A PROJECT WORK REPORT

ON

Development of Therapeutic Energy Bar Using Mushroom

Submitted To

Professor Dr. Md. Bellal Hossain
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Nutrition & Food Engineering
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Submitted By

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Date of Submission: 10 .05.2019

LETTER OF TRANSMITTAL

Date: 10.05.2019
Professor Dr. Md. Bellal Hossain
Head of the Department
Nutrition & Food Engineering
Daffodil International University.
Subject: Submission of a project report on Mushroom Mixed Cereals Bar.

Dear Sir,
It is a great pleasure and honor for me to have the opportunity to submit me **Project report Development of Therapeutic Mushroom Mixed Cereals Bar** as a part of the Nutrition and Food Engineering (NFE) program curriculum.
I have prepared this report based on the acquired taste knowledge during my internship period in **Bangladesh Council Of Scientific and Industries Research (BCSIR**). It is great achievement to work under your active supervision. This report is based on, "Studies on nutritious Mushroom Mixed Cereals Bar" Dhaka, Science Lab. I have got the opportunity to work in **(BCSIR**), Science Lab, Dhaka.

This is the first times this project gave me both academic and practical exposures. Firstly, of all I have gained knowledge about the organizational culture of a prominent consumer product producing organization of the country. Secondly, the project gave me the opportunity to develop a network with the corporate environment.
I therefore, would like to place this report to your judgment and suggestion. Your kind advice will encouragement to perform better planning in future.

Sincerely yours,

Anusree Mozumder Dola
ID: 152-34-418
Dept: Nutrition and Food Engineering
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CERTIFICATE OF APPROVAL

I am pleased to certify that the project report on Production and Quality Control of Development of Therapeutic Mushroom Energy Bar, conducted by Anusree Mozumder Dola, bearing respectively ID No: 152-34-418 of the department of Nutrition and Food Engineering has been approved for presentation and defense/viva-voice.

I am pleased to hereby certify that the data and finding presented in the report are the authentic work of Anusree Mozumder Dola. I strongly recommended the report presented by Anusree Mozumder Dola for further academic recommendations and defense/viva-voice Anusree Mozumder Dola bears a strong moral character and a very pleasant personality. It has indeed a great pleasure working with him. I wish her all success in life.

Professor Dr. Md. Bellal Hossain
Head of the Department
Nutrition & Food Engineering
Daffodil International University

ACKNOWLEDGEMENT

At the very beginning, I offer my earnest gratitude to almighty **GOD** for all his merciful blessings upon me. **GOD**, to whom all praises, goes for enabling me to complete this research work.

My Deep gratitude and sincere thanks to the honorable Dean, Faculty of Allied Health Science, Professor **Dr. Ahmed Ismail Mustafa** for this kind cooperation and to accept this Degree. I am encouragement taking this privilege to deliver my gratefulness to each and every people who are involved with me in every phase of my lives.

I would like to take this opportunity to thank my supervisor **Dr. Md Bellal Hossain**, Professor and head, Department of Nutrition and food Engineering, Daffodil International University, for his continuous advice and guidance throughout the duration of this thesis. I would like to thank him for the precious time he took to read my draft report, the effort for getting useful information and suggestions that he given proved valuable and insightful.

I express greatest debt and sincere gratitude to my Co-supervisor **Dr Tasnim Farzana**, principal scientific Officer, Institute of Food Science and Technology (IFST), Bangladesh Council of Scientific and Industrial Research (BCSIR). Dhanmondi, Dhaka -1205, for her scholastic guidance, valuable suggestions, sincere behavior, and all sorts of helps in completion of this thesis work.
I gratefully acknowledge the support and encouragement of **Fahiza Bisrat** Scientific officer, **Tania Nowreen Orchy.** Research fellow, Institute of Food Science and Technology (IFST), Bangladesh Council of Scientific and Industrial Research (BCSIR). Dhanmondi Dhaka -1205 for their advice.love and helpful contribution during the research work.
I would like to express deepest sense of gratitude and indebtedness to other teachers of the Department of Nutrition and Food engineering, Daffodil International University, Dhaka for their valuable suggestion in completing the research work.
Last but not least. I would like to thank my **parents** for their moral encouragement, special support and inspiration throughout the work.

The Author
MAY 2019

Dedicated to
My Beloved Parents

Abstract

Use of edible mushroom with cereals bars are simply consumed in houses as dried form was based on different formulations. Different kind mushrooms are cultivating in our country now a days. These produced mushrooms were using in different recipe and added value to related food products. With different element like as Oats, Sesame Peanuts, and Almond etc. I used different percentage of mushroom like 0% ,10%, 15%, 18%. For different percentage. I have taken different value of these products. The proximate values of developed Bar was moisture 7.77%, ash 2.38%, protein 11.82%, fiber 1.95%, carbohydrate 62.74%, energy 418 kcal .as per acceptances of the (Sample B3).where 15% mushroom powder are available and compared to other samples it can be seen that B3 is acceptable from sample color, texture, flavor, taste and overall acceptation.

This characteristic maintains the purpose that the cereal bar will be consumed as delicious snacks and other products.

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INTRODUCTION

Cereal Products are existing in human life from long time ago and now they are the most preferred food items in the world. For this all the baking industry considering very rapidly and they are producing different kind of products. Very critical diseases like obesity cardiovascular diseases diabetes and some types pf cancers are related to human food habit.A cereal bar is a prepackaged food item in different size and shape and different color like a chocolate bar. It is made by cereal mushroom oats rice flakes nuts etc. Here I used mushroom powder in my cereals bar. Mushroom powder from white button are used for replacing different kind of wheat flour which are really very high level. Mushroom is very beneficial for it contains very rich element and nutrition. It works for immune system viral infection like as asthma, cancer and liver dieses. For many years, mushrooms have been edible for our different culture and its help to work as food and medicine **(Wan Rosil et al, 2011, Akbarirad et al,).** mushrooms have a high nutritional value, having high protein, having the appropriate amount of essential amino acids and fiber but have low fat content. Small amounts of vitamins (C, D, E, B1, B2, and B12) are determined by edible mushrooms. Now a day, edible mushroom is most popular and it is best food and can be help for diabetic patients, and for obesity. The edible mushroom contains small quantities of carbohydrate and fat. **(Deepalkshmi and Mirunalini, 2014)** In the developing countries, oyster mushrooms are most popular to consume and it is avail in overwhelming protein deficiency and they are also rich in calcium, iron, potassium, copper, zinc, and manganese **(Owaid, 2013)**. Mushroom also can prevent disease. The edible mushroom can be the best food for diabetic patients and for those who desire to get rid of excess fat since it contains small quantities of carbohydrate and fat **(Deepalakshmi and Mirunalini, 2014).** Additionally, oyster mushrooms considerably contribute in overcoming protein deficiency. Also, they are rich in calcium, iron, potassium, copper, zinc, and manganese **(Owaid, 2013).Mushroom have been disease prevention** as like against insomnia, cancer, asthma, diabetes, cholesterol reduction, allergies and stress **(Wang et al., 2000).**In this study ,different kind of mushroom powder used in different kind of cereal products. Many kinds of cereals products, bar is another product one of them. Cereals bar is a bar which is made in nuts, almond, rice flaxes, oats flaxes, sesame. It is most popular in breakfast. It is also called breakfast bar, but it can be eaten any time and all ages people can be eaten. Cereals bar set with glucose syrup and adjusted with dry ingredients so that stay in many shapes. It can be also added flavor, and added this enhance bar taste. Oats are good source of nutritional value. It is a good source of carbohydrate, protein and amino acid and contain unsaturated fatty acid, minerals, vitamin and phytochemical. Oats grain constitute 60% starch.

