



## NUTRITIONAL COMPOSITION AND ORGANOLEPTIC ACCEPTABILITY OF MATHRI

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Article Received on  
29 July 2017,

Revised on 18 August 2017,  
Accepted on 07 Sept. 2017

DOI: 10.20959/wjpps201710-10127

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### ABSTRACT

Functional foods implies to all foods since all foods impart aroma, taste and provide nutritive value. Functional foods include foods that contain specific minerals, vitamins, fatty acid and dietary fibre, foods with additional biologically active substances such as phytochemicals or other antioxidants and probiotics etc. It was observed that treatment T<sub>2</sub> has highest colour and appearance, body and texture, taste and flavour and overall acceptability with respect to mathri. It is concluded that T<sub>4</sub> has highest moisture, fibre, carbohydrate and energy content while T<sub>1</sub> showed highest protein, fat and ash content among various treatments. Here expect proximate value fibre impart functional properties to the food which has therapeutic value. This study suggests

that value addition of medicinal herbs will be help to combat deficiency diseases as well as the combination of barley, garlic and black cumin seeds will provide a wide variety of nutrients and maintaining healthy die.

**KEYWORDS:** Functional foods, Antioxidants, Probiotics, Health, Nutrients, Treatment.

### INTRODUCTION

The primary role of diet is to provide adequate nutrients to meet the nutritional requirements of an individual. There is much greater acknowledgement today that people can help to

reduce the risk of illness and disease and to maintain their state of health and well-being through a healthy lifestyle, including the diet.

**According to Food and Drug Administration (FDA)**, 3 g of barley  $\beta$ -glucans per day is a sufficient dietary intake to achieve a decrease in total serum and low-density lipoprotein cholesterol. The presence of  $\beta$ -glucans give the beneficial effects and that increase intestinal viscosity leading to slow absorption of food, controlling blood glucose level and binding bile acids. Barley have many health benefits like weight reduction, decreasing blood pressure, blood cholesterol, blood glucose in Type 2 diabetes and preventing colon cancer.

The word garlic was originated from the Anglo-saxon 'gar-leac' or spear plant. The word Allium is derived from the cetic word meaning pungent or burning (**Heber, 1997**). Garlic (*Allium sativum*), is used extensively as a spice in foods, exhibits medicinal properties including immunomodulation, hepatoprotection, antioxidant, antimutagenic, antibacterial and anticarcinogenic effects (**Agarwal, 1996**).

*N. sativa* as reported in earlier study (**Saeed, 1972**), and contains moisture of 7.43 per cent, ash 4.14 per cent, fixed oil 37 per cent, volatile oil 1.64 per cent, albumin 8.2 per cent, mucilage 1.9 per cent, organic acid precipitated by copper 0.38 per cent, metarabin 1.36 per cent, melanthin 1.4 per cent, cellulose 8.32 per cent, sugar 2.75 per cent, Arabic acid 3.14 per cent and other substances dissolved by soda 9.38 per cent.

Value addition of medicinal herbs will be help to combat deficiency diseases as well as the combination of barley, garlic and black cumin seeds will provide a wide variety of nutrients and maintaining healthy die.

**OBJECTIVE:** To assess organoleptic acceptability and analyse nutritional composition of develop product mathri.

## **MATERIALS AND METHODS**

The present study "Nutritional Composition and Organoleptic Acceptability of Mathri" was concluded in the Department of Foods, Nutrition and Public Health, Ethelind College of Home science, Sam Higginbottom University of Agriculture, Technology and Science (SHUATS), Allahabad.

### Details of Control and Treatments

Common breakfast such as mathri was developed and standardized. The whole experiment had control (T<sub>0</sub> standardized and prepared products were made without incorporating medicinal seeds), and four treatments as T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> and four replications were carried out for each products. The four treatments of different ratios were tried several times and evaluated by the sensory evaluation method and best ratios were then used to prepare the products.

### Details of control and treatments of *mathri* (as per 100g)

Mathri was prepared by wheat flour, barley flour, garlic seed powder and black cumin seed powder in which black cumin powder and garlic powder are constant and wheat flour was replaced by barley flour @ 27%, 37%, 47%, and 57% respectively.

