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Studies on development of ready-to-eat functional food and its storability

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Abstract
The fact that ready-to-eat food mixes provide the best method for delivering nutrients and functional components has led to a greater emphasis on ingredients than on functional claims. Formulation of ready-to-eat food mixes were developed by utilizing rice flakes (*Oryza sativa*), rice (*Oryza sativa*), ragi (*Eleusine coracana*), green gram (*Phaseolusaureus Roxb*), Bengal gram (*Cicer arietinum*), carrot (*Daucus carota*), beans (*Phaseolus coccineus*), fenugreek leaves (*Trigonella foemen*), drumstick leaves (*Moringa oleifera*) and groundnut (*Arachis hypogaea*). Sixteen types of mixes were developed with different proportion of cereals, pulses, vegetables and oilseeds in the ratio of 80:10:5:5, 70:20:5:5, 60:20:10:10 and the sprouted pulses in the ratio 60:20:10:10. The food mixes were stored in different packaging material namely Low Density Polyethylene (LDPE), Pet jars and Aluminum foil. The effect of packaging material on sensory characteristics of mixes was determined on 15 days interval. The phytic acid of ready-to-eat food mixes was analyzed. Cost and nutrient composition of ready-to-eat food mixes were estimated. The result was observed that Product-8 was having the highest overall acceptability on sensory characteristics and nutrient composition of the product was energy-384.4 kcal, CHO-71g, protein-14g, fibre-2.4g, fat-5g, Ca-108mg, iron-14mg, carotene-1701µg and low content of phytic acid i.e. 4 mg. The product stored in Pet jar has the highest overall acceptability in comparison with the product stored in LDPE and aluminum foil.

Keywords: Ready-to Mix, ready to Eat (RTE), packaging, LDPE, nutritionally adequate

Introduction
The greatest way to distribute nutrients and functional components is through ready-to-eat meal mixes, which has led to a focus on ingredients rather than functional claims. Initiatives are being made to add vegetables to cereal-based meal mixes in an effort to change their nutritional composition in response to the rising demand for wholesome, convenient, and natural diets from consumers (Sajjanar *et a*l., 2010). (2013) Mridula *et a*l. Pulses are a popular food in many parts of the country since they are made from whole grains and have a delicious flavor. It works as the main element in the creation of food mixtures by using rice flake powder of the grains, which makes their manufacturing practicable for use in human consumption. Therefore, an effort was made to standardize the quantity of components used to prepare ready-to-eat (RTE) food mixes with regard to quality features and to research how packaging materials affect the development of food mixes' sensory quality.

Materials and Methods
The study was carried out in the laboratories of Department of Food and Nutrition, College of Home Science, OUAT, Bhubaneswar. The study's materials included rice (*Oryza sativa*), rice flakes (*Oryza sativa*), and ragi (Eleusine coracana). Then, to be employed in the study, green gramme (Phaseolus aureus Roxb) and Bengal gramme (Cicer arietinum) were purchased at the neighbourhood market. Beans (Phaseolus coccineus), fenugreek leaves (Trigonella foenum graecum), drumstick leaves (Moringa oleifera), and carrot (Daucus carota) were all purchased from the neighbourhood market and washed thoroughly under running water before being utilized in the study. For the investigation, groundnut (Arachis hypogaea) was purchased from the neighborhood market.
Every standardization process included a balancing act between the different variables involved in processing the components to create a product with a respectable sensory quality. The creation of a ready-to-eat food mix was attempted. To achieve the goal, a number of early experiments were conducted to create ready-to-eat meal mixes with various proportions.

Consumer food preferences have been evolving quickly. The demand for quick, rapid meal products that eliminate hours of laborious kitchen labour is rising. Rice flake and rice were taken cleaned, roasted, powdered, sieved and stored in an air tight container separately. Green gram dal and Bengal gram dal were taken cleaned, roasted, powdered sieved and stored in an air tight container separately. Green gram and Bengal gram was germinated, dried, roasted, powdered sieved and stored separately in air tight container for germination.

