


Chapter 1

The Relation of Food With Neurodegenerative Diseases in Humans: New Insights Based on Current Biomedical Research

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ABSTRACT

Neurodegenerative disorders (NDD) are a major cause of morbidity and mortality, with limited therapeutic options. This chapter reviews the emerging role of diet in NDD prevention and management. It first provides an overview of the pathophysiology of common NDDs based on current research. A conceptual framework is then used to explore the relationship between diet and NDD, incorporating dietary components, cultural influences, food accessibility, and public health policies. The significance of a life-course approach is highlighted, emphasizing the cumulative impact of diet on neurological health. Specific food ingredients such as flavonoids, DHA, selenium, and ultra-processed foods are discussed, along with specialized diets like the Ketogenic and Mediterranean diets. The role of diet in modulating the gut-brain axis is also reviewed. Finally, dietary guidelines from various organizations are examined, concluding with research-based recommendations for future dietary strategies in NDD prevention.

DOI: 10.4018/979-8-3373-1439-6.ch001

INTRODUCTION

Neurodegenerative disorders (NDD) are a group of disorders associated with the progressive loss of neurons, in terms of their number, structure and/or function (Lamptey et al., 2022). This can occur in the central and/or peripheral nervous system. Neuron loss leads to disruption of the synapses and neural networks. Also, in many cases, there is accumulation of altered proteins around the neurons (Lamptey et al., 2022). In most cases, these are acquired sporadic conditions although there are numerous genetic syndromes too. The common NDDs include dementia like Alzheimer's disease, extra-pyramidal syndromes like Parkinson's Disease, motor neuron disease, spinal muscular atrophy, Huntington's disease and spinocerebellar ataxia, just to name a few. Symptoms of this group of disorders are diverse, ranging from cognitive decline with memory loss and movement disorders to ataxia, psychiatric manifestations and/or loss of bowel and bladder continence.

NDDs are the group of disorders with very little therapeutic option (Lamptey et al., 2022; Rapp et al., 2015). The drugs or other intervention procedures developed till now have met with at best, a modest success. But considering the financial and social impact of these diseases in the modern world with an aging population, there is an active interest in finding preventive and curative treatment (Hinge et al., 2022). Like many other chronic non-communicable diseases, lifestyle interventions, especially diet, have been an area of active interest for NDDs.

This chapter is about the role of diet in NDDs. Here, we will first discuss the pathophysiology of a few common NDDs, before delving into the role of diet in those conditions.

PATHOPHYSIOLOGY OF SOME COMMON NEURODEGENERATIVE DISORDERS

Dementia

Dementia is one of the most important chronic diseases in modern industrialized countries. It is a group of disorders associated with progressive cognitive impairment, loss of independent function, various adverse health outcomes and ultimately, early mortality (Chin, 2023). The prevalence of various types of dementia is increasing at an alarming rate and is expected to double over the next two decades (Chin, 2023). While this is incurring a considerable financial burden on the health system

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