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"Development of Spicy Cookies By Adding Jamun Seed Powder"

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Abstract : The study of spicy cookies was developed by using wheat flour, jamun seed powder, butter, Whole milk, chili powder, turmeric powder, cumin seed, curry leaves ,coriander leaves, salt, Baking soda , Baking powder to the improve the quality and quantity of spicy cookies. In Spicy Cookies preparation different levels of jamun seed powder and wheat flour used for making delicious spicy cookies with maximum amount of protein , fiber, Vitamin, minerals and carbohydrates. Finally selected T2 or 10% jamun seed powder of spicy cookie on the basis of higher score of sensory evaluation such as color, texture, flavor, overall acceptability. The final spicy cookiescontain1.74%moisture,2.69% ash,8.45%protein,4.51%crudefiber,7.93% fat,77.82% carbohydrates, 6.24 % minerals & 416.46% total energy. Spicy cookies shelf life was 60days on the basis of the microbial study, From61 days ,microbial result count increases fromout of the range. Finally Spicy cookies shelf life was 60days safely as per our study. Spicy cookies can be recommended to the diabetic patient. No any sugar or jaggary added in spicy cookies hence it is good for children's, adult and diabetic patients.

Key Words: (JS) Jamun Seed ,Physical–Chemical and microbial analysis, Spicy Cookies, Wheat flour.

1. Introduction

Cookies, among the products, are most significant in the world. These are an important food product used as snacks by children and adults cookies differ from other baked product like bread and cake because of their low moisture content which ensure that they are free from microbial spoilage and confer a long shelf life on the product Jamun (syzygium cumini) known as Indian blackberry has long been as a traditional medicine to cure various life style diseases such as diabetes, cardiovascular disease, age related macular degeneration anti-bacterial Free radical scavenging, anti-diarrheal, gastro protective, anti-inflammatory and others. Jamun fruit are rich in vitamin, minerals and carbohydrate. The main phyto chemicals found in Jamun fruit are anthocyanin have shown antagonistic activity to same bacteria, virus and fungi and also protect food from microbial spoilage Jamun is 70 % edible glucose and fructose are major sugar found in a ripe jamun and Provides fewer calories compared to other fruit. Researchers have studied the nutritional aspects and applications of jamun seed (JS) in various food matrices to determine the valorization potential of Jamun seed. Jamun seeds have been utilized to treat diabetes and

digestive problems in Ayurvedas inceancient times. Currently, the health-promoting properties of JS s are being confirmed and many bioactive compounds responsible for it, including phenolics, terpenoids, phloroglucinol derivatives and saponins, have been identified. Intensive research on biological potentials ongoing and the seed extracts, extract fractions, and isolated compounds are being tested for antidiabetic antioxidant, anti- inflammatory, anticancer, antimicrobial, cardio protective, hepato protective and neuro protective properties. Moreover, the jamun seeds have been found to contain nutrients (Singh *et.al,* 2022)

Jamun seed powder contains some essential minerals and trace elements having especially high quantities of iron. Two other important minerals present are potassium and calcium. Moderate quantities of sodium, magnesium and phosphorus are also present (Priyanka. A.A. *et.al*, 2015)

Jamun seed powder has a low-to-medium protein content, high dietary fiber content, and calcium, thus forming a good blend with whole wheat flour for functional cookies, biscuits, and cakes. Cookies fortified with JS powder at 30% showed the highest acceptability in terms of organoleptic quality and an increase in carbohydrate (15%), protein (1.5%), and fat content (8.6%).In their study on JS powder-enriched multigrain cookies, reported a concentration-dependent increase in fiber (84%), calcium 2time, iron (7%), and potassium(17%). ,In their study on JS-incorporated noodles, established an effect ton cooking time, physical properties (weight and volume), nutritional composition, and organoleptic properties. A significant improvement in the quality of noodles, with a 23.5%increase in weight, 50% increase in volume, and 9% decrease in cooking loss, along with an increase in nutritional value with respect to carbohydrates(~1.5%),crude fiber (66%), and minerals (~115%), was reported in the resulting functional product. An appreciable increase in antioxidant activity in terms of total phenolics (27%), total flavonoids (400%), and carotenoids (220%). (Santos *el.al.* 2020)

