



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(3): 1576-1580
Received: 22-03-2018
Accepted: 24-04-2018

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Development and evaluation of polyhebral powder formulation as energy booster

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Abstract

In the present study, poly-herbal powder drink was developed by using some traditional herbs having proved nutritional potential. The key ingredients were selected as cinnamon, Amla, liquorice, lemon juice, tulsi and menthe based on their household routine use in the summer with proven refreshing, cooling and 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 Amla Liquorice ginger, tulsi & mentha leaves 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. Mentha The mint (*Mentha* spp.) belongs to the is a herb of the Labiateae family, The beneficial effects of the mint leaf in treatment of many gastro-intestinal disorders 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. Topical gels containing licorice are recommended for treating eczema. Licorice can be a successful dermatological treatment due to its antibacterial properties. 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. 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. The essential minerals and vitamins

that it contains are essential not only for our body's well-being, but also for preventing some of the most common diseases. 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 the other 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 which fight against the development of cancer cells. 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 were carried out. The Herbal Energy booster is best choice for the replacement of Soft Energy drink usage and tackles the adverse effects. [6, 15]

2. Material and Methods

2.1 Selection and Collection of Herbs

The Amla, Cinnamon, Liquorice, and Ginger procured from the local market at Shevgaon and Bodhegaon, but the care was taken that material should be fresh and hygienic. After the collection of Tulsi, mentha leaves, it was dried in shade for 24 hrs and the leaves were reduce in small size and pass through the sieve No. 40.

2.2 Methods -Preparation of powder formulation

Amla, Cinnamon, Liquorice, and Ginger 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 (HEB 1 and HEB 2) were finalized for the further study. The addition of constitute is depends on their pharmacological activity which was already proved for the use.

2.3 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. [16-18]

2.4 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 Energy booster powder drink.

2.5 Physicochemical and Phytochemical 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, polyphenol 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 [19] 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.

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

3. Phytochemical analysis

3.1. Determination of Total Phenolics Total phenolics were determined using the Folin-Ciocalteu assay [20]. 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 [21]. The Absorbance was measured at 510 nm. Results were expressed in Catechin equivalents.

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

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 were stated in Tannic Acid equivalents.

3. 4 Evaluation of Formulated Herbal Energy 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.

3.5. 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.

3.6. 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.

3.7 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.

3.8 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 interparticulate 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:

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

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

3.9 Hausner's Ratio

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

$$\text{Hausner's Ratio} = \text{Tapped density (PT)} / \text{Bulk density (PB)}$$

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.

4. Result and Discussion

4.1 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.	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

4.2 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 analysed

Table 3: Sensory Scores of Herbal Energy 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

4.3 Physicochemical and Phytochemical Analysis

In order to evaluate the suitability of formulation for nutritional purpose physicochemical and phytochemical parameters were carried out.

Table 4: Phytochemical screening of herbal drugs

S. No	Phytoconstituents	Test	Result
i.	Carbohydrate	Benedicts test	+ve
ii.	Protein	Biuret test	-ve
iii.	Alkaloid	Dragondroff's test and Wagner's	+ve
iv.	Flavanoids	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 phytochemical analysis of herbal energy powder drink showed the presence of alkaloids, carbohydrates, proteins, tannins, flavonoids and phenolic

4.4 Phytochemical 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, antidibatic, antiviral, antioxidant, Therefore, total phenolic and flavonoid content of different herbal energy booster formulation of were estimated Table 4

Table 5: Phytochemical analysis

Formulation	GAE equivalents(μg GAE/mgsample)	Catechin equivalents (μg CE/mg)	Tannic acid equivalents (μg TAE/mg)
HEB1	18.43	49.2	0.292
HEB2	11.7	28.2	0.2951
HEB3	18.3	26.8	0.2696
HEB4	15.2	22.4	0.2598

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

4.5 Phyto pharmaceutical test

Moisture content and ash analysis during 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 Energy booster drink was 5.5.

Table 6: Phyto pharmaceutical test

S. No	Ash Content	Moisture content	pH
HEB1	4.7%	3.5%	4.5
HEB2	4.5%	4.7%	5.2
HEB3	5.1%	4.5%	5.4
HEB4	5.1%	5.6%	5.5

Table 7: Physical Evaluation of herbal energy booster

S.no	Parameters	Results
	Angle of repose	30.6
	Bulk density	0.53
	Tap density	0.69
	Carr's index	23.5
	Hausners 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 Hausners 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 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.

Acknowledgment

We are fully acknowledging our secretary Adv. V. J. Kakade Saheb for providing the facility for work. We are sincerely thanks to our Ex. Director, Co-ordinator and Principal of the institute for their support.

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