



THE EFFECTS OF NUTRITION ON THE COGNITIVE DEVELOPMENT OF CHILDREN WITH LEARNING DISABILITIES

Audiology

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ABSTRACT

A cognitive dysfunction is not a question of skill or creativity. Many aspects, including spoken or nonverbal therapy, organization, acquisition, or knowledge application, are associated with learning difficulties. Children with autism are not dumb or lethargic. They are all just as clever as anybody else. Their brains were just structured differently. The status of micronutrients may impact cognitive performance at any age. Insufficient nutrients and trace elements may affect memory, resulting in learning impairment. Food is a changeable lifestyle factor that may significantly affect learning impairment pathophysiology. This study investigated the influence of micronutrients on the cognitive functioning of children with intellectual challenges. This study attempted to evaluate the function of nutrients in monitoring the progress of children with impairments and their prognosis and treatment. Our study reveals unequivocally that micronutrient status is strongly connected with intellectual disability and that correcting dietary deficits following language treatment dramatically improves the learning capacity of children with learning disabilities (LD). Although micronutrient deficiencies typically co-occur in the context of deprivation, little is known about the impact of several micronutrient deficiencies on cognitive development. This research examines the relationship between four micronutrient deficiencies and children's cognitive performance.

KEYWORDS

learning disability, nutrition, cognitive function, linguistic therapy, micronutrients, cognitive development.

INTRODUCTION

The level of micronutrients in the body can affect cognitive abilities at any stage of life. A lack of vitamins and trace elements may negatively affect memory, leading to the development of learning disabilities¹. Food is a modifiable aspect of lifestyle that can play an essential role in the origin of learning disabilities². Extensive research on cognitive aging and neurodegenerative illnesses has focused on nutrition. Bioactive chemicals that are vital to human health and are useable are nutrients³. The human body cannot naturally synthesize the essential nutrients which must be obtained from the diet. Around 30% of healthy children may have mild malnourishment in one or more dietary components, including vitamins⁴. Addressing such deficiencies in old age may help prevent or slow down cognitive decline⁵. As micronutrients are linked to specific physiological processes, their impact on early cognitive development has received considerable attention⁶. Therefore, tailored recommendations for preventing or treating micronutrient deficiencies may be developed.

Biochemistry studies may help us comprehend the relationship between certain pattern deficiencies and learning disorders³. In addition, a user manual for treating learning problems may determine the biochemical impairments of these abnormalities. A child who has experienced trauma or other negative experiences may experience adverse effects on their self-esteem, emotional regulation, and general well-being. Mental health professionals can provide support by helping adolescents identify these signs, develop coping strategies, and build healthy relationships. Due to the significance of micronutrients and the need for further research in this area, conducting a study in this field was deemed beneficial.

The research examining how a lack of micronutrients impacts children's cognitive and motor skills faces similar issues in methodology to studies investigating the effects of protein and energy deprivation. Micronutrient deficiencies are common among families experiencing poverty and other stressors that can hinder the proper growth of their infants. Additionally, defects in multiple micronutrients can often occur together, primarily if derived from the same source. For example, beef, fish, and poultry are all important sources of iron, zinc, and vitamin B-12. Understanding single micronutrient supplementation trials' results may be challenging if children lack several micronutrients⁷.

Observational studies have compared children with and without micronutrient deficiencies. Although these studies can provide valuable insights into the impact of micronutrients on developmental differences, randomized trials are necessary to provide more rigorous evidence. Variations between groups that can affect infant growth, such as caregiving practices, can be controlled through randomized studies. These studies can also help explain discrepancies in the effects

of micronutrients. However, randomized trials are expensive and may require monitoring of mitigating factors, such as the consistency of caregiving practices, which can impact infant growth.

MATERIALS AND METHODS

A case-control analysis was conducted over two years at the Sevana Speech and Hearing Center. One hundred children were chosen for the study. The study included sixty children with learning disabilities, and forty controls were matched for age and gender based on the same criteria. The control group consisted of typically developing children between 6 and 15. The test group included children with learning disabilities within the same age range. The test population was further divided based on management and evaluation.

The Linguistic Profile Test (LPT) was utilized to examine the developmental stages of children with cognitive disabilities in various aspects of language, such as phonetics, semantics, vocabulary, auditory perception, responsive vocabulary, aural awareness, and verbal speech. In addition, specific standard methods were used to measure biochemical parameters through photometric means.

RESULT AND DISCUSSION

Growing evidence suggests that nutrition plays an essential role in cognitive development and that nutritional deficiencies may contribute to learning disabilities in children. Learning disabilities are a group of disorders that affect a child's ability to learn and process information, and they can significantly impact academic performance and overall quality of life. Several studies have investigated the relationship between nutrition and cognitive development in children with learning disabilities and have found evidence of several specific nutrient deficiencies that may be involved. Zinc is involved in several cognitive processes, including memory and attention. Children with learning disabilities may be at increased risk of zinc deficiency, and studies have shown that zinc supplementation can improve cognitive function in this population. B vitamins are essential for brain function, and defects in these nutrients have been linked to impaired cognitive function and behavior. Supplementation with B vitamins has been shown to improve cognitive function and behavior in children with learning disabilities. While the evidence supporting the role of nutrition in cognitive development in children with learning disabilities is growing, it is essential to note that nutritional interventions alone may not be sufficient to address all aspects of these disorders. Other interventions, such as educational and behavioral therapies, may also be necessary to support the development of academic and social skills in these children. However, optimizing nutrition and addressing nutrient deficiencies may be essential to a comprehensive approach to managing learning disabilities.

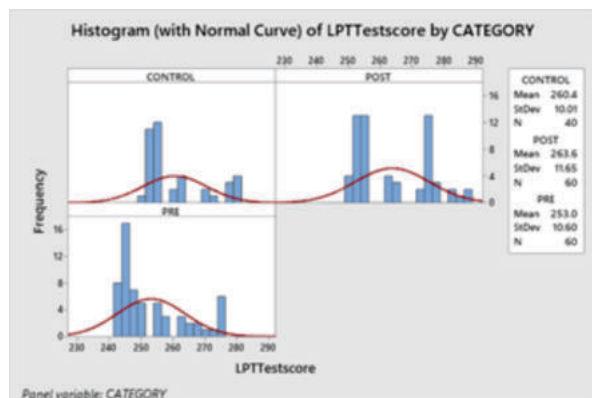
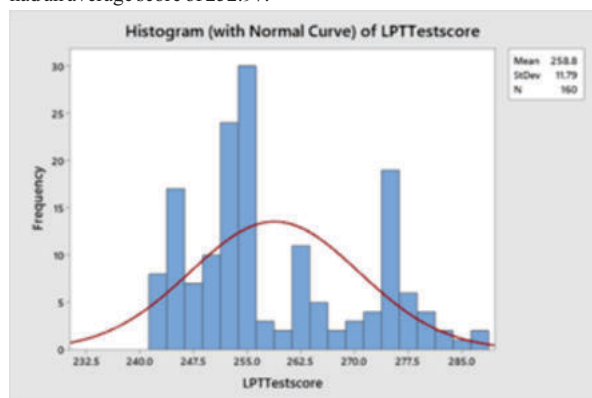
The research involved 40 control participants aged 7.55 ± 1.75 years

and 60 with learning disabilities. The LD group had an average pre-test age of 7.35 ± 1.68 years and post-test age of 8.35 ± 1.68 years. The participants' height, weight, and BMI were respectively 123.58 ± 7.18 cm, 23.18 ± 5.86 Kg, and 14.98 ± 2.46 Kg/m². The study concluded that the cognitive function of children with learning disabilities is impacted by micronutrients such as vitamins D, C, and B vitamins, as well as minerals like magnesium and zinc.

Distribution Mean Of Parameters Among The Control And Test Groups

Parameters	Control (n=40)	Pre Treatment (n=60)	Post Treatment (n=60)	p
Age (Yrs)	7.55 ± 1.753	7.35 ± 1.676	8.35 ± 1.676	<0.01**
Height (cm)	123.58 ± 7.179	122.6 ± 6.551	126.15 ± 6.483	<0.01**
Weight (Kg)	23.18 ± 5.857	22.95 ± 5.64	25.1 ± 5.577	0.086
BMI (Kg/m ²)	14.98 ± 2.462	15.08 ± 2.392	25.1 ± 5.577	<0.01**
Vitamin D (ng/mL)	32.03 ± 3.704	25.7 ± 4.496	30.25 ± 3.368	<0.01**
Vitamin C (mg/dL)	1.068 ± 0.152	0.658 ± 0.206	0.987 ± 0.178	<0.01**
Folate (ng/mL)	16.56 ± 2.619	14.59 ± 3.061	17.47 ± 2.463	<0.01**
Vitamin B6 (µg/L)	36.3 ± 4.978	22.22 ± 6.707	35.05 ± 5.173	<0.01**
Vitamin B12 (ng/dL)	64.88 ± 10.802	46.37 ± 12.384	63.78 ± 12.571	<0.01**
Magnesium (mg/dL)	1.91 ± 0.1692	1.762 ± 0.1223	1.845 ± 0.1254	<0.01**
Zinc (µg/dL)	85.98 ± 6.758	66.6 ± 8.718	84.1 ± 7.512	<0.01**
LPT Test score	260.38 ± 10.0	252.97 ± 10.6	263.65 ± 11.6	<0.01**

The average Linguistic Profile Test (LPT) score in the study population was 258.82. The control group had an average LPT score of 260.38, the post-test group had an average score of 263.65, and the pre-test group had an average score of 252.97.



CONCLUSIONS

Micronutrients, including Vitamin D, C, and B vitamins such as Folate, B6, and B12, as well as minerals like Magnesium and Zinc, positively

impact the cognitive abilities of children with learning disabilities. Addressing dietary deficiencies during language rehabilitation significantly improves the reading ability of these children.

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