Development and Physical, Nutritional and Sensory Evaluation of Instant Mix (DOSA)

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Abstract

The traditional food sector is primarily restricted to households and it is increasingly being realized to bring it out in the open for a much varied use. The present study aimed to formulate and standardize the products through blend ratio, sensory evaluation and the quality characteristics of developed products was carried out in Department of Food Science and Technology, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.), India during the session 2014-2015. The formulation of millet based dosa mix at 30% Rice, 40% little millet, 20% Black gram and 10% lentil flour accepted as best formulation. Rice will be replaced with kodo and kutki, black gram/bengal gram replaced with lentil. These instant mixes can be considered as therapeutic food for health conscious peoples and also can be prepared at cottage industries to improve women empowerment.

Keywords: Instant mix, dosa, nutritional and sensory evaluation.

Introduction

The documentation of traditional food system is urgent because the knowledge of harvesting and food preparation is fast disappearing. The traditional food sector is primarily restricted to households and it is increasingly being realized to bring it out in the open for a much varied use. Traditional food includes standardization of process parameter of existing products, shelf life studies, replacing a part or whole of ingredients with either nutritional functional, or storage purpose using advanced technology for better processing. Fermented foods are those foods which have been subjected to the action of microorganisms or their enzymes to produce desirable biochemical changes and results in significant modification to the food. Fermented foods provide variety to the diet supplying nutrients predominantly proteins and amino acids.

Fermented cereal-legume-based instant food is one of the popular indigenous foods of India. Fermented foods are better than normal cooked food varieties in terms of nutrition, amenability for digestion, etc. Natural fermentation induces phytate hydrolysis via the action of microbial phytase enzymes originating from the microflora on the surface of cereals and legumes, thereby reducing the phytate.

Cereal grains are deficient in some amino acids such as lysine and certain other amino acids. Legumes on the other hand, are higher in proteins (18 to 24%) than cereal grains and can be used to support certain amino acids such as lysine, tryptophan etc.

Minor millets are claimed to be future foods for better health and nutrition security in the recent years, they are recognized as important substitutes for major cereal crops to cope up with the world food shortage and to

meet the demands of increasing population[11]. Minor millets like kodo and kutki are described as nutritious millets and have received far less research. Millets are rich in vitamins, minerals, sulphur-containing amino acids and phytochemicals, and hence are termed as nutri-cereals.

Black gram is one of the most highly prized pulses of India. Black gram has a mucilaginous material which makes it a valuable ingredient in dosa preparation. Bengal gram significantly lowers serum lipids in man. Pulses are good sources of protein and also good sources iron, soluble fibres, several vitamins and minerals.

Lentils are high in fibre, low in fat and cholesterol free. They are also high in protein, low in sodium as well as being an excellent source of complex carbohydrates and vegetable protein. Lentils are also high in vitamins and minerals, including: foliate vitamin B1, manganese, magnesium, phosphorus, copper, potassium and many others.

Materials and Methods

Raw materials:- The organically grown kodo millet (*Paspalum scrobiculatum*) and little millet (*Panicum miliare*), were procured from Sarvamangalam (Natural products) M.P. Other materials such as Bengal gram/black gram, rice, lentil, were purchased from the local market Adhartal Jabalpur (M.P).

Preparation of instant mixes: The five variations of instant dosa mixes were formulated by changing the ingredient composition of basic dosa mix by utilizing the ingredients selected for value addition and the products were prepared (Table, 1). The prepared dosa were sensoryally evaluated in comparison with basic variation by semi trained panel members using nine point ranking scale. First of all grains were selected then soaked in water for 6-8 hr after that ground to thin batter and then fermented for 8-14hr and further dried at 65ºc for 15hr then ground coarsely, dried for 3hr at 60ºc and ground to fine powder.

Water was added to the fermented instant mix and it was spread in a thin layer (of 1–5 mm thickness) on a flat heated plate and smeared with a little oil or fat. A sol to gel transformation occurs during the heating and within a few minutes, a circular, semi-soft to crisp product resembling a pancake, ready for consumption is obtained [4]. **Spread ratio: -** Spread ratio was calculated as diameter (length) to thickness ratio[11]. The water absorption and oil absorption capacity was determined by standard method[12]. All the combinations of Instant mix were cooked respectively in boiling water at a ratio of grits to water 1:8 (w/v). The sensory properties of nutritious Instant mix were evaluated by the panel of 10 judges based on the sensory attributes of colour and appearance, taste, flavour, mouth feel and overall acceptability. The evaluation was done on a nine point hedonic scale[1] . The moisture content, fat content and crude protein contents of the samples were estimated by the standard methods[2]. The total carbohydrate in the samples was estimated by hydrolysis method[3]. The fibre content was determined by fibra plus-operational procedure for crude fibre. Total Energy Value calculation:-The total energy values were calculated by using values 4, 4, and 9 for protein, carbohydrate and fat respectively as follows: Total energy (kcal/100g) = [(% available carbohydrates x 4) + (% protein x 4) + (% fat x 9)]. The data of different parameters were analyzed statistically to assess the degree of variation within the treatments as compared to the control. The trial was laid out in randomized block design with five replications. The data were statistically analyzed following the ANOVA technique [8].

Results and Discussion

The data obtained on sensory quality attributes revealed that the D2 (30% rice+ 40% little millet+ 20% black gram +10% lentil) formulated dosa was more acceptable than other formulated millet based dosa. The result showed that increased in level of millet and lentil in dosa, color of the dosa gradually changes. The changes in color due to presence of tannin in millet flour and also might be due

to high protein content which resulted in Maillard reaction[9].

There was no significant difference in taste and texture of dosa. Millet based dosa from all formulations was accepted 'likely very much'. The incorporation of the millet at any level did not influence the taste of dosa indicating its excellent blending capacity[14].

Physical and cooking qualities of developed millet based fermented products

The physical and cooking characteristics of dosa (Table, 3) reveal that the thickness of dosa decrease as increase in diameter, resulting in increased spread ratio. As increased millet and lentil content diameter of dosa increased but weight of the dosa gradually get decreasing, this may be due to less hydration rate of millet flour. Cooking time gets increased gradually as increased millet and lentil level. The same result revealed that the cooking time of dosa from millet blend composite flour was 10-15 seconds higher than standard composite flour[9]. **Nutritional composition of instant mixes:-Moisture content:** In dosa maximum moisture content was found in control (D0), whereas minimum was found in D3 formulated dosa mix. Moisture decreased with increased millet level in formulations. The moisture content may be low due to high fibre content[10].

Protein content: The nutritional composition of dosa mixes showed in Table 4 indicate that the protein content was found to be increased with increase in little millet and lentil level in millet based dosa mix, because high level of protein in little millet and lentil[6]. This might be due to higher protein content of millets as well as fermentation which causes to increase the availability of protein content[6]. **Fat content:** The data showed in Table 4.5 showed that fat content increased significantly as increase content of little millet and lentil in millet based dosa mix, this because more fat content in little millet 5.3/100g) and lentil

(0.7/100g), similar to the findings of others, the fat content was found to be increased with increase in millet flour blend level in composite flour.

Carbohydrates content: The total carbohydrate content decreased significantly because rice (78.2g/100g) contains more carbohydrate content compared to little millet (75.2g/100g) as reported earlier [13]. Presence of rice which is rich in starch might be a contributing factor for high carbohydrate content.

Crude fibre content: It is observed that the fibre content of millet incorporated dosa mix showed high fibre content because of high fibre content in little millet (8.6 g/100g). Fibre content increased with increased level of millet and lentil[9].

Ash content: The data revealed (Table 4) that ash content of dosa mixes were increased significantly as increased level of millet. An increase in protein, fat, total ash, calcium and phosphorus contents and decrease in carbohydrate, crude fibre and iron contents of ragi dosa were observed[6].

Energy value: The calculated total energy content was more in millet based dosa mix, which could be due to high protein and fat content in the product[7].

Functional properties instant mixes:- As data showed (Table, 5) WAC% and OAC% of dosa mix increase significantly as increase in the level of little millet and lentil content may be due to high protein and fibre content in little millet flour. The protein content has been associated with the water binding properties in flour and[5, 13]. The highest WAC of potato flour could be attributed to the presence of higher amount of carbohydrates (starch) and fibre in this flour. The water and oil binding capacity of food protein depend upon the intrinsic factors like amino acid composition, protein conformation and surface polarity or hydrophobicity.

Table 1 Different formulations of *dosa mix*

Treatments	Rice flour (g)	Little millet flour (g)	Black gram flour (g)	Lentil flour (g)
D0 (control)	70	-	30	-
D1	50	20	30	-
D2	30	40	20	10
D3	10	60	10	20
D4	-	70	-	30

Table 2 Mean score values of sensory quality attributes of prepared *dosa mix*

Treatment	Color	Texture	Taste	Flavor	Overall acceptability
D0(Control)	8.5	8.3	8.5	9	8.5
D1	8.0	8	8.0	8	8
D2	7.5	8.5	8.5	8.4	8.5
D3	7.1	8.1	8.0	7.5	7.5
D4	6.7	8	8.0	7.5	7.5
SEM $\pm$	0.149	0.087	0.090	0.153	0.138
CD at 5%	0.469	0.276	0.285	0.484	0.4375

Table 3 Physical and cooking characteristics of *dosa mix*

Parameters	Volume of batter/Dosa (ml)	Diameter(cm)	Thickness(cm)	Spread ratio	Weight of cooked product	Cooking time (min.)
Do (Control)	50	12.11	0.41	29.365	53	1.5
D1	50	12.47	0.39	31.871	50	2
D2	50	13.20	0.30	44	49	2.1
D3	50	13.66	0.28	48.85	48	2
D4	50	13.86	0.26	53.423	47	2.1
SEM $\pm$	0.577	0.081	0.007	0.589	0.564	0.056
CD at 5%	1.8164	0.255	0.022	1.856	1.77	0.176

Table 4 Nutritional composition of instant *dosa mix*

Constituents	Moisture	Protein	Fat	Carbohydrates	Crude fibre	Energy value
Control	8.01	11.86	0.57	72.62	0.40	343.05
D1	8	12.25	1.03	70.87	2	341.78
D2	7.95	12.69	1.12	70.8	3.65	344.06
D3	7.87	13.27	1.27	70.75	5.42	347.51
D4	7.9	13.64	1.54	70.67	6.23	351.1
SEM	0.051	0.117	0.059	0.090	0.047	0.242
CD at 5%	0.162	0.368	0.187	0.285	0.148	0.763

Table 5 Functional properties of Instant *dosa mix*

Parameters	Control	D1	D2	D3	D4
WAC (%)	178.32	182.21	189.96	195.1	202.62
OAC (%)	221	224	208	186	232

WAC- water absorption capacity, **OAC** – Oil absorption capacity

Conclusion

On the basis of findings it can be concluded that the millet based instant dosa mix could be considered good from both nutritional and sensory point view. The formulation of millet based dosa mix at 30% Rice, 40% little millet, 20% black gram and 10% lentil flour accepted as best formulation. Rice will be replaced with kodo and kutki, black gram/bengal gram replaced with lentil. These instant mixes can be considered as therapeutic food for health conscious peoples and also can be prepared at cottage industries to improve women empowerment.

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