

Ketogenic Diet and Neurological Conditions

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The ketogenic diet has been studied for its potential therapeutic benefits in several neurological disorders, including Alzheimer's disease, Parkinson's disease, and multiple sclerosis.

What follows is a brief review of studies where the ketogenic diet has been studied as a potential treatment in neurological diseases:

1. Fat versus Ketogenic Diet in Parkinson's Disease: A Pilot Randomized Controlled Trial.

In this study, researchers investigated the impact of different diets on the symptoms of Parkinson's disease (PD). They conducted a pilot randomized, controlled trial comparing the effects of a low-fat, high-carbohydrate diet to a ketogenic diet in PD patients in a hospital clinic. The primary focus was on assessing the feasibility, safety, and effectiveness of these dietary interventions.

A total of 47 PD patients were initially enrolled in the study. Patients were randomly assigned either the low fat or ketogenic diet. Eventually, 38 patients completed the study, resulting in an 86% completion rate among those who began the diets.

Primary outcomes were within and between group changes on MDS-UPDRS scores, a tool to assess Parkinson Disease symptoms. The most significant reduction on the MDS-UPDRS scores was in Part 1, which assesses symptoms related to urinary problems, pain, sensations, fatigue, daytime sleepiness, and cognitive impairment. The Keto group showed a substantial 41% reduction from baseline while the Low Fat group's scores were reduced by 11%. There was no other significant difference in Parts 2 through 4.

Some common adverse effects reported included excessive hunger in the low-fat diet group and intermittent exacerbation of PD tremor and rigidity in the ketogenic diet group.

The study concluded that it is both feasible and safe for PD patients to maintain either a low-fat or ketogenic diet for an 8-week period. Both diet groups showed improvements in both motor and nonmotor symptoms. Notably, the ketogenic diet

group demonstrated greater improvements in nonmotor symptoms associated with PD.

2. The Ketogenic Diet and Alzheimer's Disease

Alzheimer's disease (AD) is a progressive neurodegenerative condition and the most common form of dementia. Research has suggested that diet may have a role in AD, but the optimal dietary approach remains inconclusive. One specific dietary approach that has gained attention in relation to neurodegenerative diseases is the ketogenic diet (KD). This review aims to compare methods for inducing a state of ketosis and their impact on AD prevention and treatment, while also exploring the potential benefits of a combined approach.

The review found evidence suggesting that both the KD and exogenous ketone supplementation may provide treatment benefits for AD patients. However, it remains unclear which method is superior. The composition of the KD, particularly the sources of dietary fat, can significantly influence its effectiveness. Implementing and monitoring a strict carbohydrate intake, often the responsibility of caregivers, can be challenging. Future research may be more feasible in an institutional setting, making it easier to administer and monitor dietary protocols. Exogenous ketone supplementation may be a more sustainable long-term treatment option due to its less drastic dietary changes. The review also highlights the potential benefits of a multidomain approach in preventing or delaying AD and improving or stabilizing disease progression.

Many current studies on the impact of ketosis on cognition in AD are small, often uncontrolled, and focus on short-term effects. Large, long-term, randomized, controlled trials are lacking but necessary to better understand the role of the KD in patients with cognitive impairment and AD. Combining multiple approaches may offer greater benefits in preventing or delaying AD and improving or slowing disease progression in individuals with Mild cognitive impairment or AD. Future research should further explore the effects of combined

approaches on neurocognitive decline in AD patients.

3. Ketogenic Diet in Alzheimer's Disease.

The use of the ketogenic diet (KD) has gained attention in the context of various diseases. Recent research has focused on its potential benefits, particularly in addressing metabolic abnormalities associated with Alzheimer's disease (AD). In AD, there are key metabolic changes such as abnormal glucose metabolism, reduced brain energy metabolism linked to mitochondria, alterations in neurotransmitter release, and an increased inflammatory response.

KD has been explored in animal studies and clinical trials, and it appears to have positive effects on mitochondrial function and cellular metabolism. It has shown promise in enhancing cognitive performance, especially in elderly adults with AD. The degree and duration of ketosis seem to impact the extent of cognitive improvement. It is suggested that the most favorable outcomes with KD treatment may occur in the early presymptomatic stages of AD, although practical diagnostic methods are needed for early intervention. Future research should focus on understanding the precise mechanisms by which KD affects neurodegenerative disorders, with an emphasis on restoring abnormal glucose and energy metabolism in both animal models and patients with various diseases. Additionally, long-term studies are necessary to assess the sustained effects of KD on nutritional status, overall well-being, and the progression of AD. Despite these challenges, this innovative metabolic treatment holds promise and warrants further clinical investigations in the context of AD progression.

