



A project Work Report

On

Preparation and proximate analysis of gluten free cookies by using different percentage of oats flour and wheat flour blends.

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LETTER OF TRANSMITTAL

Date:

To

Dr. Sheikh Mahatabuddin

Associate Professor & Head

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Daffodil International University

Subject: Submission of project report.

Dear Sir, with all due respect I would like to express my gratitude for your direction and support during my investigation. It would not be feasible for me to finish this report without your help. I'm additionally appreciative to Daffodil International University and my educators and numerous other individual people for their management, backing and help during my Project work.

To set up the report I accumulated what I acknowledge to be most appropriate information to make my report as consistent and trustworthy as could truly be expected. I have concentrated my best effort to achieve the objectives of the report and assumption that my endeavor will fill the need. The useful data and experience gathered during report availability will endlessly help in my future expert life. I request you to excuse me for any error that may occur in the report paying little heed to my best effort.

I would genuinely esteem it you enlighten me with your thoughts and points of view concerning the report. In case you have any inquiries as for my report, I would promptly answer your inquiries.

Sincerely yours,

Md: Ashrafujjaman

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CERTIFICATE APPROVAL

This is certifying that Md. Ashrafujjaman, ID: 163-34-570 program: BSc in Nutrition and Food Engineering are regular students of Department of Nutrition and Food Engineering, Faculty of Allied Health Sciences, Daffodil International University. He has effectively finished his project work on "Preparation and Proximate analysis of Gluten Free Cookies by Using Different percentage of Oats flour and Wheat flour blends" I feel that the report is deserving of satisfying the incomplete prerequisite of NFE program.

I'm satisfied to thus confirm that the information and test introduced in the report are real work of Md. Ashrafujjaman and It has for sure an incredible delight working with him. I wish him all accomplishment throughout everyday life.

.....

Dr. Sheikh Mahatabuddin

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Abstract:

The present study aimed to prepare and proximate analysis of gluten free oats and wheat flour blends Cookies. Oats (*Avena sativa L.*) is a species of cereal grain grown for its seeds and it contains many valuable constituents. In this study cookies fortified with five different levels of oats flour like 100% (**S1**), 75%(**S2**), 50%(**S3**), 25%(**S4**) and 100%(**S5**) wheat flour were also evaluated for their chemical characteristics. The content of protein, fat, carbohydrate, fiber and ash in different sample ranged between (3.05-9.38) % protein; (19.11-22.40) % fat; (52.78-68.51) % carbohydrate; (0.13-12.25) % fiber and (1.73-2.50) % ash respectively. This study showed that **S1**(100% oats flour cookies) contained high percentage of protein, fiber and ash content and low percentage of carbohydrate and fat content compare to another sample.

Key words: Oats, flour, cookies, chemical characteristics

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Oats, officially named *Avena sativa* L., is such an oat grain from the Poaceae grass group of plants. The grain implies expressly to the tasteful seeds of oat grass, which is what ends up in our morning dinner bowls. Whether or not loved or loathed for their delicate yet great surface when cooked, oats are generally esteemed for their sound advantage and clinical benefits. The Food and Drug Administration allows the usage of a prosperity ensure on food marks accomplice a decreased risk of coronary sickness with the use of beta-glucan dissolvable fiber from whole grain oats [1]. Cereal is similarly an ideal asset for those endeavoring to get fit as a fiddle and control hunger levels due to its high water and dissolvable fiber content. In the United States, there are ensured gluten free oats that are become on committed fields, and prepared to painstakingly keep away from any pollution. Later on, other than European country the Asians had additionally encountered the development of gluten free oats. Be that as it may, I have utilized customary flour and limited the gluten level. That is the reason my report mirrors the low gluten bloom yet the treats have been created following eliminating gluten rate at a pinnacle level. It merits sourcing the appropriate oats just to make this formula for thick and chewy gluten free cereal treats. It's been a family top pick of mine, in some structure, for around 20 years (with gluten, from the outset). The equilibrium of fixings is ideal for making cereal treats that are thick and have that great bite, and furthermore have fresh, sautéed edges. The best method to incorporate the fixings completely into each other when making the treat mixture by hand is to switch back and forth between blending the batter and pushing down on the spread with the rear of the spoon [2].

1.2 Types of Gluten free oat:

In the United States have to abide by the FDA's definition of gluten-free for any product that claims "gluten-free" and/or its synonyms. This means that manufacturers have to ensure that the final products have less than 20 ppm of gluten.

Some gluten-free oats are including:

- Bob's Red Mill Gluten-Free Extra Thick Rolled Oats
- Bob's Red Mill Gluten-Free Quick-Cooking Oats
- Bob's Red Mill Gluten-Free Scottish Oatmeal
- Gluten freed a Gluten-Free Oatmeal (assorted)
- McCann's Gluten-Free Irish Oatmeal, Quick & Easy, Steel Cut
- Nature's Path Organic Hot Oatmeal, Gluten-Free (assorted)
- Nature's Path Qi's Superfood Gluten-Free Oatmeal (assorted)
- Udi's Gluten-Free Plain Steel Cut Oats
- Quaker Select Starts Gluten-Free Instant Oatmeal Packets (assorted) [3]

1.3 Oats in Bangladesh

The reason for the portrayal is to depict the condition of the oats market in Bangladesh, to introduce real and review data about the volumes, elements, construction and qualities of creation, imports, fares and utilization and to assemble a figure for the market in the medium term. Furthermore, the report presents a detailed investigation of the fundamental market members, the value variances, development and request drivers of the market and any remaining components, affecting its turn of events [4].

1.4 About oats Cookies

Oat's cookies are a delicious sweet treat full of health benefits as oatmeal, and many people around the world choose it every morning. The first recipe for these cookies *was* written by Fannie Merritt Farmer in 1896. Oatmeal cookies have a high fiber content compared to normal sugar cookies. Oatmeal cookies contain significant amount of minerals like calcium, iron, magnesium and potassium, all of which are needed for overall physical health. Compared to sugar cookies, oatmeal cookies also have less calorie content [5].

