

Development of Healthified Instant Dosa Premix with Foxtail Millet

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ABSTRACT

Dosa is a popular south Indian thin crepe that is made of fermented rice and lentil batter. Later on a wide variety of dosa recipes are developed with cereals, lentils, millets and vegetables. The present study was carried out to develop a healthy instant dosa premix made with foxtail millet, oats, soya bean and urad dhal. It is nutrient dense and because of it's a premix powder the preparation method is also very minimal. The formulated product has been standardised by repeated trails in the laboratory and by checking the organoleptic characteristics through semi trained panel members. The final product was prepared by incorporating changes suggested by the panel members. The average score for each attribute the product were calculated. The appearance, colour, flavour, texture and taste, over all acceptability of variation-2 are higher than the other two variations. The ingredients contain so many therapeutic values which are beneficial to human health.

Keywords: Foxtail millet, dosa, premixes, Oats, Soybean, Fermentation

Foxtail millet (*Setaria italica*) is also known as Italian millet and setaria. It is grown as a cereal in southern Europe, and in temperate, subtropical, and tropical Asia. It was domesticated in the highlands of central China around 5000 years ago, and spread to Europe and Asia soon after its domestication. Foxtail is one of the world's oldest cultivated crops. Foxtail was the most important plant food in the Neolithic culture in China, and its domestication and cultivation was the earliest identifiable manifestation of this culture.

Chen *et.al* (2017) stated that the protein of foxtail millet after extruding or fermenting and the raw foxtail millet was extracted and hydrolyzed by digestive protease to generate angiotensin-converting enzyme (ACE) inhibitor peptides. The potential antihypertensive effect of protein hydrolysates from foxtail millet in SHR was investigated. Thus, ingestion of foxtail millet protein hydrolysates especially for the raw and extruded hydrolysates may ameliorate hypertension and alleviate related cardiovascular diseases.

The oat (*Avenasativa*), sometimes called the common oat, is a species of cereal grain grown for its seed. While oats are suitable for human consumption as oatmeal and rolled oats, one of the most common uses is as livestock feed. Oats are a nutrient rich food associated with lower blood

cholesterol when consumed regularly.

Joanne *et.al* (2013) concluded that Oats, in particular, contain considerable amounts of soluble fiber, which appear to have lipid-lowering and glucose-modulating effects. In addition, oats increase stool weight, speed intestinal transit, modify gut micro flora, and serve as substrate for bacteria that produce short chain fatty acids.

Soybean, also called soya bean or soya bean, annual legume of the pea family and its edible seed. The soybean is economically the most important bean in the world, providing vegetable protein for millions of people and ingredients for hundreds of chemical products.

Cassidy *et.al* (2006) stated that soya bean phyto-oestrogens in clinical interventions in post-menopausal women are presented that is based on data from the EU-funded project Phytohealth. The phyto-oestrogens, primarily genistein and daidzein, were given as soybean-protein isolates, whole-soybean foods or extracts, supplements or pure compounds for menopausal symptoms there is currently limited evidence that soybean-protein isolates, soybean foods or red-clover (*Trifoliumpratense* L.) extract are effective but soybean isoflavone extracts may be effective in reducing hot flushes.

The present study was carried out to develop a healthified dosa premix with foxtail millet, oats, soya bean and urad dhal which is a pack of nutrient dense food product. It contains high therapeutic values

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which is beneficial to human health. . It is used for the treatment various disorders such as diabetes, prevention of cardiovascular disease and also reduce the bowel movements, it helps in maintaining cholesterol levels in the body. Millets are rich in energy levels, fibre and antioxidants. Soya bean is rich in protein content and iron. Oats are rich in fibre and other essential nutrients required to the body.

MATERIALS AND METHODS

Foxtail millet contains significant levels of protein, fiber, mineral and phytochemicals. Anti-nutrients such as phytic acid and tannin present in this millet can be reduced to negligible levels by using suitable processing methods. The millet is also reported to possess hypolipidemic, low-glycemic index and antioxidant characteristics. The present study was aimed to develop instant dosa premix with incorporation of foxtail millet, oats, soya bean and urad dhal. In present study an attempt has been made to standardize 'INSTANT DOSA PREMIX WITH FOXTAIL MILLET'. The ingredients used to develop the dosa premix were foxtail millet, oats, soya bean and urad dhal.

