

Standardization and Preparation of Millet Incorporated Brownie

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ABSTRACT

Millet processing and millet-based food products are in trend these days. There are lot of Extruded and Convenience foods and ready to cook products in the market with millets as major ingredients to make life easy and nutritious. There are very few Baked food products prepared from millet. As Baking sector have met a large group of population on their daily basis, one of the products which is loved by most people are Brownies. Hence adopting the traditional pattern of consumption in a modern way is wise and healthy, so millet brownies which are prepared and standardized are discussed in this study. Three types of millets are incorporated into the Brownie which are Kodo millet, pearl millet and finger millet. These millets are selected because of their rich Dietary fiber, both soluble and insoluble, support good bacteria in digestive system and reduce the risk of colon cancer. Millets can also be grown in drought conditions as they require very little water for growth. The product was standardized by preparing five variations and the best one was selected by comparing all the sensory scores with commercially available brownies. Shelf-life testing, cost calculation and determination of yield percentage are discussed in this study. Millet and Millet based products are extremely nutritious, healthy and fiber rich hence the future for millet processed products will be high in the upcoming days. Food consumption pattern is changing now a days as people are preferring healthier products other than tastier ones. The outcome Millet incorporated Brownie was better in all aspects when compared to commercial Brownies. This study describes its significance and advantages in every aspect.

Key words: Millet, Brownie, Kodo, Pearl and finger millet, Millet processing in trend.

INTRODUCTION

A food can be regarded as functional if it is satisfactorily demonstrated to affect beneficially one or more target functions in the body, beyond adequate nutritional effects in a way that is relevant to either improved state of health and wellbeing or reduction of risk of disease. A functional food must remain food and it must demonstrate its effects in amounts that can normally not be a pill or a capsule, but part of the normal food pattern (Diplock., 1999). While some definitions are quite simple “Foods or food components that reduce the risk of specific diseases or other health concerns” (National Institute of Nutrition, 2000).

The present-day consumer looks for new bakery products, better appeal, taste and convenience from bakery foods. With a population of 1 billion plus, India has the largest middle-income consumers, who demand varieties in food, clothing, transport and improved living standards, also wish to eat out. Opportunities, in abundance, exist in Bakery Cafes and Restaurants, those who cater fast foods. Bakery products are gaining popularity day by day. Young generation mostly prefer the bakery products. Most of the bakery 2 products are made up of wheat, the major food crop of India produced abundantly in India. Wheat is the major cereal crop of the world and is consumed mainly in the form of bakery products in most parts of the world. In India, 11 wheat is consumed mainly in the form of chapati – an unleavened baked product. In India, bakery products have become popular among different cross sections of population in recent years due to increased demand for convenient foods.

Kodo millet and Pearl Millet is incorporated in Brownie because it is excellent source of fibre as opposed to rice and wheat. It contains 66.6g of CHO and 353 kcal per 100g of grain comparable to other millets. It also contains 1.4% fat and 2.6% mineral. It can be cultivated and grown also in drought places hence it is easily available during famine and water scarcity as it requires very little amount of water to grow. It is highly healthier compared to Brownies made with

Maida. It can also take by people with constipation as it is excellent source of fibre. They are nutritionally comparable or even superior to staple cereals such as rice and wheat (Gopalan et al., 2004).

Pearl Millet is the most important millet species accounting for approximately half the total worldwide production of millets. It is mainly cultivated in India and Africa and is uniquely tolerant of hot and dry conditions. The grain of pearl millet generally has higher energy, higher protein content and better-quality protein than most other cereal grains. Many traditional foods and beverages are produced from pearl millet. (J.R.N Taylor in reference Module in food science, 2016).

The project aims at formulating Millet Brownie, Considering the nutritive value and health benefits of Millet. It is significant since not many Brownies includes Millet as its ingredients.