1.5 Objectives

1.5.1 General objective:

- To study on preparation and proximate analysis of different percentage of oats and wheat flour Cookies.

1.5.2 Specific Objectives:

- To analyze protein, fat, carbohydrate, fiber and ash content in oats and wheat flour blend cookies
- To prepare gluten- free oats cookies
- To deliver great quality cookies with proper health benefits

CHAPTER 2

MATERIALS AND METHODS

2.1 Collection of Raw Materials:

These ingredients were collected from a super shop (Shwapno), Dhaka, Bangladesh and attempt to make various type of oats cookie. This study was carried out NFE food processing lab at Daffodil International University.

2.2 Apparatus and Equipment:

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

2.3 Table-1: Ingredient for Different types of oats cookies:

Ingredient	Amount(g)				
	S1	S2	S3	S4	S5
Oat's flour	148	111	75	37	0
Wheat flour	0	37	75	111	148
Butter	65	65	65	65	65
Sugar	60	60	60	60	60
Egg	57	57	57	57	57
Baking soda	1.2	1.2	1.2	1.2	1.2
Vanilla	2.10	2.10	2.10	2.10	2.10
Cinnamon	1.3	1.3	1.3	1.3	1.3
Salt	1.4	1.4	1.4	1.4	1.4

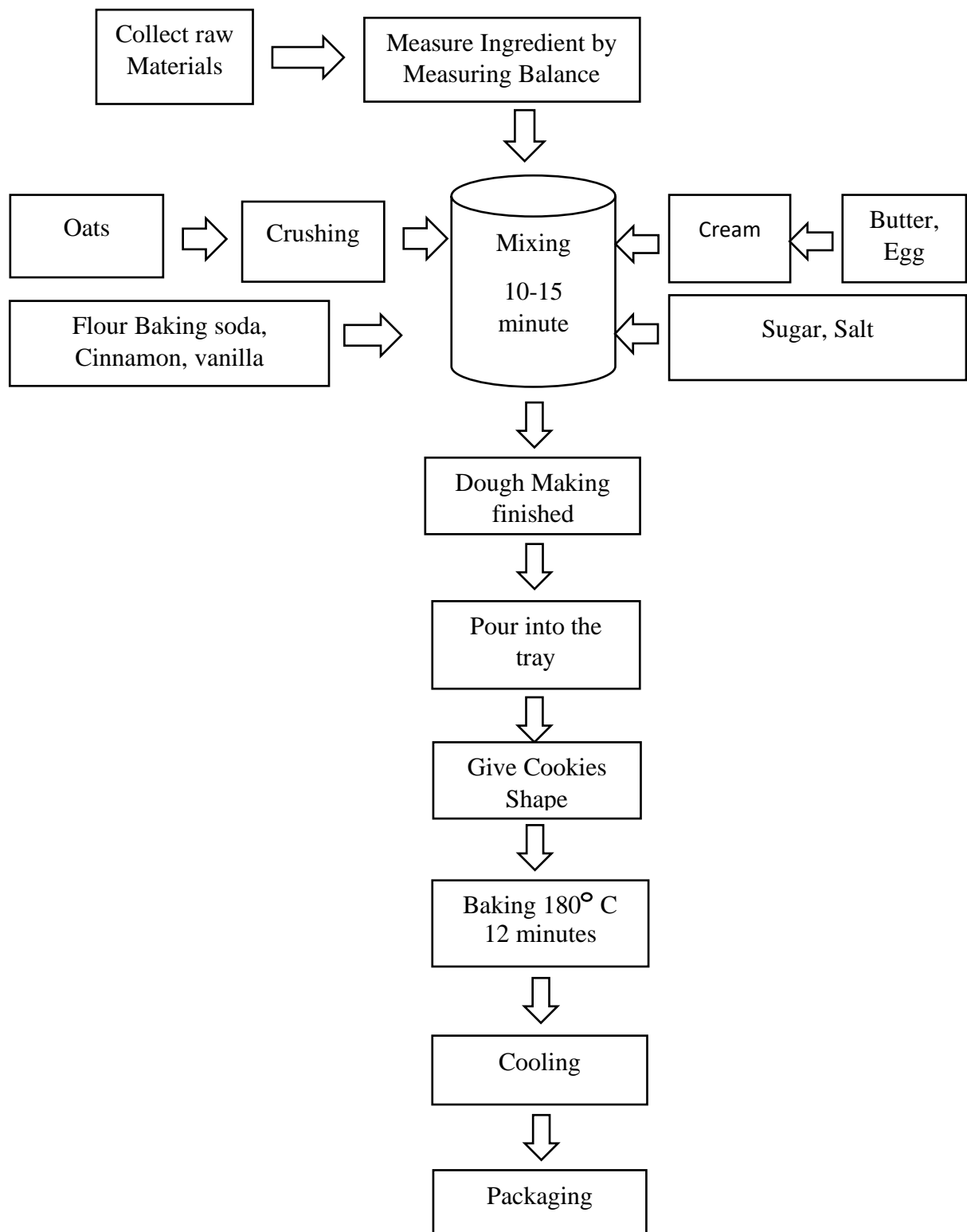
N.B: S1-100% oats flour cookies; S2- 75% oats flour with 25% wheat flour cookies; S3- 50% oats flour with 50% wheat flour cookies; S4- 25% oats flour with 75% wheat flour cookies and S5- 100% wheat flour cookies.

2.4 Photograph of Different type of cookies sample



Fig-1: Different types of oats cookies.

