potential for complications, particularly in individuals with underlying health conditions, underscore the need for a more nuanced understanding of the disease and its implications.

This article delves into the multifaceted dimensions of the common cold, exploring its virology, transmission dynamics, and the contemporary approaches to its management. In addition to examining the conventional symptomatic relief strategies, we also explore the intriguing realm of alternative medicine and ethnopharmacology, seeking to unravel the potential therapeutic contributions of medicinal plants in alleviating the burden of the common cold. As we navigate the intricate landscape of this pervasive viral infection, our exploration aims to contribute to a comprehensive understanding that may inform future interventions, bridging the gap between traditional practices and modern medical approaches [2, 24].

A viral upper respiratory tract infection, commonly known as the common cold, is a prevalent ailment caused by various viruses. Notably, over 200 virus types, encompassing rhinovirus, coronavirus, adenovirus, respiratory syncytial virus, and parainfluenza virus, contribute to the manifestation of the common cold. While rhinoviruses are the predominant agents, the dynamic nature of viral evolution continually introduces novel cold viruses, rendering the human body perpetually susceptible.

Contrary to common misconceptions, the occurrence of colds is not contingent upon exposure to low temperatures. Rather, the etiology lies in the pathogenic processes induced by the aforementioned viruses. Certain medical perspectives posit that localized cooling of specific bodily regions may compromise immune in-

tegrity, potentially predisposing individuals to viral infections. Consequently, cold exposure is construed not as a causative factor but as a potential contributory element to the overall susceptibility to viral infections [3, 53].

Viral transmission routes diverge among distinct respiratory viruses. Rhinovirus and respiratory syncytial virus primarily disseminate through direct hand contact with contaminated surfaces, facilitating subsequent self-inoculation into the nasal mucosa or conjunctiva. Additionally, airborne transmission is feasible, contingent upon the duration of exposure to infected individuals. Parainfluenza virus transmission occurs via direct person-to-person contact or large-particle aerosol dissemination. The prevalence of childhood infections, coupled with recurrent occurrences, underscores the human-to-human transmission dynamics [4, 9].

The common cold is characterized by its recurrent nature, with children in preschool and elementary school experiencing six to twelve episodes annually, while teenagers and adults typically contend with two to four instances yearly. Age-related variations in cold susceptibility suggest that cumulative immune responses, bolstered by repeated exposures, play a pivotal role in mitigating cold frequency. Despite their seemingly benign nature, colds remain a significant global health concern, contributing substantially to morbidity and mortality.

The ingress of the cold virus transpires through the oral, ocular, or nasal routes. Airborne transmission is facilitated by respiratory droplets discharged during coughing, sneezing, or speech. Confined spaces amplify the likelihood of germ transfer to new hosts. Although specialized masks offer protection, it is imperative to recognize that adenovirus and other respiratory infections are not exclusively disseminated through airborne droplets but also via direct hand-to-hand contact and fomite transmission involving contaminated objects such as utensils, towels, toys, or phones. Rigorous hygiene practices, including prompt handwashing, constitute essential preventive measures in this context.

Cold symptoms encompass a spectrum including cough, sore throat, low-grade fever, nasal congestion, runny nose, and sneezing. The manifestation of these symptoms arises from a confluence of viral cytopathic effects and the initiation of inflammatory pathways. It is imperative to acknowledge that the sole administration of antiviral treatments may not preclude these events. Optimal efficacy of antiviral agents necessitates their timely commencement, underscoring the significance of expeditious and accurate diagnostic methodologies for respiratory viruses. In the absence of definitive and efficacious treatments, symptomatic therapy stands as a primary management recourse [1, 39].

The inflammatory cascades instigated during colds represent the organism's inherent defense mechanisms against injury or damage, fostering natural healing and recovery processes. Contemporary stressors, inclusive of pollution, food sensitivities, and excess body weight, can incite chronic inflammation. Various herbs and spices have demonstrated efficacy in mitigating or preventing inflammation within the body. Medicinal herbs possessing anti-inflammatory properties

have proven instrumental in counteracting deleterious inflammatory reactions that may disrupt systemic equilibrium. These botanical agents offer advantageous attributes, including satisfactory potency, ready availability, cost-effectiveness, minimal or absent side effects, and superior safety and efficacy compared to synthetic counterparts. Phytoconstituents, such as steroids, glycosides, phenolics, flavonoids, alkaloids, polysaccharides, terpenoids, cannabinoids, and fatty acids, are prevalent in these herbs and contribute to their anti-inflammatory efficacy [5, 60].

In certain instances, viral upper respiratory tract infections, commonly referred to as colds, pose potential life-threatening risks or impart varying degrees of discomfort, exacerbating underlying medical conditions. Addressing functional, reflex, and pathological disturbances in a timely manner necessitates the integration of medicinal herbs alongside antiviral agents within medical practice. The complementary use of medicinal plants is deemed imperative for the comprehensive management of colds, leveraging the synergistic effects of both antiviral substances and botanical remedies.

Medicinal plants employed during colds should exhibit specific attributes, including antiviral and antimicrobial properties (e.g., chamomile flowers, medicinal watermelon, common blackberry, juniper fruits), antipyretic effects (e.g., raspberry leaves, cranberry fruits and flowers, linden flowers), expectorant and antitussive qualities (e.g., camel's heel, andis root and rhododendron, thyme, common blackberry, plantain, licorice root, gulkhatmi root), immunostimulant properties (e.g., fennel root, chamomile flowers, linden flowers), and the presence of polyvitamins (e.g., currant leaves, nettle leaves, rose hips). The judicious selection and integration of these medicinal plants contribute substantively to a multifaceted approach in managing the complex manifestations of viral upper respiratory tract infections [7, 112].

Herbal teas inherently encompass biologically active compounds that exhibit a low-dose antimicrobial, antiviral, and anti-inflammatory efficacy akin to pharmaceutical preparations. Importantly, phytopreparations are characterized by their capacity to exert therapeutic effects without eliciting adverse impacts on hepatic and digestive organ functions. During the initial stages of illness, these herbal formulations suffice for pathogen eradication. The judicious utilization of a meticulously curated array of herbal preparations expedites the resolution of cold symptoms, facilitating a swift convalescence and restoration to normal physiological states. In this context, we aim to disseminate information concerning several medicinal plants prevalent in the region of Nakhchivan, underscoring their applicability in mitigating the effects of common ailments.

Chamomile Flowers

Chamomile, derived from the marigold family, represents a widely utilized botanical resource renowned for its aromatic yellow-white flowers that proliferate spontaneously in roadside and vacant areas. Numerous chamomile varieties thrive across the country, with common chamomile flourishing in plains, deserts,

and arid locales, particularly within the Kura-Araz plains of Azerbaijan. Fragrant chamomile, considered a weed plant, ubiquitously populates all regions of Azerbaijan.

Harvesting chamomile flowers transpires manually or through specialized combs from May to September, necessitating protection against sunlight during both drying and storage phases. The botanical material should exhibit essential oil content not less than 0.3%, with moisture levels not exceeding 14%. Storage mandates dry, cool, and dark conditions, typically facilitated in tightly sealed wooden or cardboard containers, with a prescribed shelf life of one year.

Chamomile flowers find extensive application globally for therapeutic, preventive, and cosmetic purposes. Employed in various forms such as infusions, decoctions, powders, and complex mixtures, the flowers encapsulate bioactive constituents like chamazulene, flavonoids, coumarins, triterpene alcohols, carotene, etc. Freshly prepared infusions or decoctions serve as antiseptic, anti-inflammatory, expectorant, spasmolytic, analgesic, antiallergic, and sedative agents, addressing ailments spanning gastrointestinal, dermatological, oral, respiratory, and gynecological domains. A recommended infusion ratio is 1 tablespoon of chamomile flowers to 200 ml of boiling water [2, 69].

Medicine Badranci (Batrinc)

Badranci, a member of the Lamiaceae family, specifically the *Melissa* genus, characterizes a botanical entity prevalent in the flora of Africa and Central Asia. In the Nakhchivan Autonomous Republic, only one species, *Melissa officinalis* L. (medicinal plant), is endemic. Flourishing predominantly in lower and middle mountain zones, forest clearings, thickets, and occasional gardens, *Melissa officinalis*, colloquially known as "honey" in Latin, derives its nomenclature from its attractiveness to honeybees. The plant's aerial components emit a lemony aroma, with flowering occurring from late May to end July.

Melissa officinalis boasts a rich chemical composition, rendering it therapeutically potent. Essential oil content ranges from 0.1% to 0.3%, featuring monoterpenes like citral, geraniol, nerol, alongside phenylpropanoids, rosmarinic acid, n-coumarinic acid, and an array of vitamins and microelements, including B1, B2, C, β -carotene, potassium, calcium, magnesium, iron, manganese, copper, zinc, molybdenum, chromium, selenium, nickel, and vanadium. Its pharmacological profile encompasses antidepressant, spasmolytic, immunomodulatory, antiviral, antiallergic, and antimicrobial attributes [5, 45].

In historical and contemporary folk medicine, Badranci has found application in the treatment of diverse ailments. Internal consumption, often in the form of tea, serves as a laxative and anti-inflammatory remedy for colds. Additionally, infusions derived from Badranci are employed to address conditions such as heart pains, hypertension, flatulence, spasms, and various gastrointestinal maladies.

Thyme

Thyme, a perennial semi-shrub, belongs to the marigold family and is notably abundant in Azerbaijan, particularly in the region of Nakhchivan. Two extensively studied types, namely creeping thyme and common thyme, emanate a pleasing aroma and exhibit prolific flowering throughout the summer. The aerial parts

of thyme, excluding woody stems and roots, are harvested during the blooming phase and expeditiously air-dried. The aerial components of thyme yield essential oil, constituting 0.5-1%, featuring thymol, carvacrol, and various other compounds. Additionally, the botanical material encompasses inoculating substances, flavonoids, bitter compounds, ursolic and oleanolic acids [6, 157].

In medicinal applications, thyme serves as an effective remedy against coughs, especially those associated with whooping cough, functioning as an expectorant. Preparations such as decoctions and clear extracts derived from thyme demonstrate antiseptic, anti-inflammatory, anthelmintic, analgesic, and mild sedative properties. However, caution is warranted, as thyme infusion is contraindicated in conditions such as stomach and duodenal ulcers, kidney and liver diseases, cardiosclerosis, and atherosclerosis of cerebral vessels.

Gulkhatmi or Medicinal Mugwort Plant

Belonging to the oleander family, the Gulkhatmi plant, characterized by perennial herbs with a robust root system, proliferates extensively in Azerbaijan, notably in the territory of Nakhchivan. Its flowering phase spans from June to September. Gulkhatmi is a valuable botanical resource employed for medicinal, dyeing, fodder, and ornamental purposes. Notably, its seeds contain 25% oil. Various formulations, including a 5% decoction, ore, and pills derived from its roots, are widely utilized as gargles for respiratory tract inflammation, lung diseases, expectorant, gastrointestinal diseases, and throat pain [3, 59].

In traditional medicine, preparations from leaves, flowers, and roots of Gulkhatmi serve as remedies for cough and chest pain. Infusions, compresses, and teas formulated from Gulkhatmi flowers are applied for pediatric ailments and dry coughs. The roots, collected in autumn, contain a significant proportion of mucilage, amounting to 35%, alongside starch, sugar, and pectin. The plant is processed into dry extracts, clear extracts, and juice, which find application in various pharmaceutical formulations, including syrupus *Althaeae* and *Mukaltin* pills, renowned for their emollient, mucolytic, anti-inflammatory, and gargle properties.

Medicinal Roses

The rose plant, classified under the asteraceae family, is represented by a single species in the territory of Nakhchivan. The leaves, flowers, and occasionally the root of the rose plant are harnessed for medicinal purposes, encapsulating active alkaloids, lycopene, citraxanthin, chialoxanthin, rubixanthin, phytoncides, flavochrome, flavonoids, salonins, and triterpene diols. Medicinal roses exhibit efficacy in conditions such as stomatitis, hepatitis, angina, periodontitis, cholecystitis, and neurosis, also demonstrating antitussive, anti-spasmodic, and anticonvulsant effects [7, 45].

Extracts from the flower basket of the medicinal rose display antiviral activity against strains of herpes and influenza viruses PR-8 and frenzy. Infusions, decoctions, and gargles derived from the plant manifest antiviral, antimicrobial, and antiseptic effects. While beneficial, caution is advised, particularly for individuals with low blood pressure and heightened allergic sensitivity, when considering preparations containing Gulumbahar.

Common Camel's Heel (Camellia Plant)

The common camellia, a perennial herb belonging to the asteraceae family, finds prevalence in Azerbaijan

and the mountainous regions of Nakhchivan. Its developmental cycle involves blooming in early spring, with stem and root leaves attaining full maturity during the summer months. The flowering phase transpires in March-April, culminating in fruit-bearing during May-June. This botanical entity is characterized by alkaloids, flavonoids, essential oils, vitamin C, astringent and bitter substances, steroids, and rubber.

Camellia flowers are meticulously collected at the onset of spring blooming, and if the flowering persists, the collection may extend until mid-summer. Dried flowers are advised to be stored between clean sheets of paper in a dry and dark environment. Long-term storage exceeding two years is not recommended. Camellia leaves, appearing subsequent to the flowering phase, are hand-collected in mid-summer and dried in thin layers within a dry and well-ventilated space, with a recommended storage duration of three years [3, 29].

The dried leaves of camellia, known for inducing perspiration and expectoration, are traditionally prepared as tea and consumed for respiratory tract inflammation associated with conditions such as colds, tuberculosis, and various pulmonary diseases. The preparation involves pouring 200 ml (1 cup) of boiling water over one tablespoon of raw materials, followed by a 15-minute infusion in a boiling water bath, subsequent cooling to room temperature, and final filtration. Internally administered at a frequency of 2-3 times daily, 1/3 cup each time, this formulation is consumed one hour prior to meals. In folk medicine, the burning of dried leaves is recommended for inhalation to serve as an antitussive. Additionally, camellia is employed in treating various skin maladies, including boils and purulent wounds.

It is imperative to note the presence of pyrrolizide alkaloid in the plant, which, while exhibiting a less toxic impact on the body, prompts caution against prolonged use beyond six weeks. Furthermore, women are advised against the utilization of camel's heel infusion during pregnancy and breastfeeding.

In conclusion, viral upper respiratory tract infections, colloquially known as colds, represent ubiquitous afflictions in humans. Their classification as serious diseases stems from the intricate course, consequential impact, and potential complications. Achieving sustained and enduring pharmacotherapeutic efficacy amid these infections necessitates a comprehensive drug regimen addressing their etiopathogenesis. Given the pivotal role of endogenous and exogenous factors in cold occurrences, the urgency of this issue in the early 21st century is underscored. The incorporation of more effective antiviral agents with minimal adverse effects, coupled with the discerning use of traditional pharmaceuticals and the elucidation of indications for medicinal plants, warrants further in-depth investigation into their mechanistic actions. This imperative underscores one of the paramount challenges confronting modern pharmacology.

In conclusion, the common cold stands as a ubiquitous and persistent viral infection, exerting its influence on the upper respiratory tract. With its diverse array of symptoms, ranging from nasal and throat discomfort to systemic manifestations such as headache

and fever, the common cold places a substantial burden on global health. Despite its prevalence and impact, the management of the common cold remains primarily symptomatic, as there is currently no specific antiviral therapy.

The intricate interplay between more than 200 viral strains, predominantly rhinoviruses, underscores the challenges in developing targeted treatments. Transmission dynamics, facilitated by close interpersonal contact and environmental fomite exposure, contribute to the widespread occurrence of this infectious ailment. Notably, the immune response to the viral intrusion plays a pivotal role in symptomatology, with the body's defense mechanisms often accounting for the observed manifestations.

While conventional recovery typically transpires within seven to ten days, the persistence of symptoms in some cases emphasizes the need for a nuanced understanding of the condition. Complications, such as pneumonia, may arise in individuals with compromised health, emphasizing the importance of tailored healthcare approaches for vulnerable populations.

In the quest for therapeutic interventions, alternative medicine and Chinese herbal remedies have garnered attention, yet their efficacy remains unproven by rigorous scientific scrutiny. Ethnopharmacological and ethnobotanical investigations have sought to illuminate the traditional use of medicinal plants in managing common cold symptoms. While these studies provide valuable insights into cultural practices, the translation of such knowledge into evidence-based clinical interventions requires further validation.

In essence, the common cold persists as a formidable health challenge, necessitating ongoing research endeavors to enhance our understanding of its virology, transmission dynamics, and potential therapeutic avenues. Future investigations should strive to bridge the gap between traditional practices and modern medicine, offering a holistic approach to effectively address the multifaceted dimensions of this prevalent viral infection.

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