



## Estimation of Total Carbohydrate in Flour of Different Types of Grain

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### **Abstract:**

Carbohydrate is an essential component of our diet because it is a major source of metabolic energy. A diet that does not contain carbohydrate can lead to muscle breakdown, ketosis and dehydration. This can be prevented by 50 to 100gms of carbohydrate per day. In the present work quantitative estimation of total carbohydrates present in flour of different types of grains were observed through spectrophotometer using phenol sulphuric acid method. Sulphuric acid causes all non reducing sugar to be converted to reducing sugar so that this method determines the total sugar present in food. In our findings we got maximum carbohydrate in rice i.e. 48% & minimum in corn i.e.40.2%. Therefore from rice we gain high calories of carbohydrates which increase the energy level in body. By knowing the carbohydrate % age in different food materials we can plan our diet as per our requirement.

### **Keywords :**

Carbohydrate, Ketosis, Reducing sugar, Quantitative & Energy level.

### **Introduction:**

Carbohydrates are most abundant class of organic compounds found in living organisms. Carbohydrates are a major source of metabolic energy, both for plants and animals. A diet that does not contain carbohydrate can lead to muscle breakdown, ketosis and dehydration. This can be prevented by 50 to 100gms of carbohydrate per day. In the present work quantitative estimation of total carbohydrate present in different grains were observed using phenol sulphuric acid method. Phenol sulphuric acid method is the most reliable and easiest method (*Masuko.T .et.al, 2005*) among the quantitative assays for carbohydrate estimation ,This method is widely used to determine the total concentration of carbohydrate present in foods (*Roberts R , Elias R 2011*). The results are expressed in the terms of a single carbohydrate, usually glucose. In this method , in hot acidic medium glucose is dehydrated to hydroxy methyl furfural, this forms a yellow brown





coloured product with phenol and has absorption maximum at 490nm .(*Sadasivam and Manikam,2005*)

The sulphuric acid causes all non reducing sugar to be converted to reducing sugar so that this method determines the total sugar present in foods. The method detects all classes of carbohydrates, including mono-, di-, oligo- and polysaccharides. Although the method detects almost all carbohydrates, the absorptivity of the different carbohydrates varies(*Nielsen S,2010*). This method is non stoichiometric and so it is necessary to prepare a calibration curve using a series of standards of known concentration of carbohydrate.

### **Material and methods:**

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. 1ml of 5% Phenol and 5ml of 96% Sulphuric acid was added one by one in each tubes and shook well so that the Phenol and Sulphuric acid get mixed thoroughly with working standard .After 10 minutes all the tubes were placed in water bath at 25-30°C for 15 minutes. Blank was set with 1ml of distilled water and O.D. of each tube was taken at 490nm with the help of spectrophotometer. Then the whole process following Phenol and Sulphuric acid method was repeated with 0.2ml of different samples\* of grains and the O.D.s of sample solutions were taken.

### **Preparation of sample:**

Flour of different grains was taken and samples from flour were prepared in the following way:

100mg of flour from grains was taken in boiling tubes and to hydrolyse the sample 5ml of 2.5N HCL was added in it .Boiling tubes was kept in water bath for 3hrs, and removed from water bath and cooled to room temperature. After cooling it was neutralised by adding solid sodium carbonate until effervescence ceases. Then whole volume was made 100ml by adding distilled water and centrifuged, supernatant is used as a sample.





## Result and discussion:

In the experiment conducted here total carbohydrate observed in rice flour is 48.7%, in Barley 45.5%, in Wheat 41.0% and in Corn it is 40.02% and according to "Calories in Indian food items (medindia.net) the amount of carbohydrate present in 100gms of cereals is similar to our findings in the respect that it is maximum in rice followed by Barley, Wheat and Maize. Recommendation for the general population is that carbohydrate should supply 50 to 55 percent of total calories for adults and for athletes it is between 55 to 65 percent of total calories (Kumar et al. 2012). Thus the grains or their flour are good source of carbohydrates and all the sugar the body need can be fulfilled by taking natural food like grains, vegetables, fruits and legumes (HealthAliousNess.com).

**Table - 1:** Absorbance at 490 nm with different concentration of working standard of glucose solution:

Tube no.	Blank	1	2	3	4	5
Glucose sol. (in ml)	0	0.2	0.4	0.6	0.8	1
Distil water (in ml)	1	0.8	0.6	0.4	0.2	0
5% phenol sol. (in ml)	1	1	1	1	1	1
96% sulphuric acid sol. (in ml)	5	5	5	5	5	5
O.D	0	1.20	2.25	3.50	4.20	6
Conc. Of glucose mg/ml	0	0.020	0.040	0.060	0.080	0.10

**Table - 2:** Absorbance at 490 nm with different sample solutions :

Tube no.	1	2	3	4
	Corn	Barley	Wheat	Rice
Sample sol. (in ml)	0.2	0.2	0.2	0.2
Distil water (in ml)	0.8	0.8	0.8	0.8
5% phenol sol. (in ml)	1	1	1	1
96% sulphuric acid sol. (in ml)	5	5	5	5
O.D	4.60	4.97	5.35	5.99

