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Research Article

**ESTIMATION OF CRUDE FIBER CONTENT FROM NATURAL
FOOD STUFFS AND ITS LAXATIVE ACTIVITY INDUCED IN
RATS**

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Article Received: September 2022 **Accepted:** October 2022 **Published:** November 2022**Abstract:**

Crude fiber is a measure of the quantity of indigestible cellulose, lignin, and other components of this of this type in present foods. It is composed of insoluble residue of acid that is true cellulose, insoluble lignin and hemi-cellulose. Crude fibers are mainly used in treating and preventing constipation, blood sugar levels, appetite, hemorrhoids, diverticulosis, coronary heart diseases and some type of cancers. To determine the quantitative estimation of crude fiber from different natural food stuffs an official method developed by Hennerberg, Stohmann and Routerberg was used. The following 12 different plants like Ananascomosus, Musa accuminata, Carica papaya, Vitisvinifera, Malusdomestica, Psidiumguajava, Manilkarazapota, Spinaciaoleracea, Rumexacetosa, Amaranthus, Hibiscus sabdariffa, Trigonallafoenumgraceum shows the ascending order of percentage of crude fiber. The laxative activity of some fruits like sapota, guava, grapes, apple, papaya, banana, pine apple was studied in rats. These results had shown that oral administration of fruit pulp extract produce significant crude fibre that increases faces output in rats.

Keywords: Crude fibre, Constipation, Natural food stuffs, Hennerberg, Stohmann and Routerberg method, Laxative activity, Fruit pulp extract.

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INTRODUCTION:

The history of dietary fibre dates back to ancient Greece where it was known that bran cereals pulped to prevent constipation. In the 1930s, J.H. Kellogg confirmed the positive effects of wheat bran on patients suffering with colitis and constipation but it was not until 1953 that Dr. Eben Hipolvy coined the phrase “dietary fiber” in an article on pregnancy toxemia. In 1970, British researchers Denis Burhitt and Hugh Trowell were the leaders in the field of “dietary fiber hypothesis” and the concept of western disease. After a spent of significant causes in their study they reached the conclusion that the lack of high fiber in foods of western people, contributed to higher incidence of certain conditions that includes heart diseases, and colorectal cancer. Hugh Trowell is credited with developing the first definition of dietary fiber in 1914.

Dietary fiber is a substances of plant origin, that cannot be broken down to resorb able components by the body’s own enzymes in the small intestine. Included are essentially soluble and insoluble non-starch polysaccharides and lignin and resistant starch. For the last few decades, developments were made for the significance of crude fiber and its roles in increasing health and lowering risk of diseases. There was scientific evidence that adequate intake of dietary fiber has a number of health benefits and also maintain healthy laxation and reduce the risk of heart diseases and cancer. The 2005 Dietary guidelines for American recommendations to choose fiber rich vegetable, whole grain and fruits. Other health benefits include maintain body weight, eliminate waste from gastro intestinal tract, prevents constipation, balance intestinal p^H, lowers blood sugar levels.

CRUDE FIBRE RECOMMENDATIONS AND INTAKE:

In 2002, the institute of medicine (IOM) established an adequate intake level for fiber as part of the dietary reference intake (DRI) for macro nutrients. The IOM recommends that all age group people must consume 14 grams of fiber for each 1000 calories.

Table :1 Fiber Recommendations by Age and Sex:

Population	Dietary Fiber Recommendation
Children ages 1-3 years old	19 grams
Children ages 4-8 years old	25 grams
Young boys ages 9-13 years old	31 grams
Young girls ages 9-13 years old	26 grams
Teenage boys ages 14-18 years old	38 grams

Teenage girls ages 14-18 years old	26 grams
Young and adult men ages 14-50 years old	38 grams
Young and adult women ages 19-50 years old	25 grams
Men ages 50 years and older	30 grams
Women ages 50 years and older	21 grams

EXPERIMENTAL PROCEDURE FOR CRUDE FIBRE ESTIMATION**Principle:**

Hennerberg, Sohmann and Routerberg method:

During the acid subsequent alkali treatment, oxidative hydrolytic degradation of the native cellulose and considerable degradation of lignin occur. The residue obtained after final filtration is weighed, incinerated, cooled and weighed again. The loss in weight gives the crude fiber content.

Essential equipments:

Water bath, Heating mantle, Weighing balance, Configure, Homogenizer, Desiccator, Muffle furnace.

Chemicals and Reagents:

Water, Alcohol, Petroleum ether, Sodium hydroxide solution, Sulphuric acid solution.

Preparation of solution:

Sodium hydroxide solution: 0.3 N

Take 1.24g of sodium hydroxide and dilute it with 100 ml distilled water.

Sulphuric acid solution: 0.2 N

Take 2.02 ml of sulphuric acid and dilute it with 100 ml distilled water.

Sample preparation:

The material of plant were collected in the month of December 2019 from a local market. Around 500gms of plant material was collected. It was taxonomically identified by Dr.S.K. Mahmood, Department of Botony, Nijam University-Hyderabad.

The plant materials were produced with a mechanical stirrer (or) grinder to form a coarse powder. The powder was passed through sieve no 40 and was stored in air tight container. This powder was used for extraction process.