Wheat (Triticumasetivum-L) constituent as major sources of most of the diet in the developing countries including India, China, Russia, Pakistan. Wheat is consumed primarily as sources of carbohydrate and protein. Whole wheat flour contained moisture content;12.0, protein;10.0, lipids(fat);1.6, carbohydrate; 72.6, fibers;1.3 and ash; 1.49 g/100g respectively. Whole wheat flour contained 43mg ca, 284mg p and 45mg iron. Wheat is the major source contributor of protein content of daily diet. The major factor for the suitability

of wheat varieties for making different types of bakery products is the ability to form gluten network. Gluten the protein component of flour which gives the dough elasticity and strength. (Preeti.*el.al*. 2016)

Milk is widely consumed, thus the fortification of milk and milk-products could provide vital nutrition to a large proportion of the world's populace. Milk is a natural highly nutritious food that contains all 10 essential amino acids, as well as fats, and important minerals and vitamins. However, milk, has low concentrations of some important vitamins and minerals including iron. Increasing the quantity of some of these micronutrients could improve dietary balance and health in malnourished individuals. (McCollum EV)

Butter is a mechanical agglomeration of fat that contains at least 80% of fat, at most 16%ofwater, 0.5%ofproteinas well as 0.5% of carbohydrates, in addition to fat-soluble vitamins and minerals, making it a product of high caloric and nutritive content (Méndez-Cid *et al.*, 2017).

Chili (Capsicum annuum L.) is an important spice needed throughout the world. Chili is one type of vegetable that has particularly rich in organic micro component and antioxidant variations (Alam.et.al. 2018). Several studies have shown that these compounds have therapeutic benefits such as anticancer, anti-bacterial, analgesic, anti-inflammatory, antitumor, and antiviral (Sricharoen et al., 2017).

2. Material and Methodology The methodology will be applied as follows:

Raw Materials forcookies : All purpose whole wheat flour ,Butter ,Whole milk, Jamun seed powder, cumin seed, chili powder, green coriander, origano, turmeric powder, Curry leave, baking soda ,baking powder, salt .

Raw material will be analysis for proximate analysis (moisture, ash, protein, fat, carbohydrate, Crude fiber, Minerals as per (AOAC, 2000) method.

2.1 Preparation of Cookies

Sieved Whole whole wheat flour, Butter, Whole milk , jamun seed powder were mixed together in a planetary mixer for a cream ingredient and then flour added together indesired quantizes the uniform mixture was obtained then to form dough. the dough was rolled and form uniform shape of cookies and baked in oven .

1) Whole Wheat Flour : Wheat flour made from wheat grain, this was main ingredients of cookies. Wheat four was obtained from local market.

2) Butter: Butter is the ingredients used in preparation of cookies. Butter was obtained from local market.

3) Jamun Seed Powder: Jamun seed powder made from jamun seed. This is beneficial for diabetic patient in reduction of sugar level in blood. Jamun seed powder has good antimicrobial, antioxidant & antibacterial properties.

4) Milk: Buffalo milk used for preparation of cookies

5) Baking Soda & Baking powder: Baking soda & baking powder were used for baking & puffing purposes in preparation of cookies.

6) Spicy Ingredients: Cumin seed, chili powder, green coriander, origano, turmeric powder, Curry leave, salt were ingredients used in preparation of cookies for spicy flavor, nutrition & good taste.

2.2 Flow Diagram

Selection of Ingredients
⇩
Mixed butter & Jamun seed powder & spicy material
⇩
Then mixed milk slowly during making dough
⇩
Mixed it properly
⇩
Make the Dough
⇩
Rolled the dough & cookies were cut
⇩
Baking in oven at 160 degree C for 25 minute
⇩
Packaging

2.3 Formulation

CS - 100% Whole wheat flour cookies + Other Ingredients (control).