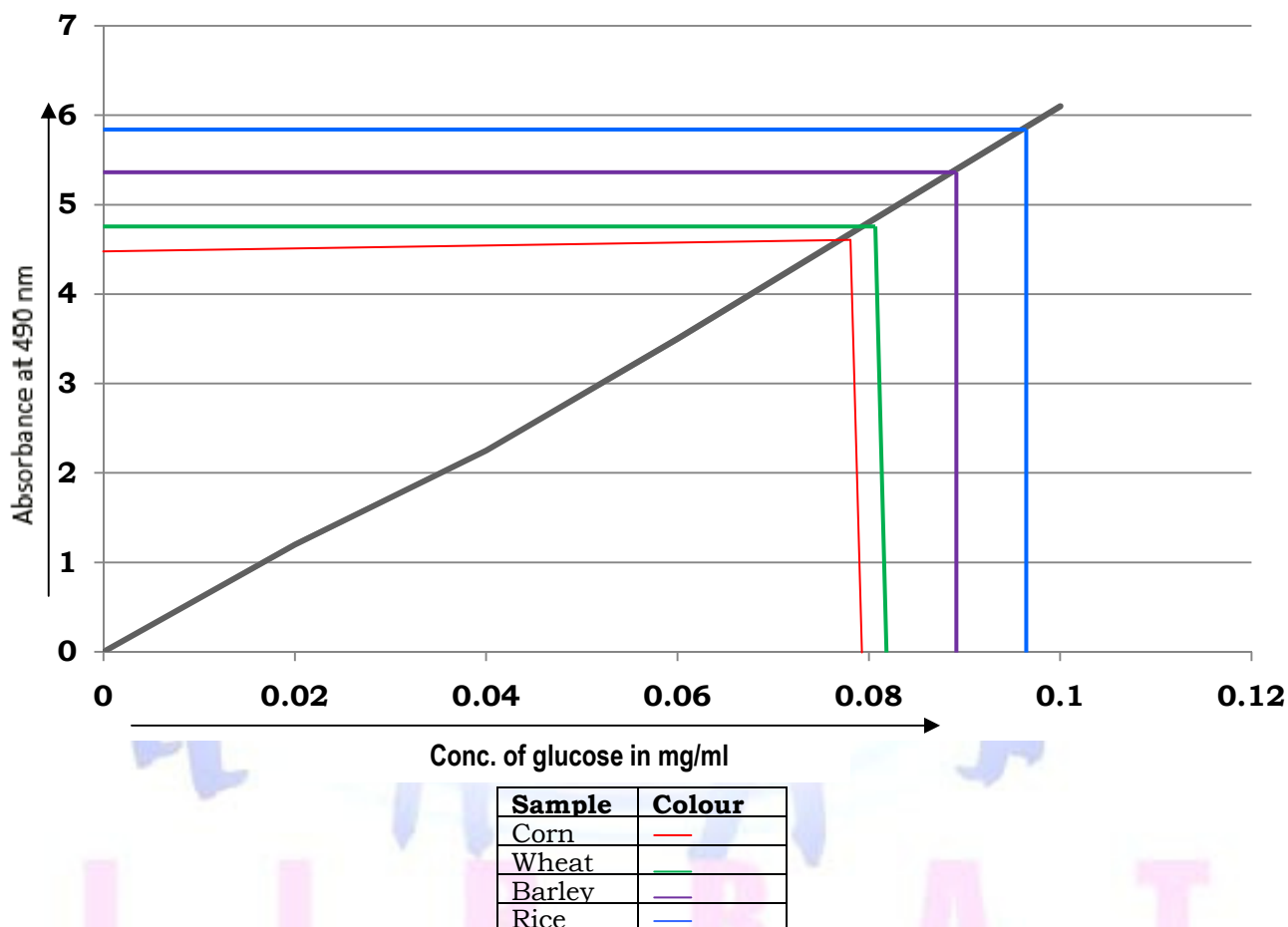
**Table - 3:** Conc. of total carbohydrates observed in different samples according to graph:

Sample	O.D	Con.(in mg/ml)
Corn	4.60	0.080
Wheat	4.97	0.082
Barley	5.35	0.091
Rice	5.99	0.097



**Table - 4:** Percentage of total carbohydrates calculated in different samples:

Sample	% of total
Corn	40.02%
Wheat	41.0%
Barley	45.5%
Rice	48.7%



**Fig. 1:** Obtained from different samples compared with standard curve of glucose

**Calculation:** Percentage of total carbohydrate present in grains was determined by following method (Sadasivam & Manickam , 2005):

Absorbance corresponds to 0.2 ml of test = X mg of glucose

100 ml of sample solution contain =  $x/0.2 \times 100$

= % of total carbohydrate present

1. Corn  $(0.080 \div 0.2) \times 100 = 40.02\%$



2. Wheat  $(0.082 \div 0.2) \times 100 = 41.0\%$
3. Barley  $(0.091 \div 0.2) \times 100 = 45.5\%$
4. Rice  $(0.097 \div 0.2) \times 100 = 48.7\%$

### Conclusion:

By knowing the percentage of total carbohydrate in different food grains we can plan our diet accordingly.

### References:

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**[www.HealthAliciousNess.com](http://www.HealthAliciousNess.com)**

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