

# Development and Sensory Evaluation of Jamun Seed Powder Fortified Cookies

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**Abstract:** The study was designed to use whole wheat flour and jamun seed powder blends in the preparation of functional cookies to improve the quantity and quality of protein, carbohydrate, and fibre content. The preparation of the jamun seed fortified cookies as influenced by different levels of jamun seed powder. Jamun seed fortified cookies were prepared by fortifying jamun seed powder in different treatments (20%, 30% and 40%) to the cookies flour, whereas cookies prepared without adding jamun seed powder was kept as control, Jamun Seed powder incorporated cookies were analyzed after baking for sensory, chemical and shelf life evaluation. Among the difference treatments 30 percent jamun seed powder was recorded the highest scores for organoleptic parameters such as, colour, appearance, flavour, crispiness, taste and overall acceptability even up to 30 days of storage. It is observed that, as the jamun seed powder increases the protein and fat content of the cookies increases. During shelf life study, it was observed that, control and jamun seed fortified cookies show best before shelf life of 30 days, but after 30, 45 and 60 days they show sudden increase in moisture content. Jamun Seed powder can be recommended to the patients those are suffering from diabetics diseases and other problems, because of the high amount of jamboline content, it is decreased in sugar level in the blood.

**Keywords:** Fortification, sensory evaluation, Jamun seed, antioxidant, jamboline, waste utilization

## 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 (Hussain *et al.*, 2000). 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 (Wade p, 1988).

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 (D. Mello *et al.*, 2000; Sagrawat *et al.*, 2006). Jamun fruit are rich in vitamin ,minerals and carbohydrate (Sharma, *et al.*, 2012). The main phytochemicals found in Jamun fruit are anthocyanin have shown antagonistic activity to same bacteria, virus and fungi and also protect food from microbial spoilage (Chattopadhyay *et al.*, 2008). Jamun is 70 % edible glucose and fructose are major sugar found in a ripe jamun and provides fewer calories compared to other fruit (Bina Rani *et al.*, 2014). The jamun seed powder contains less amount of protein, although rich in dietary fibre content and calcium so a successful combination with wheat flour for cookies production would be nutritionally advantageous. Jamun seed powder is good sources of vitamin -C and vitamin -B complex (B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub> and B<sub>6</sub>) as well as dietary fibre, potassium, iron and they are low in fat and cholesterol. The calcium content of jamun seed powders various from 12 to 15% while the rest is composed of water (82 to 85%). Jamun seed contains various micro-nutrient substantial quantities of vitamin-C moderate quantities of thiamine (vitamin-B<sub>1</sub>), riboflavin (vitamin-B<sub>6</sub>) folic acid and satisfactory quantities of protein are present. 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 are reported to be rich source of ellagitannins (ETS), including corilagin, 3, 6-hexahydroxyl diphenoyl glucose and its isomer 4, 6-hexahydroxyl diphenoyl glucose, 1-galloyl glucose, 3-galloyl glucose, gallic acid, ellagic acid (Helmstatter *et al.*, 2008) and its seed contain glycoside, jamboline and EI – lagic acid which are reported to have ability to check conversion of starch into sugar in case of excess production of glucose. (Reynertson K. *et al.*, 2005). The nutritional composition of jamun seed contain moisture content; 47.00, carbohydrate; 72.0, protein; 6.8, fibres; 0.35, crude fibres; 2.9 and ash; 2.0 (Benherlal P S and Arumughan C, 2007). Jamun seed are fatty acids (30g/kg) including lauric (2.8), myristic (31.7%), palmitic (4.7 %), stearic (6.5%), oleic (32.2%), linolenic (16.1%), malvalic (1.2%), sterculic (1.8%) and phytosterol such as  $\beta$ -sitosterol. (Lock. K *et al.*, 2009) the utilization of jamun seed powder in bakery product and supplementation of different nutrient is progressing day by day. The jamun seed possess many medicinal properties in Ayurveda system of medicine. The fresh seeds are most effective in diabetes as they quickly reduce sugar in urine (Swami, S.B., *et al.*, 2012).

Wheat (*Triticum aetivum-L*) constituent as major sources of most of the diet in the developing countries including 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 (Anjum FM., 1976).

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 (Wieser, 2007; Kaushik, *et al.*, 2013).

