A project Work Report
On
Preparation and proximate analysis of gluten free cookies by using different percentage of Moong Dal and wheat flour blends.

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Submitted To the Department of Nutrition and Food Engineering in the partial fulfillment of B.Sc. in Nutrition and Food Engineering

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APPROVAL

This project titled **Preparation and proximate analysis of gluten free cookies by using different percentage Moong Dal and Wheat flour blends**, Submitted by **Tania Islam** to the department of Nutrition and Food Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Nutrition and Food Engineering and approved as to its style and contents the presentation has been held on

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DECLARATION

We hereby declare that, this project has been done by us under supervisor of **Mr. Md. Nawal Sarwer**, **Lecturer**, **Department of NFE**, Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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ABSTRACT

Using combinations of moong dal and wheat flour, the current study's goal was to make gluten-free cookies and do a proximate analysis on them. Moong dal (Vigna radita L.) is a cereal grain variety that is grown for its seeds, which are rich in many health-promoting ingredients. This study looked at cookies that were fortified with 100% (S1), 50% (S2), and 0% (S3) wheat flour in addition to varying amounts of moong dal flour. The chemical characteristics of these cookies were also evaluated.

The percentages of protein, fat, carbohydrate, fiber, and ash content were found to vary across the samples, with the ranges being protein (3.10-8.47%), fat (19.5-22.88%), carbohydrate (58.52-72.1%), fiber (0.15-11.5%), and ash (1.77-2.41%). Specifically, compared to the other samples, the cookies in the S1 category (100% moong dal flour) showed higher percentages of protein, fiber, and ash content together with lower percentages of carbohydrate and fat content.

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CHAPTER 1
Introduction

1.1 Introduction

The versatile and nutrient-rich legume moong dal, which is derived from the mung bean (Vigna radiata), has long been a staple of traditional diets in many different civilizations all over the world. With roots in the Indian subcontinent, moong dal has established itself as a staple food item thanks to its great nutritional value, ease of cultivation, and versatility in the kitchen. Numerous studies conducted over the years have revealed the health advantages of eating moong dal, from its high protein content and critical amino acid composition to its possible involvement in treating chronic conditions. This thesis paper explores moong dal's many facets, including its historical significance, nutritional makeup, agricultural relevance, and developing applications in contemporary cuisines.

Originating in the Indian subcontinent, moong dal has become an integral part of cultural cuisines, from the dal dishes of India to the hearty soups of Southeast Asia. The mung bean, from which moong dal is made, is known for its capacity to flourish in a variety of agro-climatic conditions, making it a crucial crop for smallholder farmers and a factor in the sustainability of agricultural systems. Furthermore, nutritionists and health enthusiasts alike have taken notice of moong dal's outstanding nutritional profile, which includes its high protein content, dietary fiber, vitamins, and minerals.[1]

Moong dal presents itself as a solution on several fronts as societies struggle with problems of malnutrition, food security, and sustainable agriculture. The protein-energy deficiency that is common in many poor nations is addressed by its protein-rich composition, and its use in crop rotation systems improves soil fertility and lowers the demand for synthetic fertilizers. Furthermore, the adaptability of moong dal in culinary preparations, from traditional meals to modern modifications, emphasizes its potential to straddle the divide between cultural history and contemporary nutritional requirements.[2]

Recent scientific investigation into the bioactive components of moong dal, such as antioxidants and anti-inflammatory substances, suggests possible health advantages beyond merely nutritional. The management of chronic diseases like diabetes, obesity, and cardiovascular ailments has been related to these substances, thus upgrading moong dal's status from a simple dietary staple to a functional food with possible therapeutic implications.

This study attempts to offer a thorough understanding of moong dal's relevance and its implications for human health and sustainable food systems by reviewing existing literature and performing empirical analysis.

1.2 Types of Moong Dal

Moong dal, comes in various forms that cater to diverse culinary preferences and cooking techniques. Here are some common types of moong dal:

Whole Green Moong Dal: Mung beans that still have their green skin on. They are frequently employed in the preparation of soups, curries, and sprouting moong salad.

Split Green Moong Dal (Moong Dal Chilka) is made of split mung beans that have had their green peel removed. This kind of moong dal cooks rather rapidly and is frequently used to produce khichdi (a rice-lentil mixture), stews, and soups.

Split Yellow Moong Dal (Moong Dal Dhuli): These mung beans have been split and hulled. They are frequently used to prepare classic Indian cuisines like dosas of many varieties and tempered lentils known as moong dal.

Moong Dal Sprouts: Sprouted mung beans that have been given time to soak. These incredibly nutrient-dense sprouts are frequently added to salads, sandwiches, and wraps.[3]

1.3 Moong dal in Bangladesh

Moong dal, also known as "muger dal" in Bengali, is a staple food in Bangladesh and plays a vital role in the nation's cuisine. It is a key component of many traditional Bengali meals and is a mainstay in the cuisine. It is a crucial part of many Bangladeshi diets since it contributes to balanced nutrition in addition to being loved for its taste and texture.[4]

1.4 About Moong dal Cookies

Cookies made with moong dal are a wonderful and original take on the classic cookie. These sweets are made using moong dal, also known as mung beans, which are well-known in Indian cuisine for their nutritional worth and versatility. The cookies have a distinctive flavor that combines the rich earthiness of moong dal with a delicate sweetness. Due to the use of moong dal, their texture has a tendency to be slightly crumbly, providing a unique variation from traditional cookies.

The process of making moong dal cookies involves soaking the moong dal before transforming it into a smooth paste. This paste is combined with ingredients such as powdered sugar, ghee (clarified butter), and a touch of cardamom powder. Once mixed, the dough is shaped into cookies and optionally garnished with chopped nuts, adding both visual appeal and a delightful crunch.

Moong dal cookies begin to turn golden-brown around the edges after baking, indicating that they are ready for consumption. The protein and dietary fiber in the moong dal make the cookies a more healthful alternative for a snack. These cookies are a lovely treat that can be eaten at any time of the day since they combine classic cookie components with the health benefits of moong dal.[5]

1.5 Objectives

1.5.1 General objective:

- Researching the making and close examination of various percentages of cookies made with wheat flour and moong dal.

1.5.2 Specific Objectives:

Analyze the amount of protein, fat, carbs, fiber, and ash in cookies made using a

- wheat flour and moong dal mixture. For making gluten-free moong dal biscuits
- To provide delicious cookies that are healthily beneficial.