PREPARATION OF POWDER

Foxtail millet, soya bean and urad dhal are soaked for about overnight separately and drain the remaining water and sun dried it using solar dryer for 3 days. Blend the ingredients separately into fine and smooth powder. Steel cut oats are blended into powder make them into powder and mix them evenly. Sieve the mixture uniformly and packed the mixture in air tight container and stored at room temperature.

STANDARDIZATION OF INGREDIENTS

The formulated product has been standardised by repeated trails in the laboratory and by checking the organoleptic characteristics through semi trained panel members. The final product was prepared by incorporating changes suggested by the panel members.

VARIATION
Various trails were worked out to be developing foxtail millet instant dosa premix.

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The present study was carried out to develop a healthified dosa premix with foxtail millet, oats, soya bean and urad dhal which is a pack of nutrient dense food product. It contains high therapeutic values which is beneficial to human health. . It is used for the treatment various disorders such as diabetes, prevention of cardiovascular disease and also reduce the bowel movements, it helps in maintaining cholesterol levels in the body. Millets are rich in energy levels, fibre and antioxidants. Soya bean is rich in protein content and iron. Oats are rich in fibre and other essential nutrients required to the body. **MATERIALS AND METHODS** Foxtail millet contains significant levels of protein, fiber, mineral and phytochemicals. Anti-nutrients such as phytic acid and tannin present in this millet can be reduced to negligible levels by using suitable processing methods. The millet is also reported to possess hypolipidemic, low-glycemic index and antioxidant characteristics. The present study was aimed to develop instant dosa premix with incorporation of foxtail millet, oats, soya bean and urad dhal. In present study an attempt has been made to standardize 'INSTANT DOSA PREMIX WITH FOXTAIL MILLET'. The ingredients used to develop the dosa premix were foxtail millet, oats, soya bean and urad dhal.

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Table 1 Composition of different ingredients

S.No.	Ingredients	Variation -1	Variation-2	Variation-3
1	Foxtail millet powder	50gm	60gm	40gm
2	Urad dhal powder	30gm	30gm	30gm
3	Soyabean powder	10gm	5gm	15gm
4	Oats powder	10gm	5gm	15gm

STANDARDIZATION OF PRODUCT

The product was standardized & the ingredients used were given below:

INGREDIENTS	QUANTITIES
Foxtailmilletpowder	60gm
Uraddhalpowder	30gm
Soyabean powder	5gm
Oatspowder	5gm

PROCEDURE

- Mix the foxtail millet powder, urad dhal powder, soya bean powder and oats powder.
- Then mix it well.
- Sieve it for uniform blending.
- Pack it in polythene zip lock covers.
- Packed foods are stored at room temperature.

SENSORY EVALUATION OF PRODUCT

BY PANEL JUDGES:

Nine point hedonic rating was chosen to test acceptability. Hedonic rating scale was the test where judges express their evaluation scores

according to the scores given for each sensory attributes on the score card provided. Separate column was given to write the remarks, based on which modifications were made in the product. Sample scored card was given in the annexure. For each trail the product was subjected to sensory evaluation to the panel members by giving instructions before evaluation. The score cards were given for each trial separately.

RESULTS AND DISCUSSION

Foxtail millet is chosen as the main ingredient for the development instant dosa premix. Foxtail millet have the capability to regulate and lower the blood sugar of the body, it reduces the chances of blockage in the heart that results in cardiac arrest. Heart attacks take place since the arterial walls of the heart become blocked. Low sugar count in the blood reduces such risk.

MEAN and SD values as obtained for the different attributes of instant dosa premix Table-2 Organoleptic Evaluation of Developed Foxtail Millet Dosa Premix.

Table 2 Organoleptic Evaluation of Developed Foxtail Millet Dosa Premix.

S.NO	Attributes	Foxtail millet dosa premix Mean $\pm$ SD scores		
		Variation-1	Variation-2	Variation-3
1	Appearance	7.2 $\pm$ 1.22	8.1 $\pm$ 0.56	6.6 $\pm$ 0.84
2	Colour	7.7 $\pm$ 0.82	8.0 $\pm$ 0.66	6.6 $\pm$ 1.95
3	Flavour	7.7 $\pm$ 0.82	7.8 $\pm$ 1.13	6.5 $\pm$ 1.94
4	Texture	7.7 $\pm$ 1.05	8.3 $\pm$ 0.82	5.7 $\pm$ 1.56
5	Taste	6.6 $\pm$ 1.57	8.1 $\pm$ 0.73	4.5 $\pm$ 1.64
6	Over all acceptability	7.4 $\pm$ 0.84	8.5 $\pm$ 0.70	4.5 $\pm$ 1.64

The average score for each attribute the product were calculated. The appearance, colour, flavour, texture and taste, over all acceptability of variation-2 are higher than the other two variations.

