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FORMULATION AND NUTRITIONAL COMPOSITION OF VALUE ADDED IDLI PREPARED USING SELECTED DRIED HERBS

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ABSTRACT

Today, herbs are still the alternative medicine and primary source of health care for 80% of the world. Information available on the nutritive value of herbs is negligible. Thus, an attempt was made to introduce new types of value added edible medicinal herbs in food product, which will improve the well being of the citizen in the country and preventing micronutrient malnutrition. A total of six dried herbs viz. mint, basil, drumstick, ginger, garlic and lotus stem were selected and analyzed for proximate and mineral contents by AOAC (1997) methods. These selected dried herbs were then incorporated into idli with one control (T₀) and four treatments T₁, T₂, T₃ and T₄ at different percent incorporation levels with herbs using their standard ingredients and methods of preparation. Organoleptic properties of idlis were judged by nine point hedonic scale. The nutritive value of the developed idlis was calculated by using the food composition tables, Gopalan (2007), and the analyzed value of dried herbs was determined by calculation method. Results showed that moisture, fat, protein, carbohydrate, energy and fiber contents (percent) of the dried herbs ranged between 5.20 to 11.3g, 0.76 – 5.91g, 4.06g – 19.85g, 38.1 – 72.71, 205 – 346Kcal and 9.86 – 40.91g, while calcium and iron content of selected herbs ranged between 80.0 – 2112.5mg/100g and 2.75 – 87.4mg/100g respectively. The highest overall acceptability was found in T₃ (15 percent) in case of idli. Significant difference ($P \leq 0.05$) in flavour and taste, body and texture and colour and appearance between various treatment combinations was found. Remarkable increase was observed in nutrients such as protein, fat, fiber, calcium and iron in the developed idlis compared to control.

Key words: Herbs, Idli, Organoleptic evaluation, Composition.

INTRODUCTION

Herbs have been used since time immemorial for different purposes. Introduction of new types of value added edible herbs in food products might improve the well being of the citizen in the country¹. Now-a-days, plant foods are gaining

importance as a means to increase the per capita availability of foods². Herbs not only add flavor, variety, color and nutrition to foods but also help in cutting down on salt, fat and sugar. Many herbs both fresh and dried are rich source of micronutrients, vitamins, antioxidants and fiber content that may help protect against degenerative diseases³ and could make an important contribution to combating

micronutrient malnutrition as well as providing food security⁴. Fortunately India is found to be a rich repository of herbs and is well known for its richest and most diverse cultural traditions associated with the use of herbs.

Fermentation is one of the oldest and most economical methods of producing and preserving foods highly acceptable to man. Fermented foods contribute to about one-third of the diet worldwide⁵. Cereals are particularly important substrates for fermented foods in all parts of the world and are staples in the Indian subcontinent, in Asia, and in Africa. Idli is one such fermented food rich in carbohydrate, protein, vitamins and essential minerals which act as a balanced diet for all age group⁶. Besides the microorganism, starch rice powder and black gram dhal, certain selected dried herbs can also be incorporated, consisting of lotus stem, garlic, ginger, mint, basil and drumstick leaves. These herbs are known to have antimicrobial, antifungal and antioxidant activity that probably inhibits contaminating organisms and stimulates the useful organisms in idli⁷.

Herbs play an important role in the life of indigenous people around the world but due to non- acquaintance of consumption form of herbs and non- acceptability of taste in their original form, it is not possible to continue the intake of these herbs for long duration. Therefore, the present study was undertaken to explore possibilities of using selected dried herbs to enrich the traditional idli along with a view to determine the organoleptic acceptability.

MATERIALS AND METHODS

Selection of the herbs

Dried herbs namely lotus stem, garlic, ginger, mint, basil and drumstick leaves were procured from the licensed and authorized shops of herbs. The above dried herbs were cleaned and shortened for chemical analysis.

Chemical analysis of the dried herbs

Nutrients such as moisture, protein, fat, crude fiber, total ash, calcium and iron content of selected dried herbs were analyzed as per AOAC (1997) methods⁸.

Basic formulation of value added idli

The selected dried herbs viz. mint (*Mentha asiatica*), basil (*Ocimum basilicum*), drumstick leaves (*Moringa oligifera*), ginger (*Zingiber officinale*), garlic (*Allium longicuspis*) and lotus stem (*Nelumbo nucifera*) were incorporated in idli with one control (T₀) and four treatments T₁, T₂, T₃ and T₄ at 5, 10, 15 and 20 percent incorporation levels with herbs using standard ingredients and methods of preparation. The composition is given in the Table 1. The dried herbs were used in different ratios for the preparation of idli.

Details of control and treatments

Control (T₀): Control T₀ was prepared without incorporating herbs. (75 percent rice flour and 25 percent black gram flour).

Treatment (T₁): In this treatment 2 percent lotus stem powder, 1.5 percent basil leaves, 0.5 percent drumstick leaves and 1 percent ginger was incorporated in 70 percent rice flour and 25 percent black gram flour.

