



DEVELOPMENT AND EVALUATION OF POLYHERBAL POWDER FORMULATION AS IMMUNITY POWER BOOSTER

Suryakumari Chalakanti^{1*}

¹*Department of Pharmaceutics, KL College of Pharmacy, Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur, AP, India.*

A.Dinesh Reddy²

²*Mahatma Gandhi Institute Of Pharmacy Kanpur Road, Uttar Pradesh pin: 227101, India.*

Sk. Asha Begum³

³*Sri Padmavathi Mahila Visvavidyalayam, Padmavathi Nagar, Tripathi, Andhra Pradesh.*

G.Durgarao⁴

⁴*Dept.of Pharmaceutics, Vikas College of Pharmacy, Vissannapeta, Krishna AP.521 215.*

K. Venketeswerarao⁵

⁵*Dept.of Pharmaceutics, Vikas College of Pharmacy, Vissannapeta, Krishna AP.521 215.*

**Corresponding author*

ABSTRACT

In the present study, poly-herbal Immunity powder drink was developed by using some traditional herbs having proved nutritional potential. The key ingredients were selected as cinnamon bark, Asafetida, Black pepper powder, lemon juice based on their household routine use in the summer with proven refreshing, cooling and improve immunity, energetic feeling since ages. After several trials made, the final composition of formulation was selected as most suitable combination based on the taste and physicochemical properties. The physicochemical analysis of the prepared drink found to contain optimum level of pH which was in accordance of the commercial recommendations. During the nine point's hedonic scale sensory evaluation, the drink was strongly liked for colour, taste, flavor and texture. The developed herbal drink provides an economical and feasible option for the consumers with very good taste combined with potential health benefits. The present drink is potentially capable to replace the synthetic drinks available in the market.

KEYWORDS: *poly-herbal powder drink, sensory evaluation, herbal drugs.*



1. INTRODUCTION

India has used the herbal drugs long safe and continuous uses in alternative medicines for the treatment. Millions of people from the world wide used herbal medicine continuously and number of will be double in few years. Indian are used herbal drugs regularly as home remedies, health food as well as over the counter as self-medications by Ayurveda doctors. Its definition was “any substance that may be considered food or part of a food and provides medical or health benefits, including the prevention and treatment of disease. Such products may range from isolated nutrients, dietary, supplements and diets to genetically engineered ‘designer’ foods, herbal products, and processed foods such as cereals, soups, and beverages. Herbal drugs medicine has emerged as popular complementary and alternative medicines OR Supplementary to modern medicines. The preparation contains poly herbs such as cinnamon bark, Asafetida; Black pepper, powder and lemon juice has proved pharmacological activity with no of side effects. The cinnamon bark is used as carminative, stomachic and mild astringent. It has been used as an expectorants and demulcents and also used as antispasmodic activity. Asafetida is used as carminative, anti-viral, antibacterial, anti-inflammatory, sedative and diuretic properties. Black pepper the king of spices. Loaded with Antioxidants, Enhances Digestion, Helps You Sweat Support, weight loss efforts, Helps Get Rid of Gas, Vitiligo, Colds, Infection, Supports, Speeds Up Absorption of Drugs Supports Brain Function Acts as an Anti-Depressant, Anti-inflammatory, Helps You Quit Smoking, Lemon juice will always help in the well-being of our body in some or the other way. Lemon is an excellent source of Vitamin C; hence it helps boost your immunity, metabolism and prevents viral and bacterial infections, including cold and cough.

It is known to be associated with a range of polyphenols & citric acid. The herbal formulation contains such as cinnamon bark, Asafetida, Black pepper powder, and lemon juice which has shown pharmacological activity with no side effects. The preliminary phyto-analysis test such as Ash value, Loss of Drying, sensory evaluation etc. test were carried out. The Herbal Immunity booster is best choice for the replacement of Soft Energy drink usage and tackles the adverse effects.

