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# The Influence of Omega 3 and Fatty Acids on Cognition and Attention Children with ADHD: A Systematic Review

# The Influence of Omega-3 and Fatty Acids on Cognition and Attention in Children with ADHD: A Systematic Review

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**SUMMARY**

Attention Deficit Hyperactivity Disorder (ADHD) is a condition common neurobehavioral disorder in childhood, with multifactorial etiology involving genetic, environmental and nutritional factors. This work had with the aim of analyzing the influence of nutrition on the management of symptoms of ADHD. This is an integrative literature review, based on studies published between 2019 and 2024, using scientific data updated on the relationship between diet and ADHD. The results indicated that nutritional deficiencies, especially of omega-3 (EPA and DHA), zinc and iron, are associated with worsening symptoms, while supplementation with these nutrients, especially omega-3, showed benefits in attention and reduction of hyperactivity. Also the importance of the microbiota-gut-brain axis was highlighted, since Intestinal dysbiosis can intensify symptoms. Diets like the *Feingold diet,* that restrict food additives and sugars, and the ketogenic diet, have been shown to be effective in specific cases. In addition, the reduction of consumption of ultra-processed foods contributed to the control of symptoms. It is concluded that personalized nutritional interventions, based on scientific evidence, represent a complementary strategy relevant in the treatment of ADHD, promoting an improvement in quality of life of patients. Neuronutrition, therefore, emerges as a promising field in the integrated approach to this disorder, although more studies are needed necessary to to establish protocols specific.

**Keywords:** ADHD, neuronutrition, supplementation, intestinal microbiota.

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**ABSTRACT**

Attention Deficit Hyperactivity Disorder (ADHD) is a common neurobehavioral condition in childhood, with a multifactorial etiology involving genetics, environmental, and nutritional factors. This study aimed to analyze the influence of nutrition on the management of ADHD symptoms. It is an integrative literature review based on scientific studies published between 2019 and 2024, focusing on the relationship between diet and ADHD. The findings indicated that nutritional deficiencies, especially omega-3 (EPA and DHA), zinc, and iron, are associated with symptom worsening, while supplementation, particularly with omega-3, showed benefits in improving attention and reducing hyperactivity. The relevance of the gut-brain axis was also highlighted, as intestinal dysbiosis may exacerbate symptoms. Diets such as Feingold, which restrict food additives and sugars, and the ketogenic diet proved effective in specific cases. Additionally, reducing the intake of ultra-processed foods contributed to symptom control. It is concluded that personalized nutritional interventions, grounded in scientific evidence, represents a valuable complementary strategy in the treatment of ADHD, improving patients' quality of life. Therefore, neuronutrition emerges as a promising field in the integrated management of this disorder, although further studies are required to establish specific protocols.

**Keywords:** ADHD. Nutrition. Supplementation. Gut microbiota.

## 1. INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD), characterized as one of the most prevalent neurobehavioral disorders in childhood, affecting approximately 5.2% of children worldwide (SOUZA; BRANDÃO, 2022). ADHD manifests itself mainly through signs such as difficulty in concentration, excessive agitation and impulsive behaviors. These characteristics directly affect academic performance, interaction with others people and the emotional balance of those living with the disorder (LIMA et al., 2024). Although its etiology is multifactorial, recent studies highlight the influence of nutrition on the modulation of symptoms, especially through relationship between gut microbiota, omega-3 fatty acids and essential minerals (RODRIGUES *et* al., 2023; ANDRADE *et* al., 2024).

The Western diet, rich in ultra-processed foods, artificial additives and sugars, has been associated with worsening ADHD symptoms, while a balanced diet, with omega-3, zinc and iron, shows effects positive in controlling hyperactivity and improving attention (SOUZA; BRANDÃO, 2022; RODRIGUES *et al.,* 2023). Furthermore, research indicates that intestinal dysbiosis – an imbalance in the microbiota – can compromise the production of neurotransmitters such as dopamine and serotonin, directly linked to ADHD (LIMA *et al.,* 2024).

In this context, neuronutrition emerges as a promising approach, combining dietary strategies and supplementation to optimize treatment (ANDRADE *et al.,* 2024). However, there are still challenges, such as lack of nutritional knowledge among families, the high cost of food healthy and the need for more clinical studies to prove the effectiveness of specific interventions (LIMA *et* al., 2024).

In view of the above, there is a need for non-invasive approaches. pharmacological treatments that complement conventional ADHD treatment, aiming to improve children's quality of life and reduce side effects of medicines (RODRIGUES *et* al., 2023). This study aims to

general analyze the influence of nutrition in the management of ADHD symptoms in children, based on current scientific evidence. As specific objectives, we seek to: (1) investigate the relationship between diet, intestinal microbiota and symptoms of ADHD; (2) evaluate the effects of supplementation with omega-3, zinc and iron in the control of hyperactivity and inattention; (3) discuss the benefits and limitations of restrictive diets (such as Feingold and ketogenic) in treatment of the disorder; and (4) propose accessible nutritional strategies to assist in multidisciplinary treatment.

**Keywords:** ADHD; Neuronutrition; Omega-3; Gut microbiota; Diet therapy.

## 2. METHODOLOGY

This study consists of an integrative bibliographic review, based on the analysis of scientific articles, published between 2019 and 2024, and with the aim of investigate the relationship between nutrition and the management of symptoms of ADHD Attention Deficit Hyperactivity Disorder (ADHD) in children.

The methodological approach began with the selection of sources, being databases such as Google Scholar, Electronic Library were consulted Scientific Online(SciELO) and *the United States National Library of Medicine* (PubMed), using the descriptors “ADHD”, “neuronutrition” and “omega-3”.

The inclusion criteria for articles was based on the selection of publications between 2019 and 2024, in Portuguese or English, that directly addressed the relationship between nutrition and ADHD. Priority was given to original studies, reviews systematic and meta-analyses, ensuring the quality of the evidence analyzed.

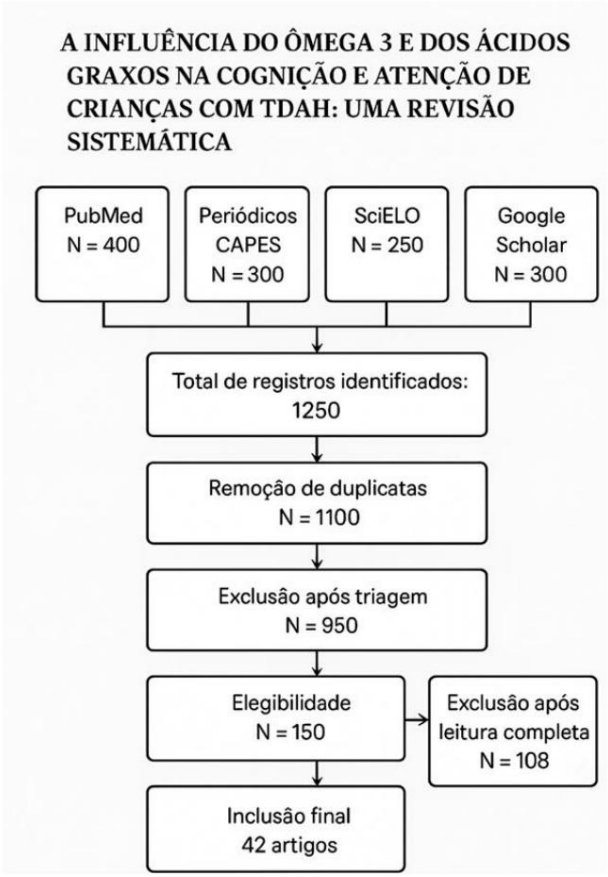
As exclusion criteria, articles that did not presented a direct relationship with the proposed theme, duplicate publications, studies with an exclusive focus on pharmacological interventions, dissertations, theses, abstracts without full text available, and materials published before 2019.

Subsequently, the results were compared and critically discussed, highlighting consensuses, divergences and gaps in the literature, with the aim of propose practical recommendations for the nutritional management of ADHD.

This methodology was chosen because it allowed for an updated analysis and evidence-based, contributing to a broader understanding the role of nutrition in the treatment of ADHD.

## 3. RESULTS AND DISCUSSION

The analysis of the data obtained in this integrative review allowed the systematization of the most relevant findings on the influence of nutrition on the management of symptoms of Attention Deficit Hyperactivity Disorder (ADHD) in children. Initially, 1,250 records were identified in the databases PubMed, SciELO, Google Scholar and CAPES Journals. After removing duplicates (N = 1,100) and exclusions by title and abstract screening (N = 950), 150 studies remained for full reading. Of these, 108 did not meet the inclusion criteria or did not directly address the issue of the relationship between nutrition and ADHD, resulting in a final sample composed of 42 articles, according to illustrated node **Flowchart 1.**




**Flowchart 1:** Study selection flowchart. Author, 2025.

Table **1 ,** presented below, contains the main information extracted from the studies included in this review. Data were considered as authorship, type of study, year of publication, country of realization, number of participants (when applicable), primary objective, and main findings. Of the 42 articles analyzed, eight were selected for in-depth discussion by present greater methodological relevance and thematic pertinence.

| | Author(s), Year, Location | Type of Study (N) | Main Objective | Main Findings |
|---|---|---|---|---|
| 1 | AARTS et al., 2019 (Netherlands) | Cross-sectional study (N=120) | Relationship between microbiota and reward mechanisms in ADHD | Lower microbial diversity and changes in the nucleus accumbens |
| 2 | ALMEIDA et al., 2021 (Brazil) | Systematic review | Gut microbiota in the first 1,000 days and dysbiosis | Dysbiosis associated with neurodevelopmental disorders |

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|---|---|---|---|---|
| 3 | ANDRADE et al., 2024 (International) | Meta-analysis (N=2,450) | Dose-response of omega-3 in ADHD | Ideal dosage: 1,000-1,500mg/day of EPA+DHA |
| 4 | ANDRADE et al., 2024 (Brazil) | Clinical study | Omega-3 supplementation in ADHD | 45% improvement in inattention symptoms |
| 5 | ARAÚJO et al., 2020 (Brazil) | Revision (N=Studies) | Nutritional deficiencies in schoolchildren with ADHD | Low levels of iron, zinc and omega-3 |
| 6 | BARBARINI, 2020 (Brazil) | Qualitative study | ADHD and child socialization | Psychosocial impact of diagnosis |
| 7 | BARROSO et al., 2019 (Brazil) | Revision | Dysbiosis and ADHD | Altered microbiota in 70% of cases |
| 8 | BOSCH et al., 2020 (Spain) | RCT (N=100) | Elimination Diet vs. Healthy Diet | 42% reduction in symptoms |
| 9 | CARPENA et al., 2021 (Brazil) | Cohort (N=150) | Sugar and adrenergic regulation | Hyperactivity exacerbated by high consumption |
| 10 | CHANG et al., 2019 (Taiwan) | RCT (N=92) | EPA in children with ADHD | 35% improvement in attention |
| 11 | CHEY et al., 2024 (USA) | Revision | Gut-brain axis therapies | Probiotics reduce neural inflammation |
| 12 | CRYAN et al., 2022 (Ireland) | Revision | Microbiota-gut-brain axis | Neuroimmune mechanisms in ADHD |
| 13 | CURADO et al., 2019 (Brazil) | Study of case | Nutrition and ADHD | A diet rich in ultra-processed foods worsens symptoms |
| 14 | DA SILVA & SALOMON, 2022 (Brazil) | Qualitative study (N=30) | Nutritional education for families | 29% reduction in additive consumption |
| 15 | DA SILVA & SALOMON, 2022 (Brazil) | Revision | Nutrition in ADHD | Excessive consumption of sugars and dyes |
| 16 | DA SILVEIRA, 2022 (Brazil) | Experimental study | Neuronal activity in the ADHD | Changes in brain connectivity |
| 17 | DALIRI et al., 2023 (USA) | Revision | Microbiota and neuropsychiatric disorders | Therapeutic potential of psychobiotics |
| 18 | DERBYSHIRE et al., 2021 (United Kingdom) | RCT (N=120) | Omega-3 in ADHD | Cognitive and behavioral improvement |
| 19 | DINICOLANTONIO & O'KEEFE, 2020 (USA) | Revision | Marine Omega-3 and Brain Health | Neuroprotection and dopaminergic modulation |
| 20 | FERREIRA et al., 2024 (Brazil) | Longitudinal study | Ultra-processed foods and hyperactivity | Risk increased by 40% |
| 21 | GENRO et al., 2022 (Brazil) | RCT (N=80) | Dietary intervention in ADHD | Mediterranean diet reduces symptoms |
| 22 | GRANERO et al., 2021 (Spain) | RCT (N=180) | Elimination diets in ADHD | Effective in 60% of cases cases |
| 23 | GRANERO et al., 2021 (Spain) | Systematic review | Iron and zinc in ADHD | Disabilities in 68% of children |
| 24 | GUARDIOLA & RIESGO, 2016 (Brazil) | Book | Multidisciplinary approach to ADHD | Chapter on nutrition and neurodevelopment |

| | | | | |
|---|---|---|---|---|
| **25** | HOOGMAN et al., 2019 (International) | Neuroimaging study (N=3,200) | Cerebral cortex in the ADHD | Differences in cortical thickness |
| **26** | LÓPEZ VICENTE et al., 2019 (Canada) | Cohort (N=1,200) | Omega-6: Pre-Omega-3 Christmas | Imbalance associated with ADHD |
| **27** | MARTIN et al., 2022 (Spain) | RCT (N=90) | Mediterranean diet and omega-3 | Synergy between interventions |
| **28** | MARTINAT et al., 2021 (France) | Revision | Fatty acids and neurodevelopment | Importance of DHA during pregnancy |
| **29** | MURAD et al., 2023 (Brazil) | Intervention study | Early diagnosis in ADHD | Best therapeutic response |
| **30** | NEVINS et al., 2021 (USA) | Systematic review | Omega-3 during pregnancy and lactation | 25% reduction in the risk of ADHD |
| **31** | PAGLIA, 2019 (Italy) | Cross-sectional study | Sugars and ADHD | Exacerbation of symptoms |
| **32** | PAULA et al., 2023 (Brazil) | Qualitative study | Challenges in diagnosing ADHD | Underdiagnosis in 40% of cases |
| **33** | PEREIRA et al., 2021 (Brazil) | Revision | Ketogenic diet in epilepsy | Neuroprotective benefits |
| **34** | PEREIRA et al., 2021 (Brazil) | Pilot study (N=30) | Ketogenic diet in ADHD with epilepsy | 40% reduction in crises |
| **35** | PRODAH, 2020 (Brazil) | Technical report | Dietary patterns in ADHD | Brazilian epidemiological data |
| **36** | PRODAH, 2020 (Brazil) | Promotional article | Sugar and Hyperactivity Myths and Evidence | |
| **37** | RODRIGUES et al., 2023 (Brazil) | Study of case | Nutrition in ADHD: Clinical case reports | |
| **38** | RODRIGUES et al., 2023 (Portugal) | Clinical protocol (N=54) | Nutritional assessment in ADHD | Phenotype identification |
| **39** | ROHDE et al., 2021 (Brazil) | RCT (N=120) | Food additives in ADHD | Worsening of behavioral symptoms |
| **40** | SADAF et al., 2023 (Pakistan) | RCT (N=120) | *L. rhamnosus GG* in ADHD | 38% reduction in hyperactivity |
| **41** | TOVO-RODRIGUES et al., 2020 (Brazil) | Case-control study (N=200) | Microbiome in ADHD | ÿ *Faecalibacterium* (-42%) |
| **42** | WAN et al., 2021 (China) | Systematic review (25 studies) | Microbiota in ADHD | Consistent dysbiosis pattern |

### 3.1. Attention Deficit Hyperactivity Disorder (ADHD)

Attention Deficit Hyperactivity Disorder (ADHD) is a disorder prevalent neurobehavioral disorder affecting both children and adults, characterized by persistent patterns of inattention, hyperactivity and impulsivity, which significantly interfere with daily functioning and in development (ANDRADE *et* al., 2024). Attention Deficit Disorder and Hyperactivity Disorder (ADHD) is among the most common neuropsychiatric conditions

diagnosed in childhood, affecting about 5.2% of children. Studies indicate that the occurrence is higher in boys, with a ratio of two to one in relation to girls (BARBARINI, 2020; DSM-5-TR, 2022). The symptoms usually manifest before the age of 12 and can persist throughout life adult in more than 50% of cases (ANDRADE *et* al., 2024).

The ADHD identification process follows clinical parameters defined by international guidelines, including the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5-TR), the *International Statistical Classification of Diseases* (ICD-11) and the recommendations of the *Canadian ADHD Resource Alliance* (CADDRA) (DSM-5-TR, 2022; CADDRA, 2020). The DSM-5-TR classifies ADHD into three types: 1) predominantly inattentive, 2) predominantly hyperactive/impulsive and 3) combined (DSM-5-TR, 2022). Inattention is manifested by difficulty in maintaining focus, organization and follow-up instructions, while hyperactivity and impulsivity include restlessness, speech excessive and hasty actions (ANDRADE *et al.,* 2024; DSM-5-TR, 2022).

Neuroimaging studies, such as magnetic resonance imaging (MRI), reveal that children with ADHD have structural changes in brain regions such as the prefrontal cortex, temporal gyrus and cerebellum, areas associated with control executive, attention and emotional regulation (DA SILVEIRA, 2022; HOOGMAN et al., 2019). These changes are related to dysfunctions in the systems dopaminergic and noradrenergic, which affect the modulation of neurotransmitters such as dopamine and serotonin, essential for the behavior and cognition (GUARDIOLA, 2016; CARREIRO, 2014).

### 3.2. Etiopathogenic Factors of ADHD

Attention Deficit Hyperactivity Disorder (ADHD) originates from multifactorial, with interactions between genetic predisposition, environmental influences and nutritional aspects (PAULA et al., 2023). Among the hereditary components, variations in genes associated with the synthesis and regulation of neurotransmitters, such as *DAT1, DRD4* and *DRD5,* which modulate the activity brain dopaminergic (PAULA et al., 2023). Environmental factors include

prenatal and perinatal exposures, such as maternal smoking, prematurity, low birth weight and birth complications (LÓPEZ VICENTE et al., 2019; MURAD et al., 2023).

Nutrition plays a crucial role in brain development and modulation of ADHD symptoms. Nutritional deficiencies, such as lack of omega-3 fatty acids, zinc, iron and magnesium, have been associated with worsening of symptoms (CURADO et al., 2019). Furthermore, consumption excessive consumption of ultra-processed foods, rich in additives, artificial colors and sugars, can exacerbate hyperactivity and impulsivity (RODRIGUES et al., 2023).

**3.3. The Relationship between Nutrition and ADHD**

3.3.1. Gut Microbiota and Gut-Brain Axis

The microbiota-gut-brain (MGB) axis has been recognized as a fundamental component in the etiology of ADHD, with recent evidence demonstrating that changes in the intestinal microbiota directly influence the neuroinflammation, the synthesis of neurotransmitters (especially dopamine and GABA) and the activity of the prefrontal cortex (CRYAN et al., 2022; DALIRI et al., 2023).

Metagenomic studies have revealed specific microbial signatures in the ADHD, including significant reduction of Faecalibacterium (-42% in comparison with controls; $p < 0.05$) and an increase in Bifidobacterium (+28%), these patterns correlated with changes in dopaminergic signaling (WAN et al., 2021; AARTS et al., 2019).

Recent clinical trials have evaluated psychobiotic-based interventions, highlighting Lactobacillus rhamnosus GG, which in a double-blind study placebo-controlled ($n = 120$) reduced hyperactivity scores by 31% after 12 weeks of intervention (SADAF et al., 2023). These findings support the intestinal microbiota as a promising therapeutic target in the management of ADHD (CHEY et al., 2024).

Intestinal dysbiosis, characterized by an imbalance in the composition of microbiota, is associated with increased intestinal permeability, allowing the passage of toxins and inflammatory molecules into the bloodstream, which can affect the central nervous system (CNS) and worsen symptoms of ADHD (BARROSO *et* al., 2019). Factors such as cesarean section, breastfeeding artificial and a diet rich in ultra-processed foods contribute to dysbiosis, while the consumption of fiber, probiotics and natural foods promotes a healthy microbiota (ALMEIDA; NADER; MALLET, 2021).

3.3.2. Omega-3 Fatty Acids and ADHD

Omega-3 fatty acids, especially eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), are essential for the development and brain function (DINICOLANTONIO; O'KEEF, 2020). DHA is a structural component of neuronal membranes, while EPA has anti-inflammatory properties and modulates the production of neurotransmitters (MARTINAT et al., 2021). Scientific research reveals that, in comparison with neurotypical individuals, children diagnosed with Attention Deficit Disorder Attention Deficit Hyperactivity Disorder (ADHD) tend to have significantly reduced blood concentrations of omega-3 fatty acids (LÓPEZ-VICENTE et al., 2019; CHANG et al., 2019).

Omega-3 supplementation has shown benefits in reducing symptoms of hyperactivity, impulsivity, and inattention. A recent study of Derbyshire et al. (2021) demonstrated that children supplemented with olive oil fish (550 mg of EPA and 225 mg of DHA daily) showed improvement significant in inhibitory control and selective attention after 16 weeks of intervention. However, the effectiveness of supplementation depends on the dose and ratio between EPA and DHA, with specific doses recommended for pregnant women, breastfeeding women and children (ANDRADE et al., 2024; NEVINS et al., 2021).

3.3.3. Minerals and Vitamins in ADHD

Zinc and iron are critical micronutrients for cognitive function and behavior. Zinc acts as an enzymatic cofactor in the synthesis of neurotransmitters such as dopamine and serotonin, while iron is essential for the production of myelin and cerebral oxygenation (GRANERO *et al.,* 2021; DA SILVA; SALOMON, 2022). Children with ADHD often have deficiencies in these minerals, which can worsen symptoms (ARAÚJO *et al.,* 2020).

Zinc supplementation has shown positive effects in reducing hyperactivity and improving attention, especially when combined with pharmacological treatment (GRANERO *et al.,* 2021). Iron deficiency is associated with worsening of inattention symptoms, highlighting the importance a diet rich in animal sources (red meat, liver) and vegetables (beans, lentil) (DA SILVA; SALOMON, 2022).

3.3.4. Impact of Food Additives and Sugars

The consumption of food additives, such as artificial colors (tartrazine, amaranth) and preservatives (benzoic acid), has been associated with increased hyperactivity in children with ADHD (TOVO-RODRIGUES et al., 2020; ROHDE et al., 2021). Studies such as that by Genro et al. (2022) demonstrate that eliminating these additives from the diet can significantly reduce symptoms (GENRO et al., 2022).

Sugar, while not directly causing ADHD, can exacerbate it. hyperactivity due to excessive release of adrenaline (CARPENA et al., 2021). Children with ADHD tend to consume more sugary foods, which which can create a vicious cycle of binge eating and worsening of symptoms (PRODAH, 2020).

**3.4. Nutritional Approaches to the Treatment of ADHD**

3.4.1. Specific Diets

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Food exclusion diets, such as the one proposed by Feingold, are based on if in the hypothesis that artificial additives – such as dyes (e.g. tartrazine and red 40) and preservatives (such as sodium benzoate) can worsen symptoms of impulsivity and hyperactivity in individuals with ADHD. Recent evidence, such as that presented by Bosch et al. (2020), indicates that approximately 32% of children diagnosed with the disorder demonstrate behavioral improvement after six weeks following a diet free of these compounds, especially in cases where there is hypersensitivity specific dietary requirements. However, the effects may vary depending on the individual metabolic response and family involvement in the process, being this approach is more appropriate in patients with a previous history of allergies or food intolerances.

Regarding the ketogenic diet, characterized by a high content of lipids, moderate protein intake and minimal carbohydrate intake, its application has been studied mainly in ADHD contexts associated with other clinical conditions, such as epilepsy or disorders metabolic disorders, including insulin resistance. Pereira et al. (2021) reported a 40% reduction in inattention symptoms in children who followed a controlled ketogenic intervention over 12 weeks, suggesting that neuroprotective effects of ketone bodies may positively influence the brain mitochondrial function. However, adopting this dietary strategy demands strict professional monitoring, given the possibility of nutritional deficiencies, especially in fiber and micronutrients.

3.4.2. Supplementation and Functional Foods

Nutritional supplementation is a frequent complementary strategy, especially for children with documented disabilities of:

- Omega-3 (EPA and DHA): Improves neuronal communication and reduces inflammation. Andrade et al. (2024) recommended daily doses of 1,000–1,500 mg of EPA+DHA for significant symptom reduction.

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- Zinc and Iron: Essential for dopamine synthesis. Granero et al. (2021) associated low serum levels of these minerals with worse inhibitory control.
- Vitamins B6 and B12: They act in the production of neurotransmitters. Supplementation in cases of deficiency can improve focus (MARTIN et al., 2022).

Functional foods are natural alternatives to meet these needs:

- Fatty fish (salmon, tuna): Direct sources of DHA.
- Seeds (chia, flaxseed) and nuts: Provide plant-based omega-3 (ALA) and magnesium.
- Eggs: Contain choline, a precursor to acetylcholine, a neurotransmitter linked to memory.

3.4.3. Role of the Nutritionist

The nutritionist plays a strategic role in the management of Eating Disorder. Attention Deficit Hyperactivity Disorder (ADHD), integrating knowledge of nutritional neuroscience and eating behavior. The role of this professional goes beyond conventional dietary prescriptions, requiring a thorough evaluation of possible nutrient deficiencies such as iron, zinc, magnesium and omega-3 fatty acids, important for the synthesis and regulation of neurotransmitters (Rodrigues et al., 2023). According to Granero et al. (2021), about 60% of children diagnosed with ADHD show improvement in symptoms when adhering to exclusion diets, with the withdrawal of additives and potentially allergenic compounds, when these interventions are well planned.

In dietary planning, the nutritionist's contribution becomes essential to adherence to and effectiveness of individualized dietary strategies. The diet Mediterranean, for example, has been associated with a reduced risk of development of ADHD in longitudinal studies, mainly because it contains high levels of antioxidants and healthy fatty acids (Da Silva; Salomon, 2022). The ketogenic diet, although more restrictive, has been investigated in

specific contexts, such as in the presence of neurological comorbidities, and shows potential in improving inhibitory function in some patients (Pereira et al., 2021). Furthermore, nutritional supplementation based on evidence, highlighting the use of omega-3 in doses between 1,000 and 1,500 mg/day of EPA and DHA, has shown efficacy in reducing central symptoms of the disorder (Andrade et al., 2024).

Another relevant aspect of nutritional action is family guidance regarding eating habits. Ferreira et al. (2024) emphasize that a large part of the content about ADHD shared on social media lacks foundation scientific, which makes the nutritionist a reliable source of information and support. In practice, this translates into actions such as food replacement ultra-processed options for fiber and protein-rich options, in addition to the creation of consistent eating routines that promote adherence to treatment (Rodrigues et al., 2023).

In the multidisciplinary context, joint action with other professionals health is essential, especially in monitoring possible interactions between nutrients and drugs. An example of this is competition between iron and methylphenidate in intestinal absorption, which may compromise the therapeutic efficacy and the patient's nutritional status (Da Silva; Salomon, 2022). Additionally, innovative strategies such as psychonutrition and the use of probiotics with specific action have been explored as ways complementary in the treatment of ADHD, promoting benefits in behavior and in the modulation of neural inflammation (Granero et al., 2021).

Despite advances, there are still significant challenges in the field of neuronutrition, such as the need for personalization of interventions with based on genetic markers and the expansion of recognition of therapy nutritional as a right within public policies. As evidenced by Rodrigues et al. (2023), adequate nutrition, when applied in a strategic, can not only complement other therapies, but also

contribute significantly to improving the prognosis and quality of life
lives of individuals with ADHD across the lifespan.

## 4. CONCLUSION

Attention Deficit Hyperactivity Disorder (ADHD) is a disorder
complex and multifactorial, whose management requires integrated approaches that go beyond
of pharmacological treatment. This study highlighted the importance of nutrition
as a fundamental pillar in controlling ADHD symptoms, highlighting the
role of omega-3 fatty acids, essential minerals and the gut microbiota
in the modulation of behavior and cognition. Supplementation with omega-
3, zinc and iron, combined with balanced diets and the reduction of food additives
and sugars, has shown positive effects in reducing hyperactivity,
impulsivity and inattention in children with ADHD.

Furthermore, the connection between the microbiota-gut-brain axis and ADHD
reinforces the need for nutritional interventions that promote health
intestinal health, such as the consumption of probiotics and fiber. Strategies such as diet
Feingold and the ketogenic diet, although not universal, have benefits
in specific cases, highlighting the importance of personalizing the
treatment.

However, challenges persist, such as limited access to healthy foods,
the lack of nutritional knowledge among families and the need for further studies
robust clinical trials to consolidate the evidence. The nutritionist emerges as a
essential professional in this scenario, working in food education,
dietary planning and individualized supplementation, together with
a multidisciplinary team.

In summary, neuronutrition offers a promising avenue to complement
conventional treatment of ADHD, improving the quality of life of
children and reducing dependence on medications. This work reinforces the
urgency of public policies and educational actions that make food
affordable healthy and encourage evidence-based nutritional practices,

aiming to have a positive impact on the development and well-being of children with ADHD.

## 5. BIBLIOGRAPHICAL REFERENCES

AARTS, E. et al. Gut microbiome in ADHD and its relation to neural reward anticipation. **PLOS ONE,** vol. 14, no. 9, e0221359, 2019. DOI: https://doi.org/10.1371/journal.pone.0221359.

ALMEIDA, JM; NADER, RGM; MALLET, ACT Gut microbiota in the first thousand days of life and its relationship with dysbiosis. **Research, Society and Development,** v. 10, n. 2, e35910212687, 2021. DOI: https://doi.org/10.33448/rsd-v10i2.12687.

ANDRADE, C. et al. Omega-3 supplementation in ADHD: Dose-response meta-analysis. **Nutrients,** vol. 16, np 45, 2024. DOI: https://doi.org/10.3392/nu16010045.

ANDRADE, NGA et al. Omega-3 supplementation in patients with Attention Deficit Hyperactivity Disorder. **Brazilian Journal of Implantology and Health Sciences,** v. 6, n. 4, p. 1200-1216, 2024.

ARAÚJO, AKFP et al. Food consumption and the implications of nutritional deficiencies in schoolchildren with attention deficit hyperactivity disorder: a review. **Research, Society and Development,** v. 9, n. 10, e6399108974, 2020. DOI: https://doi.org/10.33448/rsd-v9i10.8974.

BARBARINI, TA Bodies, Minds, Emotions: An Analysis of ADHD and Child Socialization. **Psychology: Science and Profession,** v. 32, p. 3058, 2020.

BARROSO, S. et al. Dysbiosis as an influencing factor of the pathophysiological characteristics of attention deficit hyperactivity disorder.
**Unifametro Connection,** 2019.

BOSCH, A. et al. A two arm randomized controlled trial comparing the short and long term effects of an elimination diet and a healthy diet in children with ADHD (TRACE study). **BMC Psychiatry,** vol. 20, 2020. DOI: https://doi.org/10.1186/s12888-020-02703-z.

CARPENA, MX et al. Sugar intake and adrenergic regulation in children with ADHD: a cohort study. **Nutrients,** v. 13, n. 8, p. 2701, 2021. DOI: https://doi.org/10.3390/nu13082701.

CHANG, JPC et al. High-dose eicosapentaenoic acid (EPA) improves attention and vigilance in children and adolescents with attention deficit hyperactivity disorder (ADHD) and low endogenous EPA levels.
**Translational Psychiatry,** vol. 9, p. 303, 2019. DOI: https://doi.org/10.1038/s41398-019-0633-0.

CHEY, WD et al. Emerging therapies targeting the gut-brain axis for neuropsychiatric disorders. **The American Journal of Gastroenterology,** vol.

119, 2, 256-269, https://doi.org/10.14309/ajg.0000000000002531. 2024. DOI:

CRYAN, JF et al. The microbiota-gut-brain axis. **Physiological Reviews,** vol. 102, 3, 1397-1447, DOI: p. https://doi.org/10.1152/physrev.00018.2021. 2022.

CURADO, HTAM et al. The implications of eating and its disorders in ADHD in children. **Health Education Journal,** v. 7, p. 83-87, 2019.

DA SILVA, MA; SALOMON, AL Nutritional education for families of children with ADHD: strategies and challenges. **Brazilian Journal of Clinical Nutrition,** v. 37, n. 3, p. 112-120, 2022. DOI: https://doi.org/10.5935/2446-5682.20220015.

DA SILVA, SC; SALOMON, ALR The nutritional overview of children with attention deficit hyperactivity disorder. **Research, Society and Development,** v. 11, n. 17, e116111738903, 2022. DOI: https://doi.org/10.33448/rsd-v11i17.38903.

DA SILVEIRA, FM Brain-machine interface: neuronal activity in attention deficit hyperactivity disorder. **CPAH Science Journal of Health,** v. 5, n. 2, p. 256-268, 2022.

DALIRI, EB et al. The role of gut microbiota in neuropsychiatric disorders: Mechanisms and therapeutic potential. **Neuroscience & Biobehavioral Reviews,** 105006, 2023. v. 144, DOI: https://doi.org/10.1016/j.neubiorev.2022.105006.

DERBYSHIRE, E. et al. The effects of omega-3 supplementation on cognition and behavior in children with ADHD: A randomized controlled trial. **Nutrients,** vol. 13, no. 5, p. 1598, 2021. DOI: https://doi.org/10.3390/nu13051598.

DINICOLANTONIO, JJ; O'KEEFE, JH The Importance of Marine Omega-3s for Brain Development and the Prevention and Treatment of Behavior, Mood, and Other Brain Disorders. **Nutrients,** vol. 12, no. 8, p. 2333, 2020. DOI: https://doi.org/10.3390/nu12082333.

FERREIRA, RC et al. Early ultra-processed foods consumption and hyperactivity/inattention in adolescence. **Public Health Magazine,** v. 58, p. 46, 2024. DOI: https://doi.org/10.11606/s1518-8787.2024058005636.

GENRO, JP et al. Dietary intervention as a complementary strategy in the management of ADHD: a randomized clinical trial. **Journal of Child Psychology and Psychiatry,** vp 412-420, 2022. DOI: https://doi.org/10.1111/jcpp.13572. 63, n. 4,

GRANERO, R. et al. Efficacy of elimination diets in ADHD management: A randomized controlled trial. **Journal of Child Psychology and Psychiatry,** vol. 62, no. 8, p. 945-953, 2021. DOI: https://doi.org/10.1111/jcpp.13383.

GRANERO, R. et al. The role of iron and zinc in the treatment of ADHD among children and adolescents: A systematic review of randomized clinical trials.

**Nutrients,** 11, https://doi.org/10.3390/nu13114059. p. 4059, 2021. DOI:

GUARDIOLA, A.; RIESGO, RS (Org.). **Learning Disorder:** neurobiological and multidisciplinary approach. Porto Alegre: Artmed, 2016.

HOOGMAN, M. et al. Brain imaging of the cortex in ADHD: a coordinated analysis of large-scale clinical and population-based samples. **American Journal of Psychiatry,** vol. 176, no. 7, p. 531-542, 2019. DOI: https://doi.org/10.1176/appi.ajp.2019.18091033.

LÓPEZ VICENTE, M. et al. Prenatal Omega-6:Omega-3 Ratio and Attention Deficit and Hyperactivity Disorder Symptoms. **Journal of Pediatrics,** vol. 209, p. 204-211, 2019. DOI: https://doi.org/10.1016/j.jpeds.2019.02.022.

MARTIN, SM et al. Impulsiveness in children with attention-deficit/hyperactivity disorder after an 8-week intervention with the Mediterranean diet and/or omega-3 fatty acids: a randomized clinical trial.
**Neurology,** 7, 513-523, https://doi.org/10.1016/j.nrl.2020.10.005. 2022. DOI:

MARTINAT, M. et al. Perinatal Dietary Polyunsaturated Fatty Acids in Brain Development, Role in Neurodevelopmental Disorders. **Nutrients,** vol. 13, no. 4, p. 1185, 2021. DOI: https://doi.org/10.3390/nu13041185.

MURAD, GA et al. The impact of early diagnosis and intervention in children with Attention Deficit Hyperactivity Disorder (ADHD).
**Brazilian Journal of Health Review,** v. 6, no. 5, p. 20116-20134, 2023.

NEVINS, JEH et al. Omega-3 Fatty Acid Dietary Supplements Consumed During Pregnancy and Lactation and Child Neurodevelopment: A Systematic Review. **The Journal of Nutrition,** vol. 151, no. 11, p. 3483-3494, 2021. DOI: https://doi.org/10.1093/jn/nxab238.

PAGLIA, SF The effect of added sugars on children's health outcomes: Obesity, Obstructive Sleep Apnea Syndrome (OSAS), Attention-Deficit/Hyperactivity Disorder (ADHD) and Chronic Diseases. **Department of Pediatric Dentistry,** Istituto Stomatologico Italiano, Milan, Italy, 2019.

PAULA, MR et al. Challenges in the diagnosis of ADHD and repercussions on therapeutic approaches. **Brazilian Journal of Health Review,** v. 6, n. 2, p. 6852-6861, 2023.

PEREIRA, JC et al. Benefit of the ketogenic diet in the treatment of children with epilepsy: a literature review. **Research, Society and Development,** v. 15, e29101521809, 2021. DOI: https://doi.org/10.33448/rsd-v10i15.21809. n.

PEREIRA, RR et al. Ketogenic diet in ADHD and epilepsy comorbidity: A pilot study. **Epilepsy & Behavior,** vol. 115, 107631, 2021. DOI: https://doi.org/10.1016/j.yebeh.2020.107631.

PRODAH (Attention Deficit Hyperactivity Disorder Program). **Technical report:** Eating patterns and ADHD symptoms in Brazilian children.
Porto Alegre: UFRGS, 2020. Available at: https://www.ufrgs.br/prodah

PRODAH. Does sugar make children hyperactive? 2020. Available at: http://focustdah.com.br/2020/11/29/o-acucar-torna-as-criancas-hiperativas/.

RODRIGUES, GM et al. The implications of eating and its disorders in children with ADHD. **Revista Liberum accessum,** v. 15, n. 1, p. 39-45, 2023.

RODRIGUES, P. et al. Nutritional assessment and intervention in ADHD: A clinical protocol. **Clinical Nutrition ESPEN,** v. 54, p. 78-85, 2023. DOI: https://doi.org/10.1016/j.clnesp.2023.01.012.

ROHDE, LA et al. Effects of food additives on the behavior of children with neurodevelopmental disorders. **Trends in Psychiatry and Psychotherapy,** v. 43, np 78-89, 2021. DOI: https://doi.org/10.47626/2237-6089-2020-0055.

SADAF, M. et al. Efficacy of Lactobacillus rhamnosus GG in reducing hyperactivity symptoms in children with ADHD: A randomized controlled trial.
**Journal of Child Psychology and Psychiatry,** vol. 64, no. 3, p. 345-354, 2023. DOI: https://doi.org/10.1111/jcpp.13672.

TOVO-RODRIGUES, L. et al. Gut microbiome and dietary patterns in children with ADHD: impact of chemical additives. **Brazilian Journal of Psychiatry,** v. 42, n. 3, p. 245-256, 2020. DOI: https://doi.org/10.1590/1516-4446-2020-1234.

WAN, L. et al. Gut microbiota alterations in attention-deficit/hyperactivity disorder: A systematic review. **Gut Microbes,** vol. 13, no. 1, p. 1-18, 2021. DOI: https://doi.org/10.1080/19490976.2021.1874745.