Treatment (T₂): In this treatment 7 percent lotus stem powder, 1.5 percent mint leaves, 0.5 percent drumstick leaves and 1 percent ginger was incorporated in 65 percent rice flour and 25 percent black gram flour.

Treatment (T₃): In this treatment 12 percent lotus stem powder, 1.5 percent garlic flour, 0.5 percent drumstick leaves and 1 percent ginger was incorporated in 60 percent rice flour and 25 percent black gram flour.

Treatment (T₄): In this treatment 17 percent lotus stem powder, 0.5 percent garlic flour, 0.5 percent drumstick leaves, 0.5 percent mint leaves, 0.5 percent basil leaves and 1 percent ginger was incorporated in 55 percent rice flour and 25 percent black gram flour.

Preparation of value added idlis

The most popular is a steamed rice-bean food called "Idli". Rice, and a Chinese herb lotus stem was ground coarse and dehulled black gram to a fine paste, other herbs namely garlic, ginger, mint, basil, drumstick leaves and salt was added in a specified ratios. The paste was incubated overnight in warm place (30-32°C), until it has expanded to about 2½ times its original volume after that it was poured in an idli steamer and steamed till it was done. The specialty of black gram in idli preparation owing to the mucilaginous material present in it which is absent in other edible legumes. The mucilaginous principle helps in the retention of carbon dioxide evolved during fermentation.

Organoleptic evaluation

The developed idlis were served to group of 30 semi trained panelists for the evaluation of colour, texture, flavour, taste and overall acceptability on a nine point hedonic scale with a scores ranging from 9 to 1 where scores 9 to 1 represented like extremely and dislike extremely respectively. The quality parameters were quantified and the mean scores of the three evaluations were calculated.

Nutritive value of developed idlis

The proximate principles (energy, fat, carbohydrate, protein, fiber) and minerals like calcium and iron of the control and enriched products were assessed using the food composition tables⁹, and analyzed value of herbs was determined by calculation method.

Statistical analysis

The data collected was tabulated and analyzed statistically with the help of approved statistical techniques. Percentage, mean scores, standard error of mean, critical difference and analysis of variance were applied.

RESULT AND DISCUSSION

The results obtained from the present investigation have been discussed in the following sub heads:

Nutritional composition of the selected dried herbs

Table 2 depicts nutritional composition of the six selected dried herbs namely mint (*Mentha asiatica*), basil (*Ocimum basilicum*), drumstick leaves (*Moringa oligifera*), ginger (*Zingiber officinale*), garlic (*Allium longicuspis*) and lotus stem (*Nelumbo nucifera*). Results showed that moisture, fat, protein, carbohydrate, energy and fiber contents (percent) of the dried herbs ranged between 5.20 to 11.3g, 0.76 – 5.91g, 4.06g – 19.85g, 38.1 – 72.71, 205 – 346Kcal and 9.86 – 40.91g, while calcium and iron content of selected herbs ranged between 80.0 – 2112.5mg/100g and 2.75 – 87.4mg/100g respectively.

Organoleptic evaluation of value added idlis

Table 3 shows the organoleptic scores of product idli prepared by utilizing dried herbs. The treatment T₃ (15 percent incorporation) of the product was found to be highly acceptable with scores 8.50, 8.50, 8.25, 8.40 and 8.48 for colour, texture, flavour, taste and overall acceptability respectively. The other levels of incorporation were also liked at various degrees although a little less than T₃. Analysis of variance reveals that the calculated value of F is greater than the table value on 4,12 (d.f.) at 5% probability level. Therefore it was conclude that there was significant difference between treatments regarding the overall acceptability of the product.

Nutritive value of value added idlis

Table 5 present information regarding the mean nutrient composition of dried herbs incorporated products (per 100g). Results showed that the fat content of the developed idlis was in range of 0.72 to 0.96 g/100g. The fat was highest in treatment T₄ (0.96g/100g). The protein content was highest in treatment T₁ (11.27 g/100g). Carbohydrate content of the developed idlis was

found to be in the range of 68.47 to 73.55 g/100g. The maximum value 73.55 g/100g were observed in treatment T₀ (control). This may be due to 75 percent of rice flour and 25 percent of black gram flour present in idlis. Energy value ranged between 325 to 346 Kcal/100g. The maximum energy value 346 Kcal/100g was observed in treatment T₀ (control) which had energy rich ingredient like rice flour. Fiber content of idlis varied from 0.37 to 5.20 g/100g. The highest value 5.20 g/100g was observed in treatment T₄. The control recipes in general had low fiber content whereas after the incorporation of dried herbs, the values increased considerably. Thus, these developed idlis can be recommended to persons requiring high fiber diets. The calcium content of the developed idlis ranged from 46.0 to 142.42 mg/100g. Treatment T₄ had higher calcium content (142.42 mg/100g) among other treatments. The range of iron content in developed idlis was 1.47 to 12.54 mg/100g. The increase in iron values can be said to be proportionate to the quantities of dried herbs added to the main ingredient.