CHAPTER 2
Literature Review

2.1 Nutrition fact

The high protein level of moong dal makes it a prized component of vegetarian and vegan diets. Additionally, it has a lot of dietary fiber, which might improve digestion and control blood sugar levels. It is a nutritious supplement to a balanced diet due to its high vitamin and mineral content and relatively low-fat level.

Here are some nutritional facts about moong dal:

Nutritional Information (per 100 grams of cooked moong dal)(NFPCSP):

- **Calories**: 351 kcal
- **Carbohydrates:** 60.9 grams
- **Dietary Fiber:** 0.7 grams
- **Protein:** 23.7 grams
- **Fat:** 1.2 grams

2.1.1 protein:

Based on elements including the moong dal variety, cooking technique, and serving size, the protein content of moong dal (mung beans) may vary slightly. Per 100 grams of uncooked moong dal, the average amount of protein is between 24 and 28 grams.

Remember that moong dal absorbs water during cooking and expands, so the protein content per 100 grams of cooked dal also stays fairly constant. However, because of the increased volume after cooking, the portion size might alter.[6]

The popularity of moong dal among vegetarians, vegans, and anyone seeking meals high in protein can be attributed to its reputation as a good plant-based source of protein.

2.1.2 Carbs:

Various elements, including the type of moong dal, how it is prepared, and the quantity served, might affect the amount of carbohydrates in moong dal (mung beans). Cooked moong dal typically contains 18 to 20 grams of carbs per 100 grams. This carbohydrate content consists of both sugars and dietary fiber. (The Cochrane Library. 2017 Jan)

2.1.3 Starch:

A type of legume called moong dal (mung bean) includes starch, a sort of complex carbohydrate. The main source of energy storage in plants, including legumes like moong dal, is starch. The starch in moong dal is more easily accessed and serves as a source of energy when it is cooked or processed.

The type of moong dal, the technique of processing, and the cooking procedure are only a few examples of the variables that might affect the starch content of moong dal. 100 grams of moong dal typically include 50–60 grams of starch.

It's important to note that starch is converted during digestion into less complex carbohydrates, resulting in a steady flow of energy. Additionally contributing to the control of blood sugar levels and promoting digestive health is the dietary fiber content of moong dal.[7]

2.1.4 Fiber

Dietary fiber, which is important for digestive health and can help control blood sugar levels, is found in abundance in moong dal. Each 100 grams of moong dal has about 7-8 grams of fiber.[8]

2.2 Vitamins and minerals

In addition to being a fantastic source of protein and carbohydrates, moong dal, or mung beans, are strengthened in their nutritional value by the inclusion of other vitamins and minerals. Some vitamins and minerals that are commonly found in moong dal include the following:

2.2.1 Vitamins:

Folate (Vitamin B9): Folate is crucial for DNA synthesis and cell division. With about 80 micrograms of folate per 100 grams, moong dal is a good source of this vitamin.

Vitamin B1 (Thiamine): The metabolism of energy requires thiamine. There is a moderate level of thiamine in moong dal.

Vitamin B2 (Riboflavin): The metabolism of lipids and the creation of energy both involve riboflavin. Riboflavin is reasonably abundant in moong dal.

Vitamin B3 (Niacin): Niacin plays a role in a number of metabolic pathways. Niacin is present in moong dal, albeit in small amounts.

Vitamin B6: The B6 vitamin pyridoxine has a role in the metabolism of neurotransmitters and amino acids. Vitamin B6 is a minor component in moong dal.

(Dahiya et al., 2015)

2.2.2 Minerals:

Iron: Iron is essential for the blood's ability to carry oxygen and for the creation of total energy. With 1.4 milligrams of iron per 100 grams, moong dal is a good plant-based source of this mineral.

Potassium: Potassium is necessary for muscular contractions, neuronal activity, and fluid homeostasis. Potassium is somewhat present in moong dal.

Magnesium: Magnesium has a key role in maintaining healthy bones, muscles, and nerves. Magnesium is present in moong dal, with about 48 mg per 100 grams.

Phosphorus: Phosphorus is required for a number of biological functions, including bone health. Phosphorus is present in moong dal in acceptable proportions.

Zinc: Zinc promotes cell division, wound healing, and immunological function. Zinc is present in moong dal in very small concentrations.

These vitamins and minerals contribute to moong dal's overall nutritional profile, making it a nutrient-rich addition to a balanced diet. (Dahiya et al., 2015) [9]

2.3 medical advantages of eating Moong dal:

Heart wellbeing: In addition to lowering cholesterol levels and blood pressure, the combination of protein, dietary fiber, and heart-healthy elements in moong dal can also minimize the risk of cardiovascular illnesses.

Weight Management: The protein and fibre in moong dal cookies may help you feel fuller for longer and reduce overeating, which might aid with weight management.

Diabetes control: In persons with type 2 diabetes, moong dal can assist improve blood sugar regulation, blood fat levels, and insulin affectability.

Low Glycemic Index: Foods like moong dal that have a lower glycemic index take longer to release glucose into the system. This may lessen the likelihood of blood sugar rises and crashes by stabilizing blood sugar levels and supplying long-lasting energy.

Antioxidants: Antioxidants included in moong dal aid in defending cells against harm from dangerous free radicals. Antioxidants support good health in general and may help lower the chance of developing chronic illnesses.

Bone Health: Moong dal's inclusion of minerals like calcium, magnesium, and phosphorus promotes bone health and may aid in the prevention of diseases like osteoporosis.

Digestive Health: By avoiding constipation and fostering gut health, the fiber in moong dal can support a healthy digestive tract.

Energy Boost: Moong dal is a fantastic option to help power your activities throughout the day because the carbohydrates in it offer a consistent source of energy. (Webster, F.H. (2002). [10]

CHAPTER 3
Materials and Methods

3.1 Materials

3.1.1 Collection of Raw Materials:

All of the materials were gathered from a nearby market in Dhaka, Bangladesh, in an effort to create a variety of moong dal cookies. The NFE food processing lab of Daffodil International University conducted this investigation.

