



Formulation And Evaluation of An Energy Drink Using Nutraceuticals

*¹Hemalatha Y R, ¹Roopa Karki, ¹Sowmyashree B R, ¹Anusha B S, ¹Sowjanya G Gudadwara

¹ Asst. Professor, ² Professor and Principal, ³ Student

¹ Department of Pharmaceutical Chemistry,

¹ Vivekananda College of Pharmacy, Bangalore, India

ABSTRACT:

In the present study, Powder formulation as an energy drink was developed by using ingredients which have proved for its nutritional potential. The key ingredients include millets, wheat, cashew, Almond, pista, oats, Pumpkin seed, Sunflower seed, almond gum, Flax seed, Walnut, Melon seed and Monk fruit which is used as a sweetening agent to mask the unpleasant taste. The powder formulation is mainly used to enhance the immunity in malnutrition deficiencies.

Granules of energy drink powder was prepared using almond gum with varying concentration of 1 and 2% w/v. Evaluation studies of powder formulation was carried out such as Sensory studies, Moisture content, Sieve analysis and Nutritional content. The F1 formulation was found to be better compared to F2, F3 and F4 since dough was adhered to the mesh which may be due to the oil contents which are comparatively more. In F1 formulation, the granules are retained 95% more on the 44 Mesh size and in the range of 345-375mm. The energy drink powder contains more amount of nutrients which will in turn helps to boost the energy and reduce the hunger. Hence, Formulation delays feeling of hunger for up to four hours. Therefore, an attempt was made to prepare a powder formulation as an energy drink.

KEYWORDS: Powder Formulation, Malnutrition, Energy drink, Immunity.

INTRODUCTION:

Malnutrition refers to a condition where an individual's diet does not provide the essential nutrients, vitamins, and minerals necessary for the proper functioning and growth of the body. It can result from various factors, including insufficient food intake, poor dietary quality, inadequate absorption of nutrients, and certain medical conditions. Malnutrition can manifest in several forms, including undernutrition, overnutrition, and micronutrient deficiencies.^{1,2} Malnutrition can have serious health consequences, particularly in children, pregnant women, and the elderly. It can weaken the immune system, impair physical and mental development, increase susceptibility to infections, and contribute to various chronic diseases.³ Efforts to combat malnutrition include promoting nutritious diets, improving food security, addressing poverty, and providing nutritional education and interventions, especially in vulnerable populations.^{4,5}

Nutraceuticals can be used as a complementary approach to treat malnutrition. It should be integrated into a broader strategy that includes dietary improvement, medical intervention, and addressing the underlying causes of malnutrition. The term "nutraceutical" is a combination of "nutrition" and "pharmaceutical," highlighting their dual role in promoting health and preventing or managing certain medical conditions.^{6,7} Nutraceuticals are typically available in various forms, including dietary supplements, functional foods (foods fortified with bioactive ingredients), and beverages.^{8,9}

Nutraceuticals are bioactive compounds that have potential health-promoting or therapeutic effects. Nutraceuticals are products derived from food sources that provide extra health benefits in addition to basic nutritional value. They are often considered as a bridge between traditional foods and pharmaceuticals.

Nutraceuticals can include various substances, such as vitamins, minerals, antioxidants, herbal extracts, amino acids, and other natural compounds.^{10,11}

A balanced diet is a dietary approach that provides the body with the right combination of macronutrients (carbohydrates, proteins, and fats) and micronutrients (vitamins and minerals) in appropriate proportions to support overall health and well-being. Proportion of balanced diet includes 25% Protein, 25% Fibers, 40% Carbohydrates and 10% Fats.¹²

Hence the present study focused on to prepare powder formulation as granules using millets, wheat, cashew, Almond, pista, Oats, Pumpkin seed, Sunflower seed and almond gum, Flax seed, Walnut, Melon seed and Monk fruit which was used as a sweetening to mask the unpleasant taste. Evaluation of the powder formulation was carried out.

MATERIALS AND METHODS

Preparation of energy drink/Powder

2.1 Selection and Collection of Ingredients

The ingredients were procured from the local market of Bengaluru, but the care was taken that material would be fresh and hygienic.

2.2 Method

2.2.1 Preparation of Wheat sprouts: Wheat sprouts were prepared by soaking in water for 12 hours, then rinsed it with water and drain the water completely. Place the soaked wheat grains in a wet muslin cloth and little amount of water was sprinkled over the grains. The muslin cloth with soaked grains were placed in a bowl and covered it by using a lid, so that there should be an air circulation. The presence of moisture content and air makes the grains to form a sprout. Once the sprout has formed, it was rinsed with water and drained it. Then it was dried for three days in sunlight to remove the water content.