The margarine is a typical emulsion of water in oil (w/o), who reaches its stability through the incorporation of emulsifying (especially monoglycerides) in its composition with viscosity and uniformity dependent of its crystallization system (Romica Cretu, 2008)

The bakery products in particular bread and cookies are used as main supplementation vehicle for nutrition purpose. Bread and cookies prepared from refined flour is nutritionally much poorer and does not adequately meet the requirement for many macro-or micro-nutrients. Also, wheat protein lacks the balance of essential amino acids-lysine, threonine and valine. Therefore, there have been many on-going investigations on enhancing the nutritive value of bakery product to fulfil the expanding demands of modern dietary habits, considering the products protein, minerals, vitamins and fibre content (Sabitha N. *et al.*, 2011)

## 2. Materials and Methods

### 2.1 Procurement of Raw Materials

Wheat, refined wheat, jamun seed was used in the study wheat flour and refined wheat flour was used as based materials for preparation of flour and other ingredients use in the preparation of jamun seed cookies included flour, baking soda, baking powder, margarine ,sugar, milk, jamun seed powder all this ingredient were purchased from local market of Nasik city in bulk in order to maintain uniformity

### 2.2 Processing of Raw Material

The pulp of jamun fruit was removed with stainless steel knife and seed coat was removed .the seed kernels were dried in tray dried at 60-65°c for 48 hours still complete drying and ground to fine powder of 60 mesh sieve size in cyclone mill and store in air tight plastic container. Milling of wheat was done in order to obtain fine flour with help of attrition mill.

### 2.3 Treatment Details

- T<sub>1</sub>- 80% Whole wheat flour cookies + 20% Maida (control)
- T<sub>2</sub>- 80% Whole wheat flour +20% jamun seed powder
- T<sub>3</sub>- 70% Whole wheat flour +30% jamun seed powder
- T<sub>4</sub>- 60% Whole wheat flour + 40% jamun seed powder

### 2.4 Preparation of cookies

Sieved wheat flour, seed powder, refined wheat flour, baking powder, baking soda, were mixed together and granulated sugar were mix together in a planetary mixer for a cream ingredient of 15-20 minutes and then flour added together in desired quantises the uniform mixture was obtained then added milk to form dough .the dough was rolled and form uniform shape of cookies and baked to a temperature of 180°c for 15-20 minute for uniform baking.

**Table 1:** Standardized procedure for jamun seed powder cookies (per 1kg)

Sr. No.	Ingredient	Amount (gm)
1	Wheat flour	200
2	Refined wheat flour	140
3	Jamun seed powder	150
4	Margarine	370
5	Sugar	100
6	Milk	10
7	Baking powder	20
8	Baking soda	10

Product output -100 cookies

### 2.5 Chemical Analysis

Estimation of moisture content by hot air oven method was done at 105 °C for 4 hrs (AOAC, 1995). Total ash content was estimated using muffle furnace method up to constant weigh by igniting sample in a muffle furnace at 550±/250°Cfor 4 hr. (Ranganna, 1986). For fat estimation the sample is extracted in a Soxhlet apparatus for 6-8 hrs using petroleum ether. The solvent is evaporated and the residue is weighed (Ranganna, 1986). The estimation of nitrogen was done by kjeldahl method whereas the protein content is obtained by multiplying the nitrogen value with 6.25 (Ranganna, 1986). The total carbohydrate content was estimated using method of Ranganna, 1986.

### 2.6 Sensory Evaluation

The acceptability of the cookies of jamun seed powder and wheat flour based cookies assessed by incorporating 20 to 40 % jamun seed powder in wheat flour and standardized for the sensory evaluation during initial trials it was found that jamun seed powder if used at more than 40% concentration then it was unacceptable in the given recipes .these was because incorporating jamun seed powder at these level affected the taste (bitter)and colour (darker).the incorporation of jamun seed powder at 30% produced good result hence in the presence study the jamun seed powder was incorporated at 30% flavour in the standardized recipes .The recipes were evaluated for sensory characteristics by the panels' judges.

### 2.7 Shelf life analysis of jamun seed powder fortified cookies

The jamun powder fortified cookies samples were packed in LDPE packaging material under ambient temperature for 60 days has evaluated. The moisture content of these treatments were evaluated at the interval of 0, 15, 30, 45 and 60 Days.

## 3. Result and Discussion

### 3.1 Chemical analysis of Jamun seed powder fortified cookies

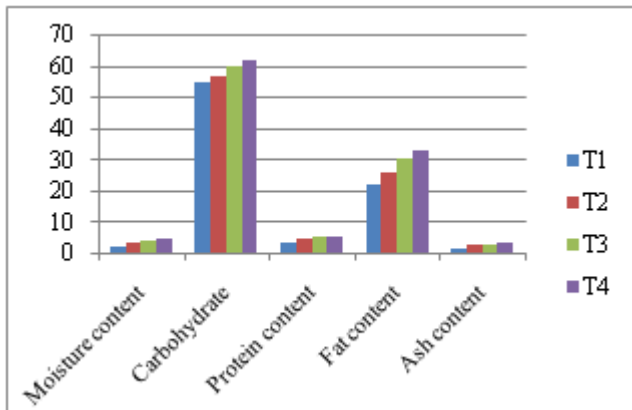
Chemical analysis of jamun seed powder fortified cookies is shown in Table No. 2. It shows that, as the amount of jamun seed powder increases in cookies the moisture content increases from 2.2 to 4.8%. While the carbohydrate and protein content increases from 55 to 62% and 3.5 to 5.5% respectively. Rest of fat and ash content also vary from 22 to

33 % and 1.5 to 3.3 % respectively. The effect of fortification on cookies is represented using graph 1.

