

Original Research Article

Development and Evaluation of Recipes enriched with Green Coffee Powder

Pooja Sharma¹ & Pooja Pandey²

*Department of Food & Nutrition,
Smt. Sushila Devi Mathur PG Girls College, Bhilwara*

Abstract

The present piece of research was an attempt to develop some Indian recipes enriched with Green coffee powder. Four recipes namely fried idli, thalipeeth, upma tikki and besan chilla were prepared. All four products were prepared with different levels of incorporation (i.e. 1g, 2.5g & 5g respectively) of green coffee powder by the standard method of preparation. Recipes prepared with incorporation of green coffee powder were evaluated for its sensory characteristics using a scorecard having nine points that the mean score obtained for all the characteristics of all the variants of fried idli varied from 6.2 to 7.5. Similarly the mean score obtained for all the variants of thalipeeth varied from 6 to 6.9. These scores rank the recipes between liked slightly to liked very much on a 9 point hedonic scale. In the case of Upma tikki, the mean scores were between 6 to 6.9. However, the mean score obtained for all the samples of besan chilla varied from 6.3 to 7.1. These scores rank between like slightly to like very much. It can be inferred from the above results that the green coffee powder incorporated recipes were acceptable, therefore it can be added in various recipes to get its beneficial effects.

Keywords

Green Coffee powder, Hedonic scale, Sensory evaluation, Acceptability

Introduction

Unroasted coffee beans obtained from coffee fruits are known as green coffee that contains more chlorogenic acid and lesser caffeine in comparison to traditional roasted coffee¹. It has a positive effect on the metabolism of the body that is helpful in maintaining the blood pressure, blood glucose as well as the cholesterol levels².

Process & production of green coffee



Figure 1: Growth of coffee plant

Coffee plant is grown at many places and its aroma and flavor vary as per the soil and climate it is grown. Processing and harvesting methods also affect the quality and aroma of coffee beans³.

The roasting process of the coffee beans is also done according to the chosen final product, e.g. Turkish / Cappuccino / Latte/ Espresso, etc.

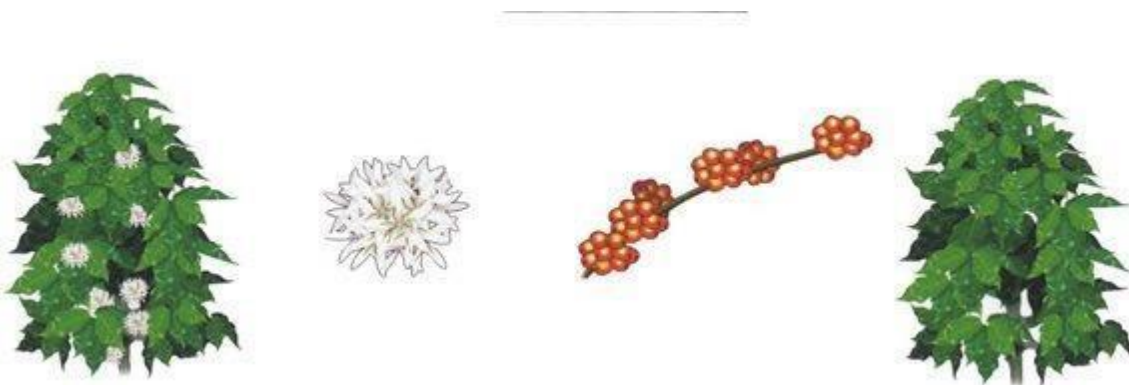


Figure 2: Development of coffee beans

Various types of coffee seeds are mixed together at the time of cultivation to get characteristic aromas and flavors. The most popularly grown species is “coffee arabica” followed by “coffee canepora”, they have different bean shape and colour⁴.

The International Coffee Agreement has defined coffee qualities Colombian washed, Arabica Central, Brazilian Natural etc⁵.

Harvesting

Coffee is harvested in 3 different ways like

1. Natural picking
2. Manual stripping
3. Mechanical stripping

Processing

Similarly, processing is also done in many ways like

1. Cherry processing
2. Dry processing
3. Wet processing⁶

Roasting

Roasting process helps to generate characteristic aroma & sensory blend of various types of coffee samples. It's an art that makes a coffee brand special and different from others. Therefore the manufacturers keep it secret and pass on to their one generation to another generation only. Coffee tasters play an important role in making these specific blends, where composition of mixing is decided for various coffee beans in a blend¹².

Roasting is of 3 types -

1. Light roasting
2. Medium roasting
3. Dark roasting

Assessment of quality of coffee beans

Each processing method has its own pros & cons. Care is needed at each step like hand picking, automatic machine picking, tasting, transport and packing etc. Coffee tasters should be exceptionally sensitive, experienced and should have well practice. Sensory evaluation includes assessment of sight, smell, taste, tactile sensations and aftertaste.

