



FORMULATION AND EVALUATION OF HERBAL IMMUNITY BOOSTER

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ABSTRACT:

This research aimed to formulate and evaluate an herbal immunity booster powder utilizing natural ingredients renowned for their immunomodulatory properties. The formulated powder was subjected to various physicochemical and microbial evaluations to ensure its safety, efficacy, and stability. The results demonstrated promising immunomodulatory potential, indicating the developed herbal powder as a viable option for enhancing immune function naturally. This research is focused on the use of nutrient and herbs for enhancing the immunity. The study was designed to explain the natural product, herbs, mineral that were proved by trial as immunity booster. Immunity system is one of the nature's most fascinating invention. It is a protection mechanism to defend us against millions of bacteria, viruses, fungi, and parasites. It is important to suggest that people should use some supplement to boost their immunity system. The best way to improve immunity naturally with the help of medicinal plant. Herbal plant increase the intestinal beneficial bacteria which are helpful and make up the immune system. Tulsi, ginger, marich, clove, turmeric, dalchini, are most effective herbal drugs used as home remedies to improve the immunity level naturally. They increase the number of white blood cells in the immune system army and train them to fight against microbes causing disease. There are other ways to boost the immunity such as active lifestyle, healthy diet, physical exercise, relaxation and sound sleep. Immunity booster contain mixture of protein and other chemicals and carbohydrates, alkaloids, flavonoids, glycosides, saponins etc.

KEY WORDS : Herbal Immunity booster, Immunomodulator, Immune system, herbal drugs, Immunity booster formulation.

INTRODUCTION :

Maintaining a strong immune system is crucial for overall well being and to ward off illness . while a healthy diet and lifestyle play a vital role , incorporating the certain herbs and spices into your meals can provide an additional boost to your immunity . The natural ingredient are packed with antioxidant , vitamin , and body defence system .Herbs and spices can transform any bland meal to a flavorful one and most of them are packed with the power of antioxidants. Used traditionally s medicine to ward off illness and taste enhancer since time immemorial , Ayurveda recommends regular use of many spices and herbs . in recent years , many of them have also been gaining popularity in the western world as superfood . from seasoning in baked goods , to being used in sauces and dressing , to herbal infusion , there are a variety of ways herbs and spices can be incorporated in our food. Herbs are arrived from medicinal plant . the leaf part of it is called herb , the dried part of it is referred to as spice . numerous scientific studies have proved that consuming herbs and spices is an effective way to manage heart disease , cancer , diabetes , blood pressure. Immunity Booster is a food supplement that helps your body to lift up the health of the immune system. Based on the Academy of Nutrition and Dietetics, there are top five essential nutrients needed to boost and strengthen the immunity of the body, it includes Vitamin A, D, C, E, and Zinc.[1].

IMMUNITY

This may be 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. 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. The immune system has two distinct but overlapping mechanisms with which to fight invading organisms, the antibody-mediated defense system (humoral immunity), and the cell-mediated defense system (cellular immunity).[2].Immune systems: The basic architecture of the immune system is multilayered, with defenses on several levels. Most obvious and primary is the skin: The first barrier against infection. Another is physiological, where conditions such as the temperature and pH of the body provide inappropriate living conditions for foreign organisms. Once pathogens have successfully entered the body, they are addressed by the innate and/or the acquired or adaptive immune system. Both systems consist of a multitude of cells and molecules that interact in a complex manner to detect and eliminate pathogens. Detection and elimination depend on chemical bonding: Surfaces of immune system cells are covered with various receptors, some of which chemically bind to pathogens, while others bind to other immune system cells or molecules to enable the complex signaling system that mediates the immune response.[3].

Immunomodulators: These are biological or synthetic substances that can stimulate, suppress, or modulate any aspect of the immune system including both adaptive and innate arms of the immune system. Classification of immunomodulators clinically, immunomodulators can be classified into the following three categories: Immunoadjuvants are used to enhance the efficacy of vaccines and therefore could be considered specific immune stimulants. Immunoadjuvants hold the promise of being the true modulators of the immune response. It has been proposed that they be exploited as selectors between cellular and humoral helper T1 (Th1) and helper T2 cells (Th2), immunoprotective, immunodestructive, and reagenic (immunoglobulin E [IgE]) versus IgG type immune responses disposing a real challenge to vaccine designers.[4] Immunostimulants are inherently non-specific as they are envisaged as enhancements to a body's resistance to infection. They can act through innate as well as adaptive immune responses. In healthy individuals, the immunostimulants are expected to serve as prophylactic and promoter agents, that is, as immunopotentiators, by enhancing the basic level of immune response. In the individual with impairment of immune response, they are expected to act as immunotherapeutic agents.[5] Immunosuppressants are a structurally and functionally heterogeneous group of drugs, which are often concomitantly administered in combination regimens to treat various types of organ transplant rejection and immunity diseases.[6]

