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NUTRITIONAL THERAPIES FOR NEUROLOGICAL DISEASES: AN INTEGRATIVE REVIEW

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ABSTRACT:

Introduction: Neurological diseases resulting from nervous system injuries can profoundly impact nutritional status and compromise physical and cognitive capabilities necessary for adequate dietary intake. This study focuses on exploring primary nutritional therapies for neurological illnesses.

Methods: An integrative literature review was conducted utilizing databases including PePSIC, Medline, and LILACS. A comprehensive search strategy encompassed cross-referencing descriptors such as neuropathies, nutritional therapy, efficacy, and side effects in both Pakistan and China. The search period spanned from January to July 2023. Following the application of inclusion criteria, 175 relevant items were identified.

Results: While traditional medical interventions for neurological conditions primarily involve pharmacotherapy, food therapy has shown promise in enhancing clinical outcomes and alleviating symptoms in certain diseases. Nutritional interventions have been particularly effective in improving the prognosis of adrenoleukodystrophy and ameliorating symptoms of Wernicke-Korsakoff syndrome and epilepsy. As such, patients afflicted with these conditions stand to benefit significantly from tailored dietary interventions.

Conclusion: Nutritional therapy presents a valuable adjunctive approach in managing neurological diseases, offering opportunities to enhance patient outcomes and alleviate symptoms where traditional medical interventions may fall short. Incorporating dietary interventions into

comprehensive treatment plans for neurological disorders is imperative for optimizing patient care and recovery.

KEYWORDS: Neurological Diseases; Nutritional Therapy; Side Effects.

INTRODUCTION:

Neurological diseases have been a significant cause of mortality worldwide. Therefore, the appearance of neurodegenerative diseases is the result of aging. According to the World Health Organization (WHO), neurological diseases affect 1 billion people worldwide, and the trend is that this number will double in the next 20 years as the world population ages (Foley, Kirkby, & Eccles, 2024; Singh et al., 2030).

In Brazil, few studies demonstrate the current incidence of all neurological diseases. However, data from DATAPREV, a technology and information company of the Ministry of Social Security, showed that 13,121 medical examinations in neurology were carried out (4,17 % of the total number of assessments), which generated an expense of R$ 97,580.00 for Social Security in 1996 (Belov et al., 2024; Singh et al., 2030).

A study carried out in the state of Bahia in 2000 found that of the 935 records of benefits granted for occupational diseases due to temporary incapacity, 10.9% were related to mental and behavioral disorders (Schulz et al., 2024; Xabibullayevich et al., 2024).

According to Simony et al., neurological conditions brought on by nervous system injuries can sometimes impair the physical and mental capacities required for sufficient feeding, depending on the location of the injury. This means that nutritional therapies can be used as supportive therapies in managing neurological diseases, such as epilepsy. However, for some neurological disorders, such as adrenoleukodystrophy and Wernicke-Korsakoff syndrome, diet therapy is the primary form of treatment (Last, Mirhashem, & Yang, 2024; Zamanian et al., 2024).

Psychological factors that influence eating behavior, such as depression, anxiety, and nonspecific feelings of tension, are identified as triggers for binge eating. Individuals with this eating pattern present, in addition to anxiety and depression, also feelings of self-contempt, revulsion towards their body shape, somatic concern, stress, and impairment of interpersonal relationships (Ayyubova, 2024; Xiong et al., 2024).

Given the outlined context, the following questions arose: What is nutritional therapy for neurological diseases? How does the pathophysiology of nutrition occur in neuropathies? What are the main dietary assistance strategies for neuropathies? What are the effectiveness and challenges of nutritional therapy in neuropathies? (Christogianni, 2025; Mattsson-Carlgren et al., 2024).

The necessity of understanding nutritional therapy for patients with neurological diseases motivated this study's creation. Creating and maintaining clinical protocols as a preventative measure against potential complications and to help organize public health actions (Goswami et al., 2024; Hirjak et al., 2024).

This research analyzes the primary dietary therapy for neurological illnesses, which is the main goal of this research. Particular goals included describing the pathophysiology of nutrition in neurological diseases, pointing out nutritional support techniques in neuropathies, and confirming the difficulties and efficacy of nutritional therapy in neuropathies (Roche et al., 2024; Taoka et al., 2024).

METHODOLOGY:

An integrative review of the literature was used to conduct the study. The integrated literature review approach aims to provide a comprehensive, systematic, and orderly summary of the findings from studies conducted on a particular subject or question. Galvao. Six distinct phases were followed in the conduct of an integrated review: 1. formulation of the central question; 2. literature review or sample; 3. gathering of data; 4. critical evaluation of the included works; 5. an explanation of the findings; 6. Integrative review presentation (Marques et al., 2024; Romano et al., 2024).

The first phase involves developing the research question. What is nutritional therapy in neurological diseases? How does the pathophysiology of nutrition occur in neuropathies? What are the main dietary assistance strategies for neuropathies? What are the effectiveness and challenges of nutritional therapy in neuropathies? (Bhatia, Paul, Acharjee, & Ramachairy, 2024; Kirkbride et al., 2024).

