



**INTERNATIONAL JOURNAL OF
PHARMACEUTICAL SCIENCES**
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: <https://www.ijpsjournal.com>



Review Paper

A Systemic Review of Fiber Content in Different Fruit and Cereals

Abhay Kumar*, Abdul Qadir, Pradeep Kumar

Ch. Sughar Singh Pharmacy College, Jaswanthnagar Etawah, India.

ARTICLE INFO

Published: 13 Apr 2026

Keywords:

Dietary fiber, cereals, fruits, fiber analysis, soluble fiber, insoluble fiber, AOAC methods..

DOI:

10.5281/zenodo.19550854

ABSTRACT

Dietary fiber is an important part of a balanced diet, known for its vital role in digestive health and preventing chronic diseases. Cereals and fruits are key sources of daily fiber intake, though their composition and amounts differ widely. This review offers an analysis of the fiber content in commonly consumed cereals and fruits, along with the methods used to estimate it. It also discusses factors that affect fiber levels, compares different food sources, and emphasizes the importance of dietary fiber for human health. Modern methods for analysis and their benefits are addressed as well

INTRODUCTION

Dietary fiber consists of plant-based carbohydrates that resist digestion in the human small intestine. Instead of being absorbed, these elements undergo partial or complete fermentation in the large intestine. Fiber includes substances like cellulose, hemicellulose, lignin, pectin, gums, and resistant starch. Cereals and fruits are among the most significant dietary sources of fiber. Whole grains offer high amounts of insoluble fiber, while fruits provide both soluble and insoluble types. In recent years, growing awareness of lifestyle-related diseases has highlighted the importance of diets rich in fiber.

2. Classification of Dietary Fiber

*Corresponding Author: Abhay kumar

Address: Department of pharmacy: Ch. Sughar Singh Pharmacy College, Jaswanthnagar Etawah, India.

Email ✉: abhaykumar639791@gmail.com

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

2.1 Soluble Fiber

Soluble fiber dissolves in water to form gels. It slows down gastric emptying and helps control blood sugar and cholesterol levels. It is commonly found in oats, barley, apples, and citrus fruits.

2.2 Insoluble Fiber

Insoluble fiber does not dissolve in water and mainly adds bulk to stool. It improves intestinal movement and prevents constipation. It is plentiful in whole cereals such as wheat bran and maize.

3. Major Sources of Dietary Fiber

3.1 Cereals



Cereals are staple foods around the world and serve as a primary source of dietary fiber. Whole grains retain their bran and germ, which are high in fiber. Examples include:

- Wheat
- Rice
- Oats
- Barley
- Maize

3.2 Fruits

Fruits offer a variety of fibers, especially soluble types like pectin. Common fruits rich in fiber include:

- Apple
- Banana
- Orange
- Mango
- Berries

4. Methods Used for Fiber Analysis

4.1 Enzymatic-Gravimetric Method

This is one of the most accepted methods for measuring total dietary fiber. It involves enzymatic digestion of starch and protein, followed by measuring the remaining residue.

4.2 Advanced AOAC Methods

New standardized methods allow for a more complete measurement of fiber, including resistant starch and non-digestible oligosaccharides. These techniques provide improved accuracy, especially for processed foods.

4.3 Enzymatic-Chemical Methods

These methods separate and quantify soluble and insoluble fiber fractions individually, giving a detailed view of fiber composition.

5. Fiber Content in Cereals

Cereal grains vary significantly in fiber content based on type and processing.

Cereal	Approximate Fiber (g/100 g)	Characteristics
Wheat (whole)	10-12	High in insoluble fiber
Brown rice	3-5	Moderate fiber
Oats	8-10	Rich in soluble fiber
Barley	15-17	High beta-glucan content
Maize	7-9	Mainly insoluble fiber

Observations

Whole cereals contain much more fiber than refined ones. Removing bran during processing greatly reduces fiber content. Oats and barley are particularly noted for their soluble fiber.

6. Fiber Content in Fruits

Fruits have varying fiber levels depending on their type, ripeness, and edible portion.

Fruit	Approximate Fiber (g/100 g)
Apple	2-4
Banana	2-3
Orange	2-3
Mango	1.5-2
Berries	3-7

Observations

Fruits with edible peels generally offer more fiber. Processing methods like juicing reduce fiber content. Berries tend to have relatively higher fiber among fruits.

7. Factors Affecting Fiber Content

7.1 Processing Techniques

Refining cereals removes outer layers, greatly lowering fiber levels. Similarly, peeling and juicing fruits reduce their fiber content.

7.2 Genetic Variation

Different types of cereals and fruits naturally differ in fiber composition.

7.3 Stage of Maturity

As fruits ripen, changes happen in fiber structure, particularly a decrease in insoluble fiber.

7.4 Storage Conditions

Temperature and length of storage can affect the stability of certain fiber components.

8. Health Benefits of Dietary Fiber

Getting enough dietary fiber is linked to numerous health benefits:

- Improved digestive health
- Lower risk of cardiovascular diseases
- Better blood sugar control
- Weight management
- Support for beneficial gut bacteria

A diet lacking enough fiber is often associated with digestive issues and metabolic diseases.

9. Comparative Evaluation: Cereals vs Fruits

Parameter | Cereals | Fruits

Fiber quantity | High | Moderate

Dominant type | Insoluble | Soluble | Nutritional role | Bulk formation | Metabolic regulation Effect of processing | Significant loss | Moderate loss | Cereals provide the bulk of fiber, while fruits offer functional fiber that aids in metabolism.

10. Recent Developments in Fiber Analysis

Recent improvements have made fiber measurement more precise. These include:

- Better enzymatic digestion techniques
- Inclusion of resistant starch in analysis
- Use of chromatographic methods for detailed profiling

Such advancements have enhanced the understanding of fiber composition in foods.

DISCUSSION

Analyzing dietary fiber in cereals and fruits underscores the need to choose whole and minimally processed foods. While cereals provide the bulk of daily fiber intake, fruits offer essential soluble fibers that support metabolic health. Differences in analysis methods can result in variations in reported fiber values, highlighting the importance of standardized techniques. A balanced intake of both cereals and fruits is needed to meet optimal fiber consumption.

CONCLUSION

Dietary fiber is vital for maintaining overall health, and cereals and fruits are its main sources. Whole cereals are rich in insoluble fiber, while fruits deliver valuable soluble fiber. Improved analysis methods have deepened understanding of fiber content in foods. Promoting the consumption of whole grains and fresh fruits is crucial for meeting dietary fiber needs and supporting long-term health.

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HOW TO CITE: Abhay Kumar, Abdul Qadir, Pradeep Kumar, A Systemic Review of Fiber Content in Different Fruit and Cereals, *Int. J. of Pharm. Sci.*, 2026, Vol 4, Issue 4, 2003-2006, <https://doi.org/10.5281/zenodo.19550854>

