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Veganism: A New Approach to Health

Miljana Z. Jovandaric

Abstract

The word vegan was given by Donald Watson in 1944 in Leicester, England, who, together with several other members of the Vegetarian Society, wanted to establish a group of vegetarians who did not consume milk or dairy products. When the proposal was rejected, Watson and like-minded people founded The Vegan Society, which advocated a complete plant-based diet, excluding meat, fish, eggs, milk and dairy products (cheese, butter) and honey. Vegans do not wear fur items, wool, bone, goat, coral, pearl or any other material of animal origin. According to surveys, vegans make up between 0.2% and 1.3% of the US population and between 0.25% and 7% of the UK population. Vegan foods contain lower levels of cholesterol and fat than the usual diet.

Keywords: veganism, health, supplements

1. Introduction

Veganism is a philosophy and lifestyle that seeks to exclude the use of animals for food or clothing and includes all other forms of diet of non-animal origin. Vegan diet is based on cereals, legumes, fruits and vegetables. Vegans do not eat meat, fish, seafood, eggs, milk, dairy products, honey threads carry things made of fur, wool, bones, leather, coral, pearls or any other materials of animal origin. Within the commitment to a vegan lifestyle, there is a group of people who eat exclusively fresh raw fruits, vegetables without heat treatment. This group of vegans is called a raw food diet. Veganism differs from vegetarianism in that it is reduced entirely to a plant-based diet, while vegetarians also eat some products of animal origin, when animals are not killed when obtaining these products, e.g. eggs, honey, milk and dairy products. It seems that feminist ecology has more sympathy to movements related to animal rights, because females are exactly the most explored ones by the industry: for milk, eggs, frequent pregnancies, rape, etc., which draws more empathy in women.

The word vegan was given by Donald Watson in 1944 in Leicester, England, who, with several other members of the Vegetarian Society, wanted to establish a subgroup of vegetarians who do not consume milk or dairy products. After rejecting the proposal, Watson and associates founded. The Vegan Society which advocates a complete plant-based diet. The newly formed association agreed that the cessation of any form of animal exploitation was necessary to create a much more reasonable and humane society.

People become vegan for many reasons, including ethical care for animals and the natural environment, as well as circumstances related to health, spirituality, and religion [1]. As far as ethical principles are concerned, a vegan diet prevents the mass breeding and systematic slaughter of large numbers of animals on farms. Vegan food contains lower levels of cholesterol and fat than the usual diet. From the ecological point of view, the meat industry participates in the pollution of air, land and water, contributes to the exploitation and deforestation of forests and large land areas for the cultivation of crops intended for feeding a large number of farmed animals.

The basis of a healthy vegan diet is all vegetables, vegetable proteins, good fats and whole grains. However, vegans should pay attention to the intake of calcium, magnesium and vitamin D. Adequate intake of vitamin B12 is especially important, which is available in certain types of herbal drinks such as herbal drinks that do not contain lactose or added sugars and are especially suitable for vegans. A well-planned vegan diet can meet all the needs of the body. A poorly organized vegan diet can cause a lack of calcium, iodine, iron, vitamin B12 and vitamin D, which must then be taken from vitamin and mineral supplements [2].

According to surveys, vegans make up between 0.2% and 1.3% of the American population and between 0.25% and 7% of the general population [3].

The benefits of a vegan diet are great - it reduces the risk of cancer, cardiovascular disease, myocardial infarction, stroke, rheumatoid arthritis, high blood pressure, asthma, allergies and kidney stones.

Many studies suggest a link between cancer and diet [4]. More than half of these cancer cases are potentially preventable. Diet affects approximately 30% of all cancers in developed countries and 20% in developing countries [5].

The diet enables the assessment of the connection between the disease and the intake of certain foods in relation to the usual diet [6]. Several studies have been published that deal with the relationship between dietary factors and overall cancer risk. The vegan diet is thought to be inversely related to the overall incidence of cancer. There are studies whose results for certain cancers are not in line with the diet. This lack of clarity may result from the heterogeneity of vegetarian diets among respondents in different countries, as they may vary widely in relation to the ratio of animal and plant foods eaten, food quality, cooking methods, limitations of measures used to quantify dietary nutrition, and other factors may affect the development of cancer [7, 8].

