HERBAL EXTRACT COMPANY

THE NATUROPATH'S GUIDE

ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD)

A focus on the herbal approach for managing ADHD

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PUBLISHED OCTOBER 2024

SAFFRON
(Crocus sativus)

ATTENTION DEFICIT HYPERACTIVITY DISORDER

ADHD is a complex neurodevelopmental disorder, with an onset typically before 12 years, which affects a person's ability to exert age-appropriate self-control. It is also, arguably, the most controversial neurological condition in contemporary life.[1]

ADHD is the most common neurodevelopmental disorder in children and adolescents although obtaining a diagnosis in adulthood is also possible. While many children and adolescents with ADHD improve as they grow up many will continue to experience symptoms as an adult, with persistence into adulthood in 60 to 86% of individuals. Today more than one million Australians (an estimated one in 20) are living with ADHD. It occurs in approximately 6 to 10% of Australian children and adolescents, and 2 to 6% of adults, and the figures are similar globally. But even these estimates may understate its prevalence, with Pharmaceutical Benefits Scheme (PBS) data suggesting that more than 1.5 million prescriptions for ADHD medication were issued in the 2020-21 financial year alone. Current trends also indicate that figure will only increase in the coming years. It is often a lifelong condition which can cause significant functional disability throughout the lifespan in all areas of life, and without appropriate intervention can lead to significantly unfavourable outcomes. However, with evidence-based treatment and support, people with ADHD can embrace their strengths and interests, learn to manage their challenges and live a full and rewarding life.[2] There is a growing body of research exploring the numerous strengths and abilities of people with ADHD and positive aspects of ADHD features. Strengths related to ADHD features include the ability to generate novel ideas, adventurousness and the ability to hyperfocus, which can result in high levels of productivity.[3,4,5]

Condition Overview

The prevalence of ADHD has seen a consistent rise in recent years. These numbers spark a debate over the reason for the observed trends, with some concerned about over diagnosis and over prescription of stimulant medications, and others raising the issue of diagnostic disparities, particularly in underrepresented populations. The general broadening of ADHD diagnostically over time plays a role in the increased prevalence over the years, but it is not the only reason. Increased awareness of physicians and the public is also believed to play a big role, particularly in underrepresented minorities, such as the prison

population and women. However, there continues to be inequalities in detection of ADHD in these groups. Currently there is a lack of research on understanding, identifying, assessing and treating ADHD in Aboriginal and Torres Strait Islander peoples. This lack of knowledge may result in over-diagnosis or under-diagnosis and cause harm to Aboriginal and Torres Strait Islander peoples through stigma or a lack of treatment. For example, there could be misidentification of symptoms that could be otherwise considered as culturally appropriate behaviours and beliefs. There is a need to provide culturally appropriate and competent care to all. Routine screening for ADHD at the population level is not currently recommended. This is because screening tools are currently not sufficiently accurate and efficient, and the costs and burden to the healthcare system of universal screening are not yet established.[6,7]

An Australian Senate inquiry report into ADHD in November 2023, described as a "heartbreaking" read on a "deeply misunderstood condition", concluded the condition is a "public health concern" and that a "more consistent and coordinated approach" is needed to improve access to assessment and support services. The Australian Government has yet to provide their response to the 15 recommendations of the Senate Inquiry's final report which recommended sweeping changes to the way ADHD is diagnosed and treated in Australia. Its final report found there were multiple barriers to Australians receiving adequate care for ADHD: limited healthcare services, high treatment costs and inconsistent prescription guidelines. It noted "thousands of dollars of out-of-pocket expenses" can bar young people from accessing diagnosis and treatment.[8]

The precise causes of ADHD are not known but there are multiple factors that make a person more likely to develop ADHD including genetic, developmental, physiological, environmental and psychosocial factors. Research hypotheses indicates that ADHD is likely to be caused by biological factors that influence chemical messages (neurotransmitters such as dopamine and noradrenaline) in certain parts of the brain. Recent studies suggest that the brain experiences a delay in maturation, and this impacts executive functioning (reasoning, good decision-making, short-term memory, attention span, listening and following instructions and impulse control). The symptoms of ADHD vary from person to person and management of symptoms can vary depending on age at diagnosis, types of interventions and co-morbidities.[9]

A high proportion of people with ADHD have co-occurring neurodevelopmental, mental health and medical conditions. In children, the most common co-occurring disorders are oppositional defiant disorder, language disorders, autism spectrum disorders and anxiety disorders, with depressive disorders and substance use disorders emerging in adolescence. Specific learning disorders also commonly occur in people with ADHD and involve difficulties in reading, written expression or mathematics. Among adults with ADHD, the most common co-occurring mental health disorders are depressive disorders, bipolar disorder, anxiety disorders, personality disorders and substance use disorders. Medical conditions, such as epilepsy, can co-occur with ADHD. For people with ADHD and a co-occurring condition, the onset, duration and pattern of functional impact may help differentiate the effects of ADHD from those of the other condition, to help guide the treatment plan.[10]

Up until last year (2023), there had not been a cross-discipline, evidence-based Australian ADHD clinical guideline approved by Australia's peak medical research body, the National Health and Medical Research Council (NHMRC). This resulted in an absence of clear and consistent guidance for organisations and clinicians in the identification, diagnosis and treatment of ADHD across the lifespan. It also had the unintended consequence of devaluing the lived experience of those with ADHD. The recently published (30 July 2022) NHMRC-approved Australian evidence-based clinical practice guideline for ADHD (the Australian ADHD guideline) aims to promote accurate and timely diagnosis, and provide guidance on optimal and consistent assessment and treatment of ADHD across the lifespan. The guideline details best-practice for ADHD diagnosis and treatment and outlines a roadmap for ADHD research and policy. It includes

a focus on everyday functioning, participation and quality of life for care. This is based on age, gender, culture, setting and geography of people who are living with ADHD, and those who support them. The Australian ADHD guideline was developed through addressing the priorities of people with a lived experience of ADHD, health professionals, educators and service providers. It integrates the best available evidence with multidisciplinary clinical expertise and consumer preferences to provide clinicians, educators, consumers and policy makers with guidance through 113 clinical recommendations. Australasian ADHD Professional Association Clinical Guideline Lead, Professor Mark Bellgrove, said that fully implementing the Australian evidence-based clinical practice guideline for ADHD would go a long way toward achieving the goals of the Senate Report mentioned above. "The Australian ADHD Guideline is a roadmap to address many of the issues highlighted by the Senate Report, especially around people's ability to get a diagnosis and treatment from a trained health care professional." [11,12]

