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Development and Quality Evaluation of Instant Breakfast from Red Rice and Maize Flour Blends

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 02 Nov 2023	Objective: This current study was to develop and evaluate instant breakfast from red rice, black gram, maize and spinach. Methodology and results: Instant idli mix was developed from red rice, black gram
	bicarbonate, water. Control products consisted of only red rice and black gram, the three treatments were incorporated with maize and spinach at different ratios. The treatments underwent proximate analysis, sensory evaluation and microbial
	analysis. The results of the most preferred idli mix recorded values of moisture(6.57 ± 0.04), protein(11.32 ± 0.27), fat(2.45 ± 0.32), total ash(3.96 ± 0.02), crude fibre(0.93 ± 0.03). The Overall acceptability in sensory evaluation revealed that sample 2 is the most preferred out of all the other treatments with overall score of 8.32. Microbial analysis showed that sample 2 had $8.5x10^4$ cfu/g of total plate count on 0 day, $12.08x10^4$ cfu/g on 30 days and $12.24x10^4$ cfu/g on 60 days.
CC License CC-BY-NC-SA 4.0	Conclusion: the instant idli premix which were made at different levels were tasted and judged by 10 panels which resulted with sample 2 as the most preferred breakfast, it was generally well received and the nutritional value were high for fat, total ash and crude fibre as compared to control. Further work and improvement can be made with proper technology for a better production in the future
	Keywords: : Instant breakfast. Idli . Red rice. Spinach. Proximate

1. Introduction

There is a widespread understanding today that breakfast should play a substantial role in assisting people in achieving an ideal nutritional profile. From a physiological standpoint, breakfast is distinct from the other meals since it is consumed following the longest fast which is also known as an overnight fast. It is believed that a person having no proper breakfast will not meet the required energy to start the daily tasks (Gibney et al. 2018). People nowadays prefer more of instant breakfasts since they are quick and simple to prepare. Due to poor time management, people prefer instant breakfast more often, especially adults and teenagers who must leave for work and school. Instant food is typically precooked and requires only a minimal amount of time for preparing before consumption. In this study, different ingredients such as Red rice, black gram, maize and spinach were used to form a product. Red rice (Oryza Punctate) is long and grainy and has a earthy, nutty flavour which receives the reddish colour due to the presence of anthocyanin pigment and is excessive in dietary content as compared to polished rice.

The low glycemic index of red rice facilitates in controlling the sugar degree and is ideal for diabetic. It has a extraordinary capacity to be produced as a health-primarily based meal product (Mazumdar et al. 2022). Black gram (Vigna mungo.L) is a nutritious crop and are rich in antioxidant which can be used to treat a variety of illnesses including liver problems, rheumatism, diabetes, heart problems and infection of the nervous system (G Battu et al. 2011). Maize (Zea Mays) is derived from the Spanish word 'maiz", In numerous elements of the sector, it's far seemed as a staple meal and ranks 1/3 amongst plants of the sector after rice and wheat (Orngu and Nwaoha, 2022). Maize affords many of the B nutrients and crucial minerals alongside with fiber. In nations in which anemia and iron deficiency are

taken into consideration the fortification of maize flour with iron and different vitamins and minerals has been used to enhance micronutrient consumption and save from iron deficiency (Ranum et al. 2014).

Spinach (Spinacia Oleracea L.) is a superfood. The feasible fitness advantages of ingesting spinach include enhancing blood glucose level in humans with diabetes, reducing the chance of cancer, and enhancing bone fitness. It additionally facilitates with fitness situations which include cataracts, atherosclerosis, coronary heart attacks, and neurological disorders. It enables mineralization of bone and possess anti-ulcerative and anticancerous advantages (Abu Al-qumboz and Abu-Naser, 2019). All the different ingredients are combined together to form instant idli premix which will go through various process to develop the instant breakfast product. Idli is a steamed rice cake made by fermenting the rice batter and one of the traditional fermented meals in South India, is eaten for breakfast. Fermentation is an important step in the making of idli, it reduces the anti-nutritional components in grains such as tannin and phytic acid, the batter of idli which goes through fermentation process has improved the protein quality and bio availability (P Mounika et al, 2022).

This current study have been carried out so that it will include particular food products and form instant breakfast cereal that is ate up in each family however with a greater nutritious and wholesome way. In the prevention of many persistent illnesses like coronary heart disorder and diabetes Mellitus, it is important to decrease the intake of saturated fat and is far higher to consume entire meals like cereals and grains which give fibre and protein to the diet. This study is to decide whether or not breakfast will offer useful results on fitness through instant breakfast cereal. It is aimed for final results with a purpose to be able to maintain the vitamins and minerals more in the product. Given the meals crisis, the usage of nearby assets like spinach is vital to lessen the dependence of growing nations on imported goods, and to enhance vitamins amongst poor households. The ingredients in the product are rich in various nutrients as it contains potential hypoglycaemic and antioxidant properties as well as provide high fibre content and the necessary amount of energy and macronutrients.

