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Research Paper

Formulation and Evaluation of Instant Energy Bar

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ABSTRACT

The increasing demand for convenient, nutritious, and energy-rich snack options has led to the development of functional food products. This study focuses on the formulation and evaluation of an Energy Booster Bar utilizing natural ingredients such as guarana, ashwagandha, brahmi, ginseng, dextrose, peanuts, almonds, fenugreek, dates, jaggery, dark chocolate, gulkand, and cardamom. The prepared bar was assessed for organoleptic properties, pH, stability, hardness, and melting point. Nutritional analysis revealed a balanced composition with high carbohydrate and moderate fat content, contributing approximately 170 kcal per 43.5g serving. The bar also provides dietary fiber, essential minerals like iron and magnesium, and natural antioxidants. The results confirm that the Energy Booster Bar is a stable, palatable, and nutritionally beneficial product suitable for individuals seeking quick and healthy energy supplementation. meals high in proteins and minerals has been a crucial component of athletes' diets.

INTRODUCTION

In recent years, there has been a growing interest in the development of functional foods that not only provide essential nutrients but also offer additional health benefits beyond basic nutrition (1). Among these, energy bars have emerged as a popular choice for health-conscious individuals due to their convenience, portability, and ability to deliver quick energy boosts (2). Energy bars are formulated using a variety of natural ingredients, including cereals, nuts, dried fruits, sweeteners, and herbal extracts, which contribute to their nutritional and functional value (3). These bars are particularly beneficial for individuals with active lifestyles, athletes, and those requiring an energydense snack between meals (4). The Incorporation of medicinal herbs and adaptogens like guarana, ashwagandha, ginseng, and brahmi has been shown to enhance the therapeutic value of food

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products, making them effective in reducing stress, improving cognitive function, and boosting energy levels (5). Herbal ingredients are also known for their antioxidant, anti-inflammatory, and immuneboosting properties (6). The inclusion of nuts such as almonds and peanuts provides healthy fats, proteins, and essential micronutrients like magnesium and vitamin E, contributing to the overall health benefits of the bar (7). Sweeteners such as jaggery and dates are rich in iron and antioxidants, offering not only sweetness but also additional nutritional value (8). Organoleptic evaluation plays a crucial role in the development of food products, as consumer acceptability largely depends on sensory attributes such as taste, aroma, texture, and appearance (9). The 9-point hedonic scale is widely used in sensory evaluation to assess consumer preferences and overall acceptability (10). This method allows researchers to gather subjective feedback and improve product formulations based on consumer insights (11). In this study, the formulated energy bar was evaluated using a combination of organoleptic, physicochemical, and nutritional parameters to ensure it meets the desired standards of quality, safety, and consumer acceptability (12). Moreover, the development of energy bars using natural and herbal ingredients aligns with the growing consumer demand for clean label and health-promoting snack options (13). The use of herbal and plant-based components supports traditional medicine nutraceutical and applications, promoting holistic health and wellness (14). With an increasing prevalence of lifestyle-related disorders and nutrient deficiencies, such functional formulations can serve as practical dietary interventions to support daily nutritional needs (15). These formulations also cater to specific target groups like children, athletes, and the elderly by addressing their unique nutritional requirements (16). The sensory quality of the bar was determined by evaluating color,

odor, texture, and taste, using standardized scales to ensure reproducibility and accuracy (17). In addition, nutritional profiling including protein content, carbohydrate levels, fat content, moisture percentage, and energy value, was carried out to assess its overall nutritional adequacy (18). Herbs used in the formulation were also analyzed through TLC and HPTLC to confirm their identity and concentration (19). The physicochemical parameters such as pH, viscosity, melting point, and physical stability were analyzed under accelerated storage conditions to determine shelflife and product integrity (20). Through this study, the aim was to formulate an energy booster bar that not only delivers quick energy but also offers functional health benefits through its herbal composition (21). Such bars serve as suitable alternatives to commercially available snacks that contain artificial ingredients often and preservatives (22). The findings from this study can contribute to the growing body of knowledge on functional foods and offer insights for future development of clean label, plant-based, and nutrient-rich food products (23). Ultimately, the integration of medicinal herbs and natural sweeteners in energy bars exemplifies the synergy between traditional health wisdom and modern food technology (24).

OBJECTIVES

- To formulate an energy-dense, herbal-based booster bar suitable for athletes.
- ✤ To assess its nutritional, sensory, and physicochemical characteristics.
- To evaluate the bar's shelf life and overall suitability for sports nutrition.

MATERIAL AND METHODS.

Place of Experiment



The samples analyses were conducted in the laboratory of Vidya Niketan College of Pharmacy, Lakhewadi, Pune In Analytical Pharmaceutics department, Vidya Niketan College of Pharmacy, Lakhewadi, Pune. Evaluation tests of different samples were conducted in Institute of JBVP'S Vidya Niketan College of Pharmacy Lakhewadi, Pune.