2. MATERIAL AND METHODS

2.1 Selection and Collection of Herbs

The cinnamon bark, Asafetida, Black pepper, lemon from the local market at Vijayawada, but the care was taken that material should be fresh and hygienic. After the collection of Cinnamon, asafetida & black pepper, it was dried in shade for 24 hrs and all ingredients powder with the help of mixerjor were reduce in small size and pass through the sieve No.40.

Methods -Preparation of powder formulation

Cinnamon bark, Asafetida, and Black pepper were clean and the sliced in small pieces dried for one day in sunlight, and then powdered separately in grinder & Passes through sieve no. 40. All the powder drugs as per formula mixed together in mortar pastel. After mixing powder dried in hot air oven at 40°C for 1 hr. and then they were packed in air tight container. The six different types of the formulation were prepared out of them two (HIB 1 and HIB 2) were finalized for the further study. The addition of constitute is depends on their pharmacological activity which was already proved for the use.



Fig. 1. Cinnamon, Asafetida, Black pepper powder

Quality Evaluation

Quality evaluation of prepared Herbal Immunity booster was essential for the efficacy, safety determination. Both physicochemical and phytochemicals evaluation was carried out by comparing it with the standard parameters. Sensory evaluation was also performed in terms of sight, smell, taste, touch and hearing.

Sensory Evaluation

Consumer awareness concerning formulation has increased the number of positive attributes desired for these products, apart from refreshment. However, no matter how nutritious the preparation, the taste must be acceptable or it will not be consumed. Sensory analysis was performed by using nine points hedonic rating scale by a panel of five people. The parameters for evaluation includes appearance, colour, taste, flavor, consistency and overall acceptability of Herbal immunity booster powder drink.

Physicochemical and Phyto chemical Evaluation Various physicochemical parameters like pH, total soluble solids, and total sugars were performed. Moreover, the prepared powder drink was analyzed for the presence of carbohydrates, proteins, glycosides, tannins, polyphene and flavonoids using standard procedures.

1. Determination of Moisture content: The moisture content was measured described by AACC method. Two gram sample was placed in a preheated and weighed glass petriplate and then dried in a hot air oven at 130 °C for 2 hrs. Or till constt. Weight after drying glass petriplate was transferred to the dessicator to cool and then petriplate was reweighed. The loss in weight was calculated as percentage of moisture content.

$$\text{Moisture content (\%)} = \frac{W1 - W2}{\text{Weight of Sample}} \times 100$$

W1 = Weight (g) of Sample before drying.
 W2 = Weight (g) of Sample after drying.

2. Determination of Ash content: The ash content was measured, described by AACC method. Two gram sample was placed in a Pre weighed crucible and then uncovered crucible was allowed to incinerate in a muffle furnace at 820°C for 4 hours and then crucible was cooled in a dessicator and then weighed.

$$\text{Ash (\%)} = \frac{\text{Weight of ash}}{\text{Weight of Sample}} \times 100$$

3. Phytochemicals Analysis

3.1. Determination of Total Phenolics Total phenolics were determined using the Folin –Ciocalteu assay. The absorbance was measured at 765 nm and the results were expressed in gallic acid equivalents.

3.2. Determination of Total Flavonoids Total flavonoids were estimated using Aluminium Chloride colorimetric method. The Absorbance was measured at



510 nm. Results were expressed in Catechin equivalents.

% of Flavonoids = $\frac{\text{Final Weight} - \text{Initial weight}}{\text{Weight of Sample}} \times 100$

3.3. Determination of Tannins

Tannins were estimated according to the method described by Van- Buren and Robinson Absorbance was measured at 605nm and the result was stated in Tannic Acid equivalents.

3. 4 Evaluation of Formulated Herbal Immunity Booster ⁽²⁵⁻²⁸⁾

In development of new dosage form preformulation study is the prior step in the possible drug development. It is the principal investigation in the drug development to obtained information on the known properties of compound and the proposed development schedule. So, this preformulation study may merely confirm that there are no significant barriers to compound development. Following pre-compressional parameters were studied like angle of repose, bulk density, tapped density, compressibility indices etc.