Vegetarians and vegans generally include greater amounts of plant foods, avoid the intake of meat, and often adopt other healthy lifestyles compared to non-vegetarians [9]. Thus there is reason to suspect that vegetarian diets may protect against cancer. Factors associated with the high fiber content in vegetarian diets promote increased insulin sensitivity [10]. Plant-based diet is associated with lower circulating levels of total IGF-I and higher levels of IGFBP-I and IGFBP-2 compared with a meat-eating or even a lacto-ovo-vegetarian diet [11]. Insulin and IGF-I act as promoters for most normal and pre-neoplastic tissues. Therefore, their down-regulation may reduce cancer rates [12]. The strongest evidence linking specific foods to decrease risk of certain cancers includes the consumption of fruits and vegetables and whole grains [13]. Studies show a strong inverse relationship between dietary fiber intake and colon cancer in populations at low risk for the disease [14]. Several hypotheses have been postulated to explain this effect, 2 of which are outlined as follows. First, fiber increases the bulk of the stool, which decreases transit time and, in turn, could decrease the time colonic epithelial cells are exposed to potential fecal carcinogens. Second, bacteria in the gut can ferment fiber to short-chain fatty acids such as butyrate. These fatty acids may promote colonic cell differentiation and normal cell apoptosis [15]. It is estimated that an

increase of dietary fiber to 20 g a day from average current intakes would reduce the rate of colorectal cancer by 40% [16].

The vegan diet has been found to be an effective means of preventing and treating cardiometabolic diseases. The risk of type 2 diabetes can be reduced by 50%, preventing atherosclerosis, hypercholesterolemia and hypertension [17].

2. Vegan diet: risks

Most of the data on the vegan diet is based on the adult population. Less is known about the vegan diet of newborns and children. Children have a greater need for energy and protein, which is met by vegetables, tofu, beans, whole grains, nuts and seeds. It is recommended for 10% more protein in childhood than in adult vegans. For this reason, alternatives rich in low-fiber vegan proteins, such as tofu and seitan, may be desirable, as these foods usually result in high satiety and can support adequate protein intake. Because animal foods such as meat, dairy, eggs, fish and fowl are among the best sources of protein, vegans can sometimes lack sufficient protein in their diets. The American Dietetic Association, however, notes that protein requirements can be met if a variety of plant proteins are consumed. Complementary proteins, specifically, can be very helpful in providing all the essential amino acids required by the body. Complementary proteins are made up by two incomplete proteins, such as beans and rice, that, when combined, form a complete protein. These proteins do not need to be consumed at the same meal, just during the same day [18]. Though vegan diets are often rich in omega-6 fatty acids, they can lack sufficient amounts of omega-3 due to the restriction of omega-3-rich foods, including eggs, fish and other seafood. The omega-3 fatty acids found in animal sources, which include eicosapentaenoic acid and docosahexaenoic acid, are important for cardiovascular, brain and eye health. Plant foods rich in omega-3, such as flaxseed, only contain another type of fatty acid, known as alpha-linolenic acid. Vegans can purchase soy milk and breakfast bars fortified with DHA, as well as DHA supplements derived from microalgae. Because DHA can be retroconverted to EPA, sources containing DHA are sufficient for vegan diets. Vitamin D is important for bone health, and low levels have been linked to reduced bone mass. Sunlight exposure is best source of vitamin D. Therefore, vegans who do not get regular sun exposure need to consume dietary vitamin D through either fortified foods or supplements, since vitamin D occurs naturally in very few foods. Vegan sources of vitamin D that are often fortified include soy milk, rice milk and orange juice. Lack of vitamin B-12 is one of the biggest concerns with vegan diets, especially because vegan diets are typically rich in folacin, which can mask B-12 deficiency symptoms [6]. Severe B-12 deficiencies can result in both anemia and dementia, notes Harvard Medical School. So, if you are a vegan, be sure to consume B-12 fortified foods such as soy and rice beverages and breakfast cereals, or supplements. Because the bioavailability of iron in vegan diets is lower than in traditional diets, vegans should consume 1.8 times the amount of iron consumed by nonvegans. Good sources of iron for vegans include dried beans and dark, leafy green vegetables. Zinc is another mineral whose bioavailability is lower in vegans than in nonvegans. Vegan sources of zinc include legumes, soy products, grains and nuts. Some research suggests that because plant-based diets are low in iodine, vegans who do not consume key sources of iodine, including iodized salt and sea vegetables, are more likely to be deficient in the mineral. The American Dietetic Association notes that vegans tend to fall below the recommended intake of calcium. The calcium in certain calcium-rich vegetables, such as Swiss chard and spinach, is not absorbed well, making fortified foods such as fruit juices, breakfast cereal and soy and rice milk among the best choices for vegans [2].

