DEVELOPMENT AND ORGANOLEPTIC EVALUATION OF *CHAKLI* PREPARED FROM GREEN GRAM FLOUR (*Vignaradiata L. Wildzek.)* AND MOTH BEAN FLOUR *(Vignaacontifolia)*

Abstract

The present study was undertaken with the objectives of evolving *chakli* containing green gram flour and moth bean flour to find out their acceptability and nutritive value. *Chakli* were prepared by using refined flour, green gram flour, moth bean flour, salt, red chilli powder and refined oil by substituting refined flour with green gram flour and moth bean flour. The different samples prepared were Control , Sample 1, Sample 2 and Sample 3 in the ratios of (refinedflour:*green gram flour: moth bean flour*) 100, 50:25:25, 50:45:5, 50:5:45 respectively. The developed *chakli* were sensory evaluated using nine point hedonic scale. Results showed that overall acceptability for Sample 3 (7.85±0.81)*Chakli* were lying in between the category of 'like very much and like extremely whereas Control (7.6±1.53) were lying in the category of 'like moderately and like very much' by panelists.Highest energy, protein, carbohydrate and fat content were observed in Sample2 *Chakli* (520.8 kilocalories), (17.5 gram), (65.3 gram) and (22.2gram) respectively. Likewise fiber, calcium and iron content were observed in Sample 3 *Chakli* (2.4 gram) (108.6 milligram) and (5.84 milligram) respectively. *Chakli* (Sample 3) was most acceptable and analysed for proximate and mineral content along with control sample. Result shows that *chakli* prepared with green gram flour and moth bean flour (Sample 3) was found to be high in protein (15.8gram), fibre (1.9 gram), ash (2.5%), moisture (5.2%), calcium (19 milligram) and iron (1.1 milligram) than control *chakli*. Thus replacement of traditional food like refined flour with green gram flour and moth bean flour for preparing *chakli* is feasible and beneficial too and also were very accepted.

Keywords- Green gram, Moth bean, Hedonic scale, nutritive value.

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Introduction

India is the largest producer and consumer of pulses in the whole world. Pulses play a very important role in Indian Agriculture. Pulses are the significant source of dietary protein in the vegetarian diet. Pulses maintain soil's fertility and these are good and rich source of protein as well. They maintain the fertility of soil through the biological nitrogen and fixation process, so it plays a very necessary role in developing and to promote the sustainable agriculture. Green gram or mung bean (*Vignaradiata [L.] Wilczek*) is well known leguminous crop that belongs to the subgenus Ceratotropis. The annual world production area of green gram is about 1510 thousand tonnes which shares 8.77% total production of pulses. India is the primary green gram producer and contributes about 75% of the world production (Singh, D.P *et al.*, 2015).

Moth bean (*Vignaaconitifolia* L.) is a draught resistant legume, belonging to the family *Fabaceae*, commonly grown in arid and semiarid regions of India. It is exceptionally hardy legume and known by various other names including mat bean, matki, Turkish gram, or dew bean. India's driest state, Rajasthan is the major moth bean growing state. (Gupta N *et al*., 2016). During the period of five years (1990- 1994) kharif pulses in Rajasthan were grown in 37.23 lakh ha, with production of 8.45 1akh ton and productivity of 226 kg ha, the corresponding figures for moth bean were: 12.78, 2.70 and 211. It is however, significant to mention that moth bean alone shares almost 34.32% area and 32.00% production of total kharif pulses in this state. However, moth bean may not be rated as a national pulse; for instance, its national contribution to pulses is hardly 5.9 in area and 1.6% in production. On the contrary, it appears to be a major pulse, as far the hot and dry regions of India are concerned (Kumar D 2002).

Chakli is a unique traditional food in a particular region where people mostly eat as a snack form. Due to globalization and modernization, people preference for fast food is increasing at a considerably greater amount. Due to heavy workloads in office works, they are preferring quick and light meal which can be eaten anywhere and anytime. But due to unbalanced diet causing due to frequent consumption of fast food, many are prone to various diseases resulting in an unhealthy lifestyle. Hence to overcome those problems, the demand for healthy and nutritious food is on rise. Consumption of balanced diet having all the required constituents can help in preventing diseases and can result in initiation of a healthy lifestyle. Hence for maintaining a balanced diet, consumption of cereal and pulse based products is essential.Due to combination of different flour

there is a considerable increase in nutritional profile of that product and thus ultimately benefitting the health and lifestyle after consumption.(Jagdale Y. D *et al*., 2020) The objective of this work were to prepare *chakli* with different proportions of refined flour , green gram flour and moth bean flour to characterize their nutritional value and to evaluate the *chakli* acceptance by panel member.

