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DEVELOPMENT OF FUNCTIONAL FOOD FOR COGNITIVE HEALTH - BRAINY BITES

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ABSTRACT

Chocolate is one of the most loved foods among the people. So, the objective was to formulate a chocolate that contains herbs like shankhpushpi and vaccha for cognitive improvement in children. It can serve various aspects of cognitive health like concentration, memory and focus. We conducted Phytochemical analysis to check the presence of important phytochemicals that are the active ingredients of these herbs. According to the studies, these herbs have anti-inflammatory, neuroprotective, antioxidant neurotransmitter modulating qualities that help to improve cognitive function. By blending these traditional herbs with morden kid friendly format like chocolate our product aims to bridge the gap between ancient wisdom and morden acceptance.

KEYWORDS: Shankhpushpi, Vaccha, Cognitive improvement, Chocolate.

INTRODUCTION

Chocolate is an adaptable food that can be combined with herbs to create a completely different taste and texture. The blending of herbs

with the adaptive texture of chocolate is giving rise to a new category of confectionery that satisfies cravings as well as offers potential health advantages.[1]

Humans have five basic tastes - sweet, sour, bitter, salty and savory. Amongst them, the sweet taste is one of the most pleasurable. Also, chocolate is known to resist microbial growth as it is an anhydrous medium. Phenyl ethylamine, also termed as 'the love drug' occurs in the brain and produces a feeling of well-being and contentment. Phenyl ethylamine is also present in chocolate.[1] This herbal chocolate is prepared by using the herbs and other ingredients and a base mould and coating it with chocolate. This can be called the chocolate delivery system. It is the best delivery system specially for children.[2]

The aim of the present study was to develop a Pediatric Herbal Chocolate for boosting cognitive health. Furthermore, to evaluate various parameters like proximate analysis, microbial analysis, phytochemical analysis, shelf life study and sensory evaluation. Further standardize the formulation and commercialize the product in the market.[3]

MATERIALS AND METHODOLOGY

Table 1: Materials and their benefits.

Ragi		Rich in iron and antioxidants, which support oxygen supply to the brain and reduce oxidative stress, aiding cognitive function.[4]
Honey		Honey is used not only as a nutritional product but also in health as a supplement and in various applications, especially related to brain booster health.[5]
Milk and dark compound chocolate		Chocolate contain numerous substances like antioxidant molecules, mainly flavonoids, most abundantly found in the form of epicatechin. These substances display several beneficial actions on the brain.[6]
Jaggery		The micronutrients which are present in Jaggery have many nutritional and medicinal aspects such as its anticarcinogenic and antitoxic activity.[7]

Shankhpushpi Powder		Shankhpushpi (Convolvulus pluricaulis Choisy) is a well-known Ayurvedic herb used for enhancing cognitive functions, reducing anxiety, and supporting mental health.[8]
Coco powder		Choco contain flavonoids, in the form of epicatechin. This substances display several beneficial actions on the brain.[6]
Walnuts power		Walnuts contain nutrients that are associated with improved cognitive health. These nutrients include essential fatty acids, soluble fiber, vitamin E, and polyphenols (e.g. ellagitannins).[9]
Flaxseed Powder		The consumption of flaxseed has been associated with improved brain health. Shows increase in the neurotrophic factors; brain-derived neurotrophic factor and glial cell-derived neurotrophic factor.[10]
Sunflower seeds		The bioactive ingredients of sunflower seeds and their possible neuroprotective mechanisms are potent antioxidant, antiinflammatory and neurotrophic.[11]
Vaccha		Acorus calamus rhizome constituents, particularly α and βasarone, possess a wide range of pharmacological activities such as sedative, CNS depressant, behavior modifying, anticonvulsant, acetyl cholinesterase inhibitory & memory enhancing.[12]

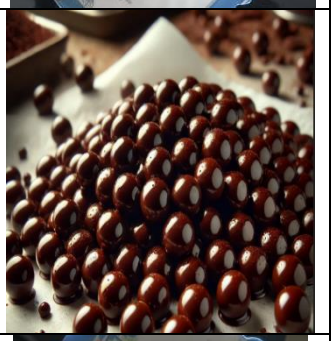
Composition of ingredients

Table No. 2: Composition of Ingridients.

Ingredients	Amount in %
Ragi	15.30%
Shankhpushpi	4.60%
Vaccha	0.15%
Coco Powder	4.61%
Walnut	3.07%
Flax seeds	3.07%
Sunflower seeds	1.53%
Jaggery	6.15%
Honey	30.76%
Compound Chocolate	30.76%

Trials

Table no. 3: Trials for Brainy Bites.

Trials	Title	Description	Observations
Trial 1	Used honey and cocoa powder for binding, forming small round vati for better taste.	The combination provided a pleasant flavor but had challenges with consistency and shelf stability. Further adjustments were needed to improve the texture and handling properties.	
Trial 2	Introduced ghee for binding, resulting in a shiny texture but excessive stickiness, leading to its exclusion.	The stickiness made handling and packaging difficult, affecting product convenience. It also impacted the overall mouthfeel, prompting the need for alternative binding agents.	
Trial 3	Increased cocoa powder and jaggery to effectively mask the taste of Shankhpushpi.	This trial significantly improved taste acceptance among children. However, balancing the sweetness while maintaining nutritional integrity remained a challenge.	
Trial 4	Coated the product with chocolate to enhance palatability for children.	The chocolate coating provided an attractive appearance and improved taste perception. However, concerns about melting and stability in different climates arose.	
Trial 5	Modified the shape into cubes, dividing one serving into three smaller units for convenience.	The cube format made portion control easier for parents and ensured consistent servings. It also allowed better packaging options and improved visual appeal.	

Trial 6	Adopted fun animal-shaped molds, reducing the serving size to two units to make it more appealing to kids.	The playful shapes increased engagement and encouraged regular consumption. It provided a fun snacking experience while retaining the product's nutritional benefits.	

1. **Prepare Dry Ingredients**

- All dry ingredients, including powdered ragi (Eleusine coracana), shankhpushpi (Convolvulus prostratus) powder, cocoa powder, and other functional additives, were accurately weighed using a digital balance.
- Ingredients were sifted to remove any clumps or impurities, ensuring a uniform particle size for better mixing.

2. **Measure the Ingredients**

- Ingredients were measured according to the pre-formulated recipe, balancing the functional and sensory components.
- Ratios were designed to maintain the desired nutritional profile, keeping in mind cognitive health benefits.

3. **Mixing and Binding of Ingredients**

- The dry ingredients were blended in a planetary mixer to achieve homogeneity.
- A natural binder honey was added gradually, ensuring a consistent dough-like texture.
- The mixture was mixed for a standard time of 10-12 minutes at a controlled temperature to prevent ingredient degradation.

4. **Mould into Bites**

- The prepared mixture was divided into uniform portions using a calibrated scooper.
- Each portion was carefully moulded into small bite-sized spheres (vati) for ease of consumption.
- The shaping process ensured that each bite maintained a consistent weight and size.

5. **Coat with Chocolate**

- The bites were then coated with either dark chocolate or milk compound chocolate, depending on the intended flavor profile.

- The coating was done by gently rolling the bites in tempered chocolate, ensuring an even and smooth layer.
- Excess chocolate was allowed to drip off before placing the coated bites on a parchment-lined tray.

6. Cooling and Storage

- The coated bites were cooled in a refrigerated chamber at 4°C for 20-30 minutes to allow the chocolate layer to set firmly.
- Once set, the *Brainy Bites* were transferred to airtight containers to prevent moisture absorption.
- The finished product was stored under refrigerated conditions (4-8°C) to maintain its stability and shelf life.

RESULT AND DISCUSSION

- Ash Content

The total ash content of the sample was found to be 1.516%. When compared to other herbal chocolate formulations, it falls within an acceptable range. This value suggests a balanced mineral composition, contributing to the overall nutritional value of Brainy Bites.

- Fat Content

The fat content analysis of Brainy Bites revealed a fat content of 7.62%. This fat content reflects the natural lipid contribution from ingredients like nuts, seeds, and cocoa. It is comparable to similar functional chocolates designed for cognitive health. The presence of healthy fats enhances the product's nutritional profile, supporting brain function and overall wellness.

- Sugar Content

The sugar content of Brainy Bites, measured using a Brix refractometer, was found to be 13%. The sugar content falls within the moderate range compared to other herbal chocolate-based nutraceuticals, which typically contain 10–15% sugar, depending on their formulation. This ensures a palatable taste without compromising health benefits, maintaining a balance between sweetness and functionality.

- Protein Content

The protein content in the sample was found to be 1.712 g per 100 g. This protein content contributes to the product's nutritional profile, supporting cognitive health and overall wellness. Proteins play a crucial role in neurotransmitter function, further justifying their presence in a brain-health-focused product.

- Carbohydrate Content

The sample contains 66.41 g of carbohydrate per 100 g. Estimation of carbohydrate content was performed using the Anthrone Method. The carbohydrate content for the sample was found to be 66.41 g per 100 g. Carbohydrates serve as the primary energy source, ensuring sustained mental and physical energy levels.

- Energy Content

The total energy content of the sample is 341.07 kcal per 100 g. Based on the obtained values — 66.41 g carbohydrates, 1.712 g proteins, and 7.62 g fats — the sample was found to contain 341.07 kcal per 100 g. The energy content aligns with similar herbal chocolate-based nutraceuticals, ensuring a balanced energy profile derived from nutrient-rich ingredients.

- Phytochemical Analysis

The phytochemical analysis of Brainy Bites confirmed the presence of glycosides, flavonoids, phenolic compounds, and terpenoids. These bioactive compounds contribute to the product's antioxidant and anti-inflammatory properties, acting as active ingredients that promote brain health and overall well-being.

- Microbial Analysis

The total bacterial count was determined using the Total Plate Count method and was found to be 8.2 x 10^5 CFU/g. According to regulatory guidelines, the permissible limit for total bacterial count in herbal formulations is typically $\leq 10^6$ CFU/g. The results fall within this permissible limit, indicating that the formulation meets microbiological safety standards. This ensures that Brainy Bites is safe for consumption.

- Sensory Evaluation

The sensory analysis of Brainy Bites revealed positive consumer acceptance. Elderly participants showed a preference for Dark chocolate-coated vati, while younger individuals

leaned towards Milk compound-coated vati. This confirms the viability of offering both flavors in the product lineup, catering to diverse consumer preferences.

- Shelf-life Testing

Shelf-life testing demonstrated that Brainy Bites remains stable and microbiologically safe for three months under refrigerated conditions. This ensures an adequate storage period for consumers, maintaining product integrity and efficacy over time.

SUMMARY

 Focused on achieving the right balance of taste, texture, nutrition, and convenience.

 Initial trials used honey and cocoa powder as binding agents but resulted in inconsistent texture and poor shelf stability.

 Introduced ghee to improve texture; however, it caused excessive stickiness, making it unsuitable for the final product.

 To enhance palatability, increased the amount of cocoa powder and jaggery to effectively mask the bitter taste of Shankhpushpi.

 Added a chocolate coating to further improve sensory appeal, making the product more enjoyable for children.

 Explored different serving formats, starting with small vati (balls), but found them lacking in portion control and packaging efficiency.

 Transitioned to cube-shaped servings for better portion control and easier packaging.

 Finalized fun animal-shaped molds to create an interactive and engaging experience for children.

 The unique approach ensures the product delivers essential nutrients for cognitive development while being visually appealing and fun for kids.

Successfully combined health benefits with child-friendly design, making daily supplementation effortless and enjoyable.

CONCLUSION

 Unlike traditional Shankhpushpi syrups or bitter-tasting herbal formulations that children often reject, our product transforms brain-boosting nutrition into a delightful experience by harnessing the universal love for chocolates.

 Parents no longer have to struggle or negotiate with their kids to take supplements — the fun, tasty, and easy-to-consume format naturally promotes daily adherence.

 What sets our product apart is its unique fusion of ancient Ayurvedic wisdom and modern nutritional science, offering a formulation that is both effective and enjoyable.

 With its innovative recipe, carefully balanced nutrient profile, and interactive design, our supplement becomes the go-to choice for health-conscious parents seeking to support their child's cognitive and overall development.

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