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Enrichment of sattu products by using nutrient rich powders

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Abstract
The objective of present investigation was Enrichment of Sattu Products by Using Nutrient Rich Powders refer to enrichment of sattu products. Sattu is a perfect blend of balanced nutrients and its high fiber content makes it healthy for the intestines. Developed enriched sattu was used for development of standardized products i.e. Sharbat & Halwa. The organoleptic evaluation of products was done by using score card method (9-Point Hedonic Scale). The result of sattu based products for Sharbat & Halwa (T2) & (T3) were best in all treatments in case of all sensory attributes. The overall acceptability of experimental (T2) & (T3) Sharbat, Halwa & Kachori were 9.0, 8.8 & 8.8, 9.0 respectably.

Keywords: Enrichment, Sattu, Intestines

Introduction
Sattu is flour consisting of a mixture of ground pulses and cereals from India and Pakistan. The dry powder is prepared in various ways as a principal or secondary ingredient of dishes.
The process of preparing Sattu is ancient and is popular over a wide area of India, particularly Bihar. It is also known as "desi horlicks" in the state of Bihar.
Sattu is a wonder flour that can be consumed uncooked. The cooling properties of sattu make it a perfect summer choice. It has low glycemic index and high fiber content. It is one of the highest sources of vegetarian proteins that is easily digestible and also of calcium and magnesium. As it provides iron too, it is very healthy option for anemia.
One of the most indigenous protein sources of India, sattu is no stranger to the locals of Bihar, Punjab, Madhya Pradesh, UP, and West Bengal. Usually served as a sharbat by street vendors at the peak of summer, sattu, typically made of roasted Bengal gram, has a near-instant cooling effect on the body. And when made into balls, to be eaten with curry, it becomes a powerhouse of energy. The 'poor man's protein' as it is often referred to is not only tasty, but packed with a lot of health benefits as well. The old school method of making sattu would involve drying roasting Bengal gram in sand (as peanuts are on the roads), using a sieve to strain the sand, and then pounding the roasted gram to a powder. Some people even use a mix of chickpea and Bengal gram to make sattu, and that adds an interesting twist to the flavor. In Punjab, sattu is usually made with barley. In fact, the drink made with this flour can easily be the equivalent of a lemon barley drink.
Flax seeds are oval and flat and range from light golden in colour to reddish brown. There seems to be a common belief that their nutritional values are about the same even though the golden colour seems more appealing to the shopper.
"Drumstick tree" and variants thereof redirect here. This name is also used for the golden shower tree (Cassia fistulosa). Moringa oleifera is the most widely cultivated species of the genus Moringa, which is the only genus in the family Moringaceae. English common names include: Moringa, drumstick tree (from the appearance of the long, slender, triangular seed-pods), horseradish tree (from the taste of the roots, which resembles horseradish), ben oil tree, or benzoil tree (from the oil which is derived from the seeds). It is a fast-growing, drought-resistant tree, native to the southern foothills of the Himalayas in northwestern India, and widely cultivated in tropical and subtropical areas where its young seed pods and leaves are used as vegetables.

Objectives

- To standardized and develop the enriched sattu based products.
- Organoleptic evaluation of developed products.

Materials and method

The present investigation entitled "Enrichment of sattu products by using nutrient rich powders" was carried out to standardized sattu and its products. The study was conducted in department of food and nutrition, faculty of home science, KNIPSS, Sultanpur.

Justified, judicious and scientific methodological consideration is indispensable for any investigation to deduce meaningful interferences concerning the objectives of the study. The study design reflects to the logical manner in which units of the study are assessed and analyzed for the purpose of drawing generalizations. Thus, with the view of available resources, the best procedures for taking correct observation should be first sorted out in a logical manner so that unbiased interference can be drown. This chapter delineates information pertaining to the research design and methodological steps used for investigation. The research procedure has been distinctly described as under in the following heads:

1. Procurement of material.
2. Processing of raw material.
3. Development of enriched sattu based products.
4. Sensory evaluation.
5. Calculating nutritive value.
6. Statistical analysis.

1. Procurement of material

For the present investigation material i.e. Bengal gram, flaxseed & drumstick leaves were produced from the local market of Sultanpur city. The procuring was done in single a lot to avoid variation compositional differences so that the quality differences should be ruled out.

