



**DEVELOPMENT, PROCESSING, PACKAGING, AND QUALITY
EVALUATION OF DHOKLA PREMIX INCORPORATED WITH BARLEY
AND CARROT POWDER**

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Abstract:

The research on the development, processing, and packaging of barley carrot dhokla premix describes the creation of a convenient and healthy snack mix that can be prepared quickly and easily. The study focuses on the development of a premix formulation that combines barley flour, carrot powder, and other ingredients to make a nutritious and tasty dhokla. The research involved optimizing the process variables for mixing, blending, and packaging the premix to ensure the stability and shelf-life of the product. Sensory evaluation of each trials were conducted to determine the acceptability of the premix. The results suggest that the barley carrot dhokla premix has a unique flavor, texture, and aroma, making it an appealing and convenient snack for health-conscious consumers. The product is high in fiber, protein, and essential nutrients, making it a healthy alternative to conventional snacks. The shelf life testing of the most acceptable premix was conducted which include salt, acidity, moisture and microbial analysis for 30 days at interval of 15 days which suggests that the premix is shelf stable for 30 days. The study demonstrates the potential of developing premixes for traditional foods to enhance their nutritional value and appeal to a wider audience.

Key words: *Premix of Dhokla, carrot powder, barley, sensory analysis.*

Introduction:

Premixes are ready-made mixtures for making products, consisting of stable ingredients and additives that require minimal handling and are known as convenience foods. Legume based food constituents an important part of human

diet in developing countries including India. Dhokla is legume based savory sponge dish which primarily found in Gujarat (western India) and its surrounding regions that is eaten for breakfast and occasionally as a supplement to lunch. During recent years the importance of high

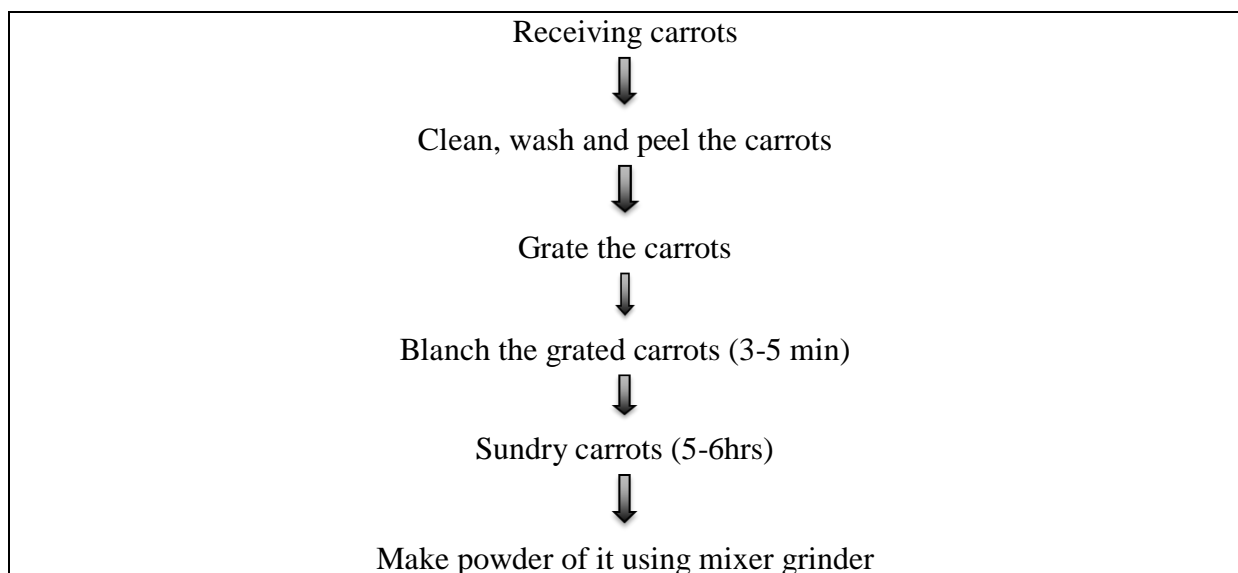
quality protein in order to fulfill the requirement of the body, dietary fiber as a prebiotic and beta carotene as antioxidant has been realized. Carrots contain high level of beta carotene, carbohydrates and essential nutrients and barely is a rich source of soluble fiber like beta glucan. Both the ingredients in combination can make a product which can have beneficial effect on the body. This study presents the formulation of dhokla premix incorporated with barley flour and dehydrated carrot powder.