Almond has a source of nutrients.it prevention in many diseases such as reducing coronary heart disease, diabetes and help to maintain weight control. (Prunus dulcis; Gradziel 2009). Almond contain around 575 kcal per 100 g and about 50% fat. Almond in naturally high in fiber ,micronutrients, sodium ,potassium and antioxidant. . Almonds are also good source of magnesium and α-tocopherol (containing >20% of the daily value (DV) (FDA 2013). It is a ingredient which is used to making in snacks and many other processed food. almond help to reduces the risk of cardiovascular diseases (Chen, Lapsley, & Blumberg, 2006). Almond are major source of dietary fiber. almonds contain around 12 g dietary fiber per 100 g. Almond have low calorie diets which reduce weight gain. and almonds (28–30 g) provides about14% of the daily fiber requirement. Almond also contain sodium and potassium and high in potassium and low in sodium.
Almond also contain phytosterols and antioxidants. The health benefits of almonds have been enlisted over few hundred years and modern scientists are clearly announced about it. They are really extremely good for anyone health. Almond contains different kind of nutrient value like as Vitamin copper magnesium potassium and largely protein. They are also bearer of unsaturated fatty acid and bioactive molecules. There are very preventive from cardiovascular disease and other kind of unhealthy problems.

Eating nuts is another good source of health benefit. It can increase cognitive function and keep heart good as well as other part of the body. In modern era, the nutritionist added a lot of health benefit of nuts. People who are able to eat nut they get a lot of health benefit and it can develop chronic diseases like respiratory diseases diabetes cancer and heart diseases. People can take nut as different form like tree nuts, peanuts and peanut butter. It is proved that lover mortality has been reduced by consuming of 15 grams of nuts or peanuts on average per day. (Piet van and Den Brandt). A large intake was not associated with further reduction in mortality risk. There are a lot of process eating about peanuts. But it is far better eating pure peanut instead of peanut butter which contains other complement like salt and vegetable oils. But it is proved that who took nuts, there mortality rate is far lower than who don’t take.
Oats have recently considered one of the best and proper food for diet of celiac patients. Taking the nutritional value oat-based food products such as breads biscuits cookies breakfast cereals flakes and faint food are increasing in consideration. Research development on oat and its product are really beneficial for human. It is designed to provide a good and development of value of added food products.

CHAPTER 2
MATERIALS AND METHOD

2.1 **Location of Experiment**

The study was carried out in the laboratory of Quality Control research section, Institute of Food Since and Technology, Bangladesh Council of Scientific &Industrial Research (BCSIR), Dr. Kudrat-E-Khuda Road, Dhanmondi, Dhaka-1205

2.2 **MATERIALS**

The ingredient used in the bar making where mushroom powder, sugar, salt, oats flaxes, rice flaxes, milk flavor, peanut, almond, glucose syrup. All chemicals and materials were purchased sopno, mina bazar. Mushroom powder was collected from local market of Mohammadpur area.

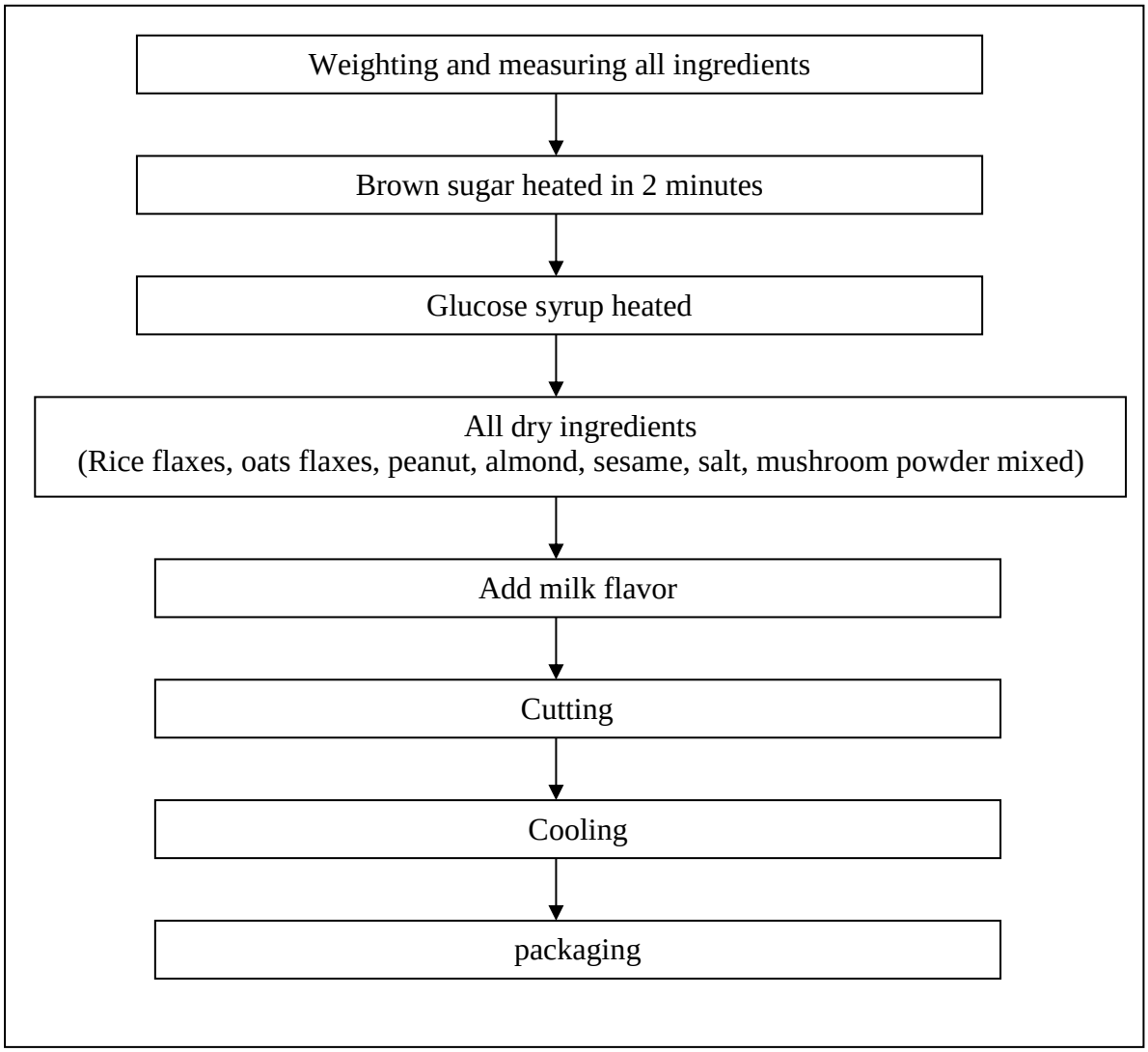
2.3 **BAR FORMULATION**

	Sample B-1 (0% Mushroom)	Sample B-2 (10% Mushroom)	Sample B-3 (15% Mushroom)	Sample B-4 (18% Mushroom)
Glucose Syrup	7.5	7.5	7.5	7.5
Brown Sugar	34.4	34.4	34.4	34.4
Oats	12.5	12.5	12.5	12.5
Sesame	7.5	7.5	7.5	7.5
Peanut	7.5	7.5	7.5	7.5
Almond	10	10	10	10
Rice Flakes	20	10	5	2
Mushroom powder	0	10	15	18
Salt	.5	.5	.5	.5
Flavor	.1	.1	.1	.1

Table 01: Bar Formulation

2.4 **BAR MAKING**

Bar making was done by the following steps: weighting and measuring the ingredients, lightly 13x9 inch pan. In 4 to quart ditch oven, heat brown sugar and glucose syrup to boiling over medium -high heat, stirring constantly. Cook until sugar is dissolved. Add peanut and other cereals and mushroom powder and all ingredients, mix well. Immediately press in pan. In 2-quart saucepan over low heat. spread evenly over bars. Refrigerate about 30 minutes until bar is set. For bars, cut into 9 rows by 4 rows and packaged in plastic bags.



Flowchart 01: The whole process of bar manufacturing.

Method

2.5.1**Determination of Moisture Content**

Five (5) grams of each of the samples was weighed out with the aid of an analytical balance into dried, cooled and crucible in each case. The samples in the crucible were then put into a Genlab moisture extraction oven set at 1050c and allowed to dry for 6 hours. When this time elapsed, the samples were then transferred into a desiccator with the aid of a laboratory tong and then allowed to cool for 30 minutes. After cooling in the desiccator, they were weighed again and their respective weights recorded accordingly. The above processes were repeated for each sample until a constant weight was obtained in each case. The difference in weight was calculated as a percentage of the original sample.

