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Formulation and Evaluation of a Polyherbal Ayurvedic Energy Booster Powder for Enhancing Stamina, Vitality, and Physical Strength

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Abstract

The present study focused on the formulation and evaluation of a polyherbal Ayurvedic energy booster powder aimed at enhancing stamina, vitality, and physical strength. Eight medicinal herbs *Ashwagandha* (*Withania somnifera*), *Shatavari* (*Asparagus racemosus*), *Giloy* (*Tinospora cordifolia*), *Amla* (*Phyllanthus emblica*), *Safed Musli* (*Chlorophytum borivilianum*), *Gokshura* (*Tribulus terrestris*), Cardamom (*Elettaria cardamomum*), and Dry Ginger (*Zingiber officinale*) were selected based on their traditional adaptogenic and energizing properties. The herbs were cleaned, shade-dried, powdered, and mixed using the geometric blending technique to obtain a uniform formulation. The powder was evaluated for organoleptic characteristics, physicochemical parameters, flow properties, preliminary phytochemical content, microbial load, and short-term stability. Results revealed that the formulation possessed light brown color, mild aromatic odor, fine texture, good flow properties, and moisture content within acceptable limits. Phytochemical analysis confirmed the presence of alkaloids, flavonoids, tannins, saponins, glycosides, and carbohydrates, supporting its potential efficacy. Microbial evaluation and stability studies confirmed the safety and shelf stability of the powder. The study concludes that the polyherbal formulation is a safe, stable, and effective natural energy booster, suitable for enhancing physical performance and vitality.

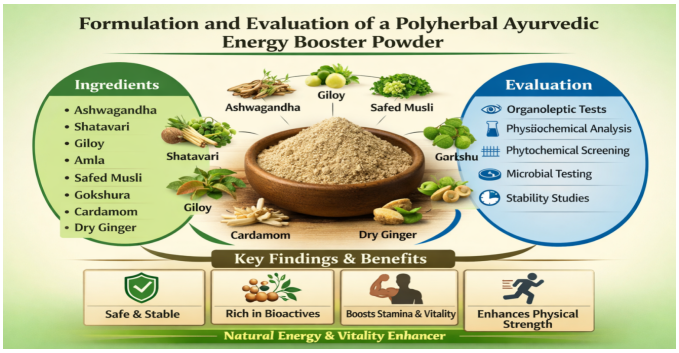
Key words: Polyherbal, Ayurvedic, Energy booster, Stamina, Vitality.

Introduction

In recent years, there has been a growing interest in traditional herbal formulations aimed at improving physical performance and overall well-being. Ayurvedic medicine, one of the oldest holistic healing systems, emphasizes the use of natural botanicals to balance physiological functions and enhance vitality (1). Traditional Ayurvedic texts describe several herbs and mineral formulations that support energy metabolism, reduce fatigue, and strengthen muscular endurance (2). Modern lifestyles characterized by stress, irregular diets, and sedentary behavior have further intensified the demand for safe and effective energy-boosting interventions (3).

Energy booster powders formulated from polyherbal combinations are gaining popularity due to their synergistic effects, offering multiple health benefits compared to single-herb formulations (4). Polyherbalism capitalizes on the complementary actions of different botanicals to target diverse biochemical pathways involved in energy production, antioxidant defense, and immune modulation (5). Several herbs such as *Withania somnifera* (Ashwagandha), *Tinospora cordifolia* (Giloy), *Asparagus racemosus* (Shatavari), *Elettaria cardamomum* (Cardamom), and *Emblica officinalis* (Amla) are traditionally incorporated in formulations to enhance stamina and vitality (6).

Scientific studies have provided evidence that these botanicals may exert beneficial effects on physical endurance, psychophysiological stress responses, and recovery from exertion (7). For example, Ashwagandha has been shown to improve cardiorespiratory endurance



and muscular strength in clinical trials (8). Similarly, Amla demonstrates antioxidant properties that help in reducing oxidative stress induced by strenuous physical activity (9).

The formulation of an Ayurvedic energy booster powder requires careful consideration of herb selection, proportion, and processing methods to ensure efficacy, stability, and consumer acceptability (10). Evaluation parameters include organoleptic properties, phytochemical profiling, microbial safety, and functional bioactivity (11). By integrating traditional knowledge with modern scientific validation, polyherbal energy boosters may offer a promising natural alternative for enhancing stamina, physical strength, and overall vitality.

