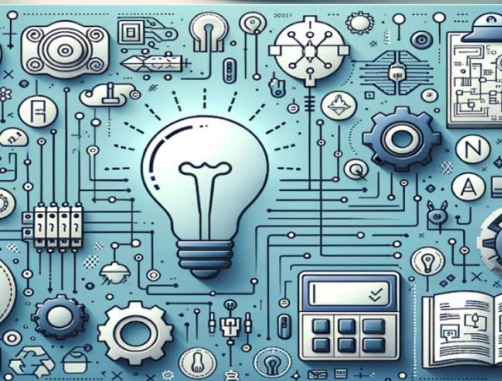


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Formulation, Evaluation and Development of Immunity Boosting Herbal Tonic

Shreya Singh, Nripen Prakash Khare, Dr. Satyaendra Shrivastava

Parijat College of Pharmacy, Indore (M.P.), India

ABSTRACT: A variety of herbs are used to improve the health and immunity. The increasing demand for natural and plant-based immunity boosters has driven the development of herbal formulations that enhance overall health and disease resistance. This study aimed to formulate and evaluate an immunity-boosting herbal tonic using Moringa, Amla, and Turmeric, three herbs renowned for their immunomodulatory and antioxidant properties. The preformulation studies are organoleptic properties, flow property, phytochemical screening, foaming index, ash value and viscosity were evaluated to understand the characteristics of herbal ingredients.

KEYWORDS: Moringa, Immunity boosting, Antioxidant activity and Herbal tonic.

I. INTRODUCTION

The immune system is not confined to any one part of the body. Immune stem cells, formed in the bone marrow, may remain in the bone marrow until maturation or migrate to different body sites for maturation. Subsequently, most immune cells circulate throughout the body, exerting specific effects. It is defined as the body's ability to identify and resist large numbers of infectious and potentially harmful microorganisms, enabling the body to prevent or resist diseases and inhibit organ and tissue damage. It has been proposed the Immunity is divided into two parts determined by the speed and specificity of the reaction. These are named the innate and the adaptive responses, although in practice there is much interaction between them.

1.2 Components of immune system:

1. **White blood cells:** These immune system cells attack and eliminate harmful germs to keep you healthy. There are many types of white blood cells, and each type has a specific mission in your body's defense system. Each type also has a different way of recognizing a problem, communicating with other cells and getting their job done.
2. **Antibodies.** These proteins protect you from invaders by binding to them and initiating their destruction.
3. **Cytokines.** These proteins serve as chemical messengers that tell your immune cells where to go and what to do. Different types of cytokines do different specific tasks, like regulating inflammation. Inflammation happens when your immune cells are warding off invaders or healing damage to your tissues.
4. **Complement system.** This is a group of proteins that teams up with other cells in your body to defend against invaders and promote healing from an injury or infection.
5. **Lymph nodes.** These small, bean-shaped organs are like colanders you use to drain pasta. They filter waste products from the fluid that drains from your tissues and cells (lymph) while keeping the good components, like nutrients. You have hundreds of lymph nodes throughout your body, and they're a vital part of your lymphatic system.

1.3 Types of immune system

The human immune system has two main types: the innate (non-specific) immune system which provides a general defense from birth and the adaptive (specific) immune system which develops over time and learns to target specific threats

- A. **Innate immune system:** The innate immune system is the body's first line of defense against intruders. It responds in the same way to all germs and foreign substances, which is why it is sometimes referred to as the "non-specific" immune system.



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- B. Adaptive immune system:** The adaptive immune system specifically targets the type of germ that is causing the infection. But to do that, it first needs to recognize the germ as such. This means that it's slower to respond than the innate immune system, but it's more accurate when it does respond. It also has the advantage of being able to "remember" germs

