Complementary Alternative Sleep Aid Therapies as a Healthier Option for Children with Neurodevelopmental Disorders

Amanda Ptak

American College of Health Science

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Abstract

Neurodevelopmental disorders affect many children, often causing them to suffer from a multitude of symptoms including sleep disturbances, ADHD, auditory and speech impairments, and learning impairments. A growing concern in the population of children with neurodevelopmental disorders who also suffer from sleep disturbances is the administration of both pharmaceutical sleep aids and Melatonin. Sometimes these sleep aids are recommended or prescribed by physicians; other times, parents of this population will choose to help their child fall and stay asleep with products such as those containing diphenhydramine or Melatonin. Both diphenhydramine and Melatonin can have unwanted side effects when used improperly, such as increased hyperactivity in children and decreased attention span during their waking hours. It is therefore important for these parents to understand the consequences of administering these products to this population and the complementary alternative sleep aids they could utilize instead. Complementary alternative therapies to correct sleep disturbances are a healthier choice for use on children with neurodevelopmental disorders who suffer from sleep disturbances.

Keywords: Diphenhydramine, Melatonin, Neurodevelopmental disorders, Complementary Alternative Medicine, Sleep Disturbances, Sleep Aides, Yoga, Ayurveda, Herbal Medicine, Reiki, Healing Touch, Diet and Exercise

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The United States Environmental Protection Agency website states that "Neurodevelopmental disorders are disabilities associated primarily with the functioning of the neurological system and brain (Neurodevelopmental Disorders, 2013, pg. 1)." It has been documented that 12% of the American population between the ages of three and 17 have been diagnosed with a neurodevelopmental disorder; that is six out of every 50 children (Neurodevelopmental Disorders, 2013)! Children diagnosed with autism spectrum disorder, attention-deficit hyperactivity disorder (ADHD), learning and intellectual disabilities, behavioral disorders, cerebral palsy, and those who suffer from visual and auditory impairments are included under this diagnostic category (Neurodevelopmental Disorders, 2013). More often than not, more than one diagnosis is given for a child with neurodevelopmental disorders, making their treatment plan difficult and their symptoms various (Neurodevelopmental Disorders, 2013). For example, a child diagnosed with autism spectrum disorder may also be diagnosed with ADHD, sleep disturbances, and auditory impairment, which may cause learning and focusing to be a great difficulty for this child as they cannot hear what is being taught, cannot focus long enough to absorb the material, and may even be easily frustrated and thus give up more easily. It is a vicious cycle for these children and many are prescribed a variety of medications to help them cope with daily life (observation, October 2014 to Present).

Many children diagnosed with neurodevelopmental disorders attend schools designed to help children with special needs. The State of New Jersey has programs such as Bergen County Special Services (BCSC) and The Gramon Family of Schools to assist these children in learning, social skills, and even provide physical and occupational therapy to their students. Since many

children in this population suffer from impaired neurological functions that impact their daily lives these schools are a step forward for them to achieve their highest level of functioning (Neurodevelopmental Disorders, 2013). They may suffer from attention deficit disorder (ADD), ADHD, obsessive compulsive disorder (OCD), anxiety, depression, poor social skills, speech delays, cognitive delays, etc. (Neurodevelopmental Disorders, 2013). Fortunately, these children now have the resources and the help of skilled, educated professionals to help them cope with their daily struggles.

In addition to the symptoms and disabilities that the majority of this population suffers from, many are also plagued by varying degrees of sleep disturbances (Cohen et al, 2014). Walker, Hall, and Hurst's (1990) publication found in the National Center for Biotechnology Information, U.S. National Library of Medicine, define sleep disturbances as "disorders of initiating and maintaining sleep (DIMS, insomnias), disorders of excessive somnolence (DOES), disorders of sleep–wake schedule, and dysfunctions associated with sleep, sleep stages, or partial arousals (parasomnias) (Walker, Hall, & Hurst, 1990)." A study performed in 2014 by Cohen and colleagues uncovered that approximately 25 to 40% of the American pediatric population is estimated to suffer from sleep disturbances versus 40 to 80% of children diagnosed with a neurodevelopmental disorder; an exceptionally large and concerning difference (Cohen et al, 2014). The researchers state that the topic of sleep disturbances among this population is greatly overlooked for being such an important topic, receiving little attention by the scientific research community (Cohen et al, 2014). Although the study focused primarily on children with low functioning autism spectrum disorder their main concept applies to the entire population of children diagnosed with neurodevelopmental disorders (Cohen et al, 2014). Sleep, especially in this population, is vital for children to function at their best during waking hours (Cohen et al,

2014). A lack of sleep may lead to decreased concentration, increased irritability, and an increase in behavioral episodes during the day (Cohen et al, 2014). In addition, treatment of sleep disturbances often do not address the underlying cause of the disturbance, but rather mask the symptoms, as do many allopathic medications (Cohen et al, 2014). This allows for the continuation of these sleep disturbances and an increase in daytime symptoms instead of determining and fixing the root cause of the sleep disturbance. Below is a table from the book, *Clinical Methods: The History, Physical, and Laboratory Examinations. 3rd edition* that demonstrates how sleep disorders are classified and provides a look into what this population may suffer from. Since this population may suffer from any of the sleep disturbances described in the below chart, this visual makes it easier to understand just how complex this issue really is (Walker, Hall, & Hurst, 1990).

