

# Formulation and evaluation of herbal immunity booster powder

Mr. Anoop Wamanrao Modak<sup>1</sup>, Dr. Vijaykumar Kale<sup>2</sup>, Mr. Kunal Hake<sup>3</sup>, Mr. Raviraj Jadhav<sup>4</sup>, Mr. Sachin Balaji Biradar<sup>5</sup>, Miss Sakshi Gavade<sup>6</sup>, Miss Neha Gosavi<sup>7</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Principal, <sup>3</sup>Assistant Professor, <sup>4</sup>Assistant Professor, <sup>5</sup>Assistant Professor  
Department Of Pharmaceutic's, Mahadev Kanchan College of Pharmaceutical Education And Research, Uruli Kanchan, Tal. Haveli, Dist. Pune, Maharashtra-412202

**Abstract:** The purpose of this study was to create and assess a powdered herbal immunity enhancer using organic components known for their immune-suppressive qualities. To guarantee its safety, effectiveness, and stability, the prepared powder was put through a number of physicochemical and microbiological tests. The outcomes showed encouraging immunomodulatory potential, suggesting that the produced herbal powder is a good choice for organically boosting immune function. The utilization of nutrients and herbs to boost immunity is the main topic of this study. The purpose of the study was to elucidate natural products, herbs, and minerals that have been shown through experimentation to enhance immunity. One of nature's most interesting inventions is the immunity system. It serves as a barrier to keep out millions of bacteria, viruses, fungus, and parasites. It's crucial to recommend that individuals take supplements in order to strengthen their immune systems. The technique is use for medicinal plants to naturally boost immunity greatest. Herbal plants boost the good bacteria in the gut that support and strengthen the immune system. The most potent herbal medicines for boosting immunity naturally are Tulsi, Ginger, Ashwagandha, Clove, Turmeric, and Dalchini. The immune system army's white blood cell count is increased, and they are trained to combat disease-causing microorganisms. Other strategies to strengthen immunity include leading an active lifestyle, eating a balanced diet, exercising, unwinding, and getting enough sleep. A combination of proteins, various compounds, carbs, and alkaloids make up an immunity booster.

**Keywords:** Herbal immunity booster, Immuno-modular, Immune system, Herbal drugs, Immunity booster Powder.

## INTRODUCTION:

Sustaining a robust immune system is essential for general health and disease prevention. A healthy lifestyle and diet are important, but adding specific herbs and spices to your food can help strengthen your immunity even more. The natural ingredients are rich in vitamins, antioxidants, and bodily defense agents. Any dish may be made appetizing by adding herbs and spices, and the majority of them are loaded with antioxidant power. Ayurveda suggests using a variety of spices and herbs on a regular basis as they have long been used as medicine to prevent disease and as a flavor enhancer. Many of them have become more well-known as superfoods in the west in recent years. From the seasoning there are numerous ways to use herbs and spices in our meals, from infusing them into baked items to using them in sauces and dressings. Herbs originate from therapeutic plants. Its dried portion is referred to as a spice, while its leaf portion is called herb. Consuming herbs and spices has been shown in multiple scientific studies to be an excellent approach to manage blood pressure, diabetes, cancer, and heart disease. A dietary supplement called Immunity Booster aids in improving the condition of your immune system. The top five vital nutrients required to strengthen and increase the body's immunity are as follows, according to the Academy of Nutrition and Dietetics: Vitamin A, D, C, E and Zinc. Herbal formulation can be defined as dosage form containing one or more than one herbal drug or processed herbal drug in particular amount to provide particular nutritional, cosmetic benefit as well as health benefit planned for use to check, treat, mitigate, or alter the bodily functions. The immunity system is the human body's protect against infectious microbes and other bacteria. Through a series of steps called the immune response, it attacks organisms and substances that invade body systems and cause disease and disorders. It is consist up of a network of cells, tissues, and organs that work together to protect the body. Herb is any plant which having the various medicinal uses and a lot of advantages. Leukocytes which is circulate in the body between lymphatic vessels and blood vessels. In this way, the immunity system works in a co-ordinated pattern to monitor the body for germs or substances that might cause problems. Accumulation are critical to our uniqueness. They secrete a wide variety of powerful chemicals, and they play an essential role in activating T cells. What each of us recalls is not quite the same as what others recollect, even of circumstances we have been in together. These cells generally persist for years.<sup>5</sup>The recollection and utilization of herb

