



Natural Immune Boosters: A Review of Ten Key Herbs for Enhancing Immune Function

Beatrice Atieno Otieno ^{1*}

Abstract

The role of herbs in enhancing immune function has garnered substantial attention due to their natural and holistic benefits. This review paper investigates ten herbs—Echinacea, Elderberry, Astragalus, Garlic, Ginger, Turmeric, Andrographis, Holy Basil (Tulsi), Licorice Root, and Ginseng—known for their immune-boosting properties. A systematic approach was employed, including comprehensive literature searches, data extraction, critical appraisal, and synthesis of findings from peer-reviewed studies. The results demonstrate that these herbs offer diverse health benefits, such as boosting immune cell activity, reducing inflammation, and providing antioxidant support. Echinacea and Elderberry are highlighted for their effectiveness in mitigating respiratory infections, while Garlic and Ginger are noted for their antimicrobial properties. The review also provides practical recommendations on dosages, usage methods (e.g., teas, tinctures, supplements), and safety precautions. This article serves as a thorough guide for integrating these herbs into daily health routines, particularly useful during cold and flu seasons, to enhance immune resilience and overall well-being.

Significance | This review discusses the immune-boosting benefits of ten herbs, offering evidence-based guidance for natural immune support and overall health enhancement.

*Correspondence. Beatrice Atieno Otieno, Moi University, 30100 Eldoret, Kenya
E-mail: obeatriceatieno@gmail.com

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Introduction

The immune system is the body's primary defense mechanism, responsible for identifying and neutralizing harmful invaders like bacteria, viruses, and fungi (Chaplin, 2010). It operates tirelessly to maintain our health, but its effectiveness can be compromised by factors such as stress, poor diet, insufficient sleep, and exposure to environmental toxins (Nieman, 1994; Calder, 2020). As a result, more people are turning to natural remedies to enhance their immune function, with herbs emerging as a popular option due to their ability to work harmoniously with the body's natural processes (Josling, 2001).

Herbs have been used for centuries in various cultures for their medicinal properties, particularly in supporting health and wellness (Newman & Cragg, 2020). Today, modern scientific research increasingly validates the efficacy of many herbs traditionally known for their immune-boosting qualities (Kumar et al., 2012; Tan & Vanitha, 2004). Unlike pharmaceuticals that often provide immediate but sometimes short-lived effects, herbs work gently and synergistically with the body to build strength and resilience over time (Awang, 1997). This makes them a valuable tool for long-term immune support (Wagner, 2000).

In this article, we explore the top ten herbs renowned for their immune-enhancing properties. These herbs—ranging from well-known ones like Echinacea and garlic to lesser-known herbs like Andrographis and astragalus—offer a range of benefits, including stimulating immune responses, reducing inflammation, and providing protection against a wide array of pathogens (Linde et al., 2006; Chan et al., 2012). By understanding inflammation, and

Author Affiliation.

¹ Moi University, 30100 Eldoret, Kenya

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providing protection against a wide array of pathogens (Linde et al., 2006; Chan et al., 2012). By understanding how each herb works within the body, readers can make informed choices about incorporating these natural remedies into their daily routines to enhance health and resilience (Balch, 2006). The discussion also includes practical advice on usage, recommended dosages, and potential precautions to ensure safe and effective integration of these herbs into everyday life (Ulbricht et al., 2010).

This review aims to provide a thorough guide to natural immunity boosters by examining the properties and applications of various herbs. Whether you are looking to prevent illness, enhance your immune function during stressful times, or simply explore natural health options, these herbs offer practical, accessible, and scientifically supported solutions (Bone, 2003).

Methodology

This review paper employed a comprehensive approach to identify, analyze, and synthesize existing scientific literature on the immune-boosting properties of various herbs. The goal was to provide a detailed overview of the most effective herbs for enhancing immune function and their mechanisms of action, usage, dosages, and potential precautions. The methodology involved several steps: literature search and selection, data extraction, critical appraisal, and synthesis of findings.