T1 - 95% Whole wheat flour cookies + 05% Jamun seed powder + Other Ingredients.

T2 - 90% Whole wheat flour +10% jamun seed powder + Other Ingredients.

T3 - 85% Whole wheat flour +15% jamun seed powder + Other Ingredients.

T4 - 80% Whole wheat flour + 20% jamun seed powder + Other Ingredients.

3. Final Result and Discussion

Table No.1 Chemical Analysis Of Trials

PARAMETER	CS	T1	T2	T3	T4
Moisture	1.69%	1.71%	1.74%	1.88%	2.02%
Ash	2.58%	2.61%	2.69%	2.75%	2.71%
Protein	8.25%	8.15%	8.45%	8.69%	8.94%
Crude Fiber	4.42%	4.33%	4.51%	4.63%	5.02%
Fat	7.80%	7.98%	7.93%	7.30%	7.40%
Carbohydrate	85.82%	75.80%	77.82%	81.95%	87.55%
Total Minerals	4.01%	5.97%	6.24%	7.01%	7.77%

After preparation of cookies, as the amount of moisture was an increase from 1.69% to 2.02%.Carbohydrate, protein & minerals content also increases respectively. Ash , Crude fiber & fat content also vary respectively. Totally five samples trial taken with physical – chemical analysis. This is the chemical analysis of Spicy cookies in graphical form.

3.1 Shelf Life Analysis :

The Development of Spicy cookies from jamun seed powder sample were packed in LDPE packaging material under ambient temp. for 60 days has evaluate.

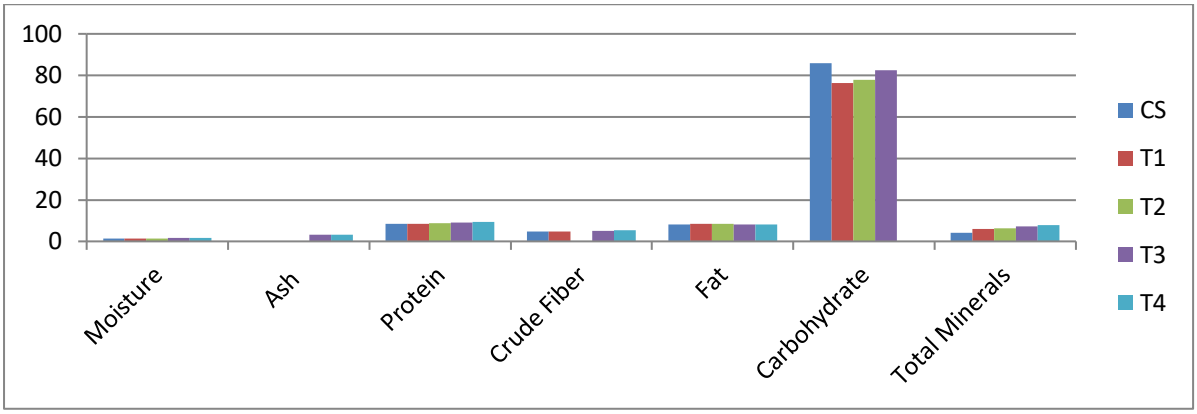
Table no.2 Zero days chemical analysis

Days	Parameters	CS	T1	T2	T3	T4
0	Moisture	1.35%	1.47%	1.41%	1.57%	1.6%
	Ash	2. 75%	2. 83%	2. 86%	3.11%	3.17%
	Protein	8.53%	8.55%	8.77%	9.13%	9.3%
	Crude Fiber	4.76%	4.72%	4. 83%	5.03%	5.43%
	Fat	8.17%	8.51%	8.53%	8.2%	8.27%
	Carbohydrate	85.72%	76.15%	77.92%	82.4%	87. 85%
	Total Minerals	4.2%	6.1%	6.35%	7.17%	7.7%

In this study, All samples such as CS,T1,T2, T3,T4 contains moisture increases from 1.35% to 1.6%,Ash increases from 2.75% to 3.17%, protein increases from 8.53% to 9.3%,Crude fiber increases 4.7% to 5.43%, Fat increases from 8.17% to 8.27% ,Carbohydrates increases from 85.72% to 87.85%.