is necessary for the physical and mental health. Today, world is facing an unprecedented pandemic corona virus disease 2019 (COVID-19) caused by severe acute respiratory syndrome corona virus 2.6 In the present scenario, it's become more important to build our defense system more strong against it as no evidence-based treatment for COVID-19 is developed so far. mentally active is usually enough to keep your limit is alluring to theorize that the renewing and provoke power of these herbal redress might be due to their action on the immunity system and some of the meditative plants are accept to heighten the earthy opposition of the body to ill health.<sup>8</sup> In the wake of coronavirus disease 2019 (COVID19) pandemic, there has been a lot of interest in ways to strengthen one's condition system and thus build a immune system in good health.<sup>9</sup> Ayurveda angoisser the usage of plant-based medication and care. Various plants identified in the Indian Ayurvedic system of medicine display a wealth of pharmacological properties.<sup>10</sup> The Ayurvedic system of medicine is one of the oldest systems of medicine and includes various ethno pharmacological activities such as immune stimulation, tonic, neuro stimulation, anti-aging, antibacterial, antiviral, anti-rheumatic, anticancer, and adaptogenic. This may be characterized as the body's quality to determine and refuse big Numbers of infective and possibly noxious microorganisms, enabling the body to prevent or resist diseases and inhibit organ and tissue damage. The immunity system is not claustrophobic to any one portion of the body. Immune stem cells, formed in the bone marrow, may stay in the bone marrow until maturation Oregon migrate to various body position for maturation. More than 80 preservative are grownup in different parts of the world, particularly in Asia. India is home to several spices that are used extensively in traditional medicine. India is home to several spices that are used extensively in traditional medicine. According to the World Health Organization (WHO), around 80% of the world's population uses herbal medicines for primary health care, particularly across Europe and South Asia.

### **IMMUNITY:**

This can be summed up as the body's capacity to recognize and fend off a wide range of pathogenic and potentially dangerous microbes, allowing the body to prevent illness and limit damage to organs and tissues. The body's immune system is not limited to any one area. After developing in the bone marrow, immune stem cells can either travel to other parts of the body or stay there until they are fully developed. The majority of immune cells then go throughout the body and have distinct impacts. The immune system uses the cell-mediated defense system (cellular immunity) and the antibody-mediated defense system (humoral immunity) as two separate but complementary defense systems to combat invasive species. Immune systems: The immune system's basic structure consists of multiple layers, each of which has a different level of defense.

The skin is the most visible and important barrier against infection. Another is physiological, in which the body's pH and temperature produce unsuitable dwelling circumstances for alien species. After viruses have effectively infiltrated the body, the innate, acquired, or adaptive immune systems deal with them. Both systems are made up of a vast number of chemicals and cells that interact intricately to identify and get rid of infections. Chemical bonding is necessary for both detection and elimination: Immune system cells have many different types of receptors covering their surfaces. Some of these receptors attach chemically to pathogens, while others connect to other immune system cells or chemicals to facilitate the intricate signalling network that drives the immune response.

Immuno modulators are chemicals, either synthetic or biological, that have the ability to activate, depress, or modify any part of the immune system, including the innate and adaptive arms. Immuno modulator classification Immuno modulators fall into three groups when it comes to clinical use: As immune adjuvants are added to vaccinations to increase their effectiveness, they can be categorized as particular immune stimulants. The potential for immune adjuvants to be the real immune response modulators exists. A significant challenge to vaccine designers may arise from the suggestion that they be used as selectors between humoral and cellular helper T1 (Th1) and helper T2 (Th2), as well as between immune protective, immune destructive, and reagenic (immunoglobulin E [IgE]) versus IgG type immune responses. Since immune stimulants are meant to strengthen an organism's resistance to infection, they are by nature non-specific. They have the ability to influence both innate and adaptive immune responses. Immuno stimulants are believed to work as immune potentiators, or prophylactic and promoter drugs, in healthy individuals by raising the baseline level of immune response. They are anticipated to function as immunotherapeutic drugs in the person with immune response deficiency. Immunosuppressants are a structurally and functionally diverse class of pharmaceuticals that are frequently used in combination regimens to treat immune disorders and different forms of organ transplant rejection.

