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Research Paper

Formulation And Evaluation of Polyherbal Immunity Booster Powder

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ABSTRACT

The present study aimed to formulate and evaluate a polyherbal immunity booster powder using natural medicinal plants. The formulation consisted of *Cinnamomum verum*, *Ocimum tenuiflorum*, *Zingiber officinale*, *Murraya koenigii*, and black pepper. These ingredients are known for their immunomodulatory, antioxidant, and antimicrobial activities. The powder was prepared by drying, grinding, sieving, and mixing methods. Evaluation parameters included organoleptic properties, physicochemical characteristics, and flow properties such as angle of repose, bulk density, tapped density, Carr's index, and Hausner ratio. The results indicated that the formulation possessed acceptable sensory properties and moderate flowability. The study concludes that the prepared polyherbal powder is a safe, economical, and effective immunity-enhancing supplement.

INTRODUCTION

The immune system is a complex network of cells, tissues, and organs that protects the body against infections and diseases caused by pathogens such as bacteria, viruses, fungi, and parasites [1]. It is broadly classified into innate and adaptive immunity, both of which work synergistically to maintain body defense [2]. In recent years, there has been increasing interest in herbal medicines due to their safety, affordability, and minimal side effects [3]. Herbal ingredients contain bioactive compounds such as flavonoids, alkaloids, tannins,

and polyphenols that exhibit antioxidant and immunomodulatory properties [10]. Polyherbal formulations are widely used because they provide synergistic therapeutic effects compared to single herbal drugs [4]. Various herbs like tulsi, ginger, cinnamon, and black pepper have been traditionally used to enhance immunity and treat infections [5]. Therefore, the present study focuses on the formulation and evaluation of a polyherbal immunity booster powder using commonly available medicinal plants.

2. MATERIALS AND METHODS

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2.1 Materials

The following ingredients were used:

- Cinnamon (*Cinnamomum verum*)
- Tulsi (*Ocimum tenuiflorum*)
- Ginger (*Zingiber officinale*)
- Curry leaves (*Murraya koenigii*)
- Black pepper
- Sugar and salt

All materials were procured from local markets and were fresh and hygienic.

2.2 Method of Preparation

The preparation of the herbal powder was carried out using the following steps:

1. Collection and cleaning of raw materials
2. Shade drying for 24 hours
3. Grinding into fine powder
4. Sieving through sieve no. 40
5. Mixing in required proportions
6. Drying at 40°C in hot air oven
7. Storage in airtight containers

3. Formulation Composition

Table 1: Composition of Immunity Booster Powder

S.No	Ingredient	Quantity (g)
1	Cinnamon	25
2	Tulsi	12
3	Ginger	4.5
4	Curry leaves	47
5	Black pepper	1.5
6	Sugar	10
7	Salt	0.001
	Total	100 g

4. EVALUATION PARAMETERS

4.1 Organoleptic Evaluation

The formulation was evaluated for:

- Color
- Taste
- Odor
- Texture

Table 2: Organoleptic Properties

Parameter	Observation
Color	Brown
Taste	Bitter
Odor	Aromatic
Texture	Fine powder

4.2 Physicochemical Evaluation

Moisture Content:

Moisture content of the sample was determined using the hot air oven method. In this method, a known quantity of the sample was accurately

weighed and placed in a hot air oven at a controlled temperature until a constant weight was obtained. The loss in weight represents the moisture present in the sample, which is important for evaluating stability, shelf life, and susceptibility to microbial growth. [4].

Ash Content:

Ash content was determined using the muffle furnace method to estimate the total inorganic matter present in the sample. A known amount of the sample was incinerated at high temperature until it became free from carbon, leaving behind ash. This residue indicates the presence of mineral content and impurities, thereby reflecting the purity of the material..

Total Flavonoid Content:

Total flavonoid content was estimated using the aluminium chloride colorimetric method. In this method, flavonoids present in the sample form a



complex with aluminium chloride, producing a measurable color intensity. The absorbance of this complex was measured using a spectrophotometer, and the flavonoid content was calculated using a standard calibration curve.^[10]

4.3 Flow Properties

Angle of Repose:

The angle of repose was determined to assess the flowability of the powder. It is measured by allowing the powder to flow through a funnel to form a conical heap and calculating the angle between the surface of the heap and the horizontal plane. A lower angle of repose indicates better flow properties, while a higher angle suggests poor flow..

Bulk Density and Tapped Density:

Bulk density and tapped density were measured to evaluate the packing and compressibility characteristics of the powder. Bulk density was determined by gently filling a graduated cylinder with the sample and measuring its volume, whereas tapped density was obtained after mechanically tapping the cylinder until a constant volume was reached. These parameters help in understanding the flow and compaction behavior of the powder..

Carr's Index and Hausner Ratio:

Carr's Index and Hausner Ratio were calculated using the values of bulk and tapped density to evaluate flow characteristics. Carr's Index indicates compressibility, while Hausner Ratio reflects interparticle friction. Lower values of Carr's Index and a Hausner Ratio close to 1 indicate good flow properties, whereas higher values suggest poor flowability.^[4]

Table 3: Physical Evaluation Results

Parameter	Result
Angle of repose	29.4°
Bulk density	0.65
Tapped density	0.60
Carr's Index	26.3
Hausner's ratio	1.23

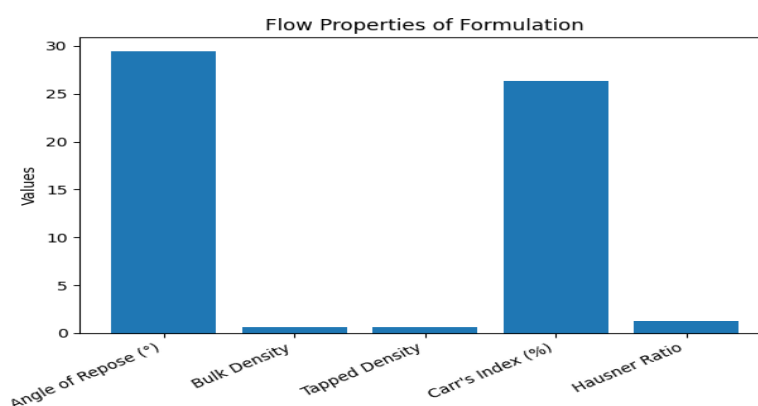


Figure 2: Flow Property Representation

RESULTS AND DISCUSSION

The prepared polyherbal powder showed acceptable organoleptic properties, with a

characteristic aromatic odor and slightly bitter taste due to phytoconstituents.

The physicochemical parameters indicated stability and good quality of the formulation. The



angle of repose (29.4°) and Hausner ratio (1.23) suggest moderate flow properties, making it suitable for handling and packaging.

The presence of bioactive compounds such as flavonoids and polyphenols supports its antioxidant and immune-enhancing potential^[10,11]. Similar findings have been reported in previous studies on herbal immunity boosters^[1,3].

CONCLUSION

The formulated polyherbal immunity booster powder is safe, economical, and effective. It provides a natural alternative to synthetic supplements and can be used for improving immune health.

The formulation showed good physicochemical and sensory properties. Further studies such as clinical evaluation and stability testing are recommended to confirm its efficacy.

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