DEVELOPMENT AND EVALUATION OF CHAKLI PREPARED BY INCORPORATION OF NIGER SEEDS

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Abstract- **The present study was conducted to see the effect of addition of Niger seeds powder on nutritional and sensory properties of the product Chakli. Sensory evaluation was conducted using six human panelist coded as J1 to J6 and it was conducted on three consecutive days in three trials (T1, T2, T3). After palatability evaluation, raw scores were tabulated, means derived and control showed highly insignificant difference[p>0.05] in control and experimental chakli. Niger seed showed higher nutritive value as compared to control. The benefits of Niger seeds include reduced risk of iron deficiency anemia.**

Keywords: **Niger seeds, Niger seeds powder, Iron, Chakli.**

INTRODUCTION

India is one of the major oilseeds producing country in the world and the main cultivated oilseeds are Groundnut, Soybean, Rape Seed, Mustard, Sunflower, safflower, Sesame & Niger etc.   From the above oilseeds, one of the most important oilseeds is Niger seeds.   Niger also referred to as "black gold" or "thistle seed". Niger is cultivated as an oil seed crop.

This crop is usually produced on poor, coarse textured soils and prefers moderate temperatures for growth, but temperatures above 30°C adversely affect the rate of growth and flower development. Niger is not frost tolerant. This seed is native to Africa, from Ethiopia to Malawi, and was probably domesticated in Ethiopia. The production of Niger seed in India is around 2 lakh tonnes. (http://www.agricommodityprices.com/niger_seed.php)

Seeds are small, oblong and black in color. Seed contains about 400 g/kg oil.

Niger seeds are a good source of iron. Iron is the major component to maintain hemoglobin level in blood. Deficiency of dietary iron leads to iron deficiency anemia. (www.shiats.edu.in/upd/af_jul_2008.pdf - Cached - Similar). After study the nutritional importance of Niger seeds the present study has planned to prepare different traditional recipes incorporating Niger seeds.

Objectives
1. To standardize the recipe of the food product- Chakli.
2. To calculate the nutritive values of food product- Chakli.

Methods
The aim of present study was to formulate and evaluate food products prepared by incorporation of Niger seeds powder. This study deals with the development of nutritious traditional fried products.

1. Selection of recipes
In this study chakli were prepared by incorporating Niger seeds powder.

2. Procurement of Ingredients
All the ingredients were purchased from the local grocery shop from Nagpur city.

3. Standardization of Recipes-
Standardization of control and experimental recipes was done. Control recipes were prepared without incorporating Niger seeds powder. Experimental recipes were prepared with addition of Niger seeds powder in different proportions.

Table- 3.1 Proportion of ingredients used in control and experimental Chakli.

Sr.no	Ingredients	Control	Experimental		
			Variation I	Variation II	Variation III
1	Rice(g)	50	50	50	50
2	Bengal Gram Dal(g)	25	25	25	25
3	Black Gram Dal (g)	13	13	13	13
4	Green Gram Dal(g)	7	7	7	7
5	Niger Seeds Powder (g)	-	18	20	22
6	Omum(g)	0.8	0.8	0.8	0.8
7	Red Chilli Powder(g)	1.6	1.6	1.6	1.6

8	Turmeric (g)	0.8	0.8	0.8	0.8
9	Groundnut Oil (g)	32.75	37.3	40.03	42.76
10	Salt(g)	2.5	2.5	2.5	2.5
11	Water(ml)	As required	As required	As required	As required

Procedure:
- All dry ingredients were roasted together and ground to a coarse powder.
- Then omum seeds, red chilli powder, turmeric powder, salt, and oil for shortening were added.
- The dough was kneaded until soft and smooth with required water.
- The dough was then added into slightly greased chakli mould.
- Chakli was prepared by deep frying in oil.

Table- 3.4. Equipments used in the preparation of Chakli.