### **ADVANTANGES:**

1. Natural ingredient: Herbal immunity booster powders are typically formulated with natural ingredients such as herbs, roots, fruits, and spices, which are believed to have immune-boosting properties.

2. Immunity system support: Many herbs and plants used in these powders contain compounds that are thought to support the immune system.

3. Reduce risk of side effect: Since herbal immunity booster powders are made from natural ingredients, they are often perceived as having fewer side effects compared to synthetic supplements or medications.

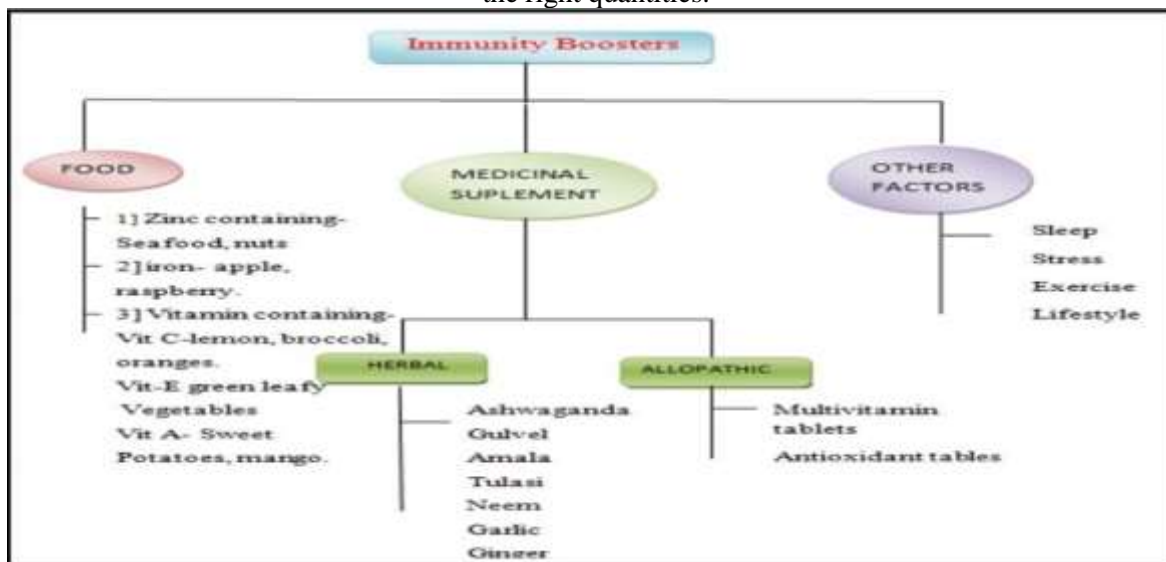
4. Helps in preventing various viral, bacterial and other diseases. It helps in removing toxins and free radical from body.

5. Helps in overcoming body weakness and Detoxifies and rejuvenate the body and Improve condition like low haemoglobin and low blood pressure

#### DISADVANTAGES:

1. Not suitable for diabetic patient
2. Due to pleasant taste of this formulation children's may take extra dose
3. Not suitable in emergency and for unconscious patients
4. Delayed onset of action because absorption take time.

**IMMUNITY BOOSTERS:** If one slips by the barrier, the immune system produces white blood cells, and other chemicals and proteins that attack and destroy these foreign substances, To boost immunity that means consumption of food provides additional benefits to the body. To boost immunity it's important to take the right kind of foods in the right quantities.



#### AIM AND OBJECTIVES

##### AIM:

To boost the body's immunity against allergens, infections, cancer and autoimmune responses.

##### OBJECTIVES:

The objective of the present research work is to provide good health by boosting immune system .the main ingredient in herbal immunity booster powder formulation is **Moringa**.

The above explored study for the present context is divided into following objectives:

1. The primary goal is to enhance the body's natural defense mechanisms against pathogens like bacteria, viruses, and other harmful microorganisms.
2. Herbal immunity booster offer natural alternative to synthetic supplement to approach health and wellness.
3. Herbal immunity booster powders often contain ingredients rich in vitamins, minerals, and antioxidants that contribute to overall health and well-being.
4. Herbal remedies may help balance immune function, preventing over activity as in allergies or autoimmune conditions.