ADVANTAGES :

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. Hells in preventing various viral , bacterial and other diseases. 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 hemoglobin and low blood pressure .

OBJECTIVE :

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 overactivity as in allergies or autoimmune conditions.

LITERATURE SURVEY :**1. Nathorn Chaiyakunapruk (2006)Am J obstet Gynecol 194(1):95-99**

Ginger is known to exhibit a powerful antioxidant activity due to its oil which has protective effect on DNA. This effect has been demonstrated in some cell culture. Due to the presence of some phenolic compounds in it, ginger has shown great antimicrobial activities and effectiveness in controlling certain viral, bacterial and fungal diseases. Ginger is used in many countries for the preservation of foods.

2. Pattanayak et al., (2010)

Tulsi contains vitamin C and A and minerals like calcium, zinc, and iron as well as chlorophyll and many other phytonutrients. It also enhances the efficient digestion, absorption, and use of nutrients from food and other herbs.

3. Sharma, S., Ghataury, S. K., Sarathe, A., Dubey, G., & Parkhe, G. (2019).1535-1540

The polyphenolic chemical curcumin is present in turmeric, this ingredient gives turmeric its antibacterial and antioxidant properties. Therefore, curcumin's phenolic component is what gives it its antioxidant properties. Curcumin's antioxidant properties are therefore due to its phenolic component.

4. Gonzalez-Lamothe R, Mitchell G, Gattuso M, Diarra MS (2009).3400–3419

Plants are continuously in contact with different microorganisms such as viruses, bacteria and fungi. The interactions between plants and microbes may be beneficial for the plants, but many plant-associated microbes are pathogens which affect development, reproduction, and growth of the plants.

5. Aly et al., 2005

liquorice possess anti-inflammatory activity, which was comparable with diclofenac sodium. Additionally, it was further recommended that activity of anti-inflammatory formulations such as famotidine or diclofinac can be further enhanced through addition of liquorice aqueous extract.

6. Abtahifroushami et al.,(2014)112-121

Immunomodulatory properties of the hydroalcohol extract of *G. glabra* roots was further assessed on Naval Medical Research Institute (NMRI)-mice challenged with sheep red blood cells (SRBCs) suggested significant increase in the level of anti-SRBC antibody and thus improve immune system.

7. Davis, L.; Kuttan, G (2000) 193–200

The immunomodulatory effect was confirmed in a study on the effect of *Withania somnifera* root powder on the stimulation of immune activity in immunodeficient mice. Administration of *Withania somnifera* was found to increase the total number of white blood cells and bone marrow cells, as well as to increase the titre of circulating antibodies and antibody-producing cells and to stimulate the production of immune cells and the phagocytosis of macrophages.

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 pharmacognocny lab and some are obtained from marketed as mentioned in table no.1.

Table no . 1. List of Ingredient

Sr no.	Ingredient	Part used	Properties
1	Ginger	Rhizome powder	Anti microbial & anti oxidant
2	Tulsi	Leaves powder	Vit c and zinc
3	Turmeric	Rhizome powder	Anti inflammatory
4	Ginseng	Root powder	Fight disease causing germ
5	Liquorice	Root powder	Maintain energy level
6	Moringa	Leaves powder	Analgesic, Lower cholesterol, Immune modulator
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 consist 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 protect the gastro-intestinal tract.

Active constituent :

It contains a number of pungent constituent and active ingredient . steam distillation of powdered ginger produces ginger oil which contain 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, anti-diarrheal, anti-oxidant, anti-cataract, anti-inflammatory, chemoprotective, radio-protective. The leaves of this easily available plant are rich in phytonutrient, 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 is the most biologically active component of the turmeric root and appear to be an anti microbial agent . 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 br 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 , anti-microbial , anti-viral , anti-fungal , anti-oxidant , chemosensitizing , radiosensitizing , and wound healing activities . curcumin can suppress tumor 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 contain triterpene glycosides or saponins , commonly referred to as ginsenosides. Many active compound 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 an adaptogen 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 . glycyrrhizin accounts for the sweet taste of licorice root.

Mechanism of action :

The beneficial effect of liquorice can be attributed to a number of mechanism . 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 consist oof dried long , slender , triangular seed – pods of Moringa oliefera .

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 boost the immune system and keeps you safe from infection . Moreover, moringa is also rich in iron and vitamin A – nutrients that enhance 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 [7].

G)ASHWAGANDHA :**Fig. no .7 .Ashwagandha**

Botanical name : Ashwagandha (*Withania somnifera* fam. Solanaceae) is commonly known 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 has been shown to encourage anti-inflammatory and disease-fighting immune cells that help to ward off illness. As Ashwagandha has potent anti-inflammatory properties it is very useful in painful conditions such as arthritis. As the herb is rich in iron it also 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 Sитоindosides and acylsterylglucosides in Ashwagandha are anti-stress agents. [10].

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- κ 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- α), IL-1 β , and IL-12, and increasing the expression of anti-inflammatory cytokines. Based on these results, it can be concluded that the anti-inflammatory effects of Ashwagandha could potentially be used in the prevention of skin inflammation.[11].

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 immune system too. It fights off bad bacteria and fungi and has antioxidants that protect 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.[12].

Mechanism of action :

The main mechanism of action of cinnamon is based on the hypothesis that it can elicit an insulin-mimetic-like effect through the regulation of insulin signaling pathways .[13].In addition to being an antioxidant ,anti-inflammatory ,antidiabetic, antimicrobial , anti-cancer lipid-lowering and cardiovascular disease lowering compound. cinnamon has also been reported to have activities against neurological disorders, such as Parkinson's and Alzheimer's diseases.[14].

List of Instruments and equipment:**Table.no.2.List of Instruments and Equipment**

Sr no	Instrument name	Model
1	Digital weighing balance	DWB 1000
2	Morter pestle	
3	Mixing tank	
4	Powder mixer	
5	sieve	No . 40

List of Glassware :**Table no.3. List of Glassware**

Sr no	Glassware name
1	Beaker
2	Funnel
3	Glass rod
4	Conical flask

METHODOLOGY

➤ Quantity of Ingredients :

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.