Health benefits

Coffee is relished by everyone as a most refreshing beverage all over the world. Green coffee is one of the popular varieties of coffee enjoyed around the globe. It is quite rich in antioxidants and has many health benefits. As it is not roasted like regular coffee, therefore it provides a bulk of chlorogenic acid that is considered very beneficial. It is milder in taste as well as contains lesser caffeine content¹.

Health benefits of the green coffee can be categorized as below -

Weight Loss: It helps in weight loss as it increases BMR and chlorogenic acid present in green coffee is helpful in burning body fat and prevents accumulation of adipose tissues.

Hypocholesterolemic: It is hypocholesterolemic also as it prevents accumulation of fat as well as a fat burner also⁷. It is good for heart health as it is known to control blood pressure also.

Controls hyperglycemia: It leads to reduced carbohydrate absorption and spike in blood glucose levels after meals. As it is anti inflammatory and prevents accumulation of fat, thereby lowering the risk of diabetes¹⁵.

Controls Blood Pressure: Control of blood pressure can be attributed to the fact as it dilates blood vessels as well as reduces cortisol hormone levels. Studies have shown that daily consumption of green is helpful in blood pressure control⁸.

Rich in antioxidants: Components of green coffee, i.e. chlorogenic acids, contain antioxidant properties that scavenges free radicals from the body. It is helpful in obtaining flawless skin. Green coffee extract is popularly used in skincare products that keep away harmful UV rays from skin^{9,10}.

Prevents Cancer: As green coffee is rich in antioxidants therefore it prevents free radicals to induce harmful carcinogenic impact on the body. Studies have reported anti tumor formation properties of chlorogenic acid¹¹.

Boosts Mood: Green coffee is known to enhance psychomotor pathways and cognitive capability. Secretion of dopamine due to it's caffeine content, is known to uplift mood and alertness that improves neurological functions. It is also beneficial in increasing endurance¹³.

Detoxifier: Green coffee is a natural detoxifier that helps to detoxify the body from toxins.

Side Effects

Green coffee is generally considered safe when consumed orally. Studies have shown that green coffee extract showed no negative impact when consumed daily upto the doses of 480 mg till 12 weeks. Consumption of extract of green coffee (specifically Svetol, Naturex, South Hackensack, NJ) has been documented safe in the dose of 200 mg five times per day for 12 weeks¹.

It is important to understand that green coffee contains caffeine, similar to regular coffee. Therefore, green coffee can cause caffeine-related side effects similar to coffee¹³.

Caffeine can cause insomnia, nervousness and restlessness, stomach upset, nausea and vomiting, increased heart and breathing rate, and other side effects. Consuming large amounts of coffee might also cause headache, anxiety, agitation, ringing in the ears, and irregular heartbeats.

In certain conditions like pregnancy and lactation or high levels of homocysteine, anxiety disorders, bleeding disorders or diarrhoea, green coffee is not recommended. Blood sugar levels also need to be monitored carefully as caffeine is known to have positive and negative impact on blood sugar levels. Caffeine may increase pressure inside eyes that may cause glaucoma. It may increase blood pressure in some cases. Some contents of unfiltered coffee cause an increase in cholesterol levels also. Excessive coffee consumption may show symptoms of irritable bowel syndrome. Similarly regular consumption of coffee may cause flush out of calcium from bones leading to osteoporosis.

Objectives

- To develop food products enriched with green coffee powder at different ratio levels
- To conduct sensory evaluation of the development food products

Methodology

Methodology has been divided under the following phases -

Phase 1: Procurement of raw material

Phase 2: Development of green coffee recipes (Fried idli, thalipeeth, besan chilla, upma tikki)

Phase 3: Sensory evaluation

Phase 4: Statistical analysis of data

1. Procurement of raw material

Raw material required for the the preparation of selected savory recipes - i.e. Green Coffee, purchased from online mode & other ingredients like – semolina, buttermilk, wheat flour, pearl millet flour, rice flour, maize flour, Bengal gram flour, green gram flour, potato, onion, coriander leaves, carrot, capsicum, spices, ajwain and sodium bi-carbonate was purchased from local market of Bhilwara city.