Table 77.1Classification of Sleep Disorders

I. Insomnias: Disorders of initiating and maintaining sleep
   - A. Psychophysiologic–situational or persistent
   - B. Associated with psychiatric disorders, particularly affective disorders
   - C. Associated with drugs and alcohol
     1. Tolerance to or withdrawal from CNS depressants
     2. Sustained use of CNS stimulants
     3. Sustained use of or withdrawal from other drugs
     4. Chronic alcoholism
   - D. Associated with sleep-induced respiratory impairment
     1. Sleep apnea syndrome
     2. Alveolar hypoventilation syndrome
   - E. Associated with sleep-related (nocturnal) myoclonus and "restless legs"
   - F. Miscellaneous—other medical, toxic, or environmental conditions

II. Hypersomnias: Disorders of excessive somnolence
   - A. Psychophysiologic—situational or persistent
   - B. Associated with psychiatric disorders, particularly affective disorders
   - C. Associated with drugs and alcohol
   - D. Associated with sleep-induced respiratory impairment (as in D above)
   - E. Narcolepsy—cataplexy
   - F. Miscellaneous—other medical, toxic, environmental, or idiopathic conditions

III. Disorders of the sleep–wake schedule
   - A. Transient—jet lag, work shift
   - B. Persistent
     1. Delayed sleep phase syndrome
     2. Advanced sleep phase syndrome
     3. Non-24-hour sleep–wake syndrome

IV. IV. Parasomnias: Dysfunctions associated with sleep, sleep stages, or partial arousal

A. Sleepwalking
B. Sleep terrors and dream anxiety attacks
C. Enuresis
D. Nocturnal seizures
E. Other sleep-related dysfunctions

Some of the children in this population attend special needs camps both during the summer and during the school year to further work on their social skills and to give this population a chance to partake in some of the same activities as their main-streamed peers (observation, October 2014 to Present). Often times, these sleep disturbances can affect them greatly in a camp setting, keeping their peers awake at night or causing them to be too drowsy during the day to actively participate (observation, October 2014 to present). As a nurse, the author has had firsthand experience working with this population in a camp setting, distributing medications throughout the day and at bedtime to a population of 60 plus children with mixed disabilities between the ages of ten and 21. It has been observed that approximately 50% of the population attending said camp suffers from a sleep disturbance (observation, October 2014 to Present). From this population, approximately 50% of the sleep disturbances are a direct side effect from other medications they are prescribed, while the other 50% are from a variety of known and unknown causes (observation, October 2014 to Present). When questioned, many of the children state that they cannot stop thinking or find it difficult to rest at night. Often, their doctors will recommend different sleep aide options to help these children fall and stay asleep (observation, October 2014 to Present). Many of these options merely mask the problem rather than fixing it, such as the administration of over the counter medications containing diphenhydramine and Melatonin (Sleep Aids, 2014; Melatonin, 2014; Diphenhydramine, 2014).

It was observed that many parents of this population administered these mediations to their children without prescription from a doctor, choosing to try new options to help their children fall and stay sleep (observation, October 2014 to Present). In addition, those who were in fact advised by a doctor to give Melatonin to their child often had not had their child tested for a Melatonin deficiency and, more alarmingly, would give their child more than the recommended dose (observation, October 2014 to Present).

Children, as well as adults, need to be given pharmaceutical medications appropriately for whatever condition they are being treated for. Over the counter pharmaceuticals containing diphenhydramine as well as Melatonin supplements are increasingly being given to children with neurodevelopmental disabilities as a sleep aide, both with and without physician consent (observation, October 2014 to Present). Unfortunately, diphenhydramine containing products and Melatonin may have unwanted side effects when used incorrectly and in this capacity (Sleep Aids, 2014; Diphenhydramine, 2014; Melatonin, 2014). Giving diphenhydramine containing products for the purpose of correcting sleep disturbances for a prolonged period of time is never an appropriate action (Sleep Aids, 2014; Diphenhydramine, 2014). In addition, using Melatonin supplementation to correct a sleep disturbance that is not directly caused by low levels of Melatonin in the body may have unwanted side effects and may further interrupt the wake-sleep cycle (Jan & Freeman, 2004). This is very concerning and calls for a need to educate parents of children with neurodevelopmental disabilities on complementary alternative medicine (CAM) options to lessen sleep disturbances naturally. It is important to give minors of this population a voice when it comes to their healthcare.

Aromatherapy, Herbal Medicine, Reiki and Healing Touch, Yoga and Ayurveda, and a healthy lifestyle are all components of CAM that could lessen and even correct sleep

disturbances in this population without the unwanted side effects of modern pharmaceuticals. These methods have been used for centuries by many cultures and have recently been the focus of scientific research to discover how and why they work (Buckle, 2003; Miles & True, 2003; Frawley, 1999). These modalities are considered non-invasive and are suitable with modification for all ages (White, 2009; Kemper & Kelly, 2004). CAM options also tend to be more cost effective and easily obtainable, being sold online and in health-food stores nation-wide. Since the proposed population tends to already take a variety of pharmaceuticals, a non-pharmaceutical option is warranted to decrease the stress on their bodies that all drugs cause. In addition, when these children are already suffering from their diagnosis and side effects from other medications, a sleep aide that has few to no known side effects is most welcome (White, 2009; Weiss & Fintelmann, 2000; Kemper & Kelly, 2004). Although pharmaceuticals have their place and are greatly beneficial when necessary and administered properly, certain ones, such as diphenhydramine containing products, should never be given for the purpose of correcting sleep disturbances (Sleep Aids, 2014). Complementary alternative therapies to correct sleep disturbances are a healthier choice for use on children with neurodevelopmental disorders who suffer from sleep disturbances.

Methods

The ProQuest database was utilized with the following search terms “melatonin supplementation AND autism,” “melatonin AND autism,” “use of Benadryl for sleep,” “diphenhydramine AND autism,” “adverse effects of melatonin supplementation,” “diphenhydramine as a sleep aide,” “Reiki AND sleep,” “Healing touch AND sleep,” “diet AND autism,” “diet AND sleep,” “exercise AND sleep,” and “yoga AND sleep.” The following search parameters were used: English, full text, peer reviewed articles written within the last 15

years and resources were chosen based on relevance. A target research population between the ages of two and 18 was used when possible. A general internet search of diphenhydramine as a sleep aide, definitions, and general statistics was also performed. In addition, required text books from the American College of Healthcare Science Masters in Complementary Alternative Medicine (CAM) Program and required books from Yoga Flow LLC's 200 hour yoga teacher training program were also examined for CAM sleep therapy options. Product inserts and professional drug monographs were obtained from CVS Pharmacy for Melatonin and Diphenhydramine as well.

