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Meeting nutritional needs on a vegetarian diet

This article forms part of a series looking at the relationship between diet and good health, and the role of the dietician in the primary health care team. This article discusses a vegetarian diet, and provides strategies to assist patients in planning meals to prevent potential nutritional deficiencies and to maximise health benefits.

■ **A vegetarian is a person who consumes a diet consisting mostly of plant based foods including fruit, vegetables, legumes, nuts, seeds and grains. Some vegetarians also consume eggs and dairy foods. Individuals choose to follow a vegetarian diet for a range of reasons, including animal rights and religion, but two common reasons are the health and environmental benefits of plant based eating.**

Types of vegetarian diets

The four main types of vegetarian diets are:

- lacto-ovo vegetarian – eats dairy foods and eggs but not meat, poultry or seafood. This is the most common form of vegetarianism
- lacto-vegetarian – eats dairy foods but not eggs, meat, poultry or seafood
- ovo-vegetarian – eats eggs but not dairy foods, meat, poultry or seafood
- vegan – does not eat any animal products including meat, poultry, seafood, eggs and dairy foods.

Health benefits of vegetarian diets

Numerous studies demonstrate the health benefits of a vegetarian or plant based diet. In general, vegetarian diets¹:

- are low in fat, particularly saturated and trans fats
- contain a high proportion of monounsaturated and polyunsaturated fats
- are low in cholesterol (a vegan diet is cholesterol free)
- are high in dietary fibre
- contain large quantities of fruits, vegetables and legumes

- are high in antioxidants and phytochemicals.

It is likely the combination of these factors provides vegetarians with an advantage when it comes to health.

Meeting nutritional needs

A well planned vegetarian diet that includes a variety of plant based foods can meet nutritional needs. However, some nutrients may need special attention.¹

Protein

Vegetarian diets usually exceed protein requirements, although they may provide less protein than a nonvegetarian diet.

As most plant foods contain limited amounts of one or more essential amino acids, it was once thought that certain combinations of plant foods had to be eaten at the same meal to ensure sufficient essential amino acids. It is now known that strict protein combining is not necessary, provided energy intake is adequate and a variety of plant foods are eaten each day including legumes, wholegrains, nuts and seeds, soy products, and vegetables.¹ Furthermore, soy protein has a protein digestibility corrected amino acid score (PDCAAS) that is almost identical to meat.²

Tips for meeting protein needs

Ensure protein rich foods are part of the daily diet, including:

- legumes such as soybeans, chickpeas, lentils, kidney beans, split peas and baked beans
- wholegrains such as brown rice, buckwheat, polenta, quinoa, amaranth, barley and oats
- dairy foods and eggs (lacto-ovo vegetarians)
- soy products such as soy beverages, soy yoghurt and tofu
- nuts and seeds.

Vitamin B12

Vitamin B12 (cobalamin) is found only in animal products so deficiency is a potential concern for any person following a vegetarian diet (especially a vegan diet), or any person who significantly restricts the consumption of animal products from their diet.

Serum levels of vitamin B12 are generally lower in vegetarians (especially vegans), and levels decrease the longer a person is on this type of diet.¹ Although it can take several years for deficiency symptoms to develop, any person excluding the consumption of animal products from their diet will eventually become deficient if their diet is not adequately supplemented. All vegans should supplement their diet with vitamin B12. This is particularly important for women who are pregnant or breastfeeding, to prevent deficiency in their baby.^{3,4} Small frequent doses of about 2 µg are recommended as bioavailability decreases with increasing intake.^{5,6}

While plant foods (including mushrooms, tempeh, miso and sea vegetables) are often reported to provide some vitamin B12, they are not a reliable source and will not prevent deficiency. These foods contain an inactive form of B12, which interferes with the normal absorption and metabolism of the active form in the body.⁷ A reliable source of biologically active vitamin B12 is recommended on a regular basis, either from fortified foods or supplements.

Tips for meeting vitamin B12 needs

- Include dairy foods and eggs in the diet regularly (one glass of milk, plus one tub of yoghurt, plus one egg, plus 40 g cheese provides the daily requirement)
- For those following a vegan diet, include fortified soy beverages. There are also some other fortified foods such as vegetarian burgers, sausages and yeast extracts (2.5 glasses of a fortified soy beverage provides the daily requirement)
- For those who do not eat foods containing vitamin B12, a B12 supplement should be taken.

Iron

There are two types of iron in food: haem and nonhaem iron. Haem iron is found in animal foods and nonhaem iron is found in eggs and plant foods.

