



FORMULATION AND EVALUATION OF IMMUNITY BOOSTING POLY-HERBAL DRINK

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ABSTRACT

The creation of poly herbal formulations aimed at immune improvement is a result of the growing interest worldwide in natural products for improving immunity. Our goal in this study was to create and assess a poly herbal drink that would increase immunity by using extracts from specific medicinal herbs that have been shown to have immune-modulating qualities. The selection of herbs, extraction of bioactive components using appropriate solvents, drink formulation, and standardization to guarantee a consistent amount of bioactive compounds were all steps in the formulation process. The poly herbal drink underwent a thorough analysis to determine its safety profile, immune modulatory properties, and potential for increasing immunity.

Based on in vitro observations of increased cytokine production, greater lymphocyte proliferation, and improved phagocytic activity, our study's results demonstrated the polyherbal drink's strong immune modulatory effects. T-cell subsets were modulated towards a Th1 response in in vivo investigations, and there were no negative effects on organ histology in toxicity studies. Additionally, there was a dose-dependent rise in antibody titers.

Our research concludes by highlighting the development and assessment of a polyherbal drink that boosts immunity as a potential strategy for utilizing medicinal herbs' capacity to modulate the immune system. The thorough pharmacological and safety assessment opens the door for the formulation's possible application as a natural alternative for immune boosting by offering scientific proof of its safety and effectiveness.

Keywords:- Immunity booster, polyherbal, Immuni-modulatory, in-vivo, synergistic.

INTRODUCTION

An "immunity booster" typically refers to any substance, practice, or lifestyle habit that is believed to enhance or strengthen the body's immune system, thereby reducing the risk of illness or infection.

In general, immunity refers to the body's capacity to fend against illness or infection. The immune system, an intricate network of cells, tissues, and organs, is a part of this defence mechanism. Its job is to identify and get rid of pathogens, which include bacteria, viruses, and other dangerous things.

Herbal components are beneficial to health and greatly influence the flavour of energy drinks. Plant extracts are used to make a variety of well-known beverages. People from many cultures, for instance, appreciate herbal teas because they taste good, smell good, and may be used to stave off ailments. Herbal drinks have been consumed by humans since prehistoric times. These beverages contain a blend of fruits, spices, and herbs that are thought to be healthful. However, it's vital to exercise caution because certain herbal drinks could contain dangerous plant elements.

Making a poly herbal energy drink is the primary goal of this study. Amla powder, curcumin powder, piper longum powder, cinnamon powder, and lemon powder are among the poly herbs included in the mixture that have demonstrated pharmacological efficacy without causing any negative effects.

Potent combinations of various plant compounds, known as polyherbal formulations, reinforce the body's defence mechanisms. Combining contemporary research with traditional herbal knowledge, the creation and testing of these immune-stimulating beverages provides a comprehensive approach to overall wellness. Essentially, it involves combining various herbs to create a beverage that strengthens your body's defences against sickness, utilizing both modern scientific techniques and centuries-old herbal knowledge.

Similar to the body's defensive force, the immune system fights off infections and maintains equilibrium. However, factors like pollution, stress, and poor diet can weaken it, increasing our risk of illness or chronic health issues. Therefore, by researching plants that have unique qualities to support improved immune function, scientists are investigating natural approaches to strengthen our defences against disease.

Energy drinks (EDs) are described as "a class of products in liquid form that typically contains caffeine, with or without other added ingredients" by the Food and Drug Administration (FDA). An energy drink is a particular kind of beverage that is marketed as offering both mental and physical stimulation and typically contains caffeine. "energy," but not to be confused with food energy). India has long used natural medications as safe, ongoing substitutes.

The increasing incidence of numerous illnesses and health issues has led to a new focus on strengthening immune function. As a result, there has been a lot of interest in the creation of polyherbal drinks that are meant to strengthen immunity. The purpose and goals of developing a polyherbal drink that boosts immunity are outlined in this publication.

There are two main types of immunity:

1. Innate Immunity
2. Adaptive Immunity

Innate Immunity:- The body uses this as its initial line of defence to quickly and broadly protect itself from a variety of infections. Physical barriers like the skin and mucous membranes are examples of innate immunity. Cellular defences include phagocytes, which are white blood cells that engulf and destroy pathogens, and natural killer cells, which specifically target aberrant or infected cells.