Results

Diphenhydramine

A member of the ethanolamine class, diphenhydramine is a popular antihistamine used in over the counter (OTC) cough, cold, and allergy medications (Diphenhydramine, 2014). It is an H1-antagonist that has anti-muscarinic and sedative properties, often used in the treatment of symptoms from allergies, hay fever, the common cold, and even motion sickness (Diphenhydramine, 2014). Diphenhydramine is the active ingredient in a multitude of OTC oral and topical medications available to the public, including but not limited to: Benadryl, Itch relief, Banophen, Aller-Dryl, PediaCare Night-Time Cough, Sleep-Eze 3, Tusstat, Wal-dryl, Genahist, DiphenMax, and Theraflu Thin Strips Multi Symptom (Diphenhydramine, 2014). The label indicates that it should be used in the treatment of allergic rhinitis, the common cold, contact dermatitis, and a cough (Diphenhydramine, 2014). Although generally regarded as safe (GRAS) when used properly the product insert and professional monograph as provided by CVS Pharmacy provides for a variety of precautions when using products containing this active ingredient (Diphenhydramine, 2014). Included in this list of precautions are the following:

- As per the FDA Nonprescription Drug Advisory Committee and the Pediatric Advisory Committee's decision in 2007, it is suggested that children under the age of six not be given cough and cold products containing diphenhydramine as well as a list of other drugs (Diphenhydramine, 2014).
- In 2008, a Public Health Advisory warning against the administration of cough and cold products to children under the age of two was issued by the FDA (Diphenhydramine, 2014).
- Prolonged use of OTC medications containing diphenhydramine may cause tolerance, which, in turn, may decrease the sedating effects (Diphenhydramine, 2014).
- Use with caution and under the care of a qualified physician in pediatric, asthmatic, geriatric, pregnant or breastfeeding, and chronic obstructive pulmonary disease (COPD) patients (Diphenhydramine, 2014).
- Moderate drug-drug interactions may occur with concurrent use of antidiarrheals, anxiolytics, sedative, hypnotics, etc. (Diphenhydramine, 2014).
- Do not use diphenhydramine containing products to help a child fall asleep (Diphenhydramine, 2014).
- For adults, do not use diphenhydramine-containing sleep aids for longer than two weeks without consulting your physician (Diphenhydramine, 2014).
- Children may be sensitive to this drug and present with excitement instead of drowsiness (Diphenhydramine, 2014).
- May cause serious side-effects such as mental/mood changes and seizures (Diphenhydramine, 2014).

- Use under the direction of a licensed physician if taking other sedatives or anti-anxiety medications (Diphenhydramine, 2014).
- Side effects may include but are not limited to: agitation, confusion, constipation, diarrhea, dizziness, drowsiness, fatigue, hallucinations, headaches, impaired cognition, palpitations, restlessness, seizures, and weakness (Diphenhydramine, 2014).

Although commonly used as a sleep aid, as is seen in the abundance of OTC products, i.e. Sleep II, Sleep Tabs, Sleep-ettes, Restfully Sleep, etc., diphenhydramine has had very little acknowledgment from the scientific research community for its use in this capacity (Diphenhydramine, 2014). While researching this topic in the ProQuest database, only one study pertaining to its use in children with sleep disturbances was found: *Benadryl for infant sleep?* (2006), which states that the use of diphenhydramine containing products to help infants sleep may cause low levels of hyperactivity which counteract any sleep inducing affects this pharmaceutical may have. Through research of other sources such as the MayoClinic evidence was found to support this study's claims, clearly placed on the product's warning label (Sleep Aids, 2014). In addition, a randomized double-blind study is described in the drug-insert/monograph as provided by CVS Pharmacy (Diphenhydramine, 2014). 44 infants and children were given diphenhydramine containing products or placebo and compared for its effects on sleep disturbances (Diphenhydramine, 2014). The study was in fact cut short after an interim analysis uncovered a lack of effectiveness on the group (Diphenhydramine, 2014).

In addition to hyperactivity, diphenhydramine containing products can also act as a stimulant and cause a jittery feeling in children, which is greatly counterproductive especially in regards to this population (Benadryl, 2014). These pharmaceuticals may also interact with

medications such as antihistamines, anti-anxiety medications, other sedatives, monoamine oxidase inhibitors (MAOIs), which may be used as a treatment for depression, and prescription pain medications (Benadryl, 2014). All of these pharmaceuticals are commonly used by this population, making it important to note that they should avoid the use of diphenhydramine containing pharmaceuticals all-together unless directly prescribed by their physician (Diphenhydramine, 2014; observation, October 2014 to Present).

Melatonin

5-methoxy-N-acetyltryptamine, or more commonly known as Melatonin, is a neuro-hormone produced naturally by the pineal gland that plays a large role in circadian sleep rhythms (Melatonin, 2014). The endogenous hormone has been extracted and synthesized by scientists and is now commonly sold as an OTC supplement to support sleep disturbances caused by jet lag, depression, various neurological disabilities, and rotating shift-work (Melatonin, 2014). The supplement works by re-setting the body's internal clock, normalizing sleep patterns as well as lowering core body temperature during sleep (Melatonin, 2014). It is sold in the form of teas, oral capsules and sprays, sublingual tablets, soft chews, and lozenges in most health stores and pharmacies in the United States (Melatonin, 2014). A reliable manufacturer must be purchased from each time to ensure quality products that are pure Melatonin, as many companies add other nutraceuticals to their OTC products or use animal-derived products that are incompatible with the human body (Melatonin, 2014). Melatonin supplementation should be used under the care of a qualified professional as there may be unwanted side effects or contraindications (Melatonin, 2014). These include the following:

- Use caution with children, depressive disorders, immunosuppressed individuals, infants, infertility, persons suffering from insomnia, neurological disabilities, and seizure disorders (Melatonin, 2014).
- This supplement is not recommended for persons already taking psychotropic, hypnotic, of neurologic medications (Melatonin, 2014).
- May have moderate drug-drug interactions with sedatives, hypnotics, anxiolytics, Fluoxetine, Fluvoxamine, etc. (Melatonin, 2014).
- May cause the following side effects: abdominal pain, depression, lethargy, nightmares, psychosis, headaches, confusion, etc. (Melatonin, 2014).
- Use caution with children as use of this supplement may affect sexual development (Melatonin, 2014).
- "Do not take this drug unless you have time for at least 6 to 8 hours of sleep after taking this medication" (Melatonin, 2014).
- May result in mental or mood changes as well as increased daytime drowsiness (Melatonin, 2014).