2. Processing of raw material

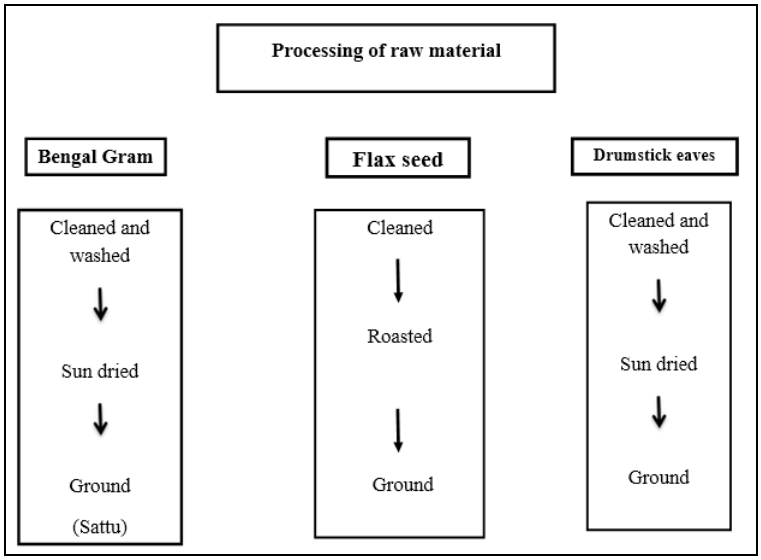

Fig 1: Flow chart of processing of raw material.

2.1. Processing of Bengal gram, flaxseed and drumstick leaves

These materials were subjected to cleaning, washing and drying in the following manner.

Cleaning and washing

Bengal gram, flaxseed and drumstick leaves were washed 1-2 times with tap water and then rinsed with water to remove dirt, dust and other adhering impurity.

Drying

This were spread on polythene sheet in shade and covered by muslin cloth to protect from foreign particles at room temperature at 27±3℃ for 2-3 days till they become brittle.

Powder making

The dried ingredients were converted into powder separately through grinder and strained and mixed up all to get uniform powder.

3. Development of enriched sattu based products

The powder was used for product development as follows

A: Sattu sharbat

Sharbat is sweet as well as salty and usually served chilled. Sattu sharbat is a healthy drink. It makes us energetic.

Ingredients	Amount			
	Controlled	Experimental		
	T 0	T 1	T 2	T 3
Sattu flour	20g.	15g.	15g.	10g.
Water	25000ml.	25000ml.	25000ml.	25000ml
Lemon	10ml.	10ml.	15ml.	15ml.
Mint leaves	8ml.	8ml.	8ml.	8ml.
Black salt	Acc. to taste	Acc. to taste	Acc. to taste	Acc. to taste
Roasted cumin powder	5g.	5g.	5g.	5g.
Black pepper powder	1g.	1g.	1g.	1g.

Salt	Acc. to taste	Acc. to taste	Acc. to taste	Acc. to taste
Flaxseed	-	5g.	-	5g.
Drumstick leaves	-	-	5g.	5g.

Method

- Take a vessel, added sattu flour and water and mix well.
- Added juice of lemon, juice of mint leaves, black salt, roasted cumin powder, black pepper powder and salt and mix well.
- Poured into glass and added ice cubes.

B: Sattu Halwa

Halwa is a popular Indian snack food consisting of small pieces. Enriched Sattu Halwa is very beneficial for the health and prevents many diseases.

Ingredients	Amount			
	Controlled	Experimental		
	T 0	T 1	T 2	T 3
Sattu flour	250g.	150g.	150g.	100g.
Khoa	80g.	80g.	80g.	80g.
Ghee	15g.	15g.	15g.	15g.
Sugar	Acc. to taste	Acc. to taste	Acc. to taste	Acc. to taste
Milk	80g.	80g.	80g.	80g.
Green cardamom powder	5g.	5g.	5g.	5g.
Flaxseed	-	100g.	-	75g.
Drumstick leaves	-	-	100g.	75g.

Method

- Melted the ghee or butter in a kadai or saucepan.
- Added the sattu and roasted them for 4-5 min.
- When they get browned, added milk in it and stirred it.
- After few minutes, added khoa and sugar in it.
- Continued stirred for 10 min.
- Putted the flamed off.
- After that added the green cardamom powder and mixed it well.
- Take the halwa on a plate and form into a layer of 1 inch thick square
- Decorated the halwa with halved almonds and pistachios.
- When cooled, cut into squares.

Result and discussion

The data were collected on different aspects per plan were tabulated and analyzed statistically. The result from the analysis presented and discussed chapter in the fallowing sequence.