The powdered ingredients were mixed in different proportions to obtain the Ready-To-Eat Mixes. Using the oven drying procedure, the moisture content of the study's samples was estimated. In a Petri plate, a ten gramme sample was weighed. It was then dried at 100 to 110 C for 30 minutes, cooled in a dessicator, and weighed again. Up till a constant weight was attained, the process was repeated. Using the NIN-recommended dry ash method, ash was estimated (2003). In a crucible that had previously been heated, cooled, and weighed, five grammes of a moisture-free sample were measured. Following complete burning of the sample on the hot plate, it was heated for 5 hours at 600oC in a muffle boiler. The crucible was weighed after cooling in a desiccator. Until a steady weight was achieved, the operation was repeated.

Phytic acid determination was used to determine the samples' phytate using the method provided by Lucas and Markaka (1975). This involves weighing 2 g of each sample into a conical flask with a capacity of 250 ml. The material was soaked in a conical flask with 100 ml of 2% concentrated HCl for three hours before being filtered through a 50 ml double layer filter. In order to provide or improve adequate acidity, 107 ml of distilled water was added to the sample filtrate in a 250 ml beaker. Each sample solution received 10 ml of 0.3% ammonium thiocyanate solution as an indicator. Each sample solution was then titrated with standard iron chloride solution, which contained 0.00195g iron/ml. The end point was indicated by a brownish-yellow coloration which persisted for 5 minutes.

Panelists were given coded samples and score cards to assess the level of acceptability of each attribute being assessed. The ready-to-eat mixture was maintained in a pet jar, wrapped in aluminum foil and low-density polyethylene, and kept at room temperature. A panel of 10 judges made up of teachers and students from the College of Home Science, OUAT in Bhubaneswar evaluated the food mix at intervals of 15 days after storage for its look, colour, flavour, texture, and general acceptability using a 9-point hedonic scale. The panelist were asked to evaluate the various samples for different sensory attributes namely appearance, flavour, taste, texture, colour.

The investigating attributes were given some weightage based on the judge's opinion regarding the importance given to a particular investigating attribute. The weight factors given to a particular subjective attribute was in such a way that the sum of the weight factor for all the investigating attribute was 1. In composite scoring the scores allotted to each investigating attribute was multiplied by corresponding weight factor and then the average of all cumulative summation was considered to be the score of overall acceptability. Statistical methods were utilized to examine the data.

Results and Discussion

Out of four ratios (80:10:5:5, 70:20:5: 60:20:10:10 and 60:20 (sprouted): 10:10) the RTE prepared from combination of Rice Flake-60g, Germinated Green Gram-20g, Carrot powder-10g and Groundnut powder-10g in the ratio 60:20:10:10 was found most acceptable. The results of nutritional composition of sample-8 (Ready-To-Eat) mixes observed that the energy content of the sample was 384.4kcal; CHO content was 71g, protein 14g, fiber-2.4g, fat-5g, calcium-108mg, iron-14mg, and carotene-1701µg. The phytic acid cnotent of the sample was found to be 4mg.

Ready-To-Eat food mixes were kept for 45 days at room temperature in a variety of containers, including Low Density Polyethylene (LDPE), Pet jars, and aluminum foil. A panel of judges examined the items created throughout the inquiry to learn about their individual sensory characteristics and the role packaging material had in boosting the sensory quality of generated food mixtures. Over the storage time, sample-8 was discovered to be more appealing than the other samples in terms of sensory evaluation. Nonetheless, the items stored in pet jars were determined to have the highest overall acceptance in compared to the products stored in LDPE and Aluminum foil. The sensory scores for various created products steadily decreased during the storage time.

