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## Development and quality evaluation of barfi fortified with coconut and medicinal herbs (Basil, lemon grass, mint, ginger)

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### Abstract

The fortification of herbs in regular coconut Barfi configuration at different levels was assessed on the nutritional and sensory quality of Barfi's. The Coconut (Desiccated) and Herbs as a functional ingredient, dried and coarse grinded were incorporated by substituting the proportions of Coconut and herbs at 50:50, 70:30, 80:20 in the barfi formulations. Proportion of 80:20% incorporated cookies were found to be more acceptable than other during examination and Sensory evaluation. A novel fortified Barfi was successfully produced and it was observed as the concentration of the coconut increases there is also gradual increase in Fat, Ash, Protein whereas energy level was also observed in ample amount and the reducing sugars were in high amount but carbohydrates were not observed. Moisture reduces as the days pass on. Coconut possesses about 61% of fibre within it and herbs are good source of antioxidant. Moreover, other nutritional parameters make it more favorable choice for the food technologists to develop such functional foods. Coconut nutrition has also proven to have anti-cancer properties, contains high content of monolaurin and lauric acid also is a good source of vitamin K, Iron and Fibre. Whereas, Herbs possess numerous medicinal properties such as Anti-bacterial, Anti-fungal, Anti-parasitic, Anti-dermatophytic, Anti-oxidants, Hypoglycaemic, Hepato protective, Immunostimulant. The objective of this whole study was acceptability of such products of different configuration in the market for health and welfare of consumers and also to reach elite growers and corporate entrepreneurs with a commitment of sustained high production of such products.

**Keywords:** incorporated, fibre, vitamins, lauric and monolaurin acid, anti-bacterial, anti-fungal

### Introduction

In confectionery products, Barfi is the most significant. This is a confection consumed by immense population in India and is suitable for all right from children to adults. However, this is most commonly relished by the school going children, teenagers and youngsters who need more fibre and protein also Anti-oxidative properties for fluent body building and maintenance. A few of the famous varieties of barfi include *besanbarfi* (made with gram flour), *kaaju barfi* (made with cashews), *pista barfi* (made with ground pistachios), and *sing barfi* (Made with peanuts). The main ingredients of plain barfis include condensed milk and sugar. The ingredients are cooked in a vessel until the mixture solidifies. The flavour of a barfi is often enhanced with fruits (Such as mango or coconut) or nuts (such as cashew, pistachio, or peanut) and spices (Such as cardamom or rose water).

Coconut is a fruit which belongs to the *Cocos nucifera* palm. This mature nut is one of the most used ingredients in the kitchens of India. Hundreds of coconut species are found all over India and its taste vary according to its soil alkalinity. Coconut is high in dietary fibre and provides a whopping 61% of fibre. The triglycerides found in coconut oil increase 24 hours of energy expenditure by 5% leading to weight loss.

Coconut *Cocos nucifera* L., is a tree that is cultivated for its multiple utilities, mainly for its nutritional and medicinal values. Coconut water and kernel contain micro-minerals and nutrients, which are essential to human health and hence coconut is used as a food by the peoples in tropical regions.

The ability to synthesize a wide variety of chemical compounds that are used to perform important biological functions, and to defend against attack from predators such as insects, fungi and herbivorous mammals is called herbal medicine. Many of these Phytochemicals have beneficial effects on long-term health when consumed by humans, and can be used to

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effectively treat human diseases. (Annual report 1980 to 81. Central <sup>[1]</sup> Institute of Medicinal and Aromatic plants). Incorporating coconut in Barfi when partially heated on low flame gives a delightful flavour to the products and hence, can add a tasty twist to routine dishes and can be used as a garnishing and goes very well with Pysams, Porridge and other confections. However, shredded coconut has high water absorption capacity which can impact on binding of the product hence a binding substitute in following case.

### Nutritive composition of ingredients

**Table 1:** Coconut proximate composition

Principle	Nutrient Value	Percentage of RDA
Energy	354 Kcal	18%
Carbohydrates	15.23 g	12%
Protein	3.3 g	6%
Total Fat	33.49 g	167%
Cholesterol	0 mg	0%
Dietary Fiber	9 g	24%

(Source: USDA National Nutrient data base).