Nonhaem iron is not as well absorbed by the body, but its absorption is increased significantly in the presence of vitamin C.⁸ Absorption is also regulated by requirements; lower body stores result in increased absorption and reduced excretion.¹ Tannins in tea and coffee,⁹ and phytates in wholegrains and legumes¹⁰ can inhibit the absorption of iron, although the presence of vitamin C can help overcome the effects of these inhibitors.^{1,11}

Vegetarian diets can contain as much or more iron (nonhaem) than mixed diets, primarily from wholegrain breads and cereals.¹² Surprisingly, iron deficiency is not more common in vegetarians, although iron stores (serum ferritin levels) are often lower.^{13,14}

Tips for meeting iron needs

- Eat legumes, tofu, dark green leafy vegetables, nuts, seeds and wholegrains, and iron fortified cereals regularly
- Include a vitamin C rich fruit or vegetable at each meal
- Limit intake of tea and coffee to between meals rather than with meals.

Zinc

While zinc is found widely in plant foods, its absorption is dependent on body stores and requirements; the body appears to adapt to lower intakes by reducing losses and increasing absorption.^{14,15} As with iron, absorption is reduced by phytates found in wheat bran, wholegrains and legumes. Processing a food by leavening (yeast in breads), soaking, fermenting or sprouting can reduce the phytate level and make zinc more readily available.¹⁶

Tips for meeting zinc needs

- Eat legumes, tofu, tempeh, nuts, seeds, brown rice and wholegrains (breads, cereals) regularly
- Use sprouted legumes (eg. mung beans) in salads and sandwiches
- Avoid excessive intake of unprocessed wheat bran.

Calcium

Research has found calcium intakes are generally similar between vegetarians and nonvegetarians,¹⁷ and a recent review of the literature concluded that there are no differences in bone health indices between lacto-ovo vegetarians and nonvegetarians.¹⁸ Plant versus animal sources of calcium and their effectiveness in maintaining bone health remain contentious. Despite a much lower intake of calcium, one recent study found vegan postmenopausal women had bone mineral densities identical to that of nonvegetarians.¹⁹

For lacto-ovo vegetarians, dairy foods provide plenty of calcium. With some careful planning, vegans can obtain their calcium from calcium fortified soy beverages, calcium fortified soy yoghurt, tofu (set in calcium salts) or other plant foods containing calcium. Some plant foods provide a significant amount of bio-available calcium, despite often having lower calcium content than dairy foods.¹⁷ Absorption of calcium is improved in the presence of vitamin D and some research has found it to be inhibited by sodium, caffeine and excess animal protein.^{2,17,20–22}

Tips for meeting calcium needs

- Aim for three serves of calcium rich foods each day from a variety of sources including dairy products, calcium fortified products and plant foods, such as tofu set with calcium, almonds, unhulled tahini, dried figs and dark green leafy vegetables (eg. broccoli and Asian greens such as bok choy, kale, collard greens and Chinese cabbage). One serve is equal to:
 - 250 mL milk or calcium fortified soy beverage (with at least 100 mg calcium per 100 mL)
 - 40 g cheese
 - 200 g yoghurt or calcium fortified soy yoghurt
 - 150 g of calcium set tofu
 - 1.5 cups Asian greens
 - 1 cup almonds
 - five dried figs
 - 3 tablespoons of unhulled tahini
- Limit salt intake
- Limit caffeine found in tea, coffee, cola and 'energy' drinks

- Ensure adequate vitamin D – for most people this can be obtained from a sensible and safe amount of natural sunlight on the skin.

Conclusion

A varied and well balanced vegetarian diet can provide all of the nutrients needed for good health. A vegetarian diet that is low in saturated fat, high in fibre (with plenty of wholegrains, fruits and vegetables), contains moderate amounts of protein foods and includes limited added fats and sugars will closely match healthy eating recommendations for the general population. However, a vegetarian diet requires careful planning, particularly for new vegetarians, to ensure nutritional needs are met. Key nutrients to consider in planning a vegetarian diet include protein, vitamin B12, iron, zinc and calcium. An Accredited Practising Dietitian can provide individual, practical nutrition advice to assist vegetarians to enjoy a varied and well balanced diet (see *Resource*).

Resource

For more information on vegetarian eating, visit the Dietitians Association of Australia website at www.daa.asn.au. To refer to a local Accredited Practising Dietitian, check out the 'Find an APD' search tool on the website. Conflict of interest: none declared.

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