Angle of Repose

The fixed funnel method was employed to measure the angle of repose. A funnel was secured with its tip at a given height (h), above a graph paper that is placed on a flat horizontal surface. The blend was carefully pored through the funnel until the apex of the conical pile just touches the tip of the funnel. The radius of the base of the conical pile was measured. The angle of repose (θ) was calculated using the following formula:

$$\tan \theta = h/r$$

Where, θ = Angle of repose,

h = Height of the cone,

r = Radius of the cone base.

Values for angle of repose $\leq 30^\circ$ usually indicate a free flowing material and angles $\geq 40^\circ$ suggest a poorly flowing material, 25- 30 show excellent flow properties, 31-35 show good flow properties, 36-40 show fair flow properties and 41-45 showing passable flow properties

Bulk Density

15 g powder blend introduced into a dry 100 ml cylinder, without compacting. The powder was carefully leveled without compacting and the unsettled apparent volume, V_o , was read. The bulk density was calculated using the following formula.

$$\rho_b = M / V_o$$

Where, ρ_b = Apparent bulk density, M = Weight of sample, V = Apparent volume of powder.

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. The tapped density was calculated, in gm per ml, using the following formula.

$$\rho_{tap} = M / V_f$$

Where, ρ_{tap} = Tapped density, M = Weight of sample, V_f = Tapped volume of powder.

Carr's index The Compressibility index

(Carr's index) is a measure of the propensity of a powder to be compressed. It is determined from the bulk and tapped densities. In theory, the less compressible a material the more flow able it is. As such, it is measures of the relative importance of inter particulate interactions. In a free flowing powder, such interactions are generally less significant, and the bulk and tapped densities will be closer in value. For poorer flowing materials, there are frequently greater inter-particle interactions, and a greater difference between the bulk and tapped densities will be observed. These differences are reflected in the Carr's Index which is calculated using the following formulas:

$$\text{Compressibility index} = \left[\frac{(\rho_{tap} - \rho_b)}{\rho_{tap}} \right] \times 100$$

Where, ρ_b = Bulk Density, ρ_{tap} = Tapped Density.

Table 1: Compressibility index values Carr's Index

Compressibility	Index Properties
≤ 10	Excellent
11 - 15	Good
16 - 20	Fair
21 - 25	Passable
26 - 31	Poor
32 - 37	Very Poor
> 38	very Very Poor

**Hausner's Ratio**

Hausner's ratio is an indirect index of ease of powder flow. It is calculated by the following formula.

Hausner's Ratio = Tapped density (PT) / Bulk density (PB) Where, PT tapped density and PB is bulk density. Lower Hausner's ratio (<1.25) indicates better flow properties than higher ones, between 1.25 to 1.5 showing moderate flow properties and more than 1.5 poor flow.

3. RESULT AND DISCUSSION**Preparation of powder formulation**

Preparation of powder dried mixed. The Herbal Energy powder drink as mentioned resulted in varying yields as detailed in Table:

Table 2: Preparation of powder formulation

S. No	Content	Quantity
1.	Cinnamon	75%W/V
2.	Asafetida	15%W/V
3.	Black pepper	2.5% W/V
4.	Lemmon Juice	0.02%W/V
5.	Sugar	10%W/V
6.	Salt	0.001%W/V
7.	Water	100 ml

Sensory Evaluation

Sensory evaluation parameters observed in Herbal Energy booster powder drink. The observed parameters like color, taste, flavor, texture, overall acceptability at room temperature of the formulation

is presented in Table2. On the basis of paired comparison evaluation the drink has very good taste, flavor and overall acceptability. Change in sensory characters during storage was also analyses.