### Nutritional composition of ginger

- 79% calories
- 17.86 g of carbohydrate
- 3.6 g of dietary fiber
- 3.57 g of protein
- 0 g of sugar
- 7.7 mg of vitamin C

### Proximate composition of cardamom

#### Cardamom

Cardamom is a very effective remedy against a common problem known as halitosis, or bad breath. Simply chewing on the seeds can help to eliminate any bad odours coming from your mouth. Recently, a study conducted by the Department of Microbiology at Kurukshetra University in India done to explore the antimicrobial effects of cardamom extracts on oral bacteria, concluded that the extracts are effective against oral pathogenic bacteria like *Streptococcus mutans* and *Candida albicans*. Additionally, the major active component of cardamom oil, cineole, is a potent antiseptic known for killing the bacteria causing bad breath. Cardamom even shows promise when it comes to cancer, exhibiting potential as a natural cancer treatment. Animal studies have shown that it can be used as a chemo preventive agent or something that's used to inhibit, delay or reverse cancer formation. Cardamom might be able to help you lower your blood pressure, which is key to maintaining the health of your heart and kidneys (E. A. depradier 2006) <sup>[6]</sup>.

**Table 2:** Cardamom, Nutritional value per 100 g.

Principle	Nutrient Value	Percentage of RDA
Energy	311 Kcal	15.50%
Carbohydrates	68.47 g	52.50%
Protein	10.76 g	19%
otal Fat	6.7 g	23%
Cholesterol	0 mg	0%
Dietary Fibre	28 g	70%

(Source: USDA National Nutrient data base).

### Proximate composition of the lemongrass

- Calcium- 43.6. mg. 4%
- Iron- 5.5. mg. 30%
- Magnesium- 40.2. mg. 10%

- Phosphorus- 67.7. mg. 7%
  - Potassium- 484. mg. 14%
  - Sodium- 4.0. mg. 0%
  - Zinc- 1.5. mg. 10%
  - Copper- 0.2 mg
- (Source: USDA April 2018)

### Proximate composition of mint

The use of peppermint oil has been found to be an effective and safe treatment for those suffering from abdominal pain or discomfort associated with IBS. In one double-blind placebo-controlled clinical trial, 75% of patients with IBS who took enteric-coated peppermint oil capsules twice daily for 4 weeks had at least a 50% reduction in total IBS symptoms (Compared to no significant change in patients taking a placebo). In a study in animals, menthol was found to help protect the lining of the stomach from the negative effects of Indomethacin and ethanol, giving it a potential role in preventing gastric ulcers. Applying peppermint extract externally has been found to increase pain threshold in humans. Part of the bush mint family (*Hyptis*), Brazilian mint (*Hyptis crenata*) has been found to be as effective for pain relief.