**MATERIALS AND METHODS:**

**INGREDIENT:** Herbs and spices used in the present formulation work have been procured from authenticated supplier and are research – grade. Some material obtained from pharmacognosy lab and some are obtained from marketed as mentioned in table no.1

SR.NO.	INGREDIENT	PART USED	PROPERTIES
1	Ginger	Rhizome powder	Anti-microbial & anti-oxidant
2	Tulsi	Leaves powder	Vitamin c and zinc
3	Turmeric	Rhizome powder	Anti-inflammatory
4	Gingsen	Root powder	Fight disease causing germ
5	Liquorice	Root powder	Maintain energy level, sweetening agent
6	Moringa	Leaves powder	Analgesic, lower cholesterol, Immunity booster
7	Ashwagandha	Root powder	Reduce blood sugar level
8	Cinnamon	Bark powder	Anti-bacterial

## A) GINGER:



Fig. no. 1 Ginger

**Botanical name:** Zinziber Officinale

**Biological source:** Ginger consists of rhizomes of Zingiber officinale.

**Family:** Zingiberaceae

**Action on immunity system:** It known to be most healthy and delicious herbs in the world .The warming effect of the herb has anti-inflammatory properties that help in reducing risk of osteoarthritis and sore muscles .It helps to improve the immunity and fight against infections .Ginger has been an old remedy for flu and common cold .Ginger is particularly good in preventing respiratory tract infection. It has digestive stimulant action. It protects the gastro-intestinal tract.

**Active constituent:** It contains a number of pungent constituent and active ingredients. Steam distillation of powdered ginger produces ginger oil which contains a high proportion of sesquiterpene hydrocarbon, predominantly zingiberene. Zingeron and shogaol are found in small amount in fresh ginger and in large amount in dried or extracted product.

**Mechanism of action:** The aromatic, spasmolytic, carminative, and absorbent properties of ginger suggest that it has direct effect on the gastrointestinal tract. Ginger is well known as its anti – inflammatory, antifungal, and anti-cancer properties.

B) TULSI :



**Fig.no 2 Tulsi**

**Botanical name:** Holy basil

**Biological source:** Tulsi is an aromatic perennial plant of *Ocimum sanctum* in the family.

**Family:** Lamiaceae

**Action on immunity system:** Tulsi is rich in vitamin C and zinc. It thus acts as a natural immunity booster and keeps infection at bay. It has immense anti-bacterial, anti-viral, and anti-fungal properties which protect us from a variety of infection. Tulsi will awaken the mind bringing mental clarity which also relaxes the nervous system.

**Active constituent :** There are many chemical constituents present in *Ocimum sanctum* such as oleanolic acid, rosmarinic acid, ursolic acid, eugenol, linalool, carvacrol, beta-elemene, beta-caryophyllene, and germacrene. *Ocimum sanctum* is considered to have diuretic, stimulant properties.

**Mechanism of action:** Tulsi has a unique combination of actions that include anti-microbial, mosquito repellent, antidiarrheal, anti-oxidant, anti-cataract, anti-inflammatory, chemoprotective, radio-protective. The leaves of this easily available plant are rich in phyto-nutrient, chlorophyll, vitamin, and mineral as well as eugenol, a bioactive compound that has anti-bacterial properties and reduces stress and plasma glucose levels.

C) TURMERIC:



**Fig no. 3 Turmeric**

**Botanical name:** Haldi , Halada

**Biological source:** Turmeric is a dried rhizome powder of *Curcuma longa*.

**Family:** Zingibaraceae

**Action on immunity system:** Curcumin acts as anti-microbial agent. The active part is turmeric root. Curcumin cooperates with various cells such as macrophages, dendritic cell, B, T and natural killer cell to modify the body's defence capacity.

**Active constituent:** Curcumin (diferuloylmethane), a polyphenol compound responsible for the bright yellow colour of turmeric, is believed to be the principal of pharmacological agent. In addition to curcumin, turmeric contain the curcuminoids atlantone, bisdemethoxycurcumin, demethoxycurcumin, diarylheptanoids and tumerone.

**Mechanism of action:** Curcumin reportedly possesses several pharmacological properties including anti-inflammatory, antimicrobial, anti-viral, anti-fungal, anti-oxidant, chemo sensitizing, radio sensitizing, and wound healing activities. Curcumin can suppress tumour initiation, promotion, and metastasis in experimental models. It can also act as anti-proliferative agent by interrupting the cell cycle, disrupting mitotic spindle structure and including apoptosis and micro nucleation .curcumin is capable of lowering cortisol levels

D) GINSENG:



**Fig.no. 4 Ginseng**

**Botanical name:** Ninjin , Pannag , Panax

**Biological source:** Ginseng is the dried root of various species panax as Panax ginseng (Korean), Panax japonica (Japanese), Panax notoginseng (Chinese).