Calculation

Moisture content was calculated by following equation:

$$\text{Moisture (\%)} = \frac{W3 - W1}{W2 - W1} \times 100$$

Here,

W1 = Crucible weight;

W2 = Crucible weight + sample weight;

W3 = Crucible weight + Dried sample weight;

2.5.2**Determination of Ash Content**

Two (2) grams of each of the samples was weighed out with the aid of an analytical balance into a dried cooled and weighed crucible in each case. The samples were then charred by placing them on a Bunsen flame inside a fume cupboard to drive off most of the smoke for 30 minutes. The samples were thereafter transferred into a pre-heated muffle furnace already at 7000C with the aid of a laboratory long. They were allowed to stay in the furnace for 6 hours until a white or light grey ash resulted. Samples that remained black or dark in color after this time had elapsed were moistened with small amount of water to dissolve salts, dried in an oven and then the ashing processes repeated again. After ashing, the crucibles were then transferred into a desiccator with a laboratory long. When they cooled, they were each weighed again and recorded accordingly.

Calculation

Ash content was calculated by following equation:

$$\text{Ash (\%)} = \frac{W3 - W1}{W2 - W1} \times 100$$

Here,

W1 = Crucible weight;

W2 = Crucible weight + sample weight;

W3 = Crucible weight + ash sample weight

2.5.3**Determination of Protein Content**

Principle

Micro-Kjeldahl method is acceptable method for determining total nitrogen of crude protein in biological samples. This involves the oxidation of organic matter with sulfuric acid in the presence of catalyst and then formation of ammonium salts and amines from the nitrogen components of samples (AOAC, 2005).

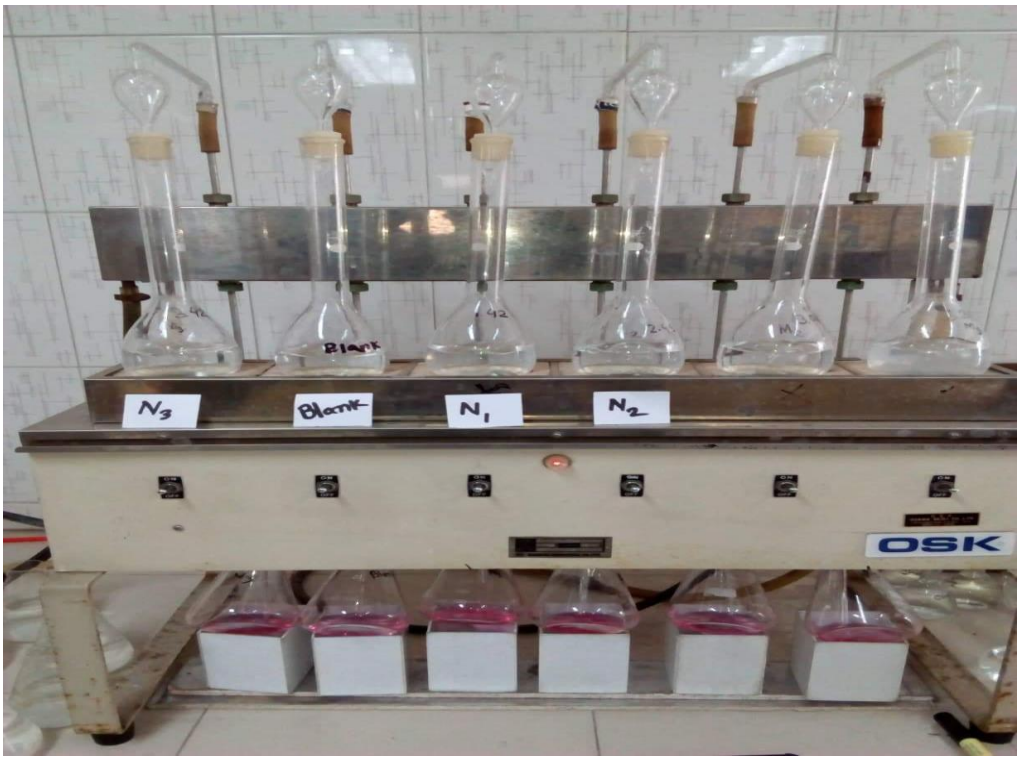


Figure 01: Distillation machine.

Reagents

Reagents used in Micro-Kjeldahl method were:

- 98% H2SO4
- Digestion mixture (catalyst)- The catalyst is the mixture of 2.5 gm powder selenium dioxide, 100.0 gm of K2SO4 and 20.0 gm of copper
- 0.01N HCL – the concentration of the final solution was checked against pure sodium bi carbonate
- 40% NaOH. □
- 0.01N NaOH for titration

Apparatus

- Digestion machine (OSK)
- Distillation machine (OSK)

Procedure

0.3-0.4 gm sample was taken in a cleaned paper & was fold it. The folded sample was kept in dried digestion tube to which one spoon of digestion mixture by spatula and 10 ml of 98% sulfuric acid were added. The mixture was digested in digestion machine for two days by continues heating till the mixture become clear (in "Kjeldahl nitrogen and distillation and distillation apparatus"). After digestion, solution was cooled and the volume was made to 100 ml with distilled water. Then10 ml of diluted sample, 10ml 40% NaOH & 150 ml distilled water were transferred in Kjeldahl distillation flask. Then the essence was collected through distillation in conical flask where 10 ml 0.1 N HCl was taken and 1-2 drop of methyl red was added. Finally, the sample was titrated by 0.1 N NaOH.

Calculation

$$\% \text{ of protein} = \frac{(\text{Blank titration value} - \text{Sample titration value}) \times 1.4 \times 6.25 \times \text{strength of NaOH} \times 10}{\text{Sample weight}}$$

2.5.4. **Determination of Fat content**

Principle
Fat was estimated as crude ether extract of dry material (AOAC, 2003).

Apparatus
Analytical balance (KERN), Soxhlet, conical flask, desiccators & hot plate (Acute plate

Figure 02: reflux of fat

Reagents
Petroleum ether.

Procedure
15-20 gm sample was taken in thimble. The sample was refluxed in a soxhlet with petroleum ether for 2 days. Weight of a small conical flask was taken. Then sample was distillated into the conical flask through washing by petroleum ether. Petroleum ether was evaporated from sample by heating on a hot plate until the smell of petroleum ether was completely removed. Finally, the sample was cooled in desiccators and then weight of sample was taken.

Calculation

$$\text{Fat (\%)} = \frac{W1 - W2}{\text{Sample weight}} \times 100$$

Where,
W1= Weight of the empty container.
W2= Weight of the container with fat.

2.5.5. Determination of Crude Fiber Content

Principle
Crude Fiber was determined by using the official method of analysis (AOAC, 2005).

Reagents
Reagents used to determine crude fiber content were:

- H2SO4 Solution: 13.2 ml of H2SO4 was taken in a 2-liter volumetric flask & volume the flask
- NaOH Solution: 25 gm of NaOH was taken in a 2-liter volumetric flask & volume the flask.

Materials
Moisture machine (Fisher Isothermal 100), muffle furnace (Thermo Concept), condenser & hot plate (Acute plate).

Procedure

About 15-20 gm of crushed sample was taken and the sample was made free from fat by fat extraction method. The sample was dried and transferred to a 500 ml flask. 200 ml of H2SO4 was added and refluxed for 30 minutes with occasional rotation in hot plate connecting with condenser. After complete digestion the content of flask was filtered through a liner cloth and washed with boiling distilled water. Wash residue was transferred back to flask by spatula. 200 ml of NaOH was added and refluxed again for 30 minutes with occasional rotation in hot plate connecting with condenser. Then it was filtered through the same cloth and washed with boiling water. The residue was transferred to a crucible and dried at 105°C to a constant weight. After cooling the weight was measured of the crucible containing dried residue. The crucible containing dried residue was transferred to a muffle furnace and burnt at 700°C for 20 minutes. Weight of burnt sample was taken.