Objectives:

1. To develop instant dhokla mix blended with barley flour and dehydrated carrot powder.
2. To evaluate the best proportion of barley flour and carrot powder in the instant dhokla mix.
3. To analyze the sensory properties of the best selected proportion of carrot powder and barley flour in instant dhokla premix.
4. To determine nutritional content of the selected instant dhokla mix.
5. To determine the shelf life of the instant dhokla mix.
6. To estimate the cost of the prepared product.

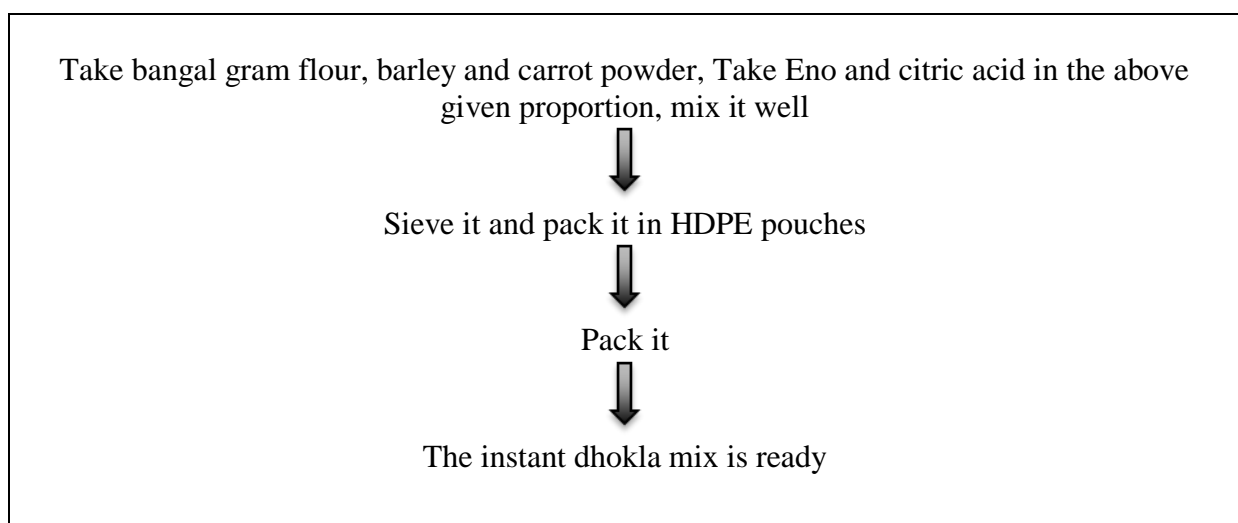
Materials and Methods:

Preprocessing for barley carrot dhokla premix



Process flow sheet of Barley Carrot Dhokla premix for bulk preparation:

Ingredients	Amount
Bengal gram flour	57gm
Barley	20gm
Carrot	10gm
Sugar	5gm
Salt	2.5gm
Eno (fruit salt)	2.5gm
Citric acid	3gm



Method of Preparation of Batter:

- The mix is poured in bowl and 150 ml water is slowly added in it while continuous stirring.
- The paste like consistency is obtained.
- The small packet inside the premix pack is cut open and added in the mixture.
- The contents are stirred slowly till air bubbles are seen and fluffy consistency is achieved.
- Steam operation- The batter is poured in vessel and the vessel is kept in cooker without wrestle for steaming. Keep the cooker at medium flame for 15mins.
- Shelf life study - Product quality can be monitored through chemical analysis, microbiological evaluation, sensory analysis for the changes in flavour, texture, colour, taste, acceptability as well as nutritional quality retention or loss. The sample is stored for about 1

month and is be periodically analysed for 15 days of interval.

The analysis of instant dhokla mix

includes the following major parameter.

