Vegan Diet and Alzheimer's Disease Prevention: Risk or Benefit?

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Key highlights:

- Lifestyle factors such as diet appear to play a significant role in the development of AD
- Various predominantly plant-based dietary patterns (e.g., the Mediterranean diet) have demonstrated a protective effect on the risk of AD
- A vegan diet is often richer in nutrients with a favorable effect on AD risk (fiber, Vitamin C, PUFAs, folate, antioxidants), but at the same time, also carries the risk of deficiency in other crucial substances for the nervous system, such as Vitamin B12, Vitamin D, and EPA/DHA
- Additional research is needed to investigate the effects of a vegan diet on the risk of AD
- Vegans should plan their diet carefully to prevent potential deficiencies through supplementation of critical nutrients

Dementia is on the rise in the general population. According to the World Health Organization (WHO) and Alzheimer’s Disease International (ADI), in the year 2019, more than 50 million people were affected, and it is estimated that by the year 2050, the number will reach almost 152 million. In addition to the main risk factor “ageing”, other risk factors such as genetic predisposition, diabetes mellitus, cardiovascular diseases, and lifestyle factors appear to play a role in the development of dementia. Concerning lifestyle and dietary patterns there is some evidence suggesting that predominantly plant-based diets, such as the Mediterranean diet, could play a protective role against the development of dementia and Alzheimer’s disease (AD), while typical Western-style diets seem to increase the risk.

Western-Style dietary patterns versus plant-based diets

A high consumption of legumes and nuts appears to slow cognitive decline, and so does a high intake of fruits and vegetables, especially when consumed in a wide variety. Other protective dietary factors seem to include dietary fiber and tocopherols, primarily found in fruits, vegetables, grains, and legumes. The ‘Salus in Apulia Study’ showed an inverse association between the consumption of vegetables, coffee, and sources of Vitamin A, and cognitive decline in elderly Italian subjects.

According to the cohort study conducted by the UK Biobank, analyzing the dietary habits of 293,888 English subjects, the consumption of processed meat appears to
increase the risk of dementia (HR 1.44, 95% CI 1.24-1.67 at a consumption of 25g) and AD (HR 1.52, 95% CI 1.18-1.96), while the consumption of unprocessed red or white meat does not show a similar association\textsuperscript{ix}. In the prospective ‘Women’s Health Initiative’-Study, processed meat consumption was also associated with increased dementia-related mortality in postmenopausal women (HR 1.20; 95% CI 1.05-1.32), while the consumption of unprocessed white meat was linked to a lower risk (HR 0.86; 95% CI 0.75-0.98)\textsuperscript{x}. A high intake of saturated fatty acids (which are particularly abundant in animal fats such as dairy products and fatty meats) was associated with a decline in global cognitive function and verbal memory in the ‘Women’s Health Study’, while the consumption of monounsaturated fats (especially in certain vegetable oils like olive oil, canola oil, nuts, seeds, avocado) exhibited a protective effect\textsuperscript{xi}.

What about strictly vegan diets?

Very limited information exists regarding the association between vegan dietary patterns and dementia. In an analysis of the ‘Adventist Health Study’ (AHS) from the 1990s, participants who consumed meat and fish had a two-fold higher risk of developing dementia compared to vegetarians (RR 2.18, p=0.065)\textsuperscript{xii}. Moreover, vegan diets, compared to an omnivorous dietary pattern, are generally richer in polyunsaturated fatty acids (PUFAs), α-linolenic acid (ALA), folate, vitamin C, E and magnesium, but lower in vitamin B12, vitamin D, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), iron, zinc, iodine and calcium\textsuperscript{xiii}. On the one hand, the higher content of vitamin C, folic acid, and PUFAs in a vegan diet could be advantageous in the prevention of dementia, including AD (figure 1), but on the other hand, deficiencies in vitamin B12, D or EPA/DHA could potentially contribute to the development of the disease\textsuperscript{xiv}. However, the high content of secondary plant compounds in a plant-based diet, including many with antioxidant functions, could potentially provide protection against AD\textsuperscript{xv}.

On the contrary, advanced glycosylation end products (AGEs), which are present in high amounts in meat-heavy Western-style diets, but much lower in plant-based foods\textsuperscript{xvi}, could play a role in the development of AD\textsuperscript{xvii}. Additional mechanisms that could contribute to primary and secondary risk reduction for Alzheimer’s disease (AD) include the anti-inflammatory effect of a vegan diet\textsuperscript{xviii, xix} and the reduced production of trimethylamine-N-oxide (TMAO) by the microbiota in vegans\textsuperscript{xx}.

Conclusion

In conclusion, despite the potential benefits of a vegan diet displayed by current literature, further research, including prospective cohort studies, is needed to demonstrate whether a 100% plant-based diet could play a role in the primary and secondary prevention of AD. Individuals who wish to adopt a vegan approach should carefully plan their diet to ensure the adequate intake or supplement of critical nutrients such as Vitamin B12, Vitamin D, and long-chain omega-3 fatty acids.
Figure 1: Potential favorable and unfavorable effects of a vegan diet on Alzheimer’s Disease risk

**VEGAN DIET**

**Potentially favorable effects**
- Vitamin C ↑
- Fibers ↑
- Folic acid ↑
- PUFAs ↑
- α-Linolenic acid ↑
- Saturated fatty acids ↓
- AGEs ↓
- TMAO ↓
- Phytochemicals ↑
- Inflammation ↓

**Potentially unfavorable effects**
- Vitamin B12 ↓
- Vitamin D ↓
- EPA ↓
- DHA ↓

**Alzheimer’s Disease (AD)**

**Abbreviations:**
- PUFAs = polyunsaturated fatty acids
- AGEs = advanced glycation endproducts
- TMAO = trimethylamine-N-oxide
- EPA = Eicosapentaenoic acid
- DHA = Docosahexaenoic acid

References


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