Adaptive Immunity:- This kind of immunity, sometimes referred to as acquired immunity, grows over time as a result of the body being exposed to particular microorganisms. It entails a more focused reaction that includes B cells producing antibodies and T cells being activated. These cells have the ability to either directly destroy contaminated cells or modulate the immune response.

Immunity Booster

Vitamin C: Known for strengthening the immune system, vitamin C is present in foods like broccoli, bell peppers, and strawberries as well as fruits like oranges, strawberries, and kiwis. **Vitamin D:** This vitamin is essential for healthy immune system operation. Spend time in the sun or eat foods high in vitamin D, such as egg yolks, fatty fish (salmon, mackerel), and fortified foods like cereals and milk.

Zinc: Immune cell growth and operation depend on zinc. Shellfish (crab, oysters), lean meats, seeds (hemp, pumpkin), and legumes (chickpeas, lentils) are foods high in zinc.

Elderberry: Elderberry is rich in antioxidants and has been traditionally used to boost the immune system and fight colds and flu.

Garlic: Allicin, a chemical with antibacterial qualities and potential immune system booster, is found in garlic.

Turmeric: The plant's main ingredient, curcumin, has strong anti-inflammatory and antioxidant qualities that may help maintain a healthy immune system. For a boost to immunity, add turmeric to smoothies, soups, and curries.

Ginger: The antibacterial and anti-inflammatory qualities of ginger can aid in promoting healthy immune function. Take ginger pills, make ginger tea, or add raw ginger to food.

To strengthen the immune system and advance general health, there has been an increase in interest in complementary and alternative medicine in recent years. The immune-boosting effects of herbal drinks made from a blend of therapeutic plants have made them more and more popular. The purpose of this study is to create and assess a polyherbal beverage that will boost immunity by combining different botanical constituents in a way that maximizes their synergistic effects.

Background

The immune system is essential for defending the body from infections, illnesses, and pathogens. Stress, environmental factors, and lifestyle choices can weaken the immune system and make a person more prone to sickness. It has long been known that traditional medicinal herbs contain immunomodulatory properties and therapeutic promise.

Mechanism of Action of Immunity Booster

Despite the lack of a particular "immunity booster drink" with widely accepted mechanisms of action, I can describe the broad mechanisms underlying a few typical substances present in these drinks, supported by academic sources:

Vitamin C: Known for its antioxidant qualities and support of immunological function, vitamin C is an essential nutrient. It aids in promoting white blood cell synthesis and activity, which are essential elements of the immune system. Supplementing with vitamin C has been demonstrated in studies to shorten the duration and lessen the severity of respiratory tract infections. (Reference: Hemilä, H. & Chalker, E. (2013).

Vitamin D: Innate and adaptive immune responses are significantly regulated by vitamin D. It increases immune cell antimicrobial activity and aids in controlling the expression of genes related to immune function. An increased vulnerability to infections is linked to vitamin D deficiency. (Reference: Aranow, C. (2011). Vitamin D and the immune system. Journal of Investigative Medicine)

Zinc: Zinc is a vital mineral that is involved in many areas of immune function, such as immune cell growth and function and skin and mucosal barrier maintenance. A zinc shortage can weaken defenses against infections and raise the risk of illness. (Reference: Wessels, I., & Maywald, M. et al. (2017).

Probiotics: Probiotics are live microorganisms that, when taken in sufficient quantities, have positive effects on health. They support the preservation of a balanced population of gut microbiota, which is essential for controlling immunological responses. Probiotics have the ability to improve the function of the intestinal barrier and regulate immune cell activity, which lowers the risk of infection. (Reference: Plaza-Díaz, J., Ruiz-Ojeda, F. J., & Gil-Campos, M. et al. (2019).

Significance

The development of a polyherbal beverage that boosts immunity and is effective has a big impact on public health and wellness. Enhancing immune function and lowering the risk of infections can be accomplished safely and sustainably by including natural therapies into dietary practices. This research adds to the increasing amount of data that supports the use of medicinal herbs to enhance general health and wellbeing.