2. Development of green coffee recipes

Green coffee powder was incorporated in different ratios in the selected savory recipes. These recipes were made by steam cooking and sautéing cooking methods. These 4 selected recipes are -

- 1) Fried idli
- 2) Thalipeeth
- 3) Besan chilla
- 4) Upma tikki

1) Fried Idli

Ingredients	Sample A	Sample B	Sample C
Semolina	30g	30g	30g
Buttermilk	15ml	15ml	15ml
Salt	5g	5g	5g
Mustard Seeds	2.5g	2.5g	2.5g
Green coffee powder	1g	2.5g	5g
Onion	15g	15g	15g
Capsicum	15g	15g	15g
Carrot	15g	15g	15g
Lemon juice	5g	5g	5g
Oil	5g	5g	5g

Table 1: Ingredients used in different ratio in fried idli

Table 1 shows that in the fried idli preparation semolina, buttermilk, vegetables, oil, salt and mustard seeds ratio are the same i.e. 30 g, 15 ml, 50 g, 10 g respectively in all samples. Green Coffee powder was incorporated in different ratios i.e. 1g, 2.5g, 5g in sample A, B, and C respectively. Standard recipe made without incorporation of green coffee powder.

Development of different types of fried idlies have shown in Figure 3.



Figure 3: Development of fried idli

Method for preparation of fried idli

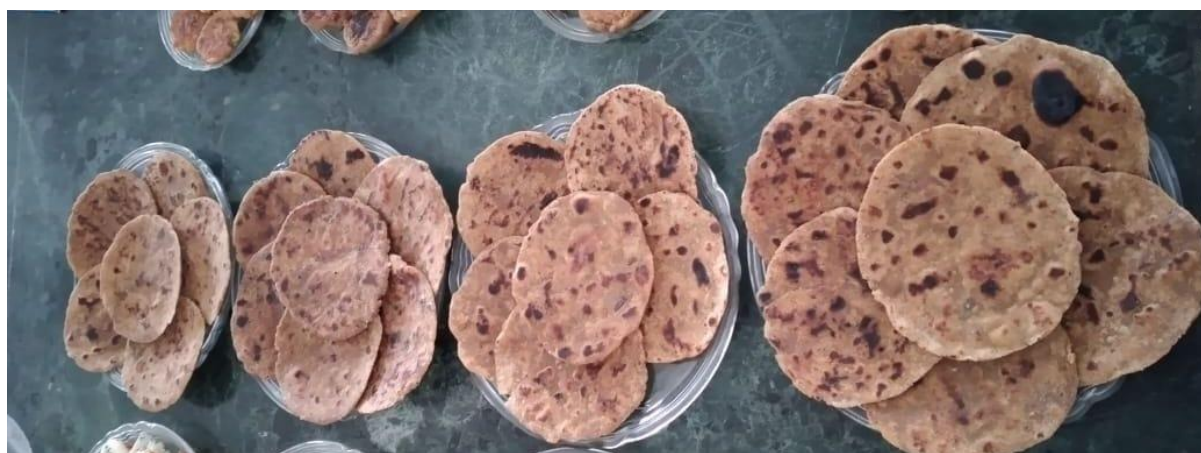
- Samolina was soaked in buttermilk & leave it for 30 min.
- Then salt was added & eno was mixed
- Then green coffee water was added & left for 2 min.
- Oil was added to idli stand, batter was poured into it and cooked for 20 - 25 min.
- Idlis were cooled and cut into pieces
- Oil was taken in a pan with mustard seeds and vegetables were added and cooked for 2 min.
- Then idli pieces were added and salt and lemon juice were added and mixed well
- Cooked for 3 - 5 min. and served hot

2) Thalipeeth

Ingredients	Sample A	Sample B	Sample C
Wheat flour	10g	10g	10g
Pearl millet flour	10g	10g	10g
Maize flour	10g	10g	10g
Rice flour	10g	10g	10g
Bengal gram flour	10g	10g	10g
Green gram flour	10g	10g	10g
Green coffee powder	1g	2.5g	5g
Onion	5g	5g	5g
Coriander leaves	5g	5g	5g
Red chili powder	2.5g	2.5g	2.5g
Salt	5g	5g	5g
Oil	5g	5g	5g

Table 2: Ingredients used for thalipeeth

It is revealed from table 2 that all flours, onion, coriander leaves, red chili powder, salt and oil ratio was the same i.e. 10g, 5g, 5g, 5g, 2.5g, 5g in all samples. Green coffee powder was added in different ration i.e. 1g, 2.5g, 5g in sample A, B and C respectively. Standard recipe made without incorporation of green coffee powder. Developed product of thalipeeth after incorporation of green coffee powder in various proportions has been shown in Fig 4.



