



Position Statement for Healthcare Professionals

Eggs and Vegetarians

Updated August 2012

Increasing numbers of people are choosing to follow vegetarian eating patterns. Although only 5-6% of women and 1-3% of men (1, 2) classify themselves as vegetarian, research shows seven out of 10 Australians are eating more plant-based meals than previously (3).

Vegetarian eating patterns are generally characterized by the exclusion of animal-based foods, with the main subtypes being the lacto-ovo vegetarian diet which excludes animal flesh but includes dairy products and eggs, and the vegan diet which excludes all animal products.

The health benefits of a vegetarian eating pattern rely heavily on achieving a nutritionally balanced diet relative to the individual's needs (4). As they consist of predominantly plant based foods, some vegetarian eating patterns can offer a number of benefits including lower levels of saturated fat, and higher levels of fibre, magnesium, potassium, folate, antioxidants such as vitamins C and E and phytochemicals compared to meat-containing diets (5). This in turn can lead to health benefits such as reduced risk of some chronic diseases and a lower incidence of risk factors associated with lifestyle related diseases (6). A 2012 study found long term vegetarians had lower oxidative stress, body fat and cholesterol levels compared to omnivores (7). A review also showed that vegetarians were 20 per cent less likely to be overweight than meat eaters (8). An Australian study of young women showed vegetarians and semi-vegetarians (those that excluded only red meat) had lower body mass indexes than non-vegetarians and tended to exercise more (9). However inadequately planned vegetarian diets can result in insufficient intakes of vitamin B12, iron, calcium and zinc in particular (10). Choosing nutrient dense foods such as eggs and dairy (lacto-ovo vegetarians), nuts, seeds, legumes and green leafy vegetables is therefore important to provide sufficient vitamins, minerals, essential amino acids and essential fatty acids.

Energy

At a population level, the kilojoule intake of vegetarians is similar to non-vegetarians (6), however vegetarian eating patterns tend to be bulky because they are based on fibre-rich plant foods (11). This can result in lower energy and nutrient intakes in infants and young children with smaller appetites (4, 10). For ovo-vegetarians, eggs are ideal in this situation as they are not bulky but are nutrient dense. Lower rates of growth in the first few years of life have been recorded in some vegan children (4) however lacto-ovo-vegetarian children have similar energy intakes and growth patterns to omnivores (12-14). As lacto-ovo-vegetarian diets include eggs and dairy foods, these foods may contribute to the improved energy intakes and growth patterns in this group of vegetarian children.

Protein

The total protein content of a vegetarian diet can be significantly lower than an omnivore diet (15). Due to a smaller variety of protein containing foods eaten by ovo-vegetarians, poor food choices can result in an insufficient intake of essential amino acids, particularly methionine and lysine (16). Additionally, the protein digestibility and lower biological protein value of many plant proteins may result in deficient dietary intakes of essential amino acids in ovo-vegetarian diets (16). It has been suggested that due to the decreased protein bioavailability of vegetarian diets, that total protein requirements should be higher for vegetarians compared to omnivores if low amounts of animal protein are consumed (17) consumed or if single plant sources are relied upon for protein (18). Due to their high protein quality and high digestibility, eggs may therefore be particularly useful in the diets of ovo-vegetarians (16).



Essential fatty acids

Vegetarian and vegan diets can be high in omega-6 fatty acids (19, 20). A high ratio of omega-6 to omega-3 fatty acids may inhibit production of other long chain fatty acids (EPA and DHA) and potentially impair development of new tissue, especially brain and retinal tissue, and production of eicosanoids (20). As fish and red meat are not eaten, EPA and DHA become virtually absent from vegetarian and vegan diets (4, 21). As a result, recently it has been suggested that in order to compensate for the lower levels of EPA and DHA in the tissues, vegetarians require double the recommended adequate intake (AI) of the plant type of omega-3 (alpha-linolenic acid) compared to non-vegetarians (22). This highlights the vital role of foods such as eggs that can provide omega-3s in a vegetarian diet, contributing an average of 114mg of long chain omega-3 fatty acids per serve*, which represents 71-127% of the adequate intake (AI) (23). Eggs are the only vegetarian source of DHA, containing 104mg per serve.