Treatment	Refined flour	Ratio of mix composite Flour (Wheat flour: barley flour : Garlic powder: Black cumin powder)
T <sub>0</sub>	100g	-
T <sub>1</sub>	-	60:27:10:3
T <sub>2</sub>	-	50:37:10:3
T <sub>3</sub>	-	40:47:10:3
T <sub>4</sub>	-	30:57:10:3

**Analytical Methods:** The proximate parameters, viz. moisture, protein, fat, total ash, crude fibre, energy and carbohydrate contents of functional food such as *mathri* were determined by following the standard methods as given in A.O.A.C. (2007).

### Data analysis

After collecting all data, data entry was performed in Microsoft Excel. Data were organized and presented by applying principles of descriptive statistics.

## RESULTS AND DISCUSSION

Developed products such as mathri was prepared by using wheat flour, barley flour, black cumin seed and garlic powder. Wheat flour was replaced by barley flour 27%, 37%, 47% and 57% respectively. The study deals with the organoleptic accessibility and nutritional composition of mathri.

**Organoleptic Acceptability and Nutritional Composition of mathri.****Organoleptic Acceptability of mathri****Table 1: Average sensory score of different parameters in control and treated sample of 'mathri'.**

Parameters	Treatments					Results
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	
	Mean ±SE	Mean ±SE	Mean ±SE	Mean ±SE	Mean ±SE	
<b>Colour and appearance</b>	7.9±0.1	7.8±0.25	8.86±0.15	8.16±0.25	7.63±0.20	S
<b>Body and texture</b>	7.5 ±0.15	7.4±0.2	8.9±0.1	7.86±0.25	7.5±0.20	S
<b>Taste and flavour</b>	7.3±0.15	7.19±0.05	8.8±0.15	7.5±0.1	6.9±0.15	S
<b>Overall acceptability</b>	7.5±0.15	7.4±0.01	8.9±0.1	7.7±0.08	7.23±0.07	S

**1. Colour and appearance**

F = 27.76 (5.14), Significant,  $P \leq 0.05$ , CD = 0.29.

**2. Body and Texture**

F = 223.03(5.14), Significant,  $P \leq 0.05$ , CD = 0.114.

**3. Taste and Flavour**

F = 95.46 (5.14), Significant,  $P \leq 0.05$ , CD = 0.20.

**4. Overall Acceptability**

F = 290.62(5.14), Significant,  $P \leq 0.05$ , CD = 0.103.

**Colour and Appearance:** Table:1 shows that the mean sensory score of *mathri* in relation to colour and appearance indicates that T<sub>2</sub> had the highest score i.e. 8.8 followed by T<sub>3</sub> (8.1), T<sub>0</sub> (7.9), T<sub>1</sub> (7.8) and T<sub>4</sub> (7.6). It is quite obvious from the table 1 revealed that the treatment T<sub>2</sub> and T<sub>3</sub> (wheat flour: barley flour: garlic powder: black cumin powder) was liked very much whereas treatment T<sub>0</sub>, T<sub>1</sub> and T<sub>4</sub> (wheat flour: barley flour: garlic powder: black cumin powder) were liked moderately regarding the colour and appearance of *mathri*.

Colour depends both on the physicochemical characteristics of the raw dough (water content, pH, reducing sugars and amino acid content) and on the operating conditions applied during baking (i.e. temperature, air speed, relative humidity, modes of heat transfer reported by Zaroni *et al.*, (1995).

**Body and Texture:** Sensory score of *mathri* in relation to body and texture indicates that T<sub>2</sub> had the highest score 8.9 followed by T<sub>3</sub> (7.8), T<sub>0</sub> (7.5), T<sub>4</sub> (7.5) and T<sub>1</sub> (7.4). It is quite obvious from the table that the treatment T<sub>2</sub> (wheat flour: barley flour: garlic powder: black cumin powder) was liked very much whereas treatment T<sub>0</sub>, T<sub>1</sub>, T<sub>3</sub> and T<sub>4</sub> (wheat flour: barley

flour: garlic powder: black cumin powder) were liked moderately regarding the body and texture of *mathri*. The scores for texture (softness and chewiness) of the composite bread samples, increased with increase in soybean flour substitution, when compared to whole wheat bread. The bread with 30% soy flour substitution had the best texture score. Hard crumb texture, caused by increased fibre from wheat bran substitution was reported by **Eiman *et al.*, (2008)**.

