A PROJECT REPORT ON

Preparation And Proximate Analysis Of Dehydrated Cruciferous (Cauliflower , Broccoli)Vegetables

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Letter of Transmittal

Date:
To,
Dr. Sheikh Mahatabuddin
Associate professor and Head
Department of Nutrition and Food Engineering
Faculty of Alied Health Science
Daffodil International University.

Subject: prayer for submission of project report.
Dear sir,
With due honor state that I'm regular student of your department from September 2016. I like to offer my gratefulness for your guidelines and kind clinch.Your valuable direction always assisted me to complete my academic part smoothly.you always told that your door is open for us alltime and that's why we didn't feel any hesitation to get help from you. I am also indebted to my department, all of the faculty of this department, and many other valuable persons for their supervision and support for my project work. I have collected data, and information to set up this report which is most relevant to my study.I have concentrated myself fully to accomplish the target of this study.I was really devoted to my work this dedication and pragmatic knowledge will collaborate me incomprehensibly in my occupational life. For this study purpose I have studied many articles, which has increased my interest in research work.I am requesting you to pardon me if you find any mistake that may happen in the report.
Finally, if any questions arise in your mind respect to my report, I will readily try to answer your inquiries.

Sincerely yours,

Farzana Haque
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CERTIFICATION OF APPROVAL

With great satisfaction and joy, I'm declaring that the project report on "Preparation and Proximate Analysis Of Dehydrated Cauliflower and Broccoli by different methods" conducted by Farzana Haque at Daffodil International University. The academic id of Farzana Haque is:163-34.For defense or viva voce this report is approving by me.

It is a matter of satisfaction that the data and experiments exhibited in this study are genuine job of Farzana Haque.This study of Farzana Haque has recommended by me for next academic recommendation. Farzana Haque bears a firm moral characters and ethical personality. I had always seen her as a hardworking and enthusiastic person. I wish her all accomplishment throughout her whole life.

X

Dr. Sheikh Mahatabuddin

Effat

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ACKNOWLEDGEMENT

First of all I would express my gratitude and thanks to my Almighty. I'm blessed to have a such family, they always inspire me to do any work.My deep and heartiest respect to the Head of this department for his valuable instructions and assistance . My cordial love and respect to my supervisor could never be expressed in a word. Her inspiration and valuable support always helped me to finish my project work. Her availability was undoubtedly appreciated. Dring my lab work whenever I fall any problem, she always handled it carefully. During covid-19 pandemic situation when we could not meet physically, she always gave us instructions by arranging meeting through online.I am also grateful to other teachers of this department They always stimulate us to do new things,and thankful to my friends who always inspired me to do a good result and always support me in good works.

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ABSTRACT

The aim of the study was to dehydrate cauliflower and Broccoli by immersing the blanched pieces in solution of various concentration. Different procedure was followed to identify the best way of dehydrating cruciferous vegetables (cauliflower, broccoli). Basically three (3) procedure were used in this study to fulfill the purpose. some cauliflower and broccoli were prepared without using any pre-treatment, that was dehydreted directly by laboratory air drier (S1). Some cauliflower and broccoli were prepared by immersing the florets in 3% common salt solution after blanching and then dehydrated by air drier(S2).some cauliflowere and broccoli were prepared by soaking the florets in 3% Common salt + 5% Sucrose solution that was containing 0.1%, pottasium meta-bi-sulphate after blanching and then dehydrated (S3). After proximate analysis different result was shown by different method. The analysis value of S1 for both cauliflower and broccoli showed higher percentage of moisture (8.05-8.71%), and lower percentage of fiber (12.01-12.48%),ash(4.06-4.29%),fat(1.13-1.29%) and protein(17.1-17.9%) compared to S2.Then result value for S2 showed lower percentage of moisture (8.01-8.18%) and higher percentage of fiber(13.2-16.5%),ash(5.5-5.6%) fat(1.2-1.3%) protein(17.9-18.4%) compared to S1.Finally the result of S3 for broccoli and cauliflower showed lowest percentage of moisture(7.8%) and highest percentage of protein(19.6%),ash(5.6%),fiber(18.5%)compared to S1and S2.High moisture percentage enhances the rate of spoilage. In case of S1 and S2 moisture is high and other nutritional value is less compared to S3 of cauliflower and broccoli .So S3 would be the best dehydration procedure to dehydrate cauliflower and broccoli as S_3 contained highest percentage of protein, fiber, ash and lowest percentage of moisture compared to S1 and S2.

Key word:- dehydration, rehydration, process, chemical analysis, storage life.

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Chapter 01 :Introduction

1.1 INTRODUCTION

Cauliflower (Brassica oleracea L. var. botrytis) Broccoli (Brassica oleraracea L. var. italica.) is a well-known and profoundly estimated wintered vegetable grown in subcontinent especially in India, Bangladesh, Pakistan etc, exceptionally short-lived in raw conditions which bring about extensive wastage because of spoilage.The significant part of the cauliflower and broccoli is devoured fresh, if restricted amount is handled most of the part is in canned and got dried out structures. Canned cauliflower and Broccoli are cumbersome, substantial furthermore, has an issue of crumbling and staining. when cauliflower and broccoli dried by traditional hot sun drying technique or air-drying process like plate drying yields an item with poor surface, color, flavor, and rehydration qualities. Further, a few shrinkage and dissemination of solutes which happen during the sluggish drying methods retard fast and full rehydration and the item becomes tough and leathery after cooking.[1]

Endeavors were made by a few projects to limit the shrinkage, also improve rehydration of dried vegetables by unstable puffing vacuum puffing and high temperature and short timeframe.In this project some safe, budge friendly , healthy procedure are applied to dehydrated vegetables without change its taste qualitty. [2-3]

