Alkaline diet

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Alkaline diet (also known as the **alkaline ash diet**, **alkaline acid diet**, **acid ash diet**, and the **acid alkaline diet**) describes a group of loosely related diets based on the belief that certain foods can affect the acidity and pH of bodily fluids, including the urine or blood, and can therefore be used to treat or prevent diseases. Due to the lack of credible evidence supporting any benefits of this diet, it is generally not recommended by dietitians and other health professionals.[1]

An alkaline diet encourages the consumption of most fruits and vegetables, and omits foods such as meat, cheese, eggs and grains

The relationship between diet and acid-base homeostasis, or the regulation of the acid-base status of the body, has been studied for decades, though the medical applications of this hypothesis have largely focused on changing the acidity of urine. Traditionally, this diet has advocated for avoiding meat, poultry, cheese, and grains in order to make the urine more alkaline (higher pH), changing the environment of the urine to prevent recurrent urinary tract infections (UTIs) and kidney stones (nephrolithiasis). However, difficulties in effectively predicting the effects of this diet have led to medications, rather than diet modification, as the preferred method of changing urine pH. The "acid-ash" hypothesis has been considered a risk factor for osteoporosis by various scientific publications, though more recently, the available weight of scientific evidence does not support this hypothesis. It is, therefore, widely dismissed as pseudoscience.

The term "alkaline diet" has also been used by alternative medicine practitioners, with the proposal that such diets treat or prevent cancer, heart disease, and low energy levels as well as other illnesses. These claims are not supported by medical evidence and make incorrect assumptions about how alkaline diets function that are contrary to modern understanding of human physiology.

Contents

Medical aspects

Diet composition

According to the traditional hypothesis underlying this diet, acid ash is produced by meat, poultry, cheese, fish, eggs, and grains. Alkaline ash is produced by fruits and vegetables, except cranberries, prunes and plums. Since the acid or alkaline ash designation is based on the residue left on combustion rather than the acidity of the food, foods such as citrus fruits that are generally considered acidic are actually considered alkaline producing in this diet.[2]

Current hypotheses

It has been suggested that diets high in "acid ash" (acid producing) elements will cause the body to try to buffer (or counteract) any additional acid load in the body by breaking down bone, leading to weaker bones and increased risk for osteoporosis. Conversely, "alkaline ash" (alkaline producing) elements will hypothetically decrease the risk of osteoporosis. This hypothesis has been advanced in a position statement of the Academy of Nutrition and Dietetics,[2] in a publication of the U.S. National Academy of Sciences,[3] as well as other scientific publications,[4] which have stated foods high in potassium and magnesium such as fruits and vegetables may decrease the risk of osteoporosis through increased alkaline ash production. This acceptance of the acid-ash hypothesis as a major modifiable risk factor of osteoporosis by these publications, however, was largely made without significant critical review by high quality systematic analysis.[5]

Recent systematic reviews have been published which have methodically analyzed the weight of available scientific evidence, and have found no significant evidence to support the acid-ash hypothesis in regard to prevention of osteoporosis. A meta-analysis of studies on the effect of dietary phosphate intake contradicted the expected results under the acid-ash hypothesis with respect to calcium in the urine and bone metabolism. This result suggests use of this diet to prevent calcium loss from bone is not justified.[5] Other meta-analyses which have investigated the effect of total dietary acid intake have also found no evidence that acid intake increases the risk for osteoporosis as would be expected under the acid-ash hypothesis.[4][6] A review looked at the effects of dairy product intake, which have been hypothesized to increase the acid load of the body through phosphate and protein components. This review found no significant evidence suggesting dairy product intake causes acidosis or increases risk for osteoporosis.[7] A meta-analysis on the effects of alkaline potassium salts on calcium metabolism and bone health found that supplementation with alkaline potassium salts reduces loss of calcium in urine and reduces acid secretion.[8]

It has also been speculated that this diet may have an effect on muscle wasting, growth hormone metabolism or back pain, though there is no conclusive evidence to confirm these hypotheses.[9][10][11] Given an aging population, the effects of an alkaline diet on public health may be worth considering, though there is little scientific evidence in this area.[11]

Alternative medicine

Alternative medicine practitioners who have promoted the alkaline diet have advocated its use in the treatment of various medical conditions including cancer.[12] These claims have been mainly promoted on websites, magazines, direct mail, and books, and have been mainly directed at a lay audience.[4] While it has been proposed that this diet can help increase energy, lose weight, and treat cancer and heart disease, there is no

evidence to support any of these claims.[13] This version of the diet, in addition to avoiding meats and other proteins, also advocates avoiding processed foods, white sugar, white flour, and caffeine,[10] and can involve specific exercise and nutritional supplement regimens as well.[14]

Evidence base

Advocates for alternative uses of an alkaline diet propose that since the normal pH of the blood is slightly alkaline, the goal of diet should be to mirror this by eating a diet that is alkaline producing as well. These advocates propose that diets high in acid-producing elements will generally lead the body to become acidic, which can foster disease.[10][13] This proposed mechanism, in which the diet can significantly change the acidity of the blood, goes against "everything we know about the chemistry of the human body" and has been called a "myth" in a statement by the American Institute for Cancer Research.[15] Unlike the pH level in the urine, a selectively alkaline diet has not been shown to elicit a sustained change in blood pH levels, nor to provide the clinical benefits claimed by its proponents. Because of the body's natural regulatory mechanisms, which do not require a special diet to work, eating an alkaline diet just can, at most, change the blood pH minimally and transiently.[10][13][15]

A similar proposal by those advocating this diet suggests that cancer grows in an acidic environment, and that a proper alkaline diet can change the environment of the body to treat cancer. This proposal ignores the fact that while cancer tissue does grow in an acidic environment, it is the cancer that creates the acidity. The rapid growth of cancer cells creates the acidic environment; the acidic environment does not create cancer.[12] The proposal also neglects to recognize that it is "virtually impossible" to create a less acidic environment in the body.[15] "Extreme" dietary plans such as this diet have more risks than benefits for patients with cancer.[12]

Other proposed benefits from eating an alkaline diet are likewise not supported by scientific evidence. Although it has been proposed that this diet will increase "energy" or treat cardiovascular disease, there is no evidence to support these assertions.[13] A version of this diet has also been promoted by Robert O. Young as a method of weight loss in his book *The pH Miracle*. According to the Academy of Nutrition and Dietetics, portions of his diet such as the emphasis on eating green leafy vegetables and exercise would likely be healthy. However, the "obscure theory" on which his diet is based and the reliance on complicated fasting regimens and nutritional supplements means that this diet "is not a healthy way to lose weight."[14] It has also been proposed that acid causes rheumatoid arthritis and osteoarthritis, and that an alkaline diet can be used to treat these conditions. There is no evidence to support this proposal.[16]

Urinary and/or saliva testing for acidity has been proposed as a way to measure the body's acidity level and therefore the level of risk for diseases.[4] However, there is no correlation between the urinary pH measured in home "test kits" and the acidity of the body.[15]

Adverse effects

Because the alkaline diet promotes excluding certain families of foods, it could result in a less-balanced diet with resulting nutrient deficiencies such as essential fatty acids and phytonutrients.[1] Many websites and books promoting this diet sell courses of supplements and foods; it should not be necessary to purchase any of these products. The level of effort needed to use this diet is considered "High" as there are many foods that need to be excluded in this diet.[10]

History

The role of the diet and its influence on the acidity of urine has been studied for decades, as physiologists have studied the kidney's role in the body's regulatory mechanisms for controlling the acidity of body fluids. The French biologist Claude Bernard provided the classical observation of this effect when he found that changing the diet of rabbits from an herbivore (mainly plant) diet to a carnivore (mainly meat) diet changed the urine from more alkaline to more acid. Spurred by these observations, subsequent investigations focused on the chemical properties and acidity of constituents of the remains of foods combusted in a bomb calorimeter, described as ash. The "dietary ash hypothesis" proposed that these foods, when metabolized, would leave a similar "acid ash" or "alkaline ash" in the body as those oxidized in combustion.[17]

Nutrition scientists began to refine this hypothesis in the early 20th century, emphasizing the role of negatively charged particles (anions) and positively charged particles (cations) in food. Diets high in chloride, phosphate and sulfate (all of which are anions) were presumed to be acid forming, while diets high in potassium, calcium and magnesium (all of which are cations) were presumed to be alkaline forming. Other investigations showed specific foods, such as cranberries, prunes and plums had unusual effects on urine pH. While these foods provided an alkaline ash in the laboratory, they contain a weak organic acid, hippuric acid, which caused the urine to become more acidic instead.[17]

Historical uses

Historically, the medical application of this diet has largely focused on preventing recurrence of kidney stones as well as the prevention of recurrent urinary tract infections, by relying on the recognized ability of this diet to affect urinary pH. Years ago, this diet was used to adjust the acidity of the urinary environment that the stones formed in, and could hypothetically help prevent stones from forming or the development of UTIs. However, the analytical methods that attempted to precisely calculate the effects of food on urinary pH were not precise except in very general terms, making effective use of this diet difficult. Therefore, medications, which can more reliably alter the urine pH, rather than diet modification, have been the treatment of choice when trying to alter the pH of the urine.[18] While there have been recent improvements in recognizing different variables that can affect acid excretion in the urine, the level of detail needed to predict the urinary pH based on diet is still daunting. Precise calculations require very detailed knowledge of the nutritional components of every meal as well as the rate of absorption of nutrients, which can vary substantially from individual to individual, making effective estimation of urine pH still not currently feasible.[19]

See also

- List of ineffective cancer treatments
- D. C. Jarvis - Advocated higher blood acidity as prevention and treatment
- Hay diet

References

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Further reading

- "Top diets review for 2015". National Health Service Choices. Retrieved 22 February 2015.

External links

- Quackwatch profile of alkaline diet (http://www.quackwatch.org/01QuackeryRelatedTopics/DSH/coral2.html)
- Discussion on ScienceBlogs about alkaline diets (http://scienceblogs.com/insolence/2007/06/08/your-friday-dose-of-woo-acid-base-or-woo-2/)