Standard

Sample A

Sample B

Sample C

Figure 4: Development of Thalipeeth

Method for the preparation of Thalipeeth

- Firstly mix all the flour in a bowl
- Add Red Chilli Powder, Salt, Chopped onion, coriander leaves and mix it
- Add Green Coffee Powder & make dough
- With some dough make a roti using hands & pastry board
- Put the roti on the pan & bake it for 2-3 min. using oil

3) Besan Chilla

Ingredients	Sample A	Sample B	Sample C
Bengal gram flour	30g	30g	30g
Green coffee powder	1g	2.5g	5g
Salt	2.5g	2.5g	2.5g
Red chili powder	5g	5g	5g
Ajwain	2g	2g	2g
Oil	10g	10g	10g

Table 3: Ingredients used in different ratio in Besan chilla

It is revealed from table 3 that the Bengal gram flour, salt, red chili powder, ajwain, oil ratio was the same i.e. 30g, 2.5g, 5g, 2g, 10g in all samples. Green coffee powder was added in

different ration 1g, 2.5g, 5g, in sample A, B and C respectively. Standard recipe made with-out incorporation of green coffee powder.

Besan chilla prepared after various ratios of green coffee powder has been presented in the Figure 5.



Standard

Sample A

Sample B

Sample C

Figure 5: Development of Besan chilla

Method for the preparation of Besan Chilla

- Firstly mix Red Chilli Powder, salt & ajvain with Green Gram Flour in a bowl
- Later add Green Coffee water to it and make a solution out of it
- Pour oil in a pan and make a scream of the solution
- Then cook it well

4) Upma tikki

Ingredients	Sample A	Sample B	Sample C
Semolina	30g	30g	30g
Chili flaks	2g	2g	2g
Green coffee powder	1g	2.5g	5g
Boiled potato	5g	5g	5g
Rice flour	2.5g	2.5g	2.5g
Green onion	5g	5g	5g
Oil	10g	10g	10g

Table 4: Ingredients used in different ratio in Upma Tikki

It is revealed from table 4 that the semolina, chili flakes, boiled potato, rice flour, green onion, oil ratio was the same i.e. 30g, 2g, 5g, 2.5g, 2.5g, 10g in all samples. Green coffee powder was added in different ration 1g, 2.5g, 5g, in sample A, B and C respectively. Standard recipe made without incorporation of green coffee powder. Upma tikkis prepared after incorporation of green coffee powder in different proportions has been shown in Fig 6.



Standard

Sample A

Sample B

Sample C

Figure 6: development of Upma Tikki

Method for the preparation of Upma Tikki

- Boil Green Coffee powder with chili flakes for 2-3 min. until it changes its color
- Put Semolina and roast it for 10 min.
- Add Salt, Red Chili Powder, Garam masala & mix it well
- Then let the upma cool down for 2 min.
- Add boiled potatoes, rice flour and green onions & mix it
- Then make tikkis out of it
- Put the Tikki in a frying pan and fry it well after adding oil to it

Quality Analysis

Sensory Evaluation

Selection of Panel Members

Panel members were selected using Threshold test, in which salt solution prepared with five dilutions i.e. 50, 100, 150, 200, and 250 mg salt per 100 ml was tasted and differentiated by panel members. Panel members who differentiated the salinity correctly, willingly and available during the study period were selected. Objectives of the study were described to the panel members and recipes were presented to them for evaluation of acceptability as shown in Figure 7.

**Figure 7: Sensory Evaluation**

Development of score card

1. Composite score card: In the composite scoring test are given for various quality characteristics of the products such as taste, appearance, color, texture, flavor, mouth feel, overall acceptability of the products (Swaminathan, 1979).

2. Hedonic scale: A 9 point hedonic scale test was used to analyze the acceptability of the samples on a 9 point scoring between “Liked extremely” to “Disliked extremely”.

Statistical Analysis of Data

The data were statistically analyzed as per the objective of the study using Microsoft Excel program. Mean $\pm$ standard deviation was calculated for the values of sensory characteristics of recipes.

Comparison of different samples

Comparison of sensory score of different samples given by test panel for color, flavor, taste, appearance and overall acceptability was done by paired t test.

Results & Discussion

The findings of the present investigation have been discussed under the following heading:

Organoleptic evaluation of developed products

1. Organoleptic evaluation of Fried Idli
2. Organoleptic evaluation of Thalipeeth
3. Organoleptic evaluation of Upma Tikki
4. Organoleptic evaluation of Besan Chilla

1. Organoleptic evaluation of fried idli

The mean values of sensory evaluation of fried idli prepared with incorporation of green coffee powder are given in Table 5 & Figure 8. Three variants of fried idli were prepared by incorporation of green coffee powder i.e. Sample A (1g), Sample B (2.5g) & Sample C (5g). These were compared with the standard recipe that was prepared without incorporation of green coffee powder.