1.2 Cruciferous Vegetables

Cruciferous vegetable is such kind of vegetables which are named or called cruciferous their cross-molded blossoms. Some example of cruciferous vegetables are cabbage, broccoli brussels sprouts, cauliflower. A few reports have shown cruciferous vegetables as well their constituents to be conceivably disease preventive especially for cancer. Isothiocyanate debasement products of glycosinolates which happen normally in an assortment of cruciferous vegetables, are probably the most contemplated comportment of cruciferous vegetables. Allyl isothiocyanate was distinguished almost 50 years prior as a compound especially common in cabbage also in cauliflower and broccoli.The clinical value of cruciferous vegetables has been estimated since old times in later years importance has given on the anticancer impact of cruciferous vegetables. The epidemiological information has been showed that there is an opposite relationship between the utilization of cruciferous vegetables and prostate cancer, colon cancer,colorectal cancer.[4]

1.3 Types of Cauliflower and Broccoli

1.3.1Green Cauliflower

One assortment of green cauliflower is known as Romanesco and it is lime green with pointed apexes at the outside of the head. The Romanesco has a gentle nutty taste very much like broccoli and it makes an extremely alluring super plate.

1.3.2 Orange Cauliflower

Another name is cheddar cauliflower this is a hybridized assortment that creates curds are radiant orange in shading they bear a greater amount of orange shade which is known as beta-carotene indeed when we cook this sort of cauliflower the tone gets considerably brighter and more profound in showing as a result of their strength you can gather the plants at different occasions rather than at the same time and still make the most of their flavor and surface.

1.3.3 Purple Cauliflower

The purple in this sort of cauliflower comes from water- dissolvable shades that are life wise found in red wine and cabbage and purple assortment incorporate the purple cape and the violate queen. The last of which has exceptionally distinctive purple curds and taste incredible when eaten raw.

1.3.4 White Cauliflower

There are varioussorts of white cauliflower including the white cloud and the early white Hybrid however all white cauliflower comprises of white curd or the top of the bloom buds encircled by encasing leaves indeed numerous assortments of white cauliflower are self-whitening which implies the leaves can life wise shield it from the sun's harming impacts.[5]

1.3.5 Chinese Broccoli

As the name infers it is popular in Asian food it has a better taste than normal broccoli.Broccolini Think Broccoli however on more slender longer stalks with more modest heads and a better taste. It is a combination of broccoli and Chinese broccoli. We may likewise contrast its appearance with asparagus.

1.3.6 Broccoli raab (rapini)

While it sure looks a ton like a kind of broccoli it isessential for similar family as turnips. Flavor-wise it is somewhat unpleasant and minimal gritty.

1.3.7 Romanesco Broccoli:

Consider blossom buds that are spikey and intriguing looking. That is are spikey and intriguing looking. That is Romanesco. It is harsh and crunchy like customs broccoli yet somewhat earthier.[6]

1.4 Comparison between raw and dried cauliflower and Broccoli.

Table 1: Comparison between raw and dried Broccoli and cauliflower

Raw cauliflower and broccoli	Dried cauliflower andbrocvoli
1. The raw broccoli and cauliflower are available in winter season in Bangladesh.	1. As raw Broccoli, cauliflowe isn't available during summer that's why it is dried.
2. The color of raw cauliflower is white, slight yellowish, and broccoli is green or lime green.	2. After drying the color of cauliflower became light brownish or dark and the color of broccoli became dark green than raw condition.
3. The texture of raw cauliflower was soft fresh, and broccoli was also in same condition.	3. The texture of dried cauliflower was tought and shrunk. But when Dried vegetables are re-hydrated it became like raw condition almost.
4. The water percentage or the moisture level of raw cauliflower and broccoli was about 90-91%	4.The moisture level of dried cauliflower and broccoli was 7.81-8.81
5. The fresh or raw vegetable can be stored for 1 weeks at 0ºc temperature.	5. But dried broccoli and cauliflower can be stored for 3-6 month at 0-5ºc temperature.
6. The weight of 2 fresh cauliflower and broccoli was 90g 315g. (after blanching).	6. But after drying the weight became 70.7g for cauliflower and 28.9g for broccoli.
7. The taste of raw or fresh vegetables after cooking was delicious.	7. The taste of dried cauliflower after cooking was almost like fresh one.

1.5 **Objectives:**

1.5.1 General Objectives

To study on the preparation and proximate analysis of dehydrated cruciferous vegetables .

1.5.2 Specific Objectives

- To check the appearance of the dried cauliflower and broccoli
- To observe the flavor of these dried products as there were no chemical or preservatives added
- To monitor the shelf-life of these dried vegetables, there were hree types of dried products for cauliflower and broccoli
- To check the proximate analysis of dehydrated cauliflower and broccoli

Chapter 02 :Materials and Methods

2.1Collection of raw materials

Fully matured broccoli and cauliflower were collected from the neighborhood market of khagan Bazar at Asulia in Daffodil International University,November 2020. The cauliflower was white in color some was also little bit yellowish, and broccoli was lime green in color. The leaves were eliminated, and the heads were altogether washed managed to remove hard prime stem and then cut into pieces of 2.5 to 3.00 cm in length and 1.5-2.00 cm in width. The full process was done at NFE food processing lab at asulia at Daffodil International University.