Objectives:

The objective of the project is,

1. To Standardize and prepare Millet incorporated Brownie.
2. To determine the sensory characteristics of Millet incorporated Brownie.
3. To determine the yield of Millet incorporated Brownie.
4. To estimate the cost of Millet incorporated Brownie.

REVIEW OF LITERATURE

The review of literature pertaining to the present study of “**Standardization and preparation of Millet incorporated Brownie**” is discussed in the following headings.

Types of Brownies

Benefits of Millet (Kodo and Pearl)

Role of ingredients

Types of Brownies

The various type of Brownies is varied with their method of production and preparation they are Special diet Brownies, Buckeye Brownies, Chocolate fudge Brownies, Cream cheese Brownies, Frozen Brownies, Marshmallow crunch Brownie bars, Outrageous Brownies, Chocolate mint Brownies, Chunky blonde Brownies, Peppermint Brownies, Candy bar Brownies, Cookies and cream brownies, Frosted fudge Brownies, White chocolate cranberry Brownies, Butternut Brownies etc.

Benefits of Millet (Kodo and Pearl)

Kodo millet can be used for traditional as well as novel foods. Un processed or processed grain can be cooked whole or decorticated and if necessary, ground to flour by traditional or industrial method. Kodo millets are rich in B Vitamins especially niacin, B6 and folic acid, as well as the minerals such as calcium, iron, potassium, magnesium and zinc. Kodo millets contain no gluten and is good for people who are gluten intolerant. Regular consumption of kodo millet is very beneficial for postmenopausal women suffering from signs of cardiovascular disease, like high blood pressure and high cholesterol levels. The highest lecithin content in kodo millet is excellent source for strengthening nervous system. Kodo millet is very easy to digest. Pearl millet is gaining importance as a climate resilient and health promoting nutritious crop. Large variability found in pearl millet germplasm has been conserved in several gene banks (Santhosh K. Pattanashetti, Kothapally Narishima Reddy, 2016). Pearl millet is quantitatively the most important millet, with world annual production 14 million tons (Mt). It is cultivated mainly in the semiarid tropics, almost exclusively by subsistence and small- scale commercial farmers. (J.R.N Taylor, in Encyclopedia of Grain Science, 2004).

Role of ingredients 2.3.1 Whole Wheat flour

Whole wheat is basically flour made from unrefined wheat. Using wheat in this form is more nutritious. Often the flour is made after the husk is removed. This kind of wheat is usually used, and it is called refined flour or ‘white’ flour. Understanding the information & facts of whole wheat will help realize that, it is in fact better for your body. Whole wheat is richest in dietary fibre. It provides over 30 percent of your daily required intake of fibre. Whole wheat is even rich in manganese, magnesium and tryptophan, which is a form of protein.

Pearl millet

Up to 30% pearl millet was used successfully in making bread in Senegal. The nutritional advantages of pearl millet are its high fat content and a relatively high lysine content, comparable with that of high-lysine corn in some varieties.

Antinutritional factors, however, have been reported in several studies. A thionamidelike substance has been identified that interferes with the formation of thyroid hormones, which in turn leads to undesirable goitrogenic effects (M.I. Gomez, S.C. Gupta, in Encyclopaedia of Food Sciences and Nutrition (Second Edition), 2003).

Kodo millet

Apart from being a rich source of nutrients, kodo millets also contain high amounts of polyphenols, antioxidants, tannins, phosphorous and phytic acids. These antinutrients form complexes with micronutrients such as iron, calcium and zinc, and reduce their solubility and bioavailability. Tannin also adversely affects utilization of proteins and carbohydrates by forming complexes, thus resulting in reduced growth, feeding efficiency, metabolizable energy and bioavailability of amino acids (Balasubramanian, 2013).

Milk

Milk is an essential component of the diet of ~6 billion people. The world production of milk reaches 730 million tons/y. Even though mammals produce milk to feed their offspring, in many 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 (Muehlhoff E, Bennett A, McMahon D 2013).