2.2.2 Preparation of Powder formulation: All the other ingredients were cleaned and then dried for one day in sunlight. All the ingredients were fried at low temperature and cooled to a room temperature. Powdered the ingredients separately using a mixer & then mixed together as per the formula.

2.2.3 Preparation of 1 and 2% Almond Gum: 0.5 gram and 1 gram of almond gum was triturated using mortar and pestle. 50ml of water was added to the gum and then mixed well, until it was completely dissolved to form a solution.

2.2.4 Preparation of Powder formulation as Granules: Prepared dough by weighing accurately 50 gram of energy powder and then added 1% and 2% almond solution drop by drop. Then dough was sieved under 22 mesh size to form granules and dried the granules in hot air oven. The four different types of formulations were prepared and mentioned in Table no.1.

2.3 Evaluation Parameters:

2.3.1 Quality Evaluation: Determining the effectiveness and safety of the prepared energy drink required a quality evaluation. Sensory investigation was achieved by observation and its pleasant odor, flavor, texture. The evaluation of the nutrients and Physicochemical analysis of Powder Formulation was done.

2.3.2 Sensory Evaluation

Sensory evaluation of formulations includes methodical analysis of its sensory attributes to assess its overall consumer appeal, acceptability, and quality. Aside from refreshment, the amount of beneficial qualities that consumers desire to observe in these products has increased due to awareness by them for formulation. But, irrespective of how healthful the preparation, food needs to taste good in order to be ingested. The evaluation parameters include appearance, aroma, taste, texture, consistency and overall acceptability of formulations.

2.3.3 Evaluation Studies:

a) Solubility test:

Method 1:- To a clean test tube, add 1 gram of energy powder and water.

Method 2:- To a clean test tube, add 1 gram of energy powder and hot water.

b) Digital moisture Analyzer:

It is an instrument to analyze the moisture content in an energy powder. A moisture analyzer works according to the thermo-gravimetric principle, also often referred to as the 'Loss on Drying' (LOD) principle. In this method, the powder formulation was weighed and placed in the digital moisture analyzer pan. Switch on the power button, the analyzer uses a halogen lamp to heat the sample. As the sample heats up, moisture starts to evaporate from the sample. The moisture analyzer continuously measured the weight of the sample during the drying process. The weight of the sample was decreased as moisture evaporated. The analyzer calculates the moisture content as a percentage based on the initial and final weights. The results are displayed digitally on the screen.

$$\text{Moisture Content \%} = \frac{w - d}{w} \times 100$$

w = wet weight (Initial weight)

d = weight after drying (Final weight)

C) Melting point: The sample was loaded to a capillary tube, which was then inserted into the heating block of melting point apparatus. At a controlled rate, the heating block was gradually heated as well as sample was heated. Noted the temperature at which substance was melted.

d) Sieve analysis: A sieve shaker is a machine designed to hold and agitate a stack of test sieves to efficiently separate particles of different sizes. It is commonly used in laboratory and industrial settings for particle size analysis and quality control purposes. A sieve shaker has a platform or holder where the stack of sieves is placed. About 5 sieves were arranged keeping one above the other in a series with the coarsest at the top and finest at the bottom. Around 100 gms of pre weighed granules was placed on the top sieve. The nest of the sieve was shaken for about 20 minutes in sieve shaker. After shaking, the granules retained on each sieve was weighed. The weight of the material retained on each sieve is divided by the total sample weight and multiplied by 100 to get the percentage of material in each size fraction.

3. Result & Discussion:

3.1 Preparation of Powder Formulation as Granules: The four different types of formulations were prepared and mentioned in Table no.1. F1 formulation was found to be better compared to other formulations.

Table 1: Preparation of powder formulation as Granules

Sl.No	Ingredients	F1(grams)	F2(grams)	F3(grams)	F4(grams)
1	Melon seed	4	4	4	4
2	Flax seed	6	6	6	6
3	Walnut	5	5	5	5
4	Almond	6	6	6	5
5	Cashew	4	4	4	5
6	Pista	5	5	5	4
7	Almond gum	1	1	2	2
8	Pumpkin seeds	5	5	5	6
9	Millet	39	37	34	33
10	Wheat	5	7	9	10
11	Oats	20	20	20	20

3.2 Sensory Evaluation: In Table no. 2, the parameters for sensory evaluation of the formulation were observed and noted which includes color, taste, flavor, texture, overall acceptability at room temperature. The formulations has very good flavor, taste, and acceptability overall, according to the paired comparison evaluation.