3.1.2 Essential Equipment:

- Mixing machine
- Oven
- Tray
- Electric Balance.
- Spoon
- Bowl.
- Blander
- Sieve

3.1.3 Table-1: Elements for moong dal cookie for various types

Elements	Amount(g)		
	S1	S2	S3
Moong Dal flour	140	70	0
Wheat flour	0	70	140
Butter	65	65	65
Sugar	50	50	50
Egg	57	57	57
Baking soda	1.2	1.2	1.2
Vanilla	2.10	2.10	2.10
Cinnamon	1.3	1.3	1.3
Salt	1.4	1.4	1.4

N.B: Cookies made with 100% moong dal flour, 50% moong dal flour and 50% wheat flour, and 100% wheat flour are S1–100%.

3.1.4 Photograph of Different type of cookies sample

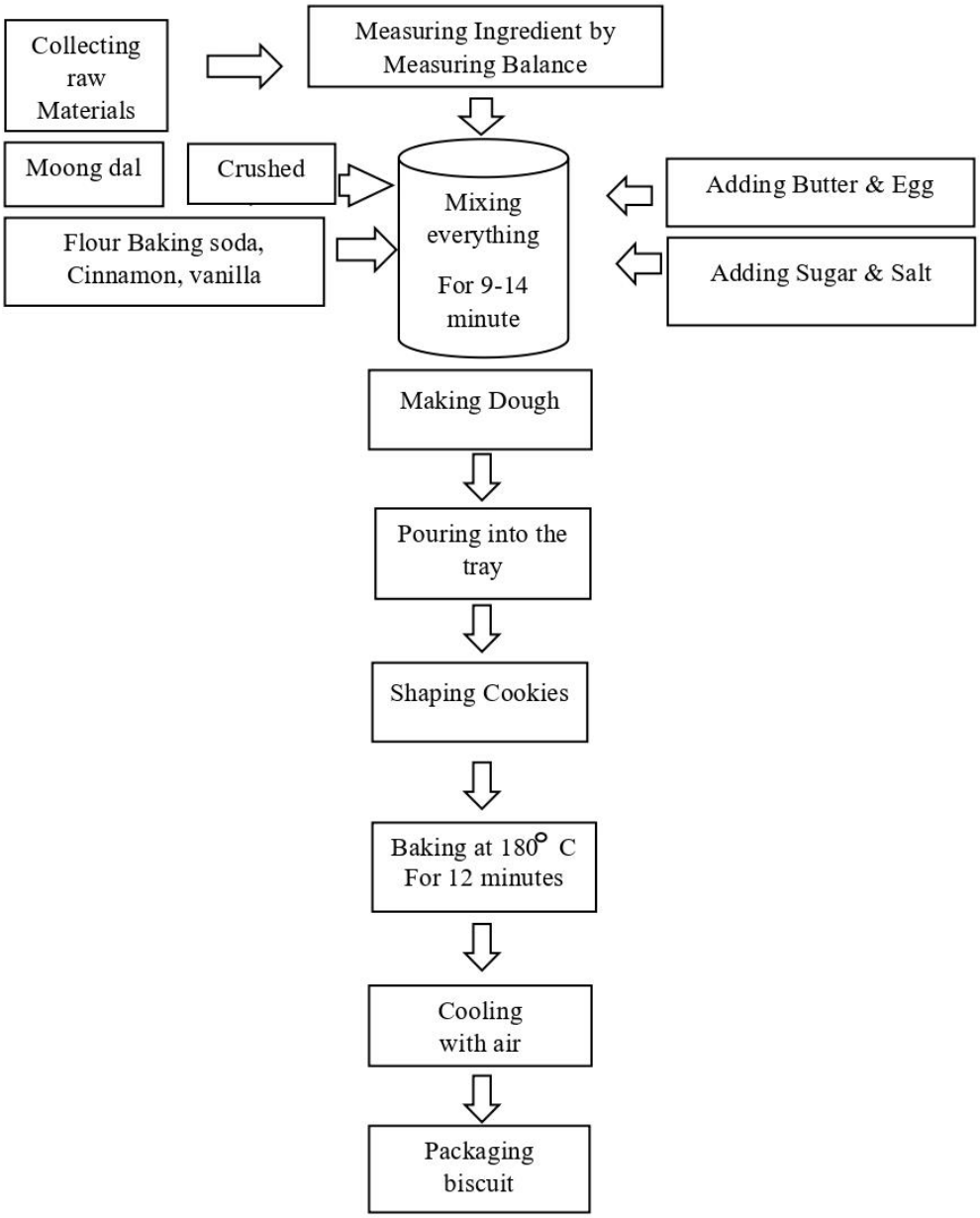
Sample- 1

Sample- 2

Sample- 3

Figure-1: Different types of moong dal cookies.

3.1.5 Preparation of moong dal cookies for three sample:[11]



3.2 Methods

The proximate analysis method is commonly used to determine the content of protein, carbohydrates, fats, ash, and fiber in food. Each component is typically measured using specific laboratory techniques. For example, protein content can be determined through methods like the Kjeldahl or Dumas method, while carbohydrates may be analyzed using gravimetric or colorimetric techniques. Lipids (fats) are often determined through solvent extraction, and ash content is obtained by incinerating the sample to burn off organic material. Fiber analysis involves the determination of both soluble and insoluble fiber using methods such as gravimetric or enzymatic procedures.

3.2.1 Protein Determination:

3.2.1.1 Apparatus:

- Stand for burette
- Graduated test tube
- Flask for boiling
- Conical flask
- Precision balance

3.2.1.2 Chemical:

- Sulfuric acid (H_2SO_4)
- Potassium sulfate (K_2SO_4)
- Sodium hydroxide (NaOH)
- 0.1N Hydrochloric acid (HCl)
- Methyl red

3.2.1.3 Method:

The determination of protein was conducted through the Kjeldahl technique, which consists of three phases. As indicated in the provided details, these phases are:

- Distillation
- Titration
- Digestion of sample

3.2.1.4 Sample Digestion Procedure:

Figure-2: Setup of digestion flask

Enclosed in foil, the test sample was carefully placed into a digestion flask. Following this, a mixture of 10 milliliters of H2SO4 and 2g of the digestion compound was added to the flask for thorough blending. To ensure uniformity, two absorption flasks were employed. These flasks underwent a heating process in a Kjeldahl digestion chamber, starting at an initial temperature of 400°C and gradually rising to 600°C. The resulting dark solution was separated during a three to four-hour period. After cooling, 100 milliliters of distilled water were introduced to dilute the contents of the flasks.

