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Preparation and Evaluation of Graviola Leaf Cookies

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Abstract: *Graviola leaves cookies is a medicinal food product. Graviola (Annona muricata) is a small deciduous tropical evergreen fruit tree, belonging to the annonaceae family. Graviola leaves cookies was made from wheat flour, milk, sugar, butter, and graviola leaf. Different variations of the product were tried with different proportion and quantity to make the cookies. The ratio of graviola leaves were changed from 5: 7: 10 while preparing the product. The chemical parameters, Nutritional – analysis, Shelf- life study and Sensory characteristics were investigated for the standard products. Based on nutritional analysis the product has all the essential macro nutrient and phytochemicals particularly high in iron and zinc. The prepared product has shelf life up to 10 days. The sample product has no difference in look and taste compared normal cookies. The cookies are well accepted among all age group. It can definitelybe consumed instead of normal cookie with added health benefits.*

Keywords: Graviola leaves, medicinal properties, cookies, phytochemicals

I. INTRODUCTION

Cookies are popular snacks widely consumed all over the world by people of all ages and traditionally made from soft wheat and are nutritious and convenience foods with longer shelf life [1]. This is typically small, flat and sweet made from flour, sugar, egg, and oil, fat, orbutter. It also includes other ingredients such as raisins, oats, chocolate chips, nuts, etc. instead we attempted a cookies with graviola leaf. Graviola (*Annona muricata)* is a small deciduous tropical evergreen fruit tree, belonging to the Annonaceae family [2]. All parts of the Graviolatree are known to be effective against various human diseases such as cancer and parasitic infections. In particular, Graviola leaves were found to be effective against cystitis, diabetes, headache, insomnia, and inflammation [3, 4]. The graviola leaf cookies have comparatively highly nutritious than the normal cookies. Hence the formulated cookies can be consumed by all age groups as sweet medicinal food product

II. MATERIALS AND METHODS

ROLE OF INGREDIENTS

Preparation of Standardized Graviola Leaf powder

Graviola leaves, grown in the local area, were obtained from. Then leaves are dried in hot air oven at 120^0c for 1hr and leaf ground to fine powder (Biotech.), which can be demonstrated for human dietary supplements [5].

Wheat flour

Wheat *(Triticum spp.)* is a cereal grain, (botanically, a type of fruit called a caryopsis) originally from the Levant region of the Near East but now cultivated worldwide [6]. Wheat, the major raw material for baking and it is a good source of carbohydrates and vitamins.

Butter

Butter is a water - in - oil emulsion with a minimum fat content of 80%, in which water contentshould not exceed 16% and non - fat milk solids generally constitute 2%. There is a substantialannual consumption of butter worldwide and world production of butter is as high as 4.1 million tons per annum [7].

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Butter is a high-energy food, containing approximately 715 calories per 100 grams. It has a high content of butterfat, or milk fat (at least 80 percent), but is low in protein. Butter hassubstantial amounts of vitamin A and minimal amounts of calcium, phosphorus, and vitamin D.

Sugar

Granulated sugar is pure refined sucrose derived from either sugarcane or sugar beets. Granulated sugar has small, evenly sized crystals, and it is the most commonly used sugar in the bakeshop [8].

Milk

Milk is an essential component of the diet of billion people. The world production of milk reaches 730 million tons. Even though mammals produce milk to feed their offspring, inmany areas of the world humans continue to consume milk throughout their life. Milk, that is,cow's milk, is composed of about 87% water; it also contains, on average, 3%–4% fat, 3.5% protein, about 5% lactose, and 1.2% minerals, with some variation depending on the breed considered [9].

Cashew nut

Cashew is a highly nutritious and concentrated form of food, providing a substantial amount of energy. The cashew nut kernel has a pleasant taste and flavour and can be eaten raw. The overall composition of the kernel is protein 21%, fat 46% and carbohydrates 25%.

Baking powder

Baking powder is a mixture of bicarbonate of soda and an acid (the leavening agents) and a starch. It may be double- or single-acting [8].Double - acting baking powders contain a mixture of a fast - acting leavening acid like MCP (monocalcium phosphate monohydrate) and a slow - acting leavening acid like SAPP (sodium acid pyrophosphate). They react partially at low temperatures and partially at high temperatures to provide uniform leavening throughout processing [10].