Calculation

$$\text{Crude Fiber (\%)} = \frac{\text{Weight after drying at } 105℃ - \text{ Weight after burnt at } 700℃}{\text{Sample weight}} \times 100$$

2.5.6 **Determination of Sugar Contents**
Sugar was estimated with AOAC method (AOAC, 2005)

Reagent
Reagents are 50% ethanol, 95% ethanol, clarifying solution 1 & 2, phenolphthalein, 6.35N HCl, 40% NaOH, Fehling solution A & B, methyl blue &

Apparatus
Centrifuge machine (BAIUSHOU – used 1008 RCF), water bath, burette
Moisture machine (Fisher Iso thermo 100), muffle furnace (Thermo Concept), condenser & hot plate (Acute plate)

Procedure

- Addition of 130 ml 50% ethanol in 15-20 g of sample taken in 250 ml volumetric flask
- Heating in water bath for 1h & kept it for over night
- Volume the sample in 250 ml by 95% ethanol & centrifuged at 1008 RCF for 5min
- The supernatant was kept in a measuring cylinder & the volume was noted
- Then it was poured in a round bottom bowl & allowed to concentrate using water bath at 84^{o}C
- The concentrated solution was volume to 100 ml with10 ml of clearing solution 1 & 2 of each & the rest with distilled water
- Then it was kept for 45 min & then filtered and the filtrate was used to determine reducing sugar (RS) content of the sample
- 20 ml from the filtrate was taken adding 5ml 6.35N HCl & let it to hydrolysis water bath for about 20/25 min till color changed
- After that 2 drops of phenolphthalein were added & the solution was neutralized with 40% NaOH
- The solution was volume to 100 ml & filtered, the filtrate was used to determine the total sugar (TS) sugar content of the sample
- 5ml of each Fehling solution-A & Fehling solution-B, 50 ml distilled water were taken in a conical & titrated with RS while heating the solution using hotplate, TS was titrated similarly.

Calculation

TS = 6.3 ×5 ×250 ×100/ Titration reading ×sample volume ×sample weight
RS = 6.3 ×250 ×100/ Titration reading ×sample volume ×sample weight
Sucrose = (TS- RS) × 0.95

2.5.7**Determination of carbohydrate content**

Principle

Carbohydrate content of sample was calculated by difference rather than direct analysis. Under this approach, the other constituents in the sample (Protein, fat, moisture, ash) were determined individually, summed and subtracted from the total weight of the sample (FAO, 1998; Pearson, 1976).

Calculation

% of carbohydrate = 100- (Moisture + Ash + Protein + Fat + Crude fiber)

2.5.8**Determination of Energy**

Principle

Energy content of sample was calculated by Atwater's conversion factor rather than direct analysis. Under this approach, the other constituents in the sample (Protein, fat, carbohydrate) were determined individually, multiplied with conversion factors (AOAC, 2005).

Calculation

Energy content (Kcal) = (Carbohydrate×4+Fat×9+Protein×4)

2.5.9 **Determination of mineral content**

3ml of HCl was added to the crucible containing ash which makes a yellow colored solution. The solution was heated until the color becomes white. Then the solution was taken into a 100ml volumetric flask and volume with deionizer water. This solution was used to determine the mineral contents of the samples.

Determination of Sodium (Na) & Potassium (K) contents The Na, K contents of the local cake & fortified cake were determined using Flame Photometer (JENWAY PFP7 flame photometer).

Figure 03: Flame Photometer

Calculation:

$$\text{Na/K contents} = \frac{\text{Concentration from flame photometer} \times 100 \times 100 \times 100}{1000 \times \text{Sample weight}} \text{mg/100g}$$

2.5.10 **Determination of iron (Fe) contents**

Fe contents were determined following the method reported by Woods and Mellon, 1941 .11.5 ml mineral solution, 1ml H_2SO_4 (30%), 1ml potassium persulfate & 1.5ml potassium thiocyanate were added together & reading was taken using a UV-spectrophotometer at 540 nm

Calculation

$$\text{Fe contents} = \frac{\text{UV concentration} \times 100 \times 100}{11.5 \times \text{sample weight}} \text{ mg/100}$$

2.5.11 **Determination of Calcium (Ca) contents**

Ca contents were determined following the method reported by Mc Crud den, 1911

- 20 ml mineral solution was taken
- 1 drop of methyl red was added & color changes into red
- the mixture was neutralized by adding few drops of concentrated NH3 while the color changes to yellow
- Heated to boil & while starts to boil 10ml 6% ammonium oxalate was added
- Heating continued till color changes to orange
- one drop of glacial acetic acid was added & the color converted to pink
- After one hour the solution was filtered & washed with hot DI water until the pink color removed fully
- the filter paper was pierced with glass rod & washed with 10ml 2N H2SO4 &4 & 50ml hot DI water
- Titrated with 0.01N KMnO4 at 70˚C

Calculation

$$\text{Ca contents} = \frac{0.2 \times \text{Titration reading} \times 100 \times 100}{20 \times \text{sample weight}}$$

CHAPTER 3

List of Figures

3.1 **Moisture content**

The moisture content of mushroom mixed cereals bar ranges from 6.00% in to 8.41%(figure3.1). the control A had lowest moisture content (6.00%). while sample D had the highest (8.41%)

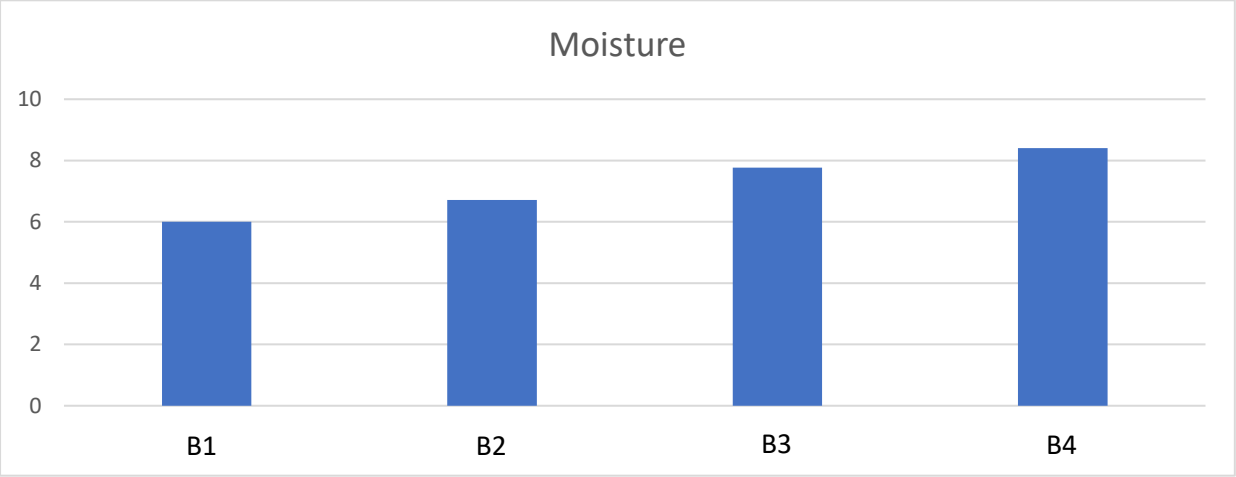


Figure 04: 3.1 Moisture content

where B1, B2, B3 and B4 where B1 is control (0%) in mushroom powder. B2, B3, B4 are 10,15,18 percent mushroom supplemented cereals bar respectively.

From figure3.1, moisture contents of these mushroom supplemented cereals bars are rank as follows: B1<B2<B3<B4

This is due to some important moisture content drying down many food. Food quality, food structure, taste, appearance and durability depend on the amount of water they retain. Moisture content of these bar is varied mostly. The above figure shows that increasing the amount of moisture powder in the bar, with increasing moisture percentage.

3.2 **Ash content**

Ash content of mushroom mixed cereals bar ranges from 1.14% to 2.58% (figure 3.1). where the B1 lowest ash content 1.14% and B4 is 2.58% highest ash content.