Machines and apparatus required

The Formulation process involved using standard lab Equipment such as a Weighing Balance, Blenders, Sieve, Heating Mental, Cutter, Mold, Microwave oven, Refregarator.

Sr. No.	Ingredient	Quantity	Functional Role
1	Guarana	1gm	Natural stimulant (caffeine), enhances Alertness. (25)
2	Ashwagandha	1gm	Adaptogen, reduces stress and improves endurance. (26)
3	Brahmi	0.5gm	Cognitive enhancer, memory booster (37)
4	Ginseng	1gm	Boosts energy and immune function (27)
5	Dextrose	5gm	Quick energy source (28)
6	Peanuts	2gm	Protein, healthy fats (29)
7	Fenugreek	0.5gm	Blood sugar control, metabolic support (30)
8	Almonds	4gm	Vitamin E, healthy fats, antioxidants (31)
9	Cadamum	0.5gm	Flavor enhancer, digestive aid (32)
10	Dates	5gm	Natural Sweetner, Binder, And Immediate Energy Source. (
11	Jaggery	15gm	A Mineral Rich Sweetner and Iron source (34)
12	Dark	5gm	Antioxidant-rich mood-enhancing, source of iron and
	Chocolate		magnesium (35)
13	Gulkand	3gm	Cooling effect, digestive health (36)

Table No. 1: Ingredients, Quantity and Functional Role.



Fig. No.1: Ingredients % Composition of Energy Booster Bar

Formulation Procedure:

The ingredients were combined following standard herbal product formulation techniques

(Sethi, 2019). Herbal powders were mixed with melted dark chocolate, dextrose, and jaggery to form a uniform blend. Roasted and ground



almonds and peanuts provided the structural matrix, while gulkand and cardamom added flavor and functionality. The mixture was shaped into bars using molds and allowed to set (38,39)

Steps: (40,41)

- 1. All dry ingredients were weighed accurately.
- 2. Peanuts and almonds were slightly roasted to enhance flavor.
- 3. Dextrose, jaggery, and dark chocolate were melted together under low heat to form a uniform binder.
- 4. Powdered herbs (guarana, ashwagandha, brahmi, ginseng, fenugreek, cardamom) were blended into the melted mixture.
- 5. Dates and gulkand were chopped finely and mixed in.
- 6. The mixture was poured into molds and allowed to set at room temperature.
- 7. The formed bars were stored in airtight containers for evaluation.

EVALUATION PARAMETERS.

1. Organoleptic Properties – Organoleptic Properties are the properties of food product That stimulate human sensory organs. (42)

A] Color – Color is a very important Organoleptic property. Color can increases the Patient acceptance. Color also made the Product attractive.

B] Odor – Odor is also a very important Organoleptic property. Odor means a smell can Increases patient acceptance towards the Product.

C] Taste – Taste is also one of the important Organoleptic property. A good taste can Increases the patient acceptance and also make the mood happy **D] Appearance** – Appearance is also one of the most important organoleptic properties. A Good appearance can increase the patient Acceptance.

- pH pH means a power of hydrogen. pH can states the nature of substances i.e., the substance is acidic, basic or neutral. (43)
- 3. Blooming Strength The test determines the Weight in grams needed by a specified plunger to depress the surface of chocolate without Breaking it at a specified temperature. (44)
- 4. Stability Studies A general method for Predicting the stability of any product is Accelerated stability studies, where the product Is subjected to elevated temperatures as per the ICH guidelines. A short term accelerated Stability study was carried out for the period of 3 months for the prepared formulation. (45)
- Hardness The hardness of chocolate can be Determined by the Pfizer and Monsanto Apparatus. The hardness of chocolate can be Determined for the transportation and stability. (46)
- 6. Melting Point The residual heat of the Chocolate will melt it. Do not rely on Appearance alone when microwaving Chocolate. (47)
- 7. Physical Stability To check the physical Stability, sample of chocolate was kept in Closed container for 1 month at 28°C after one Month interval, Test sample of chocolate was Observed for physical appearance and drug Degradation. (48)
- Estimation of herbal drug Estimation of Herbal drug carried out by TLC and HPTLC. (49)

9. Protein content – The protein content was Determine by following formula, Calculation Of protein content:(50)

Total nitrogen (% w/w) = V $/W \times 0.14$ Where.

V = Volume of 0.1 N H2SO4 required for Titration W = Weight in g of the sample Protein (% w/w) = Total nitrogen (%) X 6.25

10. Moisture content – The moisture content can Be carried out by the following formula, Formula: (51)

Moisture Content (%) = $W2-W3/W \times 100$ Where,

W = weight of sample (g)

W2 = weight of empty petri dish (g) + sample (g) W3 = weight of the petri dish after drying (g).