2.5 Preparation of oats cookies for five sample [6]:



CHAPTER 3

CHEMICAL ANALYSIS

3.1 Determination of Protein:

3.1.1 Apparatus:

- Conical flask
- Burette stand
- Measuring test tube
- Boiling flask
- Analytical balance

3.1.2 Chemical:

- H₂SO₄
- K₂SO₄
- NaOH
- 0.1N HCL
- Methyl red

3.1.3 Procedure:

Protein was determined according to the kjeldhal method. Kjeldhal method comprises of 3 stages. They are as per the following:

- Digestion of sample
- Distillation
- Titration

3.1.4 Digestion of sample:



Fig-2: Digestion flask

0.4g of testing sample was taken in a foil paper. The sample was poured in an assimilation cup. 10 ml of H_2SO_4 was added into it. At that point 2g of assimilation combination was taken into the jar. Two absorption flasks were utilized so that normal worth can be taken. The flasks were then warmed in a kjeldahl processing chamber. From the outset temperature was 400C. Later temperature expanded to 600C. 3-4hours was hung tight for become the Solution dreary. At that point the jars were cooled and diluted with 100ml refined water.

3.1.5 Distillation:

10 ml of mixed component from that jar was taken to the refining cup. 150 ml of refined water was taken into the jar. At that point 10ml of 40% NAOH was added to the refining jar. solution got no color.

Three refining jars were taken for this strategy where one of them was clear. In the third refining flagon just, reagents were taken and contained no example. Then again 50 ml of refined water and 10ml of 0.1N HCL was taken in a catching conelike flagon. 2 drops of methyl red were taken into the catching funnel shaped cup. The arrangements become pink tone.

Three catching conelike jar were utilized and contained something very similar. At that point condenser was run for 30 min to finish the refining cycle. At that point catching conelike jars were taken out and titrate with NAOH.



Fig-3: Distillation Flask

3.1.6 Titration:

The burette was loaded up with 0.1N of NAOH for titration. From the burette NAOH was added into catching tapered flagon by drop-wise and cone shaped carafe was shaken tenderly. NAOH was added until shading change. The end point was shading change from pink to light yellow tone.

3.1.7 Calculation:

% of protein present in the supplied samples: $\{(B-S) \times 1.4 \times 10 \times 5.95 \times 0.1\} / \text{sample weight}$

Where,

B= blank value

S= Sample value

Conversion factor= 5.95

Normality of NaOH= 0.1 [7]

3.2 Determination of Fat:

3.2.1 Apparatus:

- Crucible
- weight machine
- Soxhlet apparatus

3.2.2 Chemical:

N-hexane= 180-200 ml

3.2.3 Procedure:

- At first the thimble was taken
- Then the sample was weighted
- A Soxhlet was placed with a sample in the thimble with the plating machine.
- Then it was settled in the boiling flask
- n-hexane was put in the sample.
- Then its thermostat was adjusted with the heating set.
- Water gone through one direction and goes out in another direction
- The n-hexane heat got hot to the highest point of the hardware. Here water was chilled off to the lower part of the water and the gear was put away. Consequently, when the fumes were hidden away to the thimble. At that point, with the fat from the sample, the bubbling jar was stored on the n-hexane. This is to run 6 hours.
- 6 hours after the bubbling floss would be put away on the N-Hexane fat, it was dried in stove at 40-50-degree temperature.

3.2.4 Calculation:

Fat% = Weight of flash After extraction and drying / weight of flash sample weight (gm) [8].

3.3 Determination of Ash:

3.3.1 Apparatus:

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

3.3.2 Procedure:

- Samples was taken by two different crucibles.
- Then two crucibles would be kept at the 600-degree temperature for 6 hours in the electric muffle furnace at crucible.
- Following six hours, the crucible would be out and cool to the desiccators. At that point we took the heaviness of samples of burnt with crucible.

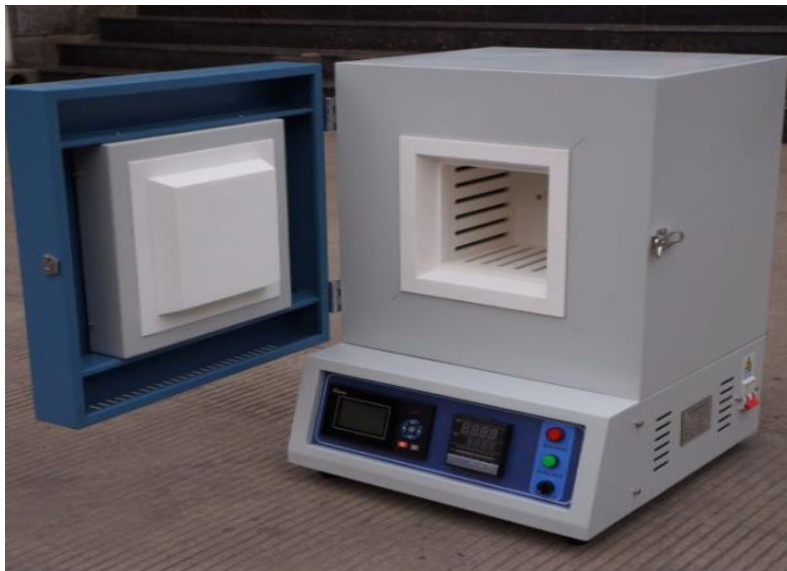


Fig-4: Electric muffle furnace

3.3.3 Calculation:

Weight of ash= (wt. of ash + crucible) – (wt. of crucible) [9].

3.4 Determination of Carbohydrate:

The FDA necessitates that food manufacturers compute all out starches in their food with the accompanying equation:

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

Sugar and fiber are viewed as starches and should be recorded independently on a nourishing name. Food manufacturers may utilize the expressions "under 1 gram," "contains under 1 gram" or "not a critical wellspring of dietary fiber/sugar" if the product has under 1 gram of fiber and additionally sugar. They don't have to ascertain the specific amount [10].