3. Vegan diet and micronutrient deficiencies

A vegan diet can increase the risk of micronutrient deficiencies, particularly iodine, iron, zinc, calcium, Vitamin B12, Vitamin D, Vitamin B2, Vitamin A, n-3 fatty acids (docosahexanoic acid; DHA).

3.1 Iodine

In a vegan diet, iodine needs can be met by iodized salt or supplements to sources of algae [19].

3.2 Iron

Vegan sources of iron are from tofu (soy), chickpeas, nuts, seeds and grains. Unlike iron from animal sources, called heme iron, which is easily absorbed, non-heme iron from plants has poor bioavailability and lower absorption due to high levels of phytate and polyphenols. Vegans, as well as vegetarians, require 1.8 times more iron in the diet, compared to those who eat meat. Vitamin C may increase the absorption of non-heme iron. However, many vegan sources of iron, especially soy, nuts and sesame seeds, are food allergens. For non-allergic children, iron-fortified foods, including packaged cereals, can be an additional source of iron. During later childhood, iron deficiency is the most common micronutrient deficiency, which emphasizes the importance of adequate iron intake [20].

3.3 Zinc

Vegan sources of zinc include soy and other legumes, nuts, seeds and whole grains, as well as fortified cereals. Due to the lower bioavailability of zinc in plant foods, vegans (as well as vegetarians) may need 1.5 times more zinc than those who eat meat [21].

3.4 Calcium

Calcium is a mineral important for the development of bone density. It is found mostly in milk and dairy products, which are absent in the vegan diet. Foods of plant origin rich in calcium are vegetables, legumes and cereals, leafy vegetables, sesame seeds, almonds and dried figs. If calcium intake is insufficient, a supplement in combination with vitamin D that promotes absorption should be considered [22].

3.5 Vitamin B12

Vitamin B12 is the biggest problem in the vegan diet, perhaps because it is found almost exclusively in foods of animal origin. Constant vitamin B12 supplementation or herbal drinks enriched with vitamin B12 are suggested [23].

3.6 Vitamin D

Most research indicates that vitamin D3 of animal origin is more effective than vitamin D2 of plant origin. Humans get most of their vitamin D from sun exposure [24].

3.7 Vitamin B2

Vitamin B2, or riboflavin, is necessary for the metabolism of amino acids, carbohydrates and the development of the nervous system. The main dietary sources

include milk, eggs and some meat, which is not part of the vegan diet, as well as leafy greens, fortified cereals, nuts and soy [25].

3.8 Vitamin A

Vitamin A is found in fortified foods and beverages, including milk, cod liver oil, eggs, and leafy green vegetables rich in beta-carotene (e.g., kale, spinach). Vegan intake was also below nutritional recommendations [25].

3.9 N-3 fatty acids (DHA)

Omega-3 fatty acids require special attention in the vegan diet. The inclusion of vegan, omega-3-containing foods, such as walnuts, ground chia seeds and ground flaxseed, is advisable. Concerns have been expressed about flaxseed processing. Currently, the safe amount of ground flaxseed is not well known and caution is advised. Alternatively, supplementary sources of preformed DHA should be considered [26].

It is important to note that a diet without animal meat and products also reduces the chances of food poisoning.

4. Link between diet, microbiota and health

The majority of microorganisms in the human intestine belong to the phyla Firmicutes (which includes *Clostridium*, *Enterococcus*, *Lactobacillus* and *Ruminococcus*) and Bacteroidetes (which includes *Bacteroides* and *Prevotella* in proportions determined in part by diet) [27].