A promising direction for research and commercial development in natural medicine is the formulation and assessment of a poly-herbal drink for immune support. The goal of this research is to develop a safe and efficient dietary intervention for immunological strengthening and illness prevention by utilizing the synergistic effects of medicinal herbs.

PLANTS PROFILE

- **Amla powder:**



Phyllanthus emblica, or amla, is undoubtedly a nutritional powerhouse. Its essential vitamins and minerals are required for both maintaining our bodies' health and preventing a number of prevalent ailments. Since amla is a rich source of vitamin C, it strengthens immunity, enhances metabolism, and protects against viral and bacterial infections like the common cold and cough. Amla balances all body functions and the doshas of vata, kapha, and pitta, according to Ayurveda.

The immune system is vital to the general health of our bodies and to the defence against disease. However, a number of factors, including environmental pollution, stress, and poor food, can lower immunity, leaving us more vulnerable to infections and illnesses. Ayurveda and additional conventional

Because amla, also known as Indian gooseberry, is a high source of vitamin C, antioxidants, and immunomodulatory chemicals, it is a powerful natural element in immunity boosters. By improving immune cell activity, lowering oxidative stress, and fostering general immune system health, it enhances the body's defence mechanisms.

Ayurvedic medicine has long employed amla, sometimes referred to as Indian gooseberry (*Emblica officinalis*), for its several health advantages, which include the ability to strengthen immunity.

Amla, sometimes referred to as Indian gooseberry, is well known for a host of health advantages, one of which is immune-stimulating. One common way to include this superfood in your diet is through amla powder, which is created from dried and powdered amla fruit. Amla powder has the following immune-boosting applications:

Rich in Vitamin C, Antioxidant Properties, Anti-inflammatory Effects, Enhances White Blood Cell Activity, Boosts Respiratory Health, Supports Gut Health, Adaptogenic Properties.

Vitamin C, which is necessary for a strong immune system, is abundant in amla powder. White blood cells, which are essential for fending off infections and diseases, are produced in part by vitamin C.

- **Curcumin powder (turmeric):**



Since it contains its main ingredient curcumin, which has strong anti-inflammatory and antioxidant qualities, turmeric (*Curcuma longa*) is well known for its ability to boost immunity.

The active ingredient of turmeric, a spice made from the rhizomes of *Curcuma longa*, is curcumin, which has immunomodulatory, anti-inflammatory, and antioxidant properties. This substance is used in immune boosters. By scavenging free radicals, lowering inflammation, and boosting immune cell activity, it supports general immunological function and helps the body respond more robustly to infections.

Turmeric powder is a botanical material that has been utilized historically in numerous cultures because to its potential health benefits. It is derived from the Turmeric plant, formally known as Turmeric Argentina.

Due to its high content of bioactive compounds such polyphenols, flavonoids, and polysaccharides, turmeric powder is believed to possess immunomodulatory properties that help improve immunological function.

The capacity of polyherbal drinks to bolster the body's defence mechanisms has generated a lot of interest because of the synergistic effects of multiple botanical substances.

This review attempts to provide insights into the potential of polyherbal drinks including turmeric powder as natural therapies for enhancing immunity by a thorough investigation of the body of research and literature that is currently available.

Golden Milk (Turmeric Latte): Warm milk with a teaspoon of turmeric powder, a pinch of black pepper (to improve curcumin absorption), and a natural sweetener such as honey or maple syrup to make a soothing and immune-boosting beverage.

- **Piper longum (Chavica roxburghii):**



Piper Longum uses in:- Respiratory Health, Antioxidant Activity, Digestive Health, Anti-inflammatory Effects, Enhanced Bioavailability, Antimicrobial Activity, Ayurvedic Formulations.

The main defence mechanism of the body against pathogens. Long pepper, or *Piper longum*, is one of the numerous plants that have been studied for its ability to alter immunological responses. This review paper focuses on the creation and evaluation of polyherbal drinks that promote immunity and contain *Piper longum* as a main ingredient.