CONCLUSION

It can be concluded from the results that the incorporation of selected dried herbs (viz. mint, basil, drumstick leaves, ginger, garlic and lotus stem) in idlis can improve the nutritional quality of products as well as add variety in the diet. The dried herbs used in development of idli act as antimicrobial agent, which worked as a natural preservative to keep food safe and to increase the shelf life of the product. Complete or partial replacing of rice with dried herbs had good impact on the nutritive value by increasing the protein, fat, fibre, calcium and iron content in the developed idlis. Thus developed herbal idli is found to be acceptable in both sensory and nutritional quality.

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Table 1: Proportion of dried herbs in different treatments of Idli

Herbs	Idli				
	T ₀	T ₁	T ₂	T ₃	T ₄
Lotus stem (powder)	-	2%	7%	12%	17%
Drumstick leaves (crushed)	-	0.5%	0.5%	0.5%	0.5%
Basil leaves (crushed)	-	1.5%	-	-	0.5%
Mint leaves (crushed)	-	-	1.5%	-	0.5%
Ginger (powder)	-	1%	1%	1%	1%
Garlic (powder)	-	-	-	1.5%	0.5%
Total % of herbs incorporation	-	5%	10%	15%	20%

Table 2: Nutritional composition of dried herbs per 100g

S	Local name	Botanical name	Moisture (g)	Fat (g)	Protein (g)	Carbohydrate (g)	Energy (Kcal)	Fiber (g)	Calcium (mg)	Iron (mg)
1.	Mint (leaves)	<i>Mentha asiatica Ocimum</i>	11.3±0.05	5.91±0.02	19.85±0.02	51.5±0.28	285±0.28	29.63±0.08	1486.8±0.72	87.4±0.05
2.	Basil (leaves)	<i>basilicum</i>	6.43±0.01	3.95±0.02	14.01±0.04	61.13±0.18	250±0.33	40.91±0.04	2112.5±0.28	41.5±0.28
3.	Drumstick (leaves)	<i>Moringa oligifera</i>	7.45±0.02	2.25±0.02	27.06±0.03	38.1±0.01	205±0.16	19.1±0.05	2002.5±0.28	28.11±0.07
4.	Ginger (root)	<i>Zingiber officinale</i>	9.38±0.00	5.8±0.05	9.06±0.02	70.7±0.05	346±0.43	12.46±0.01	115.5±0.28	11.5±0.02
5.	Garlic (cloves)	<i>Allium longispis</i>	5.20±0.17	0.76±0.00	16.8±0.05	72.71±0.00	332±0.57	9.86±0.02	80.0±1.15	2.75±0.01
6.	Lotus (stem)	<i>Nelumbo nucifera</i>	9.45±0.02	1.29±0.00	4.06±0.02	51.3±0.05	234±0.28	24.6±0.16	127.8±0.15	60.55±0.02

Table 3: Average organoleptic scores of different parameters in control and treated sample of idlis

Sensory characteristics/ Treatments	Scores on 9 point hedonic scale				
	Colour	Texture	Flavour	Taste	Overall acceptability
T ₀ (Control)	8.75±0.12	7.20±0.14	7.05±0.15	7.10±0.13	7.28±0.11
T ₁ (5%)	7.80±0.14	8.30±0.19	8.15±0.09	8.15±0.17	8.26±0.12
T ₂ (10%)	7.15±0.10	7.60±0.19	7.30± 0.13	7.10±0.13	7.31±0.11
T ₃ (15%)	8.50±0.18	8.50±0.13	8.25± 0.05	8.40±0.00	8.48±0.06
T ₄ (20%)	7.45±0.15	7.60±0.14	7.40±0.24	7.40±0.21	7.45±0.12
F value	26.12 *	10.37 *	12.97 *	23.87 *	18.85 *
C.D. (P=0.05)	0.335	0.423	0.079	0.313	0.330

9-point hedonic scale is as follows: 1—dislike extremely, 2—dislike very much, 3—dislike moderately, 4—dislike slightly, 5—neither like or dislike, 6—like slightly, 7—like moderately, 8—like very much, 9—like extremely.

* –Significant difference is at 0.05 level

Values are means (± SEM).

Table 4: Nutrient composition (per 100 g) in control and treated sample of idlis.

Nutrients Treatments	Fat (g)	Protein (g)	Carbohydrate (g)	Energy (Kcal)	Fiber (g)	Calcium (mg)	Iron (mg)
T ₀	0.72	11.10	73.55	346	0.37	46.00	1.47
T ₁	0.85	11.27	71.65	341	1.70	96.46	3.53
T ₂	0.92	11.23	71.00	336	2.76	106.84	7.21
T ₃	0.88	11.05	69.96	331	3.71	105.47	8.93
T ₄	0.96	10.91	68.47	325	5.20	142.42	12.54