

VEGETARIAN EATING PATTERNS

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BACKGROUND

A vegetarian eating style is defined broadly and consists of a range of eating patterns. The various patterns are distinguished by the foods excluded from the diet. The most basic types of vegetarian diets include semi- or partial-vegetarian, lacto-ovo (LOV), vegan, and macrobiotic. Table 1 summarizes each of these patterns, highlighting foods excluded:

TABLE 1
Types of Vegetarian Diets and Foods Excluded

Type of Vegetarian Diet	Food Excluded
Semi- or partial-vegetarian	Red meat
Lacto-ovo-vegetarian	Red meat, poultry, fish, seafood
Lacto-vegetarian	Red meat, poultry, fish, seafood, eggs
Vegan (total vegetarian)	Red meat, poultry, eggs, dairy products (may exclude honey)
Macrobiotic	Meat, poultry, eggs, dairy, seafood, fish, processed foods (fish may be included in the diets of some macrobiotic vegetarians)

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Only a minority of adolescents report consuming a vegetarian diet, however vegetarianism among this age group has gained popularity over the years.¹ Adolescents who adopt a vegetarian eating pattern have similar characteristics to adults who select this eating style.² Many choose a vegetarian diet for religious, health, social, weight-control, animal welfare, and environmental reasons. What may distinguish adolescents from the adult population is their increasing sense of autonomy. Selecting a diet different from parents and the rest of the family is a common way for adolescents to exert independence.²

Nutritional Significance and Dietary Adequacy

In general, well-planned vegetarian diets are compatible with adequate growth and meet most nutritional requirements for adolescents. However, it is well documented that zinc, iron, and calcium intakes are low among adolescent girls consuming omnivorous and vegetarian diets alike.¹⁻³ In a plant-based diet, there is concern that a high intake of fiber and phytates can interfere with zinc and iron absorption.^{1,4} With adequate planning and inclusion of a variety of food sources, most vegetarian diets (with the exception of vegan or macrobiotic diets) can be substantial on their own, without the need of vitamin supplementation.

The consumption of a well-planned vegetarian diet may provide more nutrients from fruit, vegetable, complex carbohydrate, and fiber sources, and less fat and cholesterol than omnivorous diets. A school-based study found that adolescents consuming a vegetarian diet had higher intakes of fruit and vegetables and lower consumption of sweets and salty snacks compared to non-vegetarian youth.² Research that compared Seventh Day Adventist vegetarians with Mormon omnivores suggests that vegetarian eating patterns may contribute to lower blood pressure and other health benefits, such as lower body weight.⁵

Several studies of preadolescent LOV girls show some vegetarian females experience a delay in the pubertal growth spurt and menarche compared to their non-vegetarian peers. However, by late adolescence, all of the vegetarian females were as tall or taller than their non-vegetarian counterparts. In fact, the delay in menarche may prove beneficial for long term health, such as reducing the risk of breast cancer.⁶

As with most diets that exclude certain groups of foods, there is a concern of excessive restriction. In particular, vegetarian diets low in vitamins B₁₂ and D, iron, zinc, and calcium should be of particular concern for the growing adolescent.

Health professionals should pay special attention to adolescents who choose to adopt a vegetarian diet as a means to control weight by restricting energy and/or fat. A school-based study reported that vegetarian youth were almost twice as likely to report frequent dieting, four times as likely to report intentional vomiting, and eight times as likely to report laxative use.² Although it is not appropriate to conclude that vegetarian youth are more prone to eating disorders, it is important to be aware of signals that suggest the presence of an eating disorder. A few signs to look for are excessive weight loss, eliminating all fat from the diet, eating only a few foods, and skipping meals.

Screening and Assessment

The importance of a well-balanced vegetarian diet cannot be emphasized enough for the growing adolescent. To determine if an adolescent is consuming a nutritionally adequate diet, food groups and foods that are present in the diet and those that are restricted need to be determined. Diet assessment tools such as food frequencies, 24-hour diet recalls, or food records can be utilized to help assess dietary intake (see Chapter 5). Questions about supplement use may also provide important information about nutrient intake.

Energy

Appropriate energy intake may be of concern for adolescent vegetarians, especially those who adopt a vegetarian diet for weight control reasons. To ensure adequate energy intake:⁷

- Determine acceptable nutrient-dense foods that will fit into the type of vegetarian diet chosen by the teen. Emphasize a variety of foods to encourage intake of all necessary nutrients.
- Monitor weight status and linear growth. Adequate growth and development and maintenance of a stable, healthy body weight signifies that energy needs are being met.
- Suggest additional energy-dense foods as appropriate. Remind teens that at least 20% of calories should come from fat in order to supply the essential fatty acids required to support growth and development.