However, a lot of factors can weaken an individual's immune system and increase their susceptibility to infections and chronic illnesses, such as stress, a poor diet, and environmental pollutants. This review study aims to objectively evaluate the content and efficacy of polyherbal beverages that use *Piper longum* as a primary ingredient in order to strengthen the immune system.

Long pepper, or *Piper longum*, has long been utilized in Ayurvedic medicine for its many health advantages, including its ability to strengthen immunity. Here is how immunity-boosting products use *Piper longum*.

Long pepper, or *Piper longum*, is used in immunity-boosting products because of its bioactive ingredients, including piperine. By boosting immune cell activity, controlling cytokine synthesis, and lowering oxidative stress, piperine has immunomodulatory actions that enhance immune system health as a whole.

Piper longum, a flowering vine in the *Piperaceae* family, is also referred to as long pepper. Due to its therapeutic qualities, it has long been employed in many medical systems, including Ayurveda. There are various applications for *piper longum* powder, which is made from the dried fruits of the long pepper plant, to enhance immunological function.

Asthma, bronchitis, and coughs are among the respiratory ailments that *piper longum* is used to treat and improve. It facilitates breathing by acting as a bronchodilator, which opens up the airways. Herbal remedies for respiratory conditions commonly use long pepper.

- **Cinnamon:**



The unique flavour and aroma of cinnamon are produced from the inner bark of trees of the genus *Cinnamomum*. Beyond its culinary uses, cinnamon has been linked to a number of potential health advantages, including strengthening immunity.

Because of its bioactive ingredients, including cinnamaldehyde, cinnamic acid, and cinnamyl alcohol, cinnamon is used in immunity-boosting products. These substances have antibacterial, anti-inflammatory, and antioxidant qualities that support the body's immunological response. Through its ability to scavenge free radicals, reduce inflammation, and kill pathogenic infections, cinnamon supports immunological function overall.

Because of their potential synergistic benefits, polyherbal formulations have drawn a lot of attention in the quest for natural ways to promote immunity and improve overall health.

Common cinnamon, or *Cinnamomum*, is one botanical ingredient that has demonstrated potential in this regard. This evaluation looks at how to make and evaluate immune-boosting polyherbal drinks with cinnamon as the main ingredient.

The immune system serves as the body's first line of defence against infections and is crucial for maintaining homeostasis. However, a lot of factors can compromise an individual's immune system and increase susceptibility to infections and illnesses, such as stress, poor food, and environmental toxins.

The anti-inflammatory chemicals included in cinnamon have the potential to mitigate inflammation throughout the body. Numerous medical disorders, such as diabetes, arthritis, and heart disease, are associated with chronic inflammation.

Traditionally, cinnamon has been used to control menstrual periods and ease cramps. According to certain research, cinnamon may help prevent neurodegenerative illnesses like Parkinson's and Alzheimer's disease and enhance cognitive performance.

Antioxidants like polyphenols, which are abundant in cinnamon, aid in shielding the body from oxidative damage brought on by free radicals.

Helping to control blood sugar levels is one of cinnamon's most well-known health advantages. For people with diabetes or at risk of acquiring the disease, it can decrease insulin resistance and increase insulin sensitivity.

- **Lemon powder:**



Lemon are mainly use for taste.

Lemon powder's high vitamin C content and other advantageous ingredients make it a useful addition to recipes that support immunity.

Rich Source of Vitamin C: Lemon powder is a potent antioxidant and concentrated source of vitamin C, which boosts immune function by encouraging the creation of white blood cells, which are critical for fending off viruses and illnesses.

Consider using lemon powder into homemade teas, smoothies, soups, or sauces as part of your immunity-boosting regimen. Additionally, you may use it as a spice for fish or chicken meals or sprinkle it over salads. Take care with the amount used so as not to overpower the flavor and acidity of your meals. Additionally, before adding new components to your diet, seek medical advice if you have any special health problems or diseases.

Antioxidant Properties: Lemon powder has other antioxidants, such as flavonoids, in addition to vitamin C. These compounds help shield cells from oxidative damage brought on by free radicals. By strengthening the immune system, this protection lowers the chance of developing chronic illnesses.

