

Development And Quality Assessment of Tomato Candy

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Abstract

Tomato is one of the most important edible and nutritious vegetable in the world. The aim of the research was to “Develop the Preparation and Standardization of tomato candy’s” and to standardize tomato candy using Sugar Solutions and cornflour, as well as to investigate the impact of the sugar solution on tomato candy features. Moisture, ash, protein, fat, vitamin C, total sugar, treatment Fiber, quality, and microbiological state of produced confectionery were all examined. tomato candy has the maximum nutrient and sensory score, as well as the lowest microbial load, when compared to sweets made with 60% tomato puree and 40% sugar solution. Based on the sensory analysis, Sample1 exhibited more favourable sensory characteristics compared to Sample 2 and Sample 3. As they are low calorie fruit that is high in fibre.

Keywords:

Tomato candy, sugar solution, standardization quality, nutritional composition, sensory analysis, microbial load.

Introduction

Tomato (*Solanum lycopersicum*) holds significant importance in nutrition as a widely cultivated fruit. Its rich flavour, vibrant colour, and diverse culinary applications have earned tomatoes a prominent place in the human diet. Not only are tomatoes versatile in various cuisines, but they also possess health-promoting properties. (Barman, S.C.2007).

Tomatoes are a good source of vitamin C and vitamin A equivalents (in the form of β -carotene) and also provide some vitamin E, folic acid, potassium and other trace elements. Protein and dietary fibre are also present, although the major constituent is water, comprising 94-95% of the fruit by weight (Davies & Hobson 1981).

Tomato candy, an innovative and unique confection, has gained attention in recent years as a creative twist on traditional candy-making. With its blend of natural sweetness, vibrant colour, and tantalizing flavours, tomato candy offers a delightful surprise for the taste buds. (Rismunandar et al. 1984).

Typically, fruits and vegetables do not have a long storage life, and tomatoes are similarly vulnerable to damage. One major issue that often arises on the surface of tomatoes is fungal growth. While fresh tomatoes usually stay fresh for 3-4 days without any preservation system, tomato candies can endure for approximately 6 months. Tomato candy is more attractive to consumers due to its practicality and

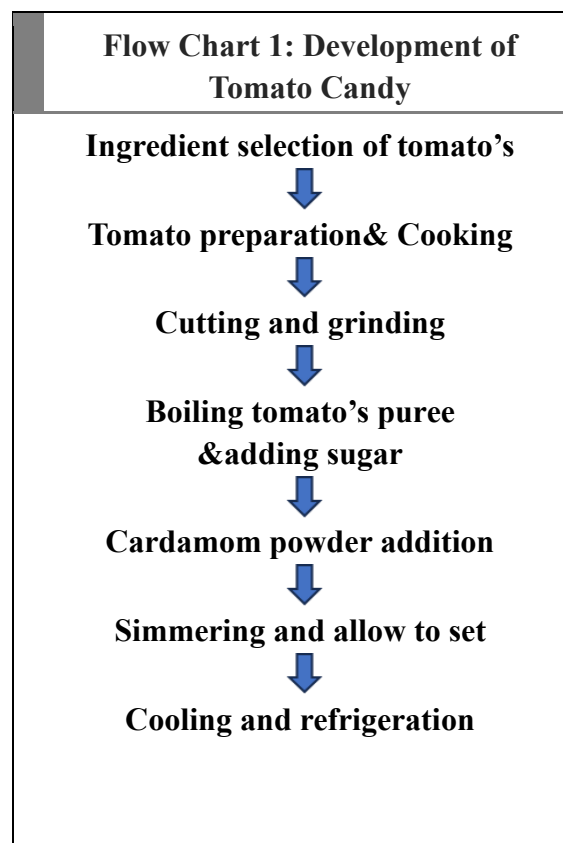
extended shelf life. Furthermore, it contains a significantly higher number of nutritive elements compared to apples and demonstrates superiority in terms of food values (*Carl Linnaeus et al., 1753*). This research aims to explore the nutritional composition of tomatoes, their potential health benefits, and their role in preventing chronic diseases.

MATERIALS AND METHODS

Raw Materials procurement

Mature ripe tomatoes and sugar was used to prepare the candy and were collected from the local markets of Hyderabad. The sample was packed in polyethylene bag and stored at refrigeration temperature in airtight box at the laboratory until use. Consider the below ingredients quantities for the candy preparation are 250g of tomatoes, 4-5 tbsp of sugar, 4-tbsp cornflour, 1-tbsp cooking oil, Dried coconut powder

Basic Procedure:



Preparation of tomato candy

Firstly, Raw materials were collected. The collected tomatoes were washed to remove any impurities. Then boiled the tomatoes for 2 mins in water. Then remove the peel of tomatoes and grind it. Now boil the tomato puree for 3-4 minutes and add sugar and strill it well. Add some cardamom powder. Now add cornflour in the puree boil it for some time until sticky consistency. Once done, shape it and serve.

Tomato candy Formulation

Three variations were formulated; the percentage will be changes with tomato puree, corn flour and sugar concentration (Table 1).

Table. 1: Variation in Candy Formulation

Sample	Tomato's	Corn flour	sugar
Sample 1	50 g	20 g	70 g
Sample 2	60 g	15 g	60 g
Sample 3	70 g	20 g	50 g

Sensory Evaluation

The sensory evaluation was carried out for the prepared tomato candy sample using a 5-point hedonic scale with panel of 20 judges considering six parameters such as colour, texture, taste, aroma, appearance, and overall acceptability. (Gilbert *et al.*, 2000).

Methods

Proximate analysis is a set of methods used to determine the nutritional composition of a food sample. It involves the measurement of various components such as moisture, protein, fat, carbohydrates, fiber, and ash.

Moisture Determination

The AOAC:925.10 21st Edition method is the method used to determine the amount of water present in the tomato candy. The moisture determination procedure outlined in AOAC 925.10 involves sample preparation, drying, cooling, and weighing. Formula to calculate is Moisture content (%) = [(Initial weight - Final weight) / Initial weight] × 100. W1 is the initial weight of the sample before drying. W2 is the weight of the sample after drying. (Buntaran W, Astirin PA, *et al.*, 2009)

Ash Determination

The FSSAI (Food Safety and Standards Authority of India) Manual of Cereal & Cereal Products provides guidelines and standards for various aspects of cereal and cereal product analysis, including ash determination. This method has different steps like preparation, weighing, incineration, ashing, cooling and weighing. Calculate the ash content using the following formula: Ash content (%) = (Weight of ash / Weight of the sample) × 100. (Md. Kamruzzaman, 2014)

Fat Determination

The AOAC International (Association of Official Agricultural Chemists) method is AOAC 922.06, which is used for the determination of fat in food samples. The method involves weighing, extraction, drying, Gravimetric determination. The formula for calculating the fat content using the AOAC 922.06 method is as follows: Fat (%) = (Weight of extracted fat / Weight of sample) × 100. (Mahajoeno M. *et al.*, 2009).

Protein Determination

IS:7219-1973 refers to the Indian Standard (IS) specification for the determination of protein in food products. The Kjeldahl method is a widely accepted reference method for protein determination. It involves the steps like Digestion, Distillation, Titration. The amount of nitrogen in the sample is determined from the volume of hydrochloric acid used in the titration. Proteins contain about 16% nitrogen; the protein content can be calculated by multiplying the nitrogen content by a conversion factor. (Artur zdunek, 2022)

Carbohydrates determination

Involves quantifying the total amount of carbohydrates present in a food sample, including sugars, starches, and dietary Fibers. Carbohydrates and fiber can be determined by difference after subtracting the sum of moisture, ash, fat, and protein. (James N. Bemiller, 2017).

Fiber content

The Fiber determination method described in IS:10226 Part 1:1982 is based on the gravimetric method, which involves the sample preparation, digestion, filtration, washing. Calculate the fiber content as a percentage based on the weight of the dried Fiber residue and the weight of the original sample. (M.Camara, 2011)

Nutritional Evaluation:

Table:2: The Nutrition evaluation of selected Tomato candy

Test Parameter	Method
Carbohydrates	IFSH/SOP/C/TE/142
Protein	IS:7219-1973
Moisture	AOAC:925.10 21 st Edition
Ash	FSSAI Manual of Cereal & Cereal Products
Fat	AOAC. 922.06
Crude Fibre	IS:10226 Part 1:1982

Microbial analysis:

Microbial analysis such as total plate count was carried out 15 days of study by procedure followed by Indian Standard method.

Statistical Analysis:

Mean and standard deviation performed on Data obtained from sensory analysis.

RESULT AND DISCUSSION

Sensory Evaluation:

In 5 point hedonic scale Sensory evaluation of treatment of Tomato candy showed in Table 3. Sample 1 showed Colour 4.6, Texture 4.45, Aroma 4.4, Taste 4.5, Appearance 4.5 and Overall acceptability 4.7; whereas Sample 2 showed Colour 3.95, Texture 3.6, Aroma 3.9, Taste 3.5, Appearance 3.8 and Overall acceptability 3.7; coming to Sample 3 showed Colour 4.4, Texture 4.1, Aroma 4.3, Taste 4.1, Appearance 4.5 and Overall acceptability 4.5 respectively.

Table 3: Sensory Analysis of Tomato Candy with Different Treatments

Sample	Colour	Texture	Aroma	Taste	Appearance	Overall Acceptability
Sample 1	4.6±0.372	4.45±0.51	4.4±0.51	4.5±0.51	4.5±0.35	4.7±0.41
Sample 2	3.95±0.55	3.6±0.46	3.9±0.3	3.5±0.46	3.8±0.61	3.7±0.34
Sample 3	4.4±0.41	4.1±0.44	4.3±0.35	4.1±0.51	4.5±0.42	4.5±4.5

Values are presented as means and standard deviation

Among all the samples of tomato candies, Sample 1 showed highest sensory score by trained panel members. Hence sample 1 was accepted for further analysis.

Nutrition Analysis of tomato candy:

The nutrition analysis of selected sample showed in Table 4. Carbohydrate 81.16 g/100g, 0.65 g/100g of protein, 11.45 g/100g of moisture, less than 0.10 g/100g of ash, 6.64 g/100 g of fat content, 0.40 g/100 g of crude Fiber.

Table 4: Nutritive value of tomato candy

Test Parameter	Result	Unit of Measurement
Carbohydrates	81.16	g/ 100 g
Protein	0.65	g/ 100 g
Moisture	11.45	g/ 100 g
Ash	<0.10	g/ 100 g
Fat	6.64	g/ 100 g
Crude Fibre	0.40	g/ 100 g
Microbial Analysis of Tomato Candy After 16 Days Storage		
Total Plate Count	145	Cfu/g

Microbial analysis of tomato candy after 16 days storage

The selected tomato candy was kept for 15 days of storage. In selected tomato candy the microbial growth was not observed till the end of the storage period and the total plate count is 145 cfu/g. By total platelet count test parameter. According to the IS (Indian standard) methods, the acceptable limit for the total plate count is 145 cfu/g.

CONCLUSION

The selected tomato candy was highly acceptable in terms of sensory properties such as colour, texture, aroma, taste, appearance, and overall acceptability. The selected tomato candy was found to be highly nutritional, and the selected sample was also found acceptable microbiological levels within the specified limit by total plate count. The candy can be a valuable of healthy diet and regulates blood pressure, synthesises cholesterol and reduce production of bad cholesterol. The people with any cardiovascular diseases are advised to include tomatoes in their daily diet.

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