Table 3: Sensory Scores of Herbal Immunity Booster

Parameters	Formulation (sugar)
Color	8
Taste	8
Flavor	7
Texture	7.5
Overall acceptability	8

1= extremely dislike, 2= strongly dislike, 3= moderate dislike,
4= slight dislike, 5= neutral, 6= slight like, 7= moderate like, 8= strongly like, 9= extremely like

Physicochemical and Phytochemicals Analysis

In order to evaluate the suitability of formulation for

nutritional purpose physicochemical and phytochemicals parameters were carried out.

**Table 4: Phytochemicals screening of herbal drugs**

S. No	Phytoconstituents	Test	Result
i.	Carbohydrate	Benedicts test	+ve
ii.	Protein	Biuret test	-ve
iii.	Alkaloid	Dragondroffs test and Wagner's	+ve
iv.	Flavonoids	Shinoda test	+ve
v.	Tannins and Phenolic content	Lead acetate & acetic acid	+ve
vi.	Saponins	Foam test	+ve
vii.	Fat	Filter paper test	-ve

The active principles in phyto pharmaceuticals are not always known. Preliminary phytochemicals analysis of herbal Immunity powder drink showed the presence of alkaloids, carbohydrates, proteins, tannins, flavonoids and phenolics

Phytochemicals analysis

Phenolics and Flavonoids are a wide class of chemical compounds found in plants. They report quality and nutritional value and plays a vital role in human fitness such as anti-inflammatory, antidiabetic, antiviral, antioxidant, Therefore, total phenolics and flavonoids content of different herbal Immunity& energy booster formulation of were estimated Table 4

Table 5: Phytochemicals analysis

Formulation	GA Equivalents ($\mu\text{gGAE}/\text{mg sample}$)	Catechin equivalents ($\mu\text{g CE}/\text{mg}$)	Tannic acid Equivalents ($\mu\text{g TAE}/\text{mg}$)
HIB1	18.43	49.2	0.292
HIB2	11.7	28.2	0.2951
HIB3	18.3	26.8	0.2696
HIB4	15.2	22.4	0.2598

Crude tannin is the compounds present in plants. Tannins are poly phenols that are responsible for the astringent flavor of food and show anti-carcinogenic

nutritional analysis are very important because it directly affects the nutritional content of the food, its stability and storage, etc. The moisture and ash contents were calculated for Herbal Energy booster powder drink. The pH of freshly prepared Herbal Immunity booster drink was 5.5.

Phyto Pharmaceutical Test

Moisture content and ash analysis during

Table 6: Phyto Pharmaceutical Test

S. No	Ash Content	Moisture content	Ph
HIB1	4.7%	3.5%	4.5
HIB2	4.5%	4.7%	5.2
HIB3	5.1%	4.5%	5.4
HIB4	5.1%	5.6%	5.5

**Table 7: Physical Evaluation of herbal energy booster**

S. no	Parameters	Results
1.	Angle of repose	30.6
2.	Bulk density	0.53
3.	Tap density	0.69
4.	Carr's index	23.5
5.	Hausner's ratio	1.23

Angle of repose was 30.6, here bulk density 0.53, tap density 0.69, Carr's index is 23.5 and Hausner's ratio was found 1.23 which shows its moderate flow property. All results are showed in table

CONCLUSION

The formulation beneficial for the diabetic as well as non- diabetic persons. The formulation is prepared from the plants source so the chances of side effects are lower than the soft drinks. This is good supplement for freshly recover from the illness and give the freshness to the person. This health immunity boosting powder drink is a natural option to the synthetic drinks along with several health benefits. All the herbs used in this preparation are easily available during any season and are not costly thus the product is economically feasible.

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AUTHORS CONTRIBUTION

Experimental design, guidance for the Research work and writing of this manuscript was done by Ch. Surya Kumari. Second author SK.Asha Begham supported to draft manuscript design and correction of data. Third author performed the experiments, analysed spectra and interpreted the result. All authors played an equal role in completing this research work.

CONFLICT OF INTERESTS All authors have none to declare

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The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

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