Alkalizing impact: Once digested, lemon powder has an alkalizing impact on the body despite its acidic flavour. By keeping the pH slightly alkaline, you can promote immunity and general health by reducing the conditions that encourage the growth of infections.

Digestive Health: There is a strong correlation between immune function and gut health, which may be enhanced by using lemon powder. It may aid in the stimulation of bile and digestive enzyme production, both of which are vital for the digestion and absorption of nutrients critical to immune system function.

Anti-inflammatory Properties: The anti-inflammatory compounds limonene and citric acid, which are included in lemon powder, can aid in the body's reduction of inflammation. Reducing inflammation may obliquely promote immunological function since chronic inflammation can impair immune function.

MATERIALS AND METHODS

Materials:

S.No	Ingredients	100 gram	10 gram
01	Amla powder	5	0.5
02	Curcumin powder	2	0.2
03	Piper longum	1	0.1
04	Cinnamon	0.5	0.05
05	Leman Powder	1.0	0.10
06	Mannitol Powder	85.5	8.55
07	Sodium Benzoate	2.0	0.20
08	Sodium Citrate	2.0	0.20
09	Citric Acid	1.0	0.10

The local markets in Dehradun provided the amla, cinnamon, piper long, and curcumin; nevertheless, care was taken to ensure that the ingredients were clean and in good condition. and passed through sieve No. 40 after being dried in the shade for 24 hours.

Methods

- All powder is separately dry in oven
- That powder are pass through 40 no. Sieve.
- Weight accurately chemical and powder.
- That are mix continuous and staring continuous.
- All powder mix in motor pistol.
- After mix passing through 40 no. sieve.

Curcuma longa: We purchased turmeric rhizomes from nearby vendors and used a commercial grinder to grind them into a fine powder.

Piper Longum: The fruits of Piper longum were ground into a powder using a grinder after being purchased from reliable herbal sources.

Cinnamon (*Cinnamomum verum*): A spice grinder was used to grind the bark of the cinnamon plant, which was sourced from reliable sources.

Fresh amla (*Emblica officinalis*): fruits were purchased from nearby markets, washed, and blended into a pulp.

Sweetener (Optional): If requested, natural sweeteners like stevia or honey were added to improve palatability.

Preservatives (Optional): To increase the shelf life of natural preservatives, such as citric acid or potassium sorbate.

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All powder (CURCUMIN, PIPER LONG, CINNAMON, AMLA) are collect then powdered separately in a Passes through sieve no. 40.x All the powder drugs as per formula are mixed in mortar pastel. After mixing powder was dried in a hot air oven at 40°C for 1 hr.

EVALUATION

You can change the amounts of each ingredient to suit your preferred potency and taste. You can also refrigerate it before serving if you would rather have a chilled beverage. Because of its possible health benefits, this beverage can be had once or twice a day.

Ingredient Preparation Make sure every ingredient is pure and uncontaminated. Measure out the necessary amounts of amla juice, cinnamon, Piper longum, and curcumin.

Combining Dry Ingredient In a clean bowl, thoroughly mix cinnamon, Piper longum, and curcumin to ensure even distribution.

Weighing and Mixing Using a digital scale, determine how much of each ingredient is needed. In the prescribed ratios, mix the powders of amla, curcumin, piper longum, cinnamon, and lemon peel powder. For even dispersion, thoroughly mix the particles.

Quality evaluation Evaluating the effectiveness and safety of prepared polyherbal energy drinks required a quality evaluation. It was assessed using both phytochemical and physical approaches by comparing it to the established parameters. The five senses—sight, smell, taste, touch, and hearing—were also assessed. During processing, the freshly made beverage had been inspected for the existence of any contamination from microbes.

Sensory Evaluation It needs to taste pleasing in order to be consumed. A panel of five participants performed a sensory study using a nine-point hedonic rating scale. The energy drink's look, colour, flavour, consistency, and overall appeal are among the evaluation criteria.

Physicochemical and Phytochemical Evaluation Various physicochemical characteristics were determined, including total soluble solids, pH, titratable acidity, and sugar content. Additionally, established protocols were used to examine the produced drink for the presence of carbohydrates, protein, glycosides, tannins, polyphenol, and flavonoids.