Total minerals increases from 4.2% to 7.7%.

Graph No.1 Zero days chemical analysis



These is the graphical representation of the Zero days chemical analysis.

Table no.3 Fifteen days chemical analysis

Days	Parameters	CS	T1	T2	T3	T4
15	Moisture	1.45%	1.55%	1.52%	1.63%	1.71%
	Ash	2.71%	2.77%	2.79%	3.05%	3.09%
	Protein	8.49%	8.44%	8.72%	9%	9.2%
	Crude Fiber	4.7%	4.66%	4.77%	4.96%	5.37%
	Fat	8.1%	8.42%	8.44%	8.12%	8.15%
	Carbohydrate	85.9%	76.3%	78%	82.5%	87.92%
	Total Minerals	4.24%	6.2%	6.45%	7.28%	7. 90%

In this study, All samples such as CS,T1,T2, T3,T4 contains moisture increases from 1.45% to 1.71%,Ash increases from 2.71% to 3.09%, protein increases from 8.49% to 9.2% ,Crude fiber increases 4.7% to 5.37%, Fat increases from 8.10% to 8.15% ,Carbohydrates increases from 85.90% to 87. 92%, Total minerals increases from 4.24% to 7.90%.

Graph No.2 Fifteen days chemical analysis

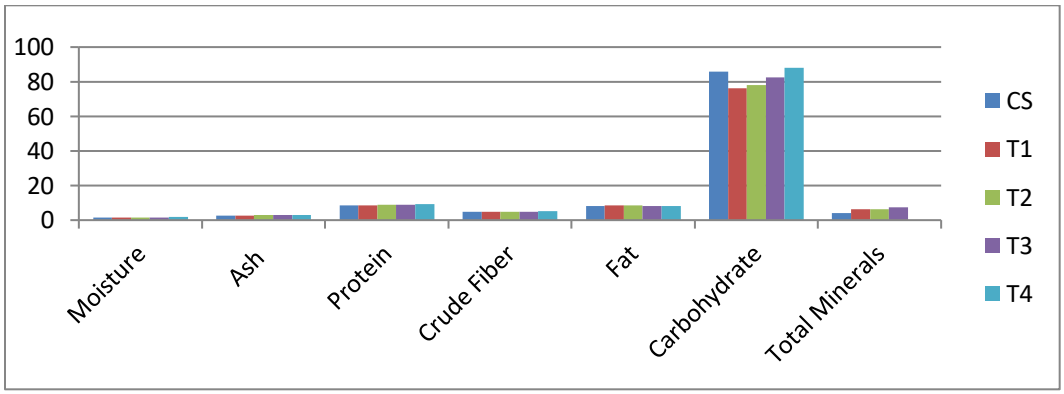


Table no.4 Thirty days chemical analysis

Days	Parameters	CS	T1	T2	T3	T4
30	Moisture	1.51%	1.6%	1.58%	1. 70%	1. 81%
	Ash	2.67%	2.7%	2. 84%	2.98%	2.94%
	Protein	8.44%	8.36%	8.66%	8.9%	9.14%
	Crude Fiber	4.6%	4.55%	4.7%	4.9%	5.3%
	Fat	8%	8.36%	8.4%	8%	7.9%
	Carbohydrate	86%	76.5%	78.2%	82.7%	88%
	Total Minerals	4.2%	6.18%	6.42%	7.25%	7. 88%

In this study, All samples such as CS,T1,T2, T3,T4 contains moisture increases from 1.51% to 1. 81%, Ash increases from 2.67% to 2.94% , protein increases from 8.44% to 9.14% ,Crude fiber increases 4.6% to 5.3%, Fat increases from 8% to 7.9% ,Carbohydrates increases from 86% to 88%. Total minerals increases from 4.2% to 7.88%.