### Methodology

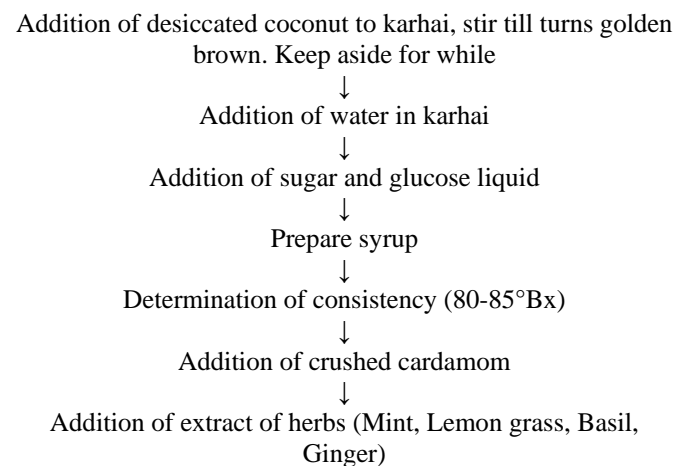
#### Collection of raw materials

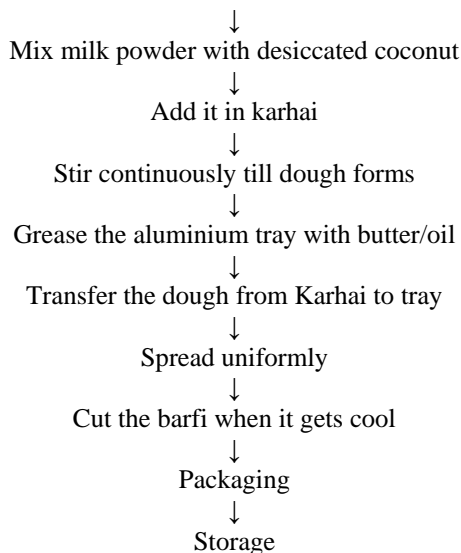
All the ingredients like Desiccated coconut, Milk powder, Sugar, Liquid glucose, Water, Arc of herbs crushed in mortar and pastel ie. (*Basil, Lemongrass, Ginger, Cardamom, Mint*) were readily available over the counters from the local markets of Nashik.

#### Preparation of the herbal (Coconut) Barfi

All the ingredients were weighed as the standard proportion. Desiccated coconut was roasted in a Karhai on low flame till turns light brown. Syrup was prepared by adding desired quantity of sugar and Glucose liquid in the water till it forms one string consistency (80-85°Bx). When Desiccated Coconut will get slightly cooled mix milk powder in it. Crushed or fine ground Cardamom powder to be added in Syrup. Arc or extract of herbs to be added in syrup and then addition of coconut is to be done. Mix all the ingredients well till a mass gob forms. End point of Barfi was judged according to textural characteristics. Barfi was allowed to mould and settle in Aluminium trays. Barfi was cut hot by knives in square shapes. Barfi allowed cooling prior to packaging. Pouches were stored in cool and dry place.

### Process flow sheet





**Fig 1:** Flow diagram of preparation of Herbal (Coconut) Barfi.

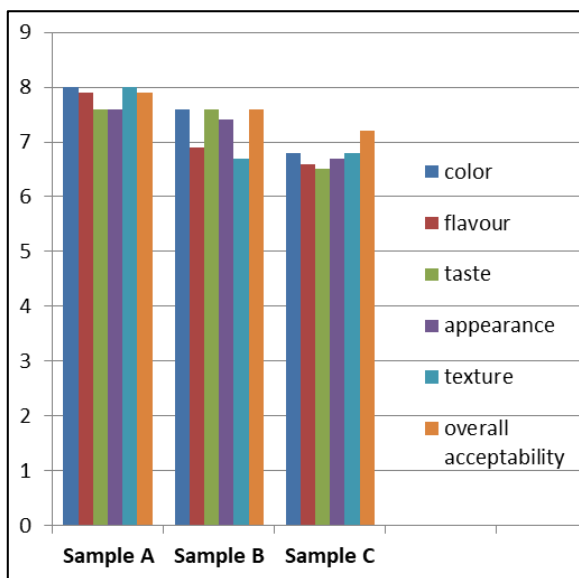
**Table 3:** Formulation of cookies sample for 01kg/ Approx.:

Ingredients	Weight in (gm)
Desiccated coconut	360 gm
Sugar	400 gm
Milk Powder	80 gm
Glucose liquid	110 gm
Cardamom	10 gm
Ginger	8 gm
Mint	10 gm
Tulsi ( <i>Basil</i> )	10 gm
Lemon Grass	10gm

**Sensory evaluation of barfi**

Sensory evaluation was carried out for color, flavor, texture, appearance, taste and overall acceptability of barfi using the 9 point Hedonic scales. The results of Sensory analysis are given below in graph.

**Overall sensory analysis**



**Fig 2:** Sensory Analysis Chart.

Amongst the above mentioned three samples the Sample A was found much appealing than other two and hence was chosen as acceptable configuration.

**Chemical analysis**

The results of the chemical Analysis shown in table B. Moisture was determined as per the method of FSSAI Lab Manual (4) 2016. Energy value was determined by the CAC 3.3.1, 1985. Protein was determined by the Microkjeldhal method according to AOAC (1975). Sugars were determined by the method of FSSAI Lab Manual (2.9), 2016. Fat was determined by the AOAC method, 1975 using Soxhlet Apparatus. Ash was estimated with the help of Muffle furnace, samples were kept in it at 550°C for about 6Hrs.