3.5 Determination of Dietary Fiber

3.5.1 Apparatus & Equipment

- Balance machine
- Muffle furnace
- Hot plate
- Hot air oven
- Measuring cylinder
- Conical flask
- Beaker
- Funnel
- Marker pen
- Cotton cloth
- Spoon
- Crucible

3.5.2 Chemical reagent list

- 0.128M Sulfuric acid: Dilute 3.49ml H₂SO₄ (98%) in 500ml distilled water. [Boiling in acid]
- 0.313M Sodium Hydroxide: Dissolve 6.25g NaOH palette in 500ml distilled water. [Boiling in base]

3.5.3 Chemical Reagent preparation: A

0.128M Sulfuric acid

- Ingredient of 0.128N H₂SO₄
- Always tried to work with acid inside the fume hood.
- Everything was gathered we need to prepare 0.128M Sulfuric acid.
- A volumetric flask was labeled (500ml) with 0.128M Sulfuric acid.
- The labeled of flask was filled with 400ml distilled water.

- 3.5ml of Sulfuric acid was transferred (98%) to the same flask
- The pipette was washed to ensure that no acid was left on the surface
- The flask was rotated to mix the solution
- Water was added to make the final volume of 500ml
- 0.128M Sulfuric acid was ready to use in fiber analysis.

0.313M Sodium Hydroxide

- Ingredient of 0.313M
- Everything was gathered that we need to prepare 0.313M NAOH
- A weighting paper was placed on balance
- Weight was taken
- 6.25g of NAOH pallets was taken
- A volumetric flask was labeled (500ml) with 0.313M NAOH.
- The flask was filled with 400ml distilled water.
- Weighted NAOH was transferred to the same flask.
- The flask was rotated to dissolve NAOH pallets in water.
- After 20 minutes, water was added to make the final volume of 500ml
- 0.313M NAOH solution was ready to use.

3.5.4 Procedure

Step-1: Boiling in acid

Step-2: Boiling in base

Step-3: Boiling in fiber

Step-4: Incineration of fiber

Step-5: Calculation

3.5.4.1 Step-1: boiling in acid

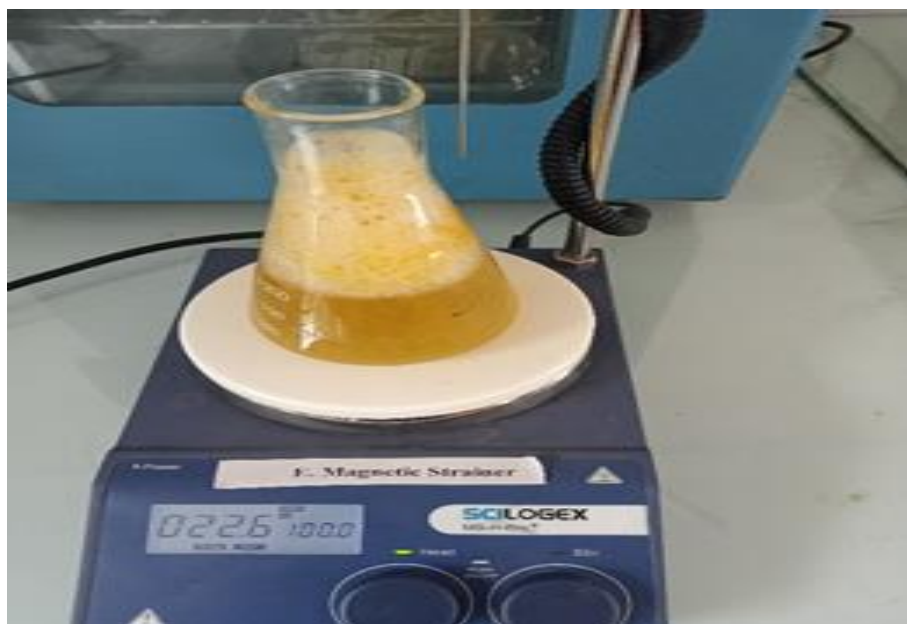


Fig-5: E. Magnetic Strainer

- 200ml of 0.128M Sulfuric acid was measured
- The acid solution was poured into a conical flask (500ml)
- A weighting paper was placed on balance
- The paper weight was taken
- A homogenized portion of sample was taken to weight.
- Approximately 2g of sample was weighted
- The sample was transferred into the conical flask to mix with acid solution.
- The flask was placed on a hot plate and boil the sample for 30 minutes.
- The flask was shaken periodically to ensure the proper boiling of sample.
- After 30 minutes, a discard was taken to conical flask of 1000ml
- A funnel was set up with cotton cloth with the discard flask.
- The boiled sample was filtered to drain the acid solution.
- The flask was washed with hot water to remove the acid residue completely.
- Another funnel was placed to the cleaned conical flask

- 200ml of 0.313M NaOH solution was measured.
- The NaOH solution was poured into the conical flask washing the filtrate.
- Rotate the flask to mix and place on hot plate.

3.5.4.2 Step-2: boiling in base

- The sample was boiled for 30 minutes
- After boiling, the sample was filtered to drain NaOH solution.
- The hot water was used to remove NaOH residue completely.
- Filtrate was collected in a clean and dried crucible till no filtration is left.