Graph No.3 Thirty days chemical analysis

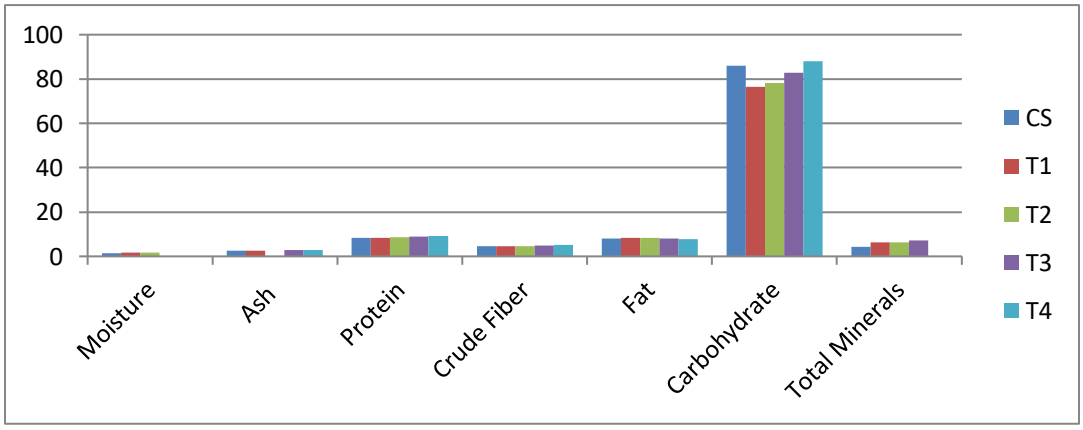


Table no.5 Forty Five days chemical analysis

Days	Parameters	CS	T1	T2	T3	T4
45	Moisture	1.57%	1.65%	1.62%	1.79%	1.9%
	Ash	2.6%	2.66%	2.76%	2. 88%	2. 80%
	Protein	8.3%	8.25%	8.56%	8.74%	9%
	Crude Fiber	4.48%	4.4%	4.56%	4.72%	5.16%
	Fat	7.86%	8.1%	8%	7.45%	7.5%
	Carbohydrate	85.92%	76%	77. 92%	82.05%	87.4%
	Total Minerals	4.12%	6.1%	6.36%	7.12%	7.7%

In this study, All samples such as CS,T1,T2, T3,T4 contains moisture increases from 1.57% to 1.9%, Ash

increases from 2.6% to 2.80%., protein increases from 8.3% to 9% ,Crude fiber increases 4.48% to 5.16%, Fat increases from 7.86% to 7.5%,Carbohydrates increases from 85.92% to 87.4%, Total minerals increases from 4.12% to 7.7%.