Iron and vitamin B12

Low serum levels of vitamin B12 have been reported in adult vegan and vegetarians (24), and low iron levels in young Australian vegetarian and semi-vegetarian women (9). Inadequate intakes of iron and B12 can lead to various forms of anaemia, which can impair the immune response and inhibit physical performance (25). Anaemia is more frequent in vegetarian women, especially during pregnancy (26). At this time, low vitamin B12 and iron intakes, coupled with low maternal stores, and lower levels secreted during lactation, increases the risk of deficiency in children born to vegetarian women (5, 27). Eggs are an excellent source of bioavailable vitamin B12, one serve* providing 40% of the RDI for vitamin B12 and 14% RDI for iron.

Other nutrients

Vegetarians tend to have similar or greater dietary intakes of most minerals except iodine, calcium (vegans only) and possibly selenium (4). Vegetarians must also take extra care to ensure adequate iron and zinc because of their low bioavailability from plant-based sources (28). Some vegetarians have diets that are significantly below recommended intakes for zinc (5) and this can be a concern as zinc deficiency can impair the immune system and reduce fertility (29). Vegetarian diets may also be low in vitamin D (30). One serve of eggs contains useful amounts of selenium (59% RDI), iodine (29% RDI) and some vitamin D (9% RDI) and zinc (4% RDI).

Conclusions

Eggs can play a significant role in a vegetarian diet due to the provision of high quality protein, vitamin B12, selenium, iodine, iron and omega-3s, nutrients that can be low in a vegetarian eating pattern. Overall, eggs are a highly nutritious food that can play an important role in the diets of ovo-vegetarians. Eggs are recommended as part of a healthy eating pattern that also includes adequate amounts of wholegrain breads and cereals, fruits, vegetables, legumes, low fat dairy foods and unsaturated fats.

This statement is for healthcare professionals only.

**One serve = 2x60g eggs (104g edible portion)*



References:

1. The Vegetarian/Vegan Society of Queensland Incorporated. A Pound of Flesh - A survey of 1202 Australians about whether they're vegetarian or vegan and what their attitudes to animals are. Queensland, Australia: VVSQ2010.
2. McLennan W, Podger A. National Nutrition Survey. Selected Highlights. Australia 1995. Canberra: Australian Bureau of Statistic & Commonwealth Department of Health and Aged Care1997.
3. Reid MA, Marsh KA, Zeuschner CL, Saunders AV, Baines SK. Meeting the nutrient reference values on a vegetarian diet. *MJA Open*. 2012;1(Suppl 2):33-40.
4. Thomas B. *Manual of Dietetic Practice*. 3rd ed: Blackwell Science Ltd.; 2001.
5. Position of the American Dietetic Association and Dietitians of Canada: Vegetarian diets. *J Am Diet Assoc*. 2003 Jun;103(6):748-65.
6. Appleby PN, Thorogood M, Mann JI, Key TJ. The Oxford Vegetarian Study: an overview. *Am J Clin Nutr*. 1999 Sep;70(3 Suppl):525S-31S.
7. Kim MK, Cho SW, Park YK. Long-term vegetarians have low oxidative stress, body fat, and cholesterol levels. *Nutr Res Pract*. 2012 Apr;6(2):155-61.
8. Berkow SE, Barnard N. Vegetarian diets and weight status. *Nutr Rev*. 2006 Apr;64(4):175-88.
9. Baines S, Powers J, Brown WJ. How does the health and well-being of young Australian vegetarian and semi-vegetarian women compare with non-vegetarians? *Public Health Nutr*. 2007 May;10(5):436-42.
10. Messina V, Mangels AR. Considerations in planning vegan diets: children. *J Am Diet Assoc*. 2001 Jun;101(6):661-9.
11. Herrmann W, Geisel J. Vegetarian lifestyle and monitoring of vitamin B-12 status. *Clin Chim Acta*. 2002 Dec;326(1-2):47-59.
12. Sabate J, Lindsted KD, Harris RD, Sanchez A. Attained height of lacto-ovo vegetarian children and adolescents. *Eur J Clin Nutr*. 1991 Jan;45(1):51-8.
13. Nathan I, Hackett AF, Kirby S. A longitudinal study of the growth of matched pairs of vegetarian and omnivorous children, aged 7-11 years, in the north-west of England. *Eur J Clin Nutr*. 1997 Jan;51(1):20-5.
14. Nathan I, Hackett AF, Kirby S. The dietary intake of a group of vegetarian children aged 7-11 years compared with matched omnivores. *Br J Nutr*. 1996 Apr;75(4):533-44.
15. Alexander D, Ball MJ, Mann J. Nutrient intake and haematological status of vegetarians and age-sex matched omnivores. *Eur J Clin Nutr*. 1994 Aug;48(8):538-46.
16. Millward DJ. Macronutrient intakes as determinants of dietary protein and amino acid adequacy. *J Nutr*. 2004 Jun;134(6 Suppl):1588S-96S.
17. Kniskern MA, Johnston CS. Protein dietary reference intakes may be inadequate for vegetarians if low amounts of animal protein are consumed. *Nutrition*. 2011 Jun;27(6):727-30.
18. Marsh KA, Munn EA, Baines SK. Protein and vegetarian diets. *MJA Open*. 2012;1(Suppl 2):7-10.
19. Sanders TA. Essential fatty acid requirements of vegetarians in pregnancy, lactation, and infancy. *Am J Clin Nutr*. 1999 Sep;70(3 Suppl):555S-9S.
20. Davis BC, Kris-Etherton PM. Achieving optimal essential fatty acid status in vegetarians: current knowledge and practical implications. *Am J Clin Nutr*. 2003 Sep;78(3 Suppl):640S-6S.
21. The British Nutrition Foundation. *n-3 Fatty Acids and Health*.: British Nutrition Foundation, London1999.
22. Howe PR, Meyer BJ, Record S, Baghurst K. Contribution of red meat to very long chain omega-3 fatty acid (VLCOmega3) intake. *Asia Pac J Clin Nutr*. 2003 Nov;12(Suppl):S27.
23. National Health and Medical Research Council. *Nutrient Reference Values for Australia and New Zealand including Recommended Dietary Intakes*. Canberra: NHRMC; 2006.



24. Hokin BD, Butler T. Cyanocobalamin (vitamin B-12) status in Seventh-day Adventist ministers in Australia. *Am J Clin Nutr.* 1999 Sep;70(3 Suppl):576S-8S.
25. Burke L, Deakin V. *Clinical Sports Nutrition*. 2nd ed: McGraw Hill Book Company; 2000.
26. Koebnick C, Hoffmann I, Dagnelie PC, Heins UA, Wickramasinghe SN, Ratnayaka ID, et al. Long-term ovo-lacto vegetarian diet impairs vitamin B-12 status in pregnant women. *J Nutr.* 2004 Dec;134(12):3319-26.
27. Allen LH. Anemia and iron deficiency: effects on pregnancy outcome. *Am J Clin Nutr.* 2000 May;71(5 Suppl):1280S-4S.
28. Hunt JR. Moving toward a plant-based diet: are iron and zinc at risk? *Nutr Rev.* 2002 Jun;60(5 Pt 1):127-34.
29. Australian Bureau of Statistics. *National Nutrition Survey Nutrient Intakes and Physical Measurements 1995*. Australian Bureau of Statistics (ABS) and Commonwealth Department of Health and Aged Care. 1998.
30. Craig WJ. Nutrition concerns and health effects of vegetarian diets. *Nutr Clin Pract.* 2010 Dec;25(6):613-20.