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Vegetarian Diets in Children and Adolescents

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Introduction

Vegetarianism is becoming more common among adults, with 1 in 40 adults currently choosing a vegetarian diet. Consequently, more children are raised as vegetarians. Vegetarianism is adopted for various reasons, including moral, religious, and health. Numerous studies have shown significant health benefits for individuals following this type of diet. Pediatricians should be well informed about vegetarianism and its role in our pediatric population.

Case 1

A first-time mother and her 2-month-old boy present to the clinic for a health supervision visit. The mother is breastfeeding, and her baby is growing appropriately. At the end of the visit, the mother mentions that she is a vegetarian and that she would like to raise her son in the same way. She would like to know what she should be doing as a breastfeeding mother and how she can make sure that her son has the appropriate nutrition in the future.

The physician should begin by taking a dietary history from the mother to determine what type of vegetarianism she practices. He or she should explain to the mother that her infant's nutrition is based on her own dietary intake for as long as she continues to breastfeed. The pediatrician should counsel the mother on the importance of diet variety. If the mother is vegan, the pediatrician must take time to ensure that she is getting enough vitamin B₁₂ and calcium in her diet. When she is ready to wean her infant, she should continue to focus on dietary variety. The mother should be cautioned that adult vegetarian diets that are high in bulk and low in calories are not always appropriate for the growing and developing child. Finally, the pediatrician should ensure that the mother has the appropriate resources to guide her in finding the best foods for her child's nutritional needs.

Initiating a Dialogue

When confronted with this scenario, it is most important to take a dietary history. Although this mother defines herself as a vegetarian, she did not specify what type of vegetarianism she practices (Table 1). In the simplest sense, a vegetarian eliminates animal-flesh foods and products from the diet (including fish). However, the definition can be delineated further. A lacto-ovo vegetarian consumes milk and egg products. A lactovegetarian consumes milk in addition to plant products. A vegan eliminates all animal and fish products. Recommendations for this mother depend on what form of vegetarianism she follows.

Comparing Human Milk Composition

For the first 6 to 12 months after birth, most babies are lactovegetarians. Their primary source of nutrition is milk, either from human milk or formula. Studies have shown that for the first 6 months, the human milk of a lacto-ovo vegetarian does not differ significantly from that of an omnivore. (1) Specifically, the composition of human milk between lacto-ovo vegetarians and omnivores is similar in minerals, trace elements, lactose, and total fat. Another study revealed that human milk from vegetarians has fewer environmental and indirect additives than that of nonvegetarians. (2)

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Table 1. Types of Vegetarianism

Semivegetarian
Includes poultry and fish
Lacto-ovovegetarian
Includes milk and egg products
Lactovegetarian
Includes milk products
Vegan
Eliminates all animal and fish products

Important Nutritional Considerations

Lacto-ovovegetarians and lactovegetarians (who consume milk or eggs or both in their diet) tend to be less deficient in certain elements than vegans, who eliminate all fish and animal products. Surprisingly, the human milk of poorly nourished women often has relatively adequate volume and composition. One hypothesis is that human milk composition is maintained to the detriment of the mother’s overall nutritional status. Regardless of the volume and composition, human milk of poorly nourished women may have fewer calories, water-soluble vitamins, calcium, and protein. (3) All vegetarians should pay special attention to the amount of vitamin B₁₂, folate, and omega-3 fatty acids that they consume. Vitamin B₁₂ and folate are important factors in protein and DNA synthesis as well as in growth and development of the brain and nervous system. Omega-3 fatty acids play a significant role in brain and retinal development. During times of growth and reproduction, requirements for these elements increase.

Vitamin B₁₂

Reliable sources for vitamin B₁₂ for the vegetarian include cereal, nondairy beverages, meat analogs, and supplements. It is important to read the labels to ascertain that the item has been fortified with vitamin B₁₂. If a vegan mother does not consume enough B₁₂-fortified foods or supplements, her infant receives 0.4 mcg/day of vitamin B₁₂ during the first 6 postnatal months and 0.5 mcg/day after 6 months of age. (4) Another reason that a breastfed infant might need to receive supplementation with vitamin B₁₂ is if the mother had an ileal resection. Removing this section of the bowel prevents the body from absorbing vitamin B₁₂.