4. Organoleptic evaluation of enriched Sattu based products.

4.1 Organoleptic evaluation of sattu based products

- Flavor and taste.
- Body and texture.
- Color and appearance.
- Over all acceptability.

Table 1: Organoleptic evaluation of enriched Sattu Sharbat

Product	Flavor& taste	Body \ texture	Color & appearance	Overall acceptability
T0(controlled)	7.6	7.4	7.6	7.6
T1(experimental)	8.3	8.4	8.5	8.4
T2(experimental)	9.0	8.8	8.8	9.0
T3(experimental)	8.8	8.7	8.8	8.8

Table 1 shows that the experimental (T2) obtained maximum 9.0, 8.8, 8.8 and 9.0 for flavor & taste, body & texture, color &appearance and overall acceptability; while controlled (T0) 7.6, 7.4, 7.6 and 7.6 obtained for flavor &taste, body & texture, color & appearance and overall acceptability respectively. This indicated that the controlled (To) sharbat was found to be fallen under category of “Like Very Much to Like Extremely”.

Similarly, S. Varghese et.al, (2014) studied that Soybean, maize and Bengal gram were blended in different proportions to prepare nutritious and ready-to-eat snack. The product was similar to sattu a traditional popular snack of North India. The grains were moistened to 30%, roasted and powdered. Product developed was analyzed for proximate composition, shelf-life and sensory evaluation. Chemical analysis of the products revealed that the protein content ranged from 16 to 72% while fat increased from 26 to 139%, respectively, as compared to the conventional maize-sattu. Shelf-life studies indicated that soy-sattu could be safely stored in metallic containers up to 60 days during summer and rainy seasons.

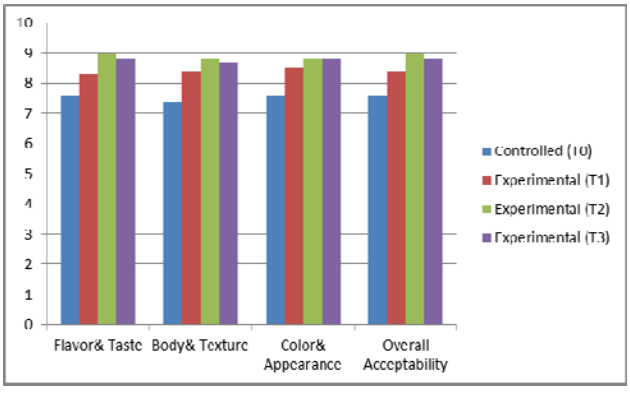

Fig 2: Mean overall acceptability of Sharbat

Table 2: Organoleptic evaluation of Halwa

Product	Flavor& taste	Body \ texture	Color & appearance	Overall acceptability
T0(controlled)	8.5	8.4	8.5	8.5
T1(experimental)	9.0	8.8	8.8	8.9
T2(experimental)	8.8	8.7	8.8	8.8
T3(experimental)	9.0	9.0	9.0	9.0

Table 2 shows that the experimental (T3) obtained maximum 9, 9, 9 and 9 for flavor &taste, body &texture, color& appearance and overall acceptability; while controlled (T0) obtained 8.5, 8.4, 8.5 and 8.5 for flavor &taste, body &texture, color& appearance and overall acceptability respectively. This indicated that the controlled (To) Halwa was found to be fallen under category of "Like Very Much to Like Extremely".

Similarly, PC Bargale et.al, (2013) studied that Sattu is a roasted flour mixture of cereal and pulse combination and used as 'ready to eat' snack food in most parts of India. Owing to its high nutritional balance, long shelf life and excellent taste, sattu is also a popular supplement food especially in rural India. Efforts were made in present study to fortify soybean and sorghum with Bengal gram (Chickpea) in various proportions to prepare nutritious and ready to eat snack. The selected grains were moisture conditioned to 30% level, roasted and powdered and then blended in different proportions so that an acceptable final product with maximum nutritional benefit and adequate shelf life was developed. Soybeans were blended in the range of 10 to 40% while sorghum was incorporated from 10 to 35% and the proportion of Bengal gram varied in the range of 40 to 70%. The products developed were analyzed for their proximate composition, shelf life and Sensory evaluation.