4. Phase II study of ketogenic diets in relapsing multiple sclerosis: safety, tolerability and potential clinical benefits.

This study aimed to investigate the tolerability and effects of a ketogenic diet (KD) on patients with relapsing multiple sclerosis (MS) via a prospective study. Sixty-five individuals with relapsing MS participated in a 6-month prospective study to assess the impact of a KD on their condition. Various health metrics were measured at the

beginning of the study and then repeated at 3 and/or 6 months while on the KD. A high adherence rate of 83% was observed among participants who followed the KD for the entire study duration. While participants experienced significant reductions in fat mass while on the diet, self-reported fatigue and depression scores showed nearly a 50% decline. Quality of life scores for both physical health and mental health increased significantly while on the KD. Enhanced physical function as assessed via the 6-minute walk test results, where they covered a longer distance, and the Nine-Hole Peg Test, where they completed the test in less time. Inflammation was assessed and found to be improved; serum leptin levels decreased significantly, while adiponectin levels increased, suggesting improvements in adipose-related inflammation. Finally, improvements were noted in Expanded Disability Status Scale scores, a measure of neurological disability.

The study concluded that ketogenic diets (KDs) were well-tolerated and safe over the 6-month study period. Participants with relapsing MS experienced multiple positive effects, suggesting that KDs may have therapeutic potential for individuals with relapsing MS.

5. The Therapeutic Role of Ketogenic Diet in Neurological Disorders.

The following image summarizes the impact that the ketogenic diet has in various neurological disorders.

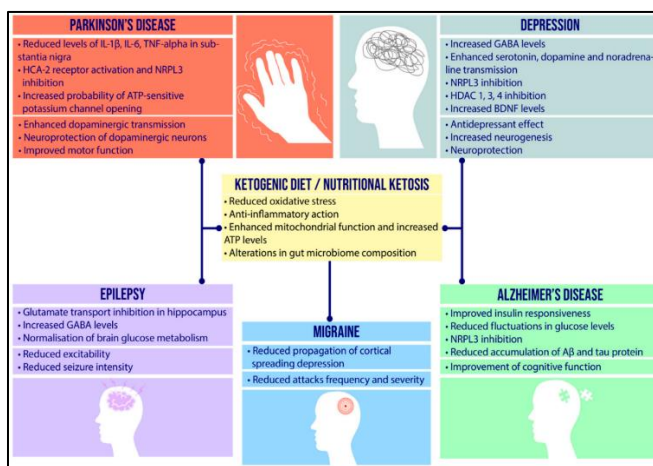


Figure 1: Diagram sourced from: Pietrzak D, Kasperek K, Rękawek P, Piątkowska-Chmiel I. The Therapeutic Role of Ketogenic Diet in Neurological Disorders. *Nutrients*. 2022 May 6;14(9):1952. doi: 10.3390/nu14091952.

While the exact mechanism by which the ketogenic diet may improve neurological diseases is not fully understood, it is believed that the diet may reduce inflammation and oxidative stress in the brain, improve mitochondrial function, and increase the production of ketones, which have neuroprotective effects.

Following a ketogenic diet can provide many benefits and it is important to check with your healthcare practitioner prior to initiating any new health care regime or practice.

Practitioners trained by the Metabolic Terrain Institute of Health take a scientific approach to working with patients who wish to implement the ketogenic diet as a treatment option. It is essential to consult with a MATC Certified™ Practitioner to properly test, assess and address each patient before and during implementing a ketogenic diet intervention, or at the very least consult with a practitioner or health care provider familiar with your specific state of metabolic health.

References

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5. Diagram sourced from Pietrzak D, Kasperek K, Rękawek P, Piątkowska-Chmiel I. The Therapeutic Role of Ketogenic Diet in

Neurological Disorders. *Nutrients.* 2022 May 6;14(9):1952. doi: 10.3390/nu14091952.