



LIFESTYLE MEDICINE INTERVENTION IN NEURODEVELOPMENTAL DISORDERS. CASE REPORT.

INTERVENCIÓN CON MEDICINA DEL ESTILO DE VIDA EN TRASTORNOS DEL NEURODESARROLLO.

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ABSTRACT

Introduction: Neurodevelopmental disorders are conditions generated by dysfunction or interruption of brain development during childhood. In this group, attention deficit hyperactivity disorder and autism spectrum disorder stand out due to their prevalence and association between them. Studies suggest that these patients, due to their behavioral dysfunctions, develop unhealthy lifestyles, and that, in turn, these same habits could exacerbate these behaviors. **Clinical Case:** We present a case of a 5 year old female with diagnoses of grade 1 autism spectrum disorder and attention deficit hyperactivity disorder, under pharmacological and non-pharmacological treatment without behavioral improvement. A lifestyle medicine approach was carried out with an emphasis on eating patterns, transitioning to a plant based diet, incorporating physical activity and sleep hygiene measures. **Conclusion:** At four months there is evident improvement in hyperactivity, attention and socialization.

Keywords: Neurodevelopmental disorders, behavior, lifestyle medicine. (Source: Mesh – NLM).

RESUMEN

Introducción: Los trastornos del neurodesarrollo son condiciones generadas por disfunción o interrupción del desarrollo cerebral durante la infancia. De este grupo, destacan el trastorno por déficit atencional con hiperactividad y el trastorno del espectro autista por su prevalencia y asociación entre ellos. Estudios sugieren que estos pacientes a causa de sus disfunciones conductuales desarrollan estilos de vida no saludable, y que, a su vez, estos mismos hábitos podrían exacerbar dichas conductas. **Caso Clínico:** Se presenta caso de paciente femenina de 5 años con diagnósticos de trastorno del espectro autista grado 1 y trastorno por déficit atencional con hiperactividad, en tratamiento farmacológico y no farmacológico sin mejoría conductual. Se realizó abordaje con medicina del estilo de vida con énfasis en patrón alimentario realizando transición a uno basado en plantas, incorporación de actividad física y medidas de higiene del sueño. **Conclusión:** A los cuatro meses se constata evidente mejoría en la hiperactividad, atención y sociabilización.

Palabras claves: Trastornos del neurodesarrollo, conducta, medicina del estilo de vida. (Fuente: Decs – BIREME)

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INTRODUCTION

Neurodevelopmental disorders are a broad and complex group of disabilities involving some form of dysfunction or disruption of brain development ⁽¹⁾. They usually appear in childhood, and present an evolutionary course without regression of psychomotor development. Their etiopathogenesis is multifactorial, they have a high hereditary component, and manifest with a high overlapping of symptoms among them ⁽²⁾. The Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM-5) classifies neurodevelopmental disorders into: attention deficit hyperactivity disorder (ADHD), autism spectrum disorder (ASD), communication disorders, intellectual disability, learning disorders and motor disorders ⁽³⁾.

Treatment is generally divided into non-pharmacological and pharmacological. Non-pharmacological treatment is mainly aimed at therapies carried out by different professionals (psychologists, occupational therapists, speech therapists, etc.) and pharmacological treatment is oriented to the management of comorbidities (epilepsy, abnormal movements, etc.) or behavioral disorders.

ADHD is defined by the presence of disruptive symptoms related to attention, hyperactivity and impulsivity that begin before 12 years of age, are present in two or more environments, and cannot be better explained by another condition ⁽³⁾. ASD is characterized as a long-lasting condition that impairs communication and social interaction in multiple contexts along with the presence of repetitive restrictions, behaviors, interests or activities, or dysfunctional sensory symptoms ⁽³⁾. The overlap between ADHD and ASD is substantially high, with an estimated 1 in 8 children with ADHD having ASD ⁽⁴⁾. In turn, ADHD is the most common comorbidity in children with ASD with rates in the range of 40% to 70% ^(5,6).

The diagnosis of ADHD, as in the rest of neurodevelopmental disorders, is purely clinical. In this sense, the Conners test is frequently used to collect symptoms and evaluate the response to treatment ⁽⁷⁾.

Data from population-based surveys have suggested that lifestyle behaviors such as screen time, physical activity, and sleep disturbances are independently associated with ADHD. These same unhealthy lifestyle factors may contribute directly to the exacerbation of these symptoms ^(8,9). Some mechanisms that could

explain this association could be secondary effects related to energy level, immune function and epigenetic changes ⁽¹⁰⁾.

Most children with ASD present gastrointestinal disorders (constipation, diarrhea, or others) that may be influenced by inadequate dietary habits, which in turn may exacerbate autistic symptoms ⁽¹¹⁾. It is suggested that this relationship may be due to neuroimmunological dysfunction due to alterations in the intestinal microbiota ⁽¹²⁾.

CLINICAL CASE

A 5-year-old female preschooler, only child of healthy non-consanguineous parents, with previous diagnoses of autism spectrum disorder grade 1, attention deficit hyperactivity disorder and focal epilepsy, possibly non-refractory genetic was under treatment with antiepileptic drugs (levetiracetam 35 mg/kg/day plus valproic acid 30 mg/kg/day) and antipsychotic (risperidone 0.01mg/kg/day). She was pending pediatric evaluation for recurrent episodes of constipation and nonspecific abdominal discomfort. She received regular occupational and psychological therapy. She was attending preschool with an integration project, which at that time was suspended due to the pandemic.

The parents attended the specialty clinic with the child due to progressive behavioral difficulties despite pharmacological and neurorehabilitation treatment. They described oppositional behaviors, severe hyperactivity, marked inattention and heteroaggressions during episodes of uncontrolled behavior. The abbreviated version of the Conners test obtained 28 out of 30 points.

In the directed anamnesis, no acute stressors or dysfunctions in the family environment were identified. With respect to lifestyle, he had a sleep onset latency of 3 hours, effective from 1 am to 7 am, with no daytime sleepiness. He used screens without limits almost all day long and did not perform regular physical activity. His dietary pattern was based on consumption of meat products almost daily, dairy products three times a day, and processed/ultra-processed products almost every day. She consumed legumes once a week, one fruit daily and practically no vegetables. The parents reported frustration and a high level of stress; in fact, they had chosen to reduce contact with family and friends to avoid possible conflicts.

The neurological examination showed poor eye contact, motor hyperkinesia, intrusive behaviors and verbose language. No alterations in cranial nerves, locomotor, sensory or cerebellar system were detected.



No dysmorphias or neurocutaneous stigmata were observed. In the anthropometry the height/age and weight/height parameters were plus one standard deviation.

With the new data and findings, the following diagnoses were made: autism spectrum disorder grade 1, combined attention deficit hyperactivity disorder, focal epilepsy, possibly non-refractory genetic, sleep disorder, chronic constipation and overweight.

It was agreed with the parents to intervene lifestyles in parallel to the study with complementary examinations, without adding or modifying drugs. To this purpose, it was suggested to:

- Increase safe exposure to sunlight, prohibit the use of screens 2 hours before bedtime, and generate relaxation routines before going to sleep.
- Restrict and supervise the use of electronic devices.
- Establish daily physical activity, ideally in the morning, with a progressive increase in the time spent.
- Progressively changing the dietary pattern to a plant-based one. Decreasing consumption of processed/ultra-processed foods, meats and dairy products. Adding fruits, vegetables, legumes, seeds and nuts.
- Allocating time for family sharing and enjoyment.

Monthly check-ups were scheduled for four months, to enhance motivation, make adjustments in the recommendations, clarify doubts and evaluate response.

During the first months of intervention, parents reported an increase in spontaneous outdoor play, reduction of exposure to screens to almost zero, establishment of bedtime routines (warm baths, listening to relaxing music), initiation of almost daily physical activity (walking, cycling, dancing), transition to plant-based diet with good adherence, and initiation of family recreational activities (cooking, drawing, painting pictures).

The requested laboratory tests were normal (hemogram, glycemia, renal profile, liver profile, plasma electrolytes, thyroid profile and vitamin B12 levels) except for vitamin D levels, which were low, so loading and subsequent supplementation was performed. Plasma levels of antiepileptic drugs were in normal ranges.

Plasma levels of antiepileptic drugs were in normal ranges. The electroencephalogram showed frequent independent multifocal interictal interictal epileptiform activity with central-temporal predominance in sleep, however, she had not presented clinical epileptic seizures for at least 2 years, so anticonvulsants were not adjusted.

After 4 months of intervention, there was evident improvement in hyperactivity, concentration, disruptive behaviors and socialization. The Conners test applied showed these improvements with respect to ADHD: first month 18/30 points, second month 12/30 points, third month 14/30 points and at the fourth month 10/30 points. Sleep latency was reduced to less than 30 minutes, being effective from 22:30 pm to 8:30 am. Anthropometrically her weight normalized. Constipation and abdominal discomfort improved.

Finally, the parents commented that they felt very satisfied with the achievements obtained and expressed great motivation to continue improving their lifestyle habits. They began to look for more information on the subject, especially regarding plant-based nutrition.

DISCUSSION

Some epidemiological studies have shown that a large proportion of children with neurodevelopmental disorders, especially ADHD and ASD, have unhealthy lifestyles. Of these, inadequate eating patterns, sedentary lifestyles, prolonged exposure to screens and sleep disorders are the most frequently reported. It is thought that these habits would be favored by the dysregulated behaviors typical of neurodevelopmental disorders; however, these same habits maintained over time could further dysregulate behavior^(9,10,11,13).

In the case of the exposed patient, lifestyle medicine was used to treat maladjusted behaviors that had not responded to conventional treatments (pharmacological and non-pharmacological), obtaining evident improvement of symptoms in a short period of time.

CONCLUSIONS

With the available information and the experience described in the case, it is possible to posit that lifestyle interventions represent a powerful therapeutic focus to add to treatment in children with neurodevelopmental disorders. In order to incorporate this tool, it is essential that professionals involved in the treatment of these patients, especially neurologists and psychiatrists, incorporate lifestyle medicine concepts in their training.



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REFERENCES

1. Continuities and discontinuities in psychopathology between childhood and adult life. Rutter M, Kim-Cohen J, Maughan B. 2006, *J Child Psychol Psychiatry*, pp. 47:276–95.
2. Neurodevelopmental disorders. Anita Thapar, Miriam Cooper, Michael Rutter FRCPsych. 2016, *Lancet Psychiatry*, pp. 1-2.
3. APA. Diagnostic and Statistical Manual of Mental Disorders 5th edn. Washington DC : American Psychiatric Association, 2013.
4. Comorbid mental disorders in children. Jensen CM, Steinhausen HC. 2015, *Atten Defic Hyperact Disord*, pp. 7(1):27–38.
5. Symptom profile of ADHD in youth with high-functioning autism. Joshi G, Faraone SV, Wozniak J, Tarko L, Fried R, Galdo M, et al. 2014, *J Atten Disord*, pp. 21:846–55.
6. Psychiatric symptom impairment. Kaat AJ, Gadov KD, Lecavalier L. 2013, *J Abnorm Child*, pp. 41(6):959–69.
7. VIDAL, ELLEINE OCAMPO. EVALUACIÓN PSICOMETRICA DEL TEST CONNERS 3. Santiago de Chile : Tesis (Magíster en Educación mención Evaluación de Aprendizajes)--Pontificia Universidad Católica de Chile, 2016.
8. Factors associated with attention deficit/hyperactivity disorder among US children: Results from a national survey. Lingineni RK, Biswas S, Ahmad N, Jackson BE, Bae S, Singh KP. 2012, *BMC Pediatrics*, p. 12.
9. Association of symptoms of attention-deficit/hyperactivity disorder with physical activity, media time, and food intake in children and adolescents. van Egmond-Frohlich AW, Weghuber D, de Zwaan M. 2012, *PLoS ONE*, p. 7(11):e49781.
10. The Association of Lifestyle Factors and ADHD in Children. Kathleen F. Holton, Joel T. Nigg. 2020, *J Atten Disord*, p. 2.
11. Gastrointestinal Symptoms in Autism Spectrum Disorder: A Meta-analysis. McElhanon, B.O., et al. 2014, *pediatrics*, pp. 133, 872–883.
12. Autism, Gastrointestinal Symptoms and Modulation. Maria Vittoria Ristori 1, Andrea Quagliariello 1, Sofia Reddel 1, Gianluca Ianaro 2., 2020, *Nutriens*, p. 4.
13. Gastrointestinal symptoms and behavioral problems in preschoolers with Autism Spectrum Disorder. Fulceri F, Morelli M, Santocchi E, Cena H, Del Bianco T, Narzisi A, Calderoni S, Muratori F. 248-54, Mar 2016, *Dig Liver Dis*, Vol. 48(3).

