ORGANOLEPTIC EVALUATION OF PRODUCT (READY TO MIX FORTIFIED DHOKLA) WITH INCORPORATION OF BROCCOLI FLOUR

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Abstract
The study presents Ready-to-mix instant dhokla to develop rice, chickpea flour as complimentary food which is fortified with broccoli flour into ready to mix dhokla. Their effects on the physiochemical, composition, nutritional properties were evaluated whereas broccoli labeled as a super food. Broccoli hasa nutrient-rich profile that does offer some real health benefits. It is a nutritional powerhouse full of vitamins, minerals, fiber, antioxidants, and bio-active compounds. To balance the healthy diet, it is important to check the sensory properties like taste, flavor, texture, appearance, aroma, the smell of ready to mix food. Incorporation of broccoli flour is the best way to enhancing nutritional aspects. The functional properties of the fortified based mix as a much more healthy diet for the vegan consumer as compared to the simple mix dhokla. The most accepted variation of developed premix and basic premix analyzed for nutritional quality. The product will be best suitable for the upcoming food market where nutritional quality and techno-economic feasibility have considered.

Keywords: Ready to mix food, bioactive compound, Incorporation, Techno economical

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1. INTRODUCTION

The value-added instant mix which prepared to enhance the vitamins and minerals that used for fortification are combined in a powdery blend called a premix.

Premix is an “instant food mix” where ingredients are added. It is simple, convenient, easy to prepare, better to cook in less time, and feasible for working people. Now, a days working people don’t have time to take a nutrient-rich healthy diet. Sometimes, they skip their meals because of abusy schedule. Traditional dhokla takes a longer time as wholenight fermentation to achieve the desired quality but instant premix dhokla prepares immediately without requiring fermentation which enhanced the content of nutrients by value addition. So, it can be used as a fortified supplement in addition to a daily diet. In this study, for the development of the product chickpea flour, rice flour, broccoli flour were used.

Broccoli (Brassica oleracea) is highly rich in secondary metabolites, and also possess their health-promoting properties. It also boosts more protein than most other vegetables. It can promote gut health, help prevent various diseases, and aid weight loss. Broccoli is low in digestible carbs but provides a decent amount of fiber, which promotes gut health and may reduce your risk of various diseases[1]. Broccoli contains a variety of vitamins and minerals, including vitamin C, Vitamin K1, Folate, Potassium, Manganese, iron. Broccoli is rich in various antioxidants with various bioactive compounds. It reduces the risk of diseases like neural disorder, diabetes, cancer prevention. These include sulforaphane, Indole-3-carbinol, Carotenoids, Kaempferol, Quercetin for the cancer prevention[2].

Rice (Oryza sativa) is a good source of thiamine (vitamin B1), riboflavin (vitamin B2), and glycemic index are higher in these cereal crops. Rice is one of the foods which is concerned for potential food vehicle for the fortification of micronutrients because of daily consumption. Minerals are rich like iron (Fe), zinc (Zn). Zinc and iron are needed by the human body for the enzymatic process and hemoglobin production. It is also a source of potassium, an important mineral needed by the body for normal metabolisms cell, tissue and organ function, muscle growth, and normal activity of heart[3]. Brown rice helps to nourish the hormonal system that heals wounds and regulate the blood pressure and their rice bran also contain beneficial antioxidants like tocopherols and tocotrienols and oryzanols[4]. According to the researcher, it has anti-cancer properties and reduces to low cholesterol absorption.

Chickpea (Cicer arietinum) It is a source of carbohydrate and protein, and their quality of protein is considered to be better than other pulses. Essential amino acids found in chickpea except for sulfur-containing types. Nutritionally rich in unsaturated fatty acids like linoleic and oleic acid and their minerals present like calcium, magnesium, phosphorus, and especially potassium are in chickpea seeds[5].Although, it is a good source of many vitamins such as riboflavin, niacin, thiamine, folate, and the vitamin A precursor, beta-carotene.

The dietary use of chickpea has several potential health benefits in combination with pulses or cereals and their beneficial effect on diseases like cardiovascular disease, type 2 diabetes disease, digestive disease, and some cancer[6].

Organoleptic Properties or Sensory Evaluation:

Food manufacturers, food production, and retailers often use sensory evaluation because according to the test, they know about the perception of consumers. Organoleptic evaluation can be used to determining the quality, similarities, differences, improvement, and evaluates a range of products and also explore specific characteristics of the ingredients of the product.