Graph No.4 Forty Five days chemical analysis

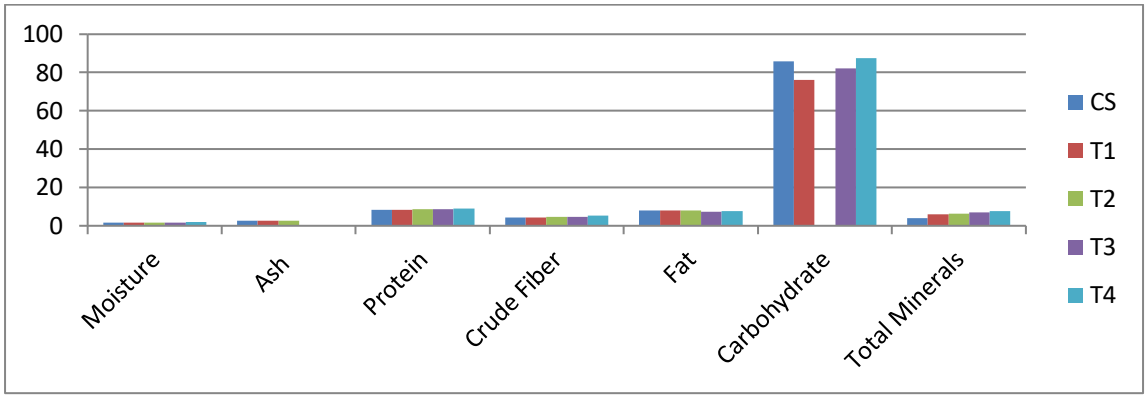
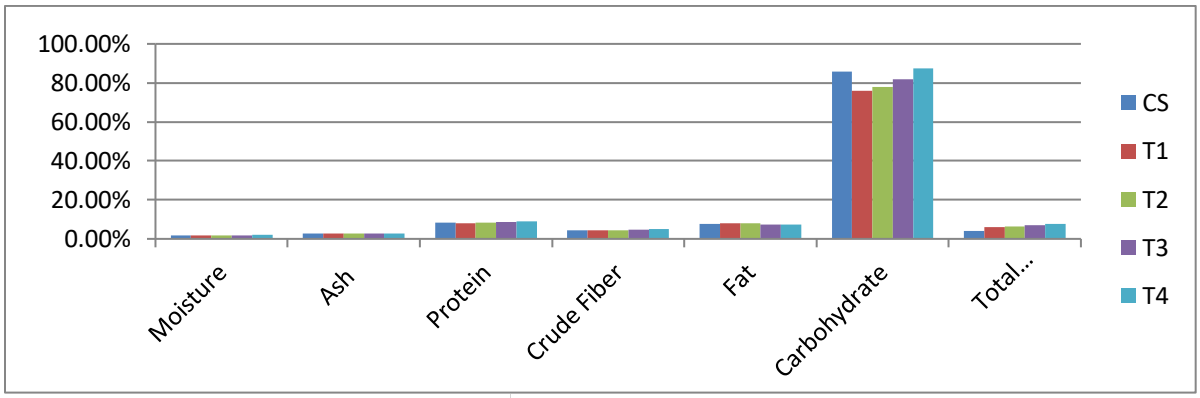


Table no.6 Sixty days chemical analysis

Days	Parameters	CS	T1	T2	T3	T4
60	Moisture	1.69%	1.71%	1.74%	1.88%	2.02%
	Ash	2.58%	2.61%	2.69%	2.75%	2.71%
	Protein	8.25%	8.15%	8.45%	8.69%	8.94%
	Crude Fiber	4.42%	4.33%	4.51%	4.63%	5.02%
	Fat	7.80%	7.98%	7.93%	7.30%	7.40%
	Carbohydrate	85.82%	75.80%	77.82%	81.95%	87.55%
	Total Minerals	4.01%	5.97%	6.24%	7.01%	7.77%

In this study, All samples such as CS,T1,T2, T3,T4 contains moisture increases from 1.69% to 2.02%, Ash increases from 2.58% to 2.71% ,protein increases from 8.25% to 8.94% ,Crude fiber increases 4.42% to 5.02%, Fat increases from 7.80% to 7.40% ,Carbohydrates increases from 85. 82 % to 87.55%, Total minerals increases from 4.01% to 7.77%.