Appearance

Surface characteristics of food products contributes to the appearance factors include such things as size, shape, wholesomeness, different form of damage, gloss, transparency, colour and

consistency.

When cross-cultural consumer research is conducted to support product market placement and expansion, sensory descriptive analysis should be conducted in parallel to define product characteristics. Jiyun Yang (2019).

The average score for each attribute of the product were calculated. The appearance mean and SD value of variation-2 (8.1 $\pm$ 0.56) is higher when

compared to variation -1 (7.2 ± 1.22) and least in variation-3 (6.6 ± 0.84).

Colour

The first impression of a food is usually visual and a major part of our willing to accept a food depends upon our willingness to accept a food depends upon its colour. Sensory food science can contribute to understanding responses of different consumer segments to emerging trends in food production, processing and consumption. (Hely Tuorila 2009).

The average score of each attribute of the product were calculated. The colour mean and SD of variation-2 (8.0 ± 0.66) is higher when compared to variation-1 (7.7 ± 0.82) and least in variation-3 (6.6 ± 1.95).

Flavour

Flavour is the sensation which gives the clear picture of the product freshness. sensory science has been defined as "a scientific method used to evoke, measure, analyse, and interpret those responses to products as perceived through the senses of sight, smell, touch, taste and hearing" (Harry T. Lawless 2010).

The average score for each attribute of the product were calculated. The flavour mean and SD value of variation-2 (7.8 ± 1.13) is higher when compared to variation-1 (7.7 ± 0.82) and least in variation-3 (6.5 ± 1.94).

Texture

The texture properties include the mechanical properties of hardness, cohesiveness, adhesiveness, chewiness, gumminess, viscosity and consistency. Kamizake *et al.* (2018) showed the effect of aging of soybean under different conditions on tofu quality. The tofu samples were made using two cultivars at three different conditions of soybean aging: control, accelerated aging, and natural aging. Those authors developed 16 sensory descriptors and found that the aging of soybean affected the

sensory quality of tofu such as colour, flavour, and texture attributes.

The average score for each attribute of the product were calculated. The texture mean and SD value of variation-2 (8.3 ± 0.82) is higher when compared to variation-1 (7.7 ± 1.05) and least in variation-3 (5.7 ± 1.56).

Taste

Taste sensation which the taste buds registered and categories as spice, salt, sweet, sour and bitter (Sri Lakshmi, 2005) the average score for each attribute of the product were calculated. The taste mean and SD value of variation-2 (8.1 ± 0.73) is higher when compared to variation-1 (6.6 ± 1.57) and lest in variation-3 (4.5 ± 1.64).

The shelf life of the majority of food products is determined by changes in their sensory characteristics. (Ana Gimenez 2019).

Overall acceptability

Overall acceptability indicates on the whole whether the product is fresh and acceptability for eating or not (Sri Lakshmi, 2005). The average score for each attribute of the product were calculated. The overall acceptability mean and SD value of variation-2 (8.5 ± 0.70) is higher when compared to variation-1 (7.4 ± 0.84) and least in variation-3 (4.5 ± 1.64).

Villagas (2009) Food acceptance constitutes an essential outcome of the interaction between humans and foods. Food acceptance may be affected by food habits, attitude, and beliefs, with culture (i.e., tradition) serving as one primary factor that underlies food choices.

The attributes evaluated by panel members for foxtail millet dosa premix using Hedonic (9 point) rating scale include: 9- Like extremely, 8- Like Very Much, 7- Like Moderately, 6- Like Slightly, 5- Neither like Nor Dislike, 4- Dislike Slightly, 3- Dislike Moderately, 2- Dislike Very Much, and 1- Dislike Extremely.

