

"COMPREHENSIVE ASSESSMENT OF PHYSICOCHEMICAL AND SENSORY ATTRIBUTES FOR A NOVEL INFANT INSTANT DRINK MIX FORMULATION"

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ABSTRACT

In growing and developing countries infants and young children suffer mostly from malnutrition. The adulting of infants from one to two years of age in life is very rapid. To meet this situation, infant instant Health Mix Powder and drink is developed, which acts as an immunity booster and helps with weight gain. It is made with nutritious cereal like corn, legume like soybeans, and millet like finger millet (ragi). The combination of this cereal, legume, and millet provides the right protein profile for the infants and help their growth. The use of such readily available crops in complementary to legume such as soybeans is very healthful in developing a simple household low-cost weaning food, holds promise in alleviating infant malnutrition and soybean is a plant-based protein which is rich in high fiber, high protein with saturated fat and it is cholesterol free, lactose free, rich in vitamin c, calcium and iron. Finger millet is 10 times higher than wheat and rice in calcium content. The right ratio of these three combinations of food and their ability to dissolve or solubility of them determines the quality of our instant infant food. The challenge, therefore, is to develop a nutrient-dense supplementary instant infant food from locally available crops that could be adopted at the household level. For flavoring milk, milk powder and coconut powder is going to be used. The main ingredient of this healthy baby is milk, which makes it sweet. It provides important nutrients such as protein, calcium and vitamin D, which are important for the development of baby's bones, teeth and general health. The sweetness of milk helps babies enjoy drinking water. Milk powder is added to make the taste of the mixture more creamy and creamier. Since it is milk powder in its essence, it both adds flavor to milk and increases the nutritional value of the drink. Vitamins and minerals, such as vitamin A and vitamin D, are often added to formula to help children grow and stay healthy. Healthy mix for babies takes advantage of the delicious coconut flavor that coconut flour provides. Tropical flavors will add interest and appeal to drinks with young tastes. Healthy fats, such as those in coconut, are also important for a child's brain development. It also adds some sweetness, eliminating the need for extra sugar. Analyzing their physicochemical properties and sensory properties with the help of proximate analysis tests and also enhancing their taste for making it a better food for feeding infants. We planned to bring out this product as an instant healthy mix as well as an infant instant drink that could help working parents to feed their babies in their tight schedule.

Keywords: Malnutrition, Infants, Health mix, Nutrition, Protein

1. INTRODUCTION

The creation of nutritionally sound and balanced dietary options is crucial in a time when infants' health and wellbeing are of utmost importance. One such breakthrough is the Infant Health Mix & Drink, a precisely formulated mixture created to offer necessary nutrients and support infants' ideal growth and development. The nutritious benefits of soybean, maize, and finger millet are combined in this special blend, which also contains milk,

milk powder, and coconut powder for flavor and added nutritional value. The Infant Health Mix and Drink could be a game-changer in the fight against infant nutritional problems in addition to being a practical and simple-to-prepare dietary option for carers. This in-depth analysis tries to delve into the formulation's essential elements while analyzing its nutritional profile, health advantages, and prospective effects on baby health. The main ingredients are finger millet, maize, and soybean, each of which provides a variety of important nutrients. A high-quality source of amino acids is provided by soybean, which is well-known for its protein content, while maize and finger millet give carbs, vitamins, and minerals necessary for energy and general growth. With the addition of milk and milk powder, you can get a large amount of protein and good fats, as well as the calcium and vitamin D your bones need to stay healthy. Additionally, adding coconut powder not only gives the dish a delicious flavor but also adds beneficial fats, dietary fiber, and critical vitamins. The nutritional advantages of each ingredient will be thoroughly examined, along with the quantity and quality of the vital elements they offer. Additionally, it will explore any synergistic effects that may result from mixing these components, guaranteeing that the Infant Health Mix and Drink provides an infant with a complete and balanced nutritional profile. We will go into detail about the exact nutritional components, health advantages, and potential drawbacks of this cutting-edge newborn feeding choice in the sections that follow. With the help of a thorough investigation, we hope to offer insightful information about the newborn Health Mix and Drink and shed light on how it contributes to the holistic and well-rounded promotion of newborn health and development.