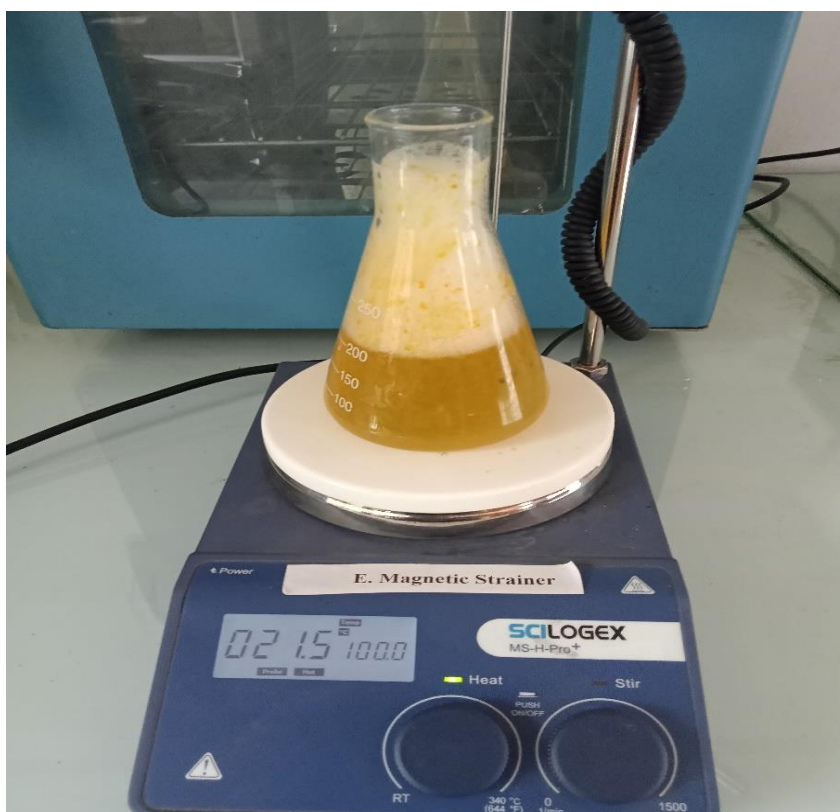


Fig-6: E. Magnetic strainer

4.3 Step-3: Drying fiber

- The crucible was placed on hot plate to evaporate the excess water.
- Then the crucible was placed in the hot air oven.
- Then the temperature was set at 230 degree Celsius and dry for 2 hours.
- After 2 hours, took out the crucible from the oven and cool in desiccator.
- After 20 minutes, we could see the dried fiber in crucible.
- Then weight was taken of crucible containing fiber.
- The weight was noted.
- The crucible was covered with its lid.

3.5.4.4 Step-4: Incineration of fiber



Fig-7: Muffle furnace

- The crucible was placed inside of muffle furnace.
- The muffle furnace was closed tightly.
- The power of furnace was turned on
- The temperature was set up at 550 degree Celsius and time for 2 hours.

- The furnace was run at attach a caution tag.
- After 4 hours, door was opened when down the temperature below 250-degree Celsius
- The crucible was took out and cool in desiccator.
- After 20 minutes, we could see the collected fiber
- The weight was taken of the crucible containing ash.
- The weight was noted.

3.5.4.5 Step-5: Calculation

$$\text{Dietary Fiber\%} = (W1 - W2 / Ws) \times 100$$

W1=Weight of the Crucible with fiber

W2= Weight of the Crucible with Ash

Ws=Weight of the sample.

CHAPTER 4

NUTRITIONAL VALUE AND HEALTH BENEFITS

4.1 Nutrition fact

Oats (*Avena sativa L.*) are a whole-grain cereal mainly grown in North America and Europe. They are a very good source of protein, fiber and ash, and are high in vitamins, minerals.

4.1.1 protein:

Oats are a nice wellspring of significant worth protein at 11–17% of dry weight, which is higher than most various grains the critical protein in oats at 80% of the total substance is avenalin, which isn't found in some other grain yet resembles vegetable proteins. The minor protein avenin is related to wheat gluten. Regardless, unadulterated oats are seen as safe for by far most with gluten bias [11]

4.1.2 Carbs:

Carbs make up 66% of oats by dry weight. About 11% of the carbs is fiber, while 85% is starch. Oats are incredibly low in sugar, with simply 1% coming from sucrose.

4.1.3 Starch:

Starch, which is incorporated long chains of glucose molecules, is the greatest fragment of oats. The starch in oats is extraordinary comparable to the starch in various grains. It has a higher fat substance and a higher consistency, which is its ability to attach with water.

Three sorts of starches are found in oats:

- Rapidly prepared starch (7%). This sort is promptly separated and consumed as glucose.
- Slowly prepared starch (22%). This construction is isolated and devoured even more slowly.
- Resistant starch (25%). Safe starch limits like fiber, moving away from assimilation and improving gut prosperity by dealing with your neighborly gut microorganisms [12]

4.1.4 Fiber

Whole oats pack essentially 11% fiber, and porridge contains 1.7% fiber. A large portion of the fiber in oats is dissolvable, for the most part a fiber called beta glucan. Oats moreover give insoluble strands, including lignin, cellulose, and hemicellulose. Oats offer more dissolvable fiber than various grains, inciting all the more lethargic preparing, extended entirety, and appetite camouflage. Dissolvable oat beta glucans are exceptional among fibers, as they can shape a gel- like game plan at a respectably low obsession. Beta glucan includes 2.3–8.5% of unrefined, whole oats, by and large stuffed in the oat wheat. Oat beta glucans are known to cut down cholesterol levels and augmentation bile destructive creation. They're moreover acknowledged to diminish glucose and insulin levels after a carb-rich dinner. Consistently use of beta glucans has been seemed to cut down cholesterol, especially LDL (terrible) cholesterol, and may thusly decrease your peril of coronary sickness [13]

4.2 Vitamins and minerals

Oats are high in numerous vitamins and minerals, including:

Manganese. Regularly found in high sums in entire grains, this minor element is significant for improvement, development, and digestion

Phosphorus. This mineral is significant for bone wellbeing and tissue support

Copper. A cell reinforcement mineral regularly ailing in the Western eating routine, copper is viewed as significant for heart wellbeing.

Vitamin B1. Otherwise called thiamine, this nutrient is found in numerous nourishments, including grains, beans, nuts, and meat.

Iron. As a part of hemoglobin, a protein liable for shipping oxygen in the blood, iron is significant in the human eating routine.

Selenium. This cancer prevention agent is significant for different cycles in your body. Low selenium levels are related with expanded danger of sudden passing and hindered resistant and mental capacity.

Magnesium. Frequently ailing in the eating routine, this mineral is significant for various cycles in your body.

Zinc. This mineral partakes in numerous synthetic responses in your body and is significant for by and large wellbeing [14]

4.3 Oats give a few great medical advantages:

Heart wellbeing. Oats can help improve risk factors for coronary sickness by cutting down LDL (awful) cholesterol and raising HDL (extraordinary) cholesterol

Weight misfortune. Oats and grain can help weight decrease by supporting control yearning and addition entirety

Diabetes control. Oats can help improve glucose control, blood fat levels, and insulin affectability in people with type 2 diabetes [15].