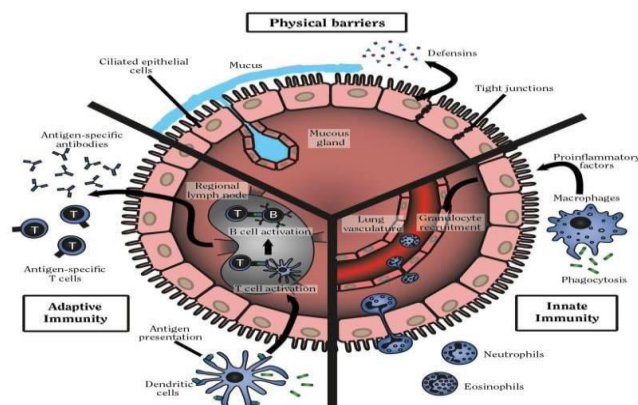


Fig.no.1

II. MATERIALS AND METHOD

2.1 Material

Sr.no.	Ingredients	Role
1.	Moringa, Amla, Turmeric	Active pharmaceutical ingredient
2.	Pumpkin seeds	Base
3.	Guar gum	Emulsifier
4.	Orange syrup	Flavouring agent
5.	Saccharin	Sweetening agent
6.	Sodium benzoate	Preservative

Table.no.1

Sr.no.	Glassware
1	Beaker
2	Glass rod
3	Measuring cylinder
4	pipette
5	Mortar pestle
6	pipette
7	Watch glass

Table.no.2



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2.2 Method

2.2.1 Collection

Moringa powder, amla powder, turmeric, and pumpkin seeds were collected from the local market.

2.2.2 Preparation of extracts

After collection of the herbal drugs. A desired quantities of herbal drugs were weight and each herb macerated in a beaker with the help of solvent and kept separately for 2 days.

2.2.3 Filtration

After 2 days, macerated herbs filtrated out by using simple filtration method. Filtration of extract was done by using simple filter paper and funnel for two times.

III. DRUG PROFILE

3.1 Moringa oleifera

- **Biological source-** consist of fresh or dried leaves of Moringa oleifera.
- **Family-** Moringaceae



Fig.no.2

3.2 Turmeric

- **Biological source-** It is obtained from dried rhizomes of *Curcuma longa* or *Curcuma*
- **Family-** Zingiberaceae



Fig.no.3



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3.3 Amla

- **Biological source-** It is consist of fresh fruits of *Phyllanthus emblica*
- **Family-** *Phyllanthaceae*



Fig.no.4

IV. METHOD

All the ingredient are collected from local market

4.1 Preformulation studies

1. Organoleptic properties

- **Appearance:** Light green to dark green fine powder with a slightly fibrous texture.
- **Odor:** Characteristic, mildly grassy, and earthy.
- **Taste:** Slightly bitter with a mild peppery after taste.
- **Texture:** Fine, powdery, and slightly coarse when not finely ground.

2. Phytochemical screening

1. Tannins

5gm of powdered leaf samples of each extract was weighed into a test tube containing 10 ml of water (distilled), heated and filtered. Iron (III) chloride (0.1%) was added to the filtered samples to give a blue-green precipitate. This showed the presence of tannins.

2. Flavonoids

A sample of 5 g was accurately weighed and stirred with a few drops of magnesium strips. The presence of flavonoid was confirmed when a yellowish colour was observed on addition of concentrated hydrochloric acid.

3. Saponins

4g of powdered leaf sample was placed in a test tube containing 10 ml of water (distilled) and warmed. The presence of saponins was confirmed upon the formation of froth.

4. Alkaloids

2 ml of. chloroform was added to a test tube containing the sample (leaf). About 3–4 drops of Wagner's colouration reagent was added to the mixture, and a reddish brown confirmed the presence of alkaloids



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Fig.no.5



Fig.no.6

Powder flow property

1 Angle of repose: Angle of repose: The funnel method was used to calculate the angle of repose. The carefully weighed mixture was poured into a funnel. The funnel's height has been modified so that the tip barely brushes the top of the heap or head of blend. The mixture of drug excipients was permitted to freely flow down the funnel and onto the surface. The powder cone's diameter was measured. the following equation was used to get the angle of repose: $\tan \theta = h/r$ $\theta = \tan^{-1} h/r$

2. Bulk Density: Bulk density is the ratio of mass of a material to its total volume, including the volume of the solids and the voids. The apparent bulk density was calculated by pouring a predetermined amount of the mix into a graduated cylinder, weighing it, and then measuring the volume.

$$BD = \text{Weight of the powder} / \text{volume of the packing}$$



Fig.no.7



Fig.no.8



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4.2 Method of preparation

The powdered plant material of pumpkin seed and Moringa was macerated by decoction method. and then extracts were collected. After that guar gum as an emulsifier was added. Then orange syrup as flavoring agent was added. Honey and sodium benzoate was added for preservation. Then the prepared tonic containing herbal drug extract was kept in well closed container.