1.1 OBJECTIVES OF THE PROPOSED WORK

- Adequate nutrition - The main aim is to provide nutritious food rich in essential nutrients to children with a mild need for health and development. These include essential fatty acids, proteins, vitamins and minerals.
- Protein source - Containing all nine essential amino acids, soybeans are a good source of protein and can be added to recipes to help create protein-rich foods. This is important for the growth and development of babies.
- Diversity of Nutrition - Corn and millet create a variety of foods for health by providing important vitamins and minerals such as iron, calcium and B vitamins.
- Digestibility - The mixture should be easily digested by the developing intestines of children. The most active methods are used to make simple carbohydrates and reduce the likelihood of gastrointestinal problems.
- Conformity - The word "immediately" indicates that the product should be easy to prepare, preferably with or mixed with water. Milk for easy use by parents or caregivers.
- Long Shelf Life - Where access to fresh food is limited, ingredients must have an appropriate shelf life to ensure they remain healthy and safe until consumed. Products need to be accessible to many families, including those with limited access; therefore, making products affordable is often the first goal.
- Related to Malnutrition - Depending on the region and specific nutritional concerns, this model could be developed to treat some malnutrition's occurring in neonates in the target population.
- Safety: It is important for the baby's health that the product is safe and meets the safety requirements.
- Promoting Child Health: The ultimate goal is to improve the health and well-being of newborns by reducing the risk of ill health, and to promote their health and development. It is important to note that the design and purpose of this product may change the population according to the specific requirements and problems of the goals, so the above goals should be adjusted. A lot of testing and research is often done to ensure the product achieves its goals and benefits from the target market.

1.2 SCOPE OF THE PROJECT

Nutrition Instant Healthy Mixed Drinks for Babies and Young Children important improve the health of infants and toddlers. Samples containing maize, millet and soybeans are of particular interest due to their nutritional value. This article discusses the potential for comprehensive evaluation of such products, taking into account various aspects such as nutritional value, safety and marketability. Content analysis for macronutrients (proteins, carbohydrates and fats), micronutrients (vitamins and minerals), biological products is called nutritional evaluation. Compare nutritional values with recommended nutritional recommendations for newborns to ensure they meet their needs.

As part of the product safety assessment process, microbiological tests are performed to ensure that the product does not contain hazardous organisms. Identify the presence of contaminants that may affect the safety of the product, such as heavy metals or mycotoxins. Determine the likelihood of allergies, especially in the presence of allergens

such as soy. The study of how well the nutrients in the mixture are absorbed and used by the body are called "digestibility" and "bioavailability". Control foods that can interfere with nutrient absorption, such as antibiotics. Analyze the taste, texture, color and aroma of the product to understand how the product affects the appreciation of the product by children and caregivers. Analyzing the stability of the mix over time, including the effects of shelf life and storage (temperature, humidity), will help you determine the quality of the product mix.

Monitor demand for products in the market, including products such as price, volume and availability. Get customer feedback to identify usage and purchase requests. Cost-Benefit Analysis: Evaluate the business potential of the joint venture, taking into account production costs, sales costs and expected revenue. Compliance: Ensure products comply with national and international laws, regulations and guidelines regarding baby food and safety labeling. See results from a combination of infant health outcomes such as growth, development and health using clinical trials or a research questionnaire. Sustainability and Ethical Considerations - Examine the ethical and environmental aspects of raw material sourcing and production. Analysis of the nutritional, safety, emotional, economic and ethical implications of a healthy infant formula made from corn, millet and soybean should have a holistic approach. These reviews help improve children's health and well-being by ensuring that products meet safety concerns, market effectiveness and stability, and infant nutritional needs.