**Family:** Araliaceae

**Action on immunity system:** Ginseng has been well known as an immune modulator. Root (mostly), stem, leaves of ginseng and their extract have been used for maintaining immune homeostasis and enhancing resistance to illness or immune system. It protect the organ against inflammation. It prevent the viral entry and replication and stabilize the immune homeostasis

**Active constituent:** Panax ginseng contains triterpene glycosides or saponins, commonly referred to as ginsenosides. Many active compounds can be found in all part of plant including amino acid, alkaloid, phenols, proteins, polypeptide, and vitamin B1 and B2

**Mechanism of action:** It is often referred to as which suggest that it has varied action and effect on the body that support non-specific resistance to biochemical and physical stressors, improve vitality and longevity and enhance mental capacity

#### E) LIQUORICE:



Fig no. 5 Liquorice

**Botanical name:** Glycyrrhiza, Mulethi

**Biological source:** It consist of dried, peeled, unpeeled, root and stolon of Glycyrrhiza glabra.

**Family:** Leguminosae

**Action on immunity system:**

Liquorice exhibited immune modulatory activities in CT26 tumor bearing BALB/c mice. The polysaccharide tumor growth and increased immune organ index. The immunomodulatory effect was evident with activation of CD4+ and CD8+ immune cells population.

**Active constituent:**

A number of component have been isolated from liquorice including a water soluble, biologically active complex that account for 40-5- % of total dry material weight. This complex is composed of triterpene saponins, flavonoids, polysaccharide, pectine , simple sugar , amino acid , mineral salts , and various other substance .The sweet taste present in licorice root of glycyrrhizin.

**Mechanism of action:** The beneficial effect of liquorice can be attributed to a number of mechanisms. Glycyrrhizin and Glycyrrhizic acid have been shown to inhibit growth and cytopathology of numerous ribonucleic acid and deoxyribonucleic acid viruses, including hepatitis A9 and C herpes zoster, human immunodeficiency virus, herpes index, and glycyrrhizin and its metabolite inhibit hepatic metabolism of aldosterone and suppress 5- Breductase, properties responsible for the well documented pseudoaldosterone syndrome

## F) MORINGA



Fig no. 6 Moringa

**Botanical name:** *Moringa oleifera* Lam is a slender softwood tree.

**Biological source:** it consists of dried long, slender, triangular seed – pods of *Moringa oleifera*.

**Family:** Moringaceae.

**Action on immunity system:** One of the most important benefits of Moringa is that it is a potent immunity booster. Its high antioxidant content also boosts the immune system and keeps you safe from infection. Moringa is the rich source of iron and vitamin A nutrients that increase the functioning of the immune system.

**Active constituent:** Flavonoids (apigenin, quercetin, luteolin, myricetin, kaempferol), lignans (secoisolariciresinol, isolariciresinol, medioresinol, epipinoresinol glycosides), and phenolcarboxylic acids and their derivatives (coumaroylquinic, caffeoylquinic, feruloylquinic acids) are the main phenolic compounds found in Moringa leaves.

**Mechanism of action:** *M. oleifera* might act as an insulin sensitizer as it behaves in a similar way to anti-resistin antibody, which enhances insulin-mediated glucose uptake in adipocytes, and to rosiglitazone (the insulin-sensitizing peroxisome proliferator-activated receptor gamma agonist) which causes reduction in resistin gene expression and its secretion from the adipose tissue is decreased in db/db obese mice.

## G) ASHWAGANDHA:



Fig. no. 7 Ashwagandha

**Botanical name:** Ashwagandha (*Withania somnifera*) it is also called as “Indian Winter cherry” or “Indian Ginseng”.

**Biological source:** Ashwagandha is derived from the root of the *Withania somnifera* plant.

**Family:** Solanaceae

**Action on immunity system:** Ashwagandha has also demonstrated excellent immune-boosting effects on our immune system. It acts as encourage anti-inflammatory and disease fighting immune cells which help to ward off illness. Ashwagandha is used for anti-inflammatory properties which is useful in diseases such as arthritis. Ashwagandha herbs present iron which contributes to red blood cell count.

