Nutrition Research Review: The Safe and Effective Use of Plant-Based Diets with Guidelines for Health Professionals

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Review by: Anna Millichamp, APD, Senior Teaching Fellow, PhD Candidate, Bond University

Plant-based diets have soared in popularity in recent years. It is important that health professionals have a good understanding of how we can support patients consuming a plant-based diet to achieve optimal nutrition.

A plant-based diet is a broad label that captures the spectrum of diets comprised mainly of plant-based foods. In this paper, the definition used includes diets that range from including only plant-based foods (e.g., vegan) through to diets that are predominantly plant-based but may include animal products such as eggs and dairy (e.g., lacto-ovo vegetarian)[1].

Plant-based diets and chronic diseases

Plant based diets generally deliver more dietary fibre and are rich in polyphenols as they often contain proportionally more fruits, vegetables, wholegrains, legumes, and nuts/seeds than an omnivore dietary pattern. These dietary components deliver metabolic and anti-inflammatory benefits and are associated with reductions in chronic disease risk factors.

Cardiovascular disease (CVD): Evidence supports that a well-balanced plant-based diet that is rich in fruits, vegetables, wholegrains, legumes, nuts and seeds is associated with reductions in CVD risk factors including body mass index, waist circumference[2, 3], blood lipids[4], blood glucose[2], inflammation[5] and blood pressure[6].

Type 2 Diabetes Mellitus (T2DM): Observational research indicates that vegan and vegetarian populations are at lower risk of developing T2DM compared to non-vegetarians (e.g., [7]). Similarly, vegetarian diets, along with other plant-based diets such as the vegan, Mediterranean, and the Dietary Approaches to Stop Hypertension (DASH) diets have been associated with a reduction in HbA1c and other metabolic risk factors[8].

Cancer: Plant foods are a rich source of phytochemicals and plant food groups have chemo-protective properties. Nuts, fruits, legumes, and vegetables are all associated with reduced cancer risk[9]. Red meat intake at 100-120 g/day has been found to significantly increase the risk of a range of cancers when compared to not eating meat[10].

Bone health: There is some evidence to suggest that plant based diets may not deliver adequate nutrients to support optimal bone health, with some studies finding vegetarians and vegans to be at higher risk of fracture[11] and have lower bone mineral density[12] compared with omnivores. It is therefore important to carefully plan plant-based diets to

deliver adequate nutrients that are supportive of bone health such as protein, calcium, Vitamin D, magnesium, potassium, zinc and Vitamin K and C.

Plant-based diets and the gut microbiome

Our understanding of the complex influence that plant-based diets have on the gut microbiome is still emerging. A plant-based diet is often rich in dietary fibre, including soluble and insoluble fibre, and resistant starch, as well as polyphenols.

The consumption of *dietary fibre* supports a high abundance of microbes that produce butyrate and other short-chain fatty acids which have an anti-inflammatory effect and strengthen the intestinal barrier function. In contrast, a low fibre diet has been found to be associated with a shift towards more mucus-degrading bacteria being present, compared with fibre-degrading bacteria[13].

The *polyphenols* in plant foods are metabolised into bioactive compounds and support the abundance of beneficial bacteria such as *Lactobacillus* and *Bifidobacterium*[14]. Some plant-based foods, e.g., nuts, have a *prebiotic* effect which also supports an increase in butyrate-producing and other beneficial microbes[15]. Interestingly, cross-sectional studies that compare vegans or vegetarians with non-vegetarians have not consistently found differences in gut microbial composition[16], leading the authors suggest that it is possible that microbial function is more important that microbial composition.

Plant-based diets across the life cycle

Well-planned plant-based diets can deliver adequate nutrition to meet requirements across all life stages. Demand for individual nutrients varies across life stages and as such, it can be helpful to pay special attention to an individual's intake of specific nutrients at the different life stages. The authors identify these nutrients of concern, listed below, that require special attention to ensure a nutritionally adequate intake is achieved (*vegans at increased risk of deficiency):

- Pregnancy/Lactation: iron, zinc, vitamin B12* (vegetarian and vegans should include vitamin B12 fortified foods and/or supplement if indicated), iodine (150 ug supplement recommended for all pregnant/lactating women), and docosahexaenoic acid (DHA).
- Infants/Childhood/Adolescence: iron, zinc, vitamin B12* (infants should be supplemented if maternal B12 intake/status is inadequate and children/adolescents should be supplemented or include vitamin B12 fortified foods), iodine, calcium, vitamin D, docosahexaenoic acid (DHA), and for vegans, potentially protein also.
- Older adults: Calcium, vitamin B6*, vitamin D, vitamin B12* and potentially protein.

To learn more about nutrient requirements for different ages and genders, please refer to the National Health and Medical Research Council's Nutrient Reference Values for Australia and New Zealand.

Conclusion:

A well-planned plant-based diet, whether vegan or vegetarian, can be consumed safely for across all life stages and may be associated with some health benefits. To ensure nutritional safety certain nutrients, such as calcium, iron, vitamin B12, and vitamin D, etc. require targeted consideration to ensure adequacy is achieved and maintained.

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