Butter

Butter is a water-in-oil emulsion with a minimum fat content of 80%, in which water content should not exceed 16% and non-fat milk solids generally constitute 2%. There is a substantial annual consumption of butter worldwide and world production of butter is as high as 4.1 million tons per annum (Mortensen, 2011).

Cocoa powder and Dark chocolate

Within the frame of the Austrian National action plan for nutrition, chocolate ranges among the sweets together with bakery products and candies, because it contains significant amounts of sugar. This group of food contributes about 10% to the daily energy intake. Sweets supply about half of total sugar intake for all age groups and may reach 90% in the group of too heavy children and teenagers. Despite a broad offer of food in the industrialized countries, children have a certain risk of malnutrition in trace elements and vitamins, if they keep too much on sweets and chips. Too high sugar consumption can lead to diabetes mellitus and adiposities. A reasonable food mix is therefore recommended to meet all requirements (Manfred Sager).

Baking powder

Baking powder contains baking soda, one or more leavening acids, and a filler. The leavening acids are added in their powdered form as salts which do not react until they dissolve in water. The filler stabilizes the product by keeping the baking soda and leavening acid separate and standardizes it to the desired strength. 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 (Brodie, 2006).

METHODOLOGY

The research design pertaining to the study Entitled “**Standardization and Preparation of Millet Incorporated Brownie**” has been discussed under the following headings.

Selection of ingredients for the preparation of Millet incorporated Brownie.

Standardization and preparation of Millet incorporated Brownie.

Calculation of yield for the Millet incorporated Brownie.

Sensory evaluation for Millet incorporated Brownie.

Cost calculation of Millet incorporated Brownie.

Selection of ingredients for the preparation of Millet incorporated Brownie

The ingredients required for Millet brownie were procured from a local market. The ingredients needed for the study are given in the table.

Table – 1 list Of Ingredients

S.No	List of Ingredients
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1	Wheat Flour
2	Kodo Millet
3	Pearl Millet
4	Butter
5	Brown sugar
6	Cocoa powder
7	Dark Chocolate
8	Milk
9	Curd
10	Baking Powder

Standardization and preparation of Millet incorporated Brownie:

The standardization of millet incorporated is done by preparation of four variations, ingredients used for variation 1,2,3,4 and variation 5 is listed in Table II.

Table II Variations

Ingredients	Control	Variation1	Variation2	Variation3	Variation4	Variation 5
Kodo millet	-	25g	10g	15g	50g	25g (organic)
Pearl millet	-	25g	15g	10g	50g	25g(organic)
Wheat	Maida -	50g	75g	75g	-	50g (organic)
Brown sugar	Sugar- 110g	110g	110g	110g	110g	110g
Curd	Egg- 2Nos	15ml	15ml	15ml	15ml	15ml
Cocoa powder	25g	25g	25g	25g	25g	25g (cadbury)
Milk	25 ml	25 ml	25 ml	25 ml	25 ml	25g
Butter	55g	55g	55g	55g	55g	55g
Semi dark chocolate	1 bar	1 bar	1 bar	1 bar	1 bar	1bar (cadbury))