Vegan samples had a significantly lower number of microbes compared to omnivores for four bacterial taxa: *Bacteroides*, *Bifidobacterium*, *E. coli* and Enterobacteriaceae. Interestingly, the vegetarian sample also showed significantly reduced bacteria and bifidobacteria. It is important to note that vegans and vegetarians did not differ significantly from each other in these four taxa, nor did they differ in *Enterobacter*, *Enterococcus*, *Clostridium*, *Klebsiella*, or *Lactobacillus*, compared to each other or to omnivorous specimens. The vegan diet contains more carbohydrates and fiber than omnivores, and as such, vegan samples significantly reduced stool pH than control groups. The lower pH is strongly correlated with the reduced number of *E. coli* and Enterobacteriaceae, species that are not tolerant of acidic environments. Microbiota and pH of vegetarian stools fall on continuity between vegans and omnivores. These results suggest that the composition of the human gut changes with diet along the continuum, with the vegan diet differing most from omnivores, but not necessarily and significantly from those of other vegetarians. It is possible that the disproportionately high prevalence of this beneficial bacterium in the vegan gut is attributable to a high fiber diet. The role of dietary fiber needs to be examined in greater depth, beyond its mechanical effect of increasing stool bulk and speeding transit time. Dietary fiber also influences the intestinal environment by inhibiting pathogen adhesion, altering bacterial fermentation patterns and short chain fatty acid concentrations, modifying microbiota community profiles, and lowering stool pH [28]. A vegan diet promotes an intestinal microbiota that directly reduces the risk of metabolic diseases. Studies have noticed a link between a vegan diet and protection against autoimmune diseases. For example, an analysis of the Adventist cohort found that a vegan diet, but not a vegetarian one, was associated with a lower risk of hypothyroidism [29]. Four fecal hydrolytic enzymes, associated with toxic and inflammatory products, decreased

during the vegan diet. However, these changes in fecal urease, hololglycine hydrolases, β -glucuronidase and β -glucosidase disappeared within two weeks of starting a normal diet. The authors attribute this reduction in fecal enzymes not only to bacterial activity during the dietary change, but also to the high fiber content in the vegan diet, which can affect fecal weight, transit time, and bacterial metabolism. More detailed research has focused on the vegan diet and the “extreme” raw vegan diet (live food movement) as a promising treatment for rheumatoid arthritis (RA). This possibility that a vegan diet may cause a rapid change in bowel profile was supported by studies in patients with rheumatoid arthritis in which a one-month transition to a vegan diet was sufficient to significantly alter fecal microflora, as determined by stool sample gas–liquid chromatographic profiles of bacterial cellular fatty acids [30]. Thus a patient’s personal taste and cultural traditions may need to dictate whether a vegan diet is the ideal choice for medical nutrition therapy [31].

5. Conclusions

A well-planned vegan diet can meet all the body’s needs. A poorly organized vegan diet can cause a deficiency of calcium, iodine, omega-3 fatty acids, iron, vitamin B12 and vitamin D, which must then be taken from vitamin and mineral supplements.

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References

- [1] Stepaniak, Joanne (2000). Being Vegan. McGraw-Hill Contemporary. pp. 2,6,17,148-150. ISBN 978-0737303230
- [2] "Position of the American Dietetic Association: vegetarian diets." J Am Diet Assoc 109 (7): 1266-1282. July 2009. doi:10.1016/j.jada.2009.05.027. PMID 19562864. <http://www.eatright.org/About/Content.aspx?id=8357>
- [3] "Donald Watson". Times Online. Times Newspapers Ltd.. 2005-11-16. <http://www.timesonline.co.uk/tol/comment/obituaries/article754304.ece>. Retrieved 2006-09-15. "The Vegan Society's 25 members swelled steadily to the 5,000 of today. There are now an estimated 250,000 vegans in Britain."
- [4] Yessenia Tantamango-Bartley , Karen Jaceldo-Siegl, Jing Fan, Gary Fraser. Vegetarian diets and the incidence of cancer in a low-risk population. Cancer Epidemiol Biomarkers Prev. 2013 ;22:286-294.
- [5] Slattery M, Boucher K, Caan B, Potter J, Ma K. Eating patterns and risk of colon cancer. Am J Epidemiol 1998;148:4-16
- [6] Park Y, Leitzmann MF, Subar AF, Hollenbeck A, Schatzkin A. Dairy food, calcium, and risk of cancer in the NIH-AARP Diet and Health Study. Arch Intern Med 2009;169:391-401
- [7] Key T, Appleby P, Spencer E, Travis R, Roddam A, Allen N. Cancer incidence in vegetarians: results from the European Prospective Investigation into Cancer and Nutrition (EPIC-Oxford). Am J Clin Nutr 2009;89:1620S-6S.
- [8] Fraser GE. Vegetarian diets: what do we know of effects on chronic common diseases? Am J Clin Nutr. 2009;89(Suppl):1607S-12S.
- [9] Lanou AJ, Svenson B. Reduced cancer risk in vegetarians: an analysis of recent reports. Cancer Manag Res. 2011;3:1-8
- [10] Fukagawa NK, Anderson JW, Hageman G, Young VR, Minaker KL. High-carbohydrate, high-fiber diets increase peripheral insulin sensitivity in healthy young and old adults. Am J Clin Nutr. 1990;52:524-8.
- [11] Allen NE, Appleby PN, Davey GK, Kaas R, Rinaldi S, Key TJ. The associations of diet with serum insulin-like growth factor I and its main binding proteins in 292 women meat-eaters, vegetarians, and vegans. Cancer Epidemiol Biomarkers Prev. 2002;11:1441-8.
- [12] Shen M-R, Hsu Y-M, Hsu K-F, Chen Y-F, Tang M-J, Chou C-Y. Insulin-like growth factor 1 is a potent stimulator of cervical cancer cell invasiveness and proliferation that is modulated by $\alpha v \beta 3$ integrin signaling. Carcinogenesis. 2006;27(5):962-71.
- [13] Williams MT, Hord NG. The Role of Dietary Factors in Cancer Prevention: Beyond Fruits and Vegetables. Nutr Clin Pract. 2005;20(4):451-9.
- [14] Peters U, Sinha R, Chatterjee N, et al. Dietary fibre and colorectal adenoma in a colorectal cancer early detection programme. Lancet. 2003; 361: 1491- 1495.
- [15] Key TJ, Schatzkin A, Willet WC, Allen NE, Spencer EA, Travis RC. Diet, nutrition and the prevention of cancer. *Public Health Nutr*. 2004; 7: 187- 200.
- [16] Bingham S, Riboli E. Diet and cancer: the European prospective investigation into cancer and nutrition. Nature. 2004; 4: 206- 215.
- [17] Kahleova H, Levin S, Barnard N. Cardio-metabolic benefits of