To determine the sample of studies selected for this integrative review, some inclusion criteria were listed: an article published in the last ten years, original articles whose language was in English with access to the full text, in which the theme corresponded to the object of study in question. Studies with publication years lower than 2011, incomplete publications, and studies that do not conform to the object and theme of this research were excluded (Bi & Uludag, 2024; Wang et al., 2024).

The databases titled Latin American Literature in Health Sciences (LILACS), Medical Literature Analysis and Retrieval System Online (Medline), and Electronic Journals of Psychology (PePSIC) were accessed via their electronic websites to conduct article searches (NEHIR, UCLER, & GEYIK, 2024; Spencer et al., 2024).

The following English descriptors were crossed to conduct the searches: "neuropathies," "nutritional therapy," "effectiveness," and "adverse effects." In 2022, the information systems were visited from January to May. The suggestion made by Souza, Silva, and Carvalho was followed to gather, document, and evaluate the data (Hernandez-Leon et al., 2024; Reznik, 2024).

The data analysis took place in the following way: reading, description of the data, and construction of the synoptic framework, followed by the detailed reading of the publications and the analysis of the content of the articles, as well as their organization, grouping them by similarities and organizing them into categories and thematic tables. The data obtained from the articles were recorded using the tool validated by Ursi, containing information such as article title, year of publication, Journal, authors, study design, sample, objectives, and results (Kakaei et al., 2024; Martino Cinnera et al., 2024; Sharma et al., 2024).

RESULTS AND DISCUSSIONS:

In this integrative review, with filters referring to the period, the type of study and the language of publication, a sample of 175 articles was initially found, with 122 articles in the LILACS database, 53 articles in PUBMED, and 0 articles in PEPSIC. After reading the titles and abstracts, the sample increased to 5 articles. Item selection details are described in Figure 1 (De Marchi, Vignaroli, Mazzini, Comi, & Tondo, 2024; Schläppi et al., 2024; Yılmaz, Atuk Kahraman, Kurtbeyoğlu, Konyalıgil Öztürk, & Gültekin, 2024).

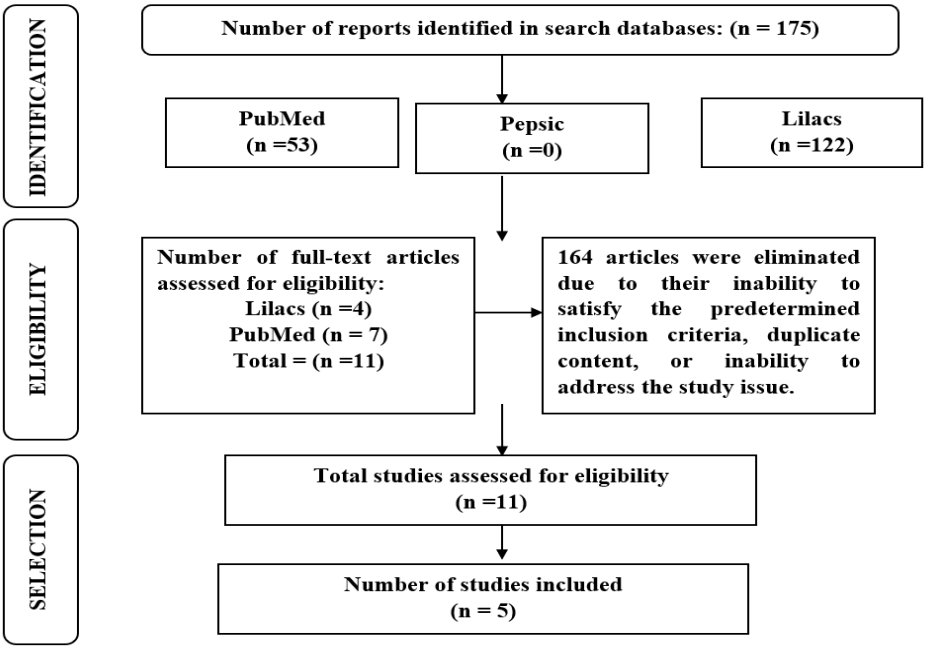

Figure 1: A diagram showing how studies are chosen from the databases.

Five of the eleven studies that were chosen focused on nutritional therapy, specifically tailored diets, for neurological illnesses. Table 1 presents the 05 articles present in the databases, which contain the authors, the year of publication, the objective, the type of study, and the main results found (Dias-Carvalho et al., 2024; Mazzucca et al., 2024).

AUTHOR/ YEAR	OBJECTIVE	TYPE OF STUDY	RESULTS
DIDANGELOS et al., (2021)	Examine the impact of oral B12 (methylcobalamin) to restore appropriate vitamin B12 (B12) levels. In patients with diabetic neuropathy (DN), 1000 μg/day for a year.	Prospective Study	B12 levels rose in the group receiving treatment compared to those in the control group, going from 232.0 ± 71.8 pmol/L starting to 776.7 ± 242.3 pmol/L at examination, $p < 0.0001$.
ARNOLD et al., (2017)	To ascertain whether consumption of potassium limitation in the diet could be a mitigating factor in chronic kidney disease.	Prospective Study	When comparing the intervention group to the control group, the average serum potassium level was considerably lower (mean 4,660.1–4,860.1 mEq/L reported every six months throughout the trial; $P = 0.03$).
ALAYSSAC et al., (2015)	To assess the practicality and effectiveness of a PRD in preventing OIPN in patients undergoing oxaliplatin chemotherapy in comparison to a typical polyamine-containing diet.	Prospective Study	Recent research has shown that a polyamine-reduced diet (PRD) can effectively prevent OIPN in animals without adverse side effects.
LEWIS et al. (2017)	to investigate the theory that those with type 1 diabetes patients' reported development of DSP, or diabetic sensory-motor polyneuropathy, will stop after taking supplements of omega-3 polyunsaturated fatty acids for a whole year.	Randomized Study	following a year of treatment. Both nerve conduction and sensory function were unchanged.
SIMONY et al. (2014)	Examine the dietary health among individuals with neurological conditions receiving physical therapy.	Cross-sectional Study	Gastritis and reflux were two of the most prevalent gastrointestinal complaints. Adult patients were eutrophic (64.3%) in the majority, followed by overweight (7.1%) and obesity (21.4%).

Table 1: Distribution of scientific production on the analysis of nutritional therapy in neurological diseases, published between 2014 and 2021.

Diseases that affect the brain, spinal cord, and nerves are called neurological diseases. Functional neurological diseases have a multifactorial origin, and several physical and psychological risk factors contribute to their appearance (Tryfonos et al., 2024).

When malnutrition-promoting variables are present, nutritional issues are prevalent yet frequently undiagnosed. Requirements may also rise in certain situations, such as when chronic respiratory infections are combined with other conditions. The following factors encourage being overweight: a decline in physical activity. Neurological diseases arising from nervous system injuries can impact nutritional status depending on the afflicted site. They can also affect the physiological and intellectual abilities required for sufficient nourishment (Gombošová et al., 2024; Probst et al., 2024).

Diets must be customized for each patient based on their unique clinical features and restrictions. Meals should be served to children with reflux less frequently and in smaller portions to ensure they get all the nutrients they need daily. Family diet recommendations ensure that everyone gets enough water and fiber-rich foods (Khairnar et al., 2024).

For many years, it was unknown what caused neuropathy in chronic renal illness. However, more recent research has linked peripheral nerve dysfunction to serum potassium levels, raising the possibility that hyperkalemia is the underlying cause. Following the study, it was observed that, compared to the control group, the intervention considerably slowed the progression of neuropathy, indicating that it might have a neuroprotective impact (Golpour-Hamedani et al., 2024).

One of the most prevalent microvascular consequences of diabetes is diabetic neuropathy (DN). The most popular supplement is vitamin B12 (B12), which is utilized in anti-glycemic therapy to achieve strict glycemic control. First, a lack of vitamin B12 is common among T2DM patients. Secondly, vitamin B12's absence may lead to neurological diseases like painful neuropathy, peripheral neuropathy, and neuropathy of the autonomic nervous system (including cardiovascular neuropathy), which can mimic or accelerate the condition's advancement (Jha et al., 2024).

As earlier studies have indicated, a study that sought to determine when taking vitamin B12 supplements (alone) impacts DN independent of glucose management showed no unfavorable events following vitamin B12 administration. The most prevalent side effect of diabetes mellitus (DM) is diabetic sensorimotor polyneuropathy (DSP), which affects over 50% of people with type 1 (T1) or type 2 diabetes (Walaszek et al., 2024).

A study posits that the recognized development of diabetes-related somatosensory polyneuropathy (DSP) in type 1 diabetes mellitus (T1D) can be stopped by supplementing with seal oil and polyunsaturated fatty acids, particularly omega-3 (PUFA v-3). The study's findings support the occurrence of abnormalities seen in the typical course of DSP, and supplementation seems to have stopped the development of clinical symptoms and abnormalities in sensory and motor function (Krishnamoorthy et al., 2024).

Although there is no clear cause-and-effect relationship for all individuals with functional neurological disorders, stressful life events and abuse are far more common in these patients than in those with additional neurological conditions or in healthy patients. The diagnosis of a functional disease shouldn't stop the treatment of concurrent pathologies because it is prevalent for other medical conditions or injuries to the body (trauma, surgery, flu-like syndrome) to cause functional symptoms or for individuals who have applicable appearances to suffer from other disorders (Holroyd & Berkowitz, 2024; Silakari et al., 2024).

FINAL CONSIDERATIONS:

Thus, it can be said that nutritional therapy for neurological diseases entails many dietary and supplement approaches that can enhance an individual's standard of life and the underlying disease's favorable progression. Therefore, with the evidence presented here from prospective studies, it is critically important that further studies evaluate these factors to explain improvements in adults and children with various neurological disorders more broadly.

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