2. METHODOLOGY

Creating an instant infant health mix and drink from soybean, maize, finger millet, and flavorings using milk, milk powder, and coconut involves several steps. This product aims to provide essential nutrients for infants in an easily consumable form. Here's a methodology to produce this mix and drink:

INGREDIENTS:

1. DRY INGREDIENTS:
 - a. Soybean
 - b. Maize
 - c. Finger millet
 - d. Milk powder
 - e. Coconut powder (for flavor and nutrition)
2. DAIRY INGREDIENTS:
 - a. Milk (preferably full-fat milk)
 - b. Milk powder (if necessary to adjust the consistency and nutrition)
 - c. Sweeteners (if needed)
 - d. Sugar or alternative sweeteners (in moderation)
3. EQUIPMENT:
 - a. Blender or food processor
 - b. Tray dryer
 - c. Packaging materials (for mix – Seal / PE packaging and for drink - Tetra Packaging)

PREPARATION OF DRY INGREDIENTS:

- a. Clean and sort the soybeans, maize, and finger millet to remove any impurities.
- b. Roast each of these ingredients separately in a dry pan until they become slightly golden and emit a nutty aroma. This helps to enhance their flavor and reduce moisture content.
- c. Let the roasted ingredients cool in the room temperature.
- d. Grind the roasted soybean, maize, and finger millet into a fine powder separately using a blender or food processor.

PREPARATION OF FLAVORING MIX:

- a. Mix the flavoring agents (fruit powders) with the coconut powder/milk powder. Use it in the correct ratio.

BLENDING:

a. In a separate blender, combine the powdered soybean, maize, finger millet, and the flavoring mix. Blend until they are well mixed and form a uniform dry mixture.

HEALTH DRINK:

- a. To prepare the infant health drink, mix the powdered mix with warm water or milk (as preferred) in the desired proportion. Mix continuously.
- b. Heat the milk (full-fat milk) to a suitable temperature (not boiling) and add milk powder if necessary to increase the nutritional content and thickness.
- c. Combine the dry mixture with the milk while stirring continuously to create a paste-like consistency. Ensure there are no lumps.
- d. Add sugar or sweeteners if required, but remember to keep the sugar content low for infant health.

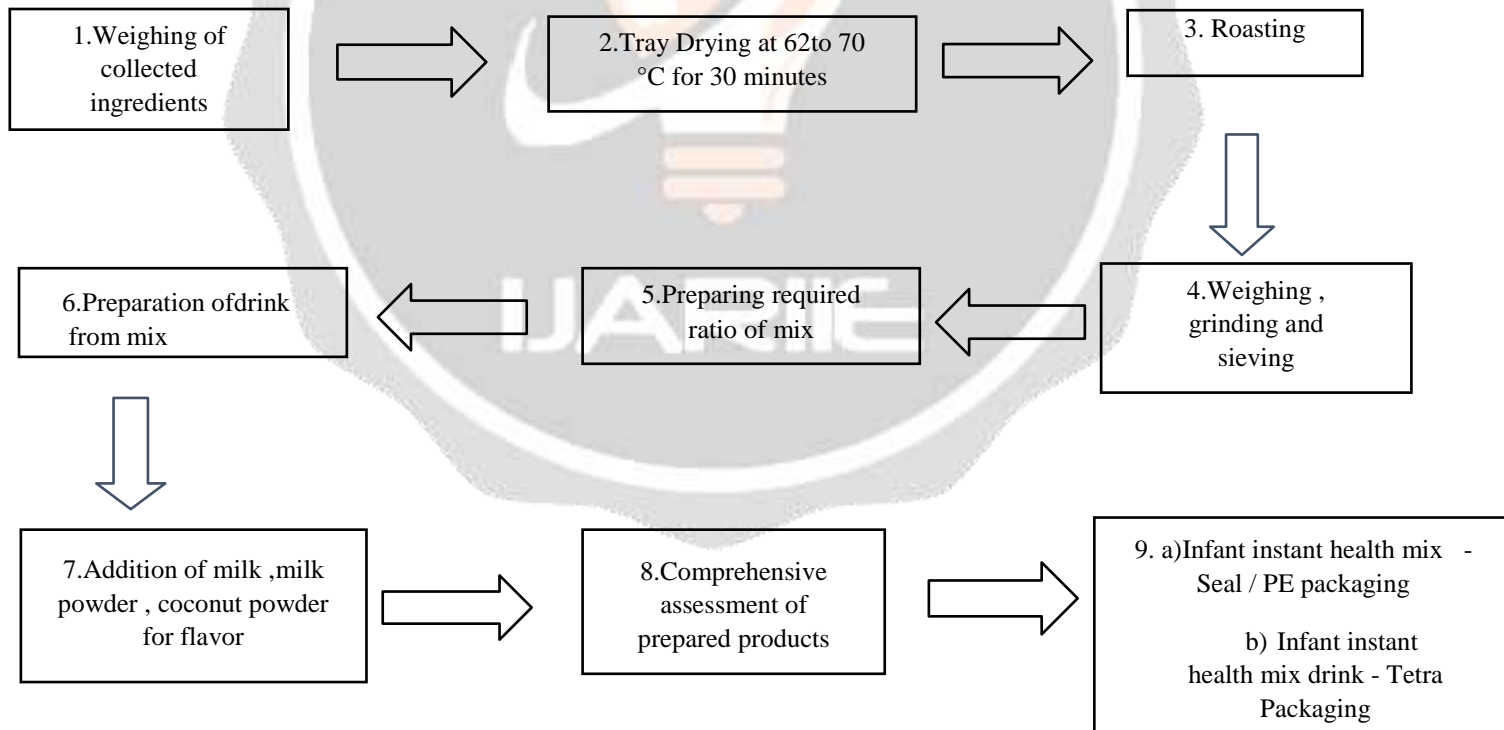
PACKAGING:

- a. Package the powdered infant health mix in airtight containers or single-serving sachets to maintain freshness.
- b. Packaging materials (for mix – Seal / PE packaging and for drink - Tetra Packaging)

STORAGE:

a. The final product should be kept out of direct sunlight in a cool, dry location. Proper storage is essential for maintaining the product's nutritional value and shelf life.

2.1 FLOW DIAGRAM OF THE PROPOSED WORK



2.2 COMPREHENSIVE ASSESSMENT OF PREPARED PRODUCTS

Comparison study between 3 samples

For drink mix -

Sample 1: Soy powder + maize powder + finger millet powder in equal proportion.

Sample 2: Soy powder + maize powder + finger millet powder + milk powder in equal proportion

Sample 3: Soy powder + maize powder + finger millet powder + coconut milk powder in equal proportion.

For drink preparation from drink mix by adding milk and coconut powder

Sample 1: (Soy powder + maize powder + finger millet powder in equal proportion) make a liquid drink by adding water

Sample 2: (Soy powder + maize powder + finger millet powder + milk powder in equal proportion) make a liquid drink by adding water

Sample 3: (Soy powder + maize powder + finger millet powder + coconut milk powder in equal proportion) make a liquid drink by adding water

For drinks preparation by adding milk and coconut milk

Sample 1: (Soy powder + maize powder + finger millet powder in equal proportion) make a liquid drink by adding water

Sample 2: (Soy powder + maize powder + finger millet powder in equal proportion) make a liquid drink by adding milk

Sample 3: (Soy powder + maize powder + finger millet powder in equal proportion) make a liquid drink by adding coconut milk

3. Testing Methods for Nutritional Analysis

mixes are directly tested to determine their nutritional value. These tests check the content of macronutrients such as protein, lipids, carbohydrates and water content. They help protect customers by making a healthy combination of food and practice. Real-time measurement allows companies to modify food to ensure nutritional balance, increasing productivity and quality control. Evaluation is very important to jointly measure and improve the nutritional value of health.