Parameters	Method of procedure
Moisture Analysis	Oven dry method (Ranganna, 2017)
Estimation Of Fat (Soxhlet extraction method) (Ranganna, 2017)	Soxhlet extraction method (Ranganna, 2017)
Determination of salt	Volhard method
Crude fibre	(Weende method) (AOAC 978.10)
Sugars	Fehlings test
Ash	(AOAC 942.05)
Microbial Analysis	

The product was analysed for total plate count (TPC) microbial load will be carried out using standard procedures.

Sensory evaluation - Is performed as per the standard procedure used for the food product by using 5 point hedonic scale for following sensory parameters.

- a) Colour
- b) Texture
- c) Taste
- d) Appearance
- e) Overall acceptability

By using 30 judges the mean of their judgment is taken, as per the score sheet and the ranking was done.

Shrushti Malap & Amar M. Dhere

Evaluation of cost estimation- The cost of the procedure was calculated using the conventional approach by Khan et.al. (2004). The pricing covered the cost of raw materials, packaging supplies, labeling, and overhead expenses (labor, machinery, rent, taxes, and profit), i.e., up to the factory receive price. In addition, the marketing and distribution costs, as well as the commission, were taken into account. While calculating the product's unit MRP price.

Results and Discussion - There were 3 treatments were replicated to check more palatable product. The sample product of

all the treatments were given to semi trained sensory panel members and the most acceptable treatment was selected for the bulk preparation.

Table No.1: Screening of the most acceptable treatment

Characteristics	Mean \pm SD		
Barley carrot dhokla Premix			
Trial	Trial 1	Trial 2	Trial 3
TASTE	3.69 \pm 0.253	3.41 \pm 0.203	4.54 \pm 0.254
COLOUR	3.95 \pm 0.253	3.83 \pm 0.249	4.59 \pm 0.249
TEXTURE	3.72 \pm 0.249	3.12 \pm 0.245	4.46 \pm 0.253
FLAVOUR	3.83 \pm 0.340	3.24 \pm 0.224	4.54 \pm 0.301
ACCEPTANCE	3.93 \pm 0.254	3.44 \pm 0.206	4.54 \pm 0.252
MEAN OF MEANS	3.84 \pm 0.269	3.40 \pm 0.225	4.51 \pm 0.261
Rank	II	III	I

*Means of 30 semi trained panellist by using 5-point hedonic scale.

Score Key: 1. Dislike Extremely to 5. Like Extremely

Rank key: Score > 4.0 = I Rank

Score 3.5 to 4.0 = II Rank

Score < 3.5 = III Rank (Ranganna, 2004)

For each parameter, the preference for the third trial was high. According to the results T3 was most acceptable treatment as mean of fourth trial is highest i.e. 4.51. Hence this treatment (T3) formulation was further used for bulk preparation.

Shelf-Life Study:

The shelf life of food products is affected in various storage conditions such

as temperature, relative humidity, storage period, place or environmental conditions. The behaviour of the food product is assessed by various methods such as changes in proximate constituents, microbial examination (TPC) and sensory quality attribute during the storage period. The analysis of each parameter was carried out at an interval of 10 days up to a storage period 30 days.

Table No.2: Changes in proximate analysis during storage period of 30 days

Parameter (g%)	Storage Days			
	0 th day	15 th day	30 th day	Mean
Moisture	2.92	2.95	2.98	2.94
Acidity	1.38	1.38	1.14	1.3
Salt	2.3	2.3	2.5	2.36
Sugar	9.5	10.1	10.7	10.1

From the data given in the above tables indicates that the increase in length of time does not affect the moisture, acidity, fat significantly. The values in the table were recorded on 0th day, 15th day, 30th day from final barley carrot dhokla premix preparation. The moisture content on 0th day was 2.92 g% and on 30th day was 2.98 g%, acidity was 1.38g% at 0th day and 1.14g% at 30th day, thus there is no change in acidity at 30th day. The salt content on 0th day was 2.3 g% and on 30th day was 2.5 g% . The sugar content on 0th day was 9.5g% and on 30th day was 10.7 g%. There was a slight increase in

moisture, salt and sugar content. This variation can be due to mishandling of equipment, improper packaging and sealing, storage condition and temperature or relative humidity during storage period.

