PHYSICOCHEMICAL, MICROBIAL AND SENSORY CHARACTERISTICS OF ALOE VERA JELLY CANDY

A PROJECT REPORT

BY

MD FUHAD HASAN

ID: 191-34-917

Submitted to the Department of Nutrition and Food Engineering in the partial fulfillment of B.Sc. in Nutrition and Food Engineering

Supervised By

Dr. Nizam Uddin

Associate Professor and Head

Department of Nutrition and Food Engineering

FACULTY OF HEALTH AND LIFE SCIENCES

DAFFODIL INTERNATIONAL UNIVERSITY

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APPROVAL

This Project titled "**Physicochemical, Microbial and Sensory Characteristics of Aloe Vera Jelly Candy"** submitted by **Md Fuhad Hasan** to the Department of Nutrition and Food Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Nutrition and Food Engineering and approved as to its style and contents.

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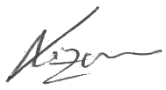

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Dr Nizam Uddin

Head

Department of Nutrition and Food Engineering

Faculty of Health and Life Sciences

Daffodil International University

DECLARATION

I hereby declare that this project has been done by me under the supervision of **Dr. Nizam Uddin**, **Associate Professor and Head**, Department of Nutrition and Food Engineering, Daffodil International University. I also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

Supervised by

Dr Nizam Uddin
Associate Professor and Head
Department of Nutrition and Food Engineering
Faculty of Health and Life Sciences
Daffodil International University

Submitted by

Md Fuhad Hasan
ID: 191-34-917
Department of Nutrition and Food Engineering
Daffodil International University

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ABSTRACT

The study aimed to assess the quality parameters of a jelly Candy prepared with Aloe Vera in terms of moisture, ash, protein, pH, vitamin C, and sensory characteristics over 7 days of storage. The pH level was in the range of (5.66-5.82) throughout the storage period, with the highest level found in Sample 3. The moisture content was in the range of (45 - 52) %; sample 2 found the higher level. The protein content found in sample 2 was in the range of (0.98 to 1.30%). The TSS content ranged from (42-48)^{o} brix with the highest found in sample 2 for the entire storage duration. The values for ash content were in the range of (0.33 to 0.97) %, with the highest observed in sample 3. The fat content found highest in sample 2 ranged between 11.2% and 12.5%. The vitamin C content was in the range of (0.26 to 0.32%), and sample 2 was found to be higher as compared to other samples. It was observed that all samples varied their proximate compositions throughout the storage period. The sensory characteristics of Aloe Vera jelly candy were evaluated in terms of taste, color, flavor, and overall acceptability. At the very beginning sample 1 was found to be the highest in taste, flavor, and overall acceptability, except for color, which was the highest in sample 2, Sample 2 found the highest sensory data, and sample 1 was found to be comparatively higher. Overall, sample 2 was ahead of the other two samples in the entire storage period. All three samples had an initial count of (4×10^3 CFU/ml), which continued to increase in all samples on day 7, with the highest count observed in sample 3 (6.5×10^3 CFU/ml). Therefore, the study suggested that samples 1 and 2 could be produced, but overall sample 2 would be the better choice.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Aloe Vera, a succulent plant belonging to the genus Aloe, has been revered for centuries for its remarkable medicinal and therapeutic properties. With its fleshy, spiky leaves and gel-filled interior, Aloe Vera has found a special place in the realms of traditional medicine, skincare, and even culinary applications. This remarkable plant has been extensively studied and utilized throughout history, gaining popularity in various cultures worldwide. The origins of Aloe Vera can be traced back thousands of years, with its documented use dating as far back as ancient Egypt. The ancient Egyptians referred to Aloe Vera as the "plant of immortality" due to its ability to thrive in harsh desert environments and its purported healing properties. The plant was highly regarded and was often depicted in wall paintings and carvings. Aloe Vera is characterized by its thick, succulent leaves that store a gel-like substance within. This gel contains a plethora of bioactive compounds, including vitamins, minerals, enzymes, amino acids, and polysaccharides. These natural compounds contribute to the numerous health benefits associated with Aloe Vera, making it a popular ingredient in various products. Beyond its external applications, Aloe Vera has also been consumed internally for its potential health benefits. Aloe Vera juice and extracts are used in traditional medicine systems across cultures for digestive health, immune support, and detoxification. In recent years, Aloe Vera has gained significant attention as a functional food ingredient, finding its way into a wide range of products, including beverages, dietary supplements, and confectioneries. Traditionally, Aloe Vera has been used topically to soothe and heal skin ailments, such as burns, wounds, and inflammation. The gel is known for its cooling and moisturizing properties, providing relief and promoting the natural healing process. Additionally, Aloe Vera is believed to possess antimicrobial and antioxidant properties, further enhancing its therapeutic potential (Manvitha & Bidya, 2014).

We delve into the world of Aloe Vera jelly candy, exploring its history, formulation, manufacturing processes, sensory attributes, nutritional composition, and consumer perceptions. Through a comprehensive analysis, we aim to provide insights into the potential of Aloe Vera jelly candy as a functional confectionery product and its implications for the food industry. Through this exploration, we hope to contribute to the existing knowledge and provide valuable insights for researchers, manufacturers, and consumers interested in Aloe Vera and its diverse applications.

1.2 Objectives

- To standardize the of formation of Aloe Vera jelly Candy
- To assess the quality parameter of Aloe Vera jelly Candy
- To evaluate of sensory parameters and consumer acceptance

CHAPTER 2

LITERATURE REVIEW

2.1 Aloe Vera

The use of natural products in the prevention and treatment of oral conditions has increased recently and could be of benefit to low socioeconomic levels in urban and rural communities among the various currently available herbal agents the most popular and currently receiving a lot of scientific attention is Aloe Vera. The name Aloe Vera is derived from the Arabic word "Alloeh" meaning "shining bitter substance," while "Vera" in Latin means "true". The plant Aloe Vera has a history dating back to biblical times. It is a perennial succulent xerophyte, which develops water-storage tissue in the leaves to survive in dry areas of low or erratic rainfall. The plant has stiff grey-green lance-shaped leaves containing clear gel in a central mucilaginous pulp. Benefits associated with Aloe Vera have been attributed to the polysaccharides contained in the gel of the leaves. There are over 250 species of Aloe grown around the world (Sung, 2006).

2.2 Aloe vera jelly candy

Aloe Vera jelly candy is a confectionery product that combines the natural goodness of Aloe Vera with the sweet and chewy texture of jelly candy. This literature review aims to provide an overview of the existing scientific literature on Aloe Vera jelly candy, focusing on its formulation, manufacturing processes, sensory attributes, nutritional composition, and consumer perceptions. The formulation of Aloe Vera jelly candy involves the incorporation of Aloe Vera gel or juice into a gelatin-based candy matrix. Studies have explored different approaches to optimize the formulation, including the selection of gelatin type, Aloe Vera concentration, and the addition of other ingredients such as sweetener flavor, and colorants. Manufacturing processes, such as gelatin hydration, heating, and mixing, have also been investigated to ensure the successful incorporation of Aloe Vera while maintaining the desired texture and sensory attributes of the jelly candy.

2.3 Nutrition value

The nutritional value of Aloe Vera candy can vary depending on the specific formulation and ingredients used. However, here is a general overview of the potential nutritional components that can be found in Aloe Vera candy:

- **Calories**: Aloe Vera candy typically contains calories derived from carbohydrates, which provide energy. The calorie content may vary depending on the serving size and formulation of the candy.
- **Carbohydrates:** Aloe Vera candy is primarily composed of carbohydrates, typically in the form of sugars. These carbohydrates provide a sweet taste and contribute to the energy content of the candy. The specific types and amounts of carbohydrates can vary based on the formulation and any additional sweeteners used.
- **Proteins:** Lectins, lectin-like substance

- **Saccharides:** Mannose, glucose, L-rhamnose, aldopentose
- **Fiber:** Aloe Vera itself contains a certain amount of dietary fiber, which may be retained in the candy. The fiber content in Aloe Vera candy can contribute to the overall nutritional value and may offer potential digestive benefits.
- **Inorganic compounds:** Calcium, chlorine, chromium, copper, iron, magnesium, manganese, potassium, phosphorous, sodium, zinc(Foster et al., 2011).

2.4 Micronutrients

2.4.1 Vitamins

Aloe Vera contains various vitamins, including:

- **Vitamin C:** Aloe Vera can be a good source of vitamin C, which is an antioxidant and plays a role in immune function, collagen synthesis, and wound healing.
- **Vitamin E:** Aloe Vera may contain vitamin E, another antioxidant that helps protect cells from oxidative damage.
- **Vitamin B12:** Aloe Vera gel has been found to contain traces of vitamin B12, although it is not a significant source for meeting dietary requirements. Other B vitamins: Aloe Vera may contain small amounts of other B vitamins, such as thiamine (B1), riboflavin (B2), niacin (B3), and folic acid (B9).

2.4.2 Minerals

Aloe Vera also provides various minerals, including:

- **Calcium:** Essential for bone health, nerve function, and muscle contraction.
- **Magnesium:** Which is involved in energy production, muscle function, and maintaining healthy bones.
- **Potassium:** An electrolyte that helps regulate fluid balance, muscle contractions, and nerve signals.
- **Zinc:** An essential mineral involved in immune function, wound healing, and DNA synthesis.
- **Copper:** Which is involved in the production of red blood cells and collagen synthesis.
- **Sodium:** Which is an essential electrolyte for maintaining fluid balance and nerve function.
- **Iron:** Aloe Vera gel can contain traces of iron, although it is not considered a significant source for meeting iron requirements(Owoade & Adeoye, 2016).

2.5 Health Benefits

Aloe Vera is widely recognized for its potential health benefits. While further research is still needed to fully understand and validate these effects, here are some of the potential

health benefits associated with aloe Vera:

- **Skin Health:** Aloe Vera has long been used for skincare due to its moisturizing, soothing, and healing properties. It can help alleviate various skin conditions such as sunburns, rashes, acne, eczema, and psoriasis. Aloe Vera's anti-inflammatory and antimicrobial properties may contribute to its beneficial effects on the skin.
- **Wound Healing:** Aloe Vera gel has been found to aid in wound healing by promoting tissue regeneration and reducing inflammation. It can be effective in treating minor burns, cuts, and abrasions. Aloe Vera gel may also help accelerate the healing process and minimize scar formation.
- **Digestive Health:** Aloe Vera has been traditionally used to support digestive health. It may help alleviate symptoms of gastrointestinal disorders such as acid reflux, indigestion, and irritable bowel syndrome (IBS). Aloe Vera may have a soothing effect on the digestive tract and promote regular bowel movements.
- **Immune Support:** Some studies suggest that aloe Vera may have properties, meaning it can help regulate the immune system. It may enhance immune function and support the body to defend against infections. Aloe Vera's antioxidant content may also contribute to its immune-supportive effects.
- **Oral Health:** Aloe Vera gel may be beneficial for oral health. It can help reduce inflammation and promote healing in the gums, potentially aiding in the treatment of gum disease and reducing plaque accumulation. Aloe Vera-based mouthwashes or gels may help freshen breath and maintain oral hygiene.
- **Antioxidant Effects:** Aloe Vera contains several antioxidants, including vitamins C and E, as well as other compounds with antioxidant properties. Antioxidants help protect cells from oxidative stress and damage caused by free radicals. This can have a positive impact on overall health and may help reduce the risk of chronic diseases.
- **Blood Sugar Management:** Some research suggests that Aloe Vera may have a positive effect on blood sugar levels. It may help improve insulin sensitivity and regulate blood glucose levels in individuals with type 2 diabetes. However, more studies are needed to confirm these effects and determine the appropriate dosage and usage(Mikołajczak et al., 2018).

CHAPTER 3

MATERIALS AND METHODS

3.1 Materials

3.1.1 Sample collection and preparation.

Figure 1: Aloe Vera

All the materials used to make the Aloe Vera Jelly Candy were bought from the market, Dhaka Bangladesh. In the laboratory, raw materials were weighed according to the form of emulation Aloe Vera stored at freezing temperature. Other raw ingredients were packed in polyethylene bags until use.

3.1.2 Raw materials

Aloe Vera, Sugar, water

3.1.3 Chemical and Reagent

Gelatin/Agar, citric acid, color, flavorings

Table 1 : Formulation of Aloe Vera jelly Candy

Ingredients	Sample 1 (%)	Sample 2(%)	Sample 3(%)
Water	4.5	4	4.2
Aloe Vera	35	33	32
Sugar	50	53	48
Gelatin/Agar	7.5	8	10
Citric Acid	2	1.5	1
Color	1	0.5	1

3.2 Method

- Step 1: Collect fresh Aloe Vera leaf.
- Step 2: Clean the aloe vera leaf properly.
- Step 3: Blanch the aloe vera less than 85℃ for 1.5 minutes.
- Step 4: Cooling at room temperature.
- Step 5: Extraction of Aloe Vera gel.

- Step 6: Mixing with sugar and water.
- Step 7: Blending Properly.
- Step 8: Heat up for cooking properly.
- Step 9: Mixing of agar properly by exact quantity.
- Step 10: Cook till getting the exact consistency.
- Step 11: Cooling at freezing temperature.
- Step 12: Packaging

3.3 Physicochemical properties

3.3.1 Determination of total soluble solid (TSS)

Figure 2 : Hand Refractometer

A hand refractometer was used for the determination of total soluble solids content. One drop of Aloe Vera jelly candy and water combined juice squeezed from the candy was placed on the prism of the Refractometer and the percent total soluble solid was obtained from scale directly.

3.3.2 Determination of Fat

The fat percentage of Aloe Vera jelly Candy was determined according to the method reported by AOAC (2005) with few modifications. Weigh a clean, dry, and empty thimble of Soxhlet apparatus and record its weight (W1). Transfer enough of the combined drink sample into the thimble and weigh it accurately. Record the weight (W2). Place the thimble with the sample into the Soxhlet apparatus and add enough solvent, such as petroleum ether or hexane, to cover the sample completely. Heat the apparatus, and the solvent will evaporate and condense in the condenser, creating a cyclical process that will extract fat from the sample. Allow the extraction process to continue 6 hours until the solvent level in the flask reaches a steady state. This will ensure that the fat in the sample has been completely extract. After the extraction is complete, remove the thimble from the Soxhlet apparatus and allow it to dry at room temperature for a few minutes. Weigh the thimble with the extracted fat and record the weight (W3) Place the thimble with the extracted fat into a drying oven and dry it at a constant temperature of around 105°C to remove any residual solvent. After the fat has been completely dried, remove the thimble from the oven, allow it to cool at room temperature, and weigh it again (W4).

Calculated the fat content of the combined drink sample using the following formula:

Fat content (%) = [(W3 - W1) / (W2 - W1)] x 100

3.3.4 Determination of Vitamin C

The vitamin C of Aloe Vera Jelly Candy was determined according to the method reported by Nagar & Rastogi (2022) with few modifications. Prepare a standard solution of iodine by dissolving potassium iodate (KIO3) in water and adding excess potassium iodide (KI) to react with the iodate to produce iodine. The standard solution can be standardized by titrating it with a known amount of ascorbic acid (vitamin C) to determine its concentration. Measure 10 ml of the Aloe Vera Candy solution into a conical flask using a pipette, add a few drops of starch indicator solution to the flask. Titrate the sample with the standard iodine solution from a burette until the blue color of the iodine persists for at least 30 seconds. The endpoint is the point at which the blue color persists, indicating that all the

Ascorbic acid in the sample has been oxidized by the iodine. Record the volume of the iodine solution used to reach the endpoint (in ml). Repeat the titration two more times to obtain three concordant results (results that are within 0.1 ml of each other). Calculate the average volume of iodine solution used (in ml) and use it to calculate the amount of ascorbic acid (in mg) in the 10 ml of Aloe Vera jelly candy solution. Amount of (vitamin C) mg

$$= \frac{\text{The volume of iodine solution used} \times \text{concentration of iodine solution} \times 88}{\text{Sample volume}}$$

3.3.5 Determination of Ash

Determination ash percentage of Aloe Vera jelly candy was determined according to the method reported by AOAC (2005) with some modifications. Weigh the empty crucible and record its weight as W1. Weigh a representative sample of the substance to be tested and record its weight as W2. Place the sample into the crucible and heat it to a temperature of 500- 600°C for 4-6 hours until all organic matter is burned off. After cooling the crucible to room temperature in a desiccator, weigh it with the ash residue and record the weight as W3. Calculate the weight of the ash by subtracting the weight of the empty crucible (W1) from the weight of the crucible with the ash residue (W3 - W1 = W4).

$$\% \text{ of Ash} = \frac{(W3 - W1) \times 100}{W2}$$

3.3.6 Determination of Moisture Content

The moisture content of the Aloe Vera jelly candy sample was determined using the hot oven method empty crucible. Then (3gm) of each sample was put into a washed and dried crucible dish and weight and placed in a Phoenix oven (Preiser model, New York, USA) at 105°C for 1 hour until the weight was constant. The samples were cooled in a desiccator and weighed. The weight loss was obtained as the moisture content and was calculated.

$$\% \text{ of Moisture} = \frac{(w - x) \times 100}{z}$$

Where, W = Crucible + sample weight (g); X = Crucible +dry sample weight (g); Z = sample weight (g).

3.3.7 Determination of pH

Take the Sample in a Beaker. Keep the pH meter in it. Note down the reading.

Figure 3: pH meter

3.3.8 Determination of Protein

Determination of protein of Aloe Vera jelly candy was done according to the method reported by AOAC (2005) with few modifications. A 5-gm sample was taken in a 250ml Kjeldahl flask. 2 gm of digestion mixture was added to the sample. 25 ml of concentrated sulfuric acid was added for oxidation. The flask was placed in an inclined position on the stand in the digestion chamber, heated continuously until frothing ceased, and then simmered briskly. The solution became clean in 15-20 min., and continued heating for 45 min. After cooling, 100 ml water was added and transferred quantitatively to a 1-liter round bottom flask; the final volume was about 500 ml. Added gently down the side enough NaOH solution to form a precipitate as cupric hydroxide and immediately connected the flask to stream-trap and condenser. To a 500 ml conical receiving flask 50 m l of boric acid solution, 50 ml distilled water and 5 drops of indicator solution were added. Positioning the condenser distillation was carried out for 40 to 45 minutes or until about 250 ml of distillate was obtained. The contents of the receiving were filtrated with hydrochloric acid, the endpoint was marked by a pink color. A reagent blank was also determined and deducted from the titration.1 ml of 0.1N hydrochloric acid contain = 0.0014 g of N2. A protein conversion factor of 6.25 was used to calculate the percent protein from nitrogen determination.

The percentage of nitrogen and protein was calculated by the following equation:

$$\text{Nitrogen} = \frac{(Ts - Tb) \times N \text{ of Acid} \times \text{meq. of } N2 \times 100}{\text{weight of sample taken}}$$

Where, Ts =Titer volume of the sample (ml), Tb =Trite volume of the blank (ml), Meq. of N2 = 0.014.

% Protein = % nitrogen × conversion factor (6.25)

3.4 Sensory Evaluation

Sensory characteristics of Aloe Vera jelly candy sample was carried out on 21 days of room temperature storage. Semi-trained fifteen panel members were selected from the University students. Randomly, the samples were presented to the panel members. Aloe Vera jelly candy was evaluated organoleptic ally for color flavor taste and overall acceptability, according to the hedonic scale of nine points (9-like extremely to 1- dislike extremely) as reported by Utomo et al. (2014).

3.5 Microbial quality analysis

The total plate count of Aloe Vera jelly candy according to the method reported by Sidhu et al., (2016) with few modifications. For serial dilution, 1 ml sample was transferred into 9 ml distilled water and then mixed thoroughly.10^{-1},10^{-2},10^{-3},10^{-4},$10^{-5}$and 10^{-6} dilutions of the Aloe Vera samples were prepared. Then 0.1 ml of aliquot was taken from each dilution and spread on the agar plates. After that, the petri dishes were then incubated at 37 o C for 48 hours. The plates were then placed on a colony counter and the number of bacterial colonies was recorded. The total plate count (TPC) of samples was calculated using the following formula.

Calculation:

$$\text{Total Plate Count (CFU)} = \frac{(\text{No. of Colonies} \times \text{Dilution}}{\text{factor ml aliquot taken}}$$

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Results

4.1.1 Physicochemical Properties

Table 2: Physicochemical characteristics of Aloe Vera Jelly Candy

Characteristics	Sample 1		Sample 2		Sample 3	
	Day 0	Day 7	Day 0	Day 7	Day 0	Day 7
Moisture%	45±1.61	42.53±7.8	43±0.94	42.29±1.19	43±2.26	43.7±0.40
Protein%	1.14±0.03	0.95±0.38	1.06±0.43	0.98±0.44	1±0.018	1±0.024
TSS (Brix%)	40±2	37.33±1.1	41.33±1.4	42.67±1.49	41±0.82	42.67±0.4
Ash %	0.33±0.1	0.34±0.2	0.32±0.04	0.33±0.02	0.36±0.02	0.36±0.01
Fat (%)	10± 2	10± 1.5	9±3	11±1.03	12±2	9±1
Vitamin C%	0.13±0.02	0.1±0.02	0.9±0.01	0.12±0.2	0.8±0.48	0.11±0.06
Sub Total%	96.6	91.25	95.61	97.39	98.16	96.84
*CHO%	3.4	8.75	4.39	2.61	1.84	3.16
Total%	100	100	100	100	100	100
pH	5.60±0.05	5.71±0.20	5.67±0.03	5.68±0.01	5.7±0.01	5.82±0.01

*CHO; Carbohydrates = 100 - (moisture + protein + TSS + ash + fat + vitamin C)% (Ubwa et al. 2014).

Table 3: Sensory score of Aloe Vera jelly Candy

Storage Period (day)	Sample	Taste	Flavor	Color	Overall acceptability
0	1	8±0.5	7.05±1.00	7.50±0.05	6.95±0.50
	2	9±0.5	7.05±1.05	8.50±0.05	8.50±0.50
	3	8.0±0.5	7.05±0.5	7.50±1.00	7.50±0.50
7	1	7.5±1.00	6.5±1.50	7.0±1.00	7.50±0.50
	2	8.5±0.5	7.50±1.00	7.50±1.00	8.50±0.50
	3	7.5±1.5	8.00±1.00	7.00±1.00	7.5±1.00

Table 4: Total plate count (TPC) of Aloe Vera jelly Candy

Days	Sample	TPC (CFU /ml)
0	1	5×10^3
	2	4×10^3
	3	5×10^3
7	1	$5\times 10^3\ to\ 6\times 10^3$
	2	$4\times 10^3\ to\ 5\times 10^3$
	3	$6\times10^3\ to\ 7\times10^3$

4.2 Discussion

Table 2 shows the physicochemical characteristics of Aloe Vera jelly Candy under room temperature with 7 days storage condition. At day 0, the pH of sample 2 was found to be

5.67. As the storage period progressed, the pH increased for all three samples. On day 3, the pH of sample 1 was found to be the highest at 5.80. By day 7, the pH of all three samples increased, with sample 2 having the pH at a balanced 5.75.

At day 0, sample 1 had the highest moisture content, with a value of 72.63 %, followed by sample 3 with 63.07 %, and sample 1 with 71.55 %. The standard deviations indicate that there is some variability within each sample, which could be due to sampling error, measurement error, or natural variability in the product. At day 7, the moisture content of all samples decreased, with sample 1 having the highest moisture content at 68.53 %, followed by sample 2 with 64.29 %, and sample 3 with 59.73 %. The decrease in moisture content could be due to evaporation or other factors such as changes in temperature or humidity. It is unclear why the moisture content of sample 1 and sample 2 increased at this time point, but it could be due to changes in the storage conditions or product composition. According to the (USDA Food Data) the moisture percentage is 92 % per 133 g of food.

At 0-day, sample 2 had the highest protein percentage value of 1.16, followed by sample 3 (1.0) and sample 1 (1.04). This indicates that sample 2 had the highest initial protein content among the three samples. After 7 days, the protein percentage values decreased for all three samples. Sample 2 had the highest value (1.25), followed by sample 3, (1.00) and sample 1(0.90). However, it is important to note that the standard deviation for sample 1 is very high, indicating that the values for this sample are highly variable and may not be reliable. At 14 days, sample 2 had the highest protein percentage value (1.32), followed by sample 2 (1.23) and sample 3 (1.10). This indicates that sample 2 had the highest protein content at this time point. At 7 days, the protein percentage values decreased for all three samples. Sample 2 had the highest value (1.25), followed by sample 2(0.856) and sample 3, (0.8567). Sample 1 had the highest protein content at this time point as well. In summary, the data indicates that the protein content of all three samples decreased over.

At 0 days, sample 1 had the highest TSS value 46 followed by sample 2, (42.33) and

sample3 (42). However, the TSS value for sample 1 is very low, which could be an outlier or indicate a problem with the sample. After 7 days, the TSS values decreased for all three samples. Sample 3 had the lowest value (40.33) followed by sample 2 (44.67) and sample 1 (43.67). Sample 1 had the highest TSS value at two time points, while sample 3 had the lowest TSS value at two time points. The TSS values for sample 2 were generally in the middle range. According to the United States, the Food and Drug Administration (FDA) has established standard Brix ranges for some types of candy is over 35 to 60. For jelly candy, the standard Brix range is 40 to 50 Used little more sugar to reduce the sour test that why TSS is increased.

At 0 days, all three samples had similar ash percentages, with sample 3 having the highest value (1.33), followed by sample 1 (0.33) and sample 2 (0.34) After 7 days, the ash percentages for all three samples remained relatively consistent, with sample 3 having the highest value (1.3), followed by sample 1 (0.33) and sample 2 (0.34) The data indicates that the ash percentages for all three samples remained relatively consistent over time, while sample 3 had the highest value at 0 days and remained relatively consistent over time. The ash content of candy can varies widely depending on the ingredients used.

At 0 days, the fat content ranged from 10% to 12.5%, with sample 1 having the lowest fat content and sample 2 having the highest. At 7 days, the fat content of sample3 increased significantly to 10.64%, while the fat content of samples 2 and 3 decreased slightly to 11.65% and 12.63%, respectively. The data suggests that the fat content of the samples varied over time, samples showing increases in fat content while others showed decreases or remained relatively constant. Candy typically contains less than 2g of fat per serving According to the (USDA Food Data) the fat content of a candy can varies widely depending on the ingredients used. In general, candies that are made primarily from leaf are likely to have a very low-moderate fat content.

At 0 days, all three samples had relatively vitamin C content, with sample 2 having the highest at 0.12%. By 7 days, there was a decrease in vitamin C content across all samples. Sample 1 had the largest decrease, dropping from 0.8% to 0.95%, while sample 2 remained the highest at 0.12%. The percentage of vitamin C present in a candy can vary depending on the type of Candy(USDA food data, 2016).

The sensory characteristics of Aloe Vera jelly Candy under room temperature storage condition was shown in table 3. here sensory attributes like color, flavor, test, and overall acceptability were evaluated under 21 days of storage at 7 days interval periods. However, in terms of specific sensory characteristics, there were some differences between the samples and over time. For flavor, sample 3 had the highest scores at 0 days, but the scores for all samples tended to decrease over time. Sample 2 had the highest scores for taste at 0 and 7 days, but the scores for all samples tended to decrease over time. Sample 2 had the highest scores for color at all time points, indicating that it was the most visually appealing sample. At day 0, the product had an overall acceptability score of 8.0, indicating that it was generally acceptable to the panelists. The taste, texture, and color scores were all above 7, which suggests that the product had good sensory characteristics at the start of the study. As the storage time increased, there were changes in the sensory characteristics of the

product. After 7 days of storage, the texture score decreased to 7.81, indicating that the product had become less desirable in terms of its texture. The color score also decreased slightly to 8.5 the overall acceptability score increased slightly to 7.0 but this increase may not be significant enough to warrant any practical importance.

Table 4 shows the microbial quality of Aloe Vera under room-temperature storage conditions. The data represents the levels of CFU (colony-forming units) per gram of sample over a period of 7 days. The samples were taken at 0 days, 7 days. CFU is a measure of the number of viable microorganisms in a sample. At 0 days, all three samples had the same level of CFU, which was 4×10^3 CFU/ml. This indicates that the initial bacterial load was the same in all three samples. At 7 days, there was a slight increase in the CFU levels for all three samples. Sample 1 and Sample 2 increased by $1\times CFU\times10^3$/ml while Sample 3 increased by 1.5×10^3CFU/ml. This increase could be due to the natural growth of the

Bacteria in the sample. This indicates that bacterial growth in Sample 3 was more rapid compared to the other two samples. Based on this data, it can be concluded that bacterial growth occurred in all three samples over the 7 days. However, the rate of growth differed between the samples, with Sample 3 showing a more rapid rate of growth compared to the other two samples.

CHAPTER 5

CONCLUSION

5.1 Conclusion

In this study, physicochemical properties include pH, moisture content, protein content, TSS (total soluble solids or brix), ash content, fat content, and vitamin C content of a certain sample over different storage periods (0, 7 days). The sample was measured and recorded thrice for each storage period, denoted as Sample 1, 2, and 3. The pH of the sample ranged from 5.68 to 5.82. The protein content ranged from 0.80% to 1.38%, with the highest value observed at day 7 for Sample 2. The TSS content ranged from 42% to 52%, with the highest value observed at day 0 for Sample 3. The ash content ranged from 0.32% to 0.33%, with the highest value observed at day 7 for Sample 2. The fat content ranged from 09% to 13%, with the highest value observed at day 2 for Sample 2. The vitamin C content ranged from 0.26% to 0.32%, with the highest value observed at day 0 for Sample 2.the result of sensory parameters ranged color (8.0 to 8.50) flavor (7.50 to8) taste (7 to 8) and overall acceptability (7.50 to8.50) The TPC found range from (4×10^3CFU /ml to 7×10^3CFU/ml). In summary, the results of this study suggest that Aloe Vera jelly Candy can be a valuable addition to the diet, providing numerous health benefits and a unique flavor profile. With further research and development, this combination has the potential to become a popular, and a healthy alternative to other sugary or artificially sweetened candy on the market.

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APPENDICES

Appendix 1

Physicochemical properties Aloe Vera jelly Candy under storage condition (0 days)

Parameter	Replication	Sample 1	Sample2	Sample 3
pH	1	5.60	5.60	5.80
	2	5.73	5.60	5.60
	3	5.50	5.83	2.84
Brix %	1	42	46	48
	2	44	42	19
	3	40	44	21
Vitamin c %	1	0.22	0.23	0.19
	2	0.20	0.22	0.20
	3	0.19	0.19	0.18
Moisture%	1	45	42	50.32
	2	42	40	50.80
	3	40	42	45.89
Ash %	1	0.32	0.34	0.35
	2	0.33	0.32	0.32
	3	0.35	0.36	0.37
Protein %	1	0.98	1.00	1.25
	2	1.05	1.08	1.15
	3	1.17	1.26	1.05
Fat %	1	11	10	11
	2	10	11	10
	3	09	10	12
TPC (CFU /ml)	1	4×10^3	4×10^3	5×10^3
	2	4×10^3	4×10^3	6×10^3
	3	5×10^3	5×10^3	7×10^3

Appendix 2

Physicochemical properties Aloe Vera jelly Candy under storage condition (7 days)

Parameter	Replication	Sample 1	Sample2	Sample 3
pH	1	5.67	5.78	5.45
	2	5.76	5.80	5.79
	3	5.80	5.60	5.80
Brix %	1	44	44	43
	2	46	45	44
	3	42	43	42
Vitamin C %(mg/100g)	1	0.26	0.28	0.30
	2	0.25	0.31	0.28
	3	0.19	0.29	0.28
Moisture%	1	45	40	42
	2	40	42	50
	3	42	45	51
Ash %	1	0.30	0.33	0.32
	2	0.31	0.29	0.29
	3	0.33	0.32	0.31
Protein %	1	0.98	1.01	0.98
	2	1.25	1.22	1.21
	3	0.98	0.95	0.88
Fat %	1	10	10	09
	2	12	11	10
	3	09	10	13
TPC (CFU /ml	1	6×103	6×103	6×103
	2	5×103	5×103	5×103
	3	5×103	7×103	7×103

Appendix 3

Sensory characteristics of Aloe Vera jelly Candy under 0-day storage

Sample1					Sample 2						Sample 3	
Panelists	**Taste**	**Color**	**Flavor**	**Overall Acceptability**	**Taste**	**Flavor**	**Color**	**Overall Acceptability**	**Taste**	**Flavor**	**Color**	**Overall Acceptability**
1	8	7	5	6	8	7	9	8	8	7	8	7
2	7	8	7	7	8	8	7	7	7	7	8	7
3	6	5	8	6	7	9	6	7	9	6	9	8
4	9	9	6	8	8	8	8	8	9	8	6	7
5	6	7	5	6	7	9	9	8	8	9	7	8
6	7	9	7	7	9	5	6	6	6	8	6	6
7	5	7	8	6	6	5	9	6	7	7	5	6
8	7	8	8	7	8	9	8	8	8	8	8	8
9	8	8	6	7	9	6	9	8	9	6	8	7
10	6	7	8	7	8	8	7	7	7	7	6	6
11	8	6	5	6	9	7	9	8	8	8	8	8
12	7	7	7	7	6	6	7	6	8	7	8	7
13	9	8	9	8	8	8	8	8	8	8	9	8
14	5	8	8	7	8	8	5	7	9	9	5	7
15	6	7	8	7	8	7	5	6	7	7	8	7

Appendix 4

Sensory characteristics of Aloe Vera jelly Candy under (7 days) storage

Sample 1					Sample 2				Sample 3			
Panelists	**Taste**	**Color**	**Flavor**	**Overall Acceptability**	**Taste**	**Flavor**	**Color**	**Overall Acceptability**	**Taste**	**Flavor**	**Color**	**Overall acceptability**
1	9	7	5	8	8	7	9	8	8	7	8	7
2	8	9	5	8	8	8	7	7	7	7	8	7
3	5	5	8	6	7	9	6	7	9	6	9	8
4	6	6	7	6	8	8	8	8	9	8	6	7
5	8	7	5	6	7	9	9	8	8	9	7	8
6	9	9	7	8	9	5	6	6	6	8	6	6
7	8	4	8	6	6	5	9	6	7	7	5	6
8	8	7	8	7	8	9	8	8	8	8	8	8
9	6	8	7	7	9	6	9	8	9	6	8	7
10	7	7	8	7	8	8	7	7	7	7	6	7
11	6	6	6	6	9	7	9	8	8	8	8	8
12	8	8	8	8	6	6	7	6	8	7	8	7
13	8	9	7	8	8	8	8	8	8	8	9	8
14	7	7	7	7	8	8	5	7	9	9	5	7
15	9	8	5	7	9	6	8	7	7	8	8	7