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Review

Attention-deficit/hyperactivity disorder (ADHD) and Valerian – A comprehensive review.

Perturbação Hiperatividade e Défice de Atenção (PHDA) e Valeriana – Uma revisão abrangente.

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Abstract: Attention-deficit/hyperactivity disorder (ADHD) is a prevalent neurodevelopmental condition affecting children and adolescents. While ADHD symptoms may ameliorate during adolescence, the disorder can endure into adulthood, resulting in a diminished quality of life. Various treatments for ADHD exist, encompassing behavioural therapy, psychosocial interventions, and medications with associated side effects—prompting concern among parents who often turn to complementary and alternative medicine (CAM). CAM approaches include dietary adjustments, nutritional supplements, and herbal medicine. This research provides an overview of CAM methods for managing ADHD, with a focus on Traditional Chinese Medicine (TCM) and phytotherapy, specifically valerian root extract. Valerian root extract is renowned for its anxiolytic effects and has demonstrated, in some studies, efficacy in alleviating ADHD symptoms such as impulsivity, inattention, and hyperactivity. Nevertheless, further research is imperative to ascertain the long-term effectiveness and safety of valerian root extract as a treatment for ADHD, thereby ensuring its appropriateness in clinical contexts.

Keywords: Attention-deficit/hyperactivity disorder, valerian root extract, complementary and alternative medicine, treatment, Traditional Chinese Medicine.

Resumo: A Perturbação de Hiperatividade e Défice de Atenção (PHDA) é uma condição prevalente do neurodesenvolvimento que afeta crianças e adolescentes. Embora os sintomas da PHDA possam melhorar durante a adolescência, a PHDA pode piorar na idade adulta, resultando na diminuição da qualidade de vida. Existem vários tratamentos para a PHDA, abrangendo terapia comportamental, intervenções psicossociais e medicamentos com efeitos laterais associados – gerando preocupação entre os pais que muitas vezes recorrem à medicina complementar e alternativa (MCA). As abordagens MCA incluem ajustes dietéticos, suplementos nutricionais e fitoterapia. Esta pesquisa fornece uma visão geral dos métodos CAM no tratamento da PHDA, com foco na Medicina Tradicional Chinesa (MTC) e na fitoterapia, especificamente no extrato de raiz de valeriana. O extrato de raiz de valeriana é conhecido pelos seus efeitos ansiolíticos e demonstrou, em alguns estudos, eficácia no alívio dos sintomas de PHDA, como impulsividade, desatenção e hiperatividade. No entanto, mais pesquisas são imperativas para determinar a eficácia e segurança a longo prazo do extrato de raiz de valeriana como tratamento para a PHDA, garantindo assim o seu uso adequado em contextos clínicos.

Palavras-chave: Perturbação de Hiperatividade e Défice de Atenção, extrato de raiz de valeriana, medicina complementar e alternativa, tratamento, Medicina Tradicional Chinesa.

1. Background

ADHD stands as one of the prevalent neurodevelopmental conditions among children and adolescents [1-3]. The prevalence rates of ADHD vary based on diagnostic criteria, the demographic under study, and the diagnostic resources employed. However, it is approximated that approximately 5-7% of school-aged children and 2-5% of adults globally are affected by ADHD [4,5].

The symptoms of ADHD typically manifest during preschool or early childhood, with a median onset age of 7 years 6. While many individuals experience symptom improvement during adolescence, ADHD can persist into adulthood [6-8].

This psychiatric condition, originating in childhood, holds significant importance in mental health [1,4,7,9-11]. Those with ADHD often present with a spectrum of psychiatric comorbidities, including learning disorders, sleep disorders, oppositional defiant disorder, anxiety disorders, intellectual disabilities, language disorders, mood disorders, social functioning challenges, conduct disorders, familial and peer relationships, self-esteem issues, and overall quality of life [10-13].

Given the growing interest in complementary and alternative therapies (CAM) for ADHD, this evidence-based review aims to evaluate the efficacy of phytotherapy, particularly valerian, in managing ADHD symptoms. By critically examining the available research and contextualizing these findings within the broader landscape of ADHD treatment, this review seeks to contribute to the development of informed clinical practice.

1. Diagnosis of ADHD

Based on the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V), ADHD can be categorized into three subtypes: hyperactive/impulsive type, inattentive type, and combined type, each exhibiting varied clinical manifestations and pathogenesis [6-8,14]. Attention deficit with hyperactivity and impulsiveness is more prevalent among boys, whereas girls are more prone to the inattentive type of the disorder [5,8,9,11].

The diagnosis of ADHD is established according to the most recent edition of the DSM-V, characterized by an onset of symptoms before the age of 12 and consistent observation of a specific pattern of behaviour, including the following criteria: Persistence of symptoms for at least 6 months; Manifestation of symptoms in multiple settings (e.g., home, school, work, social environments); Presence of patterns of inattention and/or hyperactivity-impulsivity (with at least six symptoms before the age of 17 and five symptoms at age 17 and older); Symptoms are deemed inappropriate for the individual's developmental stage and disrupt age-appropriate functioning in academic, social, or occupational contexts; Symptoms are not better explained by another mental disorder (such as mood disorders, anxiety disorders, dissociative disorders, or personality disorders) [5,8].

ADHD is acknowledged as a multifaceted and diverse disorder, with its exact causes still not completely understood [7,8,13,15]. Alongside genetic predispositions, factors such as nutrition, biochemistry, environment, and social influences play significant roles [7,8,13,15]. Furthermore, there exists compelling evidence regarding structural and functional disparities within the brains of children diagnosed with ADHD [2,8,15,16].

The familial inclination towards ADHD has long been recognized, with a notable prevalence among siblings and parents [2]. Recent research indicates that the combination of genetic predispositions with specific environmental factors further heightens the likelihood of the disorder's occurrence [2]. Millichap's 2008 study highlights early environmental contributors including maternal smoking and alcohol consumption, prematurity, hypoxemia, and thyroid dysfunction [2].

Studies have also established connections between ADHD and heightened rates of criminal behaviour and suicide [13].

Childhood medical conditions that have been associated with ADHD include meningitis, encephalitis, head injuries, and exposure to toxic substances such as lead and certain drugs [2]. Furthermore, variations in personality and temperament can influence the

manifestation of ADHD symptoms, including differences in emotional regulation, self-control, and attention span [2]. Additional factors linked to ADHD include lower socioeconomic status, parental discord, and familial instability [2].

Research has demonstrated that children diagnosed with ADHD often exhibit smaller brain volumes in regions such as the prefrontal cortex, the caudate nucleus, and the vermis of the cerebellum [2,11,13].

Comprehensive evaluations typically involve gathering information from parents, teachers, coaches, and other significant adults involved in the child's life [9].

Some commonly utilized rating scales for assessing ADHD symptoms across different age groups and informants include: "Conners Rating Scales Revised for 3- to 18-year-olds", "Conners-Wells Adolescent Self Report", "Attention Deficit Disorder Evaluation Scales for 4- to 18-year-olds", "Vanderbilt Assessment Scales for 6- to 12-year-olds" and "Brown Attention Deficit Disorder Scales for ages 3 through adulthood, with self-report available from age 8 onwards" [9,6,17].

These rating scales vary in their scoring methods, with some using age alone as the determining factor (e.g., the Vanderbilt Assessment Scales for 6- to 13-year-olds and the Conners-Wells Adolescent Self Report), while others consider both age and gender (Attention Deficit Disorder Evaluation Scales) [6,17]. Each scale provides information regarding the significance of the scores, such as indicating whether the results are very significant, concerning, or indicate a risk [6,17].

2. Conventional treatment of ADHD

Contemporary therapeutic modalities predominantly comprise a pharmaceutical constituent, a behavioural element, and a psychosocial component, either independently or in amalgamation [4,8,14].

The pharmaceutical component of the treatment plan tends to evoke apprehension among parents, often resulting in resistance and postponement of medication utilization [9]. Notably, Western medications, including methylphenidate (MPH) and atomoxetine, maintain prevalent usage in the treatment of ADHD. These medications have undergone rigorous evaluation, affirming their efficacy and association with favourable long-term outcomes and behavioural improvements [5,8,18,19].

Parents and practitioners may be tempted to initiate more than one treatment simultaneously with the intention of increasing the likelihood of effectiveness [20]. However, the concurrent use of multiple treatments may prove to be less effective than the carefully monitored application of a singular treatment [20]. Such simultaneous utilization can introduce interference, wherein one treatment may impede the potential benefits of another. Additionally, the administration of multiple treatments may pose challenges for parents, potentially compromising the precise implementation of each and resulting in a less-than-optimal trial of individual treatments [20]. Henceforth, excluding RDA/RDI multivitamins/minerals, which demonstrate compatibility with all other treatments, the authors advocate for the sequential initiation of singular treatment. It is recommended that each treatment be introduced one at a time, with a systematic monitoring of the child's response before considering the addition of further interventions [20].

Presently, stimulants, specifically methylphenidate (MPH) and dexamphetamine sulfate, constitute the primary pharmacological choice for the medical management of ADHD, with MPH being notably prevalent [18,19,21]. Nevertheless, these agents may give rise to various adverse effects, encompassing irritability, headaches, abdominal pain, loss of appetite, and growth retardation [18,19,21]. Additionally, it is imperative to acknowledge that the United States Food and Drug Administration has issued warnings pertaining to potential cardiovascular risks and the occurrence of sudden death associated with the administration of stimulants [21].

Stimulants may not be the most judicious choice for the management of ADHD, for a multitude of reasons [18,19,22]. Contraindications may be present owing to underlying cardiac conditions, the emergence of undesirable adverse effects, or parental opposition to their use [18,19].

Non-stimulant pharmacotherapeutic options, whether administered independently or in conjunction with stimulants, encompass a range of medications [5,6,8,18]. Notable among these are atomoxetine (Strattera), clonidine (Catapres, extended-release Kapvay), guanfacine (Tenex and extended-release Intuniv), bupropion (Wellbutrin), and other agents classified as antihypertensives and antidepressants [5,6,8,18].

Atomoxetine is the prevailing non-stimulant medication commonly prescribed for ADHD, exhibiting notable efficacy over placebo in augmenting capacities such as focus, organization, attention and emotion regulation, and short-term memory improvement in adults [8]. Adverse effects commonly associated with atomoxetine, a non-stimulant, include initial somnolence, gastrointestinal disturbances, and reduced appetite [1,22].

Intuniv is indicated for the management of ADHD, particularly when accompanied by aggressive and behavioural manifestations in addition to the core symptoms of ADHD [18]. Potential adverse effects associated with its use include bradycardia, diminished systolic and diastolic blood pressure, and syncope [18]. Transient adverse effects, including somnolence, sedation, and fatigue, generally resolve within the initial weeks of treatment [18].

3. Unconventional approaches for ADHD

4.1 Complementary Therapies

Patients opt for CAM modalities for diverse reasons, encompassing a preference for natural therapies, concerns regarding potential addiction to conventional mental health medications, alignment with their lifestyle choices, dissatisfaction with conventional treatment options, and financial constraints hindering access to conventional care [19,23,24]. In Europe, approximately 52% of all children utilize some form of CAM, often without the awareness of their attending paediatrician [1,14,25].

In accordance with syndrome differentiation, the identified deficiency in kidney essence and brain marrow indicates that the therapeutic approach for ADHD should involve supplementation of kidney essence and replenishment of marrow [11,13].

Researchers have documented that TCM offers certain advantages in the treatment of ADHD, characterized by reliable and stable effectiveness, a low incidence of side effects, and an absence of addiction-related issues [13,21]. It is noteworthy that, to date, none of these alternatives have undergone rigorous evaluation in randomized clinical trials to ascertain their efficacy in children with ADHD [13,21]. Nevertheless, it is pertinent to mention that some of these alternatives, such as valerian and lemon balm, are considered safe by the FDA [9,12,22,23].

Various widely embraced CAM treatment modalities encompass dietary modifications, nutritional supplements, and diverse phytotherapeutic techniques. Notably, herbal medicine stands out as a prominent facet within the realm of CAM [4,9,12-14].

In instances where a child presents a documented food allergy, the elimination of specific foods is considered a standard conventional treatment, rather than an alternative intervention [19,20]. Moreover, when specific nutritional deficiencies or insufficiencies are documented, such as those involving zinc, iron, magnesium, or vitamin D, the standard therapeutic approach involves the administration of specific supplements before contemplating alternative interventions [19,20,25].

Most studies suggest that sugar doesn't directly cause ADHD or significantly worsen its symptoms [8,24]. However, consuming simple sugars can lead to unstable blood sugar levels, affecting mental and emotional well-being [8]. Additionally, many processed sweets containing artificial colours and preservatives might contribute to behavioural problems [8,24].

Zinc, a crucial mineral involved in various biological functions, including central nervous system activities and brain glutamatergic neuron regulation, holds significance [23]. However, recommending zinc supplementation alongside standard ADHD treatments is not advised, unless a child exhibits confirmed zinc deficiency, warranting such supplementation as a standard approach [20,23,24]. While a specific study highlighted zinc sulfate's positive impact on hyperactivity, impulsiveness, and social skills in ADHD treatment, it did not notably affect attentional symptoms [8,23]. It is worth noting that this study took place in regions (Turkey, Iran) known for zinc-depleted soils, potentially leading to zinc-deficient diets, a factor less prevalent in the United States [23].

There is suggestive evidence indicating that children with ADHD might have lower levels of omega-3 fatty acids, and adjunctive supplementation could benefit those who don't respond well to standard treatments [8,26]. Three double-blind, placebo-controlled studies have shown nominal improvements in ADHD symptoms through omega-3 supplementation compared to a placebo in school-age children [23]. In summary, while omega-3 supplementation is safe and relatively simple, it should not be recommended as an alternative to proven conventional therapies [23].

A minimum of 30 to 60 minutes of daily aerobic activity is necessary for overall physical and mental health [8]. Cerebellar dysfunction has been linked to ADHD, sparking increased interest in activities that enhance balance and coordination, such as *yoga*, juggling, midline crossing exercises, Interactive Metronome, and Brain Gym [8]. Mindful exercises like *TaijiQuan* (TJQ) and yoga promote a focus on body movements, potentially enhancing concentration and enabling individuals to be more deliberate and less impulsive" [8].

While pharmacological intervention often plays a primary role in managing ADHD, educational, behavioural, and mental health strategies are equally vital [10,18].

Psychosocial interventions encompass counselling or behaviour management techniques [5]. The most frequently employed and scientifically supported intervention is behaviour modification training conducted by significant caregivers within the child's environment [5].

Individual and family therapy can aid parents and children in revitalizing emotional bonds, patience, and commitment to long-term ADHD treatment [5,9,18]. This education serves to demystify the condition and dispel prevalent misconceptions portrayed in popular media or within the community [5].

Behaviour modification strategies often assist children in gaining control over challenging aspects of their behaviour and mastering daily routines through organizational tactics [5,9]. Reward systems for desirable behaviours have also proven effective [9].

There is an abundance of possibilities and resources on the Internet that parents and children can choose from in order to reach success (see the handout ADHD Resources Available on the Internet located at www.nichq.org/resources/toolkit/) [9]. The website www.chadd.org has all of its informational materials also available in Spanish [9].

Examples of educational modifications include the following: Motor breaks (e.g., collecting student papers and taking messages to the office); Extended time for written assignments; Work in an alternative position/setting, such as standing or kneeling at a desk [18].

4.2. TCM and ADHD

Due to a pericardio-renal oscillation along with an impairment of liver function, predominantly hyperactive-impulsive ADHD (ADHD-HI) may arise [16,22]. The liver controls physiological activities, stores the ethereal soul, emotionally corresponds to anger and shouting, and an imbalance leads to elevated impulses with frenetic activity and excessive pathological motivation [16,22].

In the presence of renal yin deficiency there is a great chance that not only the cardiac and pericardiac but, the hepatic function is also affected [16,22]. The kidney stores the mind and essence, dominates bone, produces marrow, and then passes it on to the brain [22]. Kid-

ney deficiency may result in insufficiency of brain marrow and, thus, affects mental activities [22]. The renal orb acts as a provision for the behaviour of the hepatic orb and, the last one is an unyielding viscus, storing blood and governing tendons [22]. The liver controls activities, stores the ethereal soul and corresponds to anger in emotion and shouting in sound when decompensated [16,22].

TCM is a systematic healthcare system developed from clinical experience based on a scientific model of regulation [27]. TCM relies on unique theories and practices to treat diseases and enhance health [27]. These practices include Chinese herbal medicine and dietetics, acupuncture and moxibustion, and other non-medication therapies such as Chinese bodywork or manual therapy, known as "*Tuina*", and traditional biofeedback exercises, known as "*Qigong*" (QG) and "*TaijiQuan*" [27]. The integration of TCM in Western health systems and research requires a rational communicable theory, scientific proof of efficacy and safety, and quality control measures [27]. Understanding the structural concepts of the TCM language makes possible the parallelism to Western physiology, and the inherent rational use of the reflex therapeutic systems, anti-inflammatory mechanisms and mental training involved, for example, in acupuncture and QG [27].

Pediatric *Tuina* is a manual therapy that stimulates specific areas of the body or acupoints through various techniques such as pressing, kneading, squeezing, rotating, pinching, circular movements, and tapping [10]. This approach produces various stimuli on the skin, which are received by superficial sensory receptors and transmitted to the central nervous system, inducing a series of adaptive protective homeostatic activities [10].

According to Hernandez et al., Pediatric *Tuina* has been effective in increasing time spent on tasks, reducing fidgeting, improving mood and lowering hyperactivity scores in children with ADHD [28]. However, according to Chen et al., its success in improving children's attention has not been as significant [10].

Hernandez et al., state that TJQ and QG are an alternate nonpharmacological therapy for ADHD children because they reduce symptoms associated with stress, as well as anger and confusion, increase positive affect and improve mood [28].

In a study of Rodrigues et al., [16] the authors analyzed children with ADHD after interventions of TJQ classes [16]. Children have confessed to feeling more relaxed and calmer, during and after practising these modalities, and also acknowledge gaining better self-control, awakening more joy and happiness [16]. Teachers report improvements in behaviour, performance, and grades [16].

Contraindications for the TCM treatment of ADHD are a complicated issue [22]. TCM, if used inappropriately, can cause harmful effects [22]. TJQ, QG and Pediatric *Tuina* are considered relatively safe if appropriately used [16,22,29].

4.3. Scientific literature on Phytotherapy for ADHD

Several herbal preparations have demonstrated efficacy as monotherapy for ADHD in various studies [13,20]. Over-the-counter formulations designed for ADHD often incorporate herbs known for their sedative properties, including chamomile, kava, hops, valerian, lemon balm, and passion flower [5,14,19]. It is crucial to exercise caution when combining these preparations with standard pharmacologic sedatives due to the potential for increased effects [19,20].

Despite their use, none of these herbs has undergone rigorous clinical trials to establish their effectiveness in treating ADHD [5,12,20]. The variability in the quantity of active substrates present in herbal preparations poses a challenge in assessing their efficacy [5,19]. Additionally, herbal preparations lack standardization in the United States, because they are not regulated by the Food and Drug Administration [19].

In a double-blind, placebo-controlled trial, Pycnogenol (French maritime pine bark) demonstrated significant benefits, in ADHD symptoms, according to teacher ratings, though not corroborated by parent ratings [20]. Conversely, St. John's Wort did not show improvement relative to the placebo. In a comparison with methylphenidate through a double-blind randomized trial, children treated with *ginkgo biloba* exhibited significantly

less symptom improvement. However, a controlled trial comparing *ginkgo biloba* and placebo has yet to be completed [20].

In a study by Liang et al., the effects of a specific TCM herbal formula on ADHD and related behaviours were investigated [1]. The formula, containing granulized extracts equivalent to the following raw herbs: *Poriacocos, Rhizoma Acori Tatarinowii, Alpiniaeoxyphyllae Fructus, Polygalae Radix, Glycyrrhizae Radix et Rhizome, Radix Codonopsis, Triticum Aestivum*, and *Fructus Jujubae*, was administered for three months [1]. Results indicated a general reduction in ADHD symptoms and related psychopathology, improvements in functioning, and an absence of side effects, suggesting potential therapeutic benefits and safety for consumption in children with ADHD [1].

Yuan et al. [13] proposed that *Rehmanniae radix preparata* might be effective in treating ADHD by alleviating neurodevelopmental abnormalities, neuronal apoptosis, and energy metabolism failure. The literature review spanning 1999–2014 identified the 12 most frequently used herbs: *Rhizoma Acori Tatarinowii, Polygalae radix, Rehmanniae radix preparata, Os Draconis, Glycyrrhizae radix et rhizome, Poria cocos, Concha ostreae, Testudinis carapacis et plastri, Paeoniae Radix Alba, Schisandra chinensis, Corni fructus*, and *Dioscoreae Rhizoma*. Five of these herbs, like *Rehmanniae radix preparata*, *Testudinis carapacis et plastri*, *Schisandra chinensis*, *Corni fructus,* and *Dioscoreae Rhizoma*, are known for their benefits to kidney essence [13]. The analysis highlighted *Rehmanniae radix preparata* as the most frequently used herb. While evidence suggests its role in treating ADHD by alleviating cortical structural abnormalities, these herbs have not been incorporated into studies evaluating novel ADHD treatments [13].

4.4. Valeriana

4.4.1. *Scientific and traditional view*

Among the myriad species, approximately 170 in number, within the *Valeriana genus*, *Valeriana officinalis*, commonly referred to as common valerian, stands out as the predominantly cultivated variety for medicinal applications [30,31]. This hardy perennial plant, belonging to the *Caprifoliaceae* family, exhibits fragrant pink or white flowers that blossom during the summer [12,32,33]. Indigenous to Asia, North America, and Europe, it maintains a widespread presence across these continents [12,30,34].

The dried rhizome is characterized by a distinct odour that is currently regarded as offensive, whereas in the 16th century, it was considered fragrant [30]. During that historical period, the root found application as a perfume, being strategically placed among garments for aromatic purposes [30].

Valeriana officinalis is indicated for conditions typified by hyperexcitability of the nervous system [15]. The historical utilization of the plant's root, spanning several centuries, underscores its reputed anxiolytic and sedative-hypnotic properties [12,31,33,34]. Furthermore, Valerian is acknowledged for its antispasmodic, anticonvulsant, diuretic, anthelmintic, diaphoretic, emmenagogue, and antidepressant effects [31]. Moreover, it improves digestion and acts as a preventive measure against irritable bowel movements [12]. *Valeriana officinalis* demonstrates the inhibition of acute coronary insufficiency and vasopressin-induced arrhythmia, concurrently exhibiting modest positive inotropic and negative chronotropic effects [12].

Valerian is accessible in various formulations, encompassing tablets, capsules, liquid extracts, teas, and tinctures [31]. These products may comprise the whole herb, a proprietary blend, or may be combined with other herbal supplements, such as lemon balm, hops, skullcap, kava, and St. John's wort [15,31]. The European Scientific Cooperative on Phytotherapy endorses the use of valerian for children aged three to 12 years, under medical supervision [15].

On the whole, valerian demonstrates a relatively favourable tolerability profile, presenting minimal side effects [31,33]. Adverse reactions may include abdominal pain and as-

sociated gastrointestinal symptoms, agitation, excitability, drowsiness, sedation, headache, dizziness, and tachycardia [31,34]. Caution is recommended, and the use of valerian should be avoided within the two weeks preceding surgery, as well as by pregnant or breastfeeding women [34]. While Valerian is generally regarded as safe, it is noteworthy that no studies have specifically assessed its efficacy in children [15]. To date, controlled clinical trials examining its use in treating ADHD are lacking [15]. The acquisition of evidence substantiating the efficacy and safety of herbal supplements is crucial to mitigate adverse effects, avert potential herbal-drug interactions, and enhance patient outcomes [34].

In Chinese medicine, pharmacotherapy categorizes plants based on thermal properties, flavours, colours, smells, and the specific part of the plant studied. This classification is essential for selecting different therapeutic actions. In various herbal formulations, one plant plays a primary role, while others complement and reinforce the principle of balance within the formula [35].

When prescribing plants, attention is given to the specific symptoms of the patient, considering the balance necessary to restore wellness [35].

Valerian can be characterized as shown in Table 1.

Table 1. Valerian characterization according to TCM [36].

Chinese name	*Xie Cao (Pin-yin name), Jie Cao or Guang Ye Ba Di Ma*
English name	Valerian Root, valerian
Pharmaceutical name	*Radix et Rhizoma Valerianae*
Botanical name	*Valeriana officinalis*
TCM proprieties	It is bitter and sweet in nature and neutral in temperature. Heart and liver channels entered.
TCM therapeutic actions	Tranquilizes the *Shen* (spirit), and relieves spasms and pain.
Category	*Shen* Calming Herbs
TCM indication	Relieves spasms and pain associated with Liver qi stagnation to include such clinical presentations as muscle tightness and spasms, stomach cramps, and pre-menstrual syndrome.
General indications:	Insomnia, emotional distress, excessive worrying, irregular menstruation, traumatic injury, lumbago, neurasthenia, dyspepsia.
Cautions	It is contraindicated to weak people with yin deficiency.
Ancient Source(s):	*Shen Nong Ben Cao Jing*

4.4.2. Studies with Valeriana in ADHD

Valeriana officinalis is acknowledged for its purported efficacy in mitigating symptoms associated with inattention and hyperactivity [15]. In a three-week, double-blind, placebo-controlled pilot study conducted by Razlog et al., the primary aim was to ascertain the effectiveness of homoeopathic *Valeriana officinalis* mother tincture (MT) and 3X potency in the context of ADHD [15]. The assessment of ADHD symptoms was conducted at baseline, during weeks one and two of the intervention, and two weeks following the intervention [12,14,15]. The Conner's Parent Symptom Questionnaire (PSQ) demonstrated significant improvement in nearly all subscales for both treatment groups compared to the placebo, excluding psychosomatic problems and conduct problems [14,15]. *Valeriana's* treatment exhibited notable enhancements in the categories of hyperactivity, inattention, and impulsivity and/or hyperactivity [15]. Furthermore, both the MT and 3X groups displayed statistically significant improvement in anxiety symptoms, a noteworthy observation given the acknowledged anxiolytic properties of *Valeriana officinalis* [15]. In the conducted study, *Valeriana officinalis* MT and *Valeriana officinalis* 3X were administered, resulting in a

statistically significant improvement in the behaviour of the treatment groups as indicated by scores on the Parent Symptom Questionnaire (PSQ), the teacher rating scale, and the Child Concentration Test (CCT) [15]. Notably, these improvements were particularly discernible after a two-week treatment duration, suggesting a potential time-dependent or dose-response relationship [14]. The observed differences between the experimental and control groups reached statistical significance, while no statistically significant distinction was noted between the MT potency and the 3X potency [14,15]. No statistically significant distinction was observed between the MT potency and the 3X potency [15]. These improvements, evident after a two-week treatment period, did not endure upon a one-week follow-up [15]. The preliminary findings of this pilot study suggest a beneficial role for *Valeriana officinalis* in ADHD management, emphasizing the necessity for additional research [15]. A Cochrane review indicates an overall low risk of bias [12].

Gromball et al. conducted an assessment of whether treatment with a highly dosed preparation containing valerian and lemon balm could lead to improvements in concentration, hyperactivity, and impulsiveness among school children experiencing challenges in these domains but not meeting the criteria for ADHD. Initially, prominent symptoms included pronounced concentration deficits, hyperactivity, impulsiveness, and subsequent impairments in social behaviour [37]. Following the herbal treatment, a considerable improvement was observed across all these symptoms [37]. Upon entry into the study, parents reported a heightened level of distractibility and inattentiveness, succeeded by manifestations of restlessness, hyperactivity, and impulsiveness. Moderately expressed symptoms encompassed challenges in maintaining attention and concentration, resistance to tasks requiring persistence, difficulties in engaging in quiet and focused play, as well as instances of forgetfulness in everyday situations. Consistent enhancements were observed across all domains throughout the treatment period. The administration of the herbal medication, which included extracts of valerian and lemon balm, proved effective in reducing conflicts within both school environments and family settings. It is crucial to emphasize that the efficacy of herbal medicines is contingent upon the quality of specific extracts, particularly the concentration of active ingredients and the maintenance of a consistent batch-to-batch composition [37]. Both herbal extracts exhibit a sustained enhancement in sleep quality without inducing drowsiness, making them suitable for regular use in daily activities such as school and work. Within the recommended dosages, they can be deemed safe [37].

4. Final remarks and conclusions

ADHD is one of the most prevalent neurodevelopmental disorders among children and adolescents, yet it also affects a significant number of adults.

Hyperactivity is characterized by behaviours including mood swings, impatience, difficulty remaining seated, difficulty playing quietly, and excessive running and climbing. In contrast, attention deficit is characterized by behaviours such as difficulty paying attention to details or a tendency to make errors, difficulty maintaining focus on tasks or play, and avoidance of tasks that require mental effort. Consequently, ADHD can be classified into three types: predominantly Hyperactive/Impulsive, predominantly Inattentive, and Combined.

Complementary therapies, such as TCM, offer several advantages in the treatment of ADHD, with their efficacy being reliable and stable. Some clinical trials have demonstrated the effectiveness of valerian and lemon balm in children with ADHD. Specifically, these herbs act as tranquillizers of the nervous system and serve as natural sleep aids. Valerian is a viable option for mental health, as it helps maintain sleep quality, contributes to relaxation, and assists in maintaining calm during stressful situations, especially in cases of irritability.

A limitation of the study is associated with the relatively sparse body of research conducted to date, potentially attributable to the study population being comprised of children.

There remains a substantial journey ahead, with TCM being a cornerstone of complementary therapies, to explore new therapeutic avenues for ADHD. Hence, additional clinical studies ought to be undertaken, leveraging the traditional efficacies or applications of *Valeriana*, to potentially integrate them into disease management.

Valeriana, according to the information gathered, appears to have a role in the treatment of ADHD; however, further studies are needed.

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