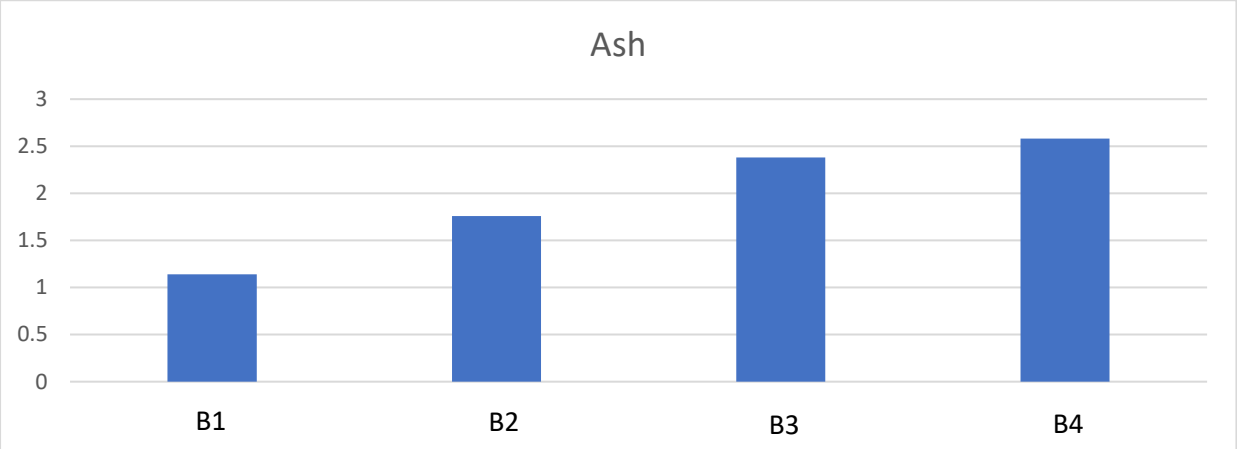


Figure 05: 3.2 Ash content

Where B1 is control where mushroom powder had (0%). B2, B3, B4 are 10,15,18 percent of mushroom supplemented bar respectively.

Figure3.2 shows ash content of these mushroom mixed cereal bar are ranked as follows:

B1<B2<B3<B4

Ash content of any food represents the total minerals contents of that food. The main mineral content of ash are sodium, potassium, calcium, magnesium, iron, zinc and phosphorus. mushroom shows there is a good amount of ash present.so that, with the increase of the mushroom powder in bar. the measurement of ash is increasing.

3.3 **Protein content**

The protein content of mushroom mixed cereals bar ranged from 7.75% to 12.56%. where the is B1 lowest protein content and B4 is highest protein content.

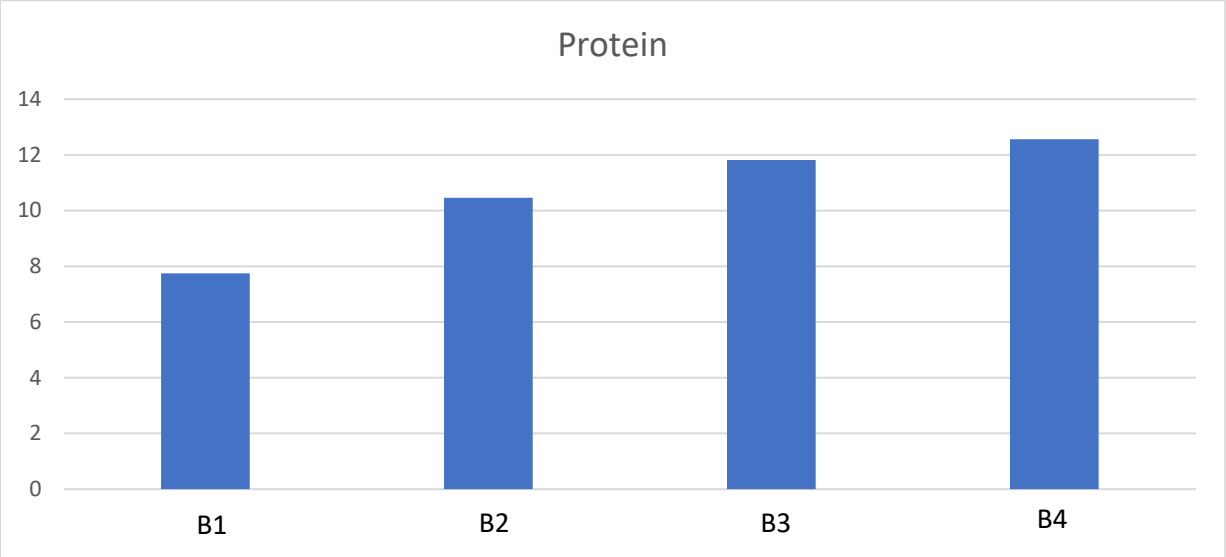


Figure 06: 3.3 Protein content

Where B1 is control. Where mushroom powder had (0%). Another are B2, B3, B4 are 10,15,18 percentage of mushroom supplement respectively.

Figure 3.3 shows the Protein content of these mushroom mixed cereal bar are ranked as follow:

B1 <B2<B3<B4

In this study protein content varied significantly. Protein percentage increased with the supplementation of mushroom contains more protein.so that, with the increase of mushroom powder in bar, the measurement of protein increased and developed bars.

3.4 **Fat content**

fat percentage of mushroom mixed cereal bars were ranged from13.67% to 13.24%. Where B1 13.67%highest fat content and B4 in lowest fat content.

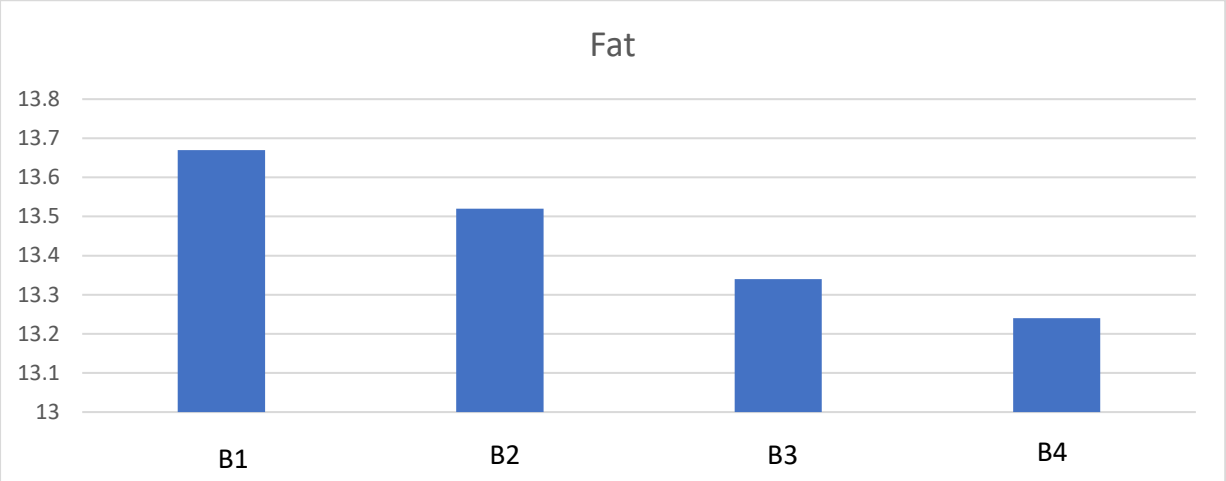


Figure 07: 3.4 Fat content

Where, B1 is control, where mushroom powder had (0%). Another B2, B3, B4 are10,15,18 percentage of mushroom supplement are respectively.

Figure3.4 shown that fat content of mushroom mixed cereal bar is ranked as follows:

B1>B2>B3>B4

Various experiment has been found that the amount of fat in mushrooms is low. That's why with the increase of mushrooms in bars, the amount of fat is decreasing.

3.5 **Fiber content**

In this study fiber content of mushroom mixed cereal bars were ranged from0.8% to 2.25%. Where B1 0.8%lowest fat content and B4 in 2.25% highest fat content.