**Active constituent:** The biologically active chemical constituents of *Withania somnifera* (WS) include alkaloids (isopelletierine, anaferine, cuseohygrine, anahygrine, etc.), steroidal lactones (withanolides, withaferins) and Sioindosides and acylsterylglucosides in Ashwagandha are anti-stress agents. .

**Mechanism of action :** In a study using the HaCaT human keratinocyte cell line, an aqueous solution from Ashwagandha root was found to inhibit the NF- $\kappa$ B and MAPK (mitogen-activated protein kinase) pathways by decreasing the expression of pro-inflammatory cytokines, including interleukin (IL)-8, IL-6, tumour necrosis factor (TNF- $\alpha$ ), IL-1 $\beta$ , and IL-12, and increasing the expression of anti-inflammatory cytokines.

#### H) CINNAMON:



Fig.no 8 Cinnamon

**Botanical name:** Cinnamon bark, Kalmi - dalchini, Ceylon cinnamon

**Biological source:** Cinnamon is usually regarded as the bark of the *Cinnamomum zeylanicum* tree

**Family:** Lauraceae

**Action on immunity system:** Cinnamon is like a superhero for your body from harmful stuff.

**Active ingredient:** The most important constituents of cinnamon are cinnamaldehyde and trans-cinnamaldehyde (Cin), which are present in the essential oil, thus contributing to the fragrance and to the various biological activities observed with cinnamon.

**Mechanism of action :** cinnamon is act on the basic of mechanism hypothesis which can elicit insulin mimetic like effect through the regulation of insulin signaling pathways .In addition to being an antioxidant ,anti-inflammatory, antidiabetic, antimicrobial , anti-cancer lipid-lowering and cardiovascular disease

#### List of instruments and equipment:

Table no. 2 list of instrument of equipment

SR.NO	INSRUMENT NAME	MODEL
1	Digital weighing balance	DWB 1000
2	Mortar pestle	
3	Mixing tank	
4	Powder mixer	
5	Sieve	No. 40

Table no. 3 list of glassware

**List of glassware**

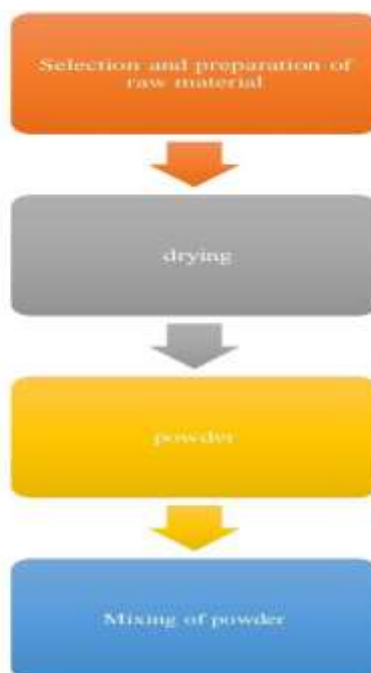
SR. NO	GLASSWARE NAME
1	Beaker
2	Funnel
3	Glass rod
4	Conical flask

**METHODOLOGY:**➤ **QUANTITY OF INGREDIENT**

Table.no.4 Quantity of Ingredients

Sr no	Ingredient	F1	F2	F3
1	Ginger	4gm	3gm	3gm
2	Tulsi	7gm	7gm	7gm
3	Turmeric	6gm	6gm	6gm
4	Ginseng	4gm	3gm	3gm
5	Liquorice	4gm	3gm	4gm
6	Moringa	14gm	18gm	20gm
7	Ashwagandha	5gm	6gm	4gm
8	Cinnamon	5gm	4gm	3gm

The whole process of making the product is presented in this section. The major process flow chart illustrated the procedures that were applied



**Fig.no.9.Flow chart of Methodology**

### **Selection and preparation of raw material:**

The selection of raw materials is paramount. Each ingredient chosen contributes not only to the efficacy but also to the safety and palatability of the final product. Here are key considerations in selecting raw materials: efficacy, quality, safety. Consider the taste and aroma of each raw material to create a palatable and enjoyable product. [15]This process depends on the part of the plant to be prepared. This process involved procedure such as removing dirt and foreign substances, discarded damaged parts, peeling of bark, sieving, trimming. Ginger, Tulsi, turmeric, Ginseng, liquorice, Moringa, Ashwagandha, Cinnamon was collected from local market but the care was taken that material should be fresh and hygienic

