

Comparative Evaluation of Total Carbohydrate Content in Various Nuts and Dry Fruits by Using Anthrone Methods

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Abstract: *This study aims to estimate the total carbohydrate content in various nuts and dry fruits using the Anthrone method, a widely accepted colorimetric technique for carbohydrate quantification. Nuts and dry fruits are important dietary components, offering a rich source of energy, fiber, and micronutrients. To determine the nutritional value and possible health advantages of different nuts and dry fruits, it is essential to estimate their total carbohydrate content. The purpose of this study was to use the anthrone method to measure the total amount of carbohydrates in dry fruits and nuts that are frequently consumed. The Anthrone reagent reacts with carbohydrates under acidic conditions to produce a green-colored complex, which is measured spectrophotometrically to determine carbohydrate concentration. Samples including almonds, cashews, walnuts, raisins, dates, and figs were analyzed. The results revealed that dry fruits contain significantly higher carbohydrate levels, primarily due to their natural sugar content, while nuts exhibited lower carbohydrate concentrations, dominated by complex carbohydrates and dietary fiber. This variation underscores the nutritional diversity of these food groups and highlights the importance of accurate carbohydrate estimation for dietary planning and food labeling. The Anthrone method proved to be a simple, rapid, and reliable approach for carbohydrate analysis, making it suitable for routine nutritional assessments in food science and dietetics.*

Keywords: Anthrone Method, Carbohydrate Content, Dry Fruits, Nuts, Spectrophotometer

I. INTRODUCTION

Carbohydrate are curious and abundant type of organic compound found in a living thing. They are major source of metabolic energy both plant and animal. They are a major energy source for people meeting in abundant 40 to 85% of energy intake and r easily digestible in the small intestine. Carbohydrate are often classified as available like sameic and unavailable. Glycemic carbohydrates are important because they provide energy to body cell, mainly as a glucose after being solved in the small intestine as a monosaccharide's. The digestion of star stars in the mouth and continuous in the small intestine throughout the action of amylase. High intake of carbohydrate rich foods like arise has been a linked two and Rick of obesity type to diabetes and chronic disease some cancer.

Carbohydrates are a major source of metabolic energy both for plant and animal. They are sugar molecules with protein and fats. They are one of the three main nutrient found in food and fruits. Carbohydrate content carbon hydrogen and oxygen atom. They place important role in a human body they act as a energy source help to control blood glucose and insulin metabolic and also participate in a cholesterol and triglycerides metabolism help with the formation. The carbohydrate is divided into four major group monosaccharide disaccharide oligosaccharide and polysaccharide carbohydrates have a the general formula . They also known as a hydrates of a carbon. Carbohydrate are most abundant class of organic compound found in living organism. [1].



Fruits are in an integral and important part of everyday diet. Most of the food best dietary guideline (FBDG) in world recommended consuming protein (approx. 400- 500g) of fruits and vegetables a day. This wear popular fruits such as almonds pista, dates, Cashew, walnuts, peanuts , raisins, coconut, and sesame. Some of them are called super foods because of three extraordinary help benefits. The dry fruits are nutritional and anti nutritional composing including energy value carbohydrates, fats , protein , dietary, fiber, minerals, tannins and antioxidants. During respiration and growth, reserve carbohydrates are metabolized. These carbohydrates are located in the different parts of the plants. Plants use it to grow as well as to recover from stress, herbivory, or disturbances [2].

Dry fruit is a fruit where majority of the original water content has been removed either naturally through sun drying or through the specialized dryers or dehydrators . They have long history of use of dating back to the millennium BC in Mesopotamia and prized because of its sweet taste nutritive value and long shelf life. Dry Fruits are the way to healthy life. Dry fruits like almonds, walnuts, dates, raisins etc. are traditionally known to be a powerhouse of nutrients. These dried fruits have the same benefits as fresh fruits but with an added advantage- easy transportation, festivals, gatherings and celebrations all call for a customary gift box of dry fruits[3,4,5]. Dry fruits are rich in protein calcium and other micro nutrient which maintain healthy bones and strengthen them. Almonds are commonly consumed dried fruit because it has many health benefits. Almonds are rich in vitamin E , essential oil and antioxidant. Which are beneficial for both adults and kids. Compared to fresh fruit, dried fruit is lower in water content, higher in calories, higher in sugar, higher in carbohydrates, and higher in fibre. So consumption of too much of dried fruit is not good for health [6]. It can be eaten in Raw or roasted form. For best result it is a daily small quantity of soaked almonds in morning for healthy and fit body. They are known as a king of dry fruits they are located with nutrient. They can help with weight management. Almonds are 4% water 22% carbohydrate, 21% protein and 50% fats. Almonds are included as a good source of a protein among recommended healthy food by the U.S department of agriculture. Pistachio can suppress your hunger and help your body for a longer time is a rich acid carbonate vitamin E, copper, manganese , potassium calcium etc. this heart shaped dry fruit has anti-inflammatory properties that provide benefit. Pistachio can suppress your hunger and help your body to fill for a longer time. It is a rich source of folic acid and antioxidant carbohydrates and vitamin E , copper, manganese , potassium, calcium etc. these heart shaped dry fruits have anti-inflammatory properties that provide various benefits. The paste derived from aerial parts of *A. aspera* is topically applied to boils and wounds [7] and consumed as vegetables by people suffering from piles [8].