CHAPTER 5

RESULT AND DISCUSSION

5.1 Table-2: Composition of Oats per 100g:

Component	Amount(g)
Water	9.37
Protein	16.9
Carbs	66.6
Sugar	0
Fiber	10.6
Fat	6.9

Table-2 shows that 100 grams oats contain 389 calories. Calorie breakdown: 16% fat, 67% carbs, 17% protein [16]

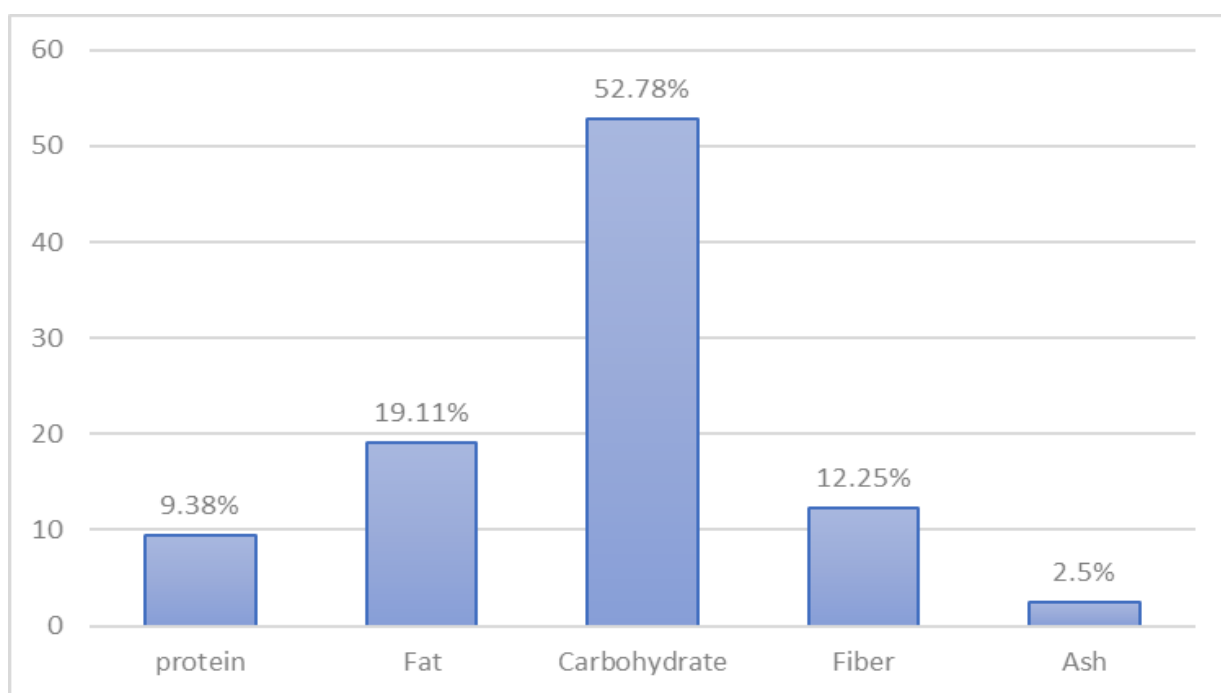
5.2 Table-3: Proximate analysis of gluten free oats and wheat flour blends cookies

Sample	Protein(g)	Fat(g)	Carbohydrate (g)	Fiber(g)	Ash(g)
S1	9.58	19.5	53.86	12.5	2.56
S2	6.24	20.32	59.37	10.06	2.03
S3	5.20	20.19	64.43	6.21	1.97
S4	4.16	20.77	67.74	3.89	1.82
S5	3.12	22.89	69.98	0.14	1.77

N.B: S1-100% oats flour cookies; S2- 75% oats flour with 25% wheat flour cookies; S3- 50% oats flour with 50% wheat flour cookies; S4- 25% oats flour with 75% wheat flour cookies and S5- 100% wheat flour cookies.

From this table it could be stated that S1 which is 100% oats flour cookies is good source of protein, fiber and ash compared with another sample which is good and healthy for dietary intake. From the same table it could be noticed that S5 which is 100% wheat flour cookies contained higher amount of carbohydrate and fat content. The report of Masih, A. S.; Raj, A.A.; Rubila S.; Patil, R.R. and Ranganathan, T.V. (2013) [17] showed that oats flour was higher in protein (9.38%), fiber (12.25%) and ash (2.50%) content than wheat flour & Webster, F.H. (2002) [18] also reported that oats flour lower in carbohydrate (52.78%) and fat (19.11%) content compare to wheat flour cookies.