Sr. no	Chakli making
1.	Electronic weighing balance
2	Measuring glass
3	Measuring spoons
4	Large plate
5	Mixing spoons
6	-
7	-
8	-
9	Bowls
10	Deep frying pan
11	Spatula
12	Serving dishes
13	Chakli mold
14	Measuring cylinder
15	Thermometer

Table-3.5. Codes of recipes

Sr.no.	Food Products	Codes
1.	**Chakli** 1.Chakli prepared without incorporation niger seeds powder. 2.Chakli prepared incorporation 18gm niger seeds powder. 3.Chakli prepared incorporation 20gm niger seeds powder 4.Chakli prepared incorporation 22gm niger Seeds powder.	Control V_1 V_2 V_3

Result and Discussion

The aim of present study was to develop and evaluate the food products prepared by incorporation of niger seeds powder and to see the effect of niger seeds powder on the sensory properties and nutrient content of recipe i.e. Chakli.

The recipes were prepared control (without niger seeds powder) and experimental (with niger seeds powder). Results are discussed below.

Chakli:

Table 4.1: Physical Parameters of Chakli

Sr. no	Parameters	Recipes			
		Control	Variation I	Variation II	Variation III
1	Kneading Time(min)	10	15	15	15
2	Weight of dough(g)	141	162	168	172
3	Water absorb(ml)	55	65	70	75
4	Weight of Chakli Before Frying(g)	12	12	12	12
5	Frying Temperature(°c)	180	180	180	180
6	Oil absorb(g)	32.75	37.3	40.03	42.76
7	Weight of Chakli After Frying(g)	10	10	10	10
8	Yield(no)	12	16	16	17
9	Total cost of chakli(Rs.)	7.81	9.72	10.16	10.6

From table 4.1, it can be seen that differences in the readings were observed in the kneading time, weight of dough, water absorb, weight of chakli before frying, oil absorb, weight of chakli after frying, yield and total cost of chakli. The differences observed in above mentioned parameters are because of the addition of niger seeds powder in different proportions in each variation.

Trials of sensory evaluation were conducted by six judges. Scores given by judges of all three trails are presented .
Control and experimental chaklies were judged on following parameters appearance, colour, texture, taste, acceptability.

Data of palatability evaluation of control and experimental chakli is shown in table below.

Table 4.2: Mean Palatability Scores for Chakli.

Sr. no	Variations	Appearance	Colour	Texture	Taste	Acceptability
1	Control	10	10	10	10	10
2	V1	10	10	10	9.88	9.88
3	V2	10	10	10	10	10
4	V3	10	10	10	9.77	9.77

From table 4.2, it can be seen that the appearance, colour, texture of control and experimental chaklies were found to be same i.e. 10 respectively. While a slight difference were observed in the mean score of taste and acceptability in variation V_1 and V_3 i.e. 9.88 and 9.77 respectively.
To compare statistically, the sensory parameters of control and experimental Chakli student's 't' test was applied to see the level of significance at 1% and 5%.
The test was applied among all sensory parameters of control and V_1, control and V_2, control and V_3, V_1 and V_2, V_1 and V_3, V_2 and V_3. The result of the student's 't' test showed the insignificant difference at both the level.i.e. ($p>0.05$).

Nutritive value of control and experimental Chaklies was calculated using Food Composition Table given by Gopalan C. et al 2005. Ingredient wise calculations of nutritive value of control and experimental Chaklies are shown in *Appendix II.*

Table 4.3: Mean Nutritive Value of Chakli

Sr. no.	Total Nutrients	Recipes			
		Control	Variation I	Variation II	Variation III
1	Energy(Kcal)	639.34	772.99	807.86	842.73
2	Carbohydrates(g)	67.22	70.30	70.64	70.98
3	Protein(g)	13.86	18.16	18.64	19.11

4	Fat(g)	34.96	46.53	50.04	53.55
5	Crude Fibre(g)	1.22	3.18	3.4	3.61
6	Iron(mg)	3.05	13.25	14.39	15.52
7	Calcium(mg)	60.23	114.23	120.23	126.23
8	Phosphorus(mg)	252.86	293.18	297.66	302.14

From the table 4.3, it can be seen that, major difference was observed in the energy, carbohydrate, protein, fat, crude fibre, iron, calcium, phosphorus content of Chakli from control and experimental. Experimental Chaklies were found rich in all nutrients as compared to control.

Summery and conclusion

The research study entitled 'Development and evaluation of chakli prepared by incorporation of niger seeds' was under taken to develop various recipes with different variations. The methodology used and result and discussion out of the experiments were presented and discussed in previous chapters and summarized below.