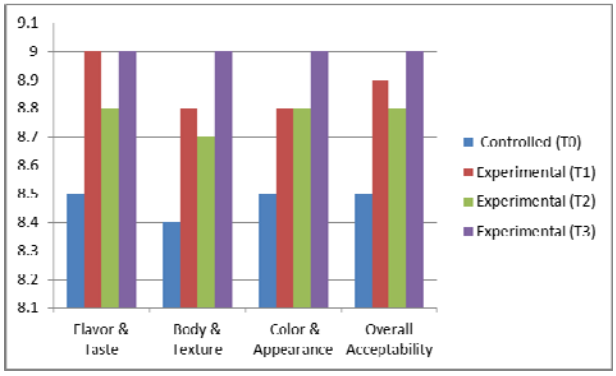

Fig 3: Mean overall acceptability of Halwa

Summary & conclusion

Sattu is traditional Indian food; it is consumed as energy drink also, which helps keep our body fit & fine. It energizes & refreshes whereas other fast food causes damage to our body. Sattu is beneficial across all age groups. It is a perfect blend of balanced nutrients and its high fiber content makes it healthy for the intestines. Having a low glycemic index is good for diabetics as well. Sattu also has cooling properties. Sattu' is your equivalent to a ' whey protein shake'. Made of roasted channa (gram) flour, this composition is one of the highest sources of vegetarian protein and a quality that is most easily absorbed by the body.60 g. (4 tbsp) of this roasted flour will give you 19.7 g. of high quality protein along with - Calcium and magnesium (a fantastic combination as magnesium helps calcium get better absorbed into the body).This makes it excellent for bone health and prevention and treatment of osteoporosis. Super healthy for growing children and adults Iron deficiency is a leading problem and can cause severe health issues. Taking iron supplements can sometimes be too toxic to the liver and cause constipation) Natural iron is best. It is excellent source of fiber. All of us know that fiber cleans out the colon and stomach, prevents and cures constipation and aids fat loss and energy levels.

The present investigation entitled "Enrichment of Sattu Products by Using Nutrient Rich Powders" was carried out to standardized enriched sattu and its products with two objectives:-

- To standardized and develop the enriched sattu based products.

The experimental work was carried out in the department of Food & Nutrition, Faculty of Home Science, K.N.I.P.S.S, Sultanpur. To standardized and developed the enriched sattu based products required different materials like Bengal gram, flaxseed, drumstick leaves, sugar etc. were used in the experiment would be purchased from the local market of Sultanpur.

In view of the facts regarding nutritional quality of developed products i.e. sattu (ICMR, 2010) was made to developed acceptable enriched sattu based products.

(a) Experimental (T2) obtained maximum 9.0, 8.8, 8.8 and 9.0 for flavor & taste, body & texture, color &appearance and overall acceptability; while controlled (T0) 7.6, 7.4, 7.6 and 7.6 obtained for flavor &taste, body & texture, color & appearance and overall acceptability respectively. This indicated that the controlled (To) Sharbat was found to be fallen under category of "Like Very Much to Like Extremely".

(b) Experimental (T3) obtained maximum 9, 9, 9 and 9 for flavor &taste, body &texture, color& appearance and overall acceptability; while controlled (T0) obtained 8.5, 8.4, 8.5 and 8.5 for flavor &taste, body &texture, color& appearance and overall acceptability respectively. This indicated that the controlled (To) Halwa was found to be fallen under category of "Like Very Much to Like Extremely".

The developed products were given to the panel of 10 judges; products were tested for Flavor &taste, body & texture, color & appearance and overall acceptability. The organoleptic evaluation of products was done by using score card method (9-Point Hedonic Scale). The result of enrichment of sattu based products, for Sharbat, Halwa (T2) & (T3) was best in all treatments in case of all sensory attributes.

The highest average score for all acceptability was found in experimental products made by developed enriched sattu based were mostly accepted by panel member.

Recommendation

- Development of enrichment of sattu based products.
- Nutrient analysis of enrichment of sattu based products.

Limitations of the study

- The study is carried out for short period so that time and other resource are limited to an extent.
- The sample size of this study was restricted and area of

study was limited to KNIPSS, Faculty of Home Science Sultanpur.

- It was a sensory evaluation which has responded information with-out any alternative.

Acknowledgement

All glory to the almighty, whose blessing in the success behind this project praise pride and perfection belong to almighty. So first of all I would like to express my deepest sense of gratitude to the omniscient power of the universe, the almighty God.

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From the very special corner of my heart I wish to record my indebtedness to my friends for their kind help and express my manifold thanks to Pinky and Priya. I am also thankful to all respondents for giving me proper cooperation during the data collection.

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