The mean score obtained for color varied from 6.4 ± 1.95 to 7.3 ± 0.67 in the 3 variants prepared by incorporation rating green coffee powder i.e. Sample A (1g), Sample B (2.5g) & Sample C (5g) shown in Table 5 & Fig. 8. Fried idli Sample A (1g) obtained a high score.

The mean scores, secured for taste of fried idli, were ranging from 6.2 ± 1.39 to 6.9 ± 0.87 . Sample A obtained a high score.

The mean score obtained for Appearance varied from 6.6 ± 1.34 to 7 ± 0.81 . Sensory mean scores for appearance of fried idli Sample A (1g) were the highest score. However the last variant 5g obtained a lower rating.

The mean score registered for the mouthfeel varied from 6.7 ± 1.05 to 7.4 ± 0.96 . The mean scores of the second (2.5g) & third (5g) variant are the same 6.7 ± 1.05 and highest score i.e. 7.4 ± 0.96 .

The mean score for flavour varied from 6.4 ± 0.84 to 6.6 ± 0.84 . The mean score of Sample C (5g) was the highest 6.6 ± 0.84 .

The mean score, secured for texture of fried idli, ranging from 7.2 ± 1.31 to 7.5 ± 0.84 . Most acceptable sample for texture of Sample B (2.5g) 7.5 ± 0.84 .

Overall acceptability of fried idli prepared by 1g obtained the highest score.

Statistical analysis of organoleptic evaluation score revealed that the 3 variants differed, in terms of mouthfeel & taste. The mean score difference was found in other characteristics i.e. appearance, color, flavour, texture & overall acceptability.

Characteristics of sensory evaluation (Mean $\pm$ SD)			
Sensory characteristics	Samples		
	A	B	C
Color	7.3 ± 0.67	6.7 ± 0.94	6.4 ± 1.95
Taste	6.9 ± 0.87	6.5 ± 0.70	6.2 ± 1.39
Appearance	7 ± 0.81	6.8 ± 0.78	6.6 ± 1.34
Mouth feel	7.4 ± 0.96	6.7 ± 1.05	6.7 ± 1.05
Flavour	6.6 ± 0.69	6.4 ± 0.84	6.6 ± 1.95
Texture	7.3 ± 0.82	7.5 ± 0.84	7.2 ± 1.31
Overall acceptability	7.2 ± 0.63	6.9 ± 1.79	6.9 ± 1.79

Table 5: Sensory evaluation for the acceptability of "Fried Idli" incorporating different levels of green coffee powder

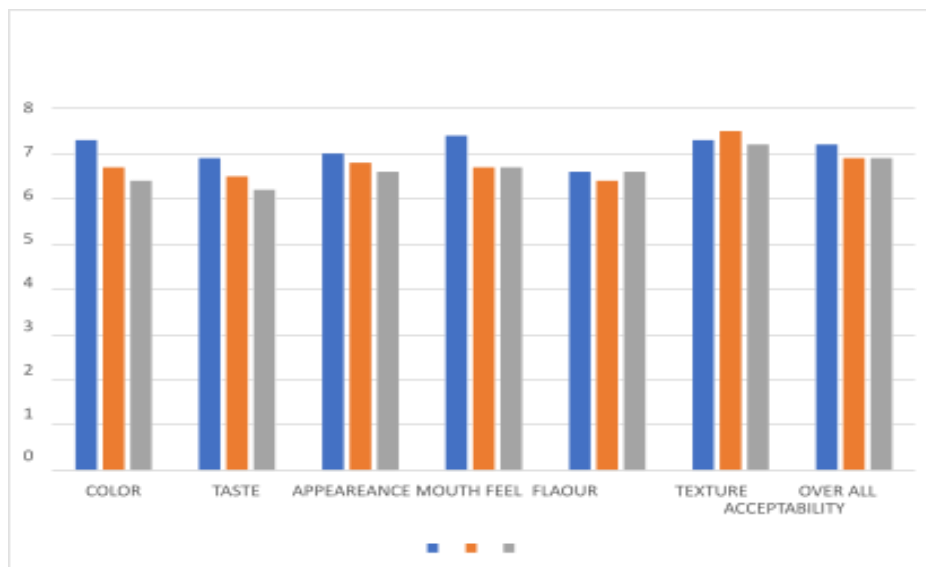


Figure 8: Sensory evaluation scores of fried idli incorporation with green coffee powder

2. Organoleptic evaluation of Thalipeeth

The mean values of sensory evaluation of Thalipeeth of prepared with incorporation of green coffee powder are given in Table 6 & Figure 9. Three variants were prepared by incorporation of green coffee powder i.e. Sample A (1g), Sample B (2.5g) & Sample C (5g). Standard recipe prepared without incorporation of green coffee powder.