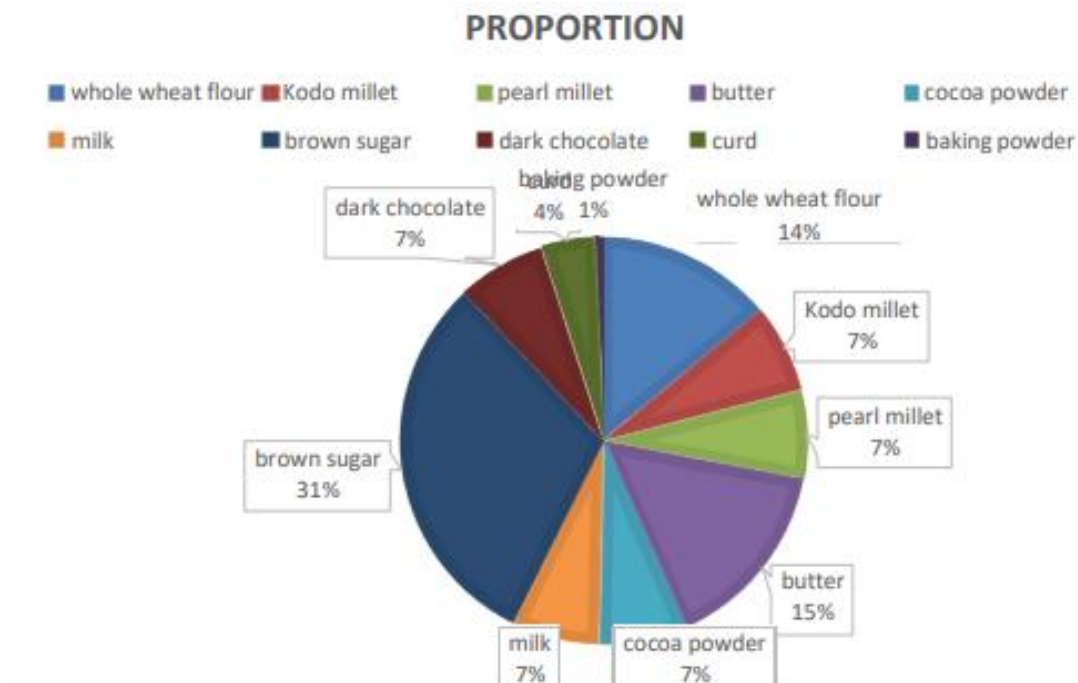


Fig I Variation 1 (50% of millet)

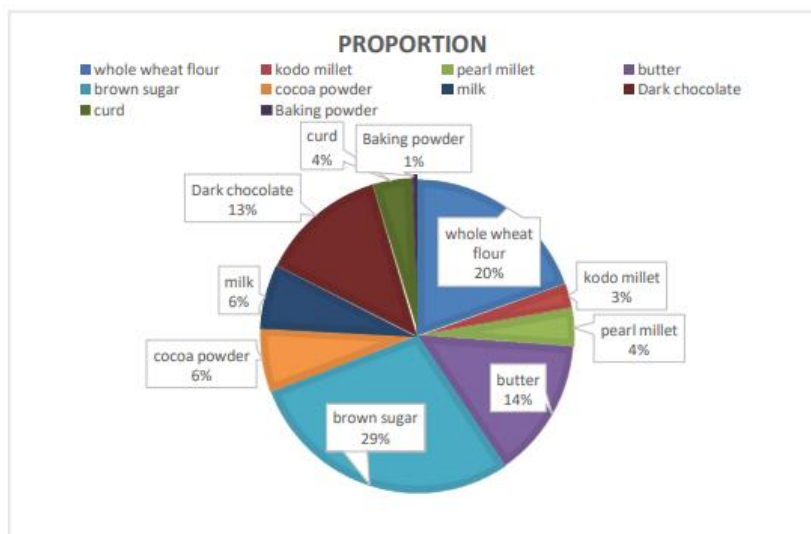


Fig II Variation 2 (25% of millet)