2.1.1 Raw materials for dried cruciferous vegetables-

Cauliflower =2 piece (905 g)
Broccoli=2 piece (315 g)

2.1.2 Amount of Ingredient for dehydration of cauliflower and broccoli.

Table 2:Amount of ingredient for dehydration of cauliflower and broccoli

Ingredient	**Amount**					
Boiling water	Cauliflower			Broccoli		
	S1	S2	S3	S_1	S_2	S_3
	500-1000L	1000-2000L	1000-2000L	500-1000L	1000-2000L	1000-2000L
Sodium sulphate	0%	0.5%	0%	0%	0.5%	0%
Common salt	0%	3%	3%	0%	3%	3%
Sucrose	0%	0%	5%	0%	0%	5%
Potassium meta-bi-sulphate	0%	0%	0.1%	0%	0%	0.1%

Here,

S1 was prepared without using any pretreatment. Normal air dried by laboratory air drier.

S2 was prepared by using 3%common salt solution after blanching, then dried by laboratory air drier.

S3 was prepared by using 3% common salt+5% sucrose solution after blanching. This soution was containing 0.1% potassium metabi sulphate then air dried.

2.2 **Apparatus and Equipment:**

1. Oven
2. Electric Balance
3. Bowl
4. Knife
5. Tray
6. Chopping Board
7. Sieve
8. Solar Drier
9. Laboratory Drier.

2.3 Procedure of preparation of dehydrated florets

Three types of procedure where used for preparing dehydrated cauliflower And broccoli.