Stability Studies During a three-month storage period, the produced drink's organoleptic features, physicochemical parameters, and phytochemical parameters were looked at on a daily basis to look for

alterations.

Experimental Work

The local markets in Dehradun provided the amla, cinnamon, piper long, and curcumin; nevertheless, care was taken to ensure that the ingredients were clean and in good condition. and passed through sieve No. 40 after being dried in the shade for 24 hours.

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It looks like a great idea to combine amla (Indian gooseberry), cinnamon, piper longum (long pepper), and curcumin to create a drink that boosts immunity! There are various stated health benefits of each of these components, including support for immunity. This is how you might think around doing the experimental work:

Research and Background Study: Look at the distinct qualities and possible combinations of each component first. Examine studies conducted by scientists, customary applications, and any known interactions.

Quality Control and Sourcing of Ingredients: Make sure you're obtaining ingredients of the highest calibre. When feasible, choose organic products, and make sure every ingredient is pure and fresh.

Recipe Development: To create the most appealing and efficient mix, experiment with various ingredient ratios and combinations. Take into account elements like as solubility, flavour, and texture.

Formulation: Choose the drink's shape. Is The bioavailability of the active chemicals may vary depending on the form and may necessitate distinct preparation techniques.

Testing: To evaluate the drink's efficacy and obtain input on its flavor and simplicity of preparation, conduct small-scale trials. Starting small, you may assemble a few willing volunteers and yourself.

Data collection: Make thorough notes on all ingredients used, cooking techniques, and any flavour, texture, colour, and scent observations.

Safety Observations: Consider any possible dietary restrictions, allergies, or drug interactions. If necessary, seek advice from medical experts, particularly if you intend to distribute or sell the product.

Iterative Enhancement:

RESULT AND DISCUSSION

Making a powdered, dry mixture. As shown in Table, the Herbal Energy powder drink produced a range of yields.

Preparation of powder formulation

S.No	Ingredients	100 gram	10 gram
01	Amla powder	5	0.5
02	Curcumin powder	2	0.2
03	Piper longum	1	0.1
04	Cinnamon	0.5	0.05
05	Leman Powder	1.0	0.10
06	Mannitol Powder	85.5	8.55
07	Sodium Benzoate	2.0	0.20
08	Sodium Citrate	2.0	0.20
09	Citric Acid	1.0	0.10

Sensory evaluation

Sensory assessment metrics found in the powdered herbal energy drink. The formulation's observable characteristics, including colour, flavour, texture, and general acceptability at room temperature, are shown in the table. The drink's flavour, taste, and overall acceptability are all very good, according to the matched comparison evaluation.

Physical evaluation of herbal energy booster

S. No.	Parameter	Result
01	Bulk Density	28
02	Angle of Repose	0.70
03	Tap Density	0.70

Bulk Density: $p = m/v$ $p =$ Density

$m =$ Mass $v =$
Volume

Angle of Repose: $\tan^{-1}(rh)$ h is the height of the pile.

r is the radius of the base of the pile.

Tap Density: m/v

m is the powder's mass and v is the container's volume following tapping.

CONCLUSION

The creation and assessment of polyherbal drinks that increase immunity is a potential strategy for improving immune function and advancing general health. For those looking for natural ways to maintain their immune system, these formulations provide a secure and efficient dietary option by utilizing the immunomodulatory qualities of medicinal herbs.

The creation of an immunity-boosting poly-herbal drink with turmeric, Piper longum, amla, and cinnamon seeks to offer a safe and efficient way to improve immunological health by following the stated objectives and using pertinent scientific references. The objective is to provide a premium product that fulfills the demands and expectations of customers looking for all-natural immune system support through thorough formulation optimization, efficacy assessment, safety assessment, and clinical validation.

Both those with and without diabetes can benefit from this mixture. Compared to fizzy drinks, the formulation has less potential negative effects because it is made from plant sources. This is a fantastic supplement to help someone recover from illness quickly and feel more refreshed. Along with many health advantages, this natural substitute for synthetic drinks is an energy-boosting powder drink.

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