- Kjeldahl method for protein analysis
- Soxhlet apparatus for fat determination
- Moisture analyzer for moisture analysis
- Muffle furnace for analyzing mineral content
- Ph meter for testing Ph
- Determination of water activity using water activity meter

4. RESULTS AND DISCUSSION

The thorough analysis of the maize, finger millet, and soybean-based infant instant drink mix formulation produced encouraging results in terms of physicochemical and sensory properties. The formulation showed favorable physicochemical properties. A balanced composition with sufficient protein from soybean, necessary carbohydrates from maize, and micronutrients from finger millet was shown by the proximate analysis. The nutritional requirements of newborns are well met by this combination. Sensory assessments showed that target consumers accepted the product well. With a slight sweetness and a light nutty undertone from the finger millet and soybean,

the flavor profile was notably pleasing. The overall sensory experience was well-received, and the color and texture both had pleasing aesthetic qualities.

The formulation also showed outstanding reconstitution abilities. For baby intake, a smooth, lump-free consistency that rapidly dissolved in water is essential. The results of the tests for shelf life stability showed that the product's quality remained constant throughout time, indicating that it could withstand long-term storage needs. The unique infant quick drink mix composition, which combines maize, finger millet, and soybean, shows promise as a satiating and nutritionally sound product. Its physicochemical properties match baby nutritional requirements, and sensory assessments point to strong customer approval. Scalability, nutritional bioavailability, and potential newborn health advantages may be the subject of future research. It may be possible for this formula to correct dietary deficits and improve newborn nutrition.

 <p style="text-align: center;">FIGURE 1</p>	<p>Figure 1 - Represents mineral content of the powders, done in muffle furnace Weight of the ash we got Finger millet – 0.070g Soybean – 0.107g Maize – 0.041g</p>
 <p style="text-align: center;">FIGURE 2</p>	<p>Figure 2 - Represents moisture content of the powders, done in moisture analyzer Finger millet – 8.33 % MC Soybean – 10.47 % MC Maize – 8.47 % MC</p>
 <p style="text-align: center;">FIGURE 3</p>	<p>Figure 3 - Represents Ph of the powders, done in Ph meter Finger millet – 6.84 Soybean – 7.28 Maize – 6.85</p>
 <p style="text-align: center;">FIGURE 4</p>	<p>Figure 4 - Represents color of the powders, done in colorimeter Finger millet – L*=71.74 , a*=3.68 , b*=9.18 Soybean – L*=88.41 , a*= -0.06 , b*=12.88 Maize – L*=77.15 , a*=5.27 , b*=35.80</p>

 <p>FIGURE 5</p>	<p>Figure 5 - Represents water activity of the powders, done in water activity meter Finger millet – 0.392 Soybean – 0.624 Maize – 0.512</p>
 <p>FIGURE 6</p>	<p>Figure 6 – Represents protein content of the powders, done by kjeldahl method Finger millet – 32.3% Soybean – 43% Maize – 18.6%</p>
 <p>FIGURE 7</p>	<p>Figure 7 – Represents fiber content of the powders, Finger millet – 32.3% Soybean – 43% Maize – 18.6%</p>

5. CONCLUSION

The full evaluation of the physicochemical properties of the novel infant instant drink mix formulation including maize, finger millet, and soybean has produced encouraging results, in conclusion. A potentially useful addition to the market for newborn nutrition products, this creative component combination offers a balanced nutritional profile that caters to the particular needs of infants. The formulation exhibits stable qualities from a physicochemical point of view, such as moisture content, pH, and shelf-life stability, maintaining the product's security and quality over time. Additionally, the addition of maize, finger millet, and soybean boosts the formulation's nutritional value by adding a variety of key macro- and micronutrients necessary for a baby's healthy growth and development. The quick drink mix has demonstrated positive sensory qualities, such as a pleasing flavor and scent, increasing the likelihood that newborns will accept it. This is essential for ensuring that infants get enough nutrition in the first few years of life. Overall, this thorough evaluation's findings show that the unique infant instant drink mix formulation has the potential to be a useful and well-liked market addition.

6. REFERENCES

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