**Table 2:** Chemical analysis of Jamun seed powder fortified cookies

Treatment	Moisture content	Carbohydrate	Protein content	Fat content	Ash content
T1	2.2± 0.1	55± 0.19	3.5±0. 21	22± 0.17	1.5± 0.3
T2	3.5± 0.19	57.3± 0.26	4.8± 0.28	26± 0.12	2.3± 0.26
T3	4.1± 0.2	60.1± 0.3	5.12± 0.33	30.6± 0.2	2.8± 0.2
T4	4.8±0.32	62± 0.11	5.5± 0.4	33± 0.1	3.3± 0.12

Values are the mean ± standard deviation. All the samples were taken in triplicates.

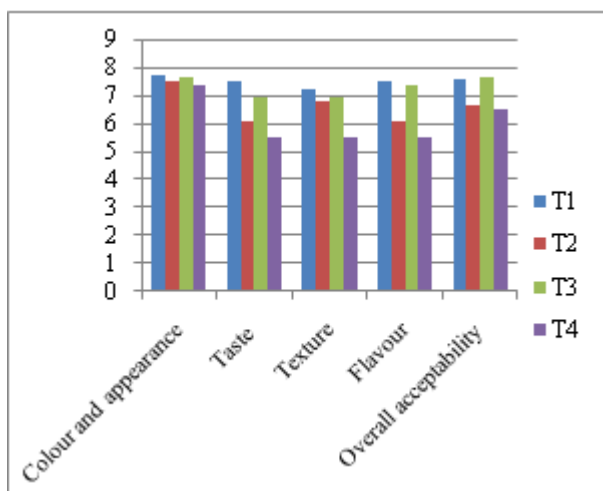


**Graph 1:** Chemical analysis of Jamun seed powder fortified cookies

**Table 3:** Sensory (Organoleptic) evaluation of Jamun seed powder fortified cookies for colour and appearance, taste, texture and overall acceptability (score out of 10)

Treatment	Colour and appearance	Taste	Texture	Flavour	Overall acceptability
T1	7.80 ± 0.12	7.57± 0.13	7.28 ± 0.11	7.57 ± 0.12	7.64 ± 0.12
T2	7.57 ± 0.2	6.14 ± 0.3	6.85 ± 0.2	6.14 ± 0.2	6.68 ± 0.1
T3	7.71 ± 0.3	7.00 ± 0.4	7.00 ± 0.3	7.42 ± 0.3	7.71 ± 0.3
T4	7.42 ± 0.1	5.57 ± 0.1	5.57 ± 0.2	5.57 ± 0.1	6.57 ± 0.2

Values are the mean ± standard deviation. All the samples were taken in triplicates.



**Graph 2:** Sensory evaluation of Jamun seed powder fortified cookies

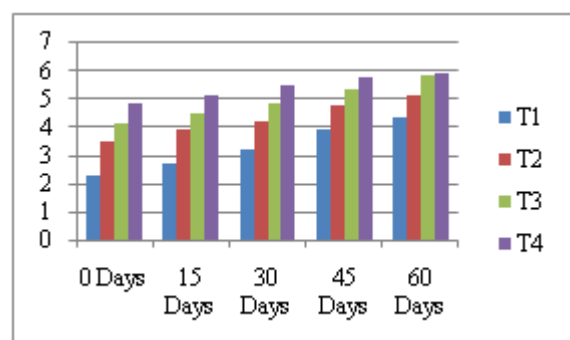
### 3.2 Sensory evaluation of Jamun seed powder fortified cookies

The data pertaining to the organoleptic evaluation of Jamun seed powder fortified cookies was influence by different treatment were presented in Table No.3 The data on texture reveals that there were significantly differences among treatment. Significantly higher score for texture was recorded in cookies flour along with fortification with 30% jamun seed powder (7.00) which was on par with cookies flour along with fortification with 20% jamun seed powder (6.85) whereas lowest score where recorded in 40% jamun seed powder (5.57)

Significantly higher score for taste was recorded in cookies flour along with fortification with 30% jamun seed powder (7.00) which was on par with control (7.57) whereas 1 lowest score where recorded in 40% incorporation(5.85). The data on overall acceptability of jamun seed fortified cookies revealed that there were significant differences among the treatment. Significant higher score for overall acceptability was recorded in cookies flour along with fortification with 30% jamun seed (7.71), which were on par with control (7.64) lowest score were recorded in 40% incorporation (6.57).