II. MATERIAL AND METHODS

Collection Of Sample: Dry fruit samples were collected from various local shops and wholesale dealers in the Sangamner market to ensure diversity in quality and origin. Samples included commonly sold dry fruits such as almonds, cashews, walnut, pistachios, Coconut and ground peanut to represent the market range. Each sample (approximately 250 g) was packed in clean, labeled polythene bags, indicating the shop name, date of collection, and type of dry fruit for identification and further analysis.

Preparation of sample: Dry fruits were crushed in pestle and mortar, from this 1gm weighed and taken in boiling tube. Boiling tubes were kept in water bath for few hrs and then removed from water bath and cooled to room temperature. After cooling it was neutralized by adding 50% ethyl alcohol . Then final volume was made to 10ml and centrifuged . Supernatant was used as sample in further process.

Preparation of Anthrone Reagent

Dissolve 0.2 g of Anthrone in 100 mL of concentrated sulfuric acid. Keep the solution chilled in an ice bath and prepare fresh before use.

Estimation of Carbohydrates in Samples

A 0.2, 0.4, 0.6, 0.8 and 1ml of working standard (with 0.1mg/ml conc.) of glucose was taken in boiling tubes and the final volumes of each tube was made 1ml by adding distilled water. Add 1 ml of each standard to 4 ml of Anthrone reagent.



Heat in a boiling water bath for 10 minutes. Cool and measure absorbance at 620 nm using a spectrophotometer . Plot absorbance vs. glucose concentration to create a standard curve. Use the standard curve to determine carbohydrate concentration in each sample.

III. RESULTS AND OBSERVATIONS

Sr.No.	Std. Glucose ml	Conc. Of Glucose mg	D.W. ml	Anthrone reagent ml	Incubate At 90 ° C For 17mins OR 100 ° C for 10mins	Absorbance at 620nm
1	0.0	0.0	1 ml	4		00
2	0.2	20	0.8	4		0.45
3	0.4	40	0.6	4		0.60
4	0.6	60	0.4	4		0.67
5	0.8	80	0.2	4		0.75
6	1.0	100	00	4		0.90
7	Almond(1 ml)	61	00	4		0.55
8	Pistachio(1 ml)	66	00	4		0.60
9	Walnuts(1 ml)	74	00	4		0.67
10	Cocount(1 ml)	58	00	4		0.53
11	Cashew(1 ml)	62	00	4		0.56
12	Peanut(1 ml)	66	00	4		0.60
13	Sesame	55	00	4		0.50
14	Raisin	44	00	4		0.40
15	Dates	46	00	4	0.42	

Table No.1: Absorbance at 630 nm with different optical density of nuts and dry fruits sample.

Formula :

$$\text{Percentage of carbohydrate (\% T)} = 10^{(\text{absorbance})} \times 100$$

Calculation:

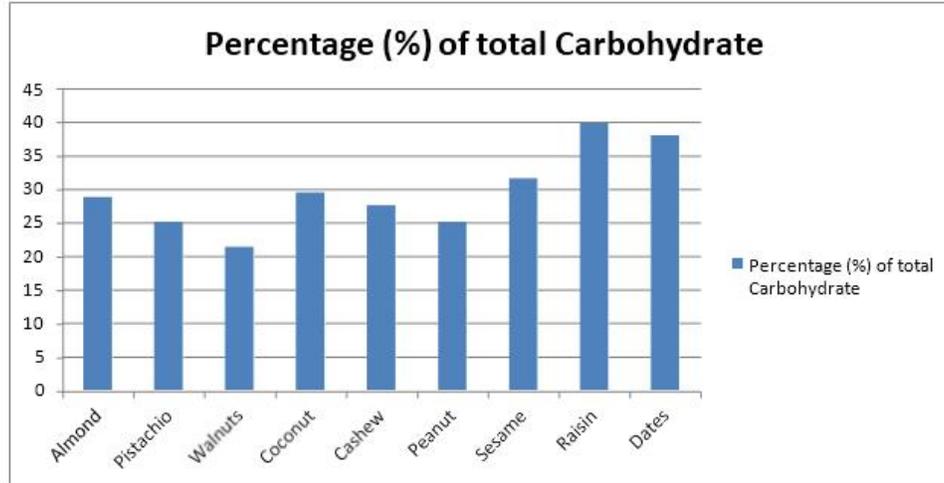
- 1] Percentage of carbohydrate in Almond (%T) = 10 (-0.55) x 100 = 28.18%
- 2] Percentage of carbohydrate in Pistachio (%T) = 10 (-0.60) x 100 = 25.11%
- 3] Percentage of carbohydrate in Walnut (%T) = 10 (-0.67) x 100 = 21.37%
- 4] Percentage of carbohydrate in Coconut (%T) = 10 (-0.53) x 100 = 29.51%
- 5] Percentage of carbohydrate in Cashew (%T) = 10 (-0.56) x 100 = 27.54%
- 6] Percentage of carbohydrate in Peanut (%T) = 10 (-0.60) x 100 = 25.11%
- 7] Percentage of carbohydrate in Sesame (%T) = 10 (-0.50) x 100 = 31.62%
- 8] Percentage of carbohydrate in Raisin (%T) = 10 (-0.40) x 100 = 39.81%
- 9] Percentage of carbohydrate in Dates (%T) = 10 (-0.42) x 100 = 38.01%

Sr.No.	Sample	Percentage (%) of total Carbohydrate
1.	Almond	28.8
2.	Pistachio	25.11
3.	Walnuts	21.37
4.	Coconut	29.51
5.	Cashew	27.54
6.	Peanut	25.11
7.	Sesame	31.62



8.	Raisin	39.81
9.	Dates	38.01

Table No.2 : Percentage of total Carbohydrate calculated in different dry fruit sample.



Graph 1 :- Percentage of total Carbohydrate calculated in different dry fruit sample.

IV. DISCUSSION

In the present study there were 09 different dry fruits are used. Initially optical Density of different dry fruits were found and these optical density converted in Percentage using formula,

$$\text{Percentage of carbohydrate (\%)} = 10^{(-\text{absorbance})} \times 100$$

The result obtained as for almond the percentage of Carbohydrate was 28.8, for pistachio 25.11 for walnut 21.37 for coconut 29.51, for Cashew 27.54, for peanut 25.11 , for sesame 31.62, for Raisin 39.81 and for Dates 38.01.

Overall result showed that the percentage of carbohydrate was different in Different Nuts and dry fruits sample. The higher concentration of carbohydrate was in Nuts such as Raisins is 39.81 and Dates 38.01 and lower concentration of carbohydrate in Dry fruit such as Walnut that is 21.37. The content of total carbohydrates in the leaf was obtained 51.41 ± 0.62 . One more study by Rana et al. found that the total carbohydrate content of the leaves was 39.91 ± 1.85 g/100g DW respectively which is also lesser than our study [9]. In previous studies by Oommen & Umamaheswari, the total carbohydrate content of the leaves was found to be 35.5 ± 0.5 mg/100g which is less than our study [10]. Earlier studies reported carbohydrate content in *A. aspera* was found to be $45.50 \pm 0.20\%$ [11]. Fatima et al. determined the carbohydrate content of *A. aspera* which was obtained to be 54.260 ± 0.490 g/100g [12].

V. CONCLUSION

Anthrone reagent proved to be a reliable and sensitive method for quantifying total carbohydrates, reacting with both mono- and polysaccharides to produce a measurable green-blue complex. Dry fruits such as dates and raisins exhibited significantly higher carbohydrate content, primarily due to their high natural sugar concentration and low moisture content. Nuts like almonds, pistachio , walnut , coconut , Cashew and sesame showed comparatively lower carbohydrate levels, with a higher proportion of complex carbohydrates and dietary fiber. The results underscore the nutritional diversity among nuts and dry fruits, highlighting their varied roles in diet planning dry fruits as quick energy sources and nuts as nutrient-dense snacks with balanced macronutrients. This study reinforces the importance of analytical techniques like the Anthrone method in food science for evaluating and comparing the nutritional value of natural food products.



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