2. Materials And Methods

Raw materials which includes Red Rice, Black Gram (Urad Dal), Maize, Spinach were procured from the local markets for study. Red rice and Black Gram were destoned, cleaned and washed properly and incorporated with Maize and spinach at three different ratios. In this study, instant idli mix was prepared at different combinations which were compared with control that was made with red rice and black gram. This present study was conducted at Chandigarh University, Nutrition and Dietetics Department, UIAHS, Mohali-140413, Punjab.

Preparation of Instant Idli Mix: Raw grains of Red rice and black gram were soaked separately in water at room temperature which were grinded and mixed together forming a batter that went through the fermentation process for 18-24 hours. It was kept for drying at 60°C in a hot air oven. The dried batter was coarsely grinded and incorporated with Maize and spinach at different levels. The Maize is roasted and coarsely grinded whereas the spinach is washed properly and dried to form into powder. Proximate analyses, sensory evaluation and shelf life were carried out to the formed product.

Treatments					Ingredi	ients (g)	
	Red rice	Black gram	Dried batter	Maize	Spinach	Salt	Sodium bicarbonate
control	560	200	-	-	-	-	-
Sample 1	-	-	160	30	10	4	4
Sample 2	-	-	140	40	20	4	4
Sample 3	-	-	120	50	30	4	4

Table 1: Different tre	atments
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Flowchart for preparation of idli mix



Proximate analysis

Determination of Proximate parameters like moisture, protein, fat, ash, crude fibre were done in accordance to FSSAI and AOAC methods. The results were recorded on dry weight basis.

Crude Fibre

Crude fibre of the control and the preferred instant idli mix was analysed. The Crude Fibre was determined according to the method of FSSAI manual of method of food 2016.

Crude fiber % =100 x (W 1 - W2) / W

Where,

W1 = wt of the Gooch crucible and contents in gm before ashing

W2 = wt of the Gooch crucible containing asbestos and ash in gm

W = wt of the dried material in gm that is taken for the test

Moisture -By Hot Air Oven Method

moisture content was analysed by the method of FSSAI manual of method of food 2016.

Moisture (%) =
$$(W1 - W2) \times 100$$

W1- W

Where,

W1 = Weight the material along with the dish in gm before drying

W2 = Weight the material along with the dish in gm after drying

W = Weight the empty dish in gm

Ash-By Muffle Furnace

The ash content of the control and the prepared idli was analysed by the method AOAC 940.26.

Total ash (% by weight) = (W2 - W) X100

$$W1-W$$

Where,

W2 = Weight the dish with the ash in gm

W = Weight the empty dish in gm

W1 = Weight in gm the dish with the sample material taken for test

Protein by Kjeldahl method

protein content for control and the idli prepared by incorporating maize and spinach was analysed. The protein content was determined by Kjeldahl method.

Protein (%) = (Blank T.V-Spl T.V)X Nomality(NaoH)X 0.0014x 1000x Protein factor

Sample Weight (g)

Fat by Soxhlet apparatus

Fat content of the formed product was evaluated by using the method of FSSAI manual of method of food.

Total fat (% by weight) = (W2 - W1) X100

W

Where,

W = weight of the sample in gm

W1 = Weight of the empty soxhlet flask in gm

W2 = Weight of the soxhlet flask with the fat in gm

Sensory Evaluation

Sensory evaluation of the three instant Idli mix with different ratios along with the control were evaluated to determine the most preferred idli mix. 10 panel members conducted the sensory evaluation of the prepared idli. The panel judges attributed according to the Appearance, flavour, taste, colour, texture, and it was scored according to the 9-point hedonic scale with the lowest score being represented as one which is extremely dislike and nine representing the highest which is extremely liked.

Shelf life analysis

150g of the samples were tightly stored in zip lock bags at the shelf at room temperature for 60 days. The Total Plate Count were evaluated for 0, 30 and 60 days to determine how long the product will be suitable for consumption.

Total Plate Count (TPC)

The total bacterial count was determined according to IS:5402: 2012 methods. 10g of initial homogenized sampled was weighed in 90ml peptone salt solution. The solution was kept for 30 mins for resuscitation before making any further dilutions and plating. All the plates were marked with sample code, dilutions, name of media and date of testing. 1ml of sample was added to marked Petri dishes with dilutions. 18-20ml of Plate count agar medium was poured and swirled gently for uniform distribution of sample. The plates were solidified and incubated at 30°C for 72 hours. After incubation, all colonies were counted on each plate having range 10-300 cfu per plate.

Statistical Analysis

The information have been statistically analyzed in entire randomized layout for evaluation of variance, mean, standards deviation and critical difference in accordance to standard method (Sheoran and Pannu, 1999).

3. Results and Discussion

In this study, different instant idli premixes were made with ingredients such as Red rice and black gram which were incorporated with maize and spinach at different ratios and combinations. The products that were prepared went through proximate analysis, sensory evaluation and microbial testing for shelf life.

Proximate Analysis of Instant Idli Mix With Different Treatment

Analysis of proximate parameters of the products were performed. Table 2 compares the control product and the preferred idli mix.