Folate

Folate is found in enriched breads, pastas, cereals, green leafy vegetables, and orange juice. Interestingly, most vegetarians consume more than the recommended amount of folate. Although the addition of folate to fortified foods has helped to reduce the risk of neural tube defects in infants, folate can mask some of the hematologic changes that signal a vitamin B₁₂ deficiency. A vitamin B₁₂ deficiency that has been masked by folate may not be apparent until deleterious neurologic consequences already have occurred. (5)

Omega-3 Fatty Acids

Omega-3 fatty acids are important in all lactating women because they assist in brain and retinal development of nursing infants. However, they also serve a special role for vegetarians because they act as building blocks for the longer chain fatty acids docosahexaenoic (DHA) and eicosapentaenoic acid (EPA), which are found in fish. DHA and EPA are critical for brain and organ development in the fetus and newborn. A daily intake of 3 to 5 g of omega-3 fatty acids is adequate, based on a 2,000-kcal/day diet. However, lactating women (especially vegetarians) should consider supplementation with reliable sources of fatty acids. Omega-3 fatty acids can be found in walnuts, flax seed, hemp, dark greens, and tofu. Quality fish oil supplements and DHA-rich eggs also are available for consumption. (6)

Weaning Future Vegetarians

When weaning infants from human milk, it is important to ensure that they receive adequate nutrition. Dietary problems that stem from certain inadequacies are seen more often in children than in adults. Children have greater energy requirements relative to their body weight, and they are not always in control of what they eat. Many of the significant deficiencies seen in children occur because of inappropriate understanding and dietary choices by adults.

Vegetarian diets that are appropriate for adults are not always right for children. Adults tend to want to consume foods that are lower in caloric and fat content, yet high in bulk. The bulk ensures that the stomach feels full despite the adult consuming a lesser amount of calories and fat. A child who is 1 to 3 years of age has a stomach capacity of only 200 to 300 mL at each meal. Thus, problems ensue when high-bulk foods are eaten by children. Children may feel satiated quickly, even though they have not eaten an adequate amount of their nutritional requirements. (7)

When well-informed parents raise vegetarian children,

studies show that the children’s means for height for age, weight for age, and weight for height are close to the 50th percentile of the National Center for Health Statistics reference values. (8) Another study of vegetarian British children, ages 1 to 18 years, found heights, weights, and head and chest circumferences to be within normal range compared with those of nonvegetarian British children. (9)

Dietary Variety is the Secret to Success

When a vegetarian follows a well-rounded diet, the health benefits are numerous. In an analysis of five prospective studies examining mortality in vegetarians and nonvegetarians, vegetarians had a 24% decrease in ischemic heart disease. (10) Vegetarian children tend to be leaner and have lower relative body weights and skinfold thicknesses while retaining normal growth and maturation. (11) As food sources become increasingly fortified, it is easier and more convenient to provide vegetarian children with appropriate food elements. Parents should ensure that their children are receiving adequate amounts of vitamin B₁₂, folate, iron, and zinc (Table 2). Food also should be high in energy density without significant bulk.

Toddlers and preschool-age children tend to develop strong eating preferences, and it may be difficult to present a variety of foods to them each day. Patience, along with repeated exposure to unfamiliar foods, may help. When opting for prepackaged foods made with tofu or tempeh (fermented soy), it is important to read the nutritional information. Many of these processed foods tend to be high in fat, sodium, and calories, similar to nonvegetarian packaged foods.

Parents should make “whole plant food” the primary staple in their child’s diet. This element includes whole grain breads, pastas, cereals, tofu, soy, legumes, vegetables, and fruits. Legumes are a class of vegetables that includes a variety of beans, peas, and lentils. Nutrients in vegetables are preserved best when they are cooked with the least amount of heat, water, and time. Therefore, ideal cooking includes steaming vegetables in a small amount of water, stir-frying, and boiling in a bag. As mentioned, vitamin B₁₂ and folate are found in a variety of fortified cereals and breads. Iron can be found in dried fruits, legumes, nuts, and fortified foods. Zinc also is found in legumes, nuts, and whole grains.