Materials and Methods

Materials

All herbal raw materials used in the preparation of the polyherbal Ayurvedic energy booster powder were procured from a certified local Ayurvedic raw drug

supplier in Bharuch, Gujarat, India. The selected herbs included Ashwagandha (*Withania somnifera*) root powder, Shatavari (*Asparagus racemosus*) root powder, Giloy (*Tinospora cordifolia*) stem powder, Amla (*Phyllanthu semblica*) fruit powder, SafedMusli (*Chlorophytum borivilianum*) root powder, Gokshura (*Tribuluster restris*) fruit powder, Cardamom (*Elettaria cardamomum*) seed powder, and Dry Ginger (*Zingiber officinale*) rhizome powder.

All plant materials were authenticated by a qualified pharmacognosist at the Department of Pharmacognosy, B. R. Nahata College of Pharmacy, Mandsaur. The authentication was performed based on macroscopic and organoleptic characteristics according to Ayurvedic Pharmacopoeia standards.

Analytical grade reagents such as ethanol, methanol, chloroform, hydrochloric acid, ferric chloride, Mayer's reagent, Dragendorff's reagent, and Benedict's reagent were procured from a standard chemical supplier and were used for phytochemical screening.

Preparation of Raw Materials

The crude plant materials were cleaned manually to remove extraneous matter such as dust, stones, and foreign particles. The materials were washed thoroughly with distilled water and shade-dried at room temperature (25 ± 2°C) for 7–10 days until a constant weight was achieved.

The dried plant materials were pulverized separately using a mechanical grinder and passed through sieve no. 60 to obtain a uniform fine powder. The powdered materials were stored individually in airtight containers protected from moisture and light until further use.

Formulation of Polyherbal Energy Booster Powder

The polyherbal formulation was prepared by geometric mixing technique to ensure uniform distribution of ingredients. The quantity of each ingredient used in the formulation is shown in Table 1.

The weighed quantities of individual powders were transferred into a clean stainless-steel container and mixed thoroughly for 20 minutes to achieve homogeneity. Aromatic ingredients such as cardamom and dry ginger were added at the final stage to enhance palatability and digestive properties.

After complete mixing, the final powder blend was passed again through sieve no. 60 to ensure uniform particle size distribution. The prepared formulation was stored in airtight amber-colored glass containers for further evaluation.

Organoleptic Evaluation

The prepared polyherbal powder was evaluated for organoleptic characteristics including color, odor, taste, and texture. The evaluation was performed visually and by sensory perception. The observations were recorded systematically.

Physicochemical Evaluation

Physicochemical parameters were determined according to standard pharmacopeial procedures.

Determination of Moisture Content (Loss on Drying)

Approximately 2 g of the powder sample was accurately weighed and dried in a hot air oven at 105°C until a constant weight was obtained. The percentage loss on drying was calculated.

Table 1: Composition of Polyherbal Ayurvedic Energy Booster Powder

S.	Ingredient	Botanical	Quantity (g
1	Ashwagandha	*Withania*	20 g
2	Shatavari	*Asparagus*	15 g
3	Giloy	*Tinospora*	15 g
4	Amla	*Phyllanthu*	15 g
5	SafedMusli	*Chlorophytum*	10 g
6	Gokshura	*Tribuluster*	10 g
7	Cardamom	*Elettaria*	5 g
8	Dry Ginger	*Zingiber*	10 g
	Total		**100 g**

Determination of Ash Values

Total ash, acid-insoluble ash, and water-soluble ash were determined. About 3 g of the sample was incinerated in a silica crucible at 450–600°C until carbon-free ash was obtained. The ash values were calculated as percentage w/w.

Bulk Density and Tapped Density

Bulk density was determined by gently filling 25 g of powder into a graduated cylinder and measuring the volume. Tapped density was measured after tapping the cylinder 100 times. Carr's index and Hausner's ratio were calculated to assess flow properties.

Table 2: Physicochemical Evaluation Parameters

Parameter	Method Used
Moisture Content	Oven drying at 105°C
Total Ash	Incineration at 450–600°C
Acid Insoluble Ash	Treatment with dilute HCl
Water Soluble Ash	Extraction with distilled water
Bulk Density	Volume measurement method
Tapped Density	Mechanical tapping method

Phytochemical Screening

Preliminary phytochemical screening was performed to detect the presence of various secondary metabolites. Methanolic extracts of the formulation were prepared by macerating 10 g of powder in 100 mL methanol for 48 hours, followed by filtration.