**Table 4:** Nutritional composition of barfi

Parameters	Values
Energy	414 K/cal.
Protein	12.5g/100g
Fat	11.8g/100g
Reducing Sugar	25.5g/100g
Moisture	10%
Non-Reducing Sugar	06.17g/100g
Sugar	25.2g/100g

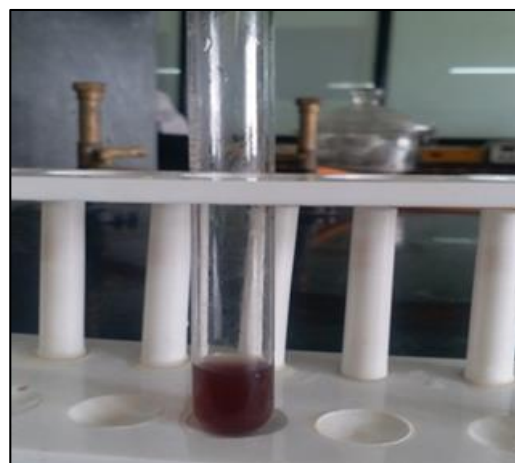
**Phytochemical analysis: (M. Satya Prasad et al., 2015)**

**Qualitative analysis**

Chemical tests were carried out on the Ethanol, Methanol and aqueous, extract using procedures to identify the Phytochemical as described by Sofowara, Trease and Evans and Harborn.

**1. Test for amino acid and protein**

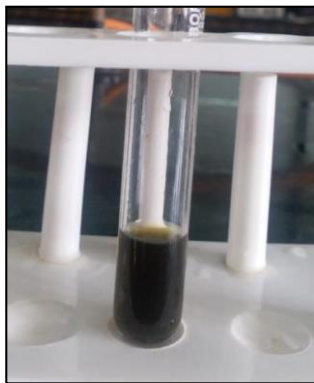
- 2ml of filter was treated with 2-5 drops of ninhydrin solution
- placed in a boiling water bath for 1-2 minute and observed for the formation of purple color



**Fig 3:** Formation of purple colour

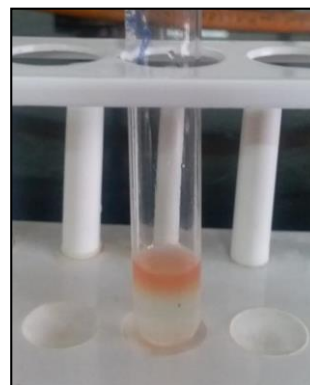
**2. Test for Tannin**

- To 1ml of extract, 2ml of 5% ferric chloride was added. Formation of greenish black colour indicates the presence of tannin.



**Fig 4:** Formation of greenish black colour

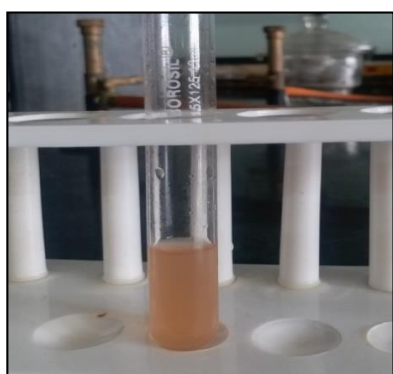
- Red brown colour formation at the interface indicated the presence of terpenoids.



**Fig 7:** Formation of Red brown colour at the interface

### 3. Test for saponins

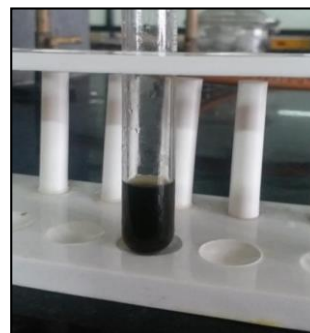
- To 2ml of extract, 2ml of distilled water was added and shaken in a graduated cylinder for 15 minutes length wise. Formation of 1cm layer of foam indicated the presence of saponin.