Although protein can be a concern, plant foods provide more than 10% of their calories in the form of protein. Plant foods combined with meat substitutes such as soy and tempeh tend to provide adequate protein for the vegetarian child. The protein intake of vegan children has been shown to be similar to that of nonvegetarian children, and the intake also is higher than the recommended standard. (12)

Case 2

A new patient and his parents present to the clinic for a health supervision visit. The boy is 7 years old and has had appropriate growth and development. The parents are lacto-ovo vegetarians, and they have raised their son in the same way. As their son becomes older and more independent, they have concerns about his eating patterns and nutrition. They want to ensure that he makes appropriate food choices at school and at friends’ houses. They ask you for advice in ensuring that he continues to have appropriate nutrition now and in the future.

It is important to identify the parents’ reasons for being vegetarian as well as their reasons for raising their son as a vegetarian. It also is essential that the physician ask both the parents and child how each feels about being vegetarian. Although the boy is only 7 years old, he most likely is exposed to many different types of food while at school and friends’ homes. How have these experiences influenced his feelings about his daily diet? The physician should follow this discussion with a dietary history. If

Table 2. **Nutrients and Food Sources**

Protein
Tofu, tempeh, legumes, grains, eggs, dairy
Omega-3 Fatty Acids
Flax seed, dark greens, tofu, fish oil, nuts
Iron
Legumes, nuts, dried fruit, spinach, fortified grains
Calcium
Kale, broccoli, fortified orange juice, fortified soy, figs, dairy
Zinc
Whole grains, legumes, nuts, wheat germ, whole grain pasta
Folate
Legumes, dark green leafy vegetables, fortified cereals/breads
Vitamin B₁₂
Fortified eggs, fortified dairy, cereals, breads, some fortified soy

additional education is needed to teach the family about appropriate nutrition, more time should be arranged to delve into this issue. The physician should ensure that this family has the appropriate resources available to them. Finally, the physician needs to begin to touch on the topics of independence and autonomy. Depending on how this boy feels about being a vegetarian, the physician may want to counsel the parents on ways that they can be accepting of their son regardless of whether he chooses to be vegetarian in the future.

Raising a School-age Vegetarian

From a nutritional standpoint, raising a school-age vegetarian is not very different from raising a younger vegetarian. These children require the same nutritional considerations as their younger counterparts, with particular attention paid to elements such as vitamin B₁₂, folate, omega-3 fatty acids, and protein. Dietary variety is the best way to ensure normal growth and development for vegetarian children.

Aside from the nutritional issues, however, many other aspects of vegetarianism during elementary school ages should be considered. Whereas the toddler or preschool-age child is still eating most of his or her meals at home, the school-age child often eats a large portion of his or her daily diet away from the home (school, extracurricular activities, friends' homes). Not only is it more difficult for parents to be in control of what their children are eating, but it also may be difficult for the child to make appropriate choices based on the foods that are available.

The school-age child places a great deal of interest and importance on fitting in among his or her social group. Acceptance in one's social group often depends on the ability to relate to other children and share in common experiences. If a vegetarian child is unable to share in common experiences, such as meals, this state may be distressing for the child and peers alike.

Finally, school-age children are just beginning to realize that children and families are not all similar to their own. Depending on school and social experiences, some vegetarian children may be exposed to many different foods that they have never encountered. Curiosity may cause vegetarian children to desire new foods, including meat products. If vegetarian children feel that they are unjustly restricted, or if the restriction causes them distress, they may begin to resent their vegetarian diets.

To identify and resolve issues related to school-age vegetarians, parents should determine how strongly they feel about reinforcing a vegetarian diet inside and outside of the home. As children enter school and become more

independent, some parents allow their children the freedom of dietary experimentation. Others may feel that a vegetarian diet takes precedence, regardless of the circumstances. Once a viewpoint has been determined, parents should include their children in a discussion that tackles the issues pertinent to school-age vegetarians.

Planning Ahead

Because of the many motivations and rationales for choosing vegetarianism, parents' discussions will differ among their children. Regardless of the differences, parents can be more prepared to work through specific issues if they have some universal tools at their disposal.