Common Symptoms

The key signs and symptoms of ADHD cover two main areas of difficulty: inattention and hyperactivity/impulsivity, although in adults, hyperactivity and impulsivity may be less obvious. The inattentive presentation is the most prevalent. Symptoms that arise later in life are unlikely to be ADHD and should be assessed immediately.[13,14]

Symptoms include:

Inattention

- Difficulty concentrating
- Difficulty sustaining attention on tasks which do not provide significant stimulation or frequent rewards
- Distractibility: difficulty staying focused
- Forgetfulness
- Disorganisation: trouble organising tasks and activities
- Tendency to lose things

Hyperactivity

- Fidgeting and restlessness
- Excessive motor activity and difficulties being still, particularly in structured situations
- Difficulty sitting for long periods of time
- Difficulty engaging in quiet activities

Impulsivity

- A tendency to act in response to immediate stimuli, without consideration of the risks and consequences
- Difficulty waiting for a turn
- Acting or speacking before thinking things through[15]

While these symptoms are normal characteristics experienced by all people at one time or another, among individuals who are diagnosed with ADHD there is an overabundance of these characteristics. Their levels of overactivity, inattention and/or impulsivity are severe and persistent and typically result in performance issues in social, educational or work settings.[16]

In adulthood the symptoms are typically displayed somewhat differently to the way they are displayed in childhood. A child who squirms, fidgets and is constantly 'on the go' may become an adult who is less obviously physically overactive but experiences intense feelings of restlessness. They may have trouble relaxing and may overwork. An impulsive child who blurts out answers in class, who constantly interrupts others and talks excessively may become an adult who displays impatience when in queues or whilst driving, and who may be impulsive with spending or quitting jobs. Inattentive children who have difficulty listening and forget their homework may become adults who often complain of losing things, such as keys and wallets, and are often late for appointments.[17]

Risk Factors

Genetics

There appears to be a strong genetic component to ADHD. ADHD runs in families and having a relative with the disorder is one of the strongest risk factors. No single ADHD gene appears responsible for causing ADHD. Instead, research suggests it is likely to result from a number of interacting genes. Epigenetics is at play so gene/environment interactions are also important to consider. Expression of these genes is thought to result in alterations in brain structure, neurochemical composition and availability and brain connectivity and function. Relevant parental characteristics, such as smoking and parenting style, are likely influenced by genetic factors. Furthermore, these risks may be epigenetically transmitted across generations.[18]

Neurobiological factors

The clinical effectiveness of psychostimulants in treating ADHD has led to the hypothesis that disruption to dopamine and noradrenaline, particularly lowered synaptic levels, is a key to the pathophysiology of ADHD. In adults with ADHD, research has found some differences in areas of the brain and brain activity that relate to short term memory, the ability to focus and the ability to make choices. Differences have also been found in brain activity associated with attention and self-regulation, that is, the ability to focus attention, as well as manage emotions, thinking and behaviour.[19,20]

Gender

ADHD affects males and females, but since ADHD was first formally defined researchers have observed that males are more likely to meet the diagnostic criteria than females. This discrepancy may be due to differences in how ADHD manifests, referral bias and misdiagnosis or delays in diagnosis.[21]

Environmental factors

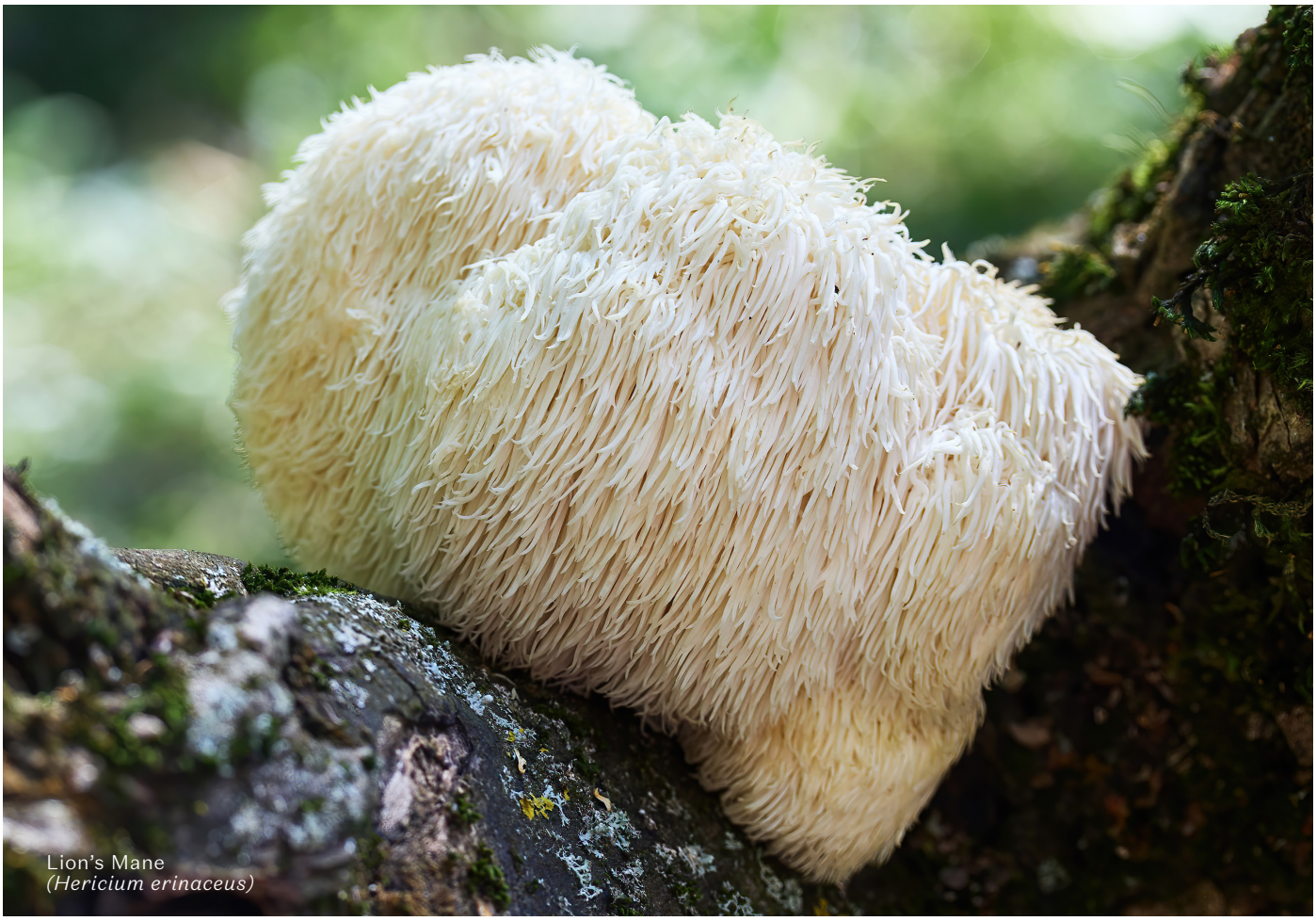
Certain environmental factors might also play a role in the development of symptoms of ADHD. These include:

- **Pregnancy and birth factors:** Maternal smoking, alcohol and substance misuse (including long-term maternal use of paracetamol during pregnancy, and prenatal exposure to the anti-epileptic drug valproate) and stress during pregnancy (for example, death of a close relative during pregnancy), trauma (for example, sexual abuse), physical neglect (particularly for ADHD inattentive type) and psychosocial adversity (lowered family income, out-of-home care, paternal criminality or maternal mental disorder), as well as low infant birth weight and prematurity are all factors linked to ADHD. Maternal obesity, hypertension, preeclampsia and hypothyroidism during pregnancy have also been associated with increased risk of ADHD in offspring. As with genetic risk factors, these environmental exposures are not specific to ADHD. Rather they may contribute to the general risk of developmental pathology across clinical syndromes.[22]
- **Certain environmental toxins:** Toxins such as lead, phthalate and organophosphate pesticides can affect brain development and behaviour and have been linked to ADHD.[23]
- **Dietary factors:** Studies have shown that children with ADHD show less adherence to healthy eating patterns than children without this disorder. Moreover, dietary patterns may influence the risk of ADHD, since processed and junk food have been positively associated with it. On the other hand, healthy eating patterns, such as the Mediterranean diet and vegetarian diets, filled with vegetables and fruits and rich in micronutrients, have been inversely associated with the risk of ADHD. A number of large-scale studies and meta-analyses of cohort studies have linked the risk for ADHD to nutrient deficiencies. These include lower overall blood levels of ferritin, and omega-3 polyunsaturated fatty acids in individuals with ADHD, compared with non-ADHD controls and the association of lower maternal vitamin D levels with increased risk of ADHD in offspring. For some people (even without ADHD) attention and concentration might be affected by sensitivities to certain foods (e.g. sugar and artificial food colourings) which can exacerbate ADHD.[24]

- **Gut microbiome:** The term "gut–brain axis" has been coined to describe the bidirectional communication between the gut microbiome and the central nervous system. The current picture of the role played by the gut microbiome in ADHD is still unclear however some studies show that people with ADHD have a different composition of bacteria and other microorganisms in their gut than people who do not have the condition. It has been proposed that gut microbiota may affect neurobiology by directly or indirectly altering the levels of neurotransmitters, including dopamine and serotonin, which fuel brain regions that mediate cognition and emotion. Although serotonin is also produced in the brain, up to 90% of serotonin is synthesised in the gut. Connections between the gut microbiome and neurotransmitters and neuropsychiatric disorders are already well-established.[25,26]
- **Autoimmunity:** Pediatric Autoimmune Neuropsychiatric Disorder Stretococcal (PANDAS) is associated with the body's immune reaction to *streptococcus* infection. Children with PANDAS are initially diagnosed with Obsessive Compulsive disorder or a tic disorder. In addition to OCD or tics these children may have ADHD that is new or dramatically worse.[27]

How To Get The Correct Diagnosis

A thorough assessment by an appropriately trained and credentialled clinician is needed to make a diagnosis of ADHD. A person with ADHD may have one or more other neurodevelopmental, mental health, or medical conditions that make diagnosis and treatment more complex. Careful assessment of possible co-occurring or alternative conditions is required. This involves interviews, taking a



Lion's Mane
(Hericium erinaceus)

detailed history of the person's development, physical health and mental health, and careful consideration of other information such as previous records, prior school reports and family accounts. This is done first via a GP, then by a psychiatrist or paediatrician. In adulthood, ADHD is assessed by a team of professionals with training and expertise in ADHD, with their findings put together to make a diagnosis.[28]

There are no physical tests, such as blood tests, which can be used to diagnose ADHD. The two main diagnostic systems used internationally, and in Australia, to diagnose ADHD are the Diagnostic and Statistical Manual of Mental Disorders, currently in its fifth Edition (DSM-5) and the International Classification of Diseases 11th Edition (ICD-11). Both the DSM-5 and ICD-11 classifications include three presentations (or subtypes) of ADHD with different combinations of symptoms:

- predominately hyperactive-impulsive (displaying more overt, disruptive symptoms)
- predominantly inattentive (displaying more forgetful, dreamy symptoms)
- combined inattentive/hyperactive-impulsive.

Many people still use the term attention deficit disorder (ADD), which was discontinued in 1987 by the American Psychological Association, to describe the predominantly inattentive ADHD subtype.[29]

Upon diagnosis, information and support should be provided to the person, their parents/carers, including explanation of available treatment options and information about how they can minimise symptoms impacting on the enjoyment of their lives and maximise their strengths. Information should be provided about the possible negative impacts of receiving a diagnosis, including stigma and labelling, the possible increased risk of self-medicating, increased risks of substance misuse, impacts on driving when ADHD is not treated and possible impacts on relationships.[30]

Everyone presents slightly differently. DSM-5 provides a list of nine inattentive and nine hyperactive-impulsive symptoms. For children, six of the nine symptoms must be present to reach the threshold for diagnosis. For people aged over 17 years, only five symptoms are required. Adult-specific descriptions of symptoms are provided in the DSM-5. The ICD-11 provides fewer specific requirements regarding symptom thresholds allowing for more flexibility and clinical judgement. DSM-5 and ICD-11 both require difficulties to have been present for at least six months and to have occurred in more than one setting (such as home, school, work, with friends or relatives), with onset before age 12 years, but both note that some individuals may not come to clinical attention until after this age, and often this is not until adulthood or later in adulthood for some. The sub-type may change over time.[31,32]

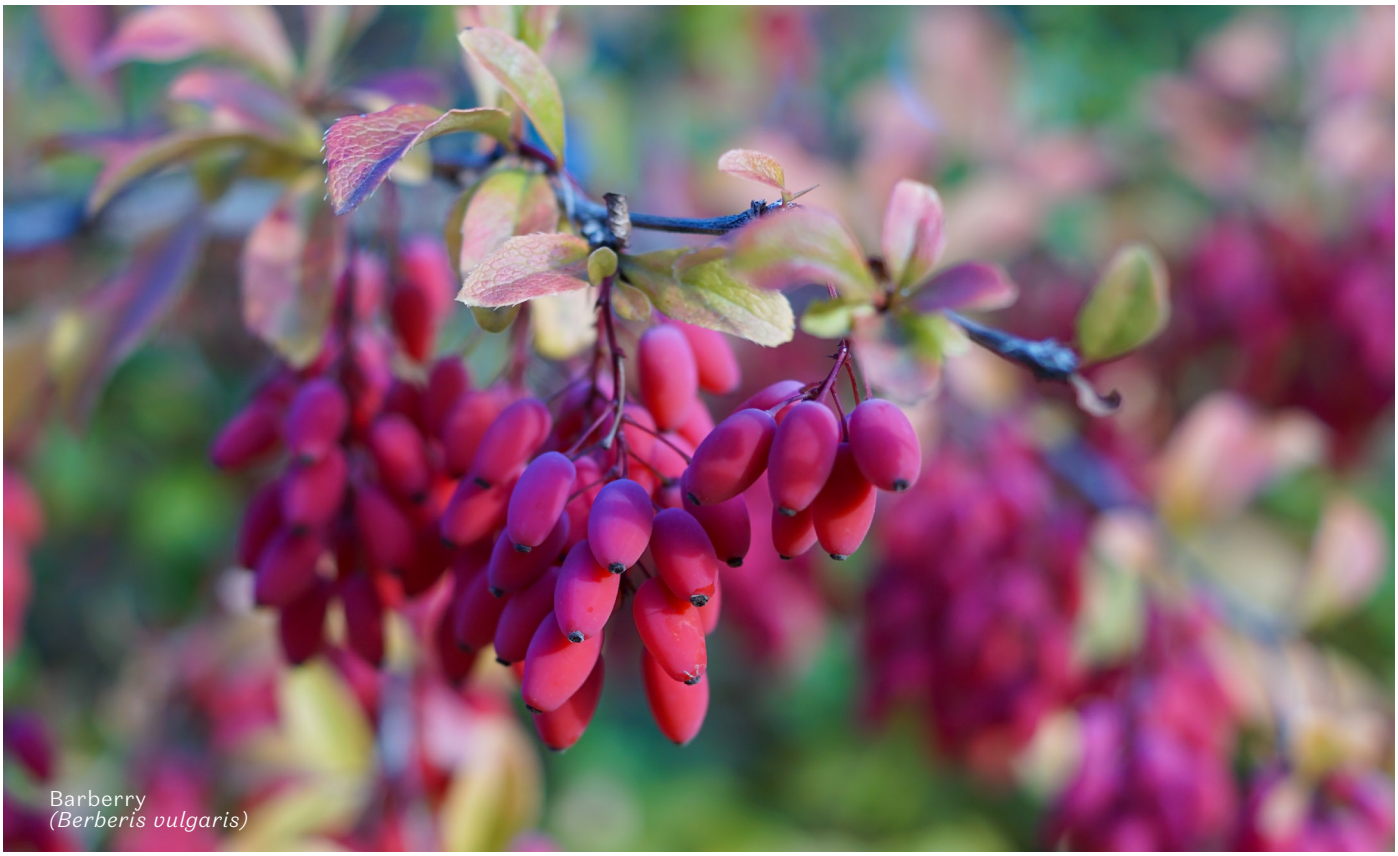
Careful assessment of possible co-occurring or alternative conditions is required. Some medical disorders can be present and have symptoms and signs similar to those of ADHD, such as obstructive sleep apnoea/sleep deprivation. Several medications can also produce symptoms similar to those of ADHD, for example, anti-epileptics such as Keppra. Clinicians should conduct a comprehensive assessment (including history and examination) to identify any possible differential medical causes for ADHD. For example, difficulties with concentration and focusing attention that are associated with a major depressive episode are usually limited in duration, whereas attention problems due to ADHD are often ongoing.[33]

Conventional Treatment & Prevention

Clinicians should offer multimodal treatment and support. Current treatment options principally include a pharmaceutical component, a behavioural component and a psychosocial component separately or in combination. After diagnostic assessment clinicians will provide the person with ADHD, and their carers, with education and information on the causes and potential consequences of ADHD and evidence-based treatments, in a way that instils hope and motivation and focuses on strengths. Pharmacological treatment is most effective in reducing core ADHD symptoms and non-pharmacological treatments provide additional support to minimise the daily impact of ADHD symptoms and associated difficulties. As a child with ADHD grows up, their clinicians should plan for a smooth move from health services for children/adolescents to adult health services.[34]

There are a range of treatments which show good outcomes for adult ADHD. These include medication, cognitive-behavioural therapy for adult ADHD and couples counselling for those experiencing relationship difficulties. Non-pharmacological interventions can improve broader aspects of functioning for people with ADHD and/or their families. Guidance will be offered on lifestyle changes, such as promoting a healthy and active lifestyle, including considering sleep patterns, as these have the potential to improve day-to-day functioning. Parent/family training should be offered to parents/carers of children and adolescents with ADHD to support the functioning of the family and child with ADHD. Cognitive-behavioural interventions should be offered to adolescents and adults with ADHD. Making changes in a person's school, university or workplace can help the person with ADHD succeed. This can include physical changes or educating other people on how to most helpfully interact with the person with ADHD.[35]

Before prescribing medication to help people treat their ADHD symptoms, clinicians should carefully assess the person's general health and explain all medication options including potential benefits and side effects. Clinicians and people with ADHD (or their parents/carers) should make treatment decisions together. Choice and dosage of medication must be optimised for each person. For children, adolescents and adults, the first medication should be stimulants (methylphenidate (Ritalin), dexamfetamine or lisdexamfetamine), unless the person is unable to take these medications due to other health problems. Clinicians should explain that medication reduces symptoms but rarely reduces them completely, therefore, it is important to have realistic expectations and ensure medication is only one part of a person's treatment and support plan. If stimulants are not effective for the person, or they are unable to use these medications, other medications (for example, atomoxetine or guanfacine) can be tried. Evidence shows the clinically important differences in sleep disturbance, decreased appetite and weight changes in people taking ADHD medication. Ongoing monitoring, such as the person's heart rate, blood pressure and height and weight in children, is required to assess whether the medication is effective, and whether there are any unwanted effects. Sometimes it is helpful to adjust the timing



Barberry
(Berberis vulgaris)

of medications and meals or snacks, or planning a break in treatment to help a child's growth to catch up. Sometimes a person with ADHD, in discussion with their clinician, will decide to stop a medication for a short time. This needs careful planning. For some medications the dose must be carefully decreased over time to avoid health harms. Using medication in combination with psychological strategies is likely to lead to the best outcomes. Like with most psychotropic medications, treatment consideration needs to be carefully weighed with regards to potential adverse outcomes. For stimulants there is also concern for diversion and misuse of the medication for performance enhancement rather than for treatment.[36,37]

A yearly review with an ADHD specialist is recommended including a comprehensive assessment that revisits the areas discussed when starting treatment and evaluates the effect of current treatment. This helps ensure that decisions around continuing or stopping treatment are fully informed. Clinicians should be aware that the symptoms of ADHD can reduce adherence, for example, forgetting to collect medication and/or organise review appointments to ensure uninterrupted supply of prescriptions.[38]

'It can be seen as a neurodevelopmental condition. I think its best seen as a variant of normal human development, and in a world of neurotypicals, a person with ADHD is more likely to stand out.' It is also often seen as a condition that needs to be managed, but Professor Kramer says ADHD may come with advantages, depending on the context. 'Typically, [people with ADHD] do better in outdoors careers with lots of variety,' he said. 'If you're a bushman in the Kalahari, you are probably better at it than non-ADHD people. 'They also flourish in marketing, sales, as chefs, primary school teachers and in emergency departments. They will often thrive in a crisis. 'My point is that it can confer survival advantages, which is why those characteristics continue in humans.'[39]

INTERVENTION	Nootropics, cognitive enhancers	Nervines, adaptogens, anxiolytics, sedatives	Digestive stimulants, antimicrobials, liver support	Antioxidants, anti-inflammatories	Immune support
Bacopa	✓	✓		✓	
Barberry			✓	✓	✓
Chamomile		✓	✓	✓	
Ginkgo	✓	✓	✓	✓	
Holy Basil		✓	✓	✓	✓
Korean Ginseng		✓		✓	✓
Lion's Mane	✓	✓	✓	✓	✓
Maritime Pine			✓	✓	
Olive Leaves			✓	✓	
Rosemary	✓	✓	✓	✓	
Saffron	✓	✓	✓	✓	
Sage	✓	✓	✓	✓	

Natural Therapies For Treatment & Prevention

The holistic treatment of ADHD requires an individualised approach that works alongside the person meeting them wherever they are at. This means going back to the naturopathic principle of treat the whole person (Tolle Totum). Naturopathic medicine recognises the harmonious functioning of all aspects of the individual as being essential to health. The multifactorial nature of health and disease requires a personalised and comprehensive approach to diagnosis and treatment.[40]

Take a complete history to determine possible relationships between diet, food allergies (including food colourings or additives) and ADHD symptoms. Document conventional and complementary and alternative medicine treatments including doses, durations and brands of conventional medications and natural products that have been tried, including the patient's response and adverse effects. Appropriate naturopathic treatment strategies for ADHD will depend on the subtype of ADHD that is being addressed, symptom severity, previous treatment outcomes, adverse effect issues, psychiatric or medical comorbidities and patient preferences. Develop an integrative treatment plan with the patient (or parent if the patient is younger than 18), including dietary changes if appropriate, behavioural therapy and psychosocial interventions and the use of select nutrients (such as essential fatty acids). Monitor symptoms and modify the treatment plan until consistent improvement is achieved.[41]

The natural approach takes time and commitment, but if the person is ready to put in the work then it is likely they can get an excellent result. Experienced practitioners suggest that ADHD patients will usually come to clinic because they are in overwhelm. Depending on the presentation of the problem they might need building up or calming down. Treatment will not be static, but will change, and the practitioner's job is to help their patient find the equilibrium.[42]

Some children and adolescents with ADHD cannot tolerate the side effects of psychostimulant medications. Furthermore, growing concerns about overprescribing and the risks of long-term exposure to these medications such as dependence, diversion and abuse discourages parents to continue the use of them. In recent years, the use of medicinal herbs has been considered an adjuvant to conventional pharmaceuticals in the management and improvement of ADHD symptoms. The herbal treatment of ADHD will need to be implemented alongside the relevant dietary and lifestyle changes such as eliminating junk food and replacing with nutritious whole foods diet, parental or caregiver support in how to implement and sustain this, as well as relevant emotional support for child and caregivers.[43]

Be conscious of the patient's capacity for change, and prioritise the most important thing, as compliance can difficult if they are not small and specific, so keep it simple. Work with the patient and work within their current schedule offering practical solutions. Liquid herbs are better for adults and herbs are not a natural substitute for Ritalin.[44]

The naturopathic treatment of ADHD aims to:

- Improve cognitive function and learning outcomes
- Improve quality of sleep
- Improve energy levels while reducing hyperactivity
- Minimise medications
- Adrenal support
- Promoting parasympathetic nervous system response
- Balance immune function.
- Repair gastrointestinal integrity/hyperpermeability
- Resolve gastrointestinal dysbiosis: look for signs of inflammation and reduced microbiome
- Improve nutritional intake
- Normalise appetite
- Provide antioxidant and liver support[45]

Diet

Paying attention to a balanced nutritious whole-foods diet, with a broad range of micronutrients,

is likely to be beneficial in managing symptoms of ADHD or general hyperactivity. Emphasise a solid, nutrient dense, traditional wholefoods diet with ample good fats and protein and some fermented foods. Dietary changes should be made one step at a time, only introducing a new change when the previous one has become habit. This ensures changes are manageable and sustainable, becoming part of the lifestyle.

- Ensure regular meals and a low glycaemic diet to avoid hypoglycaemia and check that children are eating during the school day.
- Address allergies and sensitivities: Some individuals with ADHD may be sensitive to certain foods or additives such as synthetic food colours, flavours and preservatives. Elimination or restrictive diets involve removing potential trigger foods and gradually reintroducing them to identify any adverse effects on behaviour.
- Reducing or cutting out refined sugar and junk foods for one month initially may be beneficial to establish a change in behaviour.
- Stay hydrated with filtered water
- Omega 3 fatty acids (wild salmon, flaxseeds and walnuts) are crucially important. Zinc, multivitamin and mineral supplement, magnesium and B6 help regulate the nervous system and neuroinflammation.
- Consuming foods rich in probiotics (like yoghurt, kefir and fermented vegetables) and prebiotics (such as garlic, onions and bananas) can support gut health.
- Practice mindful eating: Paying attention to eating habits, such as eating slowly and chewing thoroughly, can improve digestion and nutrient absorption.
- Avoid processed foods and drinks, refined carbohydrates, high sugar intake, low fat foods, industrial seed oils, caffeine, artificial food additives, colours, preservatives.

Lifestyle

Exercise

A growing body of literature indicates a potential role for physical exercise in the treatment of ADHD. Suggested effects include the reduction of ADHD core symptoms, promote dopamine release as well as improvements in executive functions. In children with ADHD it has been shown to improve attention and decrease aggression and impulsiveness. For children, including those with ADHD, the overall daily time spent being active is more important than participating in purposeful exercise. The general recommendation is to get 60 minutes of daily physical activity for children over the age of 6. Some examples of how a child can get 60 minutes of physical activity per day include:

- going for a bike ride with family
- playing basketball, soccer, baseball, tennis, hockey or other sports
- playing a game of hide and seek with friends
- jumping rope or playing hopscotch
- going for a hike or scenic walk with family
- following an exercise video or participating in group exercise for kids

The 60 minutes of physical activity can comprise a combination of various activities throughout the day. Adults have a wide variety of exercise options to choose from, all of which can positively affect their ability to manage their ADHD symptoms. A focus on portioning out a part of the day for exercise will help promote consistency.[46,47]

Sleep

People with ADHD are more likely to develop sleep disorders as it impairs the regulation of brain activity and often affects sleep patterns. ADHD can also increase the time it takes to fall asleep, the chance of sleep disruptions and the risk of sleep deprivation with many ADHD symptoms being similar to symptoms of sleep deprivation. People may feel exhausted but struggle to get asleep, known as being tired but wired. While medication can improve symptoms of ADHD, behavioral changes and a nightly routine can help individuals sleep better. For children, adolescents and adults with ADHD, a consistent bedtime routine and healthy sleep hygiene practices can help reinforce the connection between bed and sleep. Try making gradual changes and note where improvements are

seen to develop a system that works. People with ADHD also frequently report having trouble waking up in the morning. For help getting out of bed, try using light therapy or plan something enjoyable for when they get out of bed, such as exercise or a nice breakfast.

Some tips include:

- Cutting out sugar, caffeine and alcohol intake before bedtime
- Avoiding screen time for an hour before bed
- Avoid stimulating activities and projects that require hyperfocusing in the evening
- Making the bed a stress-free zone reserved for sleep and intimacy
- Getting enough exercise and sunlight during the day
- Developing an enjoyable bedtime routine such as rereading a favorite book, spending time with pets or taking a warm bath
- Keeping the bedroom dark, cool and quiet, using a white noise machine if necessary to block out intrusive noises
- Going to bed and waking up at the same time every day, choosing a time that is realistic to get the recommended sleep for the patient's age group
- Using a weighted blanket[48]

Improve attention and concentration

- Decrease distractions. Set up the workspace to be free from distraction such as away from the door (where people come and go) or window (and distractions outside), and free from clutter, electronic media and other distractions.
- Get organised. Use time management and organisational strategies to streamline the day. To help get more organised patients can set goals, write to-do lists and use these to plan and prioritise tasks for the day, use a diary and set reminders for jobs that need doing grouping similar tasks that can be done together.
- Break tasks down into smaller chunks. Smaller tasks are easier to complete, easier to organise and are less overwhelming. They are also more easily done while the mind is fresh and before concentration wanes. Include breaks in activities and tasks. Breaks after work is completed can help to refocus on the next task.
- Use problem-solving. Effective problem-solving includes defining a problem the patient wants to work on, brainstorming solutions, selecting a solution and trying it out, and reviewing the outcome.[49]

Mindset/Stress release

Research has found that ADHD, particularly inattentive-type ADHD, is linked to increased perceived stress. While ADHD symptoms can increase stress, stress may also worsen ADHD symptoms. Creating and maintaining routines and systems can also help to minimise stress in the environment by limiting decisions that need to be made and helping to automate daily life. Coping strategies for stress relief in ADHD include exercise, meditation, breathing exercises, journaling and self-care including hobbies or activities that help relaxation, taking a hot bubble bath, visiting the farmer's market or reading a book. Neurofeedback therapy is an alternative treatment option that some experts believe can reduce ADHD symptoms. However, there are mixed views on how effective neurofeedback is for ADHD. It uses an electroencephalogram (EEG), a noninvasive device that measures electrical activity in the brain to help the patient learn to monitor and regulate their brain activity. The aim is to change their behavior by training their brain.[50,51]

Environment

ADHD may result from 'attention fatigue' caused by limited contact with green spaces during early childhood and there are small studies which suggest that ADHD children who spend more time playing outdoors in natural environments may experience fewer and less severe symptoms. The most important thing that can be done to reduce the risk of toxic effects of organophosphates and phthalates is avoidance. The primary source of organophosphate is pesticides. Although it may be impossible to completely avoid pesticide exposure, purchasing fruits and vegetables that are organically grown can help to reduce total

toxic exposure. The Environmental Working Group releases a list including the "dirty dozen" and "clean 15" ranking the fruits and vegetables with the highest and lowest pesticide residues (https://www.ewg.org/foodnews/dirty-dozen.php). Using this as a guide can help to make decisions on how to best spend money on organic produce. When it is not possible to purchase organic produce wash thoroughly and consider using a natural produce wash product. Making smart educated choices can help to minimise risk while ensuring optimal nutritional intake. To decrease phthalate exposure read the ingredients, be wary of product ingredient lists containing the word "fragrance" as it can often contain phthalates, plastics with recycling codes 3 and 7 are more likely to contain phthalates and avoid plastic water bottles and containers, especially for hot food. Healthy swap conventional personal care products and cleaning products to non-toxic alternatives. Minimise exposure to cigarette smoke.[53]

Family support

Behavioural management may be beneficial for the whole family in terms of finding strategies to help cope with the behaviours. Sharing constructive creative activities between parent and children such as painting, crafts, singing and story-telling can enforce positive behaviour and help build bonds between children and parents/caregivers.[54]

Potential Treatment Plans

Hyperactive - Impulsive ADHD	Bacopa	Chamomile	Sage	Barberry	Holy Basil
Inattentive ADHD	Ginkgo	Lion's Mane	Saffron	Rosemary	Sage
Inattentive/ Hyperactive - Impulsive ADHD	Korean Ginseng	Maritime Pine	Lion's Mane	Olive Leaves	Ginkgo
ADHD in children	Bacopa	Saffron	Korean Ginseng	Chamomile	Maritime Pine

Desired Herbal Actions and Potential Herbs Include:

Nootropics, cognitive enhancers

Nootropic herbs, also known as cognitive enhancers, smart drugs, brain boosters or memory enhancing drugs, are neuroprotective. They are used to improve the function of various cognitive abilities, such as cognition, memory, intelligence, motivation, attention and concentration, when they have become impaired in some manner. Nootropics may be used to combat health conditions that interfere with the process of learning, motor control and the maintenance of a healthy emotional state such as ADHD.

Herbs such as bacopa, ginkgo, gotu kola, lemon balm, lion's mane, rosemary, saffron, sage.

Nervines, adaptogens, anxiolytics, sedatives

To help dampen the sympathetic response promoting calm and restful sleep. To increase tolerance to stress, reduce feelings of anxiety which may be present and build immune function. Herbs such as astragalaus, bacopa, chamomile, ginkgo, gotu kola, Korean ginseng, holy basil, hops, lavender, lemon balm, lime flowers, liquorice, oats green, passion flower, rehmannia, rosemary, saffron, sage, St. John's wort, scullcap, valerian, vervain, withania. For children who are particularly tense and prone to temper tantrums and angry outbursts, chamomile, holy basil, lime flowers, liquorice and scullcap can be beneficial.

Digestive stimulants, antimicrobials, liver support

To provide liver support and stimulate secretion of digestive acids, to improve and repair digestion. Herbs such as andrographis, astragalus, barberry, calendula, cat's claw, chamomile, dandelion root, echinacea, ginkgo, holy basil, lemon balm, lion's mane, liquorice, maritime pine, olive leaves, rosemary, sage, St Mary's thistle, turmeric.

Antioxidants, anti-inflammatories

To provide protection and repair from oxidative damage to the liver, gastrointestinal tract and nervous system. Herbs such as andrographis, astragalus, bacopa, barberry, calendula, cat's claw, chamomile, dandelion root, echinacea, ginkgo, gotu kola, holy basil, Korean ginseng, lemon balm, lion's mane, liquorice, maritime pine, olive leaves, passion flower, rehmannia, rosemary, saffron, sage, St. John's wort, St. Mary's thistle, turmeric, withania.

Immune herbs

Balance immune function. Herbs such as andrographis, astragalaus, barberry, calendula, cat's claw, echinacea, holy basil, Korean ginseng, lion's mane, liquorice, rehmannia, turmeric, withania.

Ginkgo
(Ginkgo biloba)

Herbal Support Could Include:

HERB NAME	DESCRIPTION	ACTIONS
Bacopa *(Bacopa monnieri)* 	Research has shown that bacopa may help reduce ADHD symptoms. One study in 31 children aged six to 12 years found that taking 225mg of bacopa extract daily for six months significantly reduced ADHD symptoms, such as restlessness, poor self-control, inattention and impulsivity in 85% of the children. A more recent study of 112 males aged six to 14 years with ADHD found cognitive, mood, and sleep benefits among those taking bacopa, but saw no effect on behavioral outcomes. Although some findings are promising, more large-scale studies examining the effects of bacopa on ADHD are needed.[55,56]	Nootropic Anxiolytic Sedative Nervine Tonic Adaptogen Antioxidant Anti-inflammatory
Barberry *(Berberis vulgaris)* 	Barberry is used as a bitter liver tonic to improve digestion and conditions associated with inflammatory processes and a lack of appetite. Constituents in barberry may be useful for addressing several intestinal microbial overgrowths.[57,58]	Antimicrobial Liver Support Anti-inflammatory Antioxidant Immunomodulator
Chamomile *(Matricaria chamomilla)* 	There is some evidence to suggest that chamomile may be helpful in managing hyperactive traits of ADHD. A small study found that children with ADHD who received chamomile extract for four weeks had improvements in hyperactivity and “conduct problems”, compared to a control group. However, the study was small and more research is needed to confirm these findings.[59]	Anti-inflammatory Antioxidant Antimicrobial Mild Sedative Relaxing Nervine Liver Support
Ginkgo *(Ginkgo biloba)* 	Various studies and clinical trials show that ginkgo, especially when combined with standard ADHD medications like methylphenidate, can lead to a significant reduction in ADHD symptoms, notably inattention.[60]	Antioxidant Anxiolytic Nootropic Anti-inflammatory Antimicrobial

Herbal Support Could Include: (Cont.)

HERB NAME	DESCRIPTION	ACTIONS
Holy Basil *(Ocimum tenuiflorum)* 	The emerging science on holy basil, which reinforces ancient Ayurvedic wisdom, suggests that it is a tonic for the body, mind and spirit that offers solutions to many modern-day health problems. Regular, ongoing, daily consumption of holy basil is recommended to prevent disease, assist in adaptation to the stresses of daily life and to promote general health, wellbeing and longevity. It can be considered adaptogenic through nurturing and nourishing the body, mind and spirit while fostering a sense of relaxation and wellbeing. It has a calming effect that leads to clarity of thought, along with a more relaxed and calm disposition. The cognitive and memory-enhancing properties of holy basil differ from those of caffeine-containing beverages such as coffee and tea, which heightens arousal and may cause physical and mental agitation.[61]	Adaptogen Relaxing Nervine Anxiolytic Antioxidant Immune Modulator Anti-inflammatory Antimicrobial Liver Support Digestive Stimulant
Korean Ginseng *(Panax ginseng)* 	Korean ginseng has shown some potential to help calm symptoms of ADHD. In a study involving 18 children, aged between six and 14 years old who were diagnosed with ADHD, researchers reported improvements in anxiety, personality and social functioning. The children were given 2000mg of Korean ginseng for eight weeks. The effects of Korean ginseng compared to a placebo were evaluated on 70 ADHD patients aged between six and 15 years old. In the intervention group, 33 patients were given 1g of Korean ginseng twice per day. After eight weeks a decrease in inattention and hyperactivity scores was recorded in the treatment group compared with the control group. In another study, 40 children with ADHD, aged between six and 12, were given daily supplements containing omega-3 and Korean ginseng. Results of the study suggest that the combination of the two ingredients may help improve memory and attention in children with ADHD.[62,63,64]	Adaptogen Immunostimulant Anti-inflammatory Antioxidant

Herbal Support Could Include: (Cont.)

HERB NAME	DESCRIPTION	ACTIONS
Lion's Mane *(Hericium erinaceus)* 	Some people use lion's mane for ADHD because of its potential to protect and enhance brain function. Recent studies suggest that lion's mane may have potential benefits for focus and attention. One study conducted on healthy adults found that taking lion's mane extract improved cognitive function (including memory, attention and creativity), including attention and focus.[65]	Adaptogen Nervine Nootropic Anti-inflammatory Antimicrobial Antioxidant Liver Support Immunomodulant
Maritime Pine *(Pinus pinaster)* 	A study involving 20 children with ADHD found that supplementing with maritime pine bark extract significantly decreased inattention, impulsivity and hyperactivity.[66]	Antioxidant Anti-inflammatory Antimicrobial
Olive Leaves *(Olea europaea)* 	Olive leaves are high in antioxidants and research suggests this could help support the immune system and general wellbeing by providing protection and repair from oxidative damage to the liver, gastrointestinal tract and nervous system.[67,68]	Antioxidant Liver Support Antimicrobial

Herbal Support Could Include: (Cont.)

HERB NAME	DESCRIPTION	ACTIONS
Rosemary *(Rosmarinus officinalis)* 	Rosemary has a long history for stimulating the nervous system and enhancing cerebral circulation and could fight oxidative stress and inflammation. It stimulates cognitive function and supports phase 2 liver detoxification, relevant for many ADHD children, although for some children rosemary may be too stimulating.[69]	Antioxidant Liver Support Antimicrobial Nervine Stimulant Nervinetonic Nootropic
Saffron *(Crocus sativus)* 	A growing body of research suggests that saffron may reduce some of the symptoms and help improve focus in people with ADHD. In 2019, a landmark pilot study brought saffron versus methylphenidate (Ritalin) to the attention of the ADHD community. Researchers found that 20 to 30mg of saffron a day for a period of six weeks was comparable to treatment with methylphenidate for symptoms of both inattention and hyperactivity. Since that time, more research has emerged supporting the benefits of saffron for ADHD. A 2022 study found saffron was more effective than methylphenidate for reducing ADHD symptoms of hyperactivity, though methylphenidate was more effective for inattention symptoms. Both therapies improved the number of hours slept among participants, which is a common challenge in ADHD, but only saffron helped with falling asleep. When saffron and methylphenidate were used together in a 2021 clinical trial, the combination was found to be more effective than the use of methylphenidate alone. These findings were supported by a 2022 clinical trial, which also found that saffron and methylphenidate were a superior combination. Despite these promising findings, more large-scale research on saffron for ADHD is needed.[70,71,72,73]	Nervine Tonic Anxiolytic Adaptogen (TCM) Cognitive Enhancer Sedative Antioxidant Anti-inflammatory

Herbal Support Could Include: (Cont.)

HERB NAME	DESCRIPTION	ACTIONS
Sage *(Salvia officinalis)* 	Sage might help with chemical imbalances in the brain that cause problems with memory and thinking skills. Sage is cholinergic which means it affects the neurotransmitter acetylcholine, or the components of the nervous system that use acetylcholine, which is a facilitator of memory formation. Cognitive functions in the brain are improved by increasing the availability of this neurotransmitter.[74]	Cognitive Enhancing Anxiolytic Antioxidant Antimicrobial

Holy Basil
(Ocimum tenuiflorum)

Conclusion

ADHD is not a new phenomenon, however its prevalence has increased significantly in recent years. Given changing diagnostic criteria and increasing awareness of the disorder in marginalised populations, especially individuals of colour and females, this finding is not surprising. The general public has become increasingly more aware of ADHD through the media and social media. People are more likely to bring up their concerns to a physician, which in turn might prompt more numbers of people to be diagnosed. While some may argue that the increase is concerning and due to intentional feigning of symptoms in order to gain access to stimulant medication or test accommodations, the evidence suggests these groups have a negligible impact on diagnostic trends. In fact focus on the idea of "overdiagnosis" may instead be harmful, create additional barriers to care, and add to the stigma towards their requests for help. It is important, instead, to approach patients holistically, and with an understanding of both the risks of treatment and undertreatment in mind. For those who have been struggling with unrecognised ADHD, there are significant impacts to mental health, social life and work life. Thoughtful diagnosis and subsequent treatment can make all the difference. There has been a shift towards neurodiversity affirming approaches to managing ADHD in both children and adults. These approaches prioritise a person-centered approach which recognises and celebrates the unique strengths, challenges and perspectives of individuals with ADHD, rather than their deficits. A naturopath's approach to managing ADHD focuses on managing symptoms and comorbidities, while addressing possible underlying drivers. With appropriate interventions and tailored strategies, including herbal medicine, nutrition, exercise and behavioural therapy, people with ADHD can learn to manage these difficulties and lead successful lives.[75,76]

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