It has been found that many children diagnosed with autism spectrum disorder often suffer from Melatonin deficiency (Veatch et al, 2015; Leu et al, 2011). This deficiency has been linked as the direct cause of sleep disturbances for many in this population and it has been found that Melatonin supplementation may be a viable sleep aid option in order to bring levels back up to a functioning state (Braam et al, 2009; Leu et al, 2011; Veatch et al, 2015). The Drug Insert and Monograph of Melatonin as provided by CVS Pharmacy recommends a dose of 2.5 to 7.5 mg by mouth at bedtime to induce sleep within one hour for the treatment of delayed phase sleep syndrome in children with autism, Rett's syndrome, and developmental disabilities (Melatonin,

2014). Treatment is recommended for up to four weeks, however, it is stated that effects of long term use are unknown (Melatonin, 2014).

A study by Veacht and colleagues (2015) looked at the acetylserotonin O-methyltransferase (ASMT) Melatonin pathway genes and the cytochrome P450 pathway enzyme, specifically CYP1A2, of children with autism spectrum disorders. It was determined that sleep onset delay expression in this population is directly related to Melatonin pathway genes (Veacht et al, 2015). Leu and colleagues (2011) also discuss that sleep disturbances in many children with autism are directly linked to decreased Melatonin levels. By taking urine samples of 23 autistic children ages four to ten, they were able to measure the Melatonin metabolite, 6-sulfatoxymelatonin (6-SM) (Leu et al, 2011). Using the Children's Sleep Habits Questionnaire, it was discovered that children whose urine 6-SM levels were highest experienced the least sleep disturbances and a decrease in daytime sleepiness (Leu et al, 2011). The results concluded a need for further research on Melatonin as a sleep aid to help reduce sleep disturbances as well as daytime sleepiness (Leu et al, 2011). A final study performed by Braam and colleagues (2009) looked directly into the use of Melatonin as a sleep aid supplement for children experiencing sleep disturbances and who have been diagnosed with intellectual disabilities. It was found that taking Melatonin helps this population to fall asleep more quickly, stay asleep, and to sleep for a longer period of time (Braam et al, 2009).

Despite these findings, as is suggested by Jan and Freeman (2004), Melatonin supplementation should only be used under circumstances where a decrease in Melatonin levels is the direct cause of the sleep disturbance. Not all children diagnosed with a neurodevelopmental disorder suffers from Melatonin deficiency, making supplementation highly inappropriate for many of this population. Before choosing to administer Melatonin tests should

be performed by the child's primary care physician in order to determine if there is in fact a Melatonin deficiency present (Jan & Freeman, 2004). In addition, Melatonin may cause some of the same side effects as diphenhydramine such as daytime drowsiness and interact with already prescribed pharmaceuticals, making it necessary to look to other options for this population (Sleep Aids, 2014; Melatonin, 2014). If a Melatonin deficiency is in fact present and supplementation is warranted, CAM options may still be beneficial for those who do not respond completely to Melatonin supplementation alone.

Complementary Alternative Sleep Aids

Aromatherapy. In her book, *Clinical aromatherapy: Essential oils in practice (2nd ed.)*, Buckle (2003) states that pure essential oils are generally safe when used properly, even when used by children. Toxicity and potential side effects are often seen after larger amounts than is therapeutically recommended have been ingested or when an oil that is not meant for internal use is ingested (Buckle, 2003). For this reason, it is always important to consult an aromatherapist who has been specifically trained on the internal use of essential oils before ingesting them (Buckle, 2003). There are many essential oils available for use by the public, both online and in stores. It may be difficult to choose one and a potential user may find it daunting when many claim to have similar actions. However, since essential oils are adaptogens they easily adjust themselves to aide a person in whatever their needs are at that time, healing the body as a whole rather than working on a specific system (Buckle, 2003). The most important factor to consider is whether or not the source is reliable as adulterated, or impure, essential oils have higher risks and fewer therapeutic abilities tied to them (Lis-Balchin, 2006; Buckle, 2003).

There are many essential oils that could help a person in this population to fall and stay asleep (Buckle, 2003). Certain essential oils are well-known specifically for their relaxing

properties, for example lavender, *Lavendula angustifolia*, has been found to increase sleep at night while increasing alertness during the day, which is very beneficial to this population who often find it difficult to concentrate (Buckle, 2003). Buckle (2003) discusses one way in which the oils work which is by learned memory: when an oil is diffused nightly at bedtime the child will begin to get sleepy whenever they smell it in the future since their brains will correlate that scent with the time to fall asleep. Some of the more relaxing herbs that could be diffused at this time include bergamot, chamomile, sandalwood, lavender, sweet orange, and rose (Buckle, 2003). As essential oils become more popular in the United States clinical setting have begun to employ their benefits. It has been documented that in hospital settings the essential oils of lavender, geranium, cardamom, mandarin, and marjoram have been used in place of sedatives with equal if not better results than pharmaceuticals (Buckle, 2003).

Often times in this population, the cause of the sleep disturbance is more complicated than some sort of deficiency, being related instead to their emotional state. One cause of the emotional disturbances may be due to dreaming. Some children may have disturbing dreams which they wish to stop; for this purpose a parent may wish to diffuse angelica, which has been reported to possibly stop dreaming all-together (Buckle, 2003). Another cause may be waking from a dream but not being able to remember what the dream entailed, which may cause anxiety in this population. For this concern, one may diffuse Frankincense which has been reported to enhance dream recall (Buckle, 2003). By being able to recall their dreams and to work through subconscious issues, this population may also experience lower stress levels during the day (Buckle, 2003). Another cause of sleep disturbance is an agitated state, which is often seen in this population; it can be calmed by a mixture of passionflower and lime blossom (Buckle, 2003).

Buckle (2003) suggests that it is of upmost importance to allow a client to choose the oil they wish to use. For children, this means using an oil that is safe for their age and condition(s), safe to use in conjunction with their other medications, and choosing the scent they most enjoy (Buckle, 2003). This is a very individualized treatment option and one that requires careful attention to ensure desired results are met. For example, it has been found that sedative herbs may increase restlessness in children with ADHD, for some in this population, a more stimulating herb such as Rosemary may in fact calm them (Buckle, 2003), which is why it is so important to speak with a qualified specialist before using essential oils on this population. Below is a table of commonly used essential oils for sleep disturbances, both at home and in clinical settings. This list may help to choose the best oil to suit a child's needs.