The mean score obtained for color varied from 6.4 ± 1.07 to 6.8 ± 1.03 in the 3 variants prepared by incorporation rating green coffee powder i.e. Sample A (1g), Sample B (2.5g) & Sample C (5g) shown in Table 6 & Fig. 8. Thalipeeth Sample C (5g) obtained a high score.

The mean scores secured for taste of Thalipeeth were ranging from 6.4 ± 0.96 to 6.6 ± 1.50 . Sample C obtained the highest score.

The mean score obtained for Appearance varied from 6.3 ± 0.97 to 6.9 ± 1.10 . Sensory mean scores for appearance of Thalipeeth Sample C (5g) were the highest score. However the second variant 2.5g obtained a lower rating. The mean score registered for the mouthfeel varied from 5.9 ± 1.19 to 6.5 ± 1.58 . The mean score of third (5g) variant were highest score 6.5 ± 1.58 .

The mean score for flavour varied from 6.1 ± 1.44 to 6.3 ± 1.33 . The mean score of Sample B (2.5g) is 6.3 ± 1.33 .

The mean score secured for texture of Thalipeeth ranged from 6.1 ± 0.73 to 6.7 ± 0.67 . Most acceptable sample for texture of Sample A (1g) 6.7 ± 0.67 .

Overall acceptability of Thalipeeth prepared by 2.5g green coffee powder obtained the highest score.

Sensory Analysis revealed that variants were equally accepted & did not register any change in terms of various attributes.

Characteristics of sensory evaluation (Mean±SD)			
	Samples		
	A	B	C
Color	6.5±0.97	6.4±1.07	6.8±1.03
Taste	6.4±0.96	6.5±1.26	6.6±1.50
Appearance	6.5±0.97	6.3±0.67	6.9±1.10
Mouth feel	6±1.24	5.9±1.19	6.5±1.58
Flavour	6.3±0.94	6.3±1.33	6.1±1.44
Texture	6.7±0.67	6.1±0.73	6.5±0.97
Overall acceptability	6.7±0.67	6.7±1.05	6.5±1.26

Table 6: Sensory evaluation scores for the acceptability of Thalipeeth incorporation different levels of Green Coffee Powder

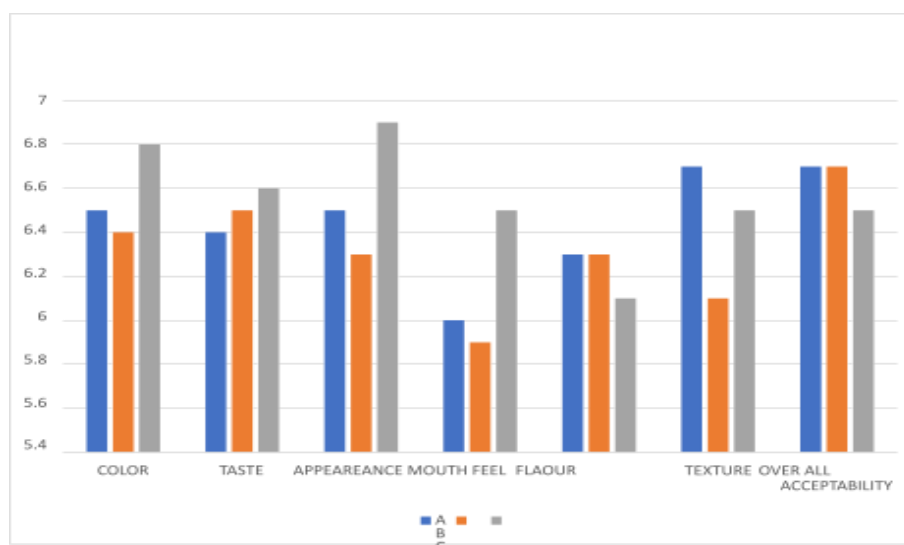


Figure 9: Sensory evaluation scores of thalipeeth incorporated with green coffee powder

3. Organoleptic evaluation of Upma Tikki

The mean values of sensory evaluation of Upma Tikki prepared with incorporation of green coffee powder are given in Table 7 & Fig. 10. Three variants were prepared by incorporation of green coffee powder i.e. Sample A (1g), Sample B (2.5g) & Sample C (5g). Standard recipe was prepared without incorporation of green coffee powder.

The mean score obtained for color varied from 6.5±0.52 to 6.9±0.87 in the 3 variants prepared by incorporation rating green coffee powder i.e. Sample A (1g), Sample B (2.5g) & Sample C (5g) shown in Table 7 and Fig. 10. Upma Tikki Sample A (1g) obtained a high score.