Niger is an oilseed crop that is produced from *Guizotia abyssinica*. Niger seed is high in oil and protein content. The seeds are used for wild bird feeding. Niger is grown for its seeds which yield a yellow, edible semidrying oil with little odour and a pleasant nutlike taste. The oil is used in cooking, oil lamps, soaps, and paints, the pressed cakes are used for live stock feed. Niger seed sold as bird seed is heated to prevent it from germinating.

Niger seeds are a good source of iron. Iron is the major component to maintain hemoglobin level in blood. Deficiency of dietary iron leads to iron deficiency anemia.

In this study chakli recipe was prepared by incorporating niger seeds powder-Standardization of control and experimental recipes was done. Control recipes were prepared without incorporating Niger seeds powder. Experimental recipes were prepared with addition of niger seeds powder in different proportions.

It can be seen that differences in the readings were observed in the kneading time, weight of dough, water absorb, weight of chakli before frying, oil absorb, weight of chakli after frying, yield and total cost of chakli. The differences observed in above mentioned parameters are because of the addition of niger seeds powder in different proportions in each variation.

Trials of sensory evaluation were conducted by six judges. Scores given by judges of all three trails are presented .

Control and experimental chaklies were judged on following parameters appearance, color, texture, taste, acceptability.

It can be seen that the appearance, color, texture of control and experimental chaklies were found to be same i.e. 10 respectively. While a slight difference were observed in the mean score of taste and acceptability in variation V_1 and V_3 i.e. 9.88 and 9.77 respectively.

To compare statistically, the sensory parameters of control and experimental Chakli student's 't' test was applied to see the level of significance at 1% and 5%.

The test was applied among all sensory parameters of control and V_1, control and V_2, control and V_3, V_1 and V_2, V_1 and V_3, V_2 and V_3. The result of the student's 't' test showed the insignificant difference at both the level i.e. ($p > 0.05$).

Nutritive value of control and experimental Chaklies was calculated using Food Composition Table given by Gopalan C. et al 2005. Ingredient wise calculations of nutritive value of control and experimental Chaklies are shown in ***Appendix II.***

It can be seen that, major difference was observed in the energy, carbohydrate, protein, fat, crude fibre, iron, calcium, phosphorus content of Chakli from control and experimental. Experimental Chaklies were found rich in all nutrients as compared to control.

.   Trials of sensory evaluation were conducted by six judges. Scores given by judges of all three trails are presented .

It is concluded that,

➢   Niger seeds consumed mostly in the form of chutney.
➢   Niger seeds can consume in traditional recepies i.e. Chakli.
➢   Niger seeds powder can incorporated in selected recipes 18(g) to22(g) in chakli.
➢   The selected recipes using niger seeds powder are rich in all nutrients as compared to control recipes.
➢   Niger seeds products can be used in prevention of iron deficiency anemia in various age group.
➢   The protein content of all the products with using niger seeds powder in different variations are more than the products without niger seeds powder can be suggested for patient with PEM.

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Nutritive Value of Recipes

Table II a:Calculated Nutritive Value of Recipe i.e. Chakli (Control)

Sr. no	Food stuffs	Weight (gm)	Energy (Kcal)	Carbohydrates (gm)	Potein (gm)	Fat (gm)	Crude fibre (gm)	Iron (mg)	Calcium (mg)	Phosphorus (mg)
1	Rice	50	172.5	39.1	3.4	0.25	0.1	0.3	5	80
2	Bengal Gram Dal	25	93	14.95	5.2	1.4	0.3	1.32	14	82.75
3	Black Gram Dal	13	45.11	7.74	3.12	0.18	0.11	0.494	20.02	50.05
4	Green Gram Dal	7	24.36	4.19	1.71	0.08	0.05	0.27	5.25	28.35
5	Omum	0.8	2.90	0.19	0.13	0.17	0.16	0.1	12.2	3.54
6	Red Chilli Powder	1.6	3.93	0.50	0.25	0.09	0.48	0.03	2.56	5.92
7	Turmeric Powder	0.8	2.79	0.55	0.05	0.04	0.02	0.54	1.2	2.25
8	Groundnut oil	32.75	294.75	-	-	32.75	-	-	-	-
9	Salt	2.5	-	-	-	-	-	-	-	-
	Total		639.34	67.22	13.86	34.96	1.22	3.05	60.23	252.86

Table II b:Calculated Nutritive Value of Recipe i.e. Chakli (V$_1$)