Methodology

Procurement of green gram dhal *(Vignaradiata L. Wildzek)* and moth bean dhal *(Vignaacontifolia)*

Green Gram *(VignaRadiata L. Wildzek)* and Moth Bean *(VignaAcontifolia)* were procured from Sector-46 market of Chandigarh.

Processing of green gram dhal *(Vignaradiata L. Wildzek)* and moth bean dhal *(Vignaacontifolia)*

Figure 1: Flow chart of processing of Green Gram flour *(Vignaradiata L. Wildzek)* and Moth Bean flour *(Vignaacontifolia)*

The clean and healthy pulses of green gram and moth bean were used for preparation of flour. These were roasted in a pan and then cooled down for grinding. After that pulses were grinded with the help of electric grinder in order to make a powder and after that powder was sieved through a mesh siever to obtain a fine powder. The powdered samples were stored in an air tight container until further use for experiment.

Standardization and development of C*hakli*

Formulation was prepared by blending refined flour, green gram flour and moth bean flour in different proportions. Table 1 depicted different combinations of flour of refinedflour, green gram flour and moth bean flour.

Table 1: Proportion of *Chakli*

Sr.No.	INGREDIENTS	CONTROL	SAMPLE 1	SAMPLE 2	SAMPLE 3
1	Refined Flour	100%	50%	50%	50%
2	Green Gram Flour	-	25%	45%	5%
3	Moth Bean Flour	-	25%	5%	45%

Preparation schedule for making *Chakli*

1. Sieved the flour, salt and red chilli powder together.
2. Added oil, water and started to knead the dough.
3. The dough should not be soft, but firm. Cover and let the dough rest for 30 minutes.
4. Once the dough has rested, apply some water in the chakli maker.
5. Place a ball in chakli maker and press the chakli maker to prepare the chakli.
6. Place chakli on butter paper or parchment paper.
7. Fry chakli till golden brown.
8. Drain the chakli on paper napkins to removed excess oil.

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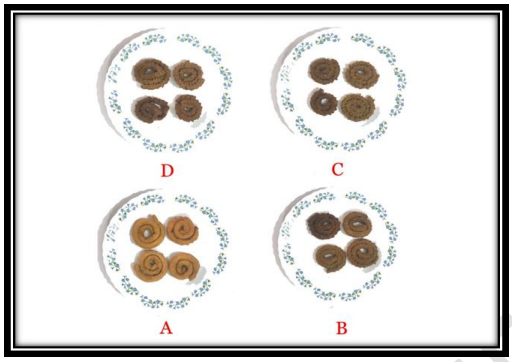

Fig 2: Different morphological characteristics of Chakli

Sensory evaluation of *Chakli*

The developed value added*chakli* was selected using sensory evaluation technique with the help of 15 panel members using 9- point hedonic scale. Most acceptable level of green gram flour and moth bean flour in *chakli* was further analysed for its nutrietnt content.

Nutritional evaluation of *Chakli*

Nutritive values of all the *chakli*swere calculated using Nutritive value of Indian foods by (Gopalan*et al*., 2014)

Estimation of proximate composition and mineral content of standard and most acceptable *chakli*

Moisture, crude protein,fat,ash, crude fiber, iron and calcium were determined by the method of (AOAC 2000) and carbohydrate (calculation).

Statistical analysis

All the obtained data of chemical analysis and sensory evaluation were statistically analysed using Mean and Standard deviation according to the standard method.