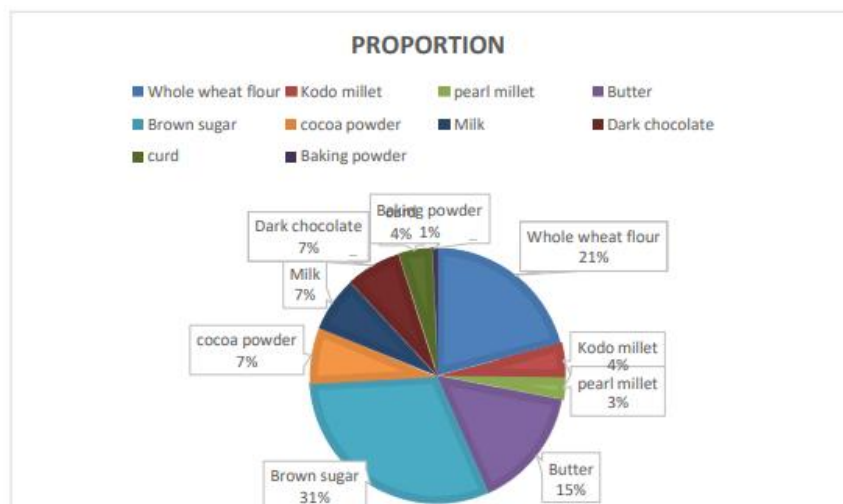


Fig III Variation 3 (25% of millet)

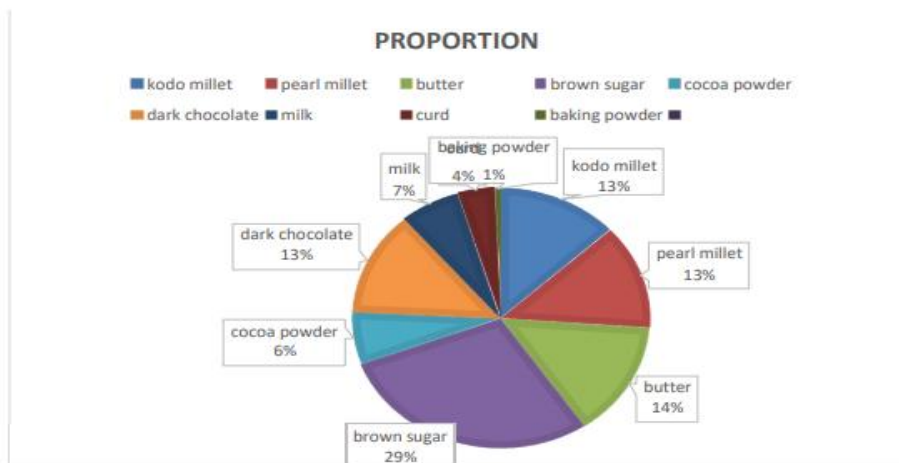


Fig IV Variation 4 (100% millet)

Preparation of Millet incorporated Brownie:

Preparation steps of millet incorporated brownie is given in Fig V

Flow chart for Millet Brownie

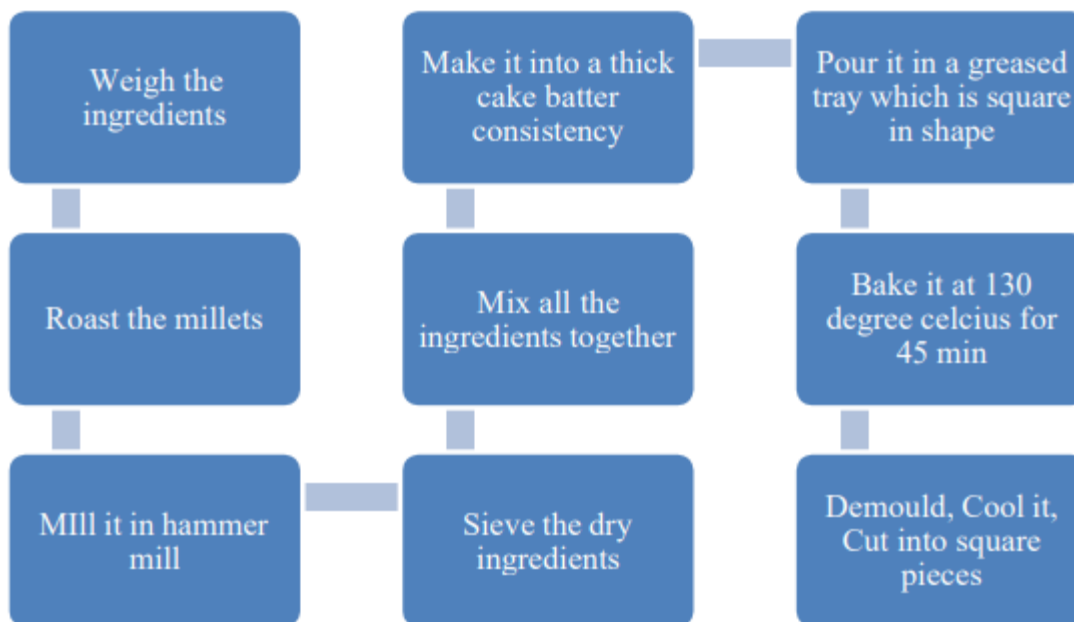


Fig V- Flow chart for Millet Brownie



Plate I
Millet Brownie Confirmed variation

Calculation of yield for the Millet brownie

The yield of the developed product was calculated using the following formula

$$\text{Yield (\%)} = \frac{\text{Weight of the prepared product}}{\text{Weight of the raw ingredients used for preparation of the product}} \times 100$$

Sensory evaluation of the Millet brownie

Millet brownie was the product, which is developed, and it was organoleptically analysed by a panel of 25 members on a 5-point hedonic scale. The parameters analysed were colour and appearance, texture, taste, flavour and overall

acceptability. The scores obtained from the sensory evaluation were calculated and average score was taken to find the most acceptable product.

Criteria for sensory evaluation, Excellent - 5

Very good - 4 Good - 3

Fair - 2

Poor - 1

Cost Calculation for Millet brownie

Cost calculation is made to find the price of the product for selling. This may help to know the loss and profit that we get. Cost for development of brownie with millet has been calculated using a standard price list from the local market where the ingredients were purchased.

RESULTS AND DISCUSSION

Results and discussion pertaining to the study of Standardization and preparation of Millet incorporated Brownie has been discussed under the following headings.

Yield of the standardized and prepared Millet incorporated Brownie.

Sensory evaluation of Millet incorporated Brownie.

Cost calculations for the Millet incorporated Brownie.

Yield calculation for Millet incorporated Brownie

The yield of the developed product was calculated using the following formula

$$\text{Yield \%} = \frac{\text{Weight of the prepared product}}{\text{Weight of the raw ingredients used for preparation}} \times 100$$

TABLE III Yield of the product

Variation	Wt of raw material	Wt of Millet Brownie	Total number of pieces	Yield of Millet Brownie	Wt of one piece
I	345g	250g	6	72.4%	41g
II	345g	250g	6	72.4%	41g
III	345g	250g	6	72.4%	41g
IV	345g	250g	6	72.4%	41g
V	345g	250g	6	72.4%	41g

DISCUSSION

The yield of the prepared Millet incorporated brownie was obtained. All the five variations had the same yield percentage as 72.4% because the taken overall flour 39 weight is for 100g in all the variations, the amount of millet proportion is only changed for 100g of flour.

Sensory evaluation Sensory Characteristics

Palatability of a newly formed food is essential for the consumption and popularization. Generally, the acceptability of any formulated food is checked by the standard organoleptic evaluation with criteria namely colour and appearance, texture, flavour, taste, over all acceptability. The Millet Brownie developed was organoleptically analysed by 5 point-hedonic scale. The sensory characteristics of variation 1 is with 50% of millet, variation 2 is with 25% of millet, variation 3 is with 25% of millet (15% kodo and 10% pearl) and variation 4 is with 100% millet and Variation 5 with organic millets with 50% was calculated.

The parameters analysed were colour and appearance, consistency, texture, taste, flavour and overall acceptability. The mean scores were obtained as below

Table IV Sensory Evaluation of Millet Brownie

Criteria	ation1	ation2	ation3	ation4	ation5	Control
Colour and Appearance	4.5	4.5	4.1	4	5	5
Texture	4.2	4.1	3.5	3.3	5	5
Taste	3.7	3.8	3.8	3.5	5	5
Flavour	3.6	3.6	3.5	3.5	5	5
Overall Acceptability	4	3.8	3.5	3.8	5	5

Colour and appearance

The score for colour and appearance of the millet brownie with variation 1, variation 2, variation 3, variation 4 and variation 5 scored 4.5, 4.5, 4.5, 4 and 5. The millet brownie made by variation 5 had an attractive colour and appearance than the other four variations.