It involves tests like taste/flavor, texture/mouth feel, appearance, aroma, and color. To ensure that sensory testing is considered to be 'fair', conditions must be carefully controlled.

Objective

- ❖ To prepare dhokla by incorporation of broccoli flour into the mixture.
- ❖ To find out the organoleptic evaluation of the fortified products (Dhokla).

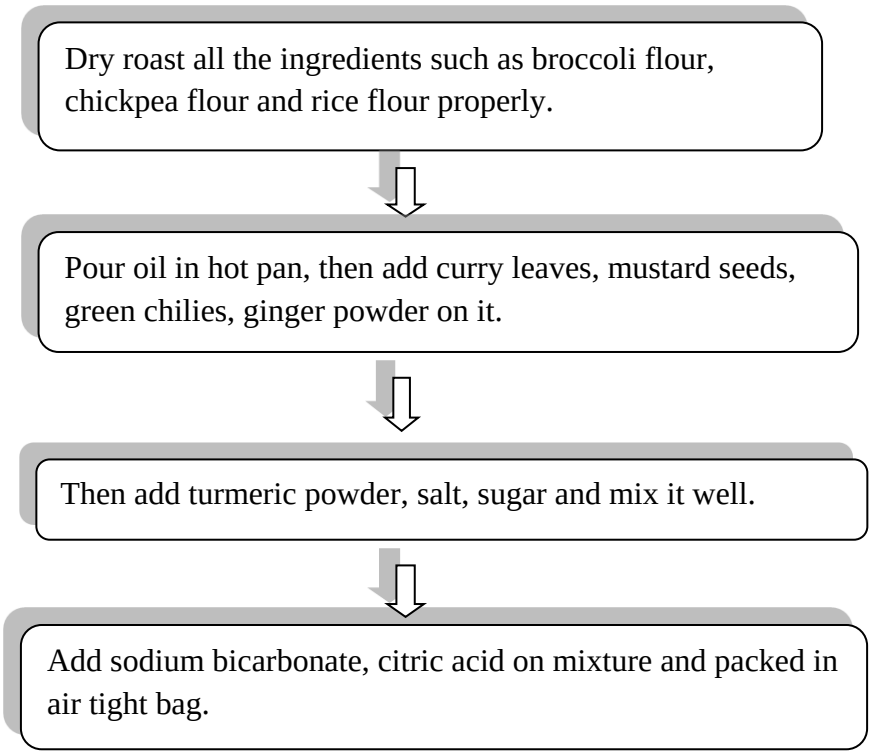
2. MATERIALS AND METHODS

The experiment was carried out in the Research Laboratory of Department of Food Science and Nutrition, School for Home Science, BBAU, Lucknow.

The required sample for the experiment is broccoli flour (50 gram), chickpeas flour (100 gram), rice flour (100 gram), curry leaves (10 gram), curd, green chilies (10 gram), turmeric powder(2 tablespoons), black mustard seeds (rai) (2 tablespoons), mustard oil (2 tablespoons), ginger powder (2 tablespoons), Eno i.e. Sodium bicarbonate & citric acid (10 gram), sugar syrup and salt. All ingredients were bought from the supermarket, local market.

Take all the ingredients to prepare batter such as is broccoli flour, chickpeas flour, rice flour, curd were mixed, and add turmeric powder, salt, ginger powder, green chilies. Pour the batter into a steamer for steam. Allowed it to coolthen for tempering, heat the oil, add mustard seed green chilly. Pour the tempering and sugar syrup on dhokla and were store in airtight containers until evaluation. During packing, no preservatives are added it is fully natural and home-cooked and healthy.

Product Development



**Curd is added during the preparation of dhokla*

Figure 1 - Preparation of fortified dhokla (Ready to mix)