Graph No.5 Sixty days chemical analysis



3.2 Sensory Evaluation

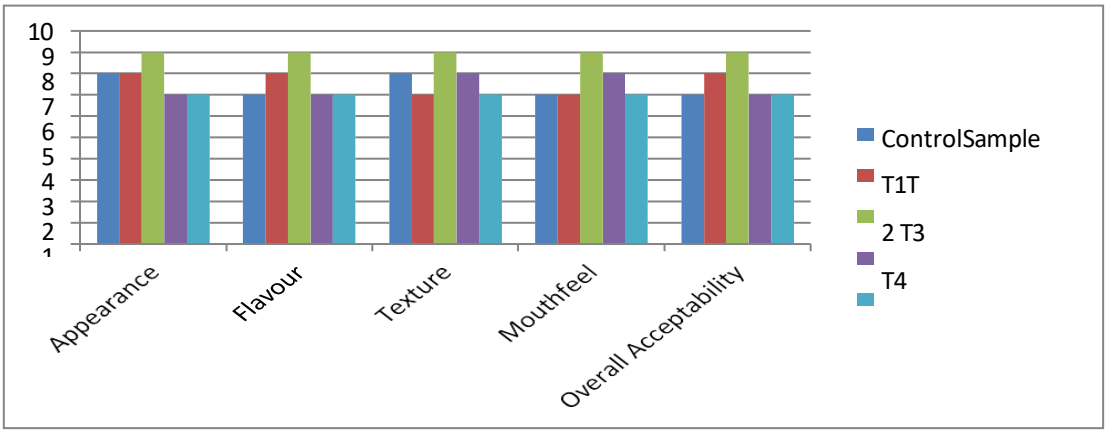
Sensory parameters such as colour, flavour, texture, taste and overall acceptability using 9 point hedonic scale by a panel of 10 semi trained panel members. Sensory evaluation done on the basis of Appearance, Flavour, texture, Mouthful and overall acceptability. Show All Points of sensory evaluation in below table no.3.

Table No.7 Sensory Analysis

Treatment	Appearance	Flavour	Texture	Mouthful	Overall Acceptability
Control Sample	8	7	8	7	7
T1	8	8	7	7	8
T2	9	9	9	9	9
T3	7	7	8	8	7
T4	7	7	7	7	7

Totally five samples such as control sample, T1, T2, T3, T4 used for sensory evaluation of spicy cookies. From these five samples we selected sample T2 on the basis of sensory parameter scoring. Sample T2 has maximum Sensory scoring than other samples.

Graph No.6 Sensory Evaluation



The sample T2 accepted because of it had the right amount appearance, flavor, texture, mouth feel as well as the attributes are present in perfect manner.

3.3 Final Result

After preparation of cookies, as the amount of moisture was an increase from 1.59% to 1.71%.Carbohydrate, protein& minerals content also increases respectively. Ash, Crude fiber & fat content also vary respectively.

Table no.8 final Physical analysis of the spicy cookies.

Parameters	Per unit
Weight of the cookies	6gm
Diameter of the cookies	6cm
Thickness of the cookies	1cm

This is the physical analysis of spicy cookies. It contains 6gm weight of cookies, 6cm Diameter of the cookies, 1cm Thickness of cookies.

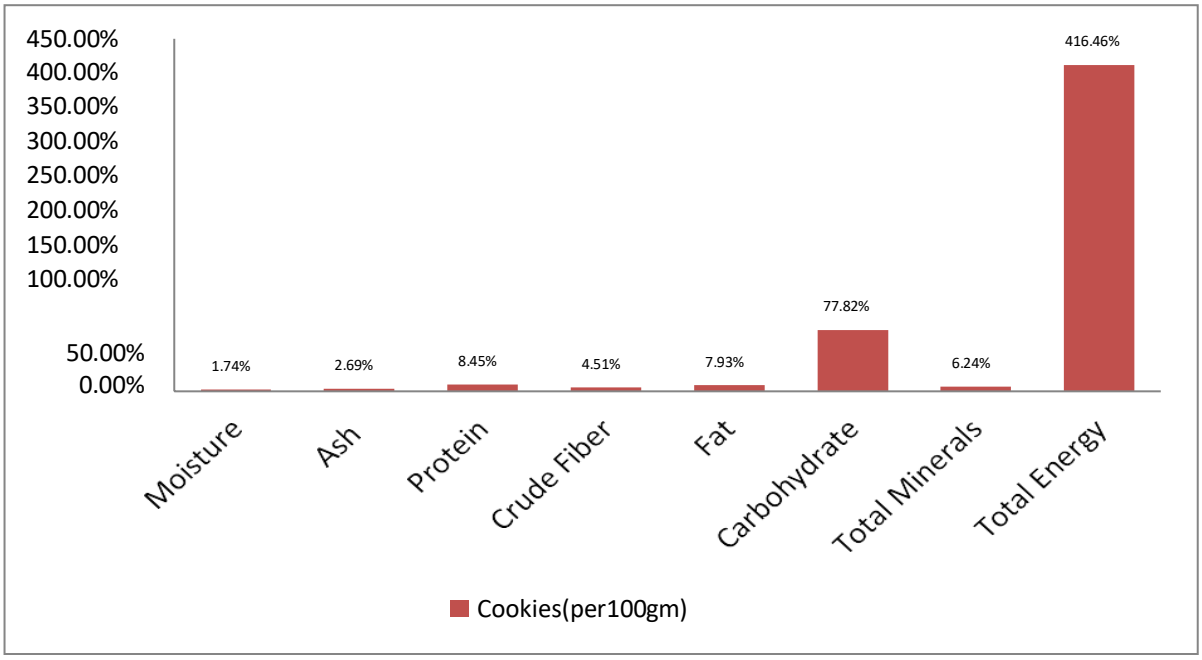
Table No.9 Chemical Analysis of Spicy Cookies