2.3.1 Flow chart of Procedure one(1) for dehydrated cauliflower and broccoli.

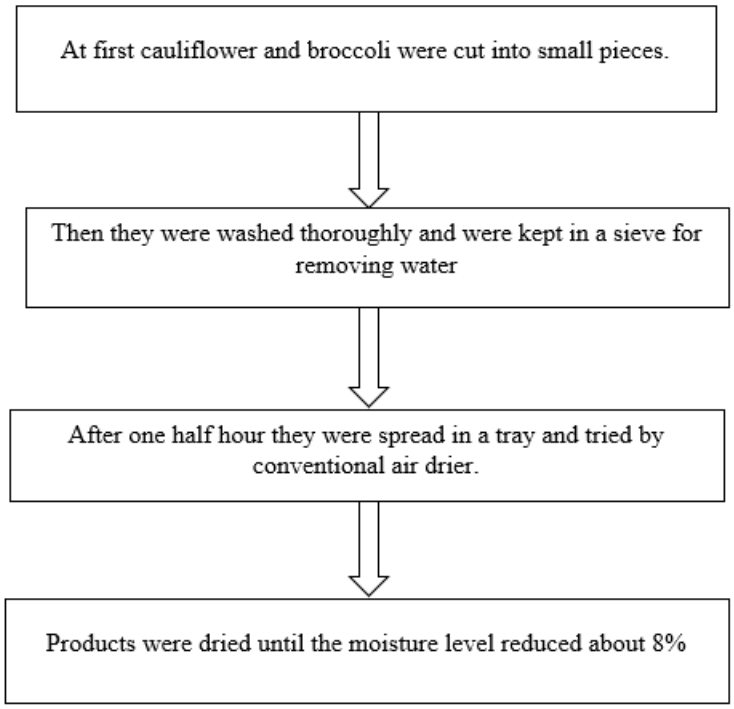

Figure 1 : Procedure of dehydrated cauliflower and broccoli by air drier

2.3.2 Flow chart of Procedure two(2) for dehydrated cauliflower and broccoli:

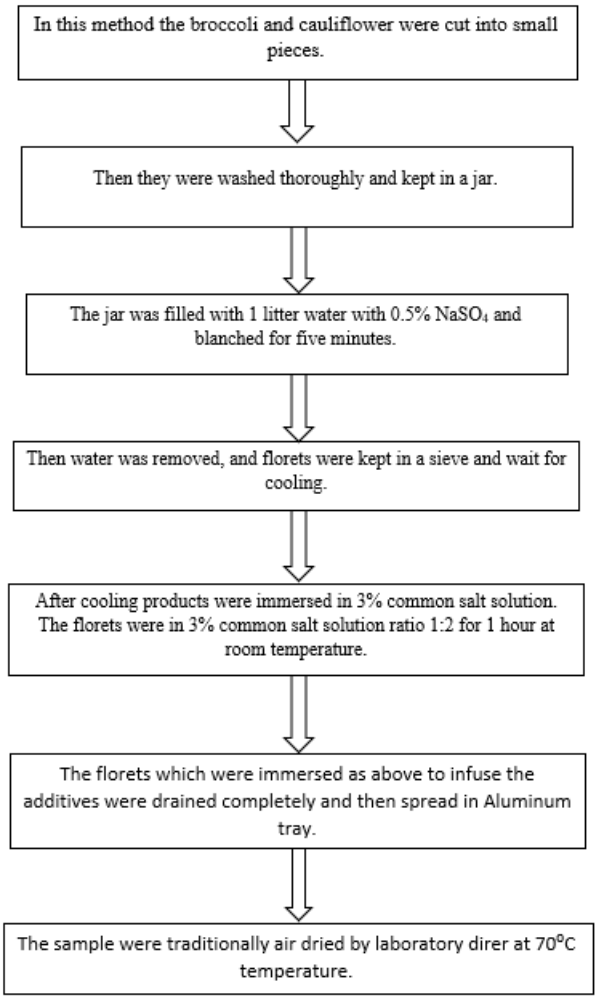

Figure 2 : Procedure of dehydrated cauliflower and broccoli using 3%common salt

2.3.3 Flow chart of Procedure three(3) for dehydration of cauliflower and broccoli:

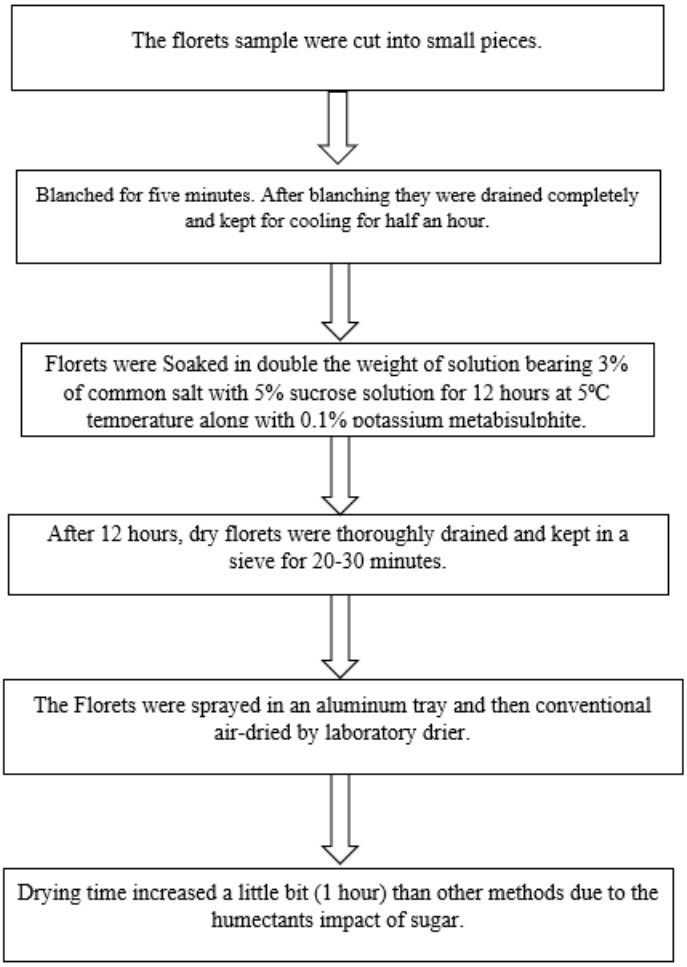

Figure 3: Procedure of dehydrate cauliflower and broccoli by 3% salt and 5% sugar.

2.4 Comparison between drying method of cauliflower and broccoli:

Table 2 : comparison among dehydration characteristics of three sample of Cauliflower

Characteristics	**Comparison**		
1) Drying time (Solar dryer)	S1	S2	S3
	2-3 days	10 hours (laboratory dryer)	12 hours (laboratory dryer)
2) Dehydration ratio	15	12.8	10.9
3) Time of reconstitution (min)	40	55	69
4) Percentage of rehydration	30	42.80	65.6
5) Appearance of cauliflower	Slight brown	Pole brown	Pole brown nearly full label yellow.
6) Texture	Tough with shrunk	Tough but not very shrunk	Tough not shrunk
7) Acceptability	Average	Good	Very good

Table 3: comparison among dehydration characteristics of three sample of Broccoli

Characteristics	**Comparison**		
1) Drying time	S1	S2	S3
	2 days	10 hours (laboratory dryer)	12 hours (laboratory dryer)
2) Dehydration ratio	12.6	10.9	9.6
3) Time of reconstitution	45	45	55
4) Percentage of rehydration	23	32	49
5) Appearance	Dark green color reduced	Lime green	Pole green
6) Texture	Tough with shrunk	Little bit shrunk	Tough but not shrunk
7) Acceptability	Average	Good	Very good

2.5 Storage Condition:

The dehydrated cauliflower and broccoli were stored in a zip lock plastic packet ,And then the zip lock packet is stored in a glass jar and kept at 0ºc and ambient temperature (25-30ºc).These dried broccoli and cauliflower are stored for proximate analysis. Storage of normal dried florets and treated florets at 0ºc temperature and ambient situation (25-30ºc) in zip lock plastic bag showed that normal dried florets with 3% salt solution florets and 3% salt solution florets and 3% salt solution + 5% sucrose solution florets were remaining in good condition 2 months 6 months and respectively at ambient condition.

Photographs of different types of dried broccoli and cauliflower:

Figure 4 : Dehydrated broccoli

Figure 5: Dehydrated cauliflower

Chapter 03: Chemical analysis of Dehydrated Cauliflower And Broccoli

3.1 Determination of Ash:

In analytical science ash or ash content detection is the method of mineralization for preconcentration of trace elements before analysis of a compound or chemicals for example alludes to the inorganic residue staying after either start or complete oxidation of nature matter in food test. The inorganic builds up comprises for the most part of the mineral present in the food test Determination of Ash content is a part of proximate analysis for nutritional assessment.[7]

Figure 6 : electrical muffle furnace

Apparatus:

1.Crucible
2.Electric muffle furnace machine.
3. Weight machine.
4. Spoon.

Procedure:

1. At first crucible should be cleaned properly there should not remain any foreign particles or dust.
2. After cleaning crucible will be kept in oven for drying. Crucible should not be used when it is in wet condition.
3. Then after few minutes crucible has removed from over and kept in desiccator so that if could be cool and moisture couldn't be grow in it.
4. After cooling the weight of empty crucible was taken by electric balance or weight machine

for taking weight.
5. Then sample was taken into the crucible in this study two sample are used for each analysis. Then average result is taken.
6. Sample with crucible are kept in electric muffle furnace at 600ºc temperature for 6 hours.
7. After 6 hours crucible was removed from muffle furnace and kept these crucibles in desiccator.
8. Then after few minutes we will take the weight of sample of burnt with crucible.