Sr. NO	INGREDIENT	TYPE OF DRYING	TIME REQUIRE FOR DRYING
1	Ginger	Sun dry	87 hours
2	Tulsi	Sun dry	10 hours
3	Turmeric	Open sun drying	42 -56 hours
4	Ginseng	Hot air drying (38 <sup>0</sup> C)	72 – 190 hours
5	Liquorice	Natural drying	8 – 16 weeks
6	Moringa	Oven drying	50 <sup>0</sup> c
7	Ashwagandha	Dry in shade	15 days
8	Cinnamon	Sun dry	4 – 5 days

### **Drying:**

Sun drying is the evaporation of water from the product by sun, or solar heat, assisted by movement of surrounding air after the collection of Ginger , Tulsi , Fenugreek , turmeric, Ginseng, liquorice , moringa , clove, Amla ,Ashwagandha , Cinnamon , Neem , it was in sundry for 48 hours. Place the trays in an area with direct sunlight. The sun's heat helps to evaporate moisture from the herbs, drying them naturally. It's essential to monitor the weather conditions and choose sunny, dry days for optimal drying. The drying time varies depending on factors such as the type of herbs, weather conditions, and thickness of the layers. It may take several days to a week for the herbs to fully dry

**Powder:**

Prepare the material: Ensuring that the material you want to powder is clean and free from any impurities. If needed, remove any stems, seeds, or other undesirable parts.

Break down the Material: Depending on the material's size and texture, you may need to break it down further before sieving. Using a mortar and pestle, grind the material until it becomes finer.

Set Up the Sieve: Place the sieve with size number 40 over a clean, dry container. This container will collect the powdered material that passes through the sieve.

Sieve the Material: Pour a small amount of the broken-down material onto the sieve. Use a spoon or spatula to gently press and move the material around on the sieve. This helps to separate the finer particles from any larger pieces.

Collect the Powder: The finer particles will pass through the sieve mesh and collect in the container below. Shake the sieve gently to encourage the finer particles to pass through. Continue this process until all of the material has been sieved.

Store the Powder: Once you have collected all the powdered material, transfer it to a clean, dry container with a tight-fitting lid. Store the powdered material in a cool, dry place away from direct sunlight.

**Mixing of powder:**

Powder of different mesh size about 40. Then all powdered ingredient are mixed together with the help of powder mixer.

**EVALUATION PARAMETER:****Quality evaluation:**

Quality evaluation of prepared herbal immunity booster was essential for the efficacy, safety, determination both physicochemical and phytochemical evaluation was carried out by comparing it with the standard parameter. Through comprehensive quality evaluation encompassing ingredient quality, manufacturing process, stability, efficacy, safety. Herbal immunity booster powder can be ensured to meet regulatory standards and provide consumers with a high-quality product that supports immune health effectively.

**Organoleptic evaluation:** Organoleptic evaluation on the parameter like colour, odour, taste and texture was carried out. Colour and texture was evaluated by vision and taste sensation respectively. For taste and odour evaluation a team of 3 taste and odour sensitive persons was formed and random sampling was performed

**➤ Sensory Parameters:**

- **Taste:** Evaluate the taste profile, considering factors such as sweetness, bitterness, astringency, and overall flavor balance.
- **Aroma:** Assess the aroma for intensity, complexity, and any off-notes. Note any herbal or medicinal scents.
- **Colour:** Examine the colour of the powder, noting its hue, brightness, and uniformity. Ensure it matches the expected colour for herbal ingredients used.
- **Texture:** Evaluate the texture, noting the fineness of the powder, any grittiness, or clumping.

**Evaluation Methods:**

**Visual Inspection:** Observe the powder's colour and uniformity under standardized lighting conditions.

- **Olfactory Assessment:** Smell the powder to assess its aroma, noting any characteristic scents or deviations.
- **Taste Testing:** Dissolve the powder in water or another suitable solvent and taste it to evaluate its flavour profile.
- **Texture Analysis:** Feel the powder between fingers to assess its texture, noting any irregularities.

**Micro-meritics powder characteristic:**

General powder characteristic include Evaluation of those parameter which are going to affect the external properties like flow properties , appearance , packaging criteria etc of the preparation , characteristic evaluation done by under this section are powder form , particle size, angle of repose and bulk density . Sample for all those evaluation were at three different level i.e. from top, middle, and lower level.