PARAMETER	Cookies (per100gm)
Moisture	1.74%
Ash	2.69%
Protein	8.45%
Crude Fibre	4.51%
Fat	7.93%
Carbohydrate	77.82%
Total Minerals	6.24%
Total Energy	416.46%

The various chemical properties such as moisture, ash, protein, Crude fiber, fat, carbohydrates, Minerals and Total energy. This is the final result of spicy cookies. These spicy cookies contain 1.74% moisture ,

2.69% ash, 8.45% protein, 4.51% crude fiber, 7.93% fat,77.82% carbohydrates,6.24% minerals & 416.46% total energy. The formulated the cookies by adding 10% jamun seed powder, the result obtained revealed that higher acceptability of 10 % jamun seed powdered cookies. It provides higher nutritional value to spicy cookies.

Graph No.7 Chemical Analysis Of Spicy Cookies



This is the graphical representation of final spicy cookies. Above graph consist of chemical analysis of spicy cookies such as moisture, ash, protein, crude fiber, fat, carbohydrates, minerals & Total energy.

3.4 Microbial Analysis

After making cookies, from zero days to 60 days we checked trial T2 microbial testing such as TPC, Yeast & Mold, and Coliform & EB. In 0 to 60 days study, all microbial testing parameter result was ok. Microbial analysis of spicy cookies contains microbial counts was ok up to 60 days from zero days of spicy cookies. This was a standard value of shelf life for spicy cookies. The shelf life of spicy cookies was 60 days on the basis of the microbial analysis.

Table No.10 Microbial testing Shelf life Analysis

Days	TPC (Cfu /gm)	Yeast/mold (Cfu /gm)	Coliform (Cfu /ml)	EB (Cfu /gm)
0	350	<10	<10	<10
15	370	<10	<10	<10
30	375	<10	<10	<10
45	380	<10	<10	<10
60	385	<10	<10	<10

This was the microbial testing shelf life analysis from zero days to 60 days.

Yeast, TPC, Coliform , EB

After making cookies, from zero days to 60 days we checked trial T2 microbial testing such as TPC, Yeast & Mold, and Coliform & EB. In 0 to 60 days study, all microbial testing parameter result was ok. On 61day, microbial result count increases from out of the range. Finally Spicy cookies shelf life was 60 days safely as per our study.

4. Conclusion

Incorporation of jamun seed powder in whole wheat flour enhanced total phenolic content and antioxidant activity of cookies with increasing fortification level. Color characteristic of cookies

were affected by increasing level of fortification. Jamun seed powder in whole wheat flour help improved texture of cookies. Jamun seeds are good sources of fat, minerals, crude fiber and energy. They are rich sources of available carbohydrate and dietary fiber. They also contain antioxidant content which helps in controlling blood sugar. Other ingredients such as chili powder, turmeric powder, origano, curry leaves and coriander leaves help to the improve spiciness, colors and nutritional properties of the cookies. Baking soda, baking powder and salt improve the puffing quality and taste of the cookies.

The selected T2 sample On the basis of the sensory evaluation, physical chemical analysis and microbial testing of the cookies.

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