The filtrate was subjected to qualitative tests for alkaloids (Mayer's and Dragendorff's tests), flavonoids (Shinoda test), tannins (Ferric chloride test), saponins (Foam test), glycosides (Keller–Killiani test), and carbohydrates (Benedict's test). The formation of characteristic color changes or precipitates indicated positive results.

Microbial Limit Test

Microbial analysis was conducted to determine total bacterial count and total fungal count. One gram of

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the formulation was dissolved in sterile saline solution and serially diluted. The diluted samples were plated on nutrient agar (for bacteria) and Sabouraud dextrose agar (for fungi).

The plates were incubated at 37°C for 24 hours for bacterial growth and at 25°C for 48–72 hours for fungal growth. Colony-forming units (CFU) were counted and compared with permissible limits as per WHO guidelines for herbal formulations.

Evaluation of Flow Properties

The angle of repose was determined by fixed funnel method. The powder was allowed to flow through a funnel fixed at a certain height, forming a conical heap. The angle was calculated using the formula:

$$\text{Angle of Repose } (\theta) = \tan^{-1} (h/r)$$

where h = height of the heap and r = radius of the base.

Stability Studies

Short-term stability studies were conducted by storing the formulation at 40 ± 2°C and 75 ± 5% relative humidity for a period of three months. Samples were withdrawn at monthly intervals and evaluated for changes in color, odor, moisture content, and microbial load.

Packaging

The final polyherbal energy booster powder was packed in airtight HDPE containers with proper labeling including batch number, manufacturing date, and storage instructions. The product was stored in a cool and dry place away from direct sunlight.

Results and Discussion

Organoleptic Evaluation

The prepared polyherbal energy booster powder was evaluated for organoleptic characteristics including color, odor, taste, and texture. The powder appeared light brown in color, consistent with the combined natural pigments of the included herbs. It exhibited a mild aromatic odor, predominantly contributed by cardamom and dry ginger. The taste was slightly bitter with a pungent note, attributable to Ashwagandha and Giloy, while the texture was fine, free-flowing, and smooth with no presence of coarse particles or lumps. These properties indicated that the powder was well-blended and organoleptically acceptable for consumption.

Physicochemical Evaluation

The physicochemical parameters were determined to assess the quality, purity, and stability of the prepared formulation. The results of the evaluation are summarized in Table 3.

Moisture Content (Loss on Drying)

The moisture content of the powder was found to be 5.2 ± 0.15%, which was within the acceptable limit for herbal powders. Low moisture content is favorable for preventing microbial growth and improving shelf-life.

Ash Values

The total ash content of the formulation was 6.8 ± 0.20%, indicating the presence of mineral matter. Acid-insoluble ash was measured at 1.2 ± 0.05%, showing minimal contamination with siliceous materials. Water-soluble ash was found to be 4.5 ± 0.12%, reflecting water-soluble inorganic constituents of the herbal ingredients.

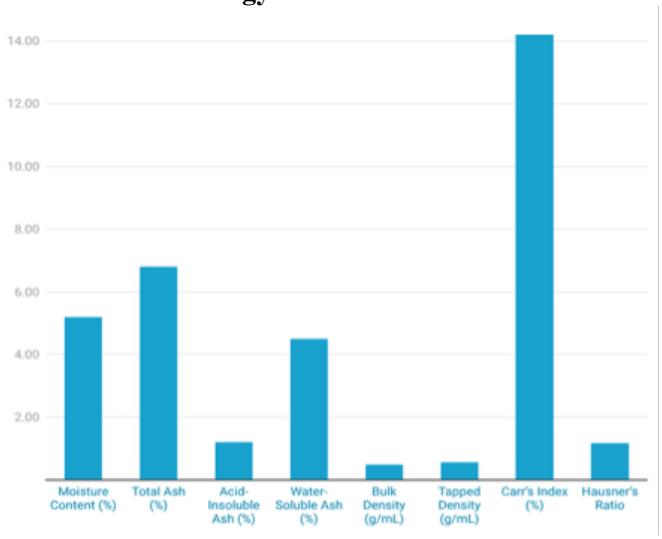
Bulk and Tapped Density

Bulk density was found to be 0.48 ± 0.02 g/mL, while tapped density was 0.56 ± 0.03 g/mL. Carr's index was calculated as 14.2%, and Hausner's ratio was 1.16, indicating good flow properties suitable for powder formulation.