Changes in microbial value during storage period of 30 days:

1. Total plate count –

The changes in microbial count examination in the storage days of premix was estimated by the standard method of analysis for TPC. The method is explained in detail under materials and methods chapter.

Table No.4: Changes in microbial value during storage period of 30 days

No. Of storage days	Dilution		
	10 ⁻⁴	10 ⁻⁵	10 ⁻⁶
0 th day	No growth	No growth	No growth
15 th day	5 colonies	No growth	No growth
30 th day	8 colonies	6 colonies	No growth

In general, microbial testing or evaluation of food product is considered very important process for quality evaluation of food from safety point of view which includes total plate count

(TPC), coliform, yeast and mould (Conte et al, 2007).

From the above data, there was no growth till 10th day. On 20th day there were 5 colonies observed in dilution 10⁻⁴ and in dilution 10⁻⁵, 10⁻⁶ there were no

growth observed. On 30th day there were 8 colonies observed in dilution 10^{-4} , 6 colonies observed in dilution 10^{-5} and in dilution 10^{-6} there were no growth observed. This is because of low moisture content i.e. Low water activity which does

not allow the growth of microbes and thereby prevents the spoilage of the product. Thus, the sample was found to be remained in good condition without showing any sign of spoilage as far as microbiological changes are concerned.

Table No.5: Changes in sensory properties of the barley carrot dhokla prepared by premix during storage period of 30 days:

Sr. No.	Day	Sensory Quality Attributes					Mean Value
		TASTE	COLOUR	TEXTURE	FLAVOUR	ACCEPTANCE	
1.	0 th day	4.65	4.8	4.78	4.65	4.53	4.68
2.	15 th day	4.65	4.78	4.78	4.65	4.51	4.67
3.	30 th day	4.63	4.75	4.75	4.61	4.48	4.64

Nutritional Value of Barley Carrot Dhokla Premix:

Nutritional value of Barley Carrot Dhokla premeix was calculated as per the standards of IFCT, 2017.

Table No.6: Nutritive value of Barley carrot dhokla premix :

Parameter	Values (Per 100gm)	Values (Per Serve) (50gm)
Energy (Kcal)	344	161
Protein (g)	20	10
Carbohydrate (g)	57	28.5
Total Fiber (g)	13	6.5
Total Fat (g)	4	2

Cost of all the ingredients required to make barley carrot hokla premix=Rs.15.4

Cost of packaging: Rs. 2.5

Cost of labelling: Rs. 1

A] Cost of ingredients + Cost of packaging + Cost of labelling = Rs.

18.9

B] Overhead processing charges (40% of A) = Rs.7.5

C] Factory gate price (A+B) = Rs 26.4

D] Returns / cripples (5% of C) = Rs. 1.3

E] Marketing, distribution, storage, transportation, advertisement (30% of C) = Rs.7.9

F] Commission to dealers (30% of C) = Rs. 7.9

G] Profit (10% of C) = Rs. 2.6

Therefore, the Saleable Price of 60 gm Barley carrot dhokla premix = Rs. 46

Conclusion:

Ready-to-cook premixes are more convenient and popular nowadays. The recent market has been overwhelmed with a range of ready-to-cook premixes such as instant chilla premix, multigrain dosa premix, rice roti instant mix etc., but their nutritional value is questionable, as the wind of health and wellness is moving fast, and people are moving their focus to nutritional food. As a result of the shift in lifestyle, it is vital to develop healthful and nutritious ready-to-cook breakfast or mid meal product. Barley carrot dhokla premix is made from bengal gram dal, barley, carrot, sugar, salt, citric acid and fruit salt is added as leavening agent.

For the selection of best treatment different trials were conducted using the ingredients at different proportion and all the samples were prepared and given to the panel of the semi trained judges for its sensory evaluation. Sensory evaluation results for all the treatment details concluded that T3 was found to be best

and hence was selected for the detailed analysis and bulk preparation of the product.

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