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DEVELOPMENT AND EVALUATION OF POLY HERBALPOWDER FORMULATION AS AN ENERGY BOOSTER

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ABSTRACT:

In the present study, poly-herbal powder drink was developed using traditional herbs that proved nutritional potential. The key ingredients were selected as cinnamon, Amla, liquorice, lemon juice, tulsi, and mentha based on their household routine use in the summer with proven refreshing, cooling, and energetic feeling for ages. After several trials made, the final composition of the formulation was selected as the most suitable combination based on the taste and physicochemical properties. The physicochemical analysis of the prepared drink was found to contain an optimum level of pH which was following the commercial recommendations.

KEYWORDS:

Poly-herbal, cinnamon, Amla, liquorice, lemon juice, tulsi, mentha, physicochemical.

INTRODUCTION:

India has used the herbal drugs long safe and continuous uses in alternative medicines for the treatment. Millions of people worldwide use herbal medicine continuously and the number will be double in a few years¹. Indians are used herbal drugs regularly as home remedies, health food as well as over-the-counter as self-medication 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 disease².

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. It has been used as an expectorants and demulcents and also used as antispasmodic activity³. The mint (*Mentha* spp.) Belongs to the is a herb of the Labiatae family, The beneficial effects of the mint leaf in treatment of many gastro-intestinal disorders⁴.

Moreover, the antimicrobial, anti- inflammatory and anti-tumoral properties of mint. Tulsi Holy Basil, the “queen of herbs” (*osimum sanctum* F: labiateae) has been well renowned for its therapeutics potentials for antiasthmatics drugs also reported the good choice for enhancer drugs the leaves have also been releaved to retain good anti-stressed and analgesics activity. Liquorice (*glycyrrhiza glabra*) also known as Liquorice and also called as sweet wood, the dried rhizomes and root of the plant used a carminative expectorant and cough remedies. Licorice supplements can give the adrenal gland some relief. Licorice root extract can stimulate the adrenal gland, which promotes a healthy level of cortisol in the body [5-7].

Topical gels containing licorice are recommended for treating eczema. Licorice can be a successful dermatological treatment due to its antibacterial properties¹¹. For that reason, holistic health practitioners often suggest applying licorice to tooth decay to kill bacteria. Licorice is recommended to treat respiratory problems. Taking licorice as an oral supplement can help the body produce healthy mucus. Increasing phlegm production may seem counterintuitive to a healthy bronchial system. However, the opposite is true. The

production of clean, healthy phlegm keeps the respiratory system functioning without old, sticky mucus clogging it ^[8,9]. Ginger, as a supplement or an ingredient in food and drink, may protect against obesity and chronic disease [cardiovascular diseases] and related disorders, consuming more of the pungent spice is smart for several reason. Amla is undoubtedly a powerhouse of nutrients, essential minerals and vitamins¹⁰.

Amla consists of dried, as well as fresh fruits of the plant *Emblica officinalis* Gaerth (*Phyllanthus emblica* Linn.), belonging to family Euphorbiaceae. Cinnamon consist of dried bark, freed from the outer cork and from the underlying parenchyma, from the shoots growing on the cut stumps of *Cinnamomum zeylanicum* Nees. Liquorice is the dried, peeled or unpeeled, roots, rhizome or stolon of *Glycyrrhiza glabra* Linn. Tulsi consists of the fresh and dried leaves of *Ocimum* species like *Ocimum sanctum* L. And *Ocimum basilicum* L etc. Lemon belongs to the lamiaceae family. The biological source of spearmint is its fresh or dried leaves. The botanical name of spearmint is *Mentha spicata*. The lemon (*Citrus limon*) is a species of small evergreen trees in the flowering plant family Rutaceae. Sugars are found in the tissues of most plants. Honey and fruit are abundant natural sources of simple sugars. Sucrose is especially concentrated in sugarcane and sugar beet, making them ideal for efficient commercial extraction to make refined sugar. All major rock salt deposits originated from the evaporation of seawater at some time during the geologic past ¹⁴.