Calculation:

Weight of ash= (weight of ash with crucible after burnt – weight of empty crucible.)**[8]**

3.2 Determination of moisture

Moisture content in fruits and vegetables generally prime factor for deteriorating it's fresh condition. Moisture level varies wildly in different types of fruits and vegetables. As moisture content promotes the growth of microorganism so during preservation moisture must be reduced. Generally, broccoli and cauliflower have 92-96% moisture content. But if we want to preserve it we have to keep the moisture level between 8-9%.**[9]**

3.2.1 Procedure:

1. At first was taken a dry crucible and at least 2g of dried florets sample was taken into the crucible.
2. The dried sample was crushed by mortar and pestle.
3. Then the cover of moisture analyzer was opened.
4. Then the crushed sample was kept in the moisture analyzer.
5. The cover of moisture was closed and wait for few moments.
6. After few moments when the moisture analyzer will give signal then result should be noted.

Figure 7 : Moisture analyzer

3.2.2 Calculation:

Moisture analyzer will show the moisture content.

3.3 Determination of fat:

Vegetable and fruits or leafy green vegetables are basically super low in fat. Leafy foods cucumbers or tomatoes for all intents and purpose zero fat However more thick vegetables like cabbage, just as verdant greens have same little but supportive solid fat pieces based on omega-3 unsaturated fats. Fat percentage of fruits and vegetables are generally law and healthy for body.**[10]**

3.3.1 Apparatus:

1.Crucible
2.Weight machine.
3. Soxhlet Apparatus.
4. Desiccator.
5. Thimble.
6. Laboratory drier.

3.3.2 Chemical:

Petroleum ether=250ml / n- hexane = 250ml.

3.3.3 Procedure:

1. At first,the thimble was taken and dried it by laboratory drier for few minutes and then the weight of thimble was noted.
2. Then the dried sample of cauliflower and broccoli was taken into the thimble, then again weight was taken. From second weight first weight was minuses and weight of sample was gained.
3. Then Soxhlet was placed with sample in thimble with the plating machine.
4. The machine was set in boiling flask
5.250ml n-hexane was poured in the sample.
6. Then the thermostat heating set was adjusted.
7. There is two direction through one direction water goes and water goes out in one direction.

8. The n-hexane heat becomes steamy to the top of the equipment. Here water cools of down to the bottom of the water and the equipment is stored. Thus, when the vapors are stored up to the thimble. Then with the fat from the sample the boiling flask was deposited on the n-hexane runs generally 6-8 hours.
9. After 6 hours the boiling floss will be stored on the n-hexane fat, it will be dried in oven at 40-50ºc temperature.

Figure 8 : Soxhlet apparatus

3.3.4 Calculation:

Fat%=weight of flash after extraction and drying – weight of flash ÷ Sample weight (g).

e range.**[11]**

3.4 Determination of Protein of Dried florets

Protein is fundamental of building, keeping up and fixing our body tissue. All tissue of our organ like hair, skin muscles are growing by the strength of protein. All types of food bear different types

of Amino acid. Normally animal protein is enriched with different types of Amino Aci which is considered as complete protein for our body. Cruciferous vegetables are good source of protein like cabbage, broccoli cauliflower. This protein content can be determined by kjeldhal method. For this we need **[12]**

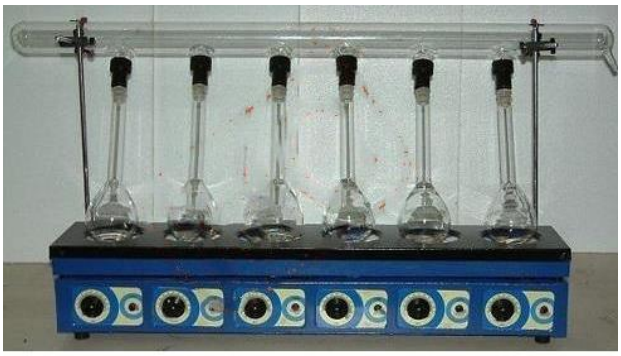

Figure 9 : Apparatus of protein Determination

3.4.1 Apparatus:

1. Conical flask
2. Burette stand
3. Measuring test tube
4. Boiling flask
5. Analytical balance

3.4.2 Chemical or Reagent

1. H_2SO_4/Hcl
2. K_2SO_4/ $CuSO_4$
3. NaoH
4. O.1N Hcl
5. Methyl red

3.4.3 Process of Kjeldhal:-

There are 3 steps in Kjeldhal methods. They are exhibited in following.

1. Digestion of Sample.
2. Distillation
3. Titration

1) Digestion of sample: -

For Digestion, each sample of Dried Cauliflower and broccoli was taken. 2g of sample was taken in foil paper. The digestion flask was previously cleared will with Hcl and then dried properly. The weighing sample of dried broccoli and cauliflower was poured into the digestion flask carefully. After taking it into flask then 10ml Hcl was added to each sample. Before taking Acid had gloves and all precautions was maintained. Then 4g of Digestion mixture was added into Digestion flask. As digestion mixture $Cuso_4$ and NaOH was used. For each sample two digest flask was taken so that average result can be taken, and maintained more accuracy . Then all digestion flasks were transferred to the Kjeldhal digestion chamber and heated at first stage the temperature was kept in 40ºC later it was raised about 60ºC. All sample was heated until getting a colorless solution. After getting a colorless solution heat was stopped and flasks were kept for getting cool and then diluted with 100ml distilled water.