Texture

The texture of millet brownie made with variation 1, variation 2, variation 3, variation 4 and variation 5 scored 4.2, 4.1, 3.5, 3.3 and 5. The texture of the millet brownie with variation 1 was good compared to other variations as others had a little grainy texture due to improper grinding.

Taste

The score for taste of millet brownie made with variation 1, variation 2, Variation 3, variation 4 and variation 5 scored 3.7, 3.8, 3.8, 3.5 and 5. The taste of millet brownie with variation 5 was very good.

Flavour

The score for flavour of millet brownie made with variation 1, variation 2, variation 3, variation 4 and variation 5 scored 3.6, 3.6, 3.5, 3.5 and 5. The flavour of variation 1 and variation 5 came out very well compared to other two variations.

Overall acceptability

The overall acceptability of millet brownie made with variation 1 scored 4 variation 2 scored 3.8, variation 3 scored 3.5, variation 4 scored 3.8 and variation 5 scored 5. The overall acceptability is high for variation 5 as it had high scores for its sensory characteristics.

Cost calculation for Millet Brownie

Cost calculation is made to find the price of the product for selling. This may help to know the loss and profit that get. Cost of development of brownie with millet has been calculated using a standard price list from the local market where the ingredients were purchased.

Table V Cost Calculation of Millet Brownie

S.No	Ingredients	Weight of Ingredients	Cost per Kg(Rs)	Cost Required(Rs)
1	Kodo Millet	25g	70	1.75
2	Pearl Millet	25g	40	1
3	Wheat	50g	50	2.5
4	Brown Sugar	110g	70	7.7
5	Milk	25ml	50	1.25
6	Curd	15ml	60	0.9
7	Butter	55g	500	27.5
8	Dark Chocolate	20g	90	22.5
9	Cocoa powder	15g	65	9.5
10	Baking Powder	2.5g	20	0.5

Grand total = 74.35 Rs for 250g of brownie Processing cost = 29.74 Rs

Net profit = 14.87 Rs

The cost of 250g of Millet Brownie is 118.96 Rs.

CONCLUSION

Millet is incorporated in brownie to enrich its nutritional quality. Most of the bakery products are made with Maida which is rich in its gluten content and may be allergic to most of the people, it is also not very easy to get digested whereas millet is gluten free rich in fiber and can also be taken by people who are suffering from constipation. The product was developed by selecting good quality ingredients for production, four variations were done by varying the proportion of millet as 50%, 25% (10g kodo and 15g pearl), 25% (15% Kodo and 10% pearl) and 100% and it is compared with control sample. Sensory evaluation is done by semi trained panel at 5- point hedonic scale. Mean scores are calculated for every variation among which best one is selected by looking for high score. The yield percentage of the product is calculated, and cost is calculated for selected variation. The nutritional value of the product is calculated with the help of a nutritional chart.

It is concluded that the variation 1 Millet with 50% ratio has improved the overall quality with special reference to color analysis & sensory evaluation of Brownie. The sensory evaluation was done with 25 people on the basis of 5 hedonic scales. By comparing variation 1, variation 2, variation 3, Variation 4 and Variation 5. Variation 5 has good sensory characteristics.

This study indicates that a good quality value added Brownie is obtained by adding 50% millet and 50% wheat flour.

FINDINGS OF THE STUDY

Yield of the product was 72.4% for 250g

Among the prepared variations of millet incorporated brownie variation 5 was highly acceptable in all organoleptic qualities.

Approximately cost of the Millet incorporated Brownie was estimated to be 118.96 Rs per 250g of Millet Brownie.

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