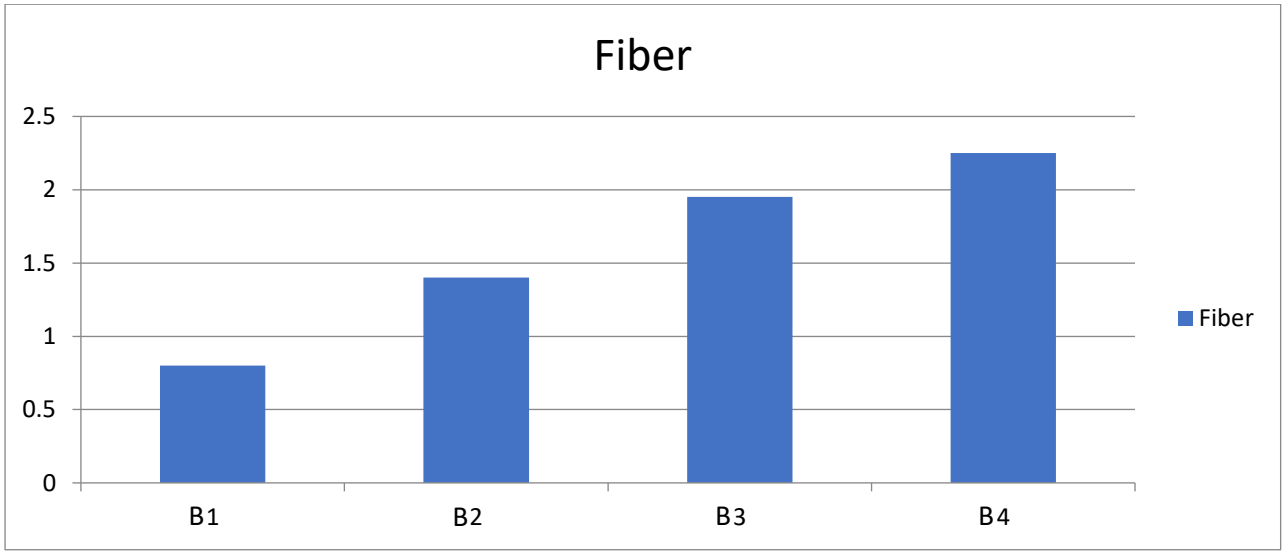


Figure 08: 3.5 Fiber content

Where, B1 is control, where mushroom powder had (0%). Another B2,B3,B4 are10,15,18 percentage of mushroom supplement are respectively.

Figure3.5 shown that fat content of mushroom mixed cereal bar is ranked as follows:

B1<B2<B3<B4.

Curde fiber refers to the residue (primarily cellulose and lignin) remaining after food is treated with acid and alkali. Although Mushroom's Do Not Mouth Definition of a High-Fiber Food, Whichever Requires 5 Grams of Fiber Perfection. According to FAO/WHO codex standard, dietary fiber content in any food should not exceed 5gm per 100 gm (FAO/WHO,1991).

3.6 **Sugar content**

Sugar content of mushroom mixed cereal bars were ranged from 32.26% to 33.67%%. Where B1 32.26%lowest sugar content and B4 in 33.67% highest sugar content.

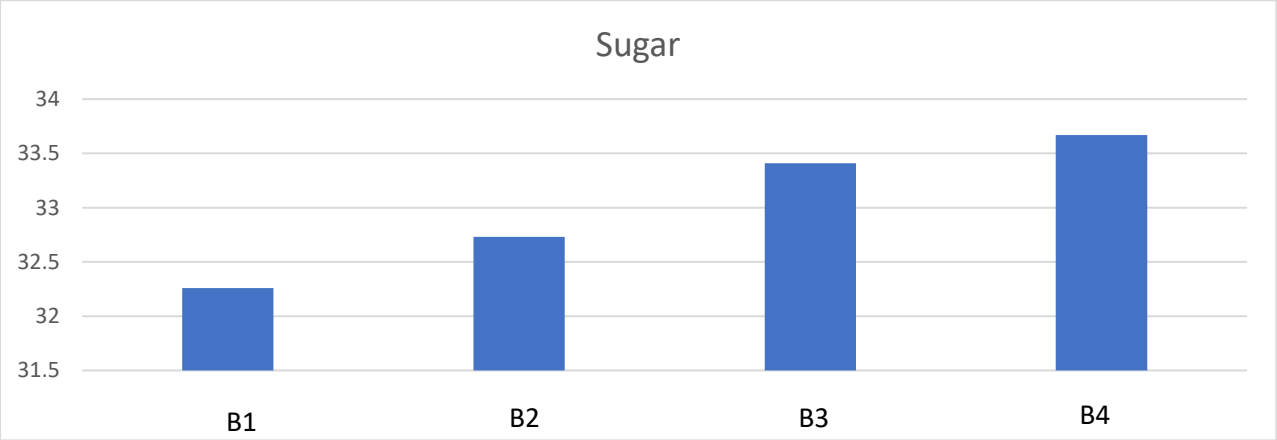


Figure 09: 3.6 Sugar content

Where, B1 is control, where mushroom powder had (0%). Another B2, B3, B4 are10,15,18 percentage of mushroom supplement are respectively.

Figure3.5 shown that sugar content of mushroom mixed cereal bar is ranked as follows:

B1<B2<B3<B4.

Sugar analysis did not show much difference because of the amount of sugar and amount of other dry ingredients in the Mushroom Bar. From the such increasing trend of sugar content according to the result has no significance in bar.

3.7 **Carbohydrate content**

Carbohydrate content of mushroom mixed cereal bars were ranged from 70.63% to 60.96%%. Where B1 70.63% highest sugar content and B4 in 60.96% lowest sugar content.

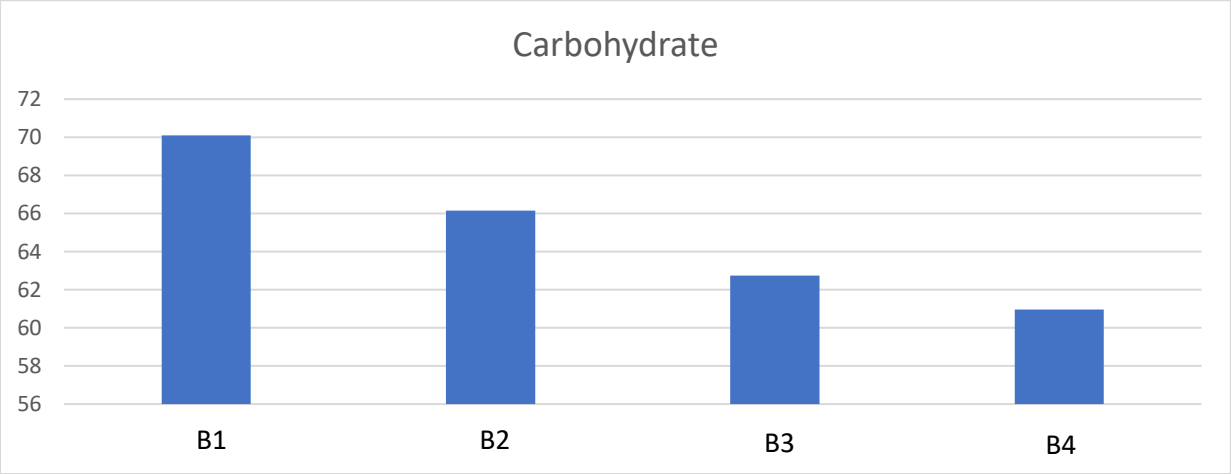


Figure 10: 3.7 Carbohydrate content

Where, B1 is control, where mushroom powder had (0%). Another B2, B3, B4 are10,15,18 percentage of mushroom supplement are respectively.

Figure3.6 shown that sugar content of mushroom mixed cereal bar is ranked as follows

B1>B2>B3>B4

With the increase in supplementation rate protein, fiber, ash increased but fat and sugar decreased because mushroom had low in fat, carbohydrate. So with increasing mushrooms in bars, the amount of carbohydrate decreases.

3.8 **Energy content**

Energy content of mushroom mixed cereal bars were ranged from 435 kcal to 418 kcal. where B1 435 kcal highest energy content and B4 in lowest 418 kcal energy content.