**Taste and Flavour:** Taste and flavour indicates that T<sub>2</sub> had the highest score 8.8 followed by T<sub>3</sub> (7.5), T<sub>0</sub> (7.3), T<sub>1</sub> (7.1) and T<sub>4</sub> (6.9). It is quite obvious from the table that the treatment T<sub>2</sub> (wheat flour: barley flour: garlic powder: black cumin powder) was liked very much whereas treatment T<sub>0</sub>, T<sub>1</sub> and T<sub>3</sub>(wheat flour: barley flour: garlic powder: black cumin powder) were liked moderately and T<sub>4</sub> (wheat flour: barley flour: garlic powder: black cumin powder) was like slightly regarding the taste and flavour of *mathri*.

**Overall acceptability:** Table 1 shows that the mean sensory score of *mathri* in relation to overall acceptability indicates that T<sub>2</sub> had the highest score 8.9 followed by T<sub>3</sub> (7.7), T<sub>0</sub> (7.5), T<sub>1</sub> (7.4) and T<sub>4</sub> (7.2). It is quite obvious from the table that the treatment T<sub>2</sub> (wheat flour: barley flour: garlic powder: black cumin powder) was liked very much whereas treatment T<sub>0</sub>, T<sub>1</sub>, T<sub>3</sub> and T<sub>4</sub> (wheat flour: barley flour: garlic powder: black cumin powder) were liked moderately regarding the overall acceptability of *mathri*.

The above table indicates that the incorporated samples were highly significant at 5% in critical difference. It means overall acceptability of incorporated samples was differed from each other. The result shows that the mean score of treatments T<sub>2</sub> (50:37:10:3) was higher than others. It means that overall acceptability of treatment T<sub>2</sub> (50:37:10:3) incorporated product was better than others.

### Nutritional Composition of *mathri*

**Table 2: Mean Score of Nutritional Composition of ‘Mathri’ Prepared by composite flour (per 100g).**

Nutrients	Treatments				
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>
Moisture (%)	10.20 ±0.01	11.30±0.02	11.32±0.02	11.36±0.02	11.40±0.03
Protein (g)	7.42±0.01	8.7±0.01	8.52±0.01	8.45±0.01	8.36±0.01
Fat (g)	18.32±0.01	20.82±0.01	20.76±0.03	20.68±0.01	20.60±0.01
Total ash (g)	1.93±0.02	3.23±0.03	2.94±0.03	2.77±0.03	2.62±0.03
Crude fibre (g)	1.46±0.30	2.79±0.01	2.90±0.02	3.16±0.02	3.34±0.04
Energy (kcal)	443±0.02	446±0.03	448±0.07	450±0.03	452±0.04
Carbohydrates (g)	62.10±0.05	55.94±0.05	56.44±0.09	56.70±0.08	57.10±0.08

**\*Results are mean  $\pm$ SD of three determinations**

### Moisture

Table 2 also reveals the moisture content of mathri ranged between  $10.20 \pm 0.01$  to  $11.40 \pm 0.025$  percent. Results showed that the moisture content was highest in treatment (T<sub>4</sub>)  $11.40 \pm 0.025$  percent and least was found in treatment (T<sub>0</sub>)  $11.30 \pm 0.015$  percent. The role of functional foods against various physiological threats, like cardiovascular disorders, diabetes, oxidative stress, cancer insurgence, and immune dysfunction.

**Samir *et al.*, (1998)** reported the similar study of moisture content of maize/maize products as 9- 19%. The slight variation (1.33%) may be attributed to the maize variety used, environmental factors and agronomic practices.

### Protein

Table 2 shows that the mean  $\pm$  SD value of protein content of mathri ranged between  $7.42 \pm 0.01$  to  $8.7 \pm 0.01$  g / 100g. Protein content of the mathri was found highest in treatment (T<sub>1</sub>)  $8.7 \pm 0.01$ g/100g, followed by (T<sub>2</sub>)  $8.52 \pm 0.01$  g/100g, (T<sub>3</sub>)  $8.45 \pm 0.01$ g/100g, (T<sub>4</sub>)  $8.36 \pm 0.01$  g/100g and (T<sub>0</sub>)  $7.42 \pm 0.01$  g/ 100g respectively. This is due to because wheat flour was replaced by barley flour. Wheat flour had high protein content than barley flour, black cumin powder and garlic powder. Nutritional evaluation of acceptable barley based products showed that all the malted flour products were nutritionally better as compared to soaked or popped flour products. (**Vasan and Alka, 2015**) similar study reported that the barley based food products the crude protein content of malted traditional products ranged from 10.35 to 17.03.