Sr.no	Food stuffs	Weight (gm)	Energy (Kcal)	Carbohydrates (gm)	Potein (gm)	Fat (gm)	Crude fibre (gm)	Iron (mg)	Calcium (mg)	Phosphorus (mg)
1	Rice	50	172.5	39.1	3.4	0.25	0.1	0.3	5	80
2	Bengal Gram Dal	25	93	14.95	5.2	1.4	0.3	1.32	14	82.75
3	Black Gram Dal	13	45.11	7.74	3.12	0.18	0.11	0.49	20.02	50.05
4	Green Gram Dal	7	24.36	4.19	1.71	0.08	0.05	0.27	5.25	28.35
5	Niger Seeds Powder	18	92.7	3.07	4.30	7.02	1.96	10.20	54	40.32
6	Omum	0.8	2.90	0.19	0.13	0.17	0.16	0.1	12.2	3.54
7	Red Chilli Powder	1.6	3.93	0.50	0.25	0.09	0.48	0.03	2.56	5.92
8	Turmeric Powder	0.8	2.79	0.55	0.05	0.04	0.02	0.54	1.2	2.25
9	Groundnut oil	37.3	335.7	-	-	37.3	-	-	-	-
10	Salt	2.5	-	-	-	-	-	-	-	-
	Total		772.99	70.29	18.16	46.53	3.18	13.25	114.23	293.18

Table II c:Calculated Nutritive Value of Recipe i.e. Chakli (V$_2$)

Sr. no	Food stuffs	Weight (gm)	Energy (Kcal)	Carbohydrates (gm)	Potein (gm)	Fat (gm)	Crude fibre (gm)	Iron (mg)	Calcium (mg)	Phosphorus (mg)
1	Rice	50	172.5	39.1	3.4	0.25	0.1	0.3	5	80
2	Bengal Gram Dal	25	93	14.95	5.2	1.4	0.3	1.32	14	82.75
3	Black Gram Dal	13	45.11	7.74	3.12	0.18	0.11	0.49	20.02	50.05
4	Green Gram Dal	7	24.36	4.19	1.71	0.08	0.05	0.27	5.25	28.35
5	Niger Seeds Powder	20	103	3.42	4.78	7.8	2.18	11.34	60	44.8
6	Omum	0.8	2.90	0.19	0.13	0.17	0.16	0.1	12.2	3.54
7	Red Chilli Powder	1.6	3.93	0.50	0.25	0.09	0.48	0.03	2.56	5.92
8	Turmeric Powder	0.8	2.79	0.55	0.05	0.04	0.02	0.54	1.2	2.25
9	Groundnut oil	40.03	360.27	-	-	40.03	-	-	-	-
10	Salt	2.5	-	-	-	-	-	-	-	-
	Total		807.86	70.64	18.64	50.04	3.4	14.39	120.23	297.66

Table IId: Calculated Nutritive Value of Recipe i.e. Chakli (V$_3$)

Sr. no	Food stuffs	Weight (gm)	Energy (Kcal)	Carbohydrates (gm)	Potein (gm)	Fat (gm)	Crude fibre (gm)	Iron (mg)	Calcium (mg)	Phosphorus (mg)
1	Rice	50	172.5	39.1	3.4	0.25	0.1	0.3	5	80
2	Bengal Gram Dal	25	93	14.95	5.2	1.4	0.3	1.32	14	82.75
3	Black Gram Dal	13	45.11	7.74	3.12	0.18	0.11	0.49	20.02	50.05
4	Green Gram Dal	7	24.36	4.19	1.71	0.08	0.05	0.27	5.25	28.35
5	Niger Seeds Powder	22	113.3	3.76	5.25	8.58	2.39	12.47	66	49.28
6	Omum	0.8	2.90	0.19	0.13	0.17	0.16	0.1	12.2	3.54
7	Red Chilli Powder	1.6	3.93	0.50	0.25	0.09	0.48	0.03	2.56	5.92
8	Turmeric Powder	0.8	2.79	0.55	0.05	0.04	0.02	0.54	1.2	2.25
9	Groundnut oil	42.76	384.84	-	-	42.76	-	-	-	-
10	Salt	2.5	-	-	-	-	-	-	-	-
	Total		842.73	70.98	19.11	53.55	3.61	15.52	126.23	302.14