Following a vegetarian diet can be challenging to even the most experienced vegetarian. Despite advancing public awareness, vegetarian options are not always available; planning ahead is often necessary. This proves to be of greater consequence when a child is involved. The vegetarian school-age child always should leave the house with an appropriate meal or at least with a snack that he or she can eat if there are no vegetarian options. If peer inclusion is an issue, parents should think about packing vegetarian foods that mimic popular meat products (ie, veggie burger, soy nuggets). Children feel more included in peer groups if their meal appears similar.

Packing food for other situations may be more complex. If a vegetarian child is asked to dinner at a friend's house, the child and his parents may seem impolite if the child brings his or her own food. In this case, communication is the key. Once nonvegetarian parents understand the situation, they may be very accommodating in terms of offering food that is appropriate for the vegetarian child. On the other hand, some parents may welcome help from a vegetarian parent in terms of suggesting or packing appropriate foods. Parents of nonvegetarian children may be very agreeable to preparing foods for their vegetarian guest, but they may not know what to cook. Vegetarian parents can offer some basic education if they think other parents would be open to suggestions.

Although planning ahead can address many scenarios, parents and children should role-play to practice scripts that deal with unexpected situations. Role-playing is particularly useful because it may help parents understand what type of circumstance causes their children the most worry or apprehension. Acting out a few scenarios can do wonders in terms of quelling a school-age vegetarian's concerns regarding diet.

Finally, it is important for parents to discuss vegetarianism and nonvegetarianism in a way that does not place undue positive or negative values on either group. A common defense mechanism for parents of a vegetar-

ian child who is questioning his or her diet may be to speak of nonvegetarians negatively. This type of coping skill is detrimental because it accentuates the differences that already are of concern to the vegetarian child. It also may have a paradoxical effect in that the vegetarian child may have heightened negative feelings about his or her diet if the child feels that his or her parents have spoken negatively about a cherished friend or peer. Parents should attempt to discuss issues of diet with objectivity. In doing so, they will make their argument more effectively without alienating others.

Case 3

A 16-year-old girl returns to the pediatric clinic for her first health supervision visit in 5 years. When questions arise concerning her diet, she appears very defensive. She states that she became a vegetarian on February 16, approximately 2 months ago. She reluctantly shares that her diet consists largely of pasta, bagels, and “side dishes” from the family meal. She cites “animal cruelty” as her motivation to become a vegetarian.

The physician should begin by taking a dietary history as well as attempting to determine what prompted this teen to change her diet, remembering that adolescence is a unique period of development that may have played a role in this teen’s motivations. To provide the most comprehensive education regarding vegetarianism, the teen’s family should be included in the discussion whenever possible. The physician should ensure that the teen and her family have access to accurate resources that can provide them with important information. Finally, the physician should take the time to ensure that this teen’s decision to be vegetarian was not based on an underlying emotional problem, including an eating disorder.

Adolescent Vegetarians: A Unique Challenge

During adolescence, youth assert their independence, develop their self-identity, and build relationships with both sexes. Adolescent vegetarians should not be thought of as younger versions of adult vegetarians. The common adult explanations for a vegetarian diet include health, religious, familial, and cultural reasons. However, these motives do not always influence adolescents in the same way. Often, the decisions that adolescents make are related directly to their developmental needs and developmental stage. (13)

The most challenging of adolescent vegetarians is one who has been raised as an omnivore and who decides to change dietary habits independent of his or her family’s eating style. Of a sample adolescent population in Minnesota of just fewer than 20,000 individuals, 0.6% of

adolescents identified themselves as vegetarians. (14) The starting point for an appropriate dialogue with a teenage patient is similar to that of a breastfeeding mother: taking a dietary history. It is most important to ascertain what it means to this young woman to be a vegetarian. Similarly, how does she define and apply this form of diet in her own life?

The Typical Adolescent Vegetarian

Most adolescent vegetarians tend to be female. In one study that investigated adolescent vegetarians in Minnesota, 81% of self-identified vegetarians were female, and only 19% were male. (14) Most often, adolescent vegetarians share negative feelings toward eating meat, feel strongly about animal cruelty, and place more importance on their appearance and environment. (13) Another common characteristic of adolescent vegetarians is that they engage in many positive behaviors. Adolescent vegetarians tend to consume more fruits and vegetables while consuming fewer sweet and salty snack foods. These youth also tend to weigh less than their nonvegetarian peers.