Table 2: Sensory Evaluation Parameters

Sl.No.	Parameter	Formulation
1.	Color	8
2.	Flavor	8
3.	Texture	7.5
4.	Taste	7.5
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

3.3 Evaluation of Nutrients: The result was analyzed by M.S. Ramaiah Food Testing Laboratory, Bangalore. The nutrients present in the formulation were analyzed and cited in Table no. 3.

Table 3: Evaluation of Nutrients

Sl.No	Nutritional Facts	Per 100g(Approximate value)
1.	Energy	418.8 Kcal
2.	Carbohydrates	55.64 g
3.	Protein	14.13g
4.	Fat	3.93 g
5.	Crude Fiber	3.86 g
6.	Sodium	21 mg
7.	Iron	5 mg
8.	Calcium	115 mg

3.4 Evaluation Studies: The Solubility, Moisture content and melting point for the prepared formulations are reported in Table No. 4.

Table 4. Evaluation studies

Formulation	Solubility		Moisture Content	Melting Point
	Cold water	Hot water		
F1	Insoluble	Soluble	54.25%	163-165°C
F2			55%	160-162°C
F3			56.15%	159-160°C
F4			57%	157-158°C

3.5 Sieve Analysis Report

Sieve analysis was carried out for F1 to F4 Formulation. The granules are retained 95%more on the 44 Mesh size. It shows that granules are in the range of 345-375mm. F2, F3 and F4 found to be adhered to the mesh which may be due to the oil contents are comparatively more.

4. Conclusion:

The Prepared Powder formulation as an energy drink includes nuts, cereals and also contains rich sources of nutrients such as vitamins, minerals, carbohydrates, proteins, fats, fibers. The F1 formulation was found to be better compared to other formulations. The formulation was prepared from the plants source, so the chances of side effects are lower and healthier than the other products available in the market. Therefore, aim was to ensure the immunity, reduce the hunger as well as to provide a longer-lasting feeling of fullness up to 4 hours. It is beneficial against malnutrition such as micronutrient deficiency and macronutrients deficiency.

5. **Acknowledgement:** We sincerely thanks to our Director and Principal of the institute for their support.

6. **Conflict of Interest:** None

7. **References:**

1. Norman K, Pichard C, Lochs H, Pirlich M. Prognostic impact of disease-related malnutrition. *Clinical nutrition*. 2008;27(1):5-15.
2. Ahmed MH, Vasas D, Hassan A, Molnár J. The impact of functional food in prevention of malnutrition. *Pharmanutrition*. 2022; 19: 100-105.
3. Agarwal E, Miller M, Yaxley A, Isenring E. Malnutrition in the elderly: a narrative review. *Maturitas*. 2013;76(4):296-302.
4. Pena M, Bacallao J. Malnutrition and poverty. *Annual review of nutrition*. 2002;22(1):241-53.
5. Chaurasia S, Pati RK, Padhi SS, Gavirneni N. Is localization better than globalization for sustainability? Evidence from the nutraceuticals industry for managing malnutrition in India. *International Journal of Production Economics*. 2023; 106-09.
6. Santini A, Cammarata SM, Capone G, Ianaro A, Tenore GC, Pani L, Novellino E. Nutraceuticals: Opening the debate for a regulatory framework. *British journal of clinical pharmacology*. 2018;84(4):659-72.
7. Shinde N, Bangar B, Deshmukh S, Kumbhar P. Nutraceuticals: A Review on current status. *Research journal of pharmacy and technology*. 2014 Jan 1;7(1):110-3.
8. Mali S, Rathod S, Kale N, Shinde N. Overview of nutraceuticals. *Asian Journal of Pharmaceutical Research*. 2022;12(1):61-70.
9. Gupta S, Chauhan D, Mehla K, Sood P, Nair A. An overview of nutraceuticals: current scenario. *Journal of basic and clinical pharmacy*. 2010;1(2):55.
10. Parulekar YR, Haldankar PM, Dalvi NV, Salvi BR, Bhattacharyya T. Nutraceuticals and their biofortification in vegetable crops: A review. *Adv. Agric. Res. Technol. J*. 2019;3: 219-29.
11. Banerjee P, Maitra S, Banerjee P. The role of small millets as functional food to combat malnutrition in developing countries. *Indian Journal of Natural Sciences*. 2020 ;10(60):20412-7.
12. Lim S. Eating a balanced diet: a healthy life through a balanced diet in the age of longevity. *Journal of obesity & metabolic syndrome*. 2018;27(1):39.