plant-based diets. *Nutrients*. 2017;9(8):848.

[18] Academy of Nutrition and Dietetics. Position of the Academy of Nutrition and Dietetics: vegetarian diets. *J Acad Nutr Diet*. 2016;116:1970-1980

[19] Baroni L, Goggi S, Battaglino R, Bergeglieri M, Fasan I, Filippin D, et al. Vegan nutrition for mothers and children: practical tools for healthcare providers. *Nutrients*. 2018;11(1):5.

[20] Monsen ER, Hallberg L, Layrisse M, Hegsted DM, Cook JD, Mertz W, et al. Estimation of available dietary iron. *Am J Clin Nutr*. 1978;31:134-141

[21] Saunders AV, Craig WJ, Baines SK. Zinc and vegetarian diets. *Med J Aust*. 2013;199(4):S17-S21.

[22] Meyer R, De Koker C, Dziubak R, Skrapac AK, Godwin H, Reeve K, et al. A practical approach to vitamin and mineral supplementation in food allergic children. *Clin Transl Allergy*. 2015;5(11):11.

[23] Berlin H, Berlin R, Brante G. Oral treatment of pernicious anemia with high doses of vitamin B12 without intrinsic factor. *Acta Med Scand*. 1968;184(4):247-268

[24] Wilson LR, Tripkovic L, Hart KH, Lanham-New SA. Vitamin D deficiency as a public health issue: using vitamin D 2 or vitamin D 3 in future fortification strategies. *Proc Nutr Soc*. 2017;76(3):392-399.

[25] Kristensen NB, Maden ML, Hansen TH, Alin KH, Hoppe C, Fagt S, et al. Intake of macro- and micronutrients in Danish vegans. *Nutr J*. 2015;14:1-10

[26] Abraham K, Buhrke T, Lampen A. Bioavailability of cyanide after consumption of a single meal of foods containing high levels of

cyanogenic glycosides: a crossover study in humans. *Arch Toxicol*. 2016;90(3):559-574

[27] Power SE, O'Toole PW, Stanton C, Ross RP, Fitzgerald GF. Intestinal microbiota, diet and health. *Br. J. Nutr*. 2014;111:387-402.

[28] Zimmer J, Lange B, Frick JS, Sauer H, Zimmermann K, Schwiertz A, Rusch K, Klosterhalb S, Enck P. A vegan or vegetarian diet substantially alters the human colonic faecal microbiota. *Eur. J. Clin. Nutr*. 2012;66:53-60.

[29] Tonstad S, Nathan E, Oda K, Fraser G. Vegan diets and hypothyroidism. *Nutrients*. 2013;5:4642-4652.

[30] Ling WH, Hänninen O. Shifting from a conventional diet to an uncooked vegan diet reversibly alters fecal hydrolytic activities in humans. *J. Nutr*. 1992;122:924-930.

[31] Khazrai YM, Defeudis G, Pozzilli P. Effect of diet on type 2 diabetes mellitus: A review. *Diabetes Metab. Res. Rev*. 2014;30:24-33