### Fat

The mean value of the highest fat content was found in treatment (T<sub>1</sub>) 20.82g/100g while followed by (T<sub>2</sub>) 20.76g/100g, (T<sub>3</sub>) 20.68g/100g, (T<sub>4</sub>) 20.60 g/100g and (T<sub>0</sub>) i.e. 18.32g/100g respectively which is almost similar to all treatments than control. Garlic has been used for a variety of reasons, most of which have been approved scientifically: anti-atherosclerotic, antimicrobial, hypolipidemic, antithrombosis, anti-hypertension, anti-diabetes etc. reported by **Mansoub, (2011)**.

### Total ash

Total Ash content of the prepared products increased with substitution of different ratio varied from 1.93 to 3.23 g/100g. Ready to eat functional food products were prepared by wheat flour, barley flour, garlic powder and black cumin powder in different ratio. Treatment (T<sub>1</sub>) (60:27:10:3) had found highest ash content 3.23g/100g, while the lowest value was observed in treatment (T<sub>1</sub>) (30:57:10:3) 2.62g/100g. The ash content is a measuring of the total amount of minerals present within food products. **Duxton *et al.*, (2000)** suggested that the similar value of ash content of maize in the range of 1.4 – 3.3%.

### Crude fibre

Regarding the total dietary fibre content, the highest value was analysed (T<sub>4</sub>) 3.34 ± 0.04 g/100g while the lowest fibre content (T<sub>1</sub>) 2.79 ± 0.01g/100g. Barley β-glucans have been associated with lowering plasma cholesterol, reducing glycaemic index, and reducing risk of colon cancer reported by **Izydorczyk and Dexter, (2008)**. Barley contains high levels of β-glucans, which are important contributors to dietary fibre, a crucial component of the human diet reported by **Newman and Newman, (1991), Granfeldt *et al.*, (1994)**.

### Carbohydrate

Carbohydrate content of prepared products was found to be in range of 55.94 ± 0.05 to 62.10 ± 0.05g/100g. This observation may be attributed to the high content of carbohydrate in barley flour. The level of incorporation of barley flour increased so the carbohydrate content was also increased. Barley is an excellent source of complex carbohydrates, which constitute ≈80% of barley grain weight determined by (**Czuchajowska *et al.*, 1992, Szczodrak *et al.*, 1992**).

### Energy

Table 2 depicts that energy value ranged between 443 to 452 kcal/100g. The maximum energy values was observed in treatment T<sub>4</sub> (452 kcal /100g) followed by T<sub>3</sub> (450 kcal/100g), T<sub>2</sub> (448 kcal/100g) and T<sub>1</sub> (446 kcal /100g) and T<sub>0</sub> (443 kcal /100g) respectively.

It is concluded that T<sub>4</sub> has highest moisture, fibre, carbohydrate and energy content while T<sub>1</sub> showed highest protein, fat and ash content among various treatments. Here expect proximate value fibre impart functional properties to the food which has therapeutic value.



## CONCLUSION

The important role of medicinal herbs, such as (barley, black cumin and garlic) which has functional properties, aromatic plants and spices in daily human nutrition for enhancement of taste, aroma and colour of food, these additives have also been efficiently used in animal nutrition for improvement of animal health and well-being. The developed product such as mathri (treatment T<sub>2</sub>) has highest colour and appearance, body and texture, taste and flavour and overall acceptability with respect to organoleptic evaluation. These scores were compared with the standard. The developed products were highly acceptable by the subjects and notable change in physical parameters of incorporated food products 'mathri' was observed when compared to standards. This study revealed that T<sub>4</sub> has highest moisture, fibre, carbohydrate and energy content while T<sub>1</sub> showed highest protein, fat and ash content among various treatments. Here expect proximate value fibre impart functional properties to the food which has therapeutic value. Now a day underutilized food item like barley, wheat etc. are easily available low cost with a functional properties which help in elimination of some diseases like CVD, diabetes and gastrointestinal problem etc.

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