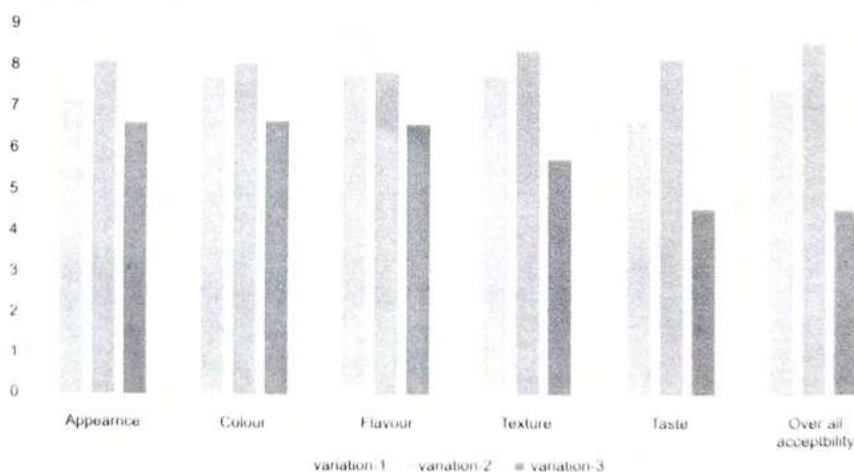


Fig no. 1 Bar diagram showing comparison between different variations

It was observed from the fig-1 the average score for each attributes like appearance, colour, flavour, texture, taste and overall acceptability of the

developed product variation-2 obtained a higher mean score in majority of the attributes.

Table 3 Nutrient Composition of Foxtail millet Dosa Premix

S.No	Ingredients	Amount	Protein (g)	Fat (g)	CHO (g)	Energy (K.cal)	Fibre (g)	Iron (mg)	Cal (mg)	Vit-A (µg)
1	Foxtail millet	60 gm	7.38	2.58	36.54	198.6	4.02	1.68	18.6	-
2	Soya bean	5 gm	2.16	0.975	1.045	21.6	0.18	0.52	12	21.3
3	Oats	5 gm	0.59	0.43	3.47	20.1	0.525	0.175	-	-
4	Urad dhal	30 gm	7.2	0.42	17.88	104.1	0.27	1.14	46.2	11.4
	Total	100 gm	17.33	4.405	58.93	344.4	5	3.515	76.8	32.7

It is evident from the above table no-3 the data shows that the nutritive composition of foxtail millet dosa premix (Variation-1). The data from the above table shows that the, Protein-17.33(g), Fat-4.405(g), Carbohydrates-58.93(g), Energy-344.4 k.cal, Fibre-5(g), Iron-3.515(mg), Calcium-76.8(mg), Vitamin-A-32.7(µg).

Hou et.al (2015) concluded that beta-glucan present in the oats promotes cardiovascular health and have

cholesterol controlling properties in it.

Depicts organoleptic evaluations and mean scores for the developed instant dosa premix. There are several steps involved in a new product development among which taste panel stage is most. In taste panel stage various attributes of the product like appearance, colour, flavour, texture, taste and over all acceptability.

DISCUSSION:

Table 4 Microbial analysis of the products

Name of the sample	Dilution factor	Initial day	15 th day	30 th day	45 th day	60 th day	CFU/gm	
							Initial day	60 th day
Control sample	103	nil	nil	nil	nil	nil	nil	nil
Dosa premix	10-4	nil	nil	nil	1	2	nil	2

The total plate count performed for developed dosa premix of regular interval of 15th day of period up to 60th day of storage period. The total plate count were nil at initial day to 30th day of storage period. The total plate count was 2 cfu/g at 60th day of storage period.

The results of shelf life studies showed that dosa premix does not have any microbial contamination & it is considered acceptable in the shelf life of a product & the count did not exceed the levels during storage throughout the storage period.

CONCLUSION

The study concluded that foxtail millet dosa premix which contains foxtail millet and oats have lot of health benefits.

Foxtail millet is rich in dietary fibre, protein and low in fat. Foxtail millet is particularly high in minerals like

iron, magnesium, phosphorous and potassium. These are considered to be the least allergenic and most easily digestible grain.

Oats contain several components that have been proposed to exert health benefits. The primary type of soluble fiber in oats is beta-glucan, which has been researched to help slow digestion, increase satiety, and suppress appetite.

Soya beans are extremely important source of protein. Approximately 20 percent of the protein present in soya beans is beta-conglycinin. This makes it an especially good source of protein for anyone following a vegetarian or vegan diet.

Based on the incredible benefits of foxtail millet, oats and soya bean towards sensory, therapeutic, acceptance and health of human, foxtail millet dosa premix was developed. To reduce the nutrient deficiencies in the people this dosa premix should be included in our regular diet.

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