### 3.3 Shelf life analysis of jamun seed powder fortified cookies

Graph no. 3 shows the effect of fortification on shelf life of jamun seed powder fortified cookies in consideration with increase in moisture content. It shows that with increase in time period, the moisture content go on increasing in all the treatments.



**Graph 3:** Shelf life analysis of jamun seed powder fortified cookies

#### 4. Conclusion

Incorporation of jamun seed powder in whole wheat flour enhanced total phenolic content and antioxidant activity of cookies with increasing fortification level. Colour 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 fibre and energy. They are rich sources of available carbohydrate and dietary fibre. They also contain antioxidant content which helps in controlling blood sugar. The cookies found to be more acceptable when jamun seed powder is added up to the level of 30%. The sensory attributes like colour, taste and flavour are also found to be acceptable and so can be consumed by all people including diabetic people.

#### 5. Acknowledgement

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#### 6. Future Developments

Jamun seed powder incorporation into cookies along with whole wheat flour increases its acceptability, also these fortification supports increase in chemical composition of the cookies. It is further important to study the effect of jamun seed powder incorporation on diabetic patients, effect of total phenols on free radical scavenging activity

#### References

- [1] Anjum FM. Studied on the physicochemical characteristics of some of the promising wheat varieties with an improved procedure for protein fractionation. M.Sc. Thesis, Department of food technology, University of Agriculture Faisalabad (1976).
- [2] Wade P (1988). Biscuits, cookies and crackers, Principles of the Craft, Elsevier Applied Science, London, UK. Volume 1.
- [3] Chaudhary, A. K. N., Pal, S., Gomes, A., Bhattacharya, S., Anti-inflammatory and related actions of *Syzygium cumini* seed extract, Phytotherapy Research, 1990, 4(1), 5-10.
- [4] D'Mello, P.M., Jadhav, M.A. and Jolly, C.I. (2000). Free radical scavenging activity of *Syzygium cumini* and ficus bengalensis- Plants used in Ayurveda for diabetes mellitus. Indian Drugs, 37: 518-520
- [5] Hussain, S., Muhammad, F.A., Butt, M.S., Khan, M., Ali A (2000) Institute of Food Science and Technology, University of Agriculture, Faisalabad – Pakistan
- [6] Reynertson K, Basile KA and Kennelly JM (2005) antioxidant potential of seven Myrtaceous fruits Ethno botany research and application 3: 25-35
- [7] Sagrawat, H., Mann, A. and Kharya, M. (2006). Pharmacological Potential of Eugenia Jambolana: A Review. Pharmacogenesis Magazine, 2: 96-104.
- [8] Wieser, H. 2007. Chemistry of gluten proteins. Food Microbiology, 24, 115–119.

- [9] Chattopadhyay, P., Chatterjee, S. and Sen, S.K. (2008). Biotechnological potentials of natural food grade colorants. Afr. J. Biotechnology., 7: 2972-2985
- [10] Romică Cretu, Gheorghe Zgherea, The modification of some physic-chemical parameters of margarine during storage. Journal. Phys., Vol. 53, Nos. 1–2, P. 393–403, Bucharest, 2008
- [11] Rout S.P., K.A. Choudhry, D.M. Kars, L. Das and A. Jain, 2009. Plants in traditional medicinal system - future source of new drugs. Int. J. Pharm. Pharmaceutical. Sci., 1: 1-23.
- [12] Lock, K., D. Stuckler, K. Charles worth and M McKee, "Potential Uses and Health Effects of Indian Raspberry," British Homeopathic Journal, Vol. 339, 2009, pp. 459- 452.
- [13] Sabitha, N. And Yamunadevipuraikalan (2011). Development and sensory evaluation of sunflower seed fortified cookies, International journal of scientific research vol 3, issue:2, 214-215.
- [14] Sharma, S., Mehta, B.K., Mehta, D., Nagar, H. and Mishra, A. (2012). A review on pharmacological activity of *Syzygium cumini* extracts using different solvent and their effective doses. Int. Res. J. Pharm., 3: 54-58.
- [15] Swami, S.B., Thakor, N.J., Haldankar, P.M. and Patil, M.M. (1995). Processing and value addition in jamun, Internat. J. Proc. & Post Harvest Technol., 3 (1): 147-149. Priyanka, A.A. Mishra, development and quality evaluation of jamun powder fortified biscuits using natural sweeteners International Journal of Science, Engineering and Technology-. Volume 3 Issue 3: 2015.
- [16] Bina Rani et al., Fabulous *Syzygium Cumini* Linn. Skeels with Potentiality of Ethno pharmacological Consequence. A. Med. Chem. Lett., 2014, 1(1): 41-42.