Treatment	Moisture	Protein	Fat	Total ash	Crude Fibre
Control	6.91±0.04	11.34±0.29	1.57±0.36	2.21±0.42	0.38±0.16
Sample 2	6.57±0.04	11.32 ± 0.27	2.45 ± 0.32	3.96 ± 0.02	0.93 ± 0.03
CD(p≤0.05)	0.15	N/D	N/D	1.2	0.46

Table 2	2: Proximate	composition of	f control product	and the preferred	idli mix
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*Value= Mean±S.E on dry weight basis. Each value is a mean of 3 replicates, C.D= ($p\leq0.05$), N/D= not detected.

Table 2 compares between the control instant breakfast and the developed sample. The developed sample had lower moisture as compared to control, moisture ranged from 6.57 for sample 2 and 6.91 for control. Protein ranging from 11.34 for control product and 11.32 for the developed sample. Fat ranged from 1.57 for control and 2.45 for developed sample. The preferred idli mix had higher range of total ash and crude fibre as compared to control product ranging from 3.96 for total ash and 0.93 for crude fibre and the control product having total ash of 2.21 and 0.38 of crude fibre. No particular significant difference ($p \le 0.05$) was found between the control and the sample. Generally the treatments had low moisture content material, which suggest that they might have an prolonged shelf life. The moisture content in the meals influences its balance and the general quality (Samuel and Otegbayo, 2006).

Sensory Evaluation of The Instant Idli Mix

The different samples of the prepared idli mix went through the process of sensory evaluation that used the 9 point hedonic scale with a panel of 10 judges. The results that were obtained were statistically analysed as shown in table 3 and fig.1.

Treatments	Appearance	Color	Texture	Flavour	Taste	Overall acceptability
Control	7.4±0.16	7.4 ± 0.22	7.3±0.26	7±0.21	7.5±0.17	7.32±0.05
Sample 1	7.6±0.16	8.3±0.15	7.4 ± 0.16	7.9 ± 0.10	7.9±0.10	7.82±0.19
Sample 2	8.1 ± 0.18	8.2 ± 0.20	8.2±0.13	8.8±0.13	8.3±0.21	8.32±0.28
Sample 3	7.2±0.13	7.3±0.26	7.2 ± 0.20	6.7±0.26	7.2 ± 0.20	7.12±0.39
CD(p≤0.05)	0.46	0.61	0.56	0.54	0.5	0.75

Table 3: sensory evaluation of idli mix with different treatments

* Value= Mean \pm S.E, each value is a mean of 3 replicates, C.D= (p \leq 0.05), Panelist= 10

The item with the highest means across the parameters examined was deemed to be the most preferred out of all the treatments . It was recorded that sample 2 was the highest and most preferred of overall acceptability as 8.32. It was recorded that sample 2 has high values in Appearance, texture, flavour and taste as 8.1, 8.2, 8.8 and 8.3. But it was seen that, sample 1 was recorded the highest value of 8.3 in color. Sample 2 has the highest overall acceptability out of all the sample, followed by sample 1 with a mean score of 7.82, thirdly control with mean 7.32 and the least preferred sample was recorded to be sample 3 with a total mean score of 7.12.



Fig 1: Sensory evaluation of different treatments of idli mix

Shelf Life Study of The Stored Product

The different samples were stored in zip lock bags for 60 days which were analysed for microbial. The result of the microbial analysis detected during the shelf life period are shown in table 4.

Table 4: T	'otal plate c	ount on pro	duct (cfu/g)
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Treatment	0 days	30 days	60 days
Control	3.2x10 ³	5.1x10 ³	6.12x10 ³
Sample 2	8.5x10 ⁴	12.08x10 ⁴	12.24x10 ⁴

The Total bacterial count was analysed for 0, 30 and 60 days of storage. Microbes were detected on both the control and sample on the 0 day, the levels of microbes in the samples were low and were acceptable. On the 30^{th} day the microbial loads gradually increased that ranged from 5.1×10^3 cfu/g for control and 12.08×10^4 cfu/g for sample 2. The microbial content of the control on the 60^{th} day increased by 6.12×10^3 cfu/g and for sample 2, it ranged to 12.24×10^4 cfu/g. Onyango Christine Akoth *et al.* (2012) revealed that the microbial loads were undetected from week 0-10 for white sorghum and from week 12-18 there was a gradual increase for red sorghum that ranged from 0.10 log CFU/ml, for white sorghum it was 0.24 log CFU/ml and 0.14 log CFU/ml for pearl millet but were low and were acceptable for cereals and products.

4. Conclusion

Instant idli mix were successfully developed from red rice, black gram by incorporating with maize and spinach at different levels. All the mixes with different ratios were analysed, they went through the process of proximate analysis, sensory evaluation and microbial testing. The most preferred product was sample 2, the overall acceptability of the sample 2 were higher than the other treatments with a score of 8.32. More work and further improvement can be recommended with different combinations and ratios for a better production. The progressive increase in the morbidity and prevalence of CKD, according to epidemiological data, highlights the importance of recognizing and understanding the specific signs and symptoms of this systemic pathology. Dental professionals must be prepared to face these challenges and appropriately and responsibly address the nursing procedures necessary in the care of these patients. Efficient and well-informed management is key to providing optimal care to those suffering from this complex kidney disease.

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