Autism Spectrum Disorder and ADHD: the potential role of therapeutic carbohydrate restriction

Nutrition Network

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Introduction

Neurodevelopmental disorders encompass a range of conditions (that frequently coexist), such as autism spectrum disorders (ASD) and attention deficit hyperactivity disorder (ADHD), and they can include movement (Tourette syndrome), speech, and language disorders like dyslexia. Due to the overlap between conditions and mechanisms, particularly from epilepsy and mitochondrial disease studies, and due to co-morbidity between conditions, there is potential benefit of a TCR approach. Common benefits of a ketogenic diet include reduced inflammation and oxidative stress, improved mitochondrial function, and modulated neurotransmitter signalling. Ketone bodies can also provide an additional fuel source for the brain where glucose hypometabolism is a feature of the pathophysiology, for example, in ADHD. This recent review highlights the key potential benefits for ASD and ADHD.

1. Dutta, P. *et al.* (2025) 'Conventional versus Modified Ketogenic Diets in Autism Spectrum Disorder: Transforming and Shaping Future Approaches'. *Int J Nutr Sci* 2025;10(4):546-560. Available at: doi: 10.30476/ijns.2025.107079.1482.

Autism Spectrum Disorder

'At present, there is strong evidence that mitochondrial and metabolic dysfunction may underlie the complex pathophysiology of ASD.' Cheng et al.

1. Varesio C, Grumi S, Zanaboni MP, et al. Ketogenic Dietary Therapies in Patients with Autism Spectrum Disorder: Facts or Fads? A Scoping Review and a Proposal for a Shared Protocol. Nutrients. 2021;13(6):2057. doi:10.3390/nu13062057
2. Lee RWY, Corley MJ, Pang A, et al. A modified ketogenic gluten-free diet with MCT improves behavior in children with autism spectrum disorder. Physiol Behav. 2018;188:205-211. doi:10.1016/j.physbeh.2018.02.006 PDF
3. Li Q, Liang J, Fu N, Han Y, Qin J. A Ketogenic Diet and the Treatment of Autism Spectrum Disorder. Front Pediatr. 2021;9. doi:10.3389/fped.2021.650624.

Areas of overlap between ASD and ADHD

ASD and ADHD can be comorbid. They share common features in presentation and pathophysiology that include mitochondrial dysfunctions, genetics, and the microbiome.

Allergies, food sensitivities, and fussy eating are common. The gluten-free/casein-free dietary approach is used in both ASD and ADHD with some success (1, 2). When compared to the gluten-free, casein-free diet, the ketogenic diet showed additional benefits (3).

1. Ly V, Bottelier M, Hoekstra PJ, Arias Vasquez A, Buitelaar JK, Rommelse NN. Elimination diets' efficacy and mechanisms in attention deficit hyperactivity disorder and autism spectrum disorder. Eur Child Adolesc Psychiatry. 2017;26(9):1067-1079. doi:10.1007/s00787-017-0959-1
2. Alamri ES. Efficacy of gluten- and casein-free diets on autism spectrum disorders in children. Saudi Med J. 2020;41(10):1041-1046. doi:10.15537/smj.2020.10.25308
3. El-Rashidy O, El-Baz F, El-Gendy Y, Khalaf R, Reda D, Saad K. Ketogenic diet versus gluten free casein free diet in autistic children: a case-control study. Metab Brain Dis. 2017;32(6):1935-1941. doi:10.1007/s11011-017-0088-z PDF

The behavioural improvements seen in epilepsy (which can be comorbid) and ASD patients indicate that further research investigating the impact of a ketogenic diet on behaviour in ADHD is warranted.

1. IJff DM, Postulart D, Lambrechts DAJE, et al. Cognitive and behavioral impact of the ketogenic diet in children and adolescents with refractory epilepsy: A randomized controlled trial. Epilepsy Behav. 2016;60:153-157. doi:10.1016/j.yebeh.2016.04.033 ABSTRACT
2. Luz IR, Pereira C, Garcia P, et al. Ketogenic Diet for Refractory Childhood Epilepsy: Beyond Seizures Control, the Experience of a Portuguese Pediatric Centre. Acta Médica Portuguesa. 2019;32(12):760-766. doi:10.20344/amp.12184 PDF

ADHD

There are a significant number of diet-related studies for ADHD that lack consensus. Variations in the dietary approaches yield mixed results. Though none specifically use a low-carbohydrate approach, common themes include exclusion protocols and/or the removal of sugars/gluten/casein (dairy), which has many features in common with the therapeutic carbohydrate restriction approach.

Some of these results may also be influenced by different causal subtypes of ADHD, where food choices may affect some more than others.

The totality of evidence suggests the potential benefits of an elimination diet (e.g., the few-foods or oligoantigenic diet) in ADHD. With any dietary approach, nutritional sufficiency and the exclusion of ultra-processed food should be considered the first step.

1. Pelsser LM, Frankena K, Toorman J, Pereira RR. Diet and ADHD, Reviewing the Evidence: A Systematic Review of Meta-Analyses of Double-Blind Placebo-Controlled Trials Evaluating the Efficacy of Diet Interventions on the Behavior of Children with ADHD. PLOS ONE. 2017;12(1):e0169277. doi:10.1371/journal.pone.0169277

2. San Mauro Martin I, Sanz Rojo S, González Cosano L, Conty de la Campa R, Garicano Vilar E, Blumenfeld Olivares JA. Impulsiveness in children with attention-deficit/hyperactivity disorder after an 8-week intervention with the Mediterranean diet and/or omega-3 fatty acids: A randomised clinical trial. Neurologia (Engl Ed). Published online December 26, 2019:S0213-4853(19)30132-X. doi:10.1016/j.nrl.2019.09.007
3. Bosch A, Bierens M, de Wit AG, 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). Rationale, study design and methods. BMC Psychiatry. 2020;20(1):262. doi:10.1186/s12888-020-02576-2
4. Walz, G. *et al.* (2022) 'Long-Term Effects of an Oligoantigenic Diet in Children with Attention-Deficit/Hyperactivity Disorder (ADHD) on Core Symptomatology', *Nutrients*, 14(23), p. 5111. Available at: https://doi.org/10.3390/nu14235111.
5. Pelsser LMJ, Frankena K, Toorman J, Savelkoul HFJ, Pereira RR, Buitelaar JK. A randomised controlled trial into the effects of food on ADHD. Eur Child Adolesc Psychiatry. 2009;18(1):12-19. doi:10.1007/s00787-008-0695-7 PDF

Adults diagnosed with ADHD

ADHD in children is associated with an increased risk of mental health conditions like anxiety and depression, which may extend into adulthood. Recent research using a ketogenic diet for adults with psychiatric conditions, including ADHD, has found benefits, which include the possibility of remission.

1. Bellamy, E.L. and Laurent, N. (2025) 'Transdiagnostic remission of psychiatric comorbidity in post-traumatic stress disorder, ADHD, and binge-eating disorder using ketogenic metabolic therapy: a retrospective case report', *Frontiers in Nutrition*, 12. Available at: https://doi.org/10.3389/fnut.2025.1600123.
2. Calabrese, L., Frase, R. and Ghaloo, M. (2024) 'Complete remission of depression and anxiety using a ketogenic diet: case series', *Frontiers in Nutrition*, 11. Available at: https://doi.org/10.3389/fnut.2024.1396685.

Common mechanistic themes among neurodevelopmental and psychiatric disorders provide an evidence base for future research efforts which are urgently needed. See the references resource section on **metabolic psychiatry** for more information.

Individual responses to dietary composition can vary so appropriate medical monitoring is advised. Patients who are taking medication should consult with their doctor, as the following guidelines (Society of Metabolic Health Practitioners) may need to be considered.