5.3 Graphical representation of S1:

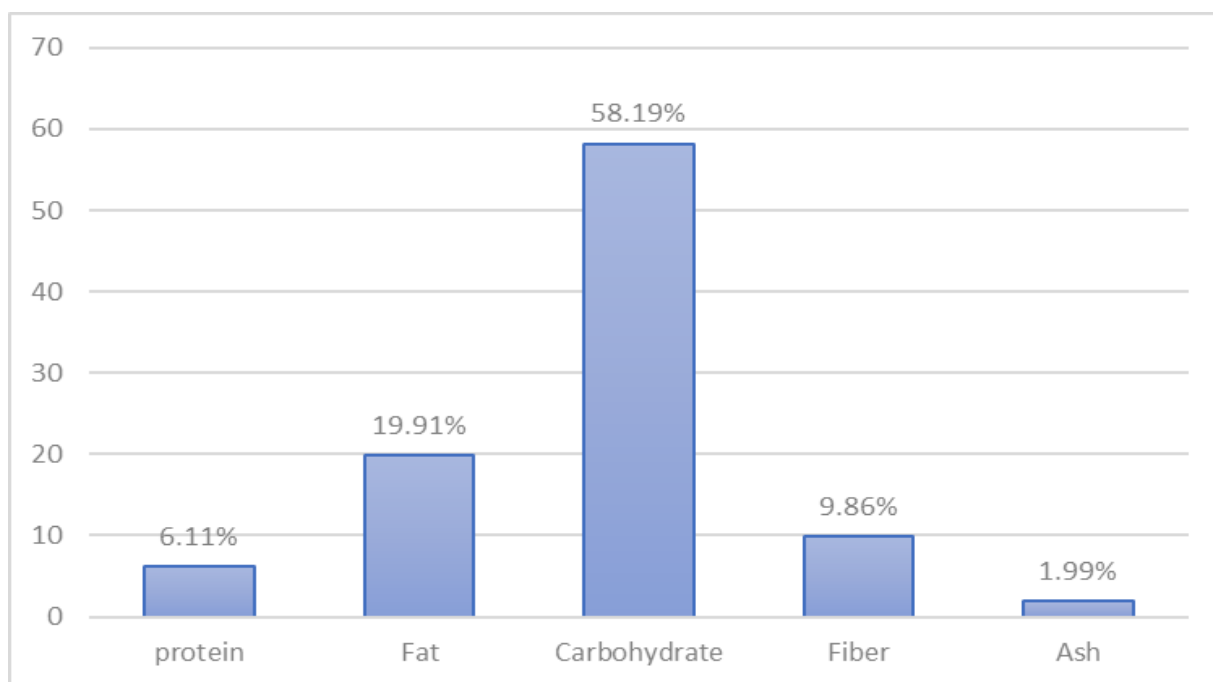


S1 (100% oats flour)

Fig-9: Graphical representation of S1

In this graph S1 Contains 9.38% protein, 19.11% fat, 52.78% carbohydrate, 12.25% fiber and 2.50% ash. It is 100% oats flour cookies, which is a good source of protein.

5.4 Graphical representation of S2:

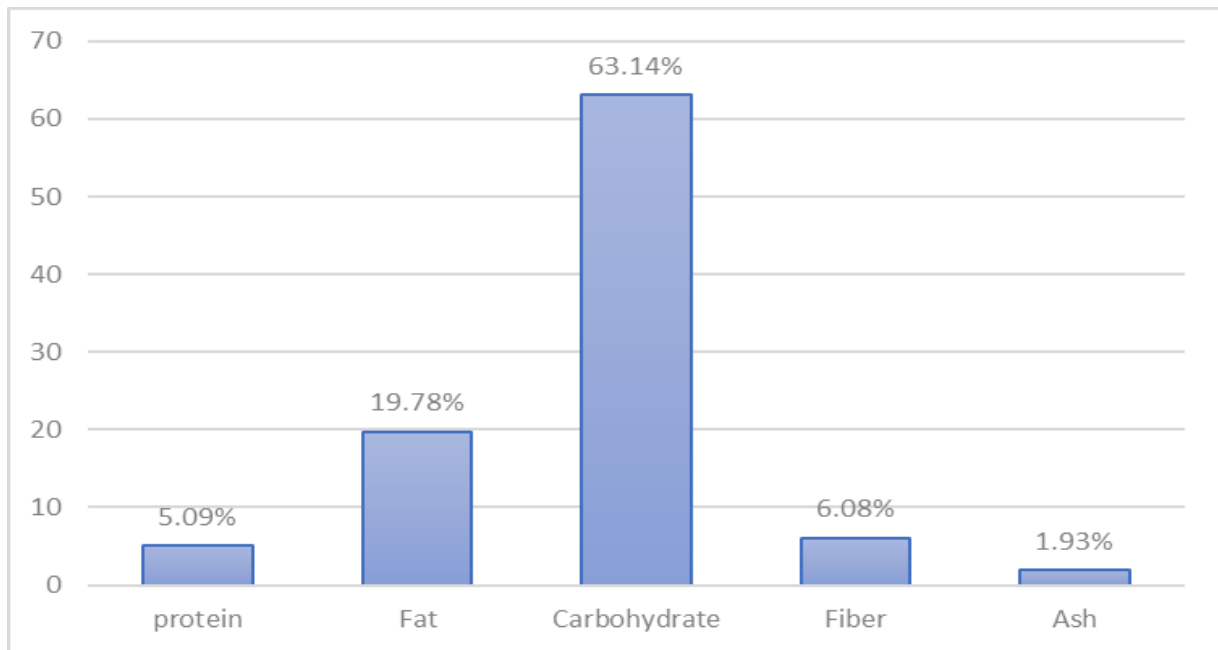


S2 (75% oats flour + 25% wheat flour)

Fig-10: Graphical representation of S2

In this graph S2 Contains 6.11% protein, 19.91% fat, 58.19% carbohydrate, 9.86% fiber and 1.99% ash. The wheat percentage was 25% and 75% Oats flour used which is a good source of protein but the protein percentage was lower compare to sample 1.

