Current Trends in the Treatment of Pediatric ADHD: A Case Study

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Abstract: Pediatric patients presenting with Attention-Deficit Hyperactivity Disorder (ADHD or ADD) are a common occurrence in naturopathic practice. While the state of the research is evolving, there is evidence supporting the use of naturopathic treatments like omega-3 fatty acids and pycnogenol as well as novel uses of supplements like vitamin D and saffron.

This review will cover the diagnosis of ADHD, current evidence for lifestyle and naturopathic therapies for ADHD prevention and treatment, as well as a case study to illustrate ADHD management in a naturopathic setting.

Diagnosis

The diagnosis of ADHD in children is achieved using the DSM-5 Criteria. It evaluates symptoms (inattention, hyperactivity and impulsivity), the impact of these symptoms, timing of symptom onset, and requires excluding other psychiatric disorders.[1] These diagnostic criteria were updated in September 2019, with an emphasis on ruling out differentials and screening for co-morbidities, as well as broadening the age range of applicability for the DSM-5 criteria.[2]

Prevention: Prenatal Health Factors to Consider

As we learn about the impact of prenatal health on pediatric health outcomes, an awareness of the maternal risk factors that can increase the likelihood of offspring ADHD is important.

A history of maternal anxiety, depression, or disordered sleep correlates with ADHD in offspring.[3] Working to improve these issues before conception may help to reduce the future risk of ADHD diagnosis. Exposure to certain substances is another important consideration during pregnancy. Correlations have been made between smoking during pregnancy and ADHD symptoms in the offspring[4], although these results have not been consistent across studies.[5] The use of acetaminophen during pregnancy has shown more consistent results, with use during any term of pregnancy increasing ADHD risk.[6-9]

Additional prenatal considerations include the assessment and monitoring of nutrient deficiencies including iron and vitamin D. Maternal iron-deficiency anemia within the first 30 weeks of pregnancy has correlated with increased risk of ADHD in their children,[10] thus assessing for and correcting deficiency is recommended. Maternal blood 25-hydroxyvitamin D [25(OH)D] levels are associated with ADHD risk; a recent meta-analysis of 25 articles found that those with the highest levels (>50nmol/L) had significantly decreased risk of ADHD in their offspring compared to those with the lowest levels (<10ng/mL) (RR 0.72, CI 0.41-0.82).[11] Studies on micronutrient deficiency and ADHD risk are observational and thus cannot determine causation; a lack of intervention trials means it is not certain whether supplementation will reduce risk. Regardless, as micronutrient adequacy is important for overall fetal and maternal health, it should be maintained throughout the entirety of the pregnancy.

Negative maternal postnatal mental health has been correlated with an increased incidence in their children.[12] Providing mothers with the appropriate care could potentially improve outcomes. Further postnatal considerations are methods and duration of breastfeeding. A short duration of breastfeeding (with some studies establishing the cutoff at under three months, and some at under six) has been associated with an increased risk of ADHD in offspring, as has non-breastfeeding.[13,14] To decrease risk, mothers should be encouraged to surpass the six month mark while breastfeeding, when possible.[13,14] However any maternal breastfeeding is likely to decrease risk compared to none at all.[15]

Recent Research Findings on the Naturopathic Treatment of ADHD

For children diagnosed with ADHD, there are a number of options to decrease symptoms. Lifestyle factors including exercise, meditation, and yoga have demonstrated therapeutic benefit in reducing symptoms of ADHD, are generally health promoting practices, and thus are an ideal first-line treatment.[16,17] Exercise in particular has been extensively researched with positive outcomes, and should be incorporated into the lifestyles of ADHD patients.[16-18] Dietary changes have been studied in depth, with these interventions showing conflicting results.[19] Research has looked into many variations of diet plans, including elimination diets, artificial food-colouring free diets, the impact of sugar, and more.[20-22] A reduction in sugar and additives may be suggested to promote overall health in general, however due to the conflicting research, dietary changes should not act as a sole therapy for ADHD symptoms.

While lifestyle recommendations of exercise and proper nutrition may act as a foundation for ADHD treatment, supplementation and botanical treatment can be of benefit when these are not sufficient to reduce symptoms.

Vitamin D:

Decreased serum levels of vitamin D have been noted in children with ADHD compared to those without.[23] Studies have shown positive results regarding symptom reduction when restoring these levels, using doses ranging from 3000IU/day for 8 weeks, up to 50000IU/week for 6 weeks.[24,25] Assessing 25(OH)D levels and supplementing for those that are deficient may provide improvements in cognitive function.[24,25]

Omega-3:

Omega-3 fatty acids can assist in minimizing symptoms of ADHD by reducing inflammation, which is a proposed contributor to the etiology of ADHD.[26] A recent study demonstrated that children with ADHD consume significantly less omega-3 containing foods than children without.[27] The evidence for supplementation to minimize symptoms is conflicting, and further studies are required to validate them as a therapy for ADHD.[28-30] Nonetheless, with multiple studies demonstrating symptom improvement and safety, omega-3 may be a suitable therapy for some patients.[31,32]

Bacopa monnieri:

While studies of the use of *Bacopa* in ADHD children are mostly small in size and limited in number, the evidence that exists examining *Bacopa*'s cognitive impact has been positive.[33,34] One small, open label trial found significant improvements in symptoms with the use of *Bacopa*.[33] Children with ADHD were administered 225mg of a standardized *Bacopa* extract per day, over the course of 6 months.[33] The results displayed a reduction in restlessness in 93% of children taking an extract of *Bacopa monnieri*, with improvements in self control in 89%, and attention deficit symptoms reducing in 83%, of which all are above the average response rate to pharmaceutical treatment.[33,34]