From the present study it was found that out of the sixteen samples, sample-8 was found to be nutritionally adequate for the breakfast and suitable to store safely up to 15 days with groundnut powder and for three months without the mixing of groundnut powder in pet jar. Hence, Ready-To-Eat products developed from cereals, pulses, vegetables and oilseeds are rich in protein, energy, minerals (calcium) and fibre should be commercialized and promoted for use among all age groups.

Table 1: Mean sensory scores of overall acceptability* of RTE samples

Sample	Texture	Appearance	Taste	Flavor	Color	Overall acceptability
1	6.8±1.87	6.1±1.52	5.4±2.01	6±1.82	5.8±1.61	5.97±1.4
2	7.4±1.43	7.4±1.0	7.1±2	7.5±1.1	7.5±1.1	7.35±0.6
3	6.1±1.00	4.1±1.3	4.9±1.4	4.4±1.7	5.1±2.2	4.93±0.7
4	7.4±0.7	7.1±1.0	6.1±1.7	7.1±1	7.1±1	6.86±0.5
5	5.1±1.4	6.2±0.7	5.5±1.5	6.4±1	6.4±1	5.85±o.6
6	6.9±1.3	6.3±1.1	6.6±1.1	6.6±1.1	6.6±1.1	6.63±0.6
7	6.6±1.3	6.1±1.5	6.3±1.3	6.5±1	6.5±1	6.42±0.7
8	7.7±0.8	7.5±0.7	7.6±1.1	7.3±1	7±1.2	7.46±0.4
9	6.3±1.3	6.4±1.2	6.5±1.7	6.3±1.2	6.3±1.2	6.37±1
10	6.6±1.5	6.8±1	6.5±1	6.2±1.9	6.2±1.9	6.43±1.1
11	5.4±2.2	5.8±1.1	5.4±1.1	6.3±1	6.3±1	5.8±0.8
12	4.9±1.0	6.5±1	4.7±1.4	5.4±1	5.2±1	5.18±o.4
13	6.7±1.5	7±1	6.4±1.1	6.4±1.3	6.4±1.3	6.52±0.6
14	6.2±1.9	6.1±1.2	5.6±2.1	5.6±2	5.6±2	5.77±1.1

15	6±1.4	5.6±1.1	5±1.3	5.4±1.4	5.4±1.4	5.42±0.8
16	5.7±1.4	6.3±1	6.2±1.4	6.7**±1.3**	6.6±1.2	6.3±0.8

*The overall acceptability was calculated based on composite scoring. Weightage factor for Texture, Appearance, Taste, Flavor and Color was contributed to be 20%, 10%, 30%, 30% and 10% respectively

Table 2: Adequacy of Energy, Protein and Fat in Comparison with RDA

Sample 8	Age groups	RTE (g)	Energy of Product	% Adequacy*	Protein of the Product(g)	% Adequacy	Fat of the Product(g)	% Adequacy
Infant	6-12 month	40	153.76	91.5	5.5024	155	2.048	43.1
Children	1-3 yr	50	192.2	72.5	6.878	164.7	2.56	38
	4-6yr	50	192.2	57	6.878	137	2.56	41
	7-9yr	50	192.2	45.4	6.878	93.2	2.56	34.1
Boys	10-12yr	100	384.4	70.2	13.756	138	5.12	58.5
	13-15yr	100	384.4	56	13.756	101.3	5.12	45.5
	16-17yr	100	384.4	51	13.756	89.4	5.12	41
Girls	10-12yr	100	384.4	76.4	13.756	136.1	5.12	58.5
	13-15yr	100	384.4	66	13.756	106	5.12	51.2
	16-17yr	100	384.4	63	13.756	99.1	5.12	58.5
man	20-39yr	100	384.4	66.2	13.756	92	5.12	82
woman	20-39yr	100	384.4	81	13.756	100	5.12	102.4

* Per cent depicted in the table indicates adequacy of nutrient in comparison with RDA