An important aspect of adolescence is that many decisions are made impulsively and without much consideration for the future. Consequently, positive aspects of vegetarianism also can lend themselves to negative or harmful behaviors. All vegetarians are at risk for nutritional inadequacies if they do not consume appropriate amounts of foods rich in protein, iron, calcium, and zinc. Adolescents are at even greater risk if their decisions to become vegetarian were sudden and without proper attention to necessary details and information.

The adolescent patient in this case revealed a distinct date in history when she changed her eating habits. Her sudden dietary changes, as well as her current food choices, imply that her decision was not well researched. If she were to continue to eat the foods that she describes (pastas, bagels, and “side dishes”), she would be at risk for specific nutritional deficiencies. However, adolescents frequently have difficulty imagining the future, and it can be challenging to impress on them future consequences. Regardless, efforts should be made to prepare them for the future because adolescents will be in charge of all their dietary choices once they leave the home for college or employment.

The Vegetarian Food Guide Pyramid, a New Model

To capitalize on positive benefits and minimize negative consequences, it is important that adolescent vegetarians receive appropriate counseling and guidance regarding

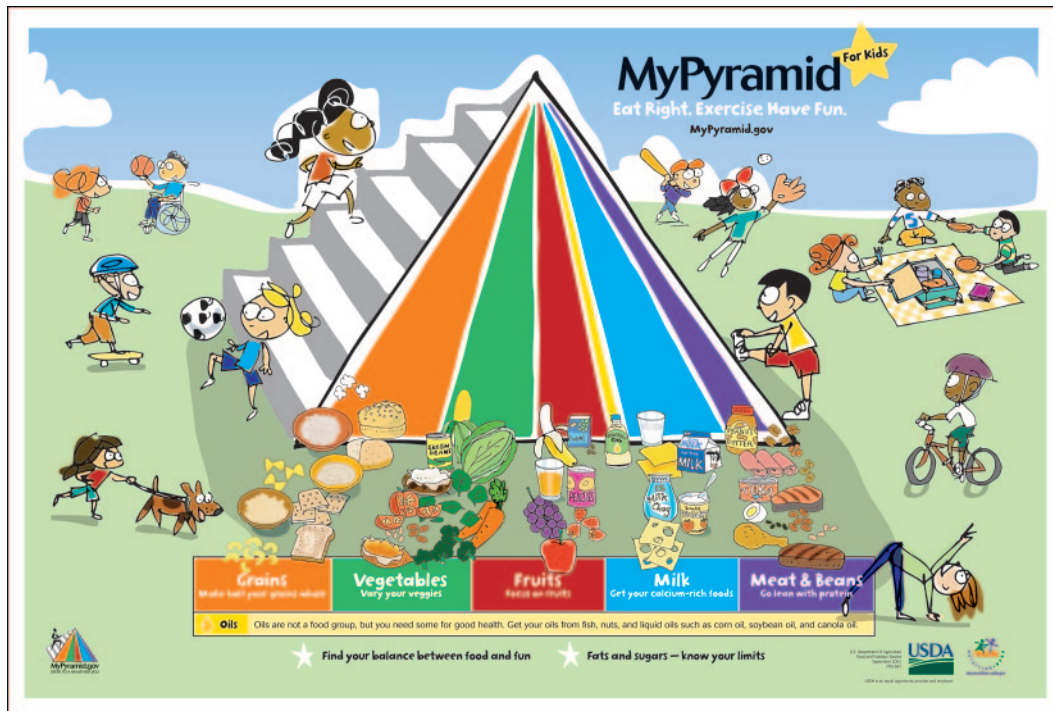


Figure 1. The Food Guide Pyramid.

their dietary choices. One of the challenges in providing appropriate information is the limited number of easily accessible models that demonstrate what foods are important and how they should be applied to the diet. Most adolescents are familiar with the Food Guide Pyramid, a model that shows how nutritional guidelines and requirements fit into one’s daily food choices (Fig. 1). The difficulty in using the Food Pyramid as a guide when talking to vegetarian adolescents is that it targets a population of omnivores. Thus, the nutritional standards are based on a nonvegetarian diet. (15)

There are adaptations of the food guide to account for vegetarianism. One example is the United States Department of Agriculture’s Food Guide Pyramid. In this guide, flesh foods are eliminated from the protein food group. Unfortunately, this guide does not take into account that some vegetarians exclude all animal and fish products. Therefore, dairy products and eggs also should be eliminated. Additionally, the proportions of the pyramid no longer are appropriate because certain staple foods have been removed without accounting for relative proportions or nutrient composition.