Whether eaten raw, juiced, powdered, or simply added in pickles, jams, dips, or spreads, amla will always help in the well-being of our body in some or another way. Amla 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 that fight against the development of cancer cells¹³. According to Ayurveda, amla juice balances all the processes in the body and brings to equilibrium all three doshas - Vata, Kapha, pitta beneficial effects against obesity, diabetes, [cardiovascular diseases] and related disorders. The herbal formulation contains such as Tulsi, mentha, Amla, Cinnamon, Liquorice, and Ginger 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 was carried out. The Herbal Energy booster is the best choice for the replacement of Soft Energy drink usage and tackles the adverse effects¹⁵.

MATERIALS AND METHODS:

Materials

The Amla, Cinnamon, Liquorice, and Ginger were procured from the local market at Ahmedabad and Gandhinagar, but the care was taken that material should be fresh and hygienic¹². After the collection of Tulsi, mentha leaves, it was dried in shade for 24 hours and the leaves were reduced in small size and passed through sieve No. 40.



Figure 1: Selection and collection of herbs

Steps for preparation

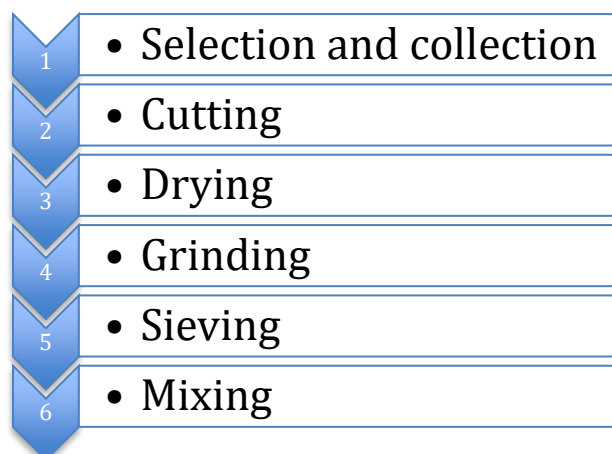


Figure 2: Steps for preparation

Methods and preparation of powder formulation^[1,2]

Amla, Cinnamon, Liquorice, and Ginger were clean and sliced into small pieces dried for one day in sunlight, and then powdered separately in a grinder & passed through sieve no. 40. All the powder drugs as per formula are mixed in mortar & pestle. After mixing powder was dried in a hot air oven at 40°C for 1 hr. and then they were packed in an airtight container.

Quality evaluation

Quality evaluation of prepared Herbal Energy booster was essential for the efficacy, safety determination. Both physicochemical and phytochemical 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 accepted 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 include appearance, color, taste, flavor, consistency, and overall acceptability of Herbal Energy booster powder drink.

Physicochemical and phytochemical evaluation

Various physicochemical parameters like pH, total soluble carbohydrates, proteins, glycosides, tannins, polyphenol and flavonoids using standard procedures. Moreover, the prepared powder drink was analyzed for the presence of carbohydrates, proteins, glycosides, tannins, polyphenol and flavonoids using standard procedures.

a) Determine of moisture content

The moisture content was measured as described by the AACC method. A two-gram sample was placed in a preheated and weighed glass Petri plate and then dried in a hot air oven at 130 °C for 2 hrs. or till constant. Weight after drying glass Petri plate was transferred to the desiccator to cool and then Petri plate was reweighed. The loss in weight was calculated as a percentage of moisture content.

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

W1 = Weight (g) of Sample before drying.

W2 = Weight (g) of Sample after drying.

b) Determination of ash content

The ash content was measured, described by the AACC method. Two-gram sample was placed in a preweighed 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 desiccator and then weighed.