3.2.1.5 Distillation:

The blended mixture was transferred from the container into the refining tank in ten milliliters. Following that, the container was filled with 150 milliliters of distilled water. In the refining barrel, 10 milliliters of 40% sodium hydroxide (NaOH) were then added. The color variations of the solution were observed.

Three refining jars were employed for this procedure, with one of them being transparent. Reagents were taken out of the third refining flagon and did not include any examples. Then, in a flagon resembling a catching cone, Additions were made of 10 ml of 0.1N HCL and 50 ml of distilled water. I added 2 drops of methyl red to the cup with the capturing funnel design. A pink tone permeates the arrangements.

Three jars, shaped like catching cones, were used and held fairly similar objects. At that moment, the refining cycle was completed by running the condenser for 30 minutes. At that moment, titrants using NAOH were added to jars that resembled cones.

Figure-3: Distillation Flask

3.2.1.6 Titration:

0.1N of NAOH was added to the burette in preparation for titration. NAOH was dropped into a cone-shaped flagon and gently shaken after being introduced from the burette. NAOH was added up until the change in color. The pink shading turned pale yellow in the conclusion.

3.2.1.7 Calculation:

The protein content in the given samples is calculated using the formula:

$$\{(B-S) \times 1.4 \times 10 \times 5.95 \times 0.1\} / \text{sample weight.}$$

Here,

- ***B*** represents the blank value,
- ***S*** represents the sample value,
- The conversion factor is 5.95,
- The normality of NaOH is 0.1 [12].

3.2.2.1 Fat Determination:

3.2.2.2 Apparatus:

- Soxhlet apparatus
- Weight Scale
- Crucible

3.2.2.3 Chemical:

N-hexane= 180-200 ml

3.2.2.4 Procedure:

- thimble was purchased.
- sample was measured..
- a plating machine used to enter the sample into a Soxhlet and transfer it into the thimble..
- After turning on the heater, the thermostat was set appropriately..
- Unidirectional water flow was established through the system.
- The temperature of the n-hexane progressively increased to its maximum hardware limit. At this point, the apparatus was stored, and the water temperature was lowered to its minimum level. Consequently, the smoke emanated close to the thimble.
- Simultaneously, the bubbling jar was positioned atop the n-hexane, capturing the fat released from the sample. This process continued for a duration of six hours.
- Following the six-hour bubbling phase, the fat-laden N-Hexane residue was subjected to drying in an oven at a temperature ranging between 40 and 50 degrees Celsius.

3.2.2.5 Computing up:

Fat% = The weight of the flash Following extraction and desiccation / weight in grams of the flash sample

3.2.3.1 Determination of Ash:

3.2.3.1.2 Apparatus:

- Spoon
- Electric muffle furnace machine
- Crucible
- Weight machine

3.2.3.1.3 Procedure:

- Samples were extracted using two distinct crucibles.
- After that, two crucibles would be held at 600 degrees for six hourly in crucible's
- After six hourly, crucible be taken out and cooled down desiccators. Using a crucible at time, we determined the burnt sample's weight.

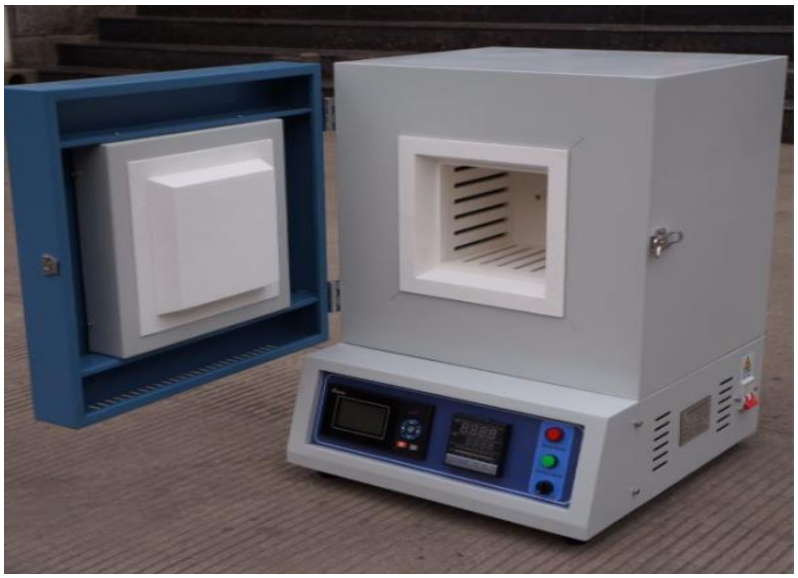


Figure-4: Electric muffle furnace

3.2.3.1.4 Calculation:

Weight of ash= (wt. of ash + crucible) – (wt. of crucible)

3.2.4 Determination of Carbohydrate:

The FDA requires food producers to use the following calculation to calculate the total amount of starch in their products:

> Absolute Carbohydrates = Total Weight of Food Serving - (Weight of Crude Protein + Weight of Total Fat + Weight of Moisture + Weight of Ash).

Since both sugar and fiber are classified as carbs, they ought to be labeled separately on a nutritional label. Food manufacturers may use the terms "under 1 gram," "contains under 1 gram," or "not a critical source of dietary fiber/sugar" to characterize goods that include less than 1 gram of both sugar and fiber. It is not necessary for them to ascertain the exact amount. [15]

3.2.5.1 Determination of Dietary Fiber

3.2.5.2 Apparatus & Equipment

- Laboratory beaker
- Precision hot air oven
- Graduated measuring cylinder
- Conical flask
- Laboratory funnel
- Precision balance apparatus
- Muffle furnace
- Laboratory hot plate
- Marking pen
- Fabricated cotton cloth
- Laboratory spoon
- Ceramic crucible

3.2.5.3 Chemical reagent list

- 0.128 milligrams sulfuric acid: 3.49 milliliters of 98% H2SO4 should be added to 500 milliliters of purified water.
- 0.313M Sodium Hydroxide: Dissolve 6.25g of NAOH solution in 500ml of distilled water. [Firing at the base]

3.2.5.4 Preparing of Chemical Reagent : A

0.128M Sulfuric acid

- After gathering everything, 0.128 milligrams of sulfuric acid need to be prepared
- A label was placed on a 500ml volumetric flask that contained 0.128M sulfuric acid.
- 400ml of distilled water was placed into the flask with a label.
- 98% of the 3.5 ml of sulfuric acid were moved to the same flask.
- To make sure there was no acid remained on the surface, the pipette was cleaned.
- The solution was mixed by rotating the flask.
- Water was added to get the final 500ml amount.
- 0.128 milligram sulfuric acid was prepared for fiber analysis usage.