When presented with accurate information, vegetarians can fulfill all of their nutritional requirements in all stages of life. Many individuals would like to become vegetarians because they are aware of the health benefits.

However, these individuals are at a loss as to how to make the transition when there are no appropriate and easily accessible guides.

Recently, a Vegetarian Food Guide Pyramid was introduced to the United States Congress by organizers of the Third International Congress on Vegetarian Nutrition (Fig. 2). (15) The bottom tiers of the pyramid consist of the five major plant-based food groups: whole grains, legumes, vegetables, fruits, nuts, and seeds. At the top of the pyramid are the foods that may or may not be included in a vegetarian diet: vegetable oil, dairy, eggs, and sweets. The hope is that this provisional guide will motivate additional research and development of future guides. (15)

Involving the Family

Another opportunity to counsel adolescent vegetarians comes about because of an adolescent’s impulsivity. Sudden changes in diet for newly converted adolescent vegetarians often are not accompanied by a change in their families’ eating habits. Many families tend to be accepting of their child’s new eating habits, but provisions are not always made to help the child receive the nutrition that he or she needs. The new vegetarian adolescent described in the case reports eating “side dishes” at the family meal. The most common reason for eating only

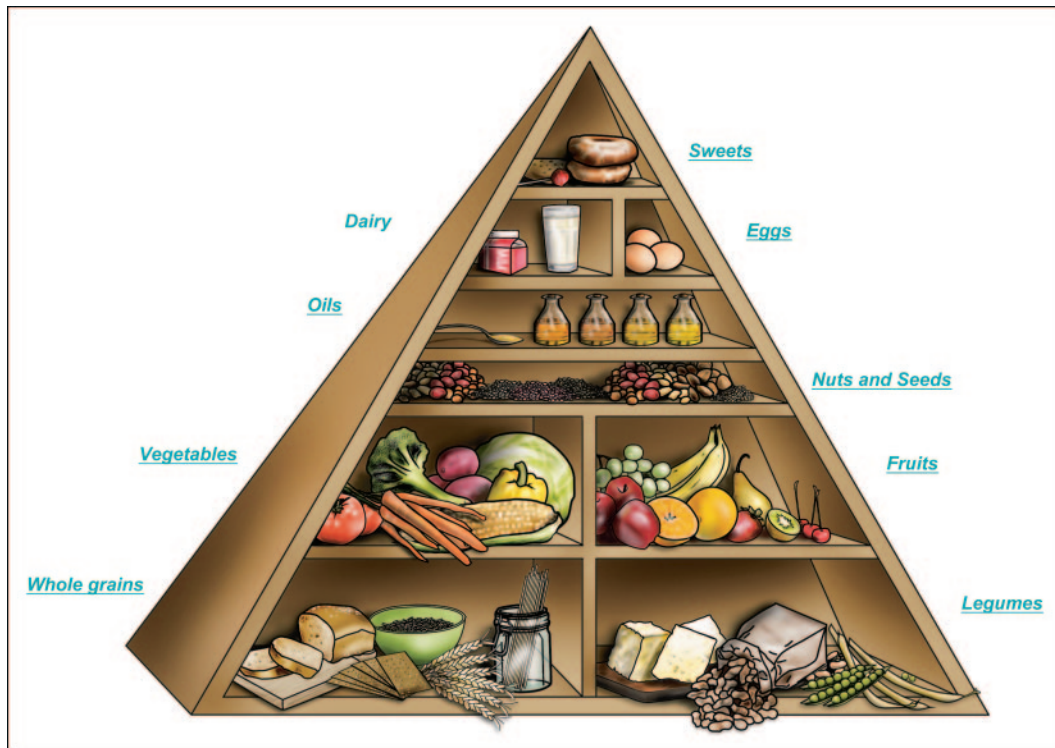


Figure 2. Vegetarian Food Guide Pyramid, depicting the specific food groups that may be included in a vegetarian diet along with the appropriate food proportions for each food group. The Dairy, Eggs, and Sweets categories are optional. Modified from Haddad et al. (15)

“side dishes” is that the main dish usually is an animal or fish product. Many families assume that their vegetarian child is going through a phase and soon will return to a meat-based diet.

