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NUTRINEWS

In the current issue, we look at the importance of cereal grains as an integral part of our daily diets. Cereals are staple foods and are important sources of nutrients for the world's population and specifically for an agricultural country like India.

"Whole grains" Has become the buzz word recently; as its consumption is associated with several health benefits such as reduced risk of chronic diseases like coronary heart disease, type 2 diabetes, obesity, cancer etc. What makes grains "whole" is that they contain all the three parts of the grain kernel in the same proportions - the endosperm, germ and bran which are rich in fibre, protein, and essential vitamins and minerals.

Further, we highlight the role of fortification of food as the most effective solution that can help virtually eliminate micronutrient deficiencies- a major public health problem in India. A recent research conducted by Liu et al in 2014, concluded that food fortification improves biological markers, particularly iron and hemoglobin when fortifying with multiple micronutrients or iron.

Several misconceptions exist among people with regards to cereal and cereal products. Firstly, many feel that cereals are stripped off essential nutrients due to various processing it undergoes to meet the sensorial expectations of the consumer. Secondly, the importance of consuming fortified foods is often 'neglected' or not understood largely due to lack of awareness and positive communication.

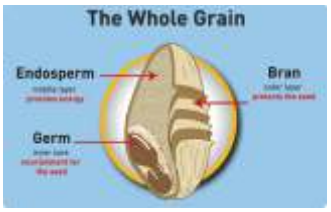
Through this issue, we intend to demystify these misconceptions and communicate the facts for interest of the larger population.

As always, we welcome your valuable feedback and comments.

Regards,

Kellogg's® Nutrition Team.

Goodness of Grains: Simple, Nutritious and Versatile



Source: Slavin J. Why whole grains are protective: biological mechanisms. ProcNutr Soc. 2003;62(1):129-34.

Grains have long been an essential part of a healthy diet. They are commonly called "cereals" after Ceres, the ancient Roman Goddess of tillage and corn. Simply put, cereal is a food derived from any plant in the grass family that yields edible grains or seed. Corn, wheat, oats, rice, and barley are some of the most popular examples of grains from which cereal can be derived. These grains provide more than half of the world's daily caloric intake, carbohydrates and proteins and are the staple part of most diets.[1] Consumption of grains, especially whole grains, provides a world of health benefits.

Nutritional benefits of grains

- Grains are important source of carbohydrates, proteins, fibre, vitamins (particularly B-group vitamins and vitamin E), minerals (including zinc and magnesium) and other beneficial food components, including antioxidants and phytonutrients
- They are low in fat; and any fat they contain is primarily polyunsaturated
- Grain-based foods – such as breakfast cereals play a vital role in healthy diets

Wheat

- Whole wheat is a source of complex carbohydrates
- It contains a wide range of minerals, vitamins and fat
- Wheat bran is a good source of insoluble dietary fibre, which helps with bowel regularity and helps to maintain a healthy digestive system

Corn (Maize)

- The nutritional highlight of corn is the amount of vitamin A it contains, which is ten times that of other grains
- Yellow maize is the only grain with significant amounts of carotenes. These act as antioxidants and are converted to vitamin A in the body
- As a gluten-free grain, corn is a key ingredient in many gluten-free foods

Oats

Oats contain beta glucan-a soluble fibre which has several health benefits like -

- Has a cholesterol lowering effect and therefore good for heart health
- Provides great satiety value and hence can help in weight management
- May help reduce the risk of type 2 diabetes and improve blood glucose control for those who already have diabetes

Rice

- Rice is rich in nutrients and a host of other vitamins and minerals
- It is an excellent source of complex carbohydrates-the best source of energy
- Brown rice may help lower blood glucose levels in healthy and diabetic individuals
- Oryzanol in rice bran has been shown to have a cholesterol lowering effect

Wholesome goodness of 'Whole Grains'

Whole grain contains all three parts of the kernel – the bran (fibre-rich outer layer), the germ (nutrient-rich inner core), and the endosperm (middle starch and protein layer).[2,3]

In the grain refining process, the bran is removed, resulting in loss of dietary fibre, vitamins, minerals, phytoestrogens, phenolic compounds and phytic acid. Most often whole grains are milled into flour and used to make breads, cereals, pasta, crackers, and other grain based foods. Regardless of how the grain is processed, a whole grain food product must deliver approximately the same relative proportions of bran, germ, and endosperm found in the original grain.[1,2]

Types of whole grains include whole wheat, whole oats/ oatmeal, brown rice, wild rice, whole cornmeal, popcorn, whole barley and millets like whole jowar, bajra, ragi, amaranth.

"Recent evidence suggests that many of the health benefits associated with whole grains may be more accurately attributable to their fibre content."[2]

USDA Guidelines recommend making **"half of all the grains eaten as whole grains"** to reap the many health benefits of whole grains.[4]

Grains for change

It is not difficult to create a healthy plate, simply by substituting food stuffs made from refined grain for food stuffs made with whole grains.