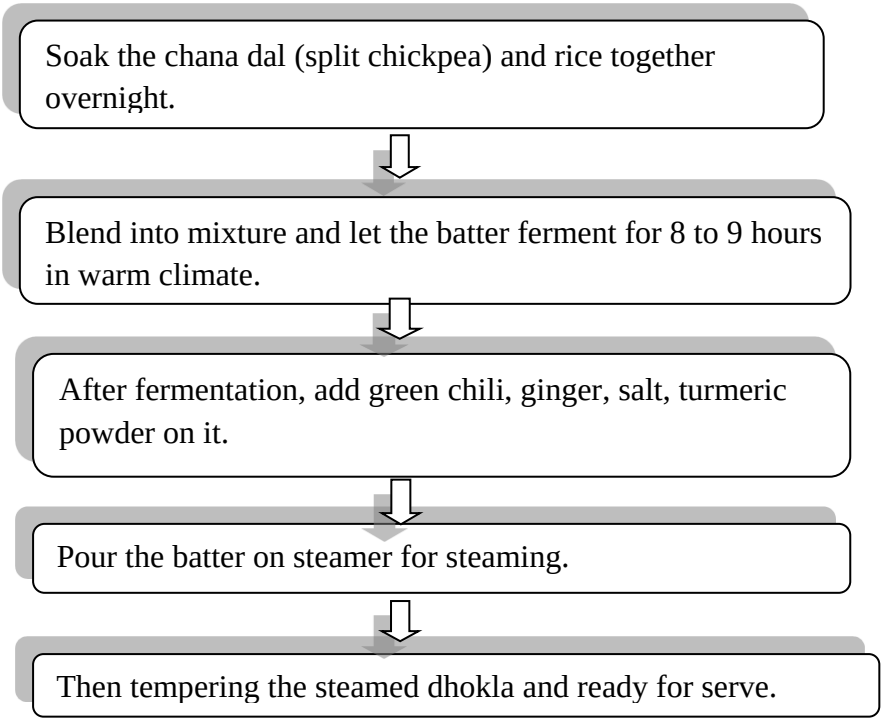


Figure 2 - Preparation of traditional dhokla

3. RESULTS AND DISCUSSION

Sensory Evaluation-The experimental of 2 different dhoklas. One is fortified dhokla and another is simple origin form of traditional dhokla were sensory evaluated by a panel of nine members on a 9 point hedonic scale and marking is done based on 6 parameters:

- Taste / Flavor
- Texture
- Appearance
- Colour
- Aroma
- Overall Acceptances

Two different ways of evaluating the sample were present to determine the simple homemade dhokla T1&the new development of simply fortified dhokla with broccoli flour is T2, there comparison and sensory evaluation from the public about their like and view. Individual marking from each of the panel members for different parameters are:

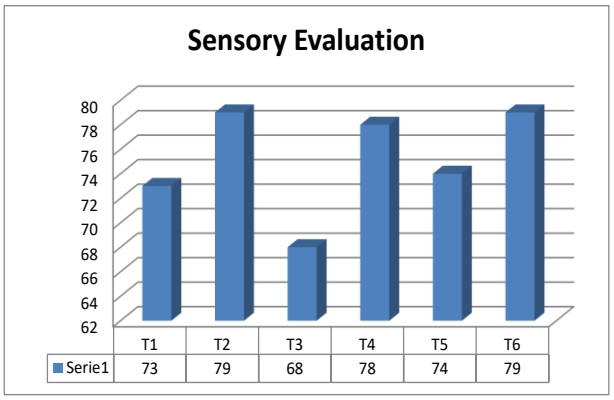


Figure 1 - Graphical representation of sensory evaluation

Above both the graphs show that T2, T4, T6 is the most accepted sample then T1, T3, T5 in the terms of 3 parameters such as taste, texture, appearance among the sensory panelist members. These results show that fortified dhokla is more like a cause of antioxidative property and nutritional value by all as compared to plain dhokla.

Table 1 - Individual marking by panel members

	Taste		Texture		Appearance	
Members	**(T1)**	**(T2)**	**(T3)**	**(T4)**	**(T5)**	**(T6)**
M1	8	9	7	9	8	9
M2	8	8	7	8	8	9
M3	8	9	8	9	7	9
M4	8	9	8	9	9	9
M5	7	9	8	9	9	9
M6	9	8	8	8	9	8
M7	8	9	7	9	8	9
M8	8	9	8	9	8	9
M9	9	9	7	8	8	8
Total	73	79	68	78	74	79

**whereas T1, T3, T5 are traditional dhokla & T2, T4, T6 is fortified dhokla.*

Table 2: Individual marking by panel members

	Aroma		Color		Overall Acceptance	
Members	**(T7)**	**(T8)**	**(T9)**	**(T10)**	**(T11)**	**(T12)**
M1	8	9	7	8	8	9
M2	7	8	7	9	8	9
M3	9	9	8	8	9	9
M4	8	9	8	9	7	9
M5	7	8	7	8	8	8
M6	8	9	9	9	6	9
M7	8	9	7	9	9	8
M8	9	9	7	9	9	9
M9	9	9	8	9	9	9
Total	73	79	68	78	73	79