Distillation: -

From that flask 10ml of solution was transferred to the distillation flask 150ml of distilled water was placed into the flask. In the distillation flask 10ml of 40% NaOH was mixed. Solution was become colorless. Tree distillation flasks were used for this method where one was blank. In the last flask there was no sample only contained regent. On the contrary 50ml of distilled water and 10 ml of 0.1 Hcl was taken in a trapping conical flask. 2 drops of methyl red were taken into the trapping into the conical flask. The solution become pink color. Three conical flasks were taken and contained same materials. Then condenser was run for 30-35 minute to finish the process of distillation. Then tapping conical flask was displace and titrate with NaOH.

Titration: -

Titration refers to a chemical process in where the concentration of an unknown sample or analytes were determined by a known concentration and volume of sample. The burette NaOH was blemded into the trapping conical flask drop wise and conical flask was shaken lightly. Until the observing of color change NaOH was mixed. The finished point was color alter from pink to light yellow color.

Calculation: -

Protein determination was calculated by following formula:

$$\% \text{ of protein} = \frac{(c-b)\times 14\times d\times 6.25\times 100}{a\times 1000}$$

Here,

a= weight of sample

b= NaOH's volume need for titration for sample

c= volume of NaOH need for blank's titration

6.25= It's a conservation factor of Nitrogen to protein

14 = The Atomic weight of Nitrogen**.[13]**

3.5 Determination of fiber

Fiber was determined by AOAC 978.10. method

Equipment and Apparatus: -

1. Beaker or Digestion flask
2. Filtering cloths
3. Electric air oven
4. Muffle furnace
5. Desiccators
6. Balance machine
7. Hot plate
8. Measuring cylinder
9. Funnel
10. Crucible
11. Spoon

Chemical Solution: -

1. 0.128 molar H_2SO_4
2. 0.313 molar NaOH

Chemical Preparation: -

1) 400 ml of distilled was taken in volumetric flask, then 3.5 ml (98%) H_2SO_4 was taken in same flask. After taking acid pipet should be washed carefully. Flask was rotated several time for proper mixing. Water was added to make the volume 500ml.
2) A weighing paper was placed in balance. 6.25g NaOH pellets was taken. In another volumetric flask. 400ml of distilled water was poured in it and weighted NaOH was added the same flask was shaken to dissolve the pallets. After 20-minute extra water was added to make final volume 500 ml.

Procedure:-

1) A measuring cylinder was taken and 200 ml of 0.128M H_2SO_4 and was poured into conical flask then 2g of sample was weighted and mixed into conical flask. And then the conical flask was placed in Electric hot plate, and sample was boiled for 30 minutes with a periodic agitation flask was shaken periodically to boiled and mixed properly.
2) After 30 minute a sample was filtered by using a cotton cloth to drain the acid solution conical flask was washed properly to remove the acid residue properly, by hot water.
3) Another conical flask was taken, placed the funnel on it, and 200ml of 0313M NaOH was poured onto the conical flask washing the filtrate into the flask. The flask was shaken properly with NaOH solution and placed on hot plate again for boiling, sample was boiled with basic solution with periodic agitation, for 30 minutes.
4) After 30 minutes filtered the boiling sample using cotton cloth, and hot water was used to remove NaOH residue completely from conical flask.
5) Now a crucible was taken and collected the fiber from cotton cloths properly and crucible was placed in hot plate to remove excess water then the crucible was kept into hot air oven at 130ºC for 1-2 hours. After two hours crucible was removed from oven and take it in desiccator for 20 minutes. After moving from desiccator crucible was weighted. And then it was placed in muffle furnace at 550ºC at 2 hours. After 2 hours it was removed from muffle furnace and dept it in desiccator for 10-15 minute. Then after cooling it was again weighted.

Calculation: -

Crude fiber % = $\frac{w1-w2}{ws} \times 100$

Here,

W_1 = weight of crucible with fiber

W_2 = weight of crucible with ash

W_S = weight of sample

Chapter 4 Nutritional value and health benefits

4.1 Nutritional value of cauliflower: -

Table 4 : Nutritional value of cauliflower (amount per 100g)

Nutrient		**Amount**
Total fat		0.3g
Dprotein		1.9g
Dietary fiber		2g
Ash	Mg	3%
	Na	30mg
	K	299mg
	Ca	2%
vitamin C		80g
Total Carbohydrate		5g
calories		25%

Source:USDA

4.2 Health Benefits of Cauliflower: --

4.2.1 Cauliflower is a heart accommodating vegetable on account of a plant compound called sulforaphane. Sulforaphane mitigate the fiery harm brought about by oxidative pressure.

4.2.2 Choline is a massive essential elements for development of our brain, choline is significant elements which we require for memory, mood, and recall.

4.2.3 Sulforaphane element has vast health benefits, especially in the mitigation of cancer, sulforaphane prevent the dsnger of cancer many ways including preventing cells from DNA damage and by inactivation of carcinogens.

4.2.4 Cauliflower broccoli, mainly cruciferous vegetables bear a compound named indole-3-carbinol which may assist in balancing hormones by circulating oestrogen levels indole-3-carbinol in breast cancer.

4.2.5. As rich in Sulphur, cauliflower may uphold gut health thus enrich our guard against disease, because sulfur instigate the production of glutathione> Glutathione is potent antioxidant.[14]

4.3 Nutritional value of broccoli (400g serving size)

Table 6:Nutritional value of broccoli

Nutrition		Amount
Fiber		3.3g
protein		2.4g
Total fat		0.9%
Ash	Na	41mg
	K	293mg
	Ca	31%
	Fe	3.7%
calories		35g

Source :USDA

4.4 Health Benefits of Broccoli: -

Borccoli is enriched with numerous number of health benefits like,

4.4.1 Two prime carotenoids in broccoli are lutein and zeaxanthin, they are important for lowering the disorder related to eye.