Type of Food	Whole grain option
Breakfast cereals	• Cereals made with whole grains like Kellogg's All Bran Wheat Flakes , Kelloggs Chocos, Kellogg's Honey Loops, Kellogg's Oat Bites • Porridge made with rolled oats or oatmeal like Kellogg's Oats • Puffed whole grains
Bread and crackers	• Whole grain wheat breads, whole wheat crackers, whole grain rice cake
Flour	• Whole wheat flour, oatmeal
Other meal accompaniments	• Brown rice, wild rice, whole wheat pasta/ macaroni, whole grain corn/ popcorn

How Grains become Cereal

Specifics on cereal processing

Traditional cereal processing method

Cereal grains used for human consumption mostly undergo some kind of processing for removal of the bran (pericarp) and the germ, primarily to make it fit for human consumption and meet the sensory expectations of the consumers. Milling (grinding of the grain) - is the principal processing method employed for deriving various cereal products. Processing of the grain also enhances its end-utilization so that it can be used to prepare various attractive food stuffs. For e.g.: Wheat may be crushed with grinding stones or similar devices or by modern automated systems employing steel cylinders, followed by air purification and numerous sieving to separate the endosperm from the outer coverings and the germ and then eventually used to obtain wheat flour, broken wheat etc. as per requirement (refer figure 1). Similarly, commercial ready- to- eat cereals are usually extruded, puffed, flaked or otherwise altered to make a desirable product.[1,5-6]

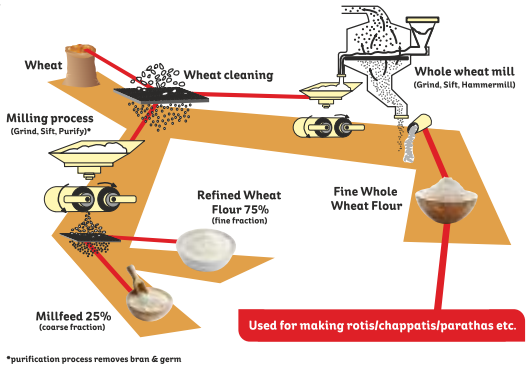
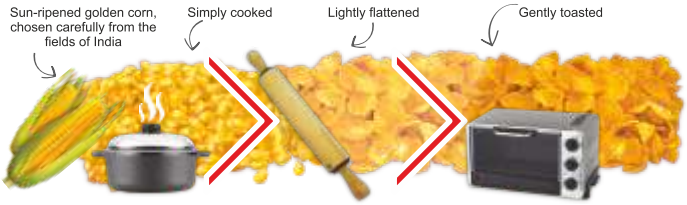


Fig 1: Traditional wheat milling process.
Adapted from Process for producing ultrafine-milled whole-grain wheat flour and products thereof http://www.google.com/patents/US20060073258#forward-citations

Kellogg's ready-to-eat cereal processing method

For more than 100 years, Kellogg has created cereals with simple grains that are fortified with essential vitamins and minerals together with a handful of other ingredients. Grains used to make Kellogg's ready-to-eat cereals or 'Anaaj Ka Nashta' are grown in the fields of India and produced by local farmers. They are made from the choicest corn, wheat, rice, barley and oats. Sun-ripened grains are chosen carefully from fields of India. The farmers deliver the grains to the miller to be cleaned and prepared before sending it to Kellogg.

These grains are then taken by Kellogg and made in to ready-to-eat cereals in just few simple processing steps using a bigger kitchen.



Result:

Simple, Nourishing & Delicious Ready- to-eat 'Anaaj ka Nashta'

Key Take-outs:

- Cereals need to undergo a range of processes in order to produce a variety of products
- Milling is the main process associated with cereals
- Kellogg's ready-to-eat cereals are simply processed
- Kellogg's ready-to-eat cereals are made from simple familiar grains; a handful of other ingredients, plus added vitamins and minerals; contain no added preservatives

Fortification of Grain: A Practical Approach for Optimizing Nutrient Intake

The milling process applied to grains, unfortunately strips them of important nutrients beneficial to health, including dietary fibre, phenolics, vitamins and minerals due to removal of bran (pericarp) and germ (refer to Fig. 2).[6]

India being an agricultural country, grains form the staple diet for the Indian population. Hence, consuming processed grains which are devoid of essential micronutrients can result in micronutrient deficiency.

Globally, more than 2 billion people have micronutrient deficiencies, most of them belong to the developing countries.[7] In India, everyday more than 6,000 children below the age of five are reported to die. More than half of these deaths are known to be caused due to malnutrition- mainly lack of vitamin A, iron, iodine, zinc and folic acid. Data from the National Nutrition Monitoring Bureau (NNMB) over the last three decades has consistently shown that more than 70% of pre-school children consume less than 50% of the RDAs for vitamin A, iron, folic acid and riboflavin.[8]

Food fortification is one of the most effective public health measures to control micronutrient deficiency in the population. It is usually regarded as the deliberate addition of one or more micronutrients to particular foods, so as to increase the intake of these micronutrient(s) in order to correct or prevent a demonstrated deficiency and provide a health benefit. Fortification generally aims to supply micronutrients in amounts that approximate to those provided by a good, well-balanced diet. Consequently, fortification of widely distributed and widely consumed staple foods like cereals can help to improve the micronutrient status of a large proportion of the population both poor and wealthy.[9]

(refer to Fig. 2).