The mean scores, secured for taste, were ranging from 6.2±0.91 to 6.7±1.05. Sample B obtained a high score.

The mean score obtained for Appearance varied from 6.5±1.08 to 6.7±1.05. Sensory mean scores for appearance of Upma Tikki Sample A (1g) were the highest score. However the third variant 5g obtained a lower rating.

The mean score registered for the mouthfeel varied from 6 ± 0.66 to 6.7 ± 0.94 . the mean score of first (1g) variant were highest score 6.7 ± 0.94

The mean score for flavour varied from 6.2 ± 1.13 to 6.6 ± 0.96 . The mean score of Sample C (5g) is 6.6 ± 0.96 .

The mean score, secured for texture of Upma Tikki, ranged from 6.6 ± 0.69 to 7.1 ± 0.99 . Most acceptable sample for texture of Sample A (1g) 7.1 ± 0.99 .

Overall acceptability of Upma Tikki prepared by 1g green coffee powder obtained the highest score.

Sensory Analysis revealed that variants were equally accepted & did not register any change in terms of various attributes.

Characteristics of sensory evaluation (Mean $\pm$ SD)			
Sensory Characteristics	Samples		
	A	B	C
Color	6.9 ± 0.87	6.5 ± 0.70	6.5 ± 0.52
Taste	6.3 ± 0.82	6.7 ± 1.05	6.2 ± 0.91
Appearance	6.7 ± 1.05	6.7 ± 0.67	6.5 ± 1.08
Mouth feel	6.7 ± 0.94	6.4 ± 1.07	6 ± 0.66
Flavour	6.2 ± 1.13	6.5 ± 0.70	6.6 ± 0.96
Texture	7.1 ± 0.99	6.6 ± 0.69	6.7 ± 0.94
Over all acceptability	6.9 ± 0.73	6.8 ± 0.91	6.6 ± 0.84

Table 7: Sensory evaluation scores for the acceptability of "Upma Tikki" incorporation levels of Green coffee powder

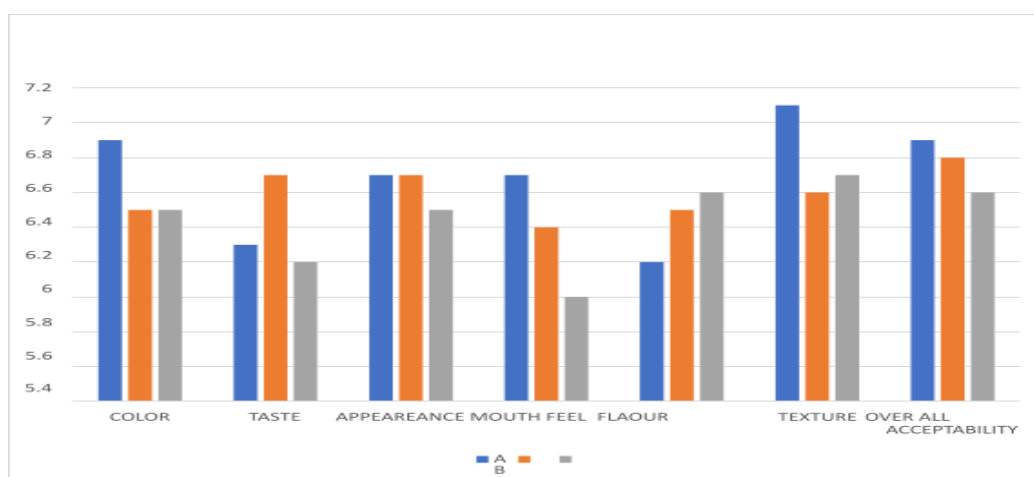


Figure 10: Sensory evaluation scores of upma tikki incorporated with green coffee powder

4. Organoleptic evaluation of Besan Chilla

The mean values of sensory evaluation of Besan Chilla prepared with incorporation of green coffee powder are shown in Table 8 and Figure 11. Simultaneously 3 variants were prepared by the incorporation of green coffee powder i.e. Sample A (1g), Sample B (2.5g) & Sample C (5g). Standard recipe without incorporation of green coffee powder worked as control.

The mean score obtained for color varied from 6.5 ± 0.97 to 6.9 ± 0.73 in the 3 variants prepared by incorporation rating green coffee powder i.e. Sample A (1g), Sample B (2.5g) & Sample C (5g) shown in Table 8 and Fig 11. Besan Chilla Sample A (1g) obtained a high score.

The mean scores, secured for taste, were ranging from 6.3 ± 1.15 to 6.7 ± 0.82 . Sample A obtained a high score.

The mean score obtained for appearance varied from 6.4 ± 0.84 to 7 ± 0.04 . Sensory mean scores for appearance of Besan Chilla Sample B (2.5g) were the highest in appearance score. However the third variant 5g obtained a lower rating.

The mean score obtained for the mouth feel varied from 6.3 ± 1.25 to 6.7 ± 0.94 . The mean score of second (2.5g) variant were highest score 6.7 ± 0.94

The mean score for flavour varied from 6.6 ± 0.96 to 7.1 ± 0.99 . The mean score of Sample C (5g) was the highest, i.e. 7.1 ± 0.99 .

The mean score, secured for the texture of Besan Chilla, ranged from 6.8 ± 1.39 to 6.9 ± 1.10 . Most acceptable sample for texture of Sample B (2.5g) was 6.9 ± 1.10 .

Overall acceptability of Besan Chilla prepared by 1g scored highest.

Sensory Analysis revealed that variants were equally accepted & did not register any change in terms of various attributes.

Characteristics of sensory evaluation (Mean $\pm$ SD)			
Sensory characteristics	Samples		
	A	B	C
Color	6.9 ± 0.73	6.7 ± 0.82	6.5 ± 0.97
Taste	6.7 ± 0.82	6.6 ± 0.84	6.3 ± 1.15
Appearance	6.8 ± 0.78	7 ± 0.04	6.4 ± 0.84
Mouth feel	6.4 ± 0.69	6.7 ± 0.94	6.3 ± 1.25
Flavour	7 ± 0.66	6.6 ± 0.96	7.1 ± 0.99
Texture	6.9 ± 0.73	6.9 ± 1.10	6.8 ± 1.39
Over all acceptability	6.6 ± 0.69	7.1 ± 0.99	6.9 ± 1.37

Table 8: Sensory evaluation scores for the acceptability of "Besan Chilla" incorporating different levels of Green Coffee Powder

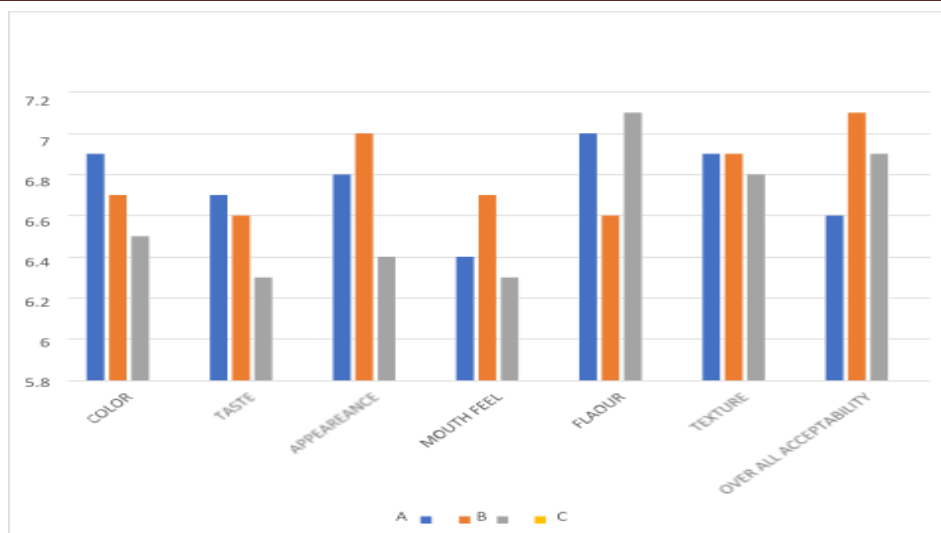


Figure 11: Sensory evaluation scores of besan chilla incorporated with green coffee powder

Conclusion

Present study was planned after watching several health benefits, like regulating sugar & blood pressure, cholesterol, diabetes (type 1 & type 2), Alzheimer disease, heart problem and obesity etc. Green coffee beans and powder are commercially available worldwide. Green coffee powder is usually used in liquid or drink form. Hence, the present investigation was aimed at development and acceptability of recipes prepared with Green coffee powder incorporation other than drinks.

Four traditional recipes named fried idli, thalipeeth, besan chilla and upma tikki were prepared experimentally by incorporating green coffee powder in different proportions.

Overall acceptability of fried idli, upma tikki and besan chilla prepared by 1g green coffee powder scored the highest.

Overall acceptability of Thalipeeth prepared by incorporating green coffee powder in the amount of 2.5 g was liked the highest by the panel members. It can be inferred from the above results that the Green Coffee Powder incorporated recipes were accepted.

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