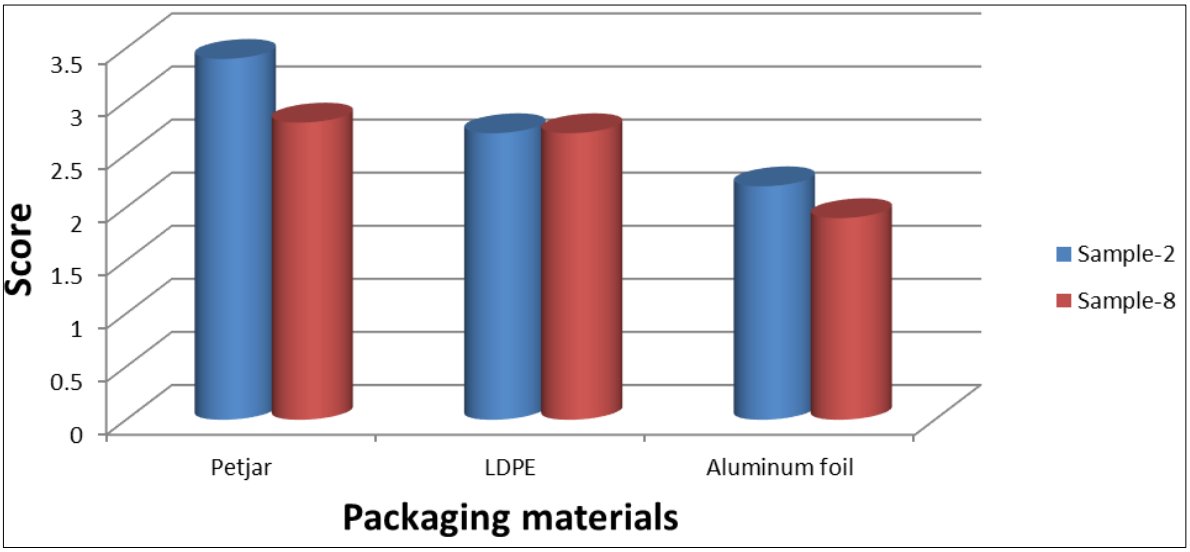

Fig 1: Scores secured by samples kept in different packaging materials on 45th day

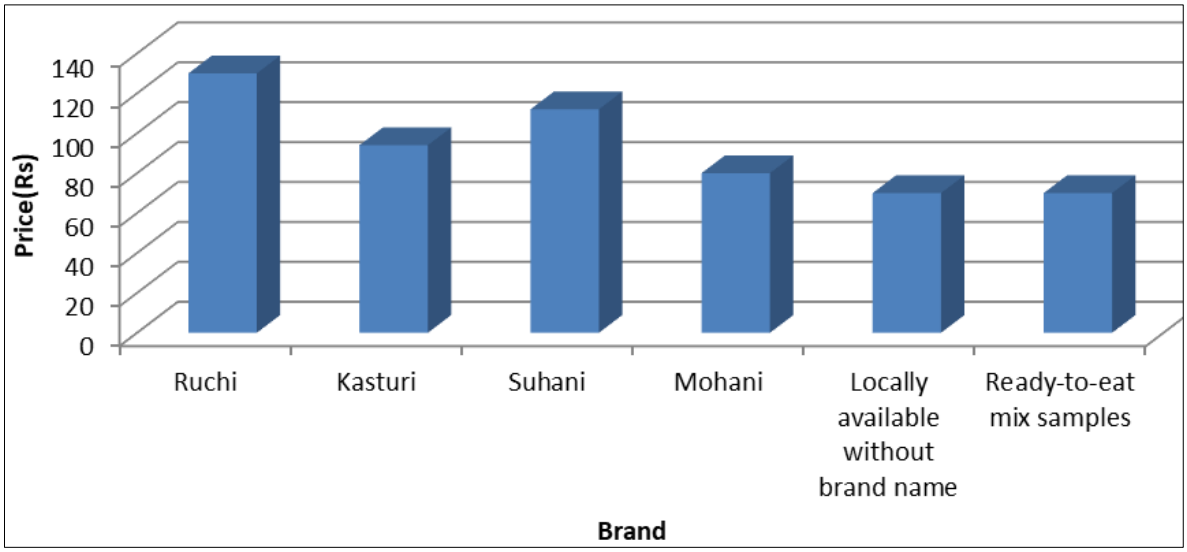

Fig 2: Comparision of market price of RTE mix with market products

Table 3: Overall Acceptability of the selected products in different packaging materials