Table 3: Physicochemical Evaluation of Polyherbal Energy Booster Powder

Parameter	Result
Moisture Content (%)	5.2 ± 0.15
Total Ash (%)	6.8 ± 0.20
Acid-Insoluble Ash (%)	1.2 ± 0.05
Water-Soluble Ash (%)	4.5 ± 0.12
Bulk Density (g/mL)	0.48 ± 0.02
Tapped Density (g/mL)	0.56 ± 0.03
Carr's Index (%)	14.2
Hausner's Ratio	1.16

Figure 1: Physicochemical Evaluation of Polyherbal Energy Booster Powder



Flow Property Evaluation

Flow properties are critical for processing, packaging, and uniform dosing of herbal powders. The angle of repose of the prepared powder was found to be 27.8 ± 0.5°, indicating excellent flow properties. The bulk and tapped density values, along with Carr's index and Hausner ratio, supported the observation that the powder was free-flowing and suitable for further formulation into capsules or sachets.

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Preliminary Phytochemical Screening

The methanolic extract of the polyherbal powder was subjected to qualitative phytochemical tests to identify the presence of bioactive compounds. The results are summarized in Table 4.

Alkaloids were detected by Mayer's and Dragendorff's tests, showing the presence of bioactive nitrogen-containing compounds mainly contributed by Ashwagandha and Giloy. Flavonoidswere positive in the Shinoda test, reflecting antioxidant potential contributed by Amla and Shatavari. Tannins were present as indicated by the Ferric chloride test, which is beneficial for energy metabolism and gastrointestinal health. Saponins were confirmed by the foam test, indicating potential adaptogenic and immunomodulatory effects. Glycosides were observed by Keller–Killiani test, while carbohydrates were confirmed with Benedict's test, supporting the nutritive value of the powder.

Table 4: Phytochemical Screening of Methanolic Extract of Polyherbal Powder

Phytochemical Component	Test Method	Result
Alkaloids	Mayer's, Dragendorff's	+ (Present)
Flavonoids	Shinoda test	+ (Present)
Tannins	Ferric chloride	+ (Present)
Saponins	Foam test	+ (Present)
Glycosides	Keller–Killiani	+ (Present)
Carbohydrates	Benedict's test	+ (Present)

Microbial Evaluation

Microbial load is an essential parameter to ensure the safety of herbal formulations. The total bacterial count was found to be 2.3×10^3 CFU/g, which was well within the permissible limits ($<10^4$ CFU/g) specified by WHO for herbal products. The total fungal count was 1.1×10^2 CFU/g, also within the acceptable limit ($<10^3$ CFU/g). No pathogenic microorganisms such as Salmonella spp., Escherichia coli, or Staphylococcus aureus were detected, confirming the microbial safety of the formulation.

Stability Studies

The short-term stability study of the polyherbal powder was performed over a period of three months at 40 ± 2°C and 75 ± 5% RH. Observations were recorded monthly for color, odor, moisture content, and microbial load.

Color and odor: The powder maintained its light brown color and mild aromatic odor throughout the study, indicating stability of natural pigments and volatile compounds.

Moisture content: The moisture content slightly increased from 5.2 ± 0.15% to 5.8 ± 0.18% after three months, remaining within acceptable limits.

Microbial load: Total bacterial and fungal counts remained within permissible limits, confirming that the packaging and storage conditions were adequate to prevent microbial proliferation.

These observations indicated that the prepared polyherbal powder was physically and microbiologically stable under accelerated storage conditions.

Particle Size and Texture

The powder exhibited a uniform particle size distribution after sieving through 60 mesh. No coarse or large particles were observed, and the powder appeared smooth and fine to the touch. The uniform particle size ensured proper blending of all herbal ingredients and supported consistent dosing.

Organoleptic and Sensory Stability

The powder maintained its organoleptic properties color, odor, taste, and texture throughout the stability study period. Sensory evaluation confirmed that there was no development of off-odor, bitterness, or caking. This indicated high acceptability and palatability of the formulation for potential consumption as an energy booster.

Conclusion

The present study successfully formulated and evaluated a polyherbal Ayurvedic energy booster powder comprising *Ashwagandha, Shatavari, Giloy, Amla, SafedMusli, Gokshura,* Cardamom, and Dry Ginger. The prepared formulation demonstrated excellent organoleptic characteristics, uniform particle size, good flow properties, and acceptable physicochemical parameters, including moisture and ash values. Phytochemical screening confirmed the presence of alkaloids, flavonoids, tannins, saponins, glycosides, and carbohydrates, indicating potential adaptogenic and nutritive effects. Microbial evaluation and short-term stability studies confirmed the safety and stability of the formulation. Overall, the polyherbal powder was physically, chemically, and microbiologically suitable as a natural energy, stamina, and vitality enhancer.

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