5.5 Graphical representation of S3

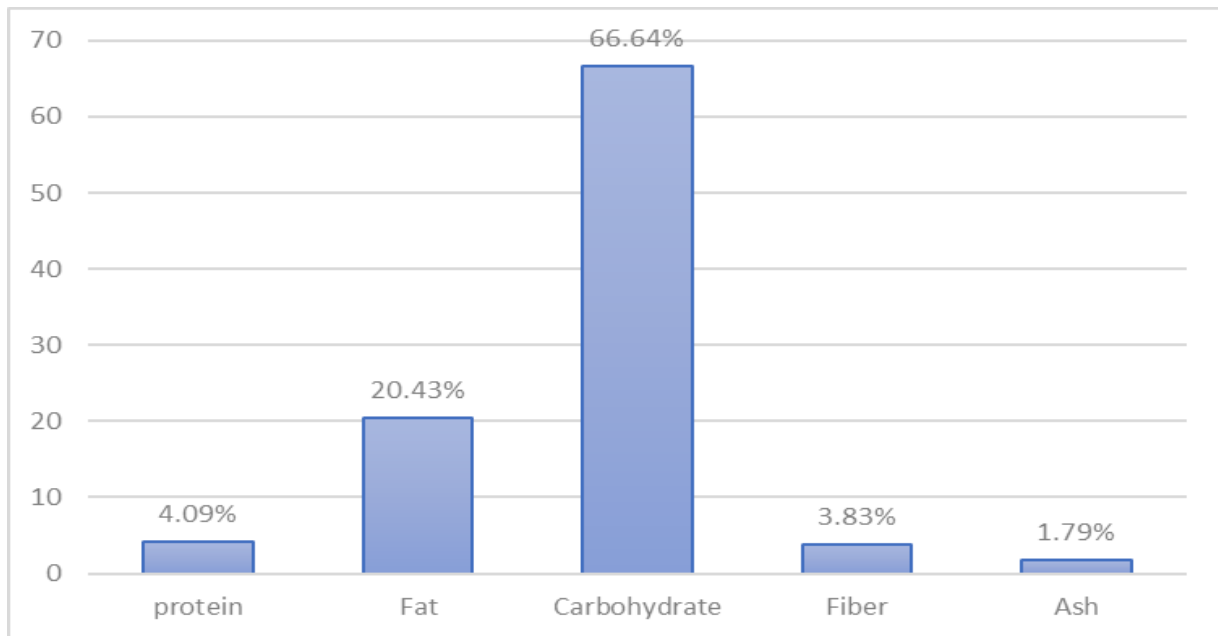


S3 (50% oats flour + 50% wheat flour)

Fig-11: Graphical representation of S3

In this graph S3 Contains 5.09% protein, 19.78% fat, 63.14% carbohydrate, 6.08% fiber and 1.93% ash. The wheat flour percentage was 50% and 50% Oats flour used in sample 3. The ratio of wheat and oats flour is 1:1

5.6 Graphical representation of S4

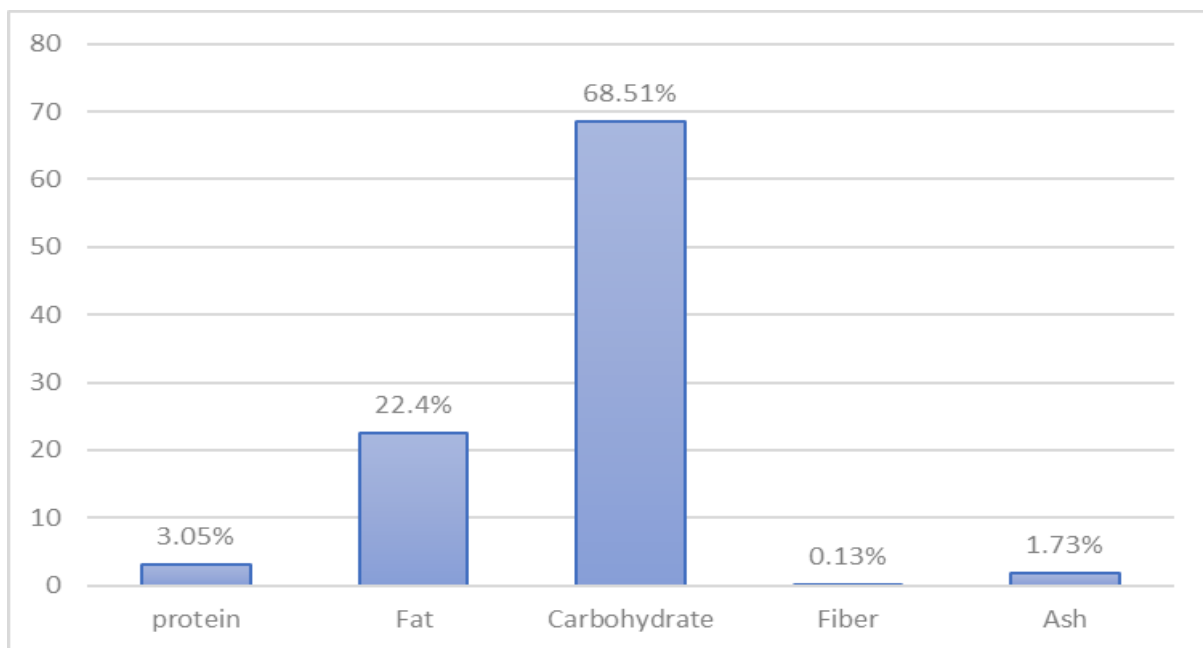


S4 (25% oats flour + 75% wheat flour)

Fig-12: Graphical representation of S4

Sample 4 Contains 4.09% protein, 20.43% fat, 66.64% carbohydrate, 3.83% fiber and 1.79% ash. The wheat percentage was 75% and 25% Oats flour used in sample 4, which was not that much good source of protein compare to sample 1, 2, and 3.

5.7 Graphical representation of S5:



S5 (100% wheat flour cookie)

Fig-13: Graphical representation of S5

In this graph S5 Contains only 3.05% of protein because of no use of oats flour. S5 contains only wheat flour (100%). The fiber and ash content were the lowest of all sample which are only 0.13% and 1.73%.

CHAPTER 6

CONCLUSION

6.1 Conclusion:

This study was conducted on preparation and proximate analysis of oats and wheat flour blends cookies. The above conclusions make it clear that S1 (100% Oats flour cookie) contains low carbohydrates, fat and high protein, dietary fiber and ash compare to S2(75% oats and 25% wheat flour cookies), S3(50% oats and 50% wheat flour cookies), S4(25% oats and 75% wheat flour cookies) and S5 (100% wheat flour cookie). As per a 2015 scientific review, oat utilization had the option to essentially decrease the convergences of fasting blood glucose, complete cholesterol and LDL cholesterol. This examination proposed that oat flour might be a useful expansion to a diabetic eating regimen, to assist diabetics with overseeing glucose and lipid profiles [19]. These cookies were prepared for marketing but before marketing we should need more research in wide range.

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