Packaging Materials	Days	Sample-2	Sample-8
Pet jar	0	7.35±0.6	7.46±0.4
	15	6.1±0.4	5.9±0.3
	30	5.2±0.6	5.1±0.3
	45	3.4±0.5	2.8±0.5
LDPE	0	7.35±0.6	7.46±0.4
	15	5.3±0.4	4.9±1
	30	3.9±0.6	3.8±1
	45	2.7±0.4	2.7±1
Aluminum foil	0	7.35±0.6	7.46±0.4
	15	4±0.3	3.7±0.8
	30	2.8±0.3	2.5±0.3
	45	2.2±0.4	1.9±1.4

Conclusion

The greatest way to distribute nutrients and functional components is through ready-to-eat meal mixes, which has led to a focus on ingredients rather than functional claims. Preparation of the ready-to-eat food included the following ingredients: rice (*Oryza sativa*), rice flakes (*Oryza sativa*), ragi (*Eleusine coracana*), Bengal gramme (*Cicer arietinum*), carrot (*Daucus carota*), beans (*Phaseolus coccineus*), fenugreek leaves (*Trigonella foemen*), drumstick leaves (Moringa oleif (*Arachis hypogaea*). Sixteen different types of mixtures were made using various ratios of cereals, pulses, vegetables, and oilseeds in the range of 80:10:5:5, 70:20:5:5, 60:20:10:10, and sprouted pulses in the range of 60:20:10:10. Out of the sixteen samples tested for the current study, sample 8 was found to be nutritionally sufficient for breakfast and suitable for storage in a pet jar for up to 15 days with groundnut powder and for three months without it. Hence, Ready-To-Eat foods made from grains, pulses, vegetables, and oilseeds that are high in protein, energy, minerals (calcium), and fiber should be marketed and encouraged for consumption by people of all ages.

References

1. Banakar R. Formulation, nutritional quality and growth promoting characteristics of supplementary food, M.HSc. Thesis, Uni. Agri. Sci., Dharwad. 2005.
2. Bower JA, Whitten R. Sensory characteristics and consumer liking for cereal based snack foods. J Sensory Studies. 2000;15(3):327.
3. Deshpandey SS, Joshi KC, Bargale PC, Jha K, Singh V, Varghese S. Development, acceptability and shelf-life studies of soy-fortified maize sattu. Journal of Food Science and Technology. 2004;41:674-678.
4. Garcia MC, Lobato LP, Benassi MT, Junior MSS. Application of roasted rice bran in cereal bars. Food Sci. Technol. (Campinas). 2012;32(4):718-724.
5. Lakshmi UK, Veena R. Value added extruded products using tapioca, cereals and pulses. In: Scientific programme, abstracts of talks abstracts of posters, XXXVI Annual Meet, Nutrition Society of India held at Mysore during. 2004 Nov. p. 120.
6. Nagarajan S. Promise of value added products. The Hindu survey of Indian Agriculture. 1997, 45.
7. Nambiar SV, Parnami S. Standardization and Organoleptic evaluation of drumstick (Moringa oleifera) leaves incorporated into traditional Indian recipes. Trees Life J. 2008;3(2):1-7.
8. Prado FC, Parada JL, Pandey A, Soccol CR. Trends in non-dairy probiotic beverages. Food Research International. 2008;41:111-123.
9. Solanki S. Formulation and shelf life study of malted ready to eat (RTE) mixes. The Ind. J Nutr. Dietet, 1986;23:35-40.