III. FORMULATION AND PREPARATION OF GRAVIOLA LEAVES COOKIES

The Graviola leaves cookies was prepared with variation as Variation I and Variation II and Variation III which is given in table.

INGREDIENTS	VARIATION -I	VARIATION -II	VARIATION -III
Wheat flour	150	150g	150g
Butter	75g	75g	75g
Icing sugar	75g	75g	75g
Graviola leaves powder	5g	7g	10g
Milk	50ml	50ml	50ml
Cashew nut	10g	10g	10g
baking powder	5g	5g	5g
Salt	2g	2g	2g

Table – 1 Variation and Ingredients of proportion for Graviola leaves cookies

Flow chart for preparation of graviola leaves cookies

Collecting graviola leaves
↓
Washing
↓
Drying (120^{0}c for 50 minutes in hot air-oven)
↓
Powdering

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↓
Mixing the ingredients
↓
Shaped to cookies
↓
Pre – heating (160^0c for 10 minutes in micro oven)
↓
Baking (160^0c for 30 minutes)
↓
Cooling and packaging
↓
Storage
↓
Process photograph

Fig 3.2.1 Graviola leaves

Fig 3.2.2 Baking process

Fig 3.2.3 Gravila leaves cookies

IV. CHARACTERISTICS

Sensory Evaluation of the graviola leaves cookies

Graviola leaves cookies was prepared from the developed product and it was organoleptic ally analysed by panel of 20 members on an Excellent, very good, good, Fair, Poor point hedonic scale. The parameters analysed were colour, appearance, texture, taste, flavour and overall acceptability. The score obtained from the sensory evaluation were calculated and average score was taken to find the most acceptable product.

Quality Testing of the graviola leaves and final products

Quality is a degree to which a set of inherent characteristics fulfils requirements. The totality of characteristics of a product or service that bear on its ability to satisfy and implied needs. Quality testing can be of Chemical parameters

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test, Phytochemicals qualitative test, Nutritional analysis and Shelf- life study test. Those testing provide adequate confidence that a product or service will satisfy the consumer needs

Chemical parameters

The checking toxicity analysis for raw graviola leaf was done using In-house test method.

Phytochemicals Qualitative analysis

The checking phytochemical qualitative analysis for raw graviola leaf was done using phytochemical methods.

Nutritional analysis

The nutrient content of Energy, Protein, Carbohydrates, fat, Dietary Fibre, Iron, Calcium and Vitamin- B complex been analysed using FSSAI manual of method.

Shelf – life study

The shelf – life was tested by using Total Plate Count (TPC) method.

V. RESULT AND DISCUSSION

Sensory evaluation

The graviola leaf powders 5: 7: 10 variations method followed to prepared for graviola leaves cookies. The prepared variation 7g: 10g two variations bitter tasted, so not consider thattwo variation. More acceptable product was variation I and hence it is been analyzed for othersquality parameters.

Criteria	Variation I	Variation II	Variation III
Colour and Appearance	3.95±1.15	2.85±1.23	2.60±1.27
Texture	3.65±1.23	2.95±1.39	2.80±1.32
Taste	4.35±0.88	3.00±1.26	2.79±1.08
Flavor	4.00±1.25	2.75±1.16	2.80±1.28
Overall acceptability	4.15±0.75	2.90±1.29	2.80±1.01

Table – 2 Mean sensory scores of the Graviola leaves cookies

Quality Testing of the graviola leaves and final products

Chemical parameters

On checking toxicity analysis for Lead, Cadmium, Chromium, Nickel, Copper which are considered to be toxic substance are not present in the graviola leaf. So, it can be used for human consumption and presence of Iron and Zinc are also present in good level.

SL. No	PARAMETERS	TEST METHOD	UNIT	RESULT
1.	Lead	Inhouse method	mg / kg	2.56
2.	Cadmium	Inhouse method	mg / kg	BLQ(LOQ:0.1)
3.	Chromium	Inhouse method	mg / kg	BLQ(LOQ:0.1)
4.	Nickel	Inhouse method	mg / kg	BLQ(LOQ:0.1)
5.	Copper	Inhouse method	mg / kg	6.50
6.	Iron	Inhouse method	mg / kg	1.36
7.	Zinc	Inhouse method	mg / kg	67.6

Table – 2 Chemical Parameter

Phytochemicals Qualitative analysis

The checking phytochemical qualitatitative analysis for graviola leaf. Flavonoids, Terpenoids, Alkaloids, Phenolic compounds, Tannins, Cardiac glycosides, and Saponins whichsubstance are present and Steroids it's not present.

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Phytochemicals -Qualitative analysis			
SL. No	Name of the Test	Result	Test Method
1.	Flavonoids	Present	Phytochemicalmethods
2.	Terpenoids	Present	
3.	Alkaloids	Present	
4.	Phenolic Compounds	Present	
5.	Tannins	Present	
6.	Cardiac Glycosides	Present	
7.	Saponins	Present	
8.	Steroids	Absent	

Table – 3 Phytochemicals Qualitative analysis

Nutrient analysis

`Nutrient content of graviola leaves cookies are high in level. Calcium and Iron of cookies is in good manner and very attractive. Based on the nutritional value given below:

QUANTITATIVE ANALYSIS			
SL. No	**PARAMETER**	**RESULT**	**TEST METHOD**
1.	Energy	485kcal	FSSAI Manual ofMethods
2.	Protein	10.8gm/100gm	
3.	Carbohydrate	56gm /100gm	
4.	Fat	24.2gm /100gm	
5.	Dietary Fiber	6.7gm /100gm	
6.	Iron	8.5gm /100gm	
7.	Calcium	90gm /100gm	
8.	Vitamin B Complex	5.8gm /100gm	

Table – 4 Nutrient analysis

Shelf – life study

Shelf-life was tested for 1st, 7th and 15th days. On chewing microbial between 1st and7th day the cookies was at good quality. Focusing at 15th day microbial growth was found to be 10x101CFU/g, without adding preservatives shelf-life was lasted for week. So, within one week .the products will be in good condition.

Fig.5.2.4.1 1st day Total Plate Count

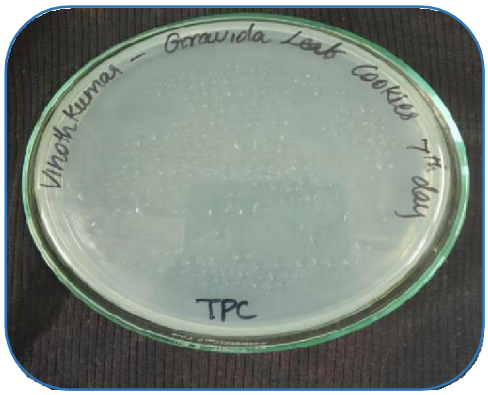

Fig.5.2.4.2 7th day Total Plate Count

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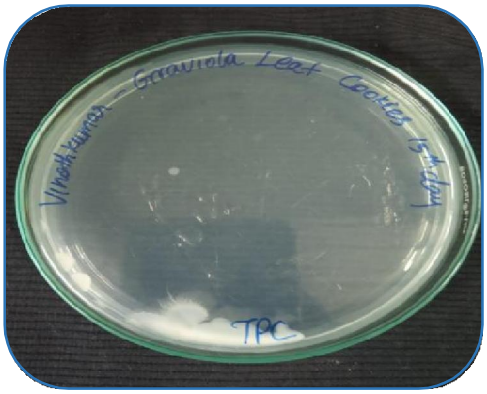

Fig.5.2.4.3. 15thday Total Plate Count

MICROBIOLOGICAL ANALYSIS				
Sl. No	**PARAMETER**	**1st day**	**7th day**	**15th day**
1.	Total Plate count	0CFU/g	0CFU/g	10x10^{1} CFU/g

Table – 5 Microbiological Analysis

VI. SUMMARY AND CONCLUSION

Graviola leaves cookies formulated were known to have potential health benefits since,it was rich in all macro and micro nutrients compared to normal cookies. It is used by a Graviola leaves powder a key ingredient with other regular ingredients. On examining the prepared product there is no difference in appearance and taste compared with normal cookies. The sensory evaluation was done with 20 people in the basis of 5 hedonic scales. The prepared product (variation I) was found to be acceptable by all sensory panel members by comparing all variations. Hence, the formulated cookie would be an healthy snack option for all age groups.

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