0.313M Sodium Hydroxide

- The integral is 0.313M.
- All the necessary items were collected for our preparation. 0.313M NaOH
- A balance was set up with a weighing paper.
- Weight was measured
- 6.25 grams of palletized NAOH were consumed.
- A 500ml volumetric flask with 0.313M NAOH inside was marked.
- 400ml of distilled water was added to the flask.
- The same flask was filled with weighted NAOH.
- NAOH pallets were dissolved in water by rotating the flask.
- Water was added after 20 minutes to get a final amount of 500ml.
- The 0.313M NaOH solution was prepared.

3.2.5.5 Procedure

Step-1: Boiling in acid

Step-2: Boiling in base

Step-3: Boiling in fiber

Step-4: Incineration of fiber

Step-5: Calculation

3.2.6.1 Step-1: Boiling (In Acid)

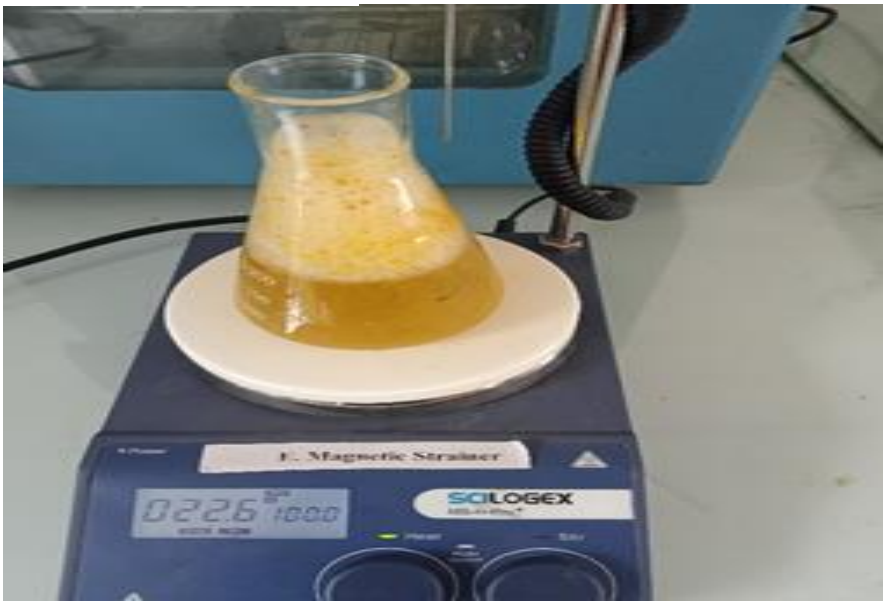


Figure-5: E-Magnetic Strainer

- 0.128M sulfuric acid in 200ml was detected.
- 500ml conical flask was filled with the acid solution.
- A balance was set up with a weighing paper.
- The weight of the paper was recorded.
- A homogenized sample portion was weighed.
- A sample weighing around 2g was accurately measured.
- To mix the sample with the acid solution, it was transferred to the conical flask.
- The sample was boiled for a period of thirty minutes.
- Periodic shaking of the flask ensured proper boiling of the sample.
- To make sure the sample was boiling properly, the flask was frequently shook.
- Afterward, a 1000 ml conical flask was disposed of after 30 minutes.
- A cotton cloth funnel was positioned alongside the waste flask.
- After the sample was cooked, the acid solution was drained using a filter.
- To ensure that all acid residue was gone, the flask was thoroughly cleaned with hot water.
- After cleaning, a second funnel was added to the conical flask.
- A 200ml solution of 0.313M NAOH was tested.

- After filling the conical flask with the NAOH solution, the filtrate was cleaned.
- After mixing, rotate the flask and set it on a

3.2.6.2 Step-2: Boiling (in Base)

- sample boiling for thirty minutes.
- Residue left behind by the NAOH was entirely removed using hot water.
- The filtrate was collected and dried in a crucible until it was completely clear.

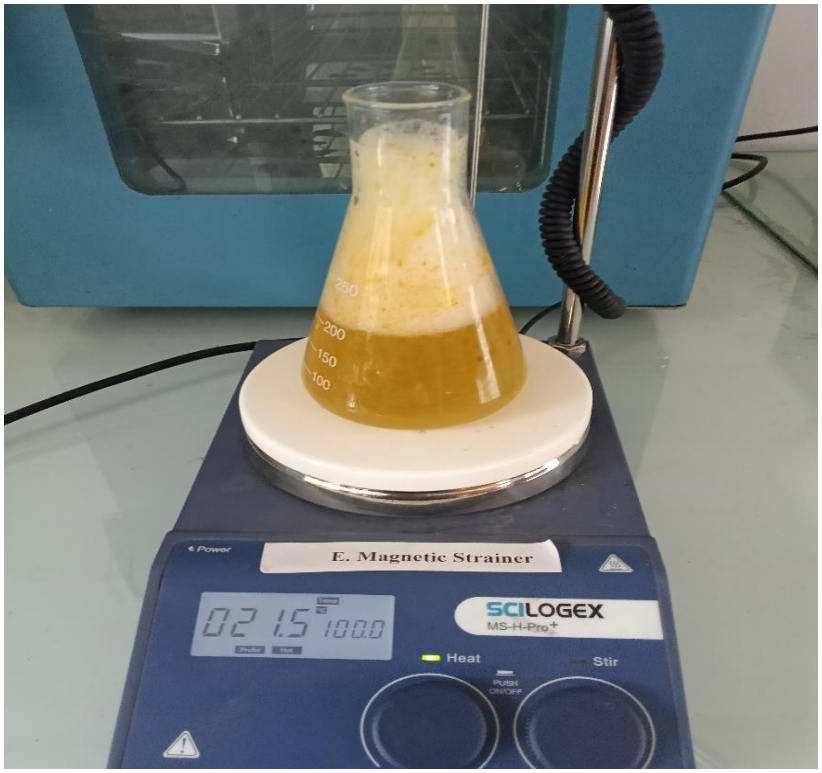


Figure-6: E. Magnetic strainer

3.2.6.3 Step-3: Drying fiber

- Next, hot air oven filled with crucible.
- After that, it was dried for two hours at 230 degrees Celsius.
- When the two hours are up, take the crucible out of the oven and let it cool.
- We were able to observe the dried fiber in the crucible after 20 minutes.
- Then the fiber-containing crucible's weight was measured.
- The mass was recorded.