Protein

One misperception of vegetarian diets is that they are universally low in protein. Protein is found in a wide variety of plant foods, particularly in whole grains, nuts, and legumes. However, no single plant food provides a complete protein source since they are limited sources of one or more essential amino acids. Contrary to popular belief, incomplete proteins (such as grains) do not have to be consumed in the same meal to meet protein needs. Requirements for essential amino acids will be met if energy intake is adequate and a variety of plant foods are consumed over the course of the day.^{4,7} Legumes (dried beans), seeds, whole grains, nuts, and whole wheat pasta are particularly good sources of amino acids for vegans. Dairy products and eggs are excellent sources of complete proteins for lacto- and lacto-ovo vegetarians (LOV).

Fat

Fat is essential for growth and development. At least 20% of total energy consumed should come from fatty acids. Inadequate intakes of fat may result in essential fatty acid deficiencies or inadequate energy intake, leading to delayed or stunted physical growth. Diets of vegetarian adolescents should be assessed for adequacy of total fat and essential fatty acid intakes, with special attention focused on intakes of the essential fatty acids, linoleic (18:2n-6) and α -linolenic (18:3n-3).

- Linoleic acid is metabolized to arachidonic acid, which is an important component of cell membranes. A primary source of linoleic acids is vegetable oil.
- Alpha linolenic acid is metabolized to eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). DHA is vital for visual and neurological function. Alpha linolenic acids can be found in eggs, flax seed, canola oil, walnuts, and soy products.
- Generally, diets low in fat are also low in alpha linolenic acids. To avoid restricting too much fat from the diet, diet should provide around 25-30% total calories from fat. The ratio of linoleic acid to α -linolenic acid should be no more than 10:1 and preferably 5:1.⁷ Therefore it is important to consume a good source of α -linolenic acids each day.

TABLE 2
Plant Sources of α -Linolenic Acid

Food Source	α -Linolenic Acid (g)
Flax seed, 2 T	4.3
Walnuts, 1 oz	1.9
Walnut oil 1 T	1.5
Canola oil, 1 T	1.6
Soybean oil, 1 T	0.9
Soybeans, 1/2 c cooked	0.5
Tofu, 1/2 c	0.4

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Calcium

Adolescence is a critical period for bone development. Calcium retention is higher at this point in life than any other time and failure to consume adequate calcium can result in increased risk for the development of osteoporosis later in life. The Dietary Reference Intake (DRI) for calcium intake among adolescents in the 14-18 year age range is 1300 mg.^{8,9} Data from the National Health and Nutrition Examination Survey data from 1988-91 (NHANES III) show that calcium intakes among adolescents in this age range fall far below recommendations, especially among females.¹⁰ The most common sources of calcium are dairy products, but for vegans this source is not acceptable. Consumption of dark green leafy vegetables, tofu, and calcium-fortified foods and beverages can provide calcium for vegans. Not all milk substitutes or juices are fortified with calcium, however. Reading labels is the best way to make sure a food is a calcium-rich product.

Vitamin D

To properly utilize calcium, an adequate intake of vitamin D is necessary. The primary sources of vitamin D in most diets are dairy products. While sunlight exposure can improve vitamin D status, a dietary source is generally needed, especially in northern climates. For vegans, consuming foods supplemented with vitamin D such as milk substitutes or cereals is a critical way to obtain this vitamin.

Vitamin B₁₂

Vitamin B₁₂ is found naturally in animal sources only. The importance of vitamin B₁₂ relates to its role in spinal cord, brain, optic nerve, and peripheral nerve function. Vitamin B₁₂ deficiency can result in serious and sometimes irreversible neurologic abnormalities.⁴ Vegetarians who do not consume animal-derived foods need a reliable dietary source of vitamin B₁₂. The active form of vitamin B₁₂ in humans is cyanocobalamin. Cyanocobalamin can be found in fortified breakfast cereal, fortified soy beverages, some multivitamins, and some several brands of nutritional yeast.^{4,11} It is important to note that inactive analogs of vitamin B₁₂ may be present in some foods such as spirulina, seaweed, tempeh, and fermented foods.