**whereas T7, T9, T11 are traditional dhokla & T8, T10, T12 is fortified dhokla.*

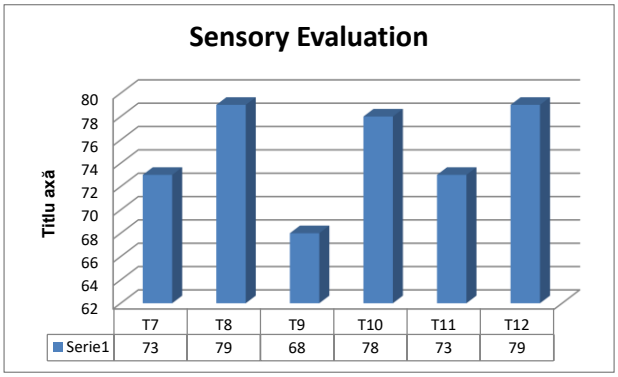


Figure 2 - Graphical representation of sensory evaluation

Above both the graphs show that T8, T10, T12 is the most accepted sample then T7, T9, T11 in the terms of 3 parameters such as color, aroma, overall acceptance among the sensory panelist members. These results show that fortified dhokla is more like the cause of therapeutic potential by all.

Table 3: Overall calculation

PARAMETER NUMBERS	TRADITIONAL DHOKLA (T1)	FORTIFIED DHOKLA(T2)
1	73	79
2	68	79
3	74	79
4	73	79
5	68	78
6	73	79
TOTAL	429	472
AVERAGE	71.5	78.6
STANDARD DEVIATION	2.73	0.52

By far the most common measure of variation for numerical data and the best measure of variation in statistics is the standard deviation. Standard deviation is nearly always considered the mean (or average).
The formula for the sample standard deviation of a data set (*s*) is

$$s = \sqrt{\frac{\sum\left(x_i - \bar{x}\right)^2}{n-1}}$$

Where x_i is each value is the data set, *x*-bar is the mean, and *n* is the number of values in the data set. Standard deviation is used for varying the different ranges among the differentiation point of any examples. In this, it was used in different parameters of the sensory test of the products.

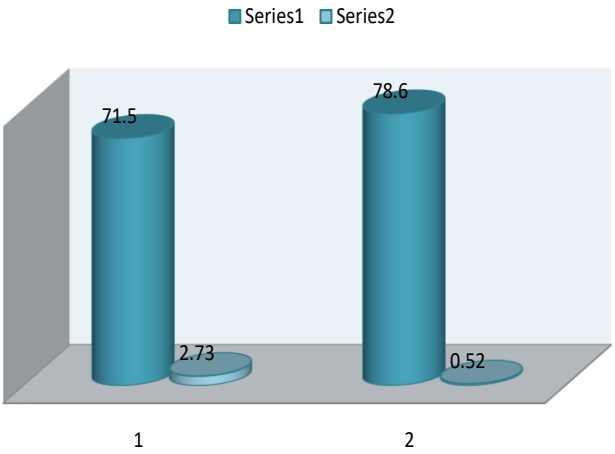


Figure 3: Graphical representation of Series 1is Total average and Series 2 is Standard Deviation.

Above the graph show theaverage value and Standard deviation both. First cylindered shows the value of Plain dhokla (1) and second cylindered shows the value of fortified dhokla (2). In which variation among series 2 data is more as compared to series 1. The product fortified dhokla is more acceptable by maximum members. According to the result, six parameters of fortified dhokladon't have maximum variation; they have very lightly minimum variation.

4. CONCLUSION

The sensory evaluation of the "Ready to mix fortified dhokla" and plain dhokla mix products was done by using 9 - point hedonic scale by a panel of 9 members. The scoring for both the dhoklas were various parameters used. As compared to plain dhokla people where like to eat fortified dhokla because they like the taste and also their nutraceutical property too. The variation is not more different among plain dhokla and fortified dhoklabut preferring innovative fortified dhokla. The secondary packaging is done both samples i.e. "Ready to mix fortified dhokla and plain "dhokla mix" to ensure safety, quality, and shelf-life of the product. Most consumers avoid eating raw broccoli but the use of broccoli flour enhances

the nutritional property as rich in source and maintains the organoleptic properties.

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