Saffron:

Two small studies released over the last year have studied the effects of Saffron on reducing ADHD symptoms. More research is required, however both showed promise in Saffron's ability to relieve ADHD symptoms to a comparable level of pharmacologic treatment.[35,36] These studies demonstrated statistical significance in parent reported symptom reduction with the use of saffron extract, as well as displaying no significance between treatment with saffron extract versus that of methylphenidate.[35,36]

Pycnogenol:

Pycnogenol - an extract of French Maritime Pine bark - has been shown to reduce oxidative stress, as well as regulate the raised catecholamine levels seen in children with ADHD.[37,38] Catecholamine excretion in urine has been shown to be higher in children with ADHD, with norepinephrine levels correlating positively to their hyperactivity symptoms.[38] One randomized control trial displayed a trend of decreased norepinephrine in children given Pycnogenol, as well as regulated catecholamine levels.[38] A second RCT showed positive results on symptom reduction in children with ADHD after 1 month of treatment, demonstrating statistically significant reductions in hyperactivity, concentration, coordination, and inattention.[37] Statistically significance was maintained across multiple scales submitted both by parents and by teachers.[37] Both RCTs used a dose of at a dose of 1 mg/kg of body weight.[37,38]

Case Report: Crissy 10 year old girl

Crissy presents to the clinic with her mother after being expelled from school for 2 days for violent behaviour. Allegedly, Crissy ran after and tackled a kindergarten student during recess. Crissy told me that there was no apparent reason for this behaviour, that she just 'lost control' and wanted to run into another child. The mother reports that Crissy has been sent to the office several times for biting and pushing classmates, as well as interrupting classroom lessons by standing up and telling jokes. In the previous year, Crissy has had an assessment with an educational psychologist, who diagnosed her with Attention Deficit-Hyperactivity Disorder (ADHD) combined type, along with being gifted and the possibility of oppositional defiant disorder (ODD). Crissy was started on a course of methylphenidate, but it was discontinued within 6 months. While the medication had a moderately positive effect on her behaviour, Crissy developed intense and persistent insomnia and anorexia. Her mother expressed desperation in helping Crissy behave at school and with homework with no or minimal methylphenidate. She is also concerned about Crissy being labelled a bully, and how that may affect her school experience.

Crissy's mother describes her daughter as spirited and extremely clever. She can recite entire passages of books she reads and can recall detailed dialogues from films. Her teachers describe her as two people; namely, the bright and compassionate 10 year old, and a destructive, violent menace to the other students. Her teachers and administrative staff express a genuine fondness for Crissy but are baffled by how erratic her behaviour is, and how to help her.

Crissy tells me that she loves candy as her favourite food. She could eat candy all day long, as well as meat. She often eats only the meat in her meals, and eschews vegetables of all kinds. She prefers her meat to be nearly raw or smoked like salami or hot dogs.

Crissy has difficulty getting to sleep and staying asleep. Three to five nights per week, she has nightmares of monsters and killers chasing her. The disrupted sleep predated the methylphenidate, but seems more frequent since starting the medication, and never returned to baseline.

Completing the physical exam is challenging, as Crissy is always in motion and exploring the treatment room. There is nothing remarkable on the physical exam of taking vitals, abdominal, head and neck and cardiovascular exams. I do witness an intense argument with the patient and her mother in which the parent is refusing to share her smartphone with Crissy. Crissy hits her mother and yells at her.

Initial Treatment Plan

- With Crissy's involvement, she agrees to eat a vegetable, raw carrots or cucumber, every day until her next visit
- For sleep and nervous system support, magnesium bis-glycinate powder at 200mg and GABA tablet at 100mg taken before before bedtime are recommended.
- For overall nervous system support and inflammation reduction, Omega-3 fish oil at 2000mg combined EPA+DHA and 1000IU Vitamin D daily are recommended
- Of course, I plan to teach Crissy a few mindfulness techniques, but I need to support her nervous system first as her behaviour in my office indicated she was not ready for mindfulness yet.

Follow Up & Treatment after 4 weeks:

- Crissy reports that she is sleeping throughout the night on most days, and feels energetic in the morning. She has been able to eat more vegetables and restrict her intake of candy
- Crissy, her mother and I plan for the patient to start after school karate lessons
- Prescribe homeopathic remedy *Anacardium* 1M in a single sublingual dose

2nd Follow Up & Treatment after another 4 weeks:

- Crissy is calm in the office, sitting in her chair for 20 minutes, and answering my questions directly.
- Crissy's mother shows me that the patient has had only one complaint from teachers in the past two weeks. Crissy has been enjoying the karate lessons and tells me "I am not a bad kid anymore!"
- Decide on no redose of *Anacardium* 1M at this time, but keep the initial treatment plan for another 2 months, with reassessment at that time.

About the Authors

Dr. Caroline Meyer, ND has a busy private practice in Toronto, Canada with a clinical focus on mental health, pediatrics, and mindfulness. She graduated from the Canadian College of Naturopathic Medicine (CCNM) in 2005 where she currently is a part-time academic and clinical faculty member. She leads lectures and has been published extensively on topics related to natural health in North America, including contributing to the textbook Naturopathic and Integrative Pediatrics (CCNM Press).

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