3.2.6.4 Step-4: Burning of fiber

Figure-7: Muffle furnace

- crucible placed muffle furnace..
- The furnace was operated while affixing a warning label.
- After four hours, when the temperature fell below 250 degrees Celsius, the door was unlocked.
- After being removed, the crucible was left in the desiccator to cool.
- After twenty minutes, the accumulated fiber became apparent.
- The mass of the crucible filled with ash was determined.
- The mass was noted down.

3.2.6.5 Step-5: Calculation

The percentage of dietary fiber is calculated using the formula:

(W1−W2 / Ws) ×100 Where,

- **W1** denotes the weight of the crucible with fiber,
- **W2** denotes the weight of the crucible with ash,
- **Ws** denotes the weight of the sample.

CHAPTER 4

Result and Discussion

4.1.1 Table-2: Composition of Moong dal per 100g:

Component	Amount(g)
Water	9.2
Protein	24
Carbs	63
Sugar	2.1
Fiber	16
Fat	1.2

Table-2 shows

Protein: 96 calories are equivalent to 24 grams times 4 calories per gram.

Carbohydrates: 4 calories/gram times 63 grams equals 252 calories.

Fat: 9 calories per gram times 1.2 grams equals 10.8 calories.

Fiber: 2 calories per gram of dietary fiber, or about 16 grams, equals 32 calories.

So, for every 100 grams of moong dal, there are around 96 + 252 + 10.8 + 32 = 391.8 calories.[16]

4.1.2 Table-3: An approximate analysis of 100 grams of cookies made with a combination of wheat flour and moong dal

Sample	Protein(g)	Fat(g)	Carbohydrate(g)	Fiber(g)	Ash(g)
S1	8.47	19.5	58.52	11.5	2.41
S2	6.21	20.31	66.17	5.21	2.1
S3	3.10	22.88	72.10	0.15	1.77

N.B: S1-100% moong dal cookies; S2- 50% moong dal with 50% wheat flour cookies; S3- 100% wheat flour cookies.

This table shows that S1, a sample of cookies manufactured only from moong dal, has a higher source of ash, fiber, and protein than another sample that can be consumed. From the same table, it was feasible to see that.

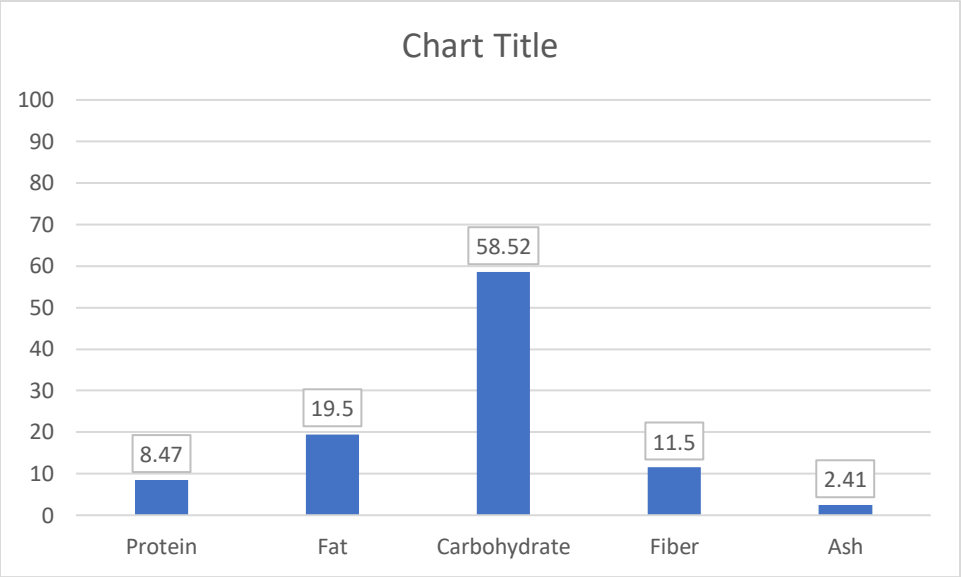
S1 (100% Moong Dal Flour Cookies): It is noted that this sample is a rich source of protein, fiber, and ash. When compared to wheat flour, moong dal flour is renowned for having a comparatively high protein, fiber, and ash content. Because of this, S1 cookies may be a better option, especially for people who want to consume more protein and fiber.

S3 (100% Wheat Flour Cookies): This sample stands out for having higher levels of fat and carbohydrates. In comparison to wheat flour, moong dal flour typically has lower levels of fat and carbohydrates. Although a necessary source of energy, S3 cookies may not be the best choice for those trying to cut back on their fat intake due to their greater fat level.

For example, research conducted in 2013 by Masih, A. S., Raj, A. A., Rubila S., Patil, R. R., and Ranganathan, T. V. showed that moong dal flour has greater levels of protein, fiber, and ash than wheat flour (8.47%). Furthermore, Webster, F.H. (2002) [18] noted that cookies made with moong dal flour contained less fat (19.5%) and carbs (58.52%) than those made with wheat flour.

The overall nutritional value of products derived from different flours, like cookies, can vary depending on these nutritional variances. When deciding which of these varieties of cookies to buy, it's crucial to take into account nutritional requirements and personal dietary preferences. Dietary decisions should be in line with an individual's unique nutritional and health objectives because some people may prefer one over the other in terms of flavor and texture.