4.4.2 Broccoli is viewed as goitrogen, which implies that high amount could hurt the thyroid organ in sensitive peoples. Cooking this vegetable on high heat may lower this effect.

4.4.3 Cruciferous vegetables are viewed as or believed as fight against cancer. A compound called isothiocyanates that is present in broccoli make it especial from other veggies, which impact liver enzyme oxidative stress, combat the development and growth in cancer. [15]

Chapter 5 Result and Discussion

5.1Proximate analysis of dehydrated cauliflower and broccoli

Sample		Moisture (%)	Fiber (%)	Ash(%)	Fat (%)	Protein (%)
Cauliflower	S1	8.81	12.01	4.29	1.13	17.10
	S2	8.01	13.21	5.05	1.24	18.4
	S3	7.89	17.9	5.81	2.20	19.6
Broccoli	S1	8.05	12.48	4.06	1.29	17.9
	S2	7.9	16.53	5.6	1.36	17.91
	S3	7.81	18.58	5.60	2.39	19.06

Table 6: Proximate analysis of dehydrated cauliflower and broccoli.

Here,S1 was dehydrated without using any pretreatment. Normal air dried by laboratory air drier.

S2 was prepared by using 3%common salt solution after blanching, then dried by laboratory air drier.

S3 was prepared by using 3% common salt+5% sucrose solution after blanching.This soution was containing 0.1% pottasium metabi sulphate then air dried.

Table 6 showed that the moisture percent is high (8.81%)for S1 then S2 and S3 of cauliflower and broccoli. Moisture content may be affect the storage life of vegetables . Comparatively S_3 contained standard level of moisture for storage (8.18-7.99%). S_3 represent the high percentage of fiber (18.8%)compared to S_1 and S_2. The same table showed that the ash content of S3 for both broccoli and cauliflower is higher(5.6-5.8%) than other two sample. The table showed that S3 for both broccoli and cauliflower showed a standard level of fat percentage(2.2-2.3%)).The same table showed that protein percentage varies among three samples. S3 for cauliflower and broccoli showed higher percentage of protein(17.9-19.6%).

5.2 Graphical representation of proximate analysis of dehydrated cauliflower and broccoli

Graphical representation of proximate analysis of dehydrated cauliflower

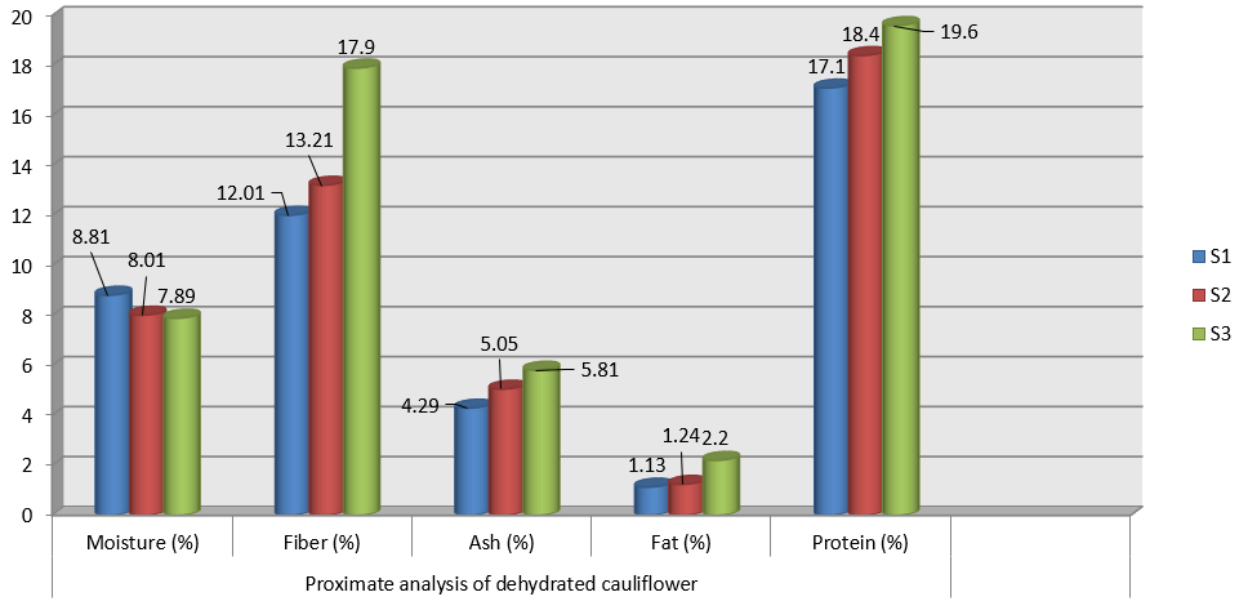

Fig:9- Proximate analysis of dehydrated cauliflower

In this graph S1 contains 8.81%moisture, 12.01% fiber,4.29% ash,1.13% fat,17.10% protein.the moisture percentage is higher than S2 and S3.fiber,ash,protein,is lower compared to S2 and S3.

S2 contains 8.01% moisture,13.21%g fiber,5.05% ash,1.24 fat, 18.4% Protein. The moisture percent is lower than S1 and higher than S1.protein,ash,fiber is higher compared to S2.

S3 contains 7.89% moisture,17.9%fiber,5.81%ash,2.2%fat,19.6% protein.in this graph protein ash, fiber percentage is higher than S1 and S2.and moisture percentage is also lower than other two samples.

