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Dietary intakes of whole grains, health benefits but do contaminants pose a major risk?

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Abstract

Introduction: There is a long history of use for whole grain cereals as part of human dietary intakes with records of dietary grain consumption from the Middle Stone Ages. Whole grains are nutrient dense and research demonstrates that the healthiest diets (those associated with reduced risk of non-communicable diseases e.g. cardiovascular disease or cancer) are characterised by higher intake of fruit, vegetables, nuts and legumes and whole grains and lower intakes of red and processed meats. Currently, grains are a main energy and carbohydrate source and as such form a cornerstone of food based dietary guidelines and dietary guidance globally. However, grains also naturally contain contaminants and as a food category can represent a significant dietary source of foodborne contaminants.

Materials and Methods: The outcomes of a narrative review on the major contaminants present in whole grains, their potential health risks and suggested strategies to mitigate any risk are described. Contaminants are limited to mycotoxins (aflatoxin B1, ochratoxin A, Fumonisin B1, deoxynivalenol, zearalenone), heavy metals (e.g. arsenic, cadmium, lead) and the process contaminant acrylamide.

Results: Whole grains can contain more contaminants than refined versions e.g. whole grain rice with bran intact can have up to 80% more arsenic than white rice. However, whole grains also provide more nutrients which may mitigate against the impact of these contaminants. For example, for heavy metals, there is some evidence that dietary fibres (e.g. wheat bran) may bind to them and reduce their absorption, as can nutrients naturally found in whole grains e.g. zinc, magnesium or copper. Minerals such as iron, calcium, magnesium and zinc may also impede heavy metal absorption by down-regulating or competing for attachment to transporters that facilitate intestinal absorption. Although, strict regulatory thresholds and monitoring processes by competent authorities minimise any risk to public health, the consumer may further lessen any risk through their own dietary choices and food storage and preparation practices

Discussion: There are a number of potential health-protective properties inherent to whole grains. Given that complete elimination of contaminants from grains is unlikely to be achieved, their presence merits continued monitoring with evidence to date suggesting any such risk does not outweigh the known benefits of wholegrain consumption.

Conflict of Interest

None