**1. Particle size:** Particle size of powder which affects the properties like spreadability, grittiness etc. Particle size was determined by sieving method by using Indian Pharmacopeia. Standard sieves by mechanical shaking for 10 minutes.

**2. Bulk density:** Bulk density is an important property for the packaging of product. Bulk density of powder which is depends on particle size, cohesiveness of particle and particle size distribution. For measuring the bulk density a weighted amount of powder was introduced in 100ml graduated cylinder. The cylinder is fixed on the bulk density apparatus and bulk density was calculated.

**3. Tapped density :** Tapped density carrying out the procedure as given in the measurement of bulk density the cylinder containing the sample was tapped 500 times initially followed by an additional taps of 750 times until difference between succeeding measurement is less than 2% and then tapped volume , Vf was measured to the nearest graduated unit.

**4. Angle of repose:** Angle of repose affects the flow properties of the powder. It was determined by the glass funnel method. a distance of 6.5 cm is maintained between the graph paper and the bottom of the powder. It was determined by glass funnel. Flowing is continued till the top of the heap touches the bottom of funnel.

**5. Surface area:** Surface area of the powder can be calculated using particle size data obtained from any suitable method. Specific surface are i.e. surface area per unit weight (Sw) or unit volume (Sv) can be estimated follows:

$$S_w = \text{surface area of particle} / \text{volume of particle.}$$

**Physical evaluation :** Physical evaluation includes determination of the extractive values , ash value , moisture content and Ph. 5gm of powder immunity booster was macerated with different solvents and kept for 24 hours , filtered and solvent was evaporated dried extracts were weighted to calculate extractive value % w/w.

**1) Ash value:** It is calculated to determine the inorganic content which is characteristic for a herb. About 2gm of powder drug was taken in silicon dish which is ignited and weighed previously. Temperature was increased by gradually increasing the heat not exceeding to red colour, ash is cooled and weighed after complete burning.

**2) Moisture content:** Moisture content in the formulation is very important it contains herbs which are liable to be attacked by weather. 2gm of powder was taken and kept in an oven and dried up to two constant reading and % moisture content was calculated as w/w.

**3) PH:** pH affects the effect of powder on body. 1gm of powder was taken and 9ml of distilled water was added to it. PH of the resulting solution was calculated using pH meter at 37 degree Celsius.

**4) Percentage compressibility index:** It is directly related to the relative flow rate cohesiveness and particle size. It is simple, fast and popular method pf presiding powder flow characters. It can be obtained from bulk density measurements.

$$\% \text{ Compressibility index} = \text{Tapped density} - \text{Bulk density} / \text{Tapped density} * 100$$

## RESULT AND DISCUSSION:

INDEX	FLOWABILITY
5 - 15	Excellent
12 - 16	Good
18 - 21	Fair - passable
21 -33	Poor
33-37	Very poor
> 40	Very very poor

**TEST RESULT:**➤ **Organoleptic evaluation :**

Quality attribute	Result	Descriptive
Appearance	Clear	Like moderately
Texture	Fine smooth	Like moderately
Flavour	Sweet	Like moderately
Odour	Slight	Like moderately

Table no. 7 Summary of organoleptic evaluation

➤ **Micro – merits powder characteristics :**

Table no. 8 Micro – merits powder characteristics

Sr. no	Test	Result
1	Particle size	10 – 15 um
2	Surface area	0.20 cm <sup>2</sup>
3	Angle of repose	32
4	Bulk density	0.8 gm/cc
5	Tapped density	0.9gm/cc

➤ **Physical evaluation :**

Sr.no	Test	Result
1	Ash value	7.62 % w/w
2	Moisture content	2.01 cm <sup>2</sup>
3	pH	4.12
4	% compressibility index	12.16

Table no. 9 Result of physical evaluation

**CONCLUSION:**

Based on the result of the evaluation conducted of the following were derived: processing the raw material through freeze-drying retains much of its nutrient essential for the product formulation; clear packaging helps to preserve the attribute of the product and label is directly printed on the container for the product information and convenience ; analyses show that the product is safe for consumption and contains ample amount of nutrient needed to boost immune system ; the product attained an overall mean of 8.06 interpreted as “likely very much” thereby, indicates that the product is acceptable.

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