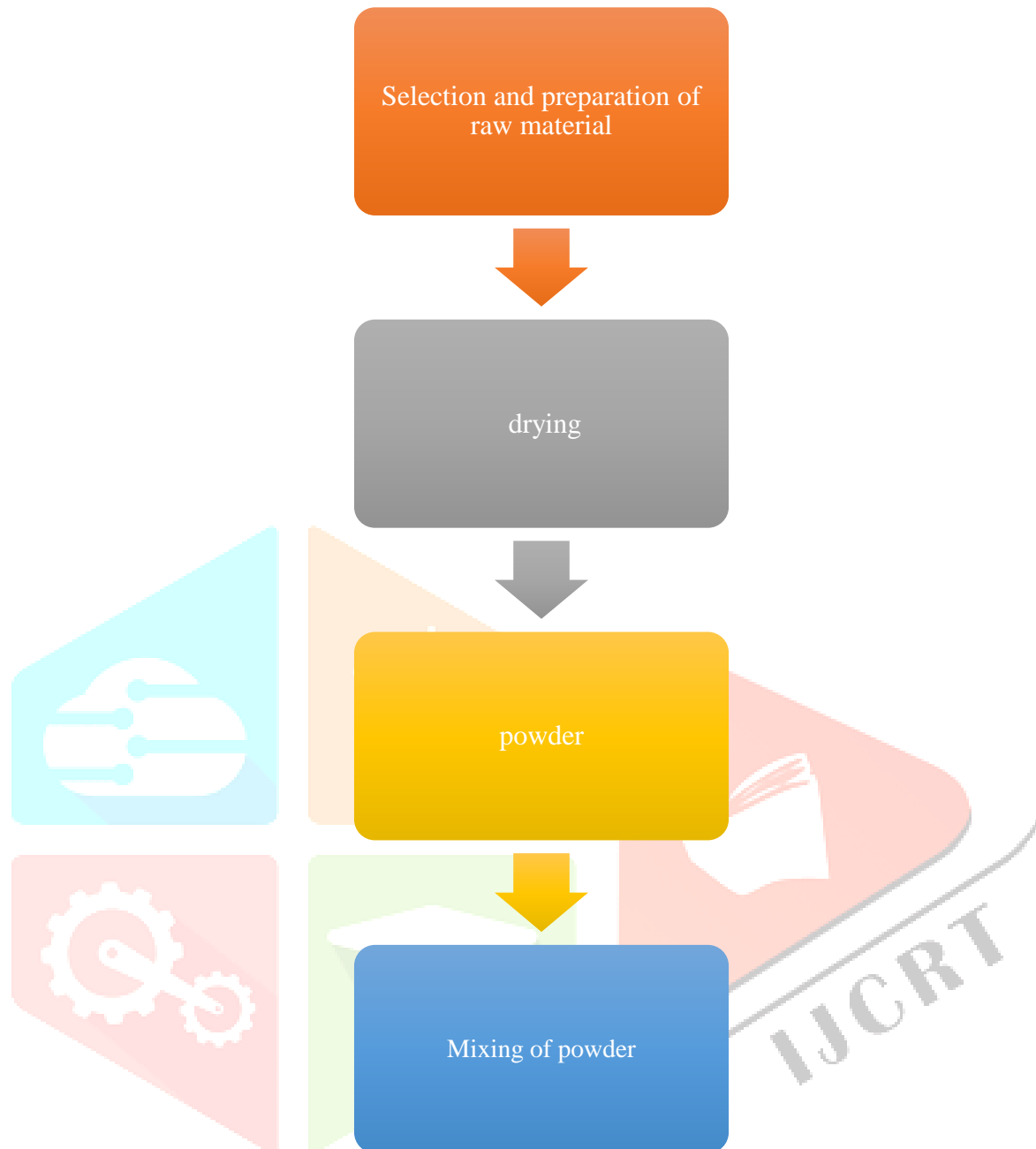


Fig.no.9. Flow chart of Methodology

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.

Table no.5. Drying

Sr no	Ingredient	Type of drying	Time required for drying
1	Ginger	Sun dry	87 hours
2	Tulsi	Sun dry	10 hours
3	Turmeric	Open sun drying	42 hours to 56 hours
4	Ginseng	Hot air drying (38°C)	72 – 190 hours
5	Liquorice	Natural drying	8 to 16 weeks
6	Moringa	Oven drying	50° 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 color , odor , taste and texture was carried out. Color and texture was evaluated by vision and taste sensation respectively. For taste and odor evaluation a team of 3 taste and odor 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.
- Color: Examine the color of the powder, noting its hue, brightness, and uniformity. Ensure it matches the expected color 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 color 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 flavor 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 evaluated 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 is a parameter , which could affect various properties like spreadibility , grittiness etc., particle size was determined by sieving method by using I.P. standard sieves by mechanical shaking for 10 minutes.

2. Bulk density :

Bulk density is an important property for the packaging of product. Bulk density depends on particle size , particle size distribution and cohesiveness of particle. 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 :

After 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 , V_f 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 (S_w) or unit volume (S_v) can be estimated follows:

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

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 2 gm of powder drug was taken in silicon dish previously ignited and weighed . temperature was increased by gradually increasing the heat noy exceeding to red color . after complete burning ,ash is cooled and weighed.
- 2) **Moisture content :** Moisture content in the formulation is very important a 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 affect 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 celcius.
- 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.

$$\% \text{ compressibility index} = \frac{\text{tapped density} - \text{bulk density}}{\text{tapped density}} * 100.$$

Table no.6. compressibility index

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

RESULT AND DISCUSSION :**TEST RESULT:**➤ **Organoleptic evaluation:****Table no.7.Summary of organoleptic evaluation**

Quality attribute	Result	Descriptive
Appearance	Clear	Like moderately
Texture	Fine smooth	Like very much
Flavor	Sweet	Like moderately
Odor	Slight	Like moderately

➤ **Micro-meritics powder characteristics:****Table .no.8. Micro-meritics powder characteristics**

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

Physical evaluation:**Table.no.9 . Result of physical evaluation**

Sr no	Test	Result
1	Ash value	7.62 %w/w
2	Moisture content	2.01 % w/w
3	pH	4.12
4	% compressibility index	12-16

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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