Ash (%) = $\text{Weight of ash} / \text{Weight of sample} \times 100$



Phytochemical analysis

Figure 3: Muffle furnace

a) Determination of Total Flavonoids

Total flavonoids were estimated using the Aluminum Chloride colorimetric method. The Absorbance was measured at 510 nm. Results were expressed in Catechin equivalents.

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

Evaluation of formulated herbal energy booster

In the development of a new dosage form pre-formulation study is the prior step in the possible drug development. It is the principal investigator in drug development to obtain information on the known properties of the compound and the proposed development

schedule. So, this pre-formulation study may merely confirm that there are no significant barriers to compound development. Following pre-compressional parameters were studied like the angle of repose, bulk density, tapped density, compressibility indices, etc.

a) 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 carefully poured 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:

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

Table 1: Relation between Carr's Index and Flow Property

(Carr's %)	Flow
5 – 15	Excellent
12 – 16	Good
18 – 21	Fair to passable
23 – 35	Poor
33 – 38	Very poor
>40	Very very poor

b) 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.

c) 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 tap of 750 times until the 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.

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

Where,

ρ_{tap} = Tapped density,

M = Weight of sample,

V_f = Tapped volume of powder.

d) 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 flowable it is. As such, it is a measure 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 interparticle 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:

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

Where,

ρ_b = Bulk Density,

ρ_{tap} = Tapped Density.

Table 2: 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

e) 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/ Poured or bulk density

Hausner's ratio was related to interparticle friction. Value less than 1.25 indicates good flow (=20% carr) Between 1.25 to 1.5 showing moderate flow properties and more than 1.5 poor flow.

Table 3: Relation between Hausner ratio and flow character

Hausner ratio	Flow character
1.00-1.11	Excellent
1.12-1.18	Good
1.19-1.25	Fair
1.26-1.34	Passable
1.35-1.45	Poor
1.46-1.56	Very Poor
>1.60	Very, Very Poor

RESULT AND DISCUSSION:

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

Table 4: Preparation of powder formulation

NO	CONTENT	QUANTITY
1.	Amla	80%W/V
2.	Cinnamon	15%W/V
3.	Ginger	2.5% W/V
4.	Liquorice	2.4%W/V
5.	Tulsi	0.5%W/V
6.	Mentha	1.56%
7.	Lemmon Juice	0.02%W/V
8.	Sugar	10%W/V
9.	Salt	0.001%W/V

a) 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 Table. 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 analyzed.

Table 5: Sensory scores of herbal energy booster

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

b) Physicochemical analysis

In order to evaluate the suitability of formulation for nutritional purpose physicochemical and photochemical parameters were carried out. The active principles in phytopharmaceuticals are not always known. Preliminary photochemical analysis of herbal energy powder drinks showed the presence of alkaloids, carbohydrates, proteins, tannins, flavonoids, and phenolic.

Table 6: Phytochemical screening of herbal drug

SR. 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

c) Phytochemical analysis

Flavonoids are a wide class of chemical compounds found in plants. The report quality and nutritional value and plays a vital role in human fitness such as anti-inflammatory, antidiabetic, antiviral, antioxidant. Therefore, total phenolic and flavonoid content of different herbal energy booster formulations were estimated in Table.

Table 7: Phytochemical analysis

Formulation	Catechin equivalents ($\mu\text{g CE/mg}$)
HEB1	24.2
HEB2	29.4

d) Phytopharmaceutical test

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

Table 8: Phytopharmaceutical test

S. No	Ash Content	Moisture content	pH
HEB1	4.7%	3.5%	4.5
HEB2	4.5%	4.7%	5.2

Angle of repose was **29.6**, here bulk density **0.63**, tap density **0.60**, Carr's index is **26.3** and Hausners ratio was found 1.23 which shows its moderate flow property. All results are showed in table.

Table 9: Physical evaluation of herbal energy booster

S.no	Parameters	Results
1	Angle of repose	29.6
2	Bulk density	0.63
3	Tap density	0.60
4	Carr's index	26.3
5	Hausners ratio	1.23

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 energy 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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