S.No	Ingredients	Formulation		
		F1	F2	F3
1	moringa	10g	7.5g	5g
2	amla	2g	2g	2g
3	turmeric	2g	2g	2g
4	Pumpkin seed powder	5g	7.5g	7.5g
5	Guar gum	0.1g	0.1g	0.1g
6	Orange syrup	2ml	3ml	4ml
7	honey	7.5g	8g	6g
8	sachharin	0.025gm	0.025gm	0.025gm
9	Sodium benzoate	q.s.	q.s.	q.s.
10	water	q.s.	q.s.	q.s.

Table.no.3

4.3 Evaluation Parameters of Prepared Formulation

➤ Organoleptic properties

- **Taste:** The tonic will likely have a combination of bitter (from moringa), earthy (from turmeric), and sour (from amla) flavors. The overall taste might be tangy, with some warmth and bitterness, but could be mellowed or balanced with added sweeteners or other ingredients like honey or lemon.
- **Smell:** Expect a distinctive, herbal aroma with earthy, spicy, and slightly sour notes from turmeric, moringa, and amla.
- **Appearance:** The tonic will typically have a vibrant yellow or greenish color, sometimes brightened with a golden hue from turmeric.
- **Texture:** If well-prepared, the tonic should have a smooth consistency, although it might have slight particulate matter from the herbs if not strained properly.



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➤ Drug content determination

Drug content of medicated tonic was determined by Thin Layer Chromatography. Here, control was taken as aqueous TLC plates were prepared by using silica gel G and plates were activated for half an hour. Spotting was carried out on both plates i.e., control and test plate by using capillary. Run both the plates in mobile phase i.e., Toluene: Ethyl acetate: Water having ratio 7:3:2. After running of both plates air drying of plates was carried out. Further, visualization of both plates was carried out by using iodine chamber. By comparing the RF value of both the plates i.e., control and test, Drug content in Medicated tonic was determined. 8. Estimation of herbal drug – Estimation



Fig.no.9

V. RESULT AND DISCUSSION

When combined, three herbs—Moringa, Turmeric, and Amla—create a potent tonic that not only enhances immune function but also ensures that the immune system remains balanced. Moringa supports the production of white blood cells, turmeric modulates immune responses to prevent inflammation, and Amla boosts antibody production and further supports immune cells.

5.1 Evaluation of prepared tonic.

S.no.	Evaluation Parameter	Formulation		
		F ¹	F ²	F ³
1.	Color	Pale Yellow	Pale Yellow	Pale Yellow
2.	Appearance	Cloudy or slightly opaque	Cloudy or slightly opaque	Cloudy or slightly opaque
3.	Consistency	Liquid ,slightly thick	Liquid ,slightly thick	Liquid ,slightly thick
4.	odor	Herbal ,pungent (due to turmeric)	Herbal ,pungent (due to turmeric)	Herbal ,pungent (due to turmeric)
5.	viscosity	Medium viscosity	Medium viscosity	Medium viscosity

Table.no.4



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5.2 Discussion

The combined use of Moringa, Amla, and Turmeric resulted in a synergistic effect, where each herb's properties worked together to improve immune system efficiency. This tonic showed a significant increase in the production of key immune cells like macrophages and lymphocytes, highlighting its potential as a natural remedy for supporting and strengthening immune health.

VI. CONCLUSION

In conclusion, the study demonstrates that the immunity-boosting herbal tonic made with moringa, amla, and turmeric plays a significant role in enhancing the body's overall health and immune function. and primary protective organ of our body. The body's immune system fights against a huge number of pathogens and antigens and plays a central role in our survival. Therefore, enhancing the immune system's ability is highly beneficial in preventing many health disorders. Some medicinal plants and different natural ingredients have been effectively used to augment immunity and prevent infections since ancient times.

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