4.1.3 Graphical representation of S1:

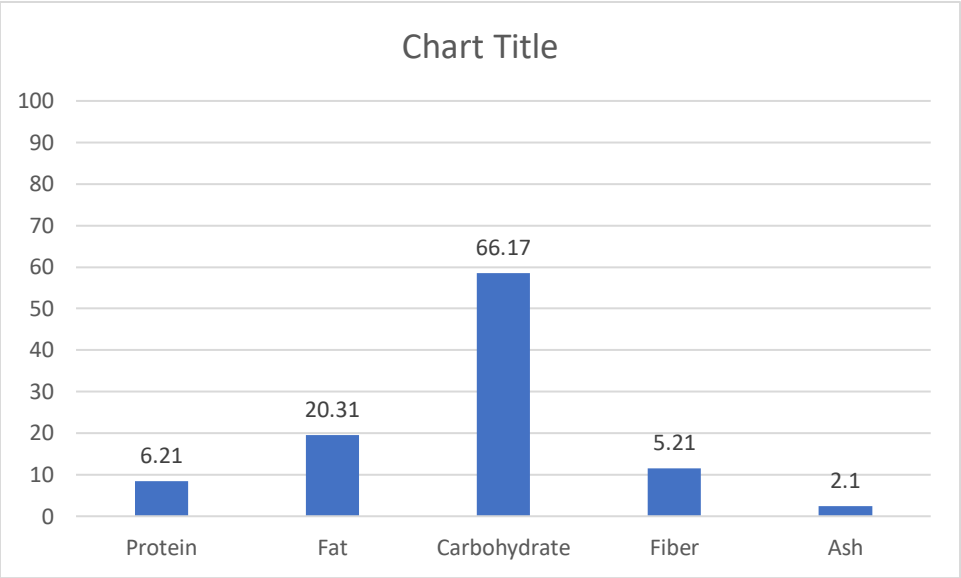


S1 (100% moong dal cookies)

Figure-8 -: Representation of S1 in Graph

Above graph S1 contains 8.47% protein, around 19.5% of fat, 58.52% carbohydrates, 11.5% fiber, and 2.41% ash are included in graph S1. It is made entirely of moong dal biscuits, which are high in protein.

4.1.4 Graphical representation of S2:

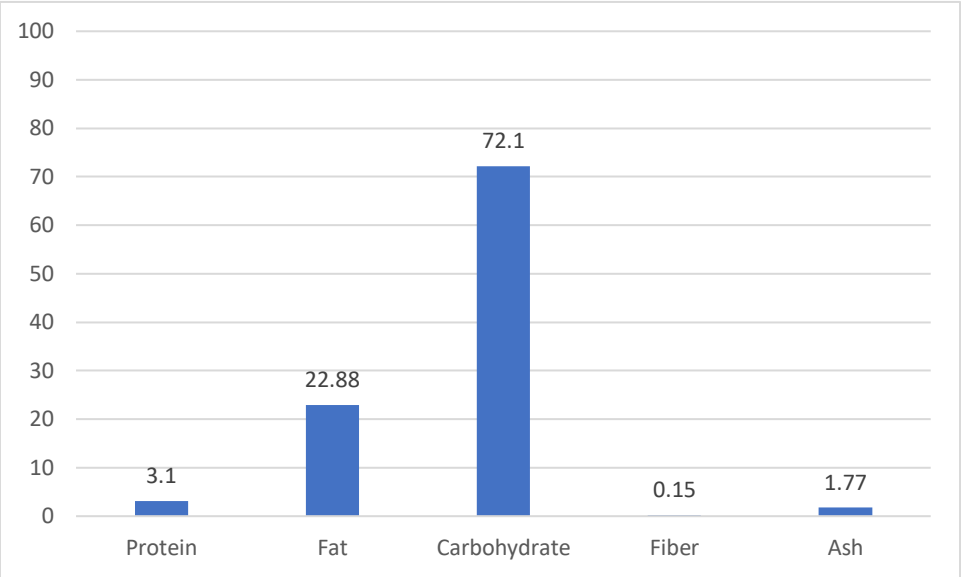


S2 (50% moong dal and 50 % wheat flour cookies)

Figure-9: Representation of S2 in Graph

Above graph S2 Contains 66.17% carbohydrates, 20.31% fat, 5.21% fiber, 2.1% ash, and 6.21% protein. In sample 2, 50% of the flour was moong dal flour and 50% was wheat flour. The proportion of moong dal flour to wheat flour is 1:1

4.1.5 Graphical representation of S3:



S3 (100% wheat flour cookies)

Figure-10: Representation of S3 in Graph

Above graph S3 Contains just 3.1% protein due to the absence of moong dal powder. Only 100% wheat flour is included in S3. With only 0.15% and 1.77%, respectively, and also the ash and fiber contents were the lowest of all the samples.

4.2 Sensory quality

4.2.1 Sensory Quality Sample 1

Figure-11: Sensory Quality (S1)

Figure :(11) The sensory quality bar chart attributes of a product based on various sensory characteristics. In this case, the product is rated on a scale from 0 to 5 for different qualities, and the scores are as follows:

This suggests that the product is highly rated for its taste, with a score of 4.2 out of 5, indicating a strong and favorable taste. The texture of the product is also well-received, with a score of 4.1, Indicating a good and appealing texture. While the flavor is still rated positively at 3.73, it is slightly lower than taste and texture.

The mouthfeel is rated at 3.44, which is lower than the other attributes, The color of the product is rated at 4, which suggests that the color is considered appealing and satisfactory.

4.2.2 Sensory Quality Sample 2

Figure-12: Sensory Quality (S2)

Figure (12) show bar chart with ratings for various sensory qualities of a product, each on a scale from 1 to 5. The highest-rated aspects of this product appear to be texture and color, both scoring close to 4, Indicating that they are perceived as very favorable. The product's taste and flavor are rated at 3.5, which suggests they are moderately satisfactory. However, the aspect with the lowest rating is mouthfeel, with a score of 3.23.

4.2.3 Sensory Quality Sample 3

Figure-13: Sensory Quality (S3)

Figure (13) show bar chart with ratings for various sensory qualities of a product, each on a scale from 1 to 5.This rating suggests that the product's taste is moderately good, but not exceptional. It may have some positive qualities, but there is room for improvement. The texture rating is quite high, indicating that the product has a particularly good texture. It's likely to be pleasingly consistent and enjoyable to eat. Similar to taste, the flavor is rated at 3.3, suggesting that it is moderately good but not outstanding. The mouthfeel rating is slightly lower than taste and texture, indicating that the product's overall mouthfeel might be decent but not as impressive as its texture. The color rating is relatively high, suggesting that the product has an appealing and well-balanced color, which is likely contributing positively to its sensory appeal.