Iron

The iron status of vegetarians is always of concern since the predominant source of iron in plant-based foods is in the non-heme form, which is less bioavailable than the heme form found in animal sources such as meats. Adolescent females are particularly likely to consume low levels of dietary iron.^{8,9} Research suggests that lacto-ovo vegetarians have iron status similar to that of omnivores.^{4,11} Other studies indicate that even though vegetarians may have lower iron stores, iron deficiency anemia is no more prevalent than among omnivores.^{4,12} In fact, lacto-ovo vegetarians often consume more dietary iron and more ascorbic acid (vitamin C) which improves the bioavailability of non-heme sources.¹³ Good sources of iron available to vegetarians include fortified and enriched cereals and grain products, legumes, dried fruit, pasta, and green leafy vegetables.

Zinc

Zinc is important for optimal growth and sexual maturation during adolescence. The recommended intake for adolescents is 8-11 mg/day.^{8,9} NHANES III data show that zinc intake among adolescents generally meets recommended intake. However, research suggests that a greater proportion of vegetarians had lower serum zinc levels than omnivores, even though there was little difference in intake.¹ Some zinc sources for vegetarians include fortified cereals, legumes, nuts, eggs, soy foods, and dairy products.

COUNSELING TIPS AND STRATEGIES

Dietary counseling is critical for vegetarian teens who are found to be at risk for nutritional deficiencies. Many health professionals find it useful to involve the adolescent in determining behavior changes that are needed to improve dietary intake. Using the vegetarian food guide tailored for adolescents (Table 3) work with adolescents to see how their dietary intake compares to recommended levels of intake for each of the major food groups. Some key messages to communicate during this process are:

- Include a variety of foods in the diet– don’t be afraid to try new foods.
- Try to avoid skipping meals.
- Encourage snacks of nutrient-dense foods that provide calcium, iron, and other vitamins and minerals.
- Avoid restricting fat to levels below 20% of calories or consuming many high fat “vegetarian” snacks, such as snack chips, cookies, and cakes.

TABLE 3
Vegetarian Food Guide for the Adolescent

Food Group	Servings per Day	Serving Size	Comments
Bread, cereal, rice and pasta	6-7 or more	1 slice bread or 1/2 bagel 1 ounce ready to eat cereal 1/2 C rice, pasta or grain 4 graham crackers 8 crackers	Choose whole grain breads and cereals Choose fortified breads and cereals
Legumes, eggs and meat substitutes	2 or more	1/2 C beans, peas, lentils 1/2 C tofu, tempeh, textured vegetable protein, soy protein or meat analogs	These provide iron, zinc and other nutrients as well as protein Eggs provide vitamin B ₁₂
Fruits and vegetables	5 or more	1/2 C cooked or canned fruit or vegetable 1 C raw vegetable 1 piece of fruit 1/2-3/4 C fruit juice	Eat a variety of fruits and vegetables Juices don’t provide fiber as do whole foods Include leafy greens daily
Nuts and seeds	1 or more	1/4 C nuts or seeds 2 T peanut butter or tahini	Flax seed (ground) and walnuts provide α -linolenic acid (essential fatty acid)
Fats and oils	6 or more	1 tsp oil or margarine 2 tsp salad dressing	Soybean, canola, walnut and flaxseed oils are high in α -linolenic acid (essential fatty acid)
Milk or milk alternatives	3-4	1 C milk or yogurt 1 C fortified soy or rice milk 1-1/2 oz (1/3 C) cheese 1 C pudding 1-1/2 C ice milk or frozen yogurt	Choose lowfat or non-fat dairy products Choose milk substitutes fortified with calcium, vitamin D, and vitamin B ₁₂

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REFERRALS

A referral to a registered dietitian or nutritionist to help in meal planning is needed for adolescents who do not appear to obtain adequate nutrients in their diet, who have delayed or slowed growth, who exhibit noticeable weight loss, or who are found to have iron deficiency anemia.

RESOURCES

Web Sites

Vegetarian Resource Group

<http://www.vrg.org>

American Dietetic Association

<http://www.eatright.org/>

American Heart Association

<http://www.americanheart.org/>

Suggested readings for adolescents

Butts L. OK, so now you're a vegetarian. Broadway Books. 2000.

Krizmanic J. A teen's guide to going vegetarian. Puffin Books, 1994.

Krizmanic J. The teen's vegetarian cookbook. Puffin Books, 1999.

Pierson S. Vegetables rock! A complete guide for teenage vegetarians, Bantam Books, 1999.

Suggested readings for health professionals

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