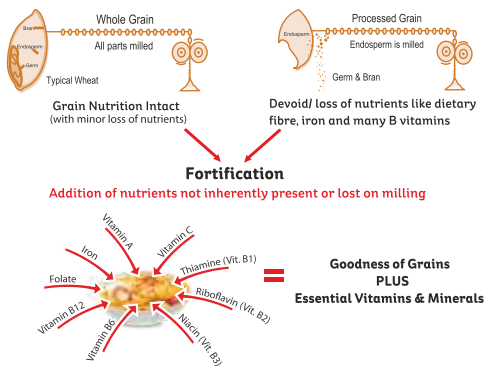


Fig 2: Grain processing and fortification

Therefore, fortified cereals have an improved micro-nutrient profile.

Cereal as a Vehicle for Delivering Deficient Micronutrients

Cereals are important food vehicles for fortification as they are staple foods in many parts of the world and key ingredient in so many food preparations.[10]

Widely used fortified foods[11]

Food vehicle	Fortifying agent
Salt	Iodine, iron
Wheat and corn flours, bread, pasta, rice	Vitamin B complex, iron, folic acid, vitamin B12
Ready-to-eat breakfast cereals	Vitamins and minerals
Milk, margarine, yoghurts, soft cheeses	Vitamin A and D
Sugar, monosodium glutamate, tea	Vitamin A
Infant formulas, cookies	Iron, Vitamin B1 And B2, Niacin, Vitamin K, Folic Acid, Zinc
Vegetable mixtures, amino acids, proteins	Vitamins and minerals
Soy milk, orange juice	Calcium
Juices and substitute drinks	Vitamin C
Diet beverages	Vitamins and minerals

For e.g.; Kellogg's Chocos fortified with vitamins A, C, B1, B2, B3, B6, B12 and folic acid and minerals including iron, calcium and zinc positively contribute to the nutrient intakes of children (refer to the table below)

Nutrients	Nutrition information of whole wheat	Nutrition information of CHOCOS - A fortified cereal made with whole wheat	
	(Typical values per 30 g)	(Typical values per 30 g)	% RDA*
Vitamin A	19.2 µg	30.0 µg	6%
Vitamin C	0.0 mg	6.0 mg	18%
Thiamine (Vit. B1)	0.13 mg	0.3 mg	30%
Riboflavin (Vit. B2)	0.05 mg	0.4 mg	33%
Niacin (Vit. B3)	1.65 mg	4.0 mg	35%
Vitamin B6	0.17 mg	0.5 mg	26%
Vitamin B12	0.0 µg	0.1 µg	68%
Folate	11.0 µg	25.5 µg	13%
Iron	1.59 mg	4.2 mg	21%
Calcium	12.3 mg	160.0 mg	51%
Zinc	0.8 mg	0.8 mg	8%

Grain/Cereals + Fortification = Improved micro-nutrient intake

Having a Vitamin-Rich Serving of Kellogg's Breakfast Cereal = Nourishing and Happy Start to the Day!

Cereals making a positive difference in people's diets

Dietary studies demonstrate that eating breakfast cereals containing vitamins and minerals make a significant contribution to the intake of these vital micronutrients:

- Studies have reported better intakes of B vitamins (thiamine, riboflavin, niacin, folic acid, B6 and B12) and iron in those children who eat breakfast cereal regularly[12-16]
- A higher percentage of children who skip breakfast have reduced intakes of many nutrients such as vitamins A, E, C, B6, B12, folate; iron; calcium; phosphorus; magnesium; potassium; and dietary fibre[12]

U.S Department of Agriculture (USDA) recommend that around 20-25% of the day's requirement of nutrients, vitamins and minerals should be met at breakfast.[17] One bowl of breakfast cereal each day provides up to 20-25% of daily intakes of essential nutrients including key vitamins and minerals thus demonstrating the valuable contribution in an Indian diet.

Key take-outs:

- Food fortification can be used to increase the micronutrient content of foods or to replace nutrients lost in food processing, thus playing a valuable role in preventing dietary deficiencies
- Cereals are important food vehicles for fortification as they are staple foods in many parts of the world
- Eating breakfast cereals fortified with essential vitamins and minerals can make a positive contribution to nutrient intakes
- Kellogg's ready-to-eat cereals are made with whole grains They contain many of the basic nutrients that are needed to give a solid start to the day: carbohydrates, protein, fat, minerals, vitamins and fibre

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