- **11. Viscosity** The viscosity is an important Evaluation parameter. The chocolate with a Viscosity of 50 or less is considered to be low Viscosity chocolate. (52)
- 12. Carbohydrate Determination The total carbohydrate is determined by 100 (Moisture+ Protein + fat + ash). (53)
- 13. Sensory Evaluation The samples were evaluated by 10 panelist drawn from Department of Pharmaceutics, Pharmacology, Vidya Niketan College of Pharmacy Lakhewadi, on the basis of body & texture, colour & Appearance, aroma & flavour, and overall acceptability using 9-point hedonic scale as mentioned in Table no. 2. (54)

Hedonic Score Point	Evaluation
9	Like extremely
8	Like very much
7	Like moderately
6	Like slightly
5	Neither like or dislike
4	Dislike slightly
3	Dislike moderately
2	Dislike very much
1	Dislike extremely

Table No. 2: Sensory analysis by 9-point hedonic scale

RESULT AND DISCUSSION.

1. Organoleptic Evaluation

The Energy Booster Bar was assessed using a 9point hedonic scale by a panel of 10 members from the Department of Pharmaceutics, Vidya Niketan College of Pharmacy Lakhewadi, Pune. The average scores were:

- Color: 8.6
- Odor: 8.4
- Taste: 8.8
- Appearance: 8.7

These high scores reflect excellent acceptability due to the presence of ingredients such as dark chocolate, cardamom, and gulkand, which enhance flavor, aroma, and appearance.





Fig. No. 2: Individual Organoleptic Evaluation Parameters of the Energy Booster Bar.

2. pH

The measured pH was 6.1, indicating a mildly acidic nature. This is acceptable for a chocolate-based food product and contributes to its stability and taste.

3. Blooming Strength

The blooming strength was found to be 460 grams, demonstrating good surface firmness of the chocolate bar, essential for maintaining texture during storage.

4. Hardness

The bar showed a hardness of 5.2 kg/cm², indicating adequate compactness and resistance to breaking, which is crucial for packaging and transportation stability.

5. Melting Point

The melting point was determined to be 33.5°C, appropriate for a chocolate-based formulation, ensuring it remains solid at room temperature but melts easily in the mouth.

6. Viscosity

The viscosity of the melted chocolate was measured at 50, classifying it as low-viscosity chocolate. This property is ideal for molding and consistency.

7. Moisture Content

The moisture content was 7.2%, which is within acceptable limits for a stable bar and helps in extending shelf life by preventing microbial growth.

8. Protein Content

The protein content was estimated at 1.5%, primarily contributed by peanuts, almonds, and ashwagandha. While modest, it adds nutritional value and supports minor muscle recovery.

9. Carbohydrate Content

The total carbohydrate content was calculated as 30.5%, providing an instant and sustained energy release due to the inclusion of jaggery, dates, and dextrose.



10. Sensory Evaluation

The overall sensory evaluation score was 8.5, indicating high acceptability by panelists in terms of body & texture, flavor, and overall satisfaction.



Fig. No. 3: Acceptability Scores

The formulated Energy Booster Bar weighs approximately 43.5 grams and delivers about 170 kcal of energy per serving. The product contains 4.6 grams of total fat, primarily sourced from healthy nuts (almonds and peanuts) and antioxidant-rich dark chocolate. The saturated fat content is moderate at 1.5 grams. The bar is low in cholesterol and sodium, making it heart-friendly. With a total carbohydrate content of 29.9 grams, largely from natural sweeteners like jaggery, dates, and gulkand, the bar provides a quick and sustained energy boost. Additionally, the bar offers 1.85 grams of dietary fiber, aiding digestion, and 1.36 grams of protein that contributes to minor muscle support. Notably, the bar is a good source of iron (from jaggery and chocolate) and magnesium (from almonds and dark chocolate), making it a functional snack option that not only boosts energy but also offers essential micronutrients.



Fig. No. 4: Formulated Energy Bar

CONCLUSION

The developed energy booster bar is nutritionally rich, palatable, and shelf-stable. Its unique blend of herbs and natural ingredients makes it suitable for enhancing energy, improving focus, and supporting overall well-being. The product has strong potential for commercialization in the functional food sector. The present study aimed at formulating and evaluating a natural Energy Booster Bar using ingredients like guarana, ashwagandha, brahmi, ginseng, dextrose, nuts,



dark chocolate, jaggery, and gulkand. The final formulation was found to possess acceptable organoleptic properties (color, taste, odor, and appearance) and demonstrated good physical stability over the observation period. Nutritional evaluation revealed that the bar provides approximately 170 kcal of energy per 43.5g serving, with a balanced composition of carbohydrates, healthy fats, fiber, and minor proteins. The bar is also a notable source of natural antioxidants, iron, and magnesium, supporting both immediate energy needs and longer-term health benefits. Hence, the Energy Booster Bar can be considered a promising, convenient, and nutritious snack option, particularly suitable for individuals requiring quick energy replenishment, such athletes. students, as and working professionals.

FUTURE SCOPE:

Further optimization can include the addition of superfoods and natural preservatives to enhance shelf life. Clinical studies can validate its benefits on endurance, cognitive function, and energy levels. Large-scale production and sensory evaluation on a broader population would help in the commercial launch of the product. Product variations with different flavours' and herbal combinations can be explored to enhance market appeal.

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