PROCEDURE:

1. 2g of ground material was extracted with ether (or) petroleum to remove fat at a temperature of 35-38°C to 52°C.
2. If fat content is below 1%, extraction can be omitted.
3. After ether extraction, 2g of dried material is coiled with 200 ml of sulphuric acid for 30 min with bumping chips.

4. It is then filtered with muslin and wash it with boiling water until total acid content is removed.
5. Again boil it with 200 ml of sodium hydroxide solution for 30 min.
6. Later it is filtered by passing through muslin cloth.
7. It is again washed with 25 ml of 1.25% H₂SO₄, 150 ml of water and 25 ml alcohol.
8. The residue is removed and transfer to ashing dish it is the weighed as W₁.
9. Dry the residue for 2 hours at 130^oC of cool it in a desiccation of weighed as W₂.
10. Ignite it in a muffler furnace at 600^oC for 30 min
11. Cool in a desiccator of reweigh as W₃.

Calculation:

$$\% \text{ crude fibre in ground sample} = \frac{\text{loss in weight on ignition}}{\text{weight of the sample}} \times 100$$

$$= \frac{(W_2 - W_1) - (W_3 - W_1)}{\text{weight of the sample}} \times 100$$

EXPERIMENTAL PROCEDURE FOR LAXATIVE ACTIVITY ESTIMATION**Sample preparation:**

The extract of fruits pulp of sapota, guava, apple, grapes, papaya, banana, pine apple, was prepared homogenizing the pulp and subjected to the calculation for its laxative potential. The yield of 10

ml fluid like consistency for better oral administration through needle.

Animals:

Albino Wistar rats weighing 150-180g were housed and bred kept in standard cages with good ventilation, free access to feeds and water. Experimental procedures and protocols used in this study were appeared by ethical committee. These guidelines were in accordance with the internationally accepted principles for laboratory use and care.

Laxative activity:

The method of Capasso et al was followed for this activity. Rats fasted for 12 hours before the experiment were placed individually rats were divided in six groups and dose were given orally.

1st group : Acting as the control and administered normal saline (1 ml/rat/hour)

2nd group : Acting as the standard and administered castor oil (1 ml/rat/hour)

3rd group : Received sapota juice (1 ml/rat/hour)

4th group : Received guava juice (1 ml/rat/hour)

5th group : Received apple juice (1 ml/rat/hour)

6th group : Received grape juice (1 ml/rat/hour)

The same amount of dose solutions was given to each group for 5 hours.

The faeces produced in all six groups was monitored for 24 hours.

RESULTS AND DISCUSSIONS:**Table :2 Data showing amount crude fibre present in some plant materials.**

S.no	Plant material	Weight taken (in gms)	W ₁ (in gms)	W ₂ (in gms)	W ₃ (in gms)	Crude fibre %
1.	Sapota (Manilkarazapota)	10g	9.65	2.3	0.06	22.4
2.	Guava (Psidiumguajava)	10g	8.35	2.3	0.56	17.4
3.	Apple (Malusdomestica)	10g	7.97	1.23	0.09	11.4
4.	Grapes (Vitisvinifera)	10g	5.5	0.96	0.07	8.9
5.	Papaya (Carica papaya)	10g	9.03	2.1	1.51	5.9
6.	Banana (Musa accuminata)	10g	4.46	0.22	0.01	2.1
7.	Pine apple (Ananascosmosus)	10g	4.82	0.26	0.08	1.8
8.	Menthikura (Trigonallafoenumgraceum)	10g	11.54	7.71	0.17	75.4
9.	Gongura (Hibiscus sabdariffa)	10g	11.3	7.53	0.05	74.8
10.	Thotakura (Amaranthus)	10g	10.08	5.93	0.08	58.5
11.	Chukka kura (Rumexacetosa)	10g	6.089	3.26	0.02	32.4
12.	Palakura (Spinaciaoleracea)	10g	5.35	2.91	0.11	28

Where,

W₁ = Weight of residue before drying

W₂ = Weight of residue after drying for 2 hours at 130^oC

W₃ = Weight of residue after ignite for 30 min at 600^oC

Table :3 Data showing the weight of faeces output from each group and each rat.

Group number	Treatment	Wt. of faeces output from each group (X in gms)	Wt. of fecal matter output from each rat (X/6) in gms
1.	Saline (control)	6.4	1.06
2.	Castor oil (std)	17.1	2.85
3.	Sapota	14.6	2.43
4.	Guava	8.7	1.45
5.	Apple	8.9	1.48
6.	Grape	7.8	1.3

Number of rats per group (n) = 6

Table :4 Data showing the amount of laxative activity induced on each rat base on the fruit extract given orally.

Group number	Treatment	Laxative activity induced on each rat
1.	Castor oil	100%
2.	Sapota	85%
3.	Guava	50%
4.	Apple	52%
5.	Grape	45%

CONCLUSION:

From the above values of crude fiber percentage in different natural plant materials, it is found in that different plant materials contains varying amount of crude fiber. 50 according to IOM people of different ages and sex should intake prescribed amount of crude fiber daily for respective food stuff consumed.

The laxative activity of fruits (sapota, guava, apple, grape) was studied in rats. The results showed that an oral administration of the fruit juice produced significant and crude fiber dependent increases in faeces output of rats.

A wealth of scientific evidence demonstrate that adequate crude fiber intake has a number of health benefits, including maintenance of healthy laxation and the reduced risk of cardiovascular disease and cancer etc.

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