4.3 Overall Sensory Acceptance

4.3.1 Sample 1

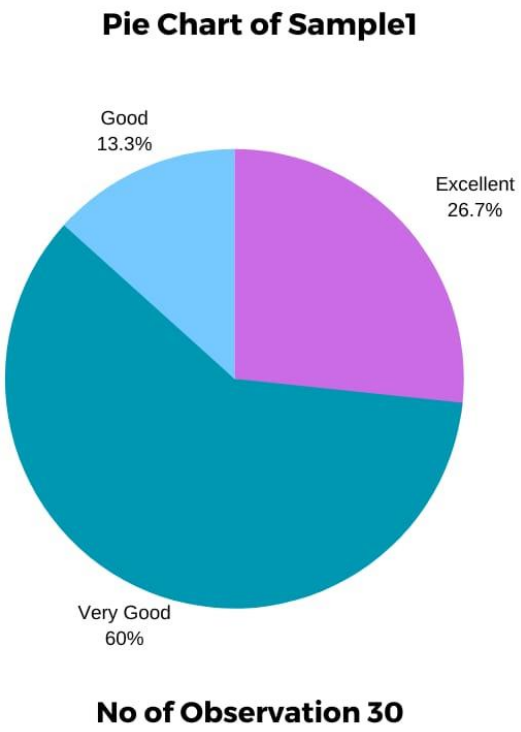


Figure 14: - Overall Sensory Acceptance (S1)

This pie chart (Figure-14) represents the overall sensory perception of Moong Dal Cookies Among all participants, 26.7% of participants gave excellent. 60% of participants gave Very good. Among all criteria, participants marked it the most. However, 13.3% of participants gave good. Most importantly, no one said moong dal cookies need to be modified.

4.3.2 Sample 2

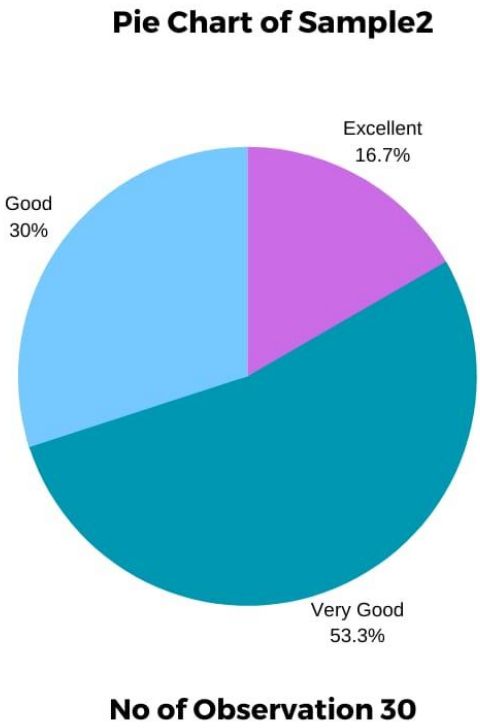


Figure 15: - Overall Sensory Acceptance (S2)

This pie chart (Figure -15) represents the overall sensory perception of Moong Dal Cookies Among all participants, 16.7% of participants gave excellent. 53.3% of participants gave Very good. Among all criteria, participants marked it the most. However, 30% of participants gave good. Most importantly, no one said moong dal cookies need to be modified.

4.3.3 Sample 3

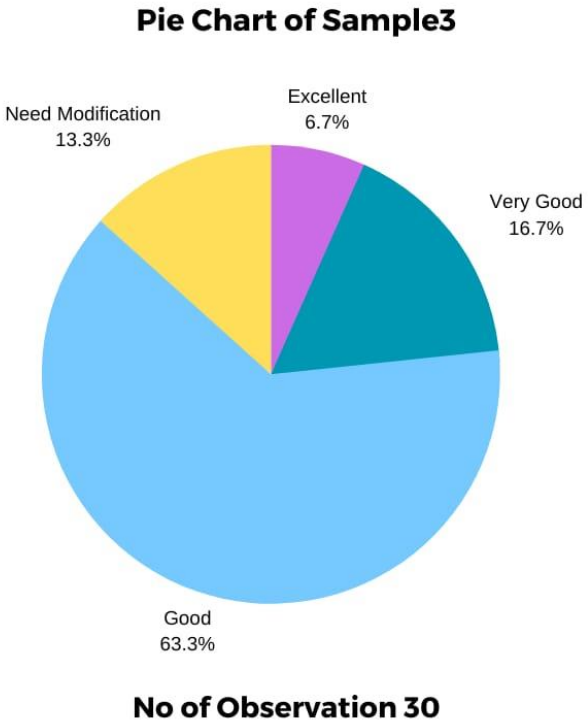


Figure 16: - Overall Sensory Acceptance (S3)

This pie chart (Figure-16) represents the overall sensory perception of Moong Dal Cookies Among all participants. 6.7% of participants gave excellent. 63.39% of participants gave good. Among all criteria, participants marked it the most. However, 16.7% of participants gave very good. 13.3% participants said modification is needed

4.4 Discussion

Based on the summary evaluations, Sample 1 is generally rated slightly better than Sample 2 in terms of flavor, texture, and color. In contrast, Sample 2's mouthfeel grade is marginally higher. For both samples, the flavor rating is the same. The sensory qualities of the two samples can be compared using these scores, with Sample 1 often scoring marginally higher across the board. Is this discussion. This analysis of sample 3 shows that while the product's texture and color are excellent, its taste, flavor, and mouthfeel might be enhanced.

CHAPTER 5
Conclusion

5 Conclusion

The production and analysis of moong dal and flour of wheat mix cookies were studied, and the results show some interesting tendencies. The results show that S1 (a cookie made entirely of moong dal flour) had lower levels of carbs and fat and greater levels of protein, dietary fiber, and ash than S2 (a cookie made entirely of moong dal and wheat flour) and S3 (a cookie made entirely of wheat flour). Notably, a scientific study conducted in 2015 underscored the potential advantages of incorporating moong dal into one's diet, indicating that its consumption could lead to a notable decrease in overall cholesterol, LDL cholesterol, and fasting blood glucose levels. This insight suggests that those who are watching their blood sugar and cholesterol levels may find it helpful to incorporate moong dal flour into their cookies.[19] To prove the viability of these cookies, however, extensive research across a wider range is required before they can be presented to the market.

The potential for marketing these cookies hinge on robust research that substantiates the health benefits attributed to moong dal. This entails conducting additional research to verify the alleged benefits, conducting thorough customer preference analyses, and resolving any production or formulation issues that could occur. In order to make sure that the product is supported by reliable research, skillfully formulated, and appropriately communicated to customers, collaboration with specialists in nutrition, food science, and marketing will be crucial.

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Preparation and proximate analysis of gluten free cookies by using different percentage of Moong Dal and wheat flour blends

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