

# Attention Deficit Hyperactivity Disorder

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## ABSTRACT

The aim of study was to find out symptoms, diagnosis, various causes, treatment, associated risk factors among children about ADHD. ADHD is most commonly seen developmental disorder in children within 5-12 years. Children shows symptoms associate with ADHD as talk nonstop, fidget and squirm, forget things, difficulty focusing on one thing. The core behavioral symptoms of Hyperkinetic disorder (HKD) and attention deficit hyperactivity disorder (ADHD) are inappropriate patterns of inattentiveness, impulsivity, and hyperactivity. The causes that lead to the development of ADHD include genetic and environmental factors, nutritional and psychosocial factors, chemical exposure. Children are emotionally affected when they witness violence within the family. Attention deficit hyperactivity disorder (ADHD) is neurobehavioral disorder in children, characterized by symptoms as inattention, hyperactivity impulsivity. Dopamine deficit theory proposed for ADHD says that abnormalities in the dopamine modulated frontal-striatal circuits, effects on brain imaging and functioning. It also associate with the iron deficiency which is major cause of Restless Leg Syndrome (RLS), a condition related to ADHD. This study indicated that yoga may contribute to stabilising the emotions, reducing restless /impulsive behavior and reducing oppositional behavior. Negative family relationships are associated with symptoms of ADHD. Its association with the intelligence quotient reiterates the importance of the genetic and environmental basis at the origin of the disorder.

**Keywords :** Attention deficit hyperactivity disorder, Hyperkinetic disorder, Restless Leg Syndrome, symptoms of Attention deficit hyperactivity disorder

## I. INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) has many faces and remains one of the most talked-about and controversial subjects in education. Hanging in the balance of heated debates over medication, diagnostic methods, and treatment options are children, adolescents, and adults who must manage the condition and lead productive lives on a daily basis.

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most common neuropsychiatric disorders of childhood. The core behavioral symptoms of Hyperkinetic disorder (HKD) and attention deficit hyperactivity disorder (ADHD) are inappropriate patterns of inattentiveness, impulsivity, and hyperactivity. Attention-deficit/hyperactivity disorder is an early-onset, highly prevalent neurobehavioral

disorder, with genetic, environmental, and biologic etiologies, that persists into adolescence and adulthood in a sizable majority of afflicted children of both sexes. These disorders are common, particularly in boys, with 1 year combined prevalence rates in school-age children of 1.7% for hyperkinetic disorder and between 5 and 10% for ADHD. The impairments associated with ADHD are associated with social, interpersonal, and academic problems which often persist into adulthood.

Cognitive deficits, particularly impairments in attention and executive functions (EF), are hypothesized to be a core part of ADHD. The term EF refers to a set of cognitive functions which enable one to demonstrate goal-directed behavior, usually in novel contexts with competing response alternatives. Children who have ADHD have been reported to exhibit sub average or relatively weak performance on various tasks of

vigilance and sustained attention, motor inhibition, executive functions and verbal learning and memory.

## II. METHODS AND MATERIAL

### DIAGNOSIS:

Although toddlers and preschoolers, on occasion, may show characteristics of ADHD, some of these behaviors may be normal for their age or developmental stage. These behaviors must be exhibited to an abnormal degree to warrant identification as ADHD. Even with older children, other factors (including environmental influences) can produce behaviors resembling ADHD. The criteria set forth by the fourth edition of the **Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)** are used as the standardized clinical definition to determine the presence of ADHD (DSM-IV Criteria for ADHD). A person must exhibit several characteristics to be clinically diagnosed as having ADHD

**Severity:** The behavior in question must occur more frequently in the child than in other children at the same developmental stage.

**Early onset:** At least some of the symptoms must have been present prior to age 7.

**Duration:** The symptoms must also have been present for at least 6 months prior to the evaluation.

**Impact:** The symptoms must have a negative impact on the child's academic or social life. **Settings:** The symptoms must be present in multiple settings. The specific DSM-IV criteria are set forth in the following chart.

### DSM-IV Criteria for Attention Deficit/Hyperactivity Disorder

- A. According to the DSM-IV, a person with Attention Deficit / Hyperactivity Disorder must have either or (2):
- (1) Six (or more) of the following symptoms of inattention have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level.

### Inattention

- a) often fails to give close attention to details or makes careless mistakes in school work, work, or other activities.
- b) Often has difficulty sustaining attention in tasks or play activities.
- c) Often does not seem to listen when spoken to directly.
- d) Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions).
- e) Often has difficulty organizing tasks and activities.
- f) Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework).
- g) Often loses things necessary for tasks or activities (e.g., toys, school assignments, pencils, books, or tools).
- h) Is often easily distracted by extraneous stimuli.
- i) is often forgetful in daily activities.
- j) Six (or more) of the following symptoms of hyperactivity-impulsivity have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level.

### Hyperactivity:

- a) Often fidgets with hands or feet or squirms in seat.
- b) Often leaves seat in classroom or in other situations in which remaining seated is expected.
- c) often runs about or climbs excessively in situations in which it inappropriate (in adolescents or adults, may be limited to subjective feelings or restlessness).
- d) Often has difficulty playing or engaging in leisure activities quietly.
- e) Is often "on the go" or often acts as if "driven by a motor".
- f) Often talks excessively.
- g) Often blurts out answers before questions have been completed.
- h) Often has difficulty awaiting turn.
- i) Often interrupts or intrudes on others (e.g., butts into conversations or games).

- B.** Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7 years.
- C.** Some impairment from the symptoms is present in two or more settings (e.g., at school [or work] and at home).
- D.** There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.
- E.** The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder and are not better accounted for by another mental disorder (e.g., Mood Disorder, Anxiety Disorder, Disassociative Disorder, or a Personality Disorder).

Attention Deficit/Hyperactivity Disorder, Combined Type: if both Criteria A1 and A2 are met for the past 6 months.

Attention Deficit/Hyperactivity Disorder, Predominantly Inattentive Type: if Criterion A1 is met but Criterion A2 is not met for the past 6 months.

**SYMPTOMS:**

ADHD is a disorder that has three different types of symptoms:

- Difficulty paying attention or focusing on certain tasks
- Being overactive (or hyperactive)
- Acting on impulse (without thinking)

**Children or teens with ADHD may:**

Get distracted easily and forget things often	Switch too quickly from one activity to the next
Have trouble following directions	Run around a lot ☒
Daydream too much	Touch and play with everything they see
Have trouble finishing tasks like homework or chores ☒	Be very impatient ☒
Lose toys, books, and school supplies often	Blurt out inappropriate comments
Fidget and squirm a lot	Have trouble controlling their emotion
Talk nonstop and interrupt people	

Children may first develop ADHD symptoms at an early age (between 3 and 6 years old). However, ADHD is most often found and treated in elementary school (between 7 and 9 years old).

ADHD symptoms like hyperactivity may get better as a child gets older. However, symptoms may not disappear completely and may continue into adulthood.

**Impact of food additives:**

Food additives are chemicals that manufacturers add to foods for various reasons such as preserving foods or improving their appearance. Food additives can come from either natural or artificial sources. Examples of food additives include colours, preservatives and some sweeteners. In Canada, food additives must be identified in the ingredient list of foods containing them. Research indicates that there may be a link between consumption of mixtures of certain food additives, such as artificial colours or preservatives, and hyperactivity in children. Health Canada is proposing regulatory amendments that would eliminate the manufacturers' option of simply using the word "colour," and require that individual colours be identified on food ingredient labels of pre-packaged foods sold in Canada. Improved labelling will provide consumers the choice of avoiding specific colours. If you strongly suspect a specific food ingredient is causing behavioural problems, you would need to test the relationship. Any elimination diet should be done under the supervision of a doctor or dietitian.

**Sugar**

You may have noticed that your child is over-active or "hyper" when there is a special occasion such as a birthday party. Some people link this over-active behaviour with eating too much sugar at the event. However, research has found that sugary foods do not affect children's behaviour. The child's over-active behaviour is probably caused by the excitement surrounding the treat (for example, the exciting games and activities at a birthday party). It's important, however, to limit the amount of sugar your child eats. These are some problems that may occur when children eat too much sugar:

- Foods high in sugar may replace the nutritious foods needed for growth and development
- Sticky, sugary foods, especially when eaten between

meals, can cause dental cavities • Sugary foods are also often higher in fat and calories. Too much of these foods can lead to unhealthy weight gain.

### **Caffeine**

Caffeine is found in chocolate, coffee, tea, cola beverages, energy drinks, chocolate and some medicines. Too much caffeine can cause:

- Irritability
- Nervousness
- Headaches
- Problems sleeping
- Behavioural problems

For children age 12 and under, Health Canada recommends a maximum daily caffeine intake of no more than 2.5 milligrams per kilogram of body weight.

## **III. RESULT AND DISCUSSION**

### **CAUSES**

#### **1. Domestic Causes:**

Sociodemographic factors associated with ADHD (low income, parents low level of schooling and large families) have been investigated, as well as aspects related to the family environment (parenting style, parents-children attachment, parental psychology and family functioning). Living within dysfunctional families may predict the emergence of Family violence is a psychosocial factor that has been recently introduced in the literature about ADHD, with indications that parents of hyperactive children are more likely to use physical methods to discipline them ADHD. Besides being direct victims of family violence, children are emotionally affected when they witness of violence within the family. Children in this situation tend to present externalizing and internalizing behaviors more commonly.

#### **2. Gender:**

ADHD in girls was more likely to be predominantly the inattentive subtype, less likely to be associated with a learning disability in reading or mathematics, and less likely to be associated with problems in school or fewer spare-time activities than ADHD in boys. Since these

gender differences were apparent in the absence of gender-by- ADHD interactions, our results suggest that the risk for ADHD-associated impairments may be similarly elevated in both boys and girls, but that gender-specific variation in baseline risks may result in different rates of psychiatric morbidity and dysfunction that may adversely affect the identification of the disorder in girls. ADHD in girls was a more serious risk factor for substance use disorders than it was in boys was an unanticipated and surprising finding. In the light of ongoing concerns regarding ADHD as a putative risk factor for substance use disorders, this finding may indicate that girls are particularly at risk in early adolescence.

#### **3. Genetic:**

Individuals cannot be randomly assigned to different environmental or genetic backgrounds. Therefore, family, adoption, and twin studies take advantage of naturally occurring events to estimate the relative influence of genetic and environmental factors on a trait or disorder.

#### **A) Family Studies:**

Previous studies demonstrate clearly that ADHD is familial. In comparison to the families of children without ADHD, the rate of ADHD is significantly higher in the biological relatives of probands with DSM-III ADD, DSM-III-R ADHD, and DSM-IV ADHD. Specifically, 30-35% of the full siblings of ADHD probands also meet criteria for ADHD, indicating that the relative risk for ADHD is 6-8 times higher among first degree relatives of probands with ADHD than the base rate of ADHD in the population.

#### **b) Twin Studies:**

By comparing the similarity of monozygotic (MZ) twins, who share all of their genes, to dizygotic (DZ) twins, who share half of their segregating genes on average, twin analyses provide direct estimates of the extent to which a trait is due to the influence of genes, shared environmental factors, and nonshared environmental factors. The most straightforward analysis of twin data involves a comparison of the rate of concordance for the disorder of interest in pairs of MZ versus DZ twins. All twin studies of ADHD that

reported concordance rates found that the rate of concordance was significantly higher among MZ pairs (58% - 82%) than same-sex DZ pairs (31% - 38%), providing further evidence that ADHD is significantly heritable. In addition, the fact that the MZ concordance was less than 100% in all studies suggests that environmental influences also play a role in the etiology of ADHD.

#### **4. Environment & Chemical :**

These include heavy metals and chemical exposures, nutritional and lifestyle/psychosocial factors. There is an association between ADHD or ADHD-related symptoms and widespread environmental factors such as phthalates, bisphenol A (BPA), tobacco smoke, polycyclic aromatic hydrocarbons (PAHs), polyfluoroalkyl chemicals (PFCs) and alcohol. Medline, PubMed and Ebsco search was performed to identify the studies which analyze the association of prenatal and postnatal child exposure to environmental toxicants and lifestyle factors and ADHD or ADHD-related symptoms. Despite much research has been done on the association between environmental risk factors and ADHD or ADHD symptoms, results are not consistent. Most studies in this field, focused on exposure to tobacco smoke, found an association between that exposure and ADHD and ADHD symptoms. On the other hand, the impact of phthalates, BPA, PFCs, PAHs and alcohol is less frequently investigated and does not allow a firm conclusion regarding the association with the outcomes of interest.

#### **Treatment:**

There is no cure for ADHD, but there are treatments that can help improve symptoms. You may have heard about some treatments, such as changes in diet, use of supplements or vitamins, and others. There is not much research to say how well these treatments work, and they are not included in this summary. The two treatments below have much more research:

- Non-medicine treatments: Parental behavior training, psychosocial therapy, and school-based programmes
- Medicines

Families may use both non-medicine treatments and medicines together

#### **Non-medicine Treatments**

Several types of non-medicine treatments have been used for children with ADHD. Sometimes the whole family takes part in these treatments.

#### **Parental Behavior Training**

Parental behavior training programs teach parents better ways to help their child or teen. Often, parents and their child attend behavior training sessions together.

Usually one of the first things the programs focus on is creating a healthy bond between the parents and the child. Programs teach parents how to understand their child's behavior. Parents learn skills to help their child avoid behavior problems before they start. Parents can learn how to organize tasks in a way that makes it easier for their child or teen to complete them. Parental behavior training programs teach parents how to create a system of rewards and consequences. Program sessions usually take place in an office, and there may be weekly sessions for several weeks or months. These programs usually charge a fee. Some of these costs may be covered by your insurance.

#### **Psychosocial Therapy**

A trained therapist can talk with your child and other family members about controlling behaviors and emotions and improving social skills.

Therapy sessions usually take place in an office. The therapist may suggest weekly sessions for several weeks, months, or years, depending on the child's needs. Therapists usually charge a fee for each hour of therapy. Some of these costs may be covered by your insurance.

#### **School-Based Programs**

The Individuals with Disabilities Education Act (IDEA) requires public schools to offer special education services to the children who qualify. Children with ADHD are often included. Education specialists at schools help students with ADHD succeed in learning and academics. They can work with the child, the

parents, and teachers to make adjustments to the classroom, learning activities, or homework assignments.

An individual education plan (IEP) is created with education specialists, teachers, and parents. The IEP outlines the actions taken at the school to help the child succeed. These plans are reviewed at the end of the year and should be passed on to the child's next teacher. These services may be free of charge for families living within the school district.

### Medicines

Two types of medicines treat ADHD symptoms: stimulants and nonstimulants. There are many different types and brands of these medicines. All ADHD medicines come with possible side effects. It is believed that these medicines work by changing the amount of certain chemicals in the brain.

TYPE	BRAND NAME	FORMULATION
<b>Stimulants</b>		
Mixed amphetamine salts	Adderall	Pill
Dextroamphetamine	Dexedrine	Pill
Methylphenedine	Concerta	Pill
	Daytrana	Skin patch
	Focalin	Pill
	Ritalin	Pill
<b>Non stimulants</b>		
Atomoxetine	Strattera	Pill
Clonidine hydrochloride	Kapvay	Pill

### Play Therapy:

To put the objectives of the research into practical effect 4 hypothesis were suggested. The quadratic hypothesis of the carried out research proposed based on raised questions and the objectives of the research and formulated as followings:

- H1: Play therapy decreases attention deficit hyperactivity disorders (ADHD) in children with ADHD.
- H2: Play therapy increases social maturity in children with ADHD.
- H3: Play therapy decreases anxiety in anxious (with anxiety disorder) children.

- H4: Play therapy increases social maturity in anxious (with anxiety disorder) children.

Following are some of the play therapy techniques

- The Feeling Word Game
- Color-Your-Life
- The Pick-Up-Sticks Game
- Balloons of Anger
- Beat the Clock
- The Slow Motion Game

### Yoga and ADHD

In recent years, meditation has become increasingly popular as treatment for psychological conditions. There is emerging evidence from randomized trials to support popular beliefs concerning the beneficial effects of yoga in the treatment of neuropsychiatric disorders such as depression or sleep disorder. The long periods of concentration required by yoga are thought to potentially help reduce attention deficits. In addition, yoga may produce a state of calmness and contentment which is lacking in patients with ADHD. combinations of the following:

“Attention Deficit Hyperactivity Disorder”, “ADHD”, “Yoga”, “Complementary and Alternative Medicine” and “CAM”. (trial study)

### Yoga Techniques :

The proposed yoga program, described below, was developed and trialled successfully in a pilot and feasibility study conducted by the first author. The program incorporates standard yogic practices comprising:

Respiratory Training : The respiratory training incorporated selective use of oral and nasal passages for respiratory flow. These exercises increased the boys' awareness of breath as well as training them to breathe naturally through both nares. All exercises were repeated several times and in a regulated rhythmical manner.

Postural Training: Postural training involved stretching, load bearing, backward, forward, lateral flexion and extensions and inversions performed in sitting, standing, supine and prone positions. These were performed in combination with respiratory exercises.

**Relaxation Training:** Relaxation training involved exercises to heighten awareness of and to reduce bodily tension by systematically relaxing body parts and tensing and relaxing muscles.

**Concentration training:** concentration training involved a technique called trataka, which requires participants to focus on word or shape, followed by seeing the image with eyes closed and continuing to see the image on a blank piece of paper.

### **Ayurvedic Formulations:**

Ashwagandha



**Improves memory and cognition:** When one takes the supplement, their memory is improved therefore allowing them to retain more information which can come in handy in an exam and even when teaching. This ensures that information dispensed is accurate therefore improving the knowledge of students as well as allowing one to pass their exams.

**Lowers stress levels:** Stress is the body's way of responding to different kinds of threats and demands. The supplement helps to reduce one's stress levels by producing serotonin and other neurotransmitters in the body. These neurotransmitters help to lower stress and make one to be relaxed always.

**Eliminates insomnia:** Insomnia is a sleep disorder that makes one to stay awake and have difficulty sleeping. The herb contains ingredients which help to make one feel sleepy therefore allowing one to rest well during the night and eliminating frequently waking up and not going to sleep again. Lowers anxiety levels

**Dosage of Ashwagandha for ADHD**

The recommended dosage of the supplement is 300 to 500 mg. In a day, one should take 6000 mg therefore in

order to accomplish this, one should take 2000 mg for three times a day. This amounts to 4 capsules or pills each measuring 500mg.

### **Ginseng**



Ginseng is an adaptogenic herb and the root of the plant has been used for many conditions including as a diabetes II treatment, to treat central nervous conditions, to increase quality of life as well as a respiratory aid.

### **Ginkgo Biloba**

Ginkgo Biloba, also known as the maidenhair tree has also been used for centuries to treat various conditions or ailments. Ginkgo has generally been used as a memory enhancer to improve concentration – which makes it a really valuable herb when trying to find an ADHD treatment without drugs.

### **Herbal Tea**

A recent study found that children with ADHD had more problems falling asleep, sleeping soundly, and getting going in the morning. Researchers suggested that additional treatments might be helpful. Herbal teas that contain chamomile, spearmint, lemon grass, and other herbs and flowers are generally considered to be safe options for children and adults who want to relax. They're often recommended as a way to encourage rest and sleep. These teas may be best used before bedtime.

### **Brahmi**

Brahmi (*Bacopa monnieri*) is also known as water hyssop. It's a marsh plant that grows wild in India. The herb is made from the leaves and stems of the plant. It has been used for centuries to improve brain function and memory. Studies on humans are mixed, but some have been positive. The herb is often recommended as

an alternative treatment for ADHD today. A 2013 study found that adults taking brahmi showed improvements in their ability to retain new information. Another study also found benefits. Participants taking a brahmi extract showed significantly improved performance in their memory and brain function.

### **Gotu Kola**

Gotu kola (*Centella asiatica*) grows naturally in Asia, South Africa, and the South Pacific. It's high in nutrients that are needed for healthy brain function. These include vitamin B1, B2, and B6.

### **Green Oats**

Green oats are unripe oats. The product, also known as "wild oat extract," comes from the crop before it matures. Green oats are sold under the name *Avena sativa*. They have long been thought to help calm nerves and treat stress and anxiety.

### **Combinations May Work Better**

Some studies have indicated that combining some of these herbs may produce better results than using one alone. A small study in Canada studied children with ADHD who took both American ginseng and Ginkgo biloba twice a day for four weeks. The participants experienced improvements in social problems, hyperactivity, and impulsivity.

### **MENTAT SYRUP:**



#### **Action:**

**Enhances memory and learning capacity:** The natural ingredients in Mentat improve mental quotient, memory span and concentration ability.

**Treats neurological disorders:** Mentat reduces the level of tribulin, an endogenous monoamine oxidase inhibitor that is elevated during anxiety. The calming effects of Mentat are beneficial in treating insomnia and convulsions.

**As an adjuvant in neurological diseases:** Due to its anticholinesterase, dopaminergic-neuroprotective (important neurotransmitter in the brain), adaptogenic and antioxidant properties, Mentat is useful as an adjuvant in the treatment of epilepsy and enuresis.

#### **Key ingredients:**

Thyme-Leaved Gratiola (Brahmi) maintains cognitive function. Well known for its nootropic (memory enhancer) effect, the herb enhances memory and learning. It is also known to calm restlessness and is used to treat several mental disorders.

Indian Pennywort (Madhukaparni) possesses antiepileptic properties and is commonly used as an adjuvant to epileptic drugs. It balances amino acid levels, which is beneficial in treating depression. It also prevents cognitive impairment.

Winter Cherry (Ashvagandha) is used as a mood stabilizer in clinical conditions of anxiety and depression. Withanolides, the chemical constituents present in Winter Cherry, possess rejuvenating properties. The herb also reduces oxidative stress, which can cause mental fatigue.

#### **Directions for use:**

Available as a syrup.

#### **Side Effects :**

Mentat is not known to have any side effects if taken as per the prescribed dosage.

#### **Diet for ADHD Children:**

One of the most important things in a diet for ADHD is to eat whole, natural, unprocessed foods, free artificial additives. This is important because of the sensitivity of many ADHD sufferers to chemical food additives. It is also important to identify food allergies and sensitivities.

and to eliminate these problematic foods. This can be done through an elimination diet, in which potentially allergenic foods are eliminated for two weeks, and then carefully reintroduced, one at a time. These foods include dairy products, gluten-containing grains, legumes (including peanuts and soy), citrus, yeast, and eggs. Because this is not conclusive, it is also good to have an IgG blood test. (Most food intolerances are IgG mediated, but some are also IgE mediated, so it is good to have an IgE test as well.) Because blood sugar issues also have a big impact on ADHD, it is also important to eat a diet with a low glycemic load (those with ADHD benefit from the same diet that helps diabetics and others with insulin resistance issues).

### **Feingold Diet**

The Feingold diet food list eliminates many ingredients in regular foods that are responsible for allergic reactions and behavioral problems in children, often reflected in many developmental disorders. As part of the Feingold Program, this diet list aims to eliminate synthetic food additives that are responsible for many childhood conditions such as ADHD, Hives, Dyslexia, and ADD. The Feingold diet food list contains the following items and encourages people to eat whole foods in their natural state.

#### **Fruits And Vegetables**

Broccoli  
Sweet corn  
Zucchini  
Lemons  
Potatoes  
Kiwis  
Sprouts  
Beets  
Bananas  
Pears

#### **• Non-vegetarian Food:**

Fresh seafood  
Fresh meat  
Eggs

#### **Dairy/Cereals:**

- All milk products
- Cereals without synthetic colors or additives
- Bread without preservatives

### **Supplements:**

The following supplements may be beneficial for ADHD:

#### **Most important Supplements:**

These are some of the very top supplements for ADHD:

#### **Essential Fatty Acid Supplements**

If wild cold water fish is not included in the diet, supplementing DHA is important. Fish oil is the best way to do this.

#### **DMAE**

Other than essential fatty acids, this is probably the most important supplement to consider, and if you had to choose one single supplement, this one might be the best. DMAE boosts the production of Dopamine. It aids in concentration by improving nerve impulse transmission in brain, and may also produce antidepressant effects. Some authors caution that this should only be used for adults. However, others recommend it for children. A children's dose is 100 to 500 mg daily.

#### **Other supplements:**

These supplements may also prove useful:

### **Vitamins:**

#### **Vitamin C:**

Vitamin C is an antistress vitamin. The dosage for adults and children over 12 years old is 1000 mg, three times daily.

#### **Inositol: Inositol is a B-**

complex vitamin. The dosage is 20 mg per pound of body weight.

### **Minerals:**

#### **Chromium Polynicotinate**

This supplement helps regulate blood sugar levels. The dosage is 4 mcg per pound of body weight.

### **Amino Acids:**

**L-Cysteine** Use this if hair analysis reveals high levels of metals. Take on an empty stomach with water or

juice. Take with 50 mg Vitamin B6 and 100 mg Vitamin C for better absorption. L-Glutamine Dosage: 10 mg per pound of body weight. Phenylalanine Dosage: 10 mg per pound of body weight. Phenylalanine is contraindicated in phenylketonuria Taurine Taurine has calming effects. The dosage is 500 mg, for children, or 50 mg per pound of body weight. 5-Hydroxy-Tryptophan This supplement is only available by prescription in the United States. The dosage is 2–3 mg per pound of body weight. N-Acetyl-Tyrosine This is used by herbalist and nutritionist Donald Yance as part of his protocol for ADHD. It is a precursor to dopamine and norepinephrine. The dose is 6–8 mg per pound of body weight.

#### **Lipid Nutrients:**

Evening Primrose Oil Evening primrose oil reduces inflammation and oxidative stress. A children's dose is 500 mg daily. Phosphatidylserine This is a phospholipid nutrient found in fish, green leafy vegetables, soybeans, and rice. It is essential for the normal functioning of neuronal cell membranes. It may aid in balancing neurotransmitters in the brain, and may alleviate depression. Phosphatidylserine improves behavior problems in children. Results take up to four months. The dosage is 100 mg daily for young children, and 300 mg daily for children over 50 pounds, or alternately 2–3 mg per pound of body weight.

#### **Neurotransmitters:**

Acetylcholine Acetylcholine can improve memory and attention. GABA GABA improves behavior problems in children. The children's dosage is 100 mg daily, or 6–8 mg per pound of body weight.

#### **Miscellaneous Supplements:**

##### **NADH**

NADH improves behavior problems in children. The dosage is 2.5 mg daily.<sup>50</sup>

##### **Octacosanol**

Octacosanol is derived from wheat germ and associated with vitamin E. It was not specified how this may be helpful. The dosage is 100 mcg/lb. of body weight.<sup>51</sup>

## **IV. CONCLUSION**

In our setting, alcohol dependence syndrome and mood disorders in the parents are the most important familial risk factors for ADHD, both in terms of heritability and disturbed family situations. Perinatal complications resulting out of inadequate maternal and child health care delivery system are the important environmental risk factors. Improvement in the health care delivery system, both in terms of obstetric as well as psychiatric services may improve the situation either in terms of Adult ADHD has diagnostic stability at the one year follow up. The adult ADHD subjects remained highly comorbid with other psychiatric disorders including increased substance abuse at the follow up. Only 10.5 per cent subjects remained in the regular follow up. The above findings suggest that the patients with adult ADHD should be properly psycho-educated and regularly followed up preventing or improving the outcome of ADHD children.

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