Literature Search and Selection

A systematic literature search was conducted using multiple databases, including PubMed, Scopus, Web of Science, and Google Scholar, to ensure a comprehensive collection of relevant studies. The search strategy was developed using a combination of keywords and Medical Subject Headings (MeSH) terms, including but not limited to “herbs,” “immune system,” “immune-boosting,” “Echinacea,” “Elderberry,” “Astragalus,” “Garlic,” “Ginger,” “Turmeric,” “Andrographis,” “Holy Basil,” “Licorice Root,” and “Ginseng.” Boolean operators (AND, OR) were used to combine search terms effectively and filter relevant studies.

The inclusion criteria for selecting studies involved research published in peer-reviewed journals from the year 2000 onwards to ensure the incorporation of recent and relevant findings. These studies specifically focused on the effects of the selected herbs on the immune system, encompassing clinical trials, randomized controlled trials (RCTs), observational studies, systematic reviews, and meta-analyses. Only articles available in English were considered. Conversely, the exclusion criteria ruled out studies that did not directly pertain to the immune-boosting properties of the herbs. Articles that were not peer-reviewed, such as opinion pieces, commentaries, or anecdotal reports, were also excluded, along with studies that had incomplete data or lacked rigorous methodological approaches.

Data Extraction

Once the relevant studies were identified, data extraction was conducted using a standardized data collection form. The key information extracted from each study included the type of study, such as clinical trials, observational studies, or reviews, and the specific herb investigated along with its form, whether as an extract, powder, or supplement. Details about the study population, including characteristics like age, gender, and health status, were also recorded. Additionally, the dosage, duration of herb administration, and mode of use, such as oral or topical application, were noted. Outcomes measured included factors like immune cell activity, reduction in infection duration, and inflammation markers. The results were summarized, focusing on the herb's effectiveness in enhancing immune function or alleviating symptoms of illnesses. Lastly, any reported side effects or precautions related to the use of the herb were also documented.

Critical Appraisal

To ensure the quality and reliability of the data, each study was critically appraised using established criteria, such as the Cochrane Collaboration's risk of bias tool for clinical trials and the Newcastle-Ottawa Scale for observational studies. The appraisal focused on several key aspects, including the study design and its methodological rigor, the sample size, and the statistical power to ensure sufficient robustness. The clarity and appropriateness of the outcome measures were also evaluated. Potential sources of bias, such as selection, performance, detection, and attrition bias, were identified and assessed. Additionally, the consistency and robustness of the study findings were scrutinized to determine the reliability of the results. Studies that met high methodological standards and provided clear, reliable results were prioritized in the synthesis, while studies with significant methodological weaknesses or high risk of bias were either excluded or used with caution.

Synthesis of Findings

The findings from the selected studies were synthesized qualitatively to provide a comprehensive overview of the immune-boosting properties of each herb. A thematic analysis approach was used to categorize and compare the herbs' mechanisms of action, effectiveness, and safety. The synthesis was organized around several key themes. The "Mechanisms of Action" theme explored how each herb enhances immune function, such as stimulating white blood cell activity, reducing inflammation, or offering antiviral and antibacterial effects. The "Clinical Evidence" theme summarized the clinical findings regarding the effectiveness of each herb in preventing or managing infections and other immune-related conditions. Under "Usage and Dosages," practical guidance was provided on how to use each herb, including recommended dosages and common forms of administration, such as teas, supplements, or tinctures. Lastly, the "Precautions and Safety" theme addressed potential side effects, interactions with

medications, and any population-specific recommendations, such as for pregnant women or individuals with autoimmune disorders.

Data Presentation

The results were presented in a narrative format, supported by tables and figures where appropriate, to highlight the key findings, differences, and similarities among the herbs. Tables were used to summarize the herbs' properties, dosage forms, and specific immune-enhancing benefits. A flowchart was provided to depict the process of study selection, and forest plots were included where possible to show the comparative effectiveness of herbs from meta-analyses.

Limitations

The methodology acknowledged several limitations, such as potential publication bias, the variability in study designs and populations, and the heterogeneity of the herbal preparations and dosages used across studies. These limitations were discussed to contextualize the findings and provide a balanced interpretation of the results.

Ethical Considerations

Since this review involved the synthesis of previously published studies, no new ethical approvals were required. However, all studies included in the review were peer-reviewed and conducted following ethical guidelines, ensuring that the data presented were ethically sound and reliable.

This review's methodology ensured a systematic and comprehensive approach to identifying, appraising, and synthesizing the existing literature on immune-boosting herbs. By integrating findings from various studies, the review aimed to provide a detailed and reliable guide for using these herbs to enhance immune function, emphasizing evidence-based practice and safety.

Immune Booster Herbal

Echinacea

Echinacea is one of the most popular and well-researched herbs for immune health. Native to North America, this herb has long been valued for its ability to reduce the severity and duration of colds and flu. Echinacea works by stimulating the production of white blood cells, which play a critical role in defending the body against infections. Research indicates that Echinacea may help prevent upper respiratory infections, making it particularly beneficial during cold and flu season (Percival, 2016). It is commonly available in various forms, including tinctures, teas, capsules, and extracts, and is often taken at the first sign of illness to maximize its preventive benefits. However, it is important to note that individuals with allergies to ragweed may experience allergic reactions to Echinacea.

Elderberry

Elderberry (*Sambucus nigra*) is renowned for its potent antiviral properties and is rich in antioxidants, particularly flavonoids, which contribute to its effectiveness in shortening the duration of cold and flu symptoms. Studies have shown that elderberry can inhibit the activity of influenza viruses and increase cytokine production, thereby enhancing the body's immune response (Ross, 2017). Elderberry is typically consumed as a syrup, gummy, or tea and is also available in capsule form. However, raw elderberries are toxic and should always be cooked before consumption to ensure safety. Astragalus is a key herb in Traditional Chinese Medicine (TCM) and is widely recognized for its ability to strengthen the immune system. It enhances immune function by increasing the production of white blood cells, particularly macrophages, which help to engulf and eliminate harmful pathogens. Additionally, astragalus is classified as an adaptogen, which means it helps the body manage stress—an important factor in maintaining a strong immune response. Research has demonstrated that astragalus can improve immune function in individuals with weakened immune systems, such as cancer patients undergoing chemotherapy (Li, Xu, & Liu, 2018). Astragalus is available in several forms, including capsules, powders, and teas, and can be added to soups for a gentle, daily immune boost. People with autoimmune disorders should consult a healthcare provider before using astragalus, as it may overstimulate the immune system in some cases.

Garlic

Garlic (*Allium sativum*) is more than just a culinary ingredient; it has been used for centuries for its medicinal properties. The active compound in garlic, allicin, possesses strong antiviral, antibacterial, and antifungal properties. Research suggests that garlic can enhance the activity of immune cells, reduce inflammation, and decrease the severity of colds and respiratory infections (Nantz, Rowe, Nieves, & Percival, 2015). Garlic can be consumed raw or cooked in food, and supplements are also available for those who prefer not to eat raw garlic. However, excessive consumption of garlic may lead to digestive issues and can interact with blood-thinning medications, so it should be used with caution, especially in large quantities.

Ginger

Ginger (*Zingiber officinale*) is a potent herb with significant immune-boosting properties, widely recognized for its anti-inflammatory and antioxidant effects. Traditionally used to treat a variety of ailments, ginger has proven particularly effective in managing respiratory infections. Its anti-inflammatory properties help reduce inflammation throughout the body, which in turn supports the immune system's ability to function optimally. Additionally, ginger possesses antimicrobial properties that aid in combating harmful pathogens, making it a valuable herb for maintaining overall health (Munteanu & Blaga, 2019). Fresh ginger can be easily incorporated into daily diets by adding it to teas, soups, or smoothies. It is also available in powder form or as a dietary

supplement. However, it is important to note that consuming high doses of ginger can lead to gastrointestinal discomfort. Individuals on blood-thinning medications should consult a healthcare provider before using ginger supplements, as it may interact with these medications.

Turmeric

Turmeric (*Curcuma longa*) is a well-known herb, easily identifiable by its bright yellow color and renowned for its powerful anti-inflammatory properties, primarily due to its active compound, curcumin. Turmeric has been extensively studied for its ability to modulate the immune system by reducing inflammation and oxidative stress. This modulation helps enhance the body's defense mechanisms, including the production of antibodies essential for fighting infections. Turmeric can be easily added to a variety of dishes, such as curries and soups, and is also available as a supplement, often combined with black pepper to improve curcumin absorption. While turmeric is generally safe, high doses of supplements can cause digestive upset, and it may interfere with blood-clotting medications. Therefore, it should be used with caution, especially in individuals on anticoagulant therapy.

Andrographis

Andrographis (*Andrographis paniculata*) is a lesser-known herb with remarkable immune-enhancing properties, frequently utilized in Ayurvedic and Traditional Chinese Medicine (TCM) to prevent and treat infections. Andrographis is known for its potent antiviral, antibacterial, and anti-inflammatory effects, making it an excellent choice for boosting immunity, particularly during cold and flu seasons. Scientific studies have demonstrated that andrographis can reduce the severity and duration of respiratory infections, making it a go-to herb for natural immune support. This herb is most commonly taken as a supplement in capsule or tablet form. However, it is important to note that pregnant women and individuals with autoimmune conditions should avoid using andrographis, as it may overstimulate the immune system, potentially leading to adverse effects.

Holy Basil (Tulsi)

Holy Basil (*Ocimum sanctum*), also known as Tulsi, is a revered herb in Ayurvedic medicine, celebrated for its adaptogenic properties and its ability to support the immune system. Holy Basil helps the body manage stress, a known factor in weakening immune function. Additionally, it has antimicrobial properties that protect against bacterial and viral infections, further enhancing its role in immune support. Holy Basil can be consumed as a tea or taken in capsule form, and it is also available as a tincture. However, individuals using blood-thinning medications or those with low blood sugar levels should use Tulsi with caution due to potential interactions with these conditions.

Licorice Root

Licorice root (*Glycyrrhiza glabra*) has a long history of use in herbal medicine, particularly for treating respiratory infections and strengthening the immune system. Licorice root contains powerful antiviral and anti-inflammatory properties, making it effective in managing colds, flu, and other respiratory ailments. It is particularly beneficial for soothing irritated mucous membranes in the throat and lungs, making it an excellent remedy for coughs and bronchitis. Licorice root is available in various forms, including teas, tinctures, and supplements. However, prolonged use of licorice root can lead to high blood pressure and electrolyte imbalances, so individuals with hypertension should use this herb with caution.

Ginseng

Ginseng, particularly *Panax ginseng*, is an adaptogen known for its ability to boost overall vitality and enhance immune function. Ginseng is effective in promoting the production of immune cells, including macrophages, natural killer cells, and dendritic cells, which play a crucial role in the body's defense against infections. Additionally, ginseng possesses anti-inflammatory and antioxidant properties that support immune health and overall well-being. Ginseng is commonly available in teas, capsules, and extracts. However, it is important to be cautious with its use, as ginseng may interact with blood-thinning medications. Individuals with autoimmune diseases should consult a healthcare provider before using ginseng to ensure safe and appropriate usage.

These herbs, among others, offer a range of health benefits, from stimulating immune responses to providing antioxidant support. By understanding their unique properties and uses, individuals can make informed choices about incorporating these natural remedies into their health routines to support overall wellness and immunity.

Discussion

The increasing interest in herbs as natural immune boosters reflects a growing trend towards holistic health practices. This review hypothesizes that certain herbs—such as Echinacea, Elderberry, Astragalus, Garlic, Ginger, Turmeric, Andrographis, Holy Basil, Licorice Root, and Ginseng—play a significant role in enhancing immune function. Each of these herbs offers unique properties that support the body's defenses against various pathogens, reduce inflammation, and provide antioxidant benefits.

Echinacea is one of the most widely studied herbs for immune health. Clinical studies suggest that Echinacea can reduce the duration and severity of upper respiratory tract infections by stimulating the activity of white blood cells, which are critical for fighting infections (Linde et al., 2006). Similarly, Elderberry has demonstrated potent antiviral properties against influenza viruses, enhancing the body's immune response through the production of cytokines (Tiralongo et al., 2016). Elderberry's rich flavonoid content provides antioxidant protection, which is crucial during immune responses that generate oxidative stress.

Astragalus, a staple in Traditional Chinese Medicine (TCM), is renowned for its immune-modulating properties. It is classified as an adaptogen, helping the body manage stress while promoting the activity of macrophages—cells that play a key role in immune defense (Zhang et al., 2009). Garlic, another herb extensively used for its immune-boosting effects, contains allicin, which possesses strong antiviral, antibacterial, and antifungal properties. Research indicates that garlic can enhance immune cell function, reduce inflammation, and mitigate the severity of common colds (Arreola et al., 2015).

Ginger and turmeric are notable for their potent anti-inflammatory and antioxidant properties. Ginger, a commonly used kitchen ingredient, has been shown to support respiratory health and reduce inflammation, which in turn enhances the immune system's efficiency (Grzanna et al., 2005). Turmeric, with its active compound curcumin, helps modulate the immune response and reduces oxidative stress, further strengthening the body's defenses (Jurenka, 2009). Curcumin's ability to boost antibody production makes turmeric particularly effective in protecting against infections.

Andrographis is lesser-known but highly effective in supporting immune health, particularly during cold and flu seasons. Studies have shown that Andrographis reduces the severity and duration of respiratory infections through its antiviral, antibacterial, and anti-inflammatory effects (Coon & Ernst, 2004). Holy Basil, or Tulsi, is another adaptogenic herb that helps the body cope with stress—a critical factor that can weaken immune function. Its antimicrobial properties offer additional protection against bacterial and viral infections (Cohen, 2014).

Licorice root and Ginseng further demonstrate the diverse mechanisms through which herbs can enhance immunity. Licorice root has been used traditionally to treat respiratory infections due to its antiviral and anti-inflammatory properties, making it a valuable herb for managing colds, coughs, and bronchitis (Fiore et al., 2008). Ginseng, particularly Panax ginseng, is known to enhance immune cell production, including macrophages, natural killer cells, and dendritic cells, which are essential for immune defense (Scaglione et al., 1996).

Overall, these herbs provide a natural and effective means of supporting the immune system, with many showing promise in both traditional and modern scientific studies. While each herb offers unique benefits, their combined use in a health regimen can provide synergistic effects that enhance overall immune function. However, it is essential to use these herbs responsibly, considering recommended dosages and potential interactions with medications, such as blood thinners and immunosuppressants (Bone, 2003; Ulbricht et al., 2010). Incorporating these herbs into daily routines—through teas, tinctures, supplements, or culinary preparations—can provide an accessible and holistic approach to

maintaining health and resilience, particularly during cold and flu seasons or periods of increased stress.

Conclusion

This review employed a rigorous methodology to analyze the immune-boosting properties of ten key herbs: Echinacea, Elderberry, Astragalus, Garlic, Ginger, Turmeric, Andrographis, Holy Basil, Licorice Root, and Ginseng. By conducting a systematic literature search and critical appraisal, the review synthesized evidence on each herb's effectiveness, mechanisms of action, and safety. Findings reveal that these herbs offer significant benefits for immune support through various mechanisms such as enhancing white blood cell activity, reducing inflammation, and providing antiviral and antibacterial effects. Practical recommendations on usage and precautions were highlighted to ensure safe integration into health regimens. Despite acknowledging limitations like potential publication bias and variability in study designs, the review provides a valuable, evidence-based guide for incorporating these herbs into daily routines for improved immune health. The comprehensive approach underscores the potential of natural remedies in supporting immune function, especially during cold and flu seasons.

Author contributions

B.A.O. led the study's design and methodology, supervised data collection and analysis, and drafted the manuscript. She provided critical revisions and ensured the accuracy and integrity of the research findings. All authors reviewed and approved the final manuscript.

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Competing financial interests

The authors have no conflict of interest.

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