Essential Oils for Sleep Disturbances

Common	Latin	Uses	Contraindications	Dose
Lavender (Lis-Balchin, 2006).	*Lavendula angustifolia*	Headaches, nervous tension, emotional extremes, passive/aggressive personalities, manic-depressive states, muscular pain, spasms, and cramps, and as a general relaxant	Do not confuse with Spike Lavender, which is a stimulant. Possibly photosensitization and dermal irritation Do not use if allergic to lavender Do not apply directly to the skin of very young children and babies (under the age of ten).	Do not exceed 5 g/kg body weight orally. Do not exceed 5 g/kg body weight dermally.
Bergamot (Lis-Balchin, 2006).	*Citrus bergamia*	Depression, anxiety, digestive disorders, headaches, stress relief, and sinus congestion	May cause a reaction with sensitive skin types Photosensitizing, avoid sun exposure after topical application Do not apply directly to the skin of very young children and babies (under the age of ten).	Do not exceed 10 g/kg body weight orally Do not exceed 10 g/kg body weight dermally
Chamomile	*Matricaria recutita*	Anxiety, digestive problems, skin problems, asthma, insomnia, hay fever	Possible allergic or skin reactions, especially if known allergy to member of the ragweed family. Do not use with hormone sensitive conditions	N/A

(Chamomile, 2015).			Do not apply directly to the skin of very young children and babies (under the age of ten).	
Sandalwood (Lis-Balchin, 2006).	*Santalum album*	Insomnia, depression, sedative, stress, calming, immune-stimulating, digestive and genitourinary issues, neuralgia, and nervous tension.	No known side effects when used properly and an unadulterated oil is used Do not apply directly to the skin of very young children and babies (under the age of ten).	Do not exceed 5 g/kg body weight orally. Do not exceed 5 g/kg body weight dermally.
Rose (Lis-Balchin, 2006).	*Rosa damascena*	Calming, promotes feelings of well-being, good to calm babies, digestive issues, and palpitations	May be irritating and sensitizing to the skin, especially if an adulterated oil is used Essential to properly dilute before dermal application Do not apply directly to the skin of very young children and babies (under the age of ten).	Do not exceed 5 g/kg body weight orally Do not exceed 2.5 g/kg body weight dermally
Sweet Orange	*Citrus sinensis*	Palpitations, stress, anxiety, insomnia, and is good for children	May cause mild to severe dermatitis Photosensitizing when applied to the skin Do not apply directly to the skin of very young children and babies	Do not exceed 5 g/kg body weight orally. Do not exceed

(Lis-Balchin, 2006).			(under the age of ten).	10 g/kg body weight dermally.
Geranium (Lis-Balchin, 2006).	*Pelargonium spp.*	Stimulates and cleanses the lymphatic and immune system, stimulating and relaxing	May be sensitizing to the skin When diffused, this oil may have a stimulating effects if the odor is disliked Do not apply directly to the skin of very young children and babies (under the age of ten).	Do not exceed 5 g/kg body weight orally. Do not exceed 2.5 g/kg body weight dermally.
Marjoram (Lis-Balchin, 2006).	*Origanum marjorana*	Anxiety, depression, agitation, insomnia, epilepsy, migraines, neuralgia, constipation, and palpitations	May damage mucous membranes when in a concentration of greater than 1% Do not use on irritated or damaged skin Do not apply directly to the skin of very young children and babies (under the age of ten).	Do not exceed 2.2 g/kg body weight orally. Do not exceed 5 g/kg body weight dermally.
Frankincense	*Boswellia carterii*	Stress-related conditions, nervous tension, anxiety, dysmenorrhea, and stimulating	May be stimulating when inhaled (Burnt resin is more relaxing than the inhaled oil) May be sensitizing Do not apply directly to the skin of very young children and babies	Do not exceed 5 g/kg body weight orally. Do not exceed 5 g/kg

(Lis-Balchin, 2006).			(under the age of ten).	body weight dermally.
Angelica (Lis-Balchin, 2006).	*Angelica officinalis*	Indigestion, migraine, stress disorder, nervous tension, and removal of toxins when added to bath water	Oral use may have a negative effect on the liver and kidneys in high doses Potentially sensitizing in not properly diluted Highly photosensitizing when used topically May interact with anticoagulant therapy due to the constituent coumarin Do not apply directly to the skin of very young children and babies (under the age of ten).	Do not exceed 5 g/kg body weight orally. Do not exceed 5 g/kg body weight dermally.
Passionflower (Peterson, 2015).	*Passiflora incarnata*	ADHD, generalized anxiety disorder (GAD), generalized seizures, hysteria, insomnia, and nervousness and excitability	May increase the effects of MAOIs, barbiturates, and tranquilizers. Do not apply directly to the skin of very young children and babies (under the age of ten).	N/A

Herbal Medicine. Peterson (2015) wrote an educational book for the online Advanced Herbal Materia Medica II course for the American College of Healthcare Science. In it, she discusses the use of nervine and antispasmodic herbs for their use as sedatives and for calming the nervous system (Peterson, 2015). It is stated that nervines can come in three forms; toning,

relaxing, and stimulating (Peterson, 2015). When toning and relaxing nervines are combined with antispasmodics with sedative properties different forms of insomnia may be treated successfully (Peterson, 2015). Nervine herbs described in the book with sedating properties included *Avena sativa* Oat, *Centella asiatica* Gotu kola, *Humulus lupulus* Hops, *Lavandula angustifolia* English lavender, *Ocimum tenuiflorum* Holy basil, *Piper methysticum* Kava, and *Viscum album* Mistletoe (Peterson, 2015). Antispasmodic herbs that were discussed as having sedating properties that would make wonderful additions to a sleep tonic included *Eschscholzia californica* California poppy, *Hypericum perforatum* St. John's wort, *Melissa officinalis* Lemon balm, *Passiflora incarnata* Passionflower, and *Valeriana officinalis* Valerian (Peterson, 2015). All of these herbs may be used safely when instructions are carefully followed and precautions are adhered to (Peterson, 2015). For example, *Viscum album* Mistletoe has a very low therapeutic margin, so should always be used with caution and under the close eye of a knowledgeable professional (Peterson, 2015).