Graphical representation of proximate analysis of dehydrated broccoli:

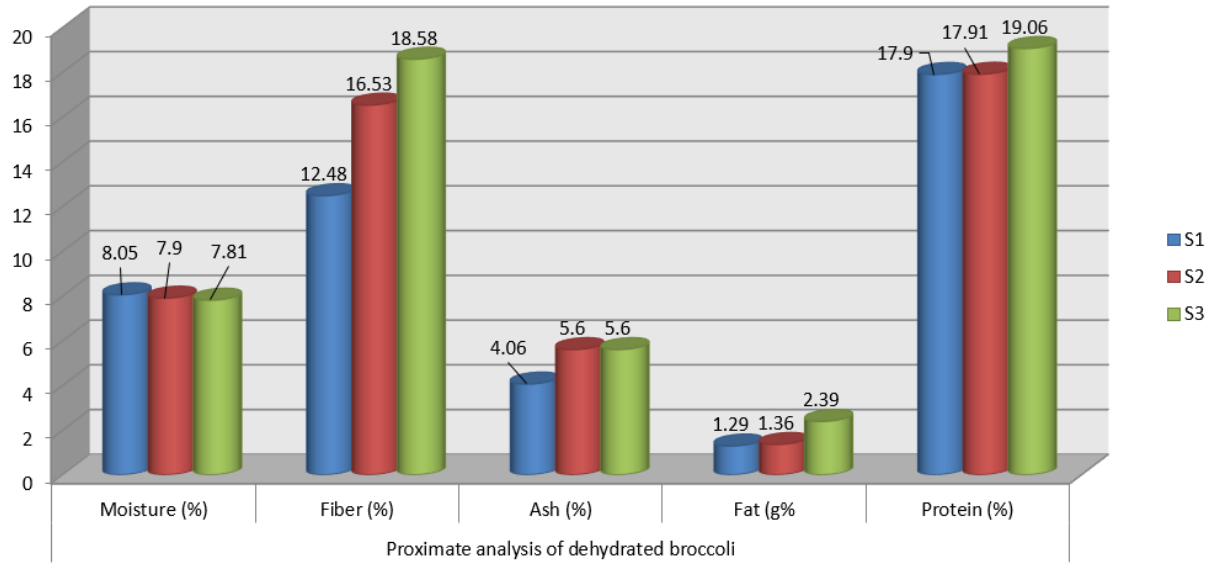

Fig:10-Graphical representation of dehydrated broccoli

In this graph S1 contains 8.05% moisture, 12.48% fiber,4.06% ash,1.29% fat 17.9% protein.Moisture percent is higher,than two other sample. S2 contains 7.98% moisture, 16.53% fiber,5.6%ash,16.53% fiber,17.9% protein.Protein,ash,fiber percent is higher than S1,but lower than S3.S3 contains 7.81% moisture,18.58% fiber,5.6% ash,19.6% protein,2.3% fat.In this graph moisture percentage is lower than other two sample. fiber ash,protein percentage is higher compared to other two samples.

5.3 Discussion:

Dehydration is very much popular and traditional methods for preserving fruits and vegetables. But dehydration process not yield good quality products all time.In order to get a good quality products, products should be dried in proper and maintained way. In case of some dehydration

process products became sluggish, poor texture, and sometimes appearance is not good.In this study three(3) basic economical, safe and budget friendly procedure of treatment was applied to select a best dehydration method.S1 was normal dehydration, and produce a product with high moisture content , and appearance was also poor compared to S2.S2 was prepared using 3%common salt solution and produced a better quality and appearance florets compared to S1.When 3% common salt used the moisture content was 7.98, protein percent was 18.4%,fiber was 13.2%similarly S.M. Pokharkar et al.,[16]also showed an effective result when using 3% common salt and that study reported moisture content was 7.98-8.01%,protein percent was 19.4%,fiber 13.6%. S3 was dehydration with 3% common salt+5% sucrose solution containing 0.1% pottasium meta bi sulphate.Among them S3 produce best quality products.The moisture content is also lowest (7.8%)in case of S3 protein percent was 19.6-19.6%,fiber percent was 17.9-18.8%. S3 also provides a good quality product when rehydrated. And proximate analysis of S3 showed good result compared to S1 and S2.Allah Bux Baloch et al.,[**17]** reported that dehydrated cauliflower contains higher proximate analysis value than fresh one due to the removal of moisture. High moistured vegetables generally contains low fat,but when moisture removed fat percentage increased. That same study also showed that Due to the impact of salt and sucrose Dehydration produced a good quality cauliflower. And proximate analysis showed moisture content of dried floret was 9.99%,protein 19.6%,fiber 18.5%,fat 2.24% which is almost similar to our study of S3.

Chapter 06 Conclusion

6.1 Conclusion

The study showed that three (3) procedure yield three(3) samples (S1, S2, S3) for both cauliflower and broccoli respectively.The moisture content of untreated florets(S1) showed higher result that is 8.81%.whereses the content of moisture for treated florets (using 3%common salt) showed less moisture level(7.89%)than untreated florets (S1). Finally another treated florets (3%salt+5%sucrose) showed perfect moisture level(7.8%) for both cauliflower and broccoli then S1 and S2.we know Moisture level promotes spoilage and the growth of microorganism. As S3 (3%salt+5%sucrose) contained less moisture than S1 and S2 so the storage condition of S3 would be better. So S3 procedure can be applied for dehydration of cauliflower and broccoli. cauliflower showed an incredible guarantee in giving significant insurance against cardiovascular illness, malignancy, diabetes.This study suggested that cauliflower broccoli may be the best diet in the prevention of carcinogenic diseases and cardiovascular diseases[17].These prepared florets can be marketed but it needs more research.

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