

Standardization and Development of Instant Ragi Dosa Mix with Dehydrated Green Leafy Vegetables

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Abstract: *"Instant Foods" play an important role in everyone's day-to-day life. The very term 'instant food' means simple, fast and convenient food which is easy and fast to prepare besides being hygienic, free from microbial contamination and also convenient to eat. Instant foods have become popular with time because of less cost, time and energy saving, convenience in preparation and consumption in the busy and hectic life. It was a boon for working people who were able to save time, energy and money by using these foods. In developing countries like India, where it is engulfed with poverty suffers with various micronutrient deficient diseases, hence there is a need to enhance the micronutrient levels with low cost foods. Hence the present study was development of instant ragi dosa mix with less utilized ragi, moringa oleifera and spinach leaves, which are rich in micronutrients but are mostly underutilized was used to enhance the micronutrient level.*

I. Introduction

In modern days where the life is at fast pace with the time very valuable to every person, "Instant Foods" play an important role in everyone's day-to-day life. The very term 'instant food' means simple, fast and convenient food which is easy and fast to prepare besides being hygienic, free from microbial contamination and also convenient to eat. Unlike olden days where man used to have his food lavishly and slowly, the present trend changed the habits to foods which are simple and easy to digest. Hence, the existence of these foods fulfilled all the needs of modern human being. (Shanti D et al. 2000)

Canned foods, convenience foods, fast foods, frozen foods, instant products, dried foods, preserved foods, etc. all come under instant foods or ready-to-eat foods. The food habits in India have changed due to the Western influence and the usage of these foods is also on the rise. These foods are widely used in catering industries as well as at homes. There are varieties of instant/ready-to-eat foods available in the market to choose from and they have been a part of everyday life. Instant foods have become popular with time because of less cost, time and energy saving, convenience in preparation and consumption in the busy and hectic life. It was a boon for working people who were able to save time, energy and money by using these foods

India is a country with diverse agro-climatic conditions which favors the cultivation and availability of wide array of foods specially fruits and vegetables (Naik R, 2004). Green Leafy Vegetables (GLV), a treasure trove of nutrients in general and micronutrients in particular, are available at low cost or no cost throughout the year. However, the consumption of these is restricted to the local area, with the adequacy ranging from 7-10 per cent among adolescents (Hanagi and Deepa, 2006). IDA is one of the major public health problems of the country among women of reproductive ages. Prevalence of anemia among rural adolescent girls of Dharwad was found to range from 73 to 87 per cent (Hanagi, 2006) and 63 to 85 per cent among urban girls (Deepa, 2006). Iron being an essential element in formation of hemoglobin, main etiological factors contributing to IDA is low dietary intake, poor socioeconomic status and associated deficiencies like Protein Energy Malnutrition, as well as recurrent infections. The time has come to put the array of iron rich foods like Green leafy vegetables to effective use not just for combating anemia but for achieving all round improvement in health. A number of surveys conducted locally and in the country have indicated lower consumption of green leafy vegetables among the population in general and adolescent girls in particular. This segment of population not only has rigid likes and dislikes, is figure conscious and weight watchers (Bhosale and Arya, 2006).

Hence the present study is planned to develop nutritious instant ragi dosa mix with green leafy vegetables. So, that the less utilized ragi, moringa oleifera, which are rich in micronutrients but are mostly underutilized was used to prepare ragi dosa mix which will enhance the micronutrient levels

II. Materials And Methodology

All chemicals were purchased from Qualigens Fine Chemicals (Mumbai, India) or Molychem India Pvt. Ltd. (Mumbai, India). Microbiology media were obtained from Hi-Media Laboratories (Mumbai, India). Unless otherwise mentioned, all chemicals used were of analytical grade. In the present study, dehydrated green leafy vegetable were collected aseptically from local super markets and analyzed for and microbial parameters, Sensory and nutritional parameters.

III. Microbial Analysis

Ten gram analytical unit of each food sample [i.e. Insatnt ragi dosa mix] was homogenized with 90 ml of sterile Ringer's solution for 2 min and then 10 fold serial dilutions were prepared in sterile Ringer's solution. Briefly, individual serial decimal dilutions, starting with the prepared sample and each of the subsequent dilutions were prepared in 9 ml volume of sterile Ringer's solution up to 1×10^{-6} dilution, of the original food sample. Triplicate 1 ml inoculums of appropriate dilutions were pouring plated, on the following media; for enumeration of total plate counts (TPC) on plate count agar and for enumeration of yeast and moulds on potato dextrose agar. The inoculated Petri plates were incubated at 37°C for 48 h for TPC and at 25°C for 48 h for yeast and moulds, respectively. Colonies were counted and expressed as colony forming units (cfu) per gram. Standard enumeration procedures were followed (Speck, 1975).

IV. Sensory Analysis

The product developed in each trail was subjected to sensory evaluation with the panel members. Five point hedonic scales were chosen to test the acceptability, where the judges express their evaluation according to the scores given for each sensory attributes on the score card provided. Separate column was given to write the remarks based on the results, modifications were made in the recipe and was presented again in other trail.

Sensory evaluation was carried out for three trails. Evaluation was an important step during development of new food product and of analyzing the market potential for these foods. Likewise it was necessary in the study of processing and storage effects. The product was evaluated by the sensory evaluation technique with the selected panel members. The quality parameters such as appearance, color, taste, flavor and texture, on a five point hedonic scale was assessed. The five point hedonic scale was used for the development of score card for various sensory characteristic like appearance, taste, color, texture, flavor and overall acceptability.

The first requirement in starting with sensory evaluation was a reliable and capable group of panel members. The sensory evaluation was carried out by two categories of panel members, and they are P.G students and house wives. Fifteen members were selected from each category of panel for sensory evaluation. There was no sex and age discrimination made in the selection of panel members. Care was taken that panel members were available throughout the experimental period and they did not have any dislikes towards the product and ill health. Sensory evaluation of the instant ragi dosa mix was carried out in the laboratory at all storage periods. A glass of water was provided along with the appropriate labeled samples. Each panel member was providing with score card individually and prior instructions were given to the panel members and required to provide their fullest cooperation to conduct the study.

Nutritive analysis

Energy (k.cal), Total fat (gm), Total CHO (gm), Iron (mg), was determined using approved AOAC methods (2002).

Standardization of the product

Various trails were carried out to standardize the product. Based on the subjective evaluation, the trail which scored the maximum for all the sensory attributes and overall acceptability was selected as the best standard sample and was chosen for product development further.

A. TRAIL - I

The ingredients and procedure followed is given below:

Ingredients

The following ingredients were used in the preparation of instant ragi dosa mix.

Table 1: standardization of ingredients for Trail- I, II, III

S. No.	Ingredients	Quantity TRAIL: I	TRAIL:II	TRAIL: III
1	Ragi	30	30	35
2	Wheat	10	20	25
3	Maida	10	15	25
4	Drumsticks leaves	25	15	7
5	Spinach leaves	20	15	6
6	Pepper	3	3	0.5
7	Salt	1.5	1.5	1
8	Soda	0.5		0.5
	TOTAL	100		100

The ingredients (Ragi, dehydrated drumstick leaves and spinach leaves) were weighed according to the quantities given in table no.1 Maida, salt, wheat flour, pepper, and soda was added to the above mixture. The above mixture was blended for uniform distribution of particles.

The trail I prepared instant ragi dosa mix was subjected to sensory evaluation. Though the taste was good, the appearance and the color for the product were not good. Hence second trial was conducted in order to bring changes in the product.

In this trail-II the prepared instant ragi dosa mix was subjected to sensory evaluation. Though the taste was good, the color of the product was not acceptable. Hence, Trail III was carried out to bring changes in the product.

In the trial-III the prepared instant ragi dosa mix was good in all sensory attributes. The product was standardized in this trial.

V. Results And Discussion

The major aim of the present study was development of instant ragi dosa mix with less utilized ragi, moringa oleifera and spinach leaves, which are rich in micronutrients but are mostly underutilized was used to enhance the micronutrients level.

In the first trial the developed product was greener in colour and taste was poor, hence second trail was carried out to bring necessary changes in the second trial. The presented instant ragi dosa mix was good in taste but the appearance and colour of the prepared product was little green in color. Hence third trial was conducted. In this trail all the sensory attributes were well acceptable. Hence the product was standardized in this trail.

Microbial Quality of Instant ragi dosa mix

Instant ragi dosa mix was analyzed and the TPC and yeasts / molds content present in the samples was analyzed and observed during storage periods.

Total plate count of Instant ragi dosa mix during storage period

The total plate count Instant ragi dosa mix during storage period is presented in Table 2.

Table 2. Total plate count (cfu/gm) of Instant ragi dosa mix

Instant ragi dosa mix	Mean ± SD			F-Value	Sig
	1 st month	3 rd month	6 th month		
TPC	$4.2 \times 10^3 \pm 5\%$	$5.0 \times 10^5 \pm 5\%$	$5.8 \times 10^6 \pm 5\%$	8.2×10^3	0.000*

P value < 0.05 significant at 0.05% level, *Significant at 0.05% level

The data in the Table 2 shows that the mean values of Total Plate Count of Instant ragi dosa mix during different storage periods. The mean values of TPC of Instant ragi dosa mix at 1st, 3rd, 6th months were $4.2 \times 10^3 \pm 5\%$, $5.0 \times 10^5 \pm 5\%$, $5.8 \times 10^6 \pm 5\%$ respectively. The F values are 8.2×10^3 . A significant difference was observed in the TPC of Instant ragi dosa mix during storage.

Yeasts/molds of Instant ragi dosa mix

The yeasts and molds count of Instant ragi dosa mix during storage period is presented in Table 3.

Table 3. Yeast / Molds (cfu/gm) of minimally processed pineapple and cabbage

Instant ragi dosa mix	Mean ± SD			F Value	Sig
	1 st month	3 rd month	6 th month		
Yeast/Mold	$6.9 \times 10^2 \pm 5\%$	$7.4 \times 10^3 \pm 5\%$	$8.4 \times 10^4 \pm 5\%$	1.9×10^4	0.000*

P value < 0.05 significant at 0.05% level *Significant at 0.05% level

The data in the Table 3 shows that the mean values of yeasts /molds of Instant ragi dosa mix during different storage periods. The mean values of yeasts /molds of minimally processed pineapple at 1st, 3rd, 6th months were $6.9 \times 10^2 \pm 5\%$, $7.4 \times 10^3 \pm 5\%$, $8.4 \times 10^4 \pm 5\%$ respectively. The F values are 1.9×10^4 for Instant ragi dosa mix. A significant difference was observed in the Yeast/ molds of Instant ragi dosa mix during storage

Sensory evaluation of the product

Sensory evaluation was carried out for three variants. Evaluation was important during developing a new food product to analyzing the market potential for these foods.

Table no: 4 Sensory evaluations of various Trails on instant ragi dosa mix

Sample	Appearance	Color	Taste	Texture	Flavor	Overall scores	Description
Trail I	3	1.5	2	3	4.5	13.5	Acceptable
Trail II	3.5	3	4	4	4	18.5	Moderate acceptable
Trail III	4	4	4.5	4.5	4	21	Well acceptable

Table No: 5 Sensory Evaluation of Instant Ragi Dosa Mix by Various Age Groups For Trail III

S. No.	Sensory attributes	Target groups	
		PG Students	House wives
1	Appearance	4.5	4.4
2	Colour	4.6	4.6
3	Texture	4.5	4.7
4	Taste	4.8	4.6
5	Flavour	4.8	4.5
6	Overall acceptability	4.8	4.5

The mean scores of each sensory attributes and the overall scores obtained by the PG students were represented in table no: 5. the scores of all three trails were well acceptable. Based on the organoleptic evaluation, the third trail was considered as the standard among the experimental samples due to the highest mean scores as per the evaluation of panel members i.e., P.G. Students. From the obtained values it was observed that the prepared product in trail **III** was more acceptable and hence product prepared in trail **III** was used to standardize the instant ragi dosa mix

Nutritive value calculations

Energy (k.cal), Total fat (gm), Total CHO (gm), Iron (mg), was determined using approved AOAC methods (2002).

Nutritive values:

Table no: 6 Nutritive values of instant ragi dosa mix per 100 gm

Nutritive values	Quantity
Energy(k.cal)	310.54
Total fat(gm)	1.46
Total CHO(gm)	45.47
Iron(mg)	3.09
Protein	7.73

VI. Conclusions

The developing countries where most of the people are engulfed in poverty and cannot afford the expensive food products and suffer from various deficiency diseases a need to identify cheap and easily available source rich in micronutrients. Malnutrition is found to be widespread problem in India irrespective of topographical description over 40000 children die of malnutrition and related diseases every day. The ninth five year plan (1997-98 to 2001-2002) of government of India has identified chronic protein energy deficiency especially in children as a major nutritional problem of health importance and micronutrient deficiencies of iron, iodine and vitamin A and its associated health hazards as another nutrition problem (Malleshi Nget al. ,2000).

Hence, through this study the less utilized ragi, m oleifera, spinach which are rich in micronutrients but are mostly discarded or go waste was used to prepare ragi dosa mix which will enhance the micronutrients levels. The basic ingredients in this product are ragi, dehydrated green leafy vegetables (spinach, drumstick leaves) Maida, wheat flour, salt were produced from local supermarket of Tirupati. Ragi provides highest level of calcium, antioxidants properties, phytochemicals, which makes it easily and slowly digestible. Hence it helps to control blood glucose levels in diabetic patients very efficiently. The bulkiness of the fibres and the slower digestion rate makes us feel fuller on, fewer calories and therefore may help to prevent us from eating excess calories (Srilakshmi B, 2007). Therefore, ragi is considered to be ideal food for diabetic individuals due to its low sugar content and slow release of glucose/sugar in the body (shanty et al,2000). In the germination process, both starch and protein are partially degraded, important for better digestibility and some of the flatus factors are also degraded. Ragi provides ample amount of calcium and protein to those people who cannot afford milk. It acts as a whole diet for diabetic and obese people.

Dehydrated leafy vegetables are concentrated source of several nutrients including iron and β-carotene. Development of the products by incorporation of the dehydrated Green leafy vegetable in traditional preparations can assist to meet the product was tested for preliminary acceptance in the laboratory as well as for product standardization daily nutritional requirements of the adolescent girls. Drumstick leaves (moringa oleifera) leaves are highly nutritious being a significant source of beta carotene, vit C, protein iron, and K. Spinach contains a 'plethora' of nutritional and medicinal properties which help to strength our immune system, boost energy levels and provide our body with necessarily vitamins and minerals (Srivastava R P, 2009)

Three trails were undertaken to standardize the instant ragi dosa mix and subjected to sensory evaluation by selected panel members. As the drumstick leaves and spinach contains many micro nutrients which will enhance the micronutrient levels of malnourished people. Hence it can be incorporated in to the malted ragi powders to prepare instant ragi dosa mix. The prepared instant ragi dosa mix was subjected to test

marketing .The product was tested for preliminary acceptance in the laboratory as well as for product standardization.

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