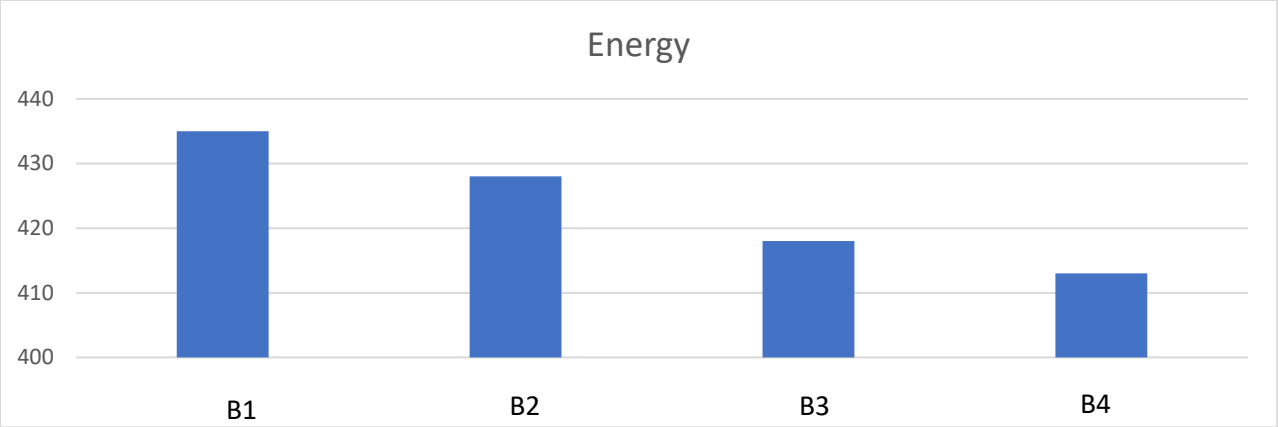


Figure 11: 3.8 Energy content

Where, B1 is control, where mushroom powder had (0%). Another B2, B3, B4 are10,15,18 percentage of mushroom supplement are respectively.

Figure3.6 shown that energy content of mushroom mixed cereal bar is ranked as follows

B1>B2>B3>B4

Carbohydrate is main source of energy. Mushroom had low carbohydrate, so as the mushroom increases, the amount of carbohydrate decreases. Similarly, the amount of energy will be reduced.

3.9 **Sodium content**

Sodium content of mushroom mixed cereal bars were ranged from 213.95(mg/100 g) to 361.17mg/100gm.where B1 213.95(mg/100 gm) lowest sodium content and B4 in361.17 (mg/100g) highest sodium content.

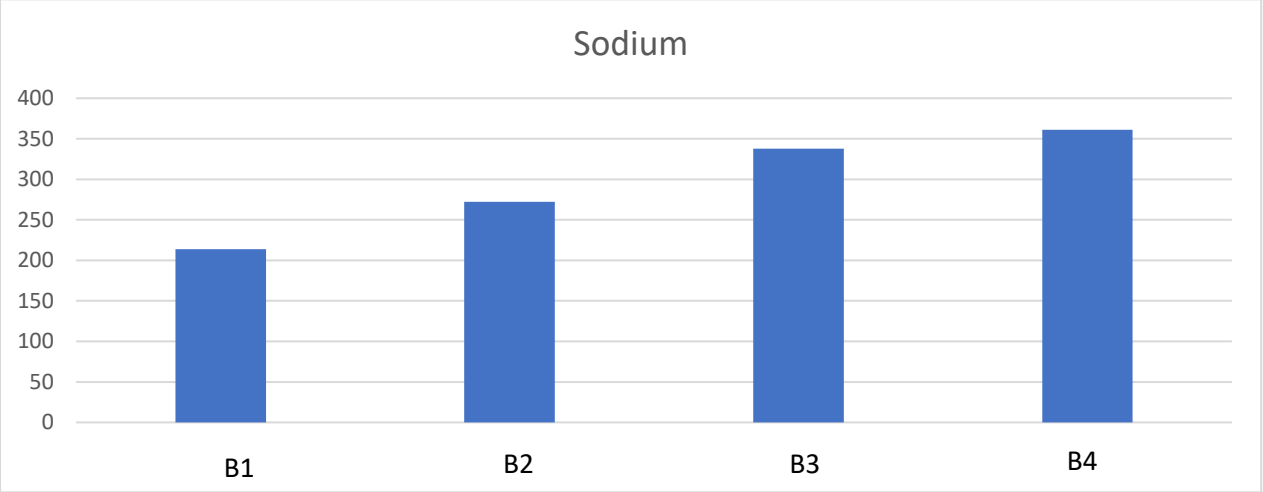


Figure 12: 3.9 Sodium content

Where, B1 is control, where mushroom powder had (0%). Another B2, B3, B4 are10,15,18 percentage of mushroom supplement are respectively.

Figure3.6 shown that sodium content of mushroom mixed cereal bar is ranked as follows

B1<B2<B3<B4

According to the results the sodium contents of bar varied significantly and were increased with the enhancing of mushroom. This will increase the amount of sodium in the bar as well as increasing the amount of mushrooms.

3.10 **Potassium content**

Potassium content of mushroom mixed cereal bars were ranged from 166.04(mg/100 g) to 630.95 mg/100gm.where B166.04(mg/100 gm) lowest potassium content and B4 in (630.95mg/100g) lowest potassium content.

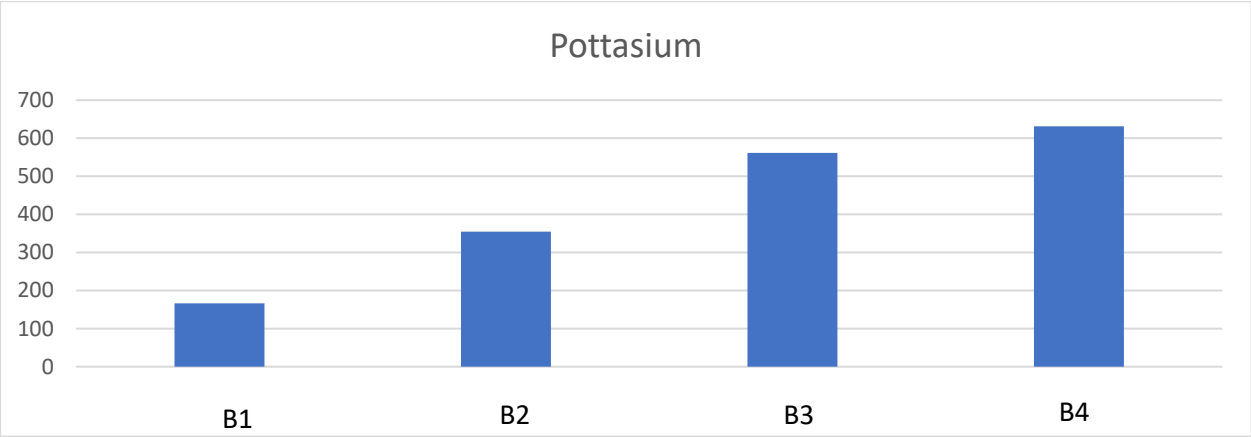


Figure 13: 3.10 Potassium content

Where, B1 is control, where mushroom powder had (0%). Another B2, B3, B4 are10,15,18 percentage of mushroom supplement are respectively.

Figure3.6 shown that potassium content of mushroom mixed cereal bar is ranked as follows

B1<B2<B3<B4

Mushrooms are rich in potassium.so such increasing trend of potassium content with the increase of mushroom. So that, As the mushroom increases in bars, the amount of potassium is increasing.

3.11 **Calcium Content**

Sodium content of mushroom mixed cereal bars were ranged from 4.08 (mg/100 g) to 13.24 mg/100gm.where B1 4.08(mg/100 gm) lowest calcium content and B4 in 13.24 (mg/100g) highest calcium content.

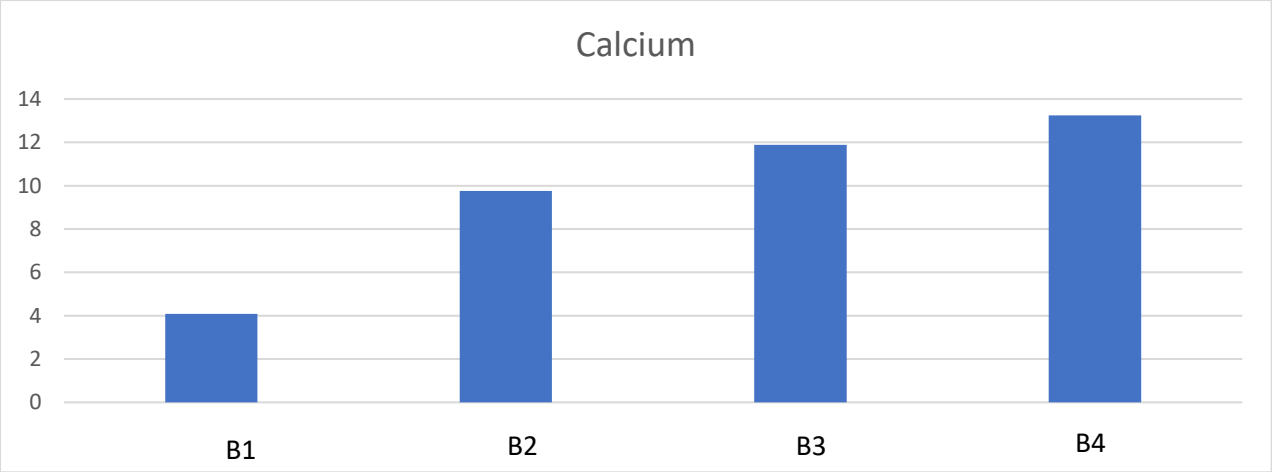


Figure 14: 3.11 Calcium content

Where, B1 is control, where mushroom powder had (0%). Another B2, B3, B4 are10,15,18 percentage of mushroom supplement are respectively.

Figure3.6 shown that calcium content of mushroom mixed cereal bar is ranked as follows

B1<B2<B3<B4

Mushroom rich in calcium. Calcium is one of the most important minerals in human body. Its help to maintain bone, teeth, blood clotting and also muscle contraction. Increasing the quantity of calcium in the bar with mushroom rise.

3.12**Iron Content**

Sodium content of mushroom mixed cereal bars were ranged from 3.53 (mg/100 g) tob6.16 mg/100gm.where B1 4.08(mg/100 gm) lowest calcium content and B4 in 13.24 (mg/100g) highest calcium content.

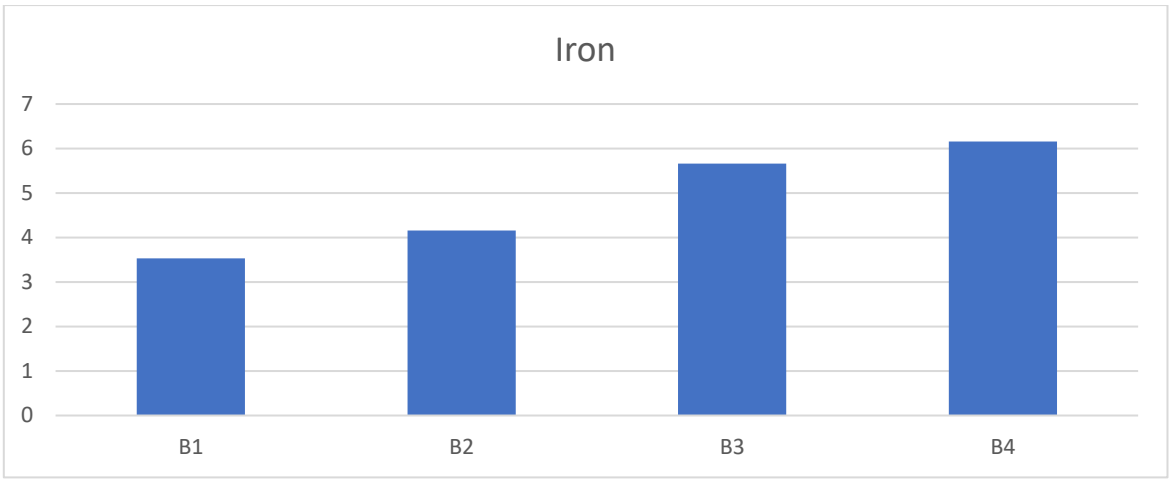


Figure 15: 3.12 Iron content

Where, B1 is control, where mushroom powder had (0%). Another B2, B3, B4 are10,15,18 percentage of mushroom supplement are respectively.

Figure3.12 shown that calcium content of mushroom mixed cereal bar is ranked as follows

B1<B2<B3<B4

Mushroom powders contain essential minerals such as potassium, calcium, sodium, as well as the element of iron. From the figure above, increasing the amount of iron with increasing mushroom powder.

CHAPTER 4
Result and Discussion

Name of mushroom mixed cereals bar	Moisture (%)	Ash (%)	Protein %)	Fiber (%)	Sugar (%)	Fat (%)	Carbohydrate (%)	Energy (Kcal/100gm)	Mineral Contents			
									Sodium	Potassium	Calcium	Iron
Control B1	6.00	1.14	7.75	0.8	32.26	13.67	70.63	435	213.95	166.04	4.08	3.53
B2	6.71	1.76	10.46	1.4	32.73	13.52	66.15	428	272.29	354.49	9.76	4.16
B3	7.77	2.38	11.82	1.95	33.41	13.34	62.74	418	337.84	561.85	11.88	5.66
B4	8.41	2.58	12.56	2.25	33.67	13.24	60.96	413	361.17	630.95	13.24	6.16

Table 02: The proximate composition of development of therapeutic mushroom energy bar.

Here are 4 sample B1, B2 and B3. Whereas B1 is considered as control, because the mushroom powder here is 0%. On the other hand, B1, B2, B3, respectively, has been increased by 10,15,18% mushroom powder. And compared with it, where there is no Mushroom Powder.

On the dry basis

Sample	Ash	Protein	Fat	Fiber	Carbohydrate	Energy
B1	1.22	8.25	14.55	0.85	75.14	539
B2	1.88	11.21	14.49	1.50	70.91	548
B3	2.58	12.81	14.46	2.11	68.03	550
B4	2.82	13.71	14.45	2.45	66.56	551

Table 03: Dry Basis

In view of the above, the chart above shows that the amount of ash, protein, fiber, energy is increasing gradually, but the amount of fat is decreasing slightly. As well as decreasing the amount of carbohydrate.

CHAPTER 5
Sensory Evaluation

0% of Mushroom Powder (control)

10% of Mushroom Powder

15% of Mushroom Powder

18% of Mushroom Powder

Figure16: Formulated Bar.

Sensory Evaluation of mushroom mixed cereals bar:

The sample was tested by 7 test panel members from IFST of (BCSIR). The quality factors judge and results there of given in a table.

Samples	Parameters					
	Color	Texture	Flavor	Taste	Softness	Overall Acceptance
B1	7.84	7.76	8.16	7.65	7.42	8.16
B2	7.80	8.00	7.66	8.00	7.33	8.00
B3	7.83	8.00	7.6	8.00	7.6	8.24
B4	5.7	6.45	6.55	6.02	6.12	6.20

Table 04: Sensory evaluation of different percentage of mushroom supplemented cereals bar.

Where, B1 is control. there is no mushroom powder. But 10,15 and 18 percentage mushroom powder supplemented cereal bar respectively.
Increasing percentage of mushroom powder affects the sensory properties of cereals bar significantly. The chart above shows that, B3 showed good result in sensory evaluation, there were 15% mushroom powder. But that was a little higher than that, i.e. 18% of the mushroom mixed bars, i.e. color, texture, flavors, softness, tastes and overall acceptance are in the lowest level. But in B1where 10% of mushroom powder is present, here color, texture, tastes, softness, flavor and overall acceptance is fairly good but from B3. So, compared with B1, B2, B3 and B4 are comparable to that, Sensory Evaluation B3 is better than all. Then B2 and finally B4.

CHAPTER 6
CONCLUTION

These delicious bars are popular among consumers like delicious, healthy food. It has been found that consumers who are young age between (15-24) and most consumers have mental ceremonies in cereal bars and health food. Changing in our eating habits are essential for changing the health of the people and maintaining consumers' confidence in health. Food industry Consumers' health sector needs to be sure to be significantly healthier. After developing new cereals to cereals bar, sensory analysis shows that nuts, rice flakes, oats flaxes, Sesame, peanut and mushroom powder, new sources of cereal bars can be successfully. Based on the maximum impression results, there were formulas B3(Where 15 grams of Mushroom Powder and 5 grams of Rice Fluxes/ 100 gram). Snacks Food like the snacks bar are made by from almond, peanut, rice flaxes, oats flaxes supplemented with mushroom powder. Exclusively, it is the serial bar that arose successfully using glucose syrup and brown sugar a specific percentage. The results of this study show that mushroom powder is included in bar to get a product rich in cereal fiber, protein and other bioactive elements. apart from analyzing the contribution of mushroom to nutritional value for determining the relationship between mechanical textual analysis and sensitive concepts, it should be analyzed with the practical bar nutrition and sensitive definitions of this novel.

CHAPTER 7

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