Although most adolescents no longer depend solely on their families for food, it still is important to educate

parents and siblings about vegetarianism and available resources (Table 3). Families should not be expected to change their eating habits, but it is important that appropriate foods be available for the vegetarian child. Well-informed parents can guide vegetarian adolescents who are having difficulty adapting to their new dietary restrictions. Vegetarian adolescents commonly eat foods out of convenience, such as pasta and bagels. It is important to stress that these foods may be meatless, but they do not provide adequate nutrition. It also is important to stress that adolescent vegetarians need to be aware of nutritional information for preprepared vegetarian meals. Vegetarians often have the misconception that certain foods must be healthy because they contain products such as tofu or tempeh. As with any food, assessing nutritional information concerning fat, sodium, calories, and sugar is important.

Potential Disorders in the Adolescent Vegetarian

An important point that often can be the most difficult to elicit is whether an adolescent’s choice to be a vegetarian is a form of restriction. Is it possible that vegetarianism

Table 3. Available Resources

United States Department of Agriculture MyPyramid.gov
Local Farmers' Markets http://www.ams.usda.gov/farmersmarkets/
Vegetarian Resource Group www.vrg.org
Vegetarian Children and Adolescents Vegetarianteen.com
Vegetarian Restaurants Around the World Vegdining.com

could be disguising an underlying eating disorder? A recent study of adolescents in Minnesota showed that adolescent vegetarianism may be a red flag signaling underlying issues of unhealthy attitudes and weight control. Interestingly, the youth in this study cited wanting to lose or not gain weight as their primary reason for being vegetarians. (13)

This study also found several “sex/vegetarian-status interactions.” Male vegetarians were much more likely than nonvegetarian males to be overly concerned about weight and body image. Adolescent vegetarian males warrant additional screening and counseling to ensure that their dietary choices are not concealing a larger issue.

Another interesting distinction was found between semivegetarians (those who eat fish and chicken) and restricted vegetarians (those who eliminate meat and fish). Restricted vegetarians were more likely to have healthful attitudes toward weight issues, and they also were more likely to engage in physical activities. They appeared more secure and had followed a vegetarian diet for at least 2 years. Semivegetarians commonly had inconsistent eating patterns and harmful weight control measures. (13)

Although adolescent vegetarianism can be a marker for an underlying disorder, it is important to remember that adult vegetarianism is associated with many health benefits. It is important for physicians to teach adolescent vegetarians how to eat in a healthy manner so they can benefit from the positive health effects that have been documented so strongly in their adult counterparts.

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Summary

Vegetarian diets can provide appropriate and adequate nutrition for all stages of life. The key to success is accurate information and understanding of the subject matter. Because vegetarianism is a complex issue influenced by many different factors, it can be difficult to stay well informed. Numerous studies have shown several important health benefits for adult vegetarians. The job of pediatricians is to ensure that their pediatric patients reap the same health benefits as adults.

- Based on strong research evidence, breastfeeding vegetarians should ensure that they are consuming adequate amounts of vitamin B₁₂, folate, and omega 3 fatty acids. (4)(5)(6)
- Based on strong research evidence, vegetarian children raised on a varied diet have normal growth and development measures. (7)(8)(9)(10)(11)(12)(16)
- Based on strong research evidence, adolescent vegetarians choose vegetarianism for very different reasons than their adult counterparts, and their decision often is impulsive and without much forethought. (13)(14)
- Based on strong research evidence, a food guide pyramid that is specific to vegetarians and takes into account the many subtleties of vegetarianism is important when counseling vegetarian patients. (15)
- Based on strong research evidence, vegetarianism in adolescents can be a means of concealing an underlying eating disorder. (13)

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