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SENSORY EVALUATION OF C*HAKLI*

Table 2: Mean scores of sensory evaluation of *Chakli*

Samples	Appearance	Color	Texture	Flavor	Taste	Overall acceptability
Control (Rf::100)	7.25±1.21	7.4±1.31	7.15±1.56	7.35±1.39	7.35±1.42	7.6±1.53
Sample 1 (Rf:Gg:Mb::50:25:25)	7.15±1.27	7.55±0.89	7.6±0.93	7.7±0.73	7.9±0.82	7.8±0.77
Sample 2 (Rf:Gg:Mb::50:45:5)	7.4±1.14	7.75±0.91	7.65±1.09	7.7±0.98	7.75±0.96	7.7±1.03
Sample 3 (Rf:Gg:Mb::50:5:45)	7.5±0.83	7.9±0.91	7.7±1.08	7.8±0.89	8±1.08	7.85±0.81

Results of sensory evaluation of *chakli* prepared with green gram flour and moth bean flour presented in (Table2) revealed that the overall acceptability of *chakli* ranged from 7.6-7.85. This indicated that the recipes were found under the category of "liked moderately and like very much". Sample 3 *chakli* exhibit highest scores for all sensory attributes i.e.7.5±0.83(appearance), 7.9±0.91 (color), 7.7± 1.08 (texture), 7.8± 0.89 (flavor), 8±1.08 (taste), 7.85±0.81 (overall acceptability) as compared to control sample which was prepared with only refined flour. So the incorporation of refined flour, green gram flour and moth bean flour with ratio 50:5:45 maintain liked very much on the basis of 9 point hedonic scale and this is an option to improve nutritional value of traditional *chakli.*

Table 3: Nutritive value of *Chakli*

Samples	Energy (kcal) #	Protein (g) #	Carbohydrate (g) #	Fat (g) #	Crude fiber (g) #	Calcium (mg) #	Iron (mg) #
Control (Ww::100)	525	6.8	78.2	20.5	0.3	23	2.7
Sample 1 (Rf:Gg:Mb::50:25:25)	518.5	15.3	67.4	20.8	2.3	93	4.82
Sample 2 (Rf:Gg:Mb::50:45:5)	519.3	15.3	67.4	20.9	2.21	77.4	3.8
Sample 3 (Rf:Gg:Mb::50:5:45)	517.7	15.2	67.3	20.8	2.37	108.6	5.8

It was observed that *chakli*, Control contains 528 kilocalories energy, 11 gram protein, 73.9 gram carbohydrate, 20.9 gram fat, 0.3 gram crude fiber, 23 milligram calcium and 2.7 milligram iron. Sample 1 contains 520 kilocalories energy, 17.4 gram protein, 65.2 gram carbohydrate, 21.05 gram fat, 2.3 gram crude fiber, 93 milligram calcium and 4.82 milligram iron. Sample 2 contains 520.8 kilocalories energy, 17.4 gram protein, 65.2 gram carbohydrate, 22.18 gram fat, 2.21 gram crude fiber, 77.4 milligram calcium and 3.77 milligram iron. Sample 3 contains 519.2 kilocalories energy, 17.32 gram protein, 65.2 gram carbohydrate, 21.01 gram fat, 2.37 gram crude fiber, 108.6 milligram calcium and 5.84 milligram iron.

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Table 4: Proximate composition and mineral content of C*hakli*

Proximate Composition	**Control**	**Sample 3**
Moisture (%)	4.92	5.2
Protein(g)	11.4	15.8
Fat(g)	25.8	25
Fibre(g)	1.5	1.9
Ash (%)	2.1	2.5
Carbohydrate(g)	55	51.5
Mineral content		
Calcium(mg)	15	19
Iron(mg)	0.5	1.1

The data in respect to proximate composition and mineral content of standard (Control) and most acceptable green gram flour and moth bean flour Chakli (Sample 3) and pictorial representation was depicted in Table 3. It was observed that Sample 3 has more calcium (19 mg), iron (1.1 mg), ash (2.5%), moisture (5.2%) , protein(15.8g) and fiber(1.9g) than Control (15mg), (0.5mg), (2.1%), (4.92%),(11.4g) and (1.5 g) respectively. However control has more fat (25.8g) and carbohydrate (55g) than Sample 1 (25g), (51.5g) respectively.

Conclusion

It was found that green gram and moth bean flour can successfully be incorporated for the development of food products to provide benefit to the ones who eat. Findings revealed that overall acceptability of *chakli* ranged from 7.6-7.85(liked moderately to liked very much). Adding green

gram flour and moth bean flour with refined flour in traditional foods is a useful strategy to increase the consumption of protein, calcium and iron in the human diet. Green gram and Moth bean Flour canbe used as a healthy alternative to other grains in our diet and can be included in commonly consumed recipes to make our diet more wholesome and nutritious.

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