**Fig 5:** There is no formation of 1cm layer of foam

### 6. Test for phenols

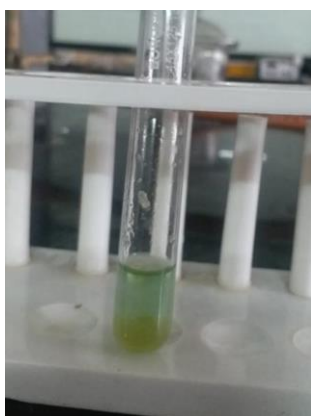
- To 1ml of the extract, 2ml of distilled water followed by few drops of 10% ferric chloride was added.
- Formation of greenish black colour indicated the presence of phenols.



**Fig 8:** Formation of greenish black colour

### 4. Test for glycoside

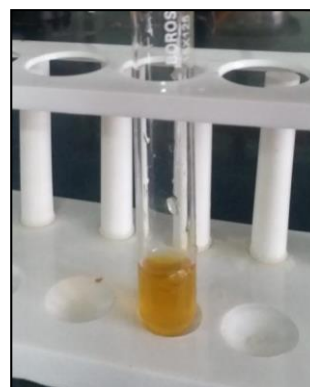
- To 1ml of the extract add few drop of HCl, allowed for 5 minutes for hydrolysis and neutralized with NaOH solution.
- A few drop of Fehling's solution A and B are added and heated for few minute.
- An orange red precipitate indicates the presence of glycosides.



**Fig 6:** Formation of orange red precipitate

### 7. Test for Coumarins

- To 1ml of extract, 1ml of 10% Sodium hydroxide was added.
- Formation of yellow color indicated the presence of coumarine.



**Fig 9:** Formation of yellow colour

### 5. Test for terpenoids

- To 0.5 ml of extract, 2ml of chloroform was added carefully.

### 8. Test for flavonoid

- Of the aqueous filter of extract followed by addition 5ml of dilute ammonia solution was added to a portion of concentrated sulphuric acid.
- Appearance of yellow colour indicated the presence of flavonoid.



Fig 10: Formation of yellow colour

### 9. Test for anthocyanins and Betacyanin

- To 2ml of extract, 1 ml of 2N sodium hydroxide was added and heated for 5 minute at 100°C.
- Formation of yellow colour indicate the presence of betacyanin.

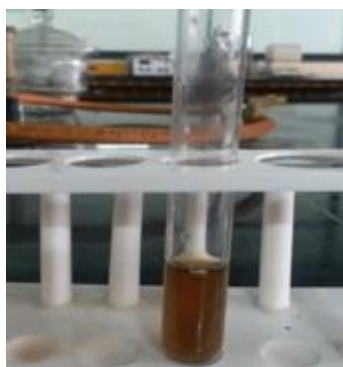


Fig 11: Formation of yellow colour

Table 5: Result of qualitative analysis

Sr. No.	Compound	Result of test
1.	Amino acid and Protein	Positive
2.	Tannin	Positive
3.	Saponin	Negative
4.	Glycoside	Positive
5.	Terpenoid	Positive
6.	Phenols	Positive
7.	Coumarins	Positive
8.	Flavonoid	Positive
9.	Anthocyanin and Beta cyanin	Positive

### Conclusion

A novel product, fortified with herbs and regular coconut barfi configuration was successfully produced. Addition of sugar and milk powder was successfully incorporated in Herbal (Coconut) Barfi. On the basis of sensory analysis it was concluded that Sample A composed of 320gm of Desiccated coconut, Sugar 400gm, Milk powder 80gm, Glucose liquid 110gm, Herbs 10gm (Basil, Mint, Lemon grass, Ginger), Cardamom 10gm has high acceptability with avg. Score 7.9.

Depending on the chemical analysis, it was concluded that, "Herbal (Coconut) Barfi" is the high calorie and nutritious product containing, Energy 414K/cal, protein 12.5, Fat 11.8, Moisture 10, Sugar 25.2 per 100 gm. The moisture was slightly decreased in fortified samples. The colour of samples attained darker colour as fortification was increased. However, the texture was slightly reduced with fortification but described not much desirable change.

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