

Palaeolithic diet (“stone age” diet)

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Abstract

A popular diet in Sweden today is the palaeolithic diet, where lean meat, fish, vegetables, fruit, roots and nuts are dietary staples, while cereals, dairy products, salt and processed fat and sugar are avoided. The underlying rationale is that foods that were available during the evolution of primates, up to the emergence of fully modern humans, are healthier than recently introduced ones (dairy products, cereals, beans, refined fat, sugar, etc.), since our digestive and metabolic systems were not designed for the latter group of foods. Variation in plant foods, another principle based on evolutionary biology, is recommended to avoid high intakes of potentially harmful bioactive substances. It is not known whether palaeolithic diets are more, or less, effective than other diets in weight reduction.

Keywords: *evolutionary medicine; metabolic syndrome; overweight; popular diets; Western disease*

Introduction

The Palaeolithic, the old stone age, started around 2.5 million years BP, when humans first made use of stone tools. The period ended with the emergence of agriculture approximately 10 000 years ago (5000 years ago in Scandinavia). During the Palaeolithic, wild meat, fish, insects, eggs, fruit, berries, vegetables and nuts were consumed in varying proportions depending on the ecological niche (1, 2). Seeds and beans were rarely eaten and never in large amounts on a daily basis. Dairy products and refined fat and sugar were not available.

A large variety of plant species was consumed, as inferred from surveys in contemporary hunter–gatherers (3) and free-living primates (4). Accordingly, the intake of any single plant-derived bioactive substance (e.g. terpenoids, alkaloids, glucosinolates, tannins, phytoestrogens and lectins) was low. Many, if not most, of these bioactive substances are considered to be part of the defence system against herbivory: plants do not “want” to be eaten (5, 6). The highest concentration of bioactive substances is typically found in seeds and beans.

Palaeolithic lifestyles may prevent Western disease

Overweight and the metabolic syndrome have been conspicuously absent in twentieth century populations with palaeolithic lifestyles, as shown in several surveys (7). Cardiovascular disease including stroke was apparently unknown in East Africa before the

transition to a modern lifestyle. One such population was studied in Kitava, Trobriand Islands, Papua New Guinea (8–13). In Kitava, food was constantly available in excess, suggesting that food shortage is an overestimated cause of leanness in palaeolithic populations. The level of physical activity of Kitavans was roughly estimated at 1.7 multiples of the basal metabolic rate, which is the same as in Western males who are moderately active at work and during leisure activities.

Ageing in the Western world is very different to that in palaeolithic populations. If, at the age of 50 years, Swedish men and women had the body mass index of Kitavans, they would weigh 19 and 22 kg, respectively, less than they actually do (9). These striking differences indicate that typical ageing in the modern world is biologically abnormal. Advanced atherosclerosis is seen in virtually every elderly Westerner, irrespective of body mass index (14). One of the main suspects is diet.

Observational studies cannot prove causal relationships, but they lend support to the notion that a palaeolithic diet may prevent overweight and Western disease, even when food is available in excess.

Age structure and genetics may not be the most important explanations

Palaeolithic populations do not lack elderly individuals, although the high mortality in infancy and childhood dramatically lowers average life expectancy. Among hunter–gatherers, estimated life

expectancy at birth may be below 40 years, while life expectancy at age 50 years may be close to European levels of today (15). Accordingly, there is no obvious reason to suspect that a different age structure is the main explanation for the apparent absence of cardiovascular disease in non-Western populations.

The role of genetics is often misinterpreted, as if genes could work independently of the environment. Although familial heritage apparently is a strong determinant within Westernized populations, genetic factors do not appear to explain the rarity of overweight, cardiovascular disease and diabetes among traditional populations. On the contrary, after adopting a Western lifestyle non-Europeans seem more prone to developing these disorders compared with populations of northern European ancestry (16–19).

Nutritional characteristics of palaeolithic diets

A diet based on lean meat, fish, vegetables, roots, fruit and nuts can easily meet human nutritional requirements according to the Nordic Nutrition Recommendations, except that calcium intake often is too low, especially when the intake of green leafy vegetables is limited. Adding milk to a palaeolithic diet thus increases calcium intake but does not necessarily prevent osteoporosis (1, 20). There are no other well-founded benefits of adding dairy products to a palaeolithic diet. The addition of wholegrain cereals or beans provides no known benefit, but may increase the risk of vitamin and mineral deficiencies.

This is not a low-carb diet

A palaeolithic diet is often high in protein, typically 15–35% of energy ($E\%$), but not necessarily low in carbohydrate (3). It should not be confused with the Atkins diet or similar programmes based on the assumption that a high intake of carbohydrates promotes insulin resistance and dyslipidaemia. Our primate ancestors are considered to have been specialized fruit-eaters for more than 40 million years (21), and it is unlikely that our metabolism has lost the capacity to handle high amounts of carbohydrates in the relatively short periods as palaeolithic hunters. In Kitava, carbohydrates provided nearly 70 $E\%$, but overweight was apparently absent and insulin sensitivity was markedly higher than in a randomly selected Swedish population (12, 22).

Palaeolithic diets do not consist of meat in exchange for vegetables: both are included. The proportion of animal products (meat, fish, shellfish, insects) as opposed to plant foods varied dramatically among our human ancestors depending on habitat and period. There is no good evidence to suggest that lean, whole meat promotes overweight or related diseases.

Caloric restriction without food restriction

There is uncertainty regarding the health benefits of weight loss. Several prospective observational cohort studies suggest increased mortality in moderately overweight subjects who voluntarily lose weight, compared with those who are weight stable (23). Losing the same amount of weight may hypothetically have different long-term health effects depending on the weight-reduction programme. For example, restricting the amount of food without improving the quality may increase the risk of suboptimal intake of micronutrients. Relevant dietary intervention trials with hard clinical endpoints (mortality, myocardial infarction, etc.) are lacking.

Animal experiments suggest that caloric restriction has several positive health effects (24). Intuitively, lean meat, fish, vegetables and fruit may be prudent choices in an energy-restricted diet model. Indirect evidence suggests that such foods are satiating owing to their low energy density, but this has not been properly tested in clinical trials.

Conclusion

The palaeolithic diet is not primarily a weight-loss programme. Rather, it is part of a theoretical template for health promotion (1, 25). It has not been proven to prolong life, and the same is true for low-fat, high-fibre diets. Overweight subjects who wish to eat a palaeolithic diet can do so without obvious risks. However, calcium supplementation may be considered.

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