Weiss and Fintelmann (2000) also discuss a variety of herbs that aide in nervous unrest and sleep disorders. The following are herbs that are discussed in the book, *Herbal Medicine*, 2nd edition (Weiss & Fintelmann, 2000):

- Valerian, *Valeriana officinalis*: may be used as a tea or in tincture form. There are no known side effects and it is very difficult to overdose as a large dose of one (1) teaspoon to two (2) tablespoons is warranted. It contains essential oil terpenes and valeoptriates which are said to work for nervous agitation and nervous sleep disorders.
- Hops, *Humulus lupulus*: has central nervous system paralyzing effects from the bitter acids and methylbutenol. It is best used as a tea or in a bath and is used as a mild

sedative and sleep inducer. In folk remedies, a sachet of hops was placed in the pillow beneath the head to help a person sleep.

- Lemon Balm, *Melissa officinalis*: The main principle, a volatile oil, helps to soothe a nervous heart and stomach, and help with sleep disorders. As is with Valerian, it is very safe and given in high doses. It is given as a hot tea (not boiling) with honey after dinner and at bedtime.
- Passionflower, *Passiflora incarnata*: a mild sedative and hypnotic, it is not useful to use on its own, however, it is a good additive to other herbs to aide in sleep disorders
- Oat, *Avena sativa*: mild sedative and hypnotic effects noted in the fruits, however, the effects are very weak and best noted in a tincture form. It has yet to be clinically validated but is commonly used in homeopathic remedies.
- Lavender, *Lavandula angustifolia*: wonderful additive to a mixture as the flowers give a pleasant floral taste and act as a mild sedative. It may also be used as a liniment for neuralgia.
- Herbs used in folk medicine but not validated for use in modern phytotherapy:
    - Opium poppy: promotes sleep
    - Geum: similar to valerian but less potent
    - Saffron, *Crocus sativus*: believed to increase the effects of opium
    - Bitter orange, *Citrus sinensis*: treats nervous unrest, good to add to valerian
    - California poppy, *Eschscholzia californica*: well-tolerated by children, treats nocturnal enuresis

Reiki and Healing Touch. Biofield therapies, such as Reiki and Healing Touch, are those that interact with a human's energy field surrounding and within them (Miles & True,

2003). In recent years these modalities have been studied for use in patients experiencing pain and unrest and are considered to be noninvasive (Miles & True, 2003). Reiki is the art of healing through the channeling of energy into another in order to allow their body's natural ability to heal be stimulated. However, it is so much more than the human language can truly define. It is currently briefly defined as "a non-physical healing energy made up of life force energy that is guided by the Higher Intelligence, or spiritually guided life force energy" (Reiki News Articles, n.d.). Both modalities strive to help heal a patient through the clearing of any energy blockages that the patient may be experiencing and work on positive, healing intentions (Tan et. al., 2007). It is believed that by balancing a person's biofield, Reiki strengthens the immune system, relaxes the person, and releases endorphins, aiding in the healing process and pain management (Miles & True, 2003).

Kemper and Kelly (2004) discuss the use of Healing Touch, also known as Therapeutic Touch, in clinical settings. Created by caring physicians and nurses and based off of the same principles as Reiki, Healing Touch heals a person's energetic field, promoting the healing of the body and mind (Kemper & Kelly, 2004). The authors suggest that the benefits of Healing Touch are numerous, including the reduction of pain and anxiety, an increase in relaxation, and specifically state its influence on enhanced sleep a number of times (Kemper & Kelly, 2004). Patients who received Healing Touch therapy in clinical settings showed that it affected the autonomic nervous system (ANS), increasing parasympathetic responses while decreasing the activity of the sympathetic nervous system (SNS) (Kemper & Kelly, 2004). Although the researchers have found no documentation of adverse effects, they noted that certain clients may be specifically sensitive to treatment, advising that treatments be catered and adjusted to each individual based on needs and response (Kemper & Kelly, 2004). It is important that this

therapy option, as well as Reiki, not take the place of other medical treatments unless advised by a physician, but are rather used alongside other treatment modalities (Kemper & Kelly, 2004).

Yoga and Ayurveda. Yoga, meaning union in Sanskrit, is defined as the "science of reintegration with the universal reality" (Frawley, 1999, pg. 324). It is a spiritual science that has been in practice for over 5,000 years, encompassing a physical practice as well as the practices of devotion, selfless service, control of the breath and senses, and ethical disciplines (Frawley, 1999). Throughout the years it has been practiced as a part of Ayurveda, the ancient art of healing the body, mind, and soul through the practice of a yogic lifestyle (Frawley, 1999). The primary goal of yoga and Ayurveda is Self-realization, which is considered to be the highest form of self-healing, acting on a deeper level than herbs, pharmaceuticals, and therapy (Frawley, 1999). This is not to say that these other modalities are not of importance as Ayurveda believes strongly that a combination of these in addition to a healthy lifestyle that is geared toward the individual is of high importance in obtaining and maintaining health (Frawley, 1999).

Yoga in schools. White (2009) discussed the increasing popularity of mandating school aged children to practice yoga in school settings. The author reveals that the hope of school officials is by practicing yoga in schools, parents will be encouraged to seek out classes for their children outside of school (White, 2009). In addition, the students benefit from increased awareness, memory recall, and an increased ability to learn in their classes after partaking in a yoga class (White, 2009). Yoga has also been shown to increase attention, calm and relax a person, and enhance sleep (Feuerstein, 2003). In addition, the practice of yoga has been shown to decrease symptoms of ADHD and help children who suffer from this diagnosis get off their prescribed medications (Flisek, 2001). This is truly an all-encompassing practice capable of being performed by all body types, ages, and physical/mental capabilities (White, 2009). As the

practice of yoga spreads through school systems across the United States more children with neurodevelopmental disorders will find peace to sleep undisturbed and to be more attentive during the day.

Hatha Yoga. The physical practice of yoga, Asana, is the most commonly practiced form of yoga in the United States (Frawley, 1999). Although most known practices are used as a workout in gyms there are Asanas that are perfect for helping this population become calm, rested, and to achieve sleep. For example, a Vata practice focuses on calming the mind and body thus slowing a person down and creating a sense of being grounded and strong (Frawley, 1999). This would be a wonderful option for a child who is hyperactive and has trouble calming their thoughts to fall asleep. The poses create a sense of consistency, which is something this population is often lacking (Frawley, 1999). Asanas that are often used in this type of practice include seated poses, slow, conscious sun salutations, grounding standing poses, inversions, forward and backbends, spinal twists, and corpse pose, or Savasana (Frawley, 1999). For children who suffer from behavioral disorders, such as Asperger's, a Pita practice may be more suitable as it works to relax and cool a person down causing them to surrender and become more forgiving (Frawley, 1999). It is a gentle practice that acts as a good diffuser for the confused, frustrated mind (Frawley, 1999). A Pita practice focuses on Asanas that open the base chakra such as seated poses, standing hip openers, gentle inversions, seated forward bends, twists, and Savasana (Frawley, 1999). This may be the ideal practice to soothe a frustrated child to sleep. Always keep in mind that a physical practice must be adjusted to a client's physical abilities, every Asana cannot be performed by every body type (Frawley, 1999).

Meditation. Meditation is a vital yogic practice for all both during daily activities and during a yoga practice. By calming the mind and taking control of the thought process a child

diagnosed with a neurodevelopmental disorder can learn to heal themselves, providing for a calmer mind and more restful sleep (Frawley, 1999). One must create a plan of action and stick to it in order for change to occur, a Samkalpa is that plan of action, or affirmation (Frawley, 1999). Samkalpas are important to the meditative process, as they provide the will and motivation to heal and transform the mind (Frawley, 1999). For a child in this population, a proper Samkalpa may look like the following:

> 'OM! I seek to heal myself to achieve more full and restful sleep by practicing yoga and meditation each night before bed in order to achieve a healthier life.'

By doing this regularly, the child becomes accountable for their actions and begins the healing process from within (Frawley, 1999). Meditation, just as is with all forms of CAM, must be catered to the individual (Frawley, 1999). Some children may wish to sit in a certain spot, listen to music, put on special lights, or listen to a guided meditation. Do not limit their creativity at this time and allow them to choose the best option for themselves.

Healthy Lifestyle. Generally speaking, diet and exercise are part of every healthy lifestyle. Every diet plan must be catered specifically to the individual's dietary needs and an exercise regimen must fit into an individual's lifestyle and physical capabilities. As mentioned above, the practice of Ayurveda through a yogic lifestyle may be just what the doctor ordered for this population, allowing for a diet, exercise regimen, and even a religious or ethical practice based on the individual's needs (Frawley, 1999). This may be a good stepping stone for parents who can work alongside their primary care physician and a nutritionist to create the best diet to suit their child. However, there are many options for parents to examine as well as important discussions to have with the child's primary care physician before choosing a plan of action.

Diet. An International Standard Randomized Controlled Trial was performed in 2010 on a group of 27 children between the ages of 3.8 and 8.5 years old (Pelsser et al, 2010). The studied population had all been diagnosed with ADHD as per the criteria set by the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition. 15 of the chosen participants were placed on the elimination diet while 12 of the participants were placed in the control group with no change to their diets; groups were randomly chosen (Pelsser et al, 2010). Parents of the groups monitored their children for sleep and physical complaints as well as their general behavior using the Physical Complaints Questionnaire (Pelsser et al, 2010). The diet group experienced a decrease of 77% ($p<0.001$, effect size=2.0) in physical and sleep complaints (Pelsser et al, 2010). The control group showed a decrease in complaints of 17% ($p=0.08$, effect size=0.2), showing that a placebo effect is greatly outweighed by the test group (Pelsser et al, 2010). The researchers concluded that the elimination diet may be effective in the treatment of physical and sleep complaints expressed by children diagnosed with ADHD (Pelsser et al, 2010).

Below is a list of foods to include and exclude during an elimination diet (Walsh, n.d.). This is an extensive list that may be somewhat altered and catered to the individual, however, by following it strictly and under the guidance of a dietician a child suffering from sleep disturbances as well as many other symptoms of neurodevelopmental disorders may find relief (Walsh, n.d.; Pelsser et al, 2010). Once the body has been flushed of all toxins the child may begin to add food back to the diet, at which point, food sensitivities will become evident and those foods may continue to be avoided in the future (Walsh, n.d.).

	Foods to include	Foods to exclude
Fruits	Almost all fresh fruit	Citrus fruits
Vegetables	Almost all fresh raw, steamed, sautéed, or roasted vegetables	Tomatoes, eggplant, potatoes (sweet potato and yams are okay)
Starch	Rice*, buckwheat*	Wheat, corn, barley, spelt, kamut, rye, oats, all gluten-containing products
Legumes		Soybeans, tofu, tempeh, soy milk, all beans, peas, lentils
Nuts and seeds		All nuts and seeds
Meat and fish	Fish, turkey, lamb, wild game	Beef, chicken, pork, eggs, cold cuts, bacon, hotdogs, canned meat, sausage, shellfish, meat substitutes made from soy
Dairy products and milk substitutes	Unsweetened rice milk*, coconut milk	Milk, cheese, cottage cheese, cream, yogurt, butter, ice cream, non-dairy creamers
Fats	Cold-expeller pressed olive oil, flaxseed oil, coconut oil	Margarine, butter, processed and hydrogenated oils, mayonnaise, spreads
Beverages	Drink plenty of fresh water, herbal teas (e.g. rooibos, peppermint, etc.)	Alcohol, caffeine (coffee, black tea, green tea, soda)
Spices and condiments	Sea salt, fresh pepper, fresh herbs and spices (i.e. garlic, cumin, dill, ginger, oregano, parsley, rosemary, thyme, turmeric)	Chocolate, ketchup, mustard, relish, chutney, soy sauce, barbecue sauce, vinegar
Sweeteners	Stevia (if needed)	White or brown sugar, honey, maple syrup, corn

	syrup, high fructose corn syrup, desserts

*May also be removed if you suspect specific sensitivities to grains.

Exercise. In 2005, the relationship between sleep and physical activity was tested on a group of 12 children diagnosed with autism spectrum disorder who suffer from sleep disturbances between the ages of three and 11 (The, 2005). The researchers determined that there were three questions to be answered by this study:

1. Does the amount of activity during the day promote better sleep?
2. Does physical activity within an hour of sleep have an effect on quality of sleep?
3. Does physical activity within two to three hours of sleep effect the quality of sleep?

(The, 2005).

An Actiwatch was used to measure each child's level of physical activity and sleep for two weeks, during which time normal routines were maintained and parents of the population documented sleep logs of bedtime and time awoken (The, 2005). The five most and least active days of the two weeks for each participant were examined using a one-way repeated multivariate analysis (The, 2005). It was determined that activity performed an hour prior to bedtime had a negative impact on sleep (The, 2005). These results matched previously performed research which found that activity before sleep may be disruptive (The, 2005). Unfortunately, the other two questions went unanswered as no significant results were identified (The, 2005). Because the study was so small and short-lived, further research is necessary to definitively determine the

effects of exercise on sleep disturbances in the pediatric population diagnosed with neurodevelopmental disorders (The, 2005).

Discussion

Current research is clearly demonstrating that non-pharmaceutical sleep aide therapies such as those used by CAM practitioners are safe and effective for use on children diagnosed with neurodevelopmental disorders who suffer from sleep disturbances (Buckle, 2003; Weiss & Fintelmann, 2000; Miles & True, 2003; White, 2009; Kemper & Kelly, 2004; Frawley, 1999; Pelsser et al, 2010). Unlike pharmaceutical products such as diphenhydramine and the natural supplement Melatonin, these options have few to no known side effects and many of these options do not involve internal consumption (Sleep Aids, 2014; Benadryl, 2014; Buckle, 2003; Weiss & Fintelmann, 2000; Miles & True, 2003; White, 2009; Kemper & Kelly, 2004; Frawley, 1999; Pelsser et al, 2010). Based on the above evidence and the apparent lack of research, at this time it is safe to say that it is unsafe and unwise to administer diphenhydramine products to this population for the purpose of treating sleep disturbances (Benadryl for infant sleep, 2006; Sleep Aids, 2014; Benadryl, 2014). Parents must always adhere to the labeled directions on all OTC medications in order to provide competent, adequate care of their child's sleep disturbances.

Although Melatonin is in fact a natural substance and utilized by CAM practitioners, there are many components that must be looked into before its administration, most importantly, whether or not the client is suffering from a Melatonin deficiency (Jan & Freeman, 2004). Another factor to take into consideration with this group when administering Melatonin is if the potential risk of increased drowsiness during the day is worth the benefits (Sleep Aids, 2014)? With a population that is already drowsy due to sleep disturbances and who also find it difficult to concentrate because of their diagnosis, this may not be the best supplement to administer

(Neurodevelopmental Disorders, 2014). However, for a child who suffers from a Melatonin deficiency, supplementation is often the best option with careful dosing and administration, especially when coupled with another CAM therapy such as Yoga or Reiki (Braam et al, 2009; Leu et al, 2011; Veatch et al, 2015).

Aromatherapy and herbal medicine, such as that used in modern phytotherapy, provide many options for this population that are safe and can be consumed easily as a tea or even inhaled via pillow sachets, diffusers, or topical application (Weiss & Fintelmann, 2000; Buckle, 2003). Herbs such as valerian, hops, lemon balm, lavender, passionflower, and oat are all viable options and may be combined to suit each client's individual needs (Weiss & Fintelmann, 2000). In addition, essential oils of bergamot, chamomile, sandalwood, lavender, sweet orange, rose, geranium, cardamom, mandarin, and marjoram have all been proven to work well to lessen the occurrence of sleep disturbances both in home and clinical settings (Buckle, 2003). The essential oils of Frankincense, passionflower, and lime blossom have also been used to decrease sleep disturbances caused by dreaming as well as to settle an agitated state (Buckle, 2003). Similar to pharmaceutical medications, a skilled practitioner should always be consulted before herbal medicine or essential oils are used, especially if one plans to ingest them (Weiss & Fintelmann, 2000; Buckle, 2003). The practitioner will be capable of creating the ideal combination of herbs and/or essential oils to lessen the sleep disturbances as well as prevent any unwanted herb-drug interactions if the client is also taking pharmaceutical medications (Weiss & Fintelmann, 2000; Buckle, 2003). When used properly and under proper guidance, both aromatherapy and herbal medicine boast few, if any, side effects, no risk of dependence, and are gentle and healing to the body as a whole with their synergistic effects (Weiss & Fintelmann, 2000; Buckle, 2003).

Other CAM approaches, such as Reiki and Healing Touch are non-invasive options with no known side effects and are suitable for all ages, disabilities, and conditions (Kemper & Kelly, 2004). Reiki and Healing Touch can easily be taught to parents in hospitals, clinics, Yoga studios, and even online. The use of these energetic modalities can be greatly beneficial, providing parents with an easy, no-cost option to supplement or eventually replace their child's current sleep aide therapy regimen (Flisek, 2001). In addition, these modalities have been shown to boost the immune system, allowing the body to heal itself and correct problems such as sleep disturbances by healing the body as a whole (Miles & True, 2003). By utilizing these modalities parents of this population may encourage the child's body to heal any abnormalities that are causing the sleep disturbances and promote restful sleep. Based on the above findings, biofield therapies such as Reiki and Healing Touch are viable options to help a child in this population treat their sleep disturbances (Miles & True, 2003; Kemper & Kelly, 2004; Tan et. al., 2007).

A related area that often utilizes Reiki and Healing Touch is the practice of Yoga and Ayurveda, which is also non-invasive and suitable for all participants (White, 2009). Yoga, meaning "union", strives to unite the body, mind, and spirit through the practice of physical poses (Asanas), breathing (Pranayama), and meditation (Frawley, 1999). The entire practice is meant to enhance one's state of meditation, thus increasing awareness of the self and the surroundings, increase focus, and promote relaxation (Frawley, