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FORMULATION AND EVALUATION OF PROBIOTIC SUGAR-FREE HERBAL AMLA CANDY AS A FUNCTIONAL NUTRACEUTICAL PRODUCT

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Abstract:

The present study focuses on the formulation and evaluation of probiotic sugar-free herbal amla candy as a functional food product. Amla (Emblica officinalis) was selected as the primary ingredient due to its high vitamin C content and antioxidant properties. The formulation incorporated stevia as a natural sugar substitute and Lactobacillus as a probiotic to enhance digestive health and immunity. The candy was prepared using processes such as washing, blanching, soaking in herbal syrup, drying, and probiotic incorporation. The prepared formulations were evaluated for organoleptic properties, pH, moisture content, texture, and stability. Results indicated that all formulations were acceptable, with formulation F2 showing better texture and uniformity. The developed candy demonstrated good stability and quality, making it suitable for diabetic and health-conscious individuals. This study highlights the potential of probiotic sugar-free amla candy as a nutraceutical product with enhanced health benefits and commercial applicability.

Keywords : *Amla, Probiotic, Sugar-free candy, Stevia, Functional food, Nutraceutical, Lactobacillus*

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INTRODUCTION:

Functional Foods and Nutraceuticals

In recent years, people have started choosing foods that not only provide nutrition but also support overall health. Functional foods and nutraceuticals are becoming popular because they can help maintain health and reduce the risk of diseases. Functional foods are those that offer benefits beyond basic nutrition. They contain active compounds that improve body functions and help in disease prevention.

The rise in lifestyle-related conditions such as diabetes, obesity, heart diseases, and digestive issues has increased the demand for such foods. Many consumers now prefer natural, low-calorie, and health-supporting products. This trend has encouraged scientists and food developers to create new products using natural ingredients along with beneficial microorganisms like probiotics.

Fruits and herbs are commonly used in functional food development because of their nutritional and medicinal value. Amla (Emblica officinalis) is one such fruit known for its health benefits. When combined with probiotics in fruit-based products, its functional properties can be further improved.[1]

Overview of Amla (Emblica officinalis)

Amla, commonly known as Indian gooseberry, belongs to the Euphorbiaceae family. It is an important medicinal fruit widely used in traditional systems of medicine such as Ayurveda, Siddha, and Unani. It is grown extensively in India and other tropical regions.

Amla is a rich source of vitamin C and contains several beneficial compounds like flavonoids, polyphenols, tannins, and antioxidants. These compounds are responsible for its various health effects, including antioxidant, anti-inflammatory, antidiabetic, liver-protecting, and immune-boosting activities.

The fruit has a sour and slightly bitter taste, which makes it less appealing for direct consumption. To improve its acceptability, it is processed into different products such as candies, pickles, juices, and preserves. These processed forms help in increasing shelf life while still maintaining its nutritional value.[2]

Figure 1: Amla (Emblica officinalis) Fruit Used for Candy Preparation

Nutritional and Medicinal Benefits

Amla is a rich source of vitamin C, calcium, iron, fiber, and antioxidants.[3] These nutrients help boost immunity and improve digestion. Amla acts as a strong antioxidant that reduces oxidative stress and protects cells from damage.[4] It also enhances immune function by increasing resistance to infections.[5] Additionally, amla helps regulate blood sugar levels and supports diabetic management.[6] Its anti-inflammatory properties further promote healing and reduce inflammation.[7]

Need for Sugar-Free Amla Candy

Traditional amla candy contains high sugar content, which increases calorie intake and may lead to diabetes, obesity, and heart diseases.[8] With increasing health awareness, there is a growing demand for sugar-free alternatives. Sugar-free amla candy provides the same nutritional benefits without harmful effects of excess sugar.[9] Natural sweeteners such as stevia can replace sugar without significantly affecting blood glucose levels.

Role of Herbal Sweeteners and Probiotics

Herbal sweeteners like stevia and licorice provide natural sweetness along with additional health benefits.[10] They are low in calories and suitable for diabetic individuals. Probiotics are beneficial microorganisms that improve digestion and maintain gut health.[11] They also enhance immunity and overall well-being.

Probiotic Sugar-Free Amla Candy as Functional Food

Probiotic sugar-free amla candy combines the benefits of amla, probiotics, and herbal sweeteners. It acts as a functional food that supports digestion, boosts immunity, and provides antioxidant protection. This product is low in calories, natural, and suitable for all age groups, especially diabetic and health-conscious individuals.[12]

HERBAL PLANT PROFILE

Amla (Emblica officinalis)

Figure 2: Amla (Emblica officinalis) Fruits

Amla (*Emblica officinalis*), commonly known as Indian gooseberry, is a widely used medicinal fruit in Ayurveda, Unani, and Siddha systems. It is rich in vitamin C and bioactive compounds such as flavonoids, tannins, and polyphenols, which provide antioxidant, antidiabetic, anti-inflammatory, and

immunomodulatory effects.[13] Traditionally, amla is used to improve digestion, boost immunity, and promote overall health.[14] Due to its sour taste, it is processed into products like candy, juice, and powder.[15] Amla candy is popular for its taste and shelf life.[16] In probiotic sugar-free formulations, amla acts as a key active ingredient, enhancing nutritional and therapeutic value.[17]

Stevia (Stevia rebaudiana)

Figure 3: Stevia (Stevia rebaudiana) Plant

Stevia (*Stevia rebaudiana*) is a natural herbal sweetener widely used as a sugar substitute in food and pharmaceutical formulations. It is obtained from the leaves of the stevia plant and contains natural glycosides responsible for sweetness. Stevia is approximately 200–300 times sweeter than sugar and contains zero calories. Due to these properties, stevia is commonly used in sugar-free formulations. Stevia is considered safe for diabetic patients because it does not increase blood glucose levels. It also exhibits antioxidant and anti-inflammatory properties. The use of stevia in sugar-free amla candy helps maintain sweetness without increasing calorie content.[14]

Table 1: Plant Profile of Amla

Parameter	Description
Biological Name	***Emblica officinalis***
Family	Euphorbiaceae
Part Used	Fruit
Category	Herbal Fruit
Role	Active Ingredient

Table 2: Key Functional Ingredients

Ingredient	Role
Stevia	Sugar substitute
Lactobacillus	Probiotic
Citric Acid	Flavor enhancer
Purified Water	Solvent
Natural Flavor	Taste enhancer

MATERIALS AND METHODS

Materials

The materials used in the formulation of probiotic sugar-free herbal amla candy were selected based on their safety, availability, and suitability for preparation of a functional food product. Fresh amla fruits were used as the main active ingredient because of their high vitamin C content and antioxidant properties. Amla is widely known for improving immunity, digestion, and overall health. Fresh and mature amla fruits were purchased from the local market and used immediately to avoid loss of nutrients and deterioration in quality.

Stevia was selected as a herbal sweetener to replace conventional sugar. Stevia is a natural sweetener and is suitable for diabetic patients as it does not increase blood glucose levels. The use of stevia helps in reducing calorie content and improving nutritional value of the formulation. Probiotic culture such as *Lactobacillus* was incorporated to improve digestive health and enhance functional value of formulation. Citric acid was used to enhance taste and maintain acidity of candy. Purified water was used as solvent during preparation of syrup. Natural flavor was added to improve taste and acceptability of prepared candy. All materials used were of food grade quality and handled under hygienic laboratory conditions.[16]

Table 1: Materials Used in Formulation

Sr. No	Material	Category	Role in Formulation
1	Amla	Herbal Ingredient	Active ingredient
2	Stevia	Herbal Sweetener	Sugar substitute
3	Lactobacillus	Probiotic	Functional ingredient
4	Citric Acid	Acidulant	Flavor enhancer
5	Purified Water	Vehicle	Solvent
6	Natural Flavor	Flavoring Agent	Taste improvement

5.2 Equipment Used

Various laboratory equipment were used during preparation of probiotic sugar-free amla candy. The equipment were selected based on formulation requirements and availability in laboratory. Electronic weighing balance was used for accurate weighing of materials. Stainless steel knives were used for cutting and removal of seeds from amla fruits. Beakers and glass containers were used for mixing and preparation of syrup. Hot plate was used for heating the solution and maintaining temperature during preparation.[17]

Tray dryer was used for drying soaked amla pieces at controlled temperature. Stirrer was used for mixing ingredients uniformly. Thermometer was used to monitor temperature during preparation. Airtight containers were used for packaging of prepared candy to avoid moisture absorption. All equipment were cleaned properly before use to maintain hygienic conditions and prevent contamination during formulation. Proper use of

equipment ensures uniformity and quality of prepared candy.[18]

Table 2: Equipment Used

Sr. No	Equipment	Purpose
1	Weighing balance	Accurate weighing
2	Beaker	Mixing
3	Hot plate	Heating
4	Tray dryer	Drying
5	Knife	Cutting
6	Stirrer	Mixing
7	Thermometer	Temperature monitoring
8	Container	Storage

Selection of Amla

Fresh and mature amla fruits were selected for preparation of probiotic sugar-free amla candy. The selection of good quality fruits is important to obtain better quality candy. Fruits were purchased from local market and inspected visually. Damaged, spoiled, and diseased fruits were removed. Only uniform size fruits were selected for formulation. Fresh amla fruits with greenish yellow color and firm texture were selected.[19]

Selection of fresh fruits helps maintain nutritional value and improves final product quality. Fresh fruits contain high vitamin C content and antioxidant properties. Uniform size fruits also help in uniform drying and candy formation. The selected fruits were washed thoroughly before further processing. Proper selection of raw material ensures consistency and stability of formulation. High-quality raw material also improves shelf life and acceptability of prepared candy.[20]

Washing of Amla

The selected amla fruits were washed thoroughly under running tap water to remove dirt, dust, and impurities. Washing is an important step to remove contaminants present on surface of fruits. After washing with tap water, fruits were rinsed with purified water to ensure removal of remaining impurities. Washing improves safety and quality of formulation.[21]

Clean fruits reduce microbial contamination and improve shelf life of candy. After washing, fruits were allowed to dry at room temperature to remove excess water. Proper washing ensures hygienic processing and prevents contamination during formulation. Clean and dry fruits were then used for further processing.[22]

Blanching of Amla

Blanching is an important step in preparation of amla candy. The washed fruits were blanched in hot water for about 5–10 minutes. Blanching helps soften fruits and reduce bitterness of amla. It also inactivates enzymes responsible for discoloration and spoilage. This process improves texture and quality of candy.

After blanching, fruits were immediately cooled in cold water. Cooling prevents overcooking and helps maintain texture of fruits. Blanching also helps in easy removal of seeds and improves absorption of syrup during soaking. Proper blanching improves taste, texture, and quality of prepared candy.[23]

Figure 4: Blanching of Amla Fruits

Cutting and Removal of Seeds

After blanching and cooling, amla fruits were cut into pieces using stainless steel knife. Seeds were removed carefully and edible pulp was collected. Uniform pieces were prepared to ensure uniform soaking and drying. Cutting helps increase surface area for better absorption of syrup.

Removal of seeds improves texture and quality of candy. Care was taken to prepare uniform pieces to obtain uniform drying and candy formation. Prepared amla pieces were then used for preparation of sugar-free candy. Uniform cutting improves quality and appearance of prepared candy.[24]

Preparation of Herbal Sugar-Free Syrup

Herbal sugar-free syrup was prepared by dissolving stevia in purified water. Citric acid was added slowly with continuous stirring. Natural flavor was added to improve taste and acceptability. The mixture was heated gently until uniform solution was obtained.
Preparation of syrup is important to provide sweetness and flavor to candy. Sugar-free syrup helps reduce calorie content and makes candy suitable for diabetic individuals. Proper mixing ensures uniform sweetness in candy. The prepared syrup was cooled before further use.[25]

Figure 5: Preparation of Herbal Sugar-Free Syrup

Soaking of Amla Pieces

After preparation of herbal sugar-free syrup, the prepared amla pieces were transferred into the syrup. The pieces were completely immersed to ensure uniform absorption of sweetness and flavor. The soaking process was carried out for a specific period to allow proper penetration of syrup into amla pieces. This step is important because it improves taste and texture of the candy.

During soaking, the mixture was occasionally stirred to ensure uniform coating of syrup on all pieces. Proper soaking helps improve sweetness and enhances overall acceptability of candy. The soaking process also helps improve texture and appearance of the final product. Care was taken to avoid excessive soaking, which may lead to over-softening of amla pieces. After soaking, the pieces were removed and prepared for drying.[26]

Figure 6: Soaking of Amla Pieces in Herbal Syrup

Drying of Amla Candy

After soaking, the amla pieces were removed from syrup and placed on drying trays. The pieces were arranged in a single layer to ensure uniform drying. Drying was carried out using tray dryer at controlled temperature. Drying is an important step to reduce moisture content and improve shelf life of candy.

Proper drying helps prevent microbial growth and enhances stability of the formulation. Excess moisture can lead to spoilage and reduce shelf life of candy. Therefore, controlled drying conditions were maintained. The drying process continued until desired moisture level was achieved. After drying, the candies were allowed to cool at room temperature before further processing.[27]

Cooling of Prepared Candy

After drying, the prepared candies were cooled at room temperature. Cooling is necessary before addition of probiotic culture. High temperature may destroy probiotic microorganisms; therefore, cooling was performed carefully. The candies were spread on clean trays and allowed to cool naturally.

Cooling also helps improve texture and firmness of candy. Proper cooling ensures stability and improves appearance of formulation. After cooling, candies were ready for addition of probiotic culture.[28]

Addition of Probiotic Culture

After cooling, probiotic culture (*Lactobacillus*) was added to prepared candies. The required quantity of probiotic powder was weighed accurately. The probiotic culture was sprinkled over cooled candies and mixed gently to ensure uniform distribution.

This step was carried out carefully to avoid damage to probiotic microorganisms. Gentle mixing helps maintain viability of probiotics. The addition of probiotics enhances functional value of candy and improves digestive health benefits. The probiotic enriched candies were then prepared for packaging.[28]

Mixing and Uniform Coating

After addition of probiotic culture, candies were mixed gently to obtain uniform coating. Proper mixing ensures equal distribution of probiotics in all candy pieces. Uniform coating improves consistency and quality of formulation.

Care was taken to avoid excessive mixing which may damage probiotics. Gentle mixing helps maintain viability of probiotic culture. Uniform mixing ensures effectiveness of probiotic candy.[30]

Packaging of Prepared Candy

The prepared probiotic sugar-free amla candies were packed in airtight containers. Packaging was carried out under hygienic conditions to prevent contamination. Airtight containers help protect candies from moisture and environmental contamination.

Proper packaging improves shelf life and stability of formulation. Labels were applied to containers indicating batch number and date of preparation. Packaged candies were stored for further evaluation.[31]

Storage of Formulations

Prepared candies were stored at room temperature for evaluation studies. Storage conditions were

maintained properly to prevent moisture absorption. Samples were stored in clean and dry containers.

Storage study helps evaluate stability of formulation. During storage, candies were observed for changes in color, texture, and taste. Stored samples were used for further evaluation.[32]

Table 3: Formulation Composition

Ingredient	F1	F2	F3
Amla	50 g	50 g	50 g
Stevia	1 g	1.5 g	2 g
Citric Acid	0.5 g	0.5 g	0.5 g
Probiotic	0 g	0.5 g	1 g
Flavor	q.s	q.s	q.s

Evaluation of Probiotic Sugar-Free Amla Candy

The prepared probiotic sugar-free amla candy formulations were evaluated to determine their quality, stability, and suitability for consumption. Evaluation of the prepared candy is essential to ensure that the formulation meets desired standards and is acceptable for consumption. The prepared formulations were evaluated for various parameters such as organoleptic properties, pH, moisture content, texture, and stability. These parameters help determine the quality and shelf life of the final product.

Each evaluation test was performed carefully using standard laboratory procedures. The observations were recorded systematically for each formulation. Evaluation of prepared candy also helps in understanding the physical and chemical characteristics of the formulation. These evaluation tests provide useful information regarding quality, stability, and consumer acceptability of probiotic sugar-free amla candy.[33]

Organoleptic Evaluation

Organoleptic evaluation was carried out to assess the physical appearance and sensory characteristics of the prepared probiotic sugar-free amla candy. A small quantity of candy from each formulation was taken and evaluated visually. The color of candy was observed under normal lighting conditions to check uniformity. The taste of candy was evaluated by chewing a small amount of candy and noting the sweetness and sourness.

Texture of candy was evaluated by pressing and chewing candy pieces to determine softness and hardness. Appearance of candy was observed for uniformity, smoothness, and absence of any defects. Organoleptic evaluation is important because it determines consumer acceptability and quality of formulation.[34]

pH Determination

The pH of prepared probiotic sugar-free amla candy was determined to evaluate acidity and stability of formulation. About 1 g of candy from each formulation was accurately weighed and dissolved in distilled water. The solution was stirred properly to obtain a uniform mixture. The pH meter was calibrated using standard buffer solutions before measurement.

The electrode of pH meter was immersed in the prepared solution and the pH value was recorded. Measurement was repeated for each formulation. The pH determination is important to ensure suitability of candy for consumption and stability during storage. The readings obtained were recorded for further analysis.[35]

Moisture Content

Moisture content of prepared candy was determined to evaluate stability and shelf life. A weighed quantity of candy from each formulation was taken and placed in hot air oven. The samples were dried at controlled temperature until constant weight was obtained. The weight of samples before and after drying was noted.

Moisture content determination is important because high moisture content may lead to microbial growth and spoilage. Low moisture content improves shelf life and stability of candy. The moisture content of each formulation was calculated and recorded.[36]

Texture Evaluation

Texture of prepared candy was evaluated manually by pressing candy pieces. Softness and hardness of candy were observed. Texture evaluation is important because it determines quality and acceptability of candy. Uniform texture indicates proper formulation.

Candy samples from each formulation were evaluated for texture characteristics. Observations were recorded carefully. Texture evaluation helps determine consistency and quality of prepared candy.

Stability Study

Stability study was conducted to evaluate shelf life of prepared candy. Samples were stored at room temperature under suitable conditions. The samples were observed periodically for changes in physical characteristics such as color, texture, and appearance.

Observations were recorded at regular intervals. Stability study helps determine quality of candy during storage. Proper storage conditions help maintain stability of prepared candy formulations.[37]

Statistical Analysis

The data obtained from evaluation parameters were recorded systematically. Statistical analysis was performed to evaluate data obtained from various tests. Mean values and standard deviation were calculated where required. Statistical analysis helps compare different formulations and evaluate consistency of prepared candy.[38]

RESULTS AND DISCUSSION:

Organoleptic Evaluation

Organoleptic evaluation of probiotic sugar-free herbal amla candy was carried out to assess physical appearance and sensory characteristics of prepared formulations. Parameters such as color, taste, texture, and appearance were evaluated. These parameters are important in determining consumer acceptability of the developed candy formulations. The prepared formulations F1, F2, and F3 were examined visually and evaluated manually.

The color of the formulations varied slightly depending on concentration of herbal sweetener and probiotic culture. The taste of candy was pleasant in all formulations due to addition of stevia and natural flavor. Texture of candy was found to be soft and smooth which indicates proper drying and formulation. Appearance of prepared candies was uniform and free from any visible defects.

Table 4: Organoleptic Evaluation of Probiotic Sugar-Free Amla Candy

Batch	Color	Taste	Texture	Appearance
F1	Light Green	Pleasant	Soft	Uniform
F2	Green	Pleasant	Smooth	Uniform
F3	Dark Green	Pleasant	Smooth	Uniform

From the organoleptic evaluation, it was observed that all formulations showed acceptable characteristics. However, formulation F2 showed better uniformity and smooth texture compared to other formulations. The prepared candies were found to be acceptable in terms of color, taste, texture, and appearance.

pH Determination

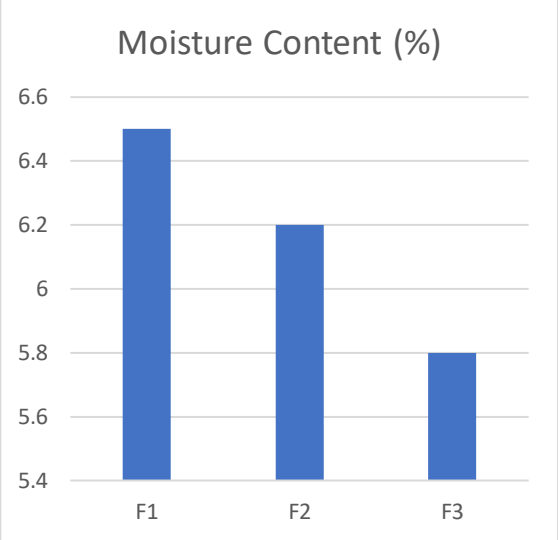
The pH of prepared probiotic sugar-free amla candy was determined to evaluate acidity and stability of formulation. The pH value plays an important role in maintaining stability and shelf life of prepared candy. The pH of candy was determined by dissolving small quantity of candy in distilled water and measuring pH using digital pH meter.

The pH values of all formulations were found within acceptable range. Slight variation in pH values was observed among formulations due to difference in concentration of probiotic culture and citric acid. The acidic nature of candy helps prevent microbial growth and improves stability of formulation.

Table 5: pH Values of Probiotic Sugar-Free Amla Candy

Batch	pH Value
F1	3.2
F2	3.4
F3	3.6

The obtained pH values indicate that prepared formulations were acidic in nature. The increase in pH value from F1 to F3 may be due to higher concentration of probiotic culture in formulation. The pH values obtained indicate that formulations were suitable for consumption and stable during storage.



Graph 6.2: pH Values of Probiotic Sugar-Free Amla Candy

Moisture Content

Moisture content of prepared probiotic sugar-free amla candy was determined to evaluate stability and shelf life of formulation. Moisture content is an important parameter as high moisture content may lead to microbial growth and spoilage. The prepared formulations were analyzed for moisture content using hot air oven method.

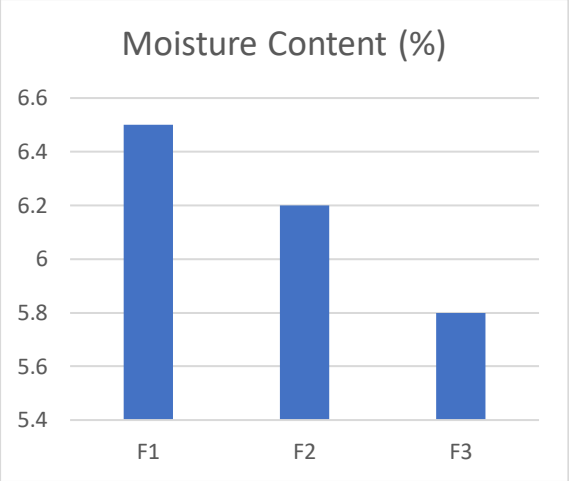
The moisture content of all formulations was found within acceptable range. Slight variation in moisture content was observed among different formulations. The variation in moisture content may be due to difference in drying conditions and formulation composition.

Table 6: Moisture Content of Probiotic Sugar-Free Amla Candy

Batch	Moisture Content (%)
F1	6.5
F2	6.2
F3	5.8

The moisture content results indicate that formulation F3 showed lower moisture content compared to other formulations. Lower moisture content improves shelf life and stability of candy.

The moisture content of prepared formulations was found suitable for storage.



Graph 6.3: Moisture Content of Probiotic Sugar-Free Amla Candy

Texture Evaluation

Texture evaluation of probiotic sugar-free herbal amla candy was carried out to determine softness, smoothness, and consistency of prepared formulations. Texture is an important parameter which affects consumer acceptability and quality of candy. Proper texture indicates uniform formulation and appropriate drying conditions.

The prepared candy samples from formulations F1, F2, and F3 were evaluated manually by pressing and chewing small quantity of candy. Softness and hardness of candy pieces were observed carefully. Uniform texture was observed in all formulations. Slight variation in texture was observed due to difference in concentration of herbal sweetener and probiotic culture.

Table 7: Texture Evaluation of Probiotic Sugar-Free Amla Candy

Batch	Texture	Consistency	Smoothness
F1	Soft	Uniform	Smooth
F2	Soft	Uniform	Very Smooth
F3	Slightly Firm	Uniform	Smooth

The results indicate that formulation F2 showed better smoothness and uniform consistency. Proper texture indicates suitable drying and formulation conditions. Texture evaluation confirmed that prepared candies were acceptable for consumption.

Stability Study

Stability study of probiotic sugar-free herbal amla candy was carried out to evaluate shelf life and stability of prepared formulations. Stability study was conducted by storing prepared candy formulations at room temperature. Samples were observed periodically for changes in color, texture, and appearance.

The stability study was conducted for 30 days. Samples were evaluated at different time intervals such as 7 days, 15 days, and 30 days. Observations were recorded carefully for each formulation. No significant changes were observed in color, texture, and appearance of candy during storage period.

Table 8: Stability Study of Probiotic Sugar-Free Amla Candy

Batch	7 Days	15 Days	30 Days
F1	Stable	Stable	Stable
F2	Stable	Stable	Stable
F3	Stable	Stable	Stable

The stability study indicates that prepared formulations were stable during storage period. Proper drying and packaging helped maintain stability of candy. The prepared candies remained acceptable during storage period.

The prepared probiotic sugar-free herbal amla candy formulations were evaluated for various parameters including organoleptic properties, pH, moisture content, texture, and stability. All formulations showed acceptable characteristics. Slight variation was observed among formulations due to variation in concentration of herbal sweetener and probiotic culture.

Formulation F2 showed better organoleptic properties and uniform texture. Moisture content of formulations was found suitable for storage. pH values of prepared candy were within acceptable range which ensures stability and safety of formulation. Stability study confirmed that prepared formulations remained stable during storage.

The results indicate that probiotic sugar-free herbal amla candy can be successfully prepared using herbal sweeteners and probiotic culture. The developed formulation showed acceptable quality and stability suitable for further use.

7. Future Scope

The developed probiotic sugar-free herbal amla candy shows promising potential as a functional nutraceutical product. The formulation combines the benefits of amla, herbal sweeteners, and probiotic culture, which makes it suitable for health-conscious individuals and diabetic patients. However, there is significant scope for further research and development to enhance the effectiveness and commercial potential of this formulation.

Future research can focus on incorporating different probiotic strains such as *Bifidobacterium* and *Saccharomyces boulardii* to improve digestive and immune health benefits. These additional probiotic strains may enhance the therapeutic value of the

formulation and improve gut health more effectively. Further studies can also be conducted to evaluate probiotic viability during long-term storage and under different environmental conditions.

The formulation can also be improved by incorporating additional herbal ingredients such as ginger, tulsi, or turmeric to enhance antioxidant and immunity-boosting properties. These herbal ingredients may increase the medicinal value of the product and expand its use as a nutraceutical formulation. Additionally, different flavors such as mint, lemon, and orange can be added to improve consumer acceptability and market demand.

Further studies can also be carried out to evaluate microbial stability, shelf life, and packaging optimization. Advanced packaging materials can be used to maintain probiotic stability and improve shelf life. Clinical studies may also be conducted to evaluate the health benefits of probiotic sugar-free amla candy in human subjects.

The developed formulation also has potential for large-scale industrial production and commercialization. This product can be marketed as a functional food, immunity booster, and digestive candy. Therefore, probiotic sugar-free herbal amla candy has wide scope for future development and commercial application in nutraceutical and functional food industries.

These alternative forms may improve convenience, patient compliance, and acceptability among children and elderly populations. Additionally, optimization of drying techniques such as freeze drying or vacuum drying can be investigated to improve probiotic survival and product quality.

Future studies may also focus on nutritional profiling and antioxidant activity evaluation of the developed candy. Evaluation of glycemic index can help confirm its suitability for diabetic patients. Moreover, large-scale production feasibility studies and cost-effectiveness analysis can be conducted to promote commercialization. With increasing demand for herbal nutraceutical products, probiotic sugar-free amla candy has strong potential to be developed as a widely accepted functional food product in healthcare and wellness markets.

8. SUMMARY AND CONCLUSION:

The present study was carried out to formulate and evaluate probiotic sugar-free herbal amla candy using natural ingredients. Amla was selected as the main active ingredient due to its high vitamin C content, antioxidant properties, and various health benefits. The formulation also included herbal sweetener stevia, probiotic culture (*Lactobacillus*), citric acid, and natural flavor. The aim of this study was to develop a functional nutraceutical product suitable for health-conscious individuals and diabetic patients.

The probiotic sugar-free amla candy was prepared using fresh amla fruits. The fruits were washed, blanched, cut, and soaked in herbal sugar-free syrup prepared using stevia and citric acid. After soaking, the amla pieces were dried at controlled temperature. The dried candies were cooled and probiotic culture was added carefully to maintain viability of microorganisms. The prepared candies were then packed in airtight containers and stored for further evaluation.

The prepared formulations were evaluated for various parameters such as organoleptic characteristics, pH, moisture content, texture, and stability. Organoleptic evaluation showed that the prepared candies had acceptable color, taste, texture, and appearance. The pH values of formulations were found within acceptable range indicating stability of candy. Moisture content evaluation showed suitable moisture level which helps improve shelf life. Texture evaluation indicated uniform and smooth texture of prepared candies. Stability study confirmed that prepared formulations remained stable during storage period.

Among all formulations, F2 showed better organoleptic characteristics and uniform texture compared to other formulations. The results obtained from evaluation studies indicated that probiotic sugar-free herbal amla candy can be successfully formulated using natural ingredients. The developed formulation showed good quality, stability, and acceptability.

In conclusion, probiotic sugar-free herbal amla candy was successfully formulated and evaluated. The developed formulation offers nutritional and therapeutic benefits such as antioxidant activity, digestive health improvement, and immunity enhancement. The formulation is suitable for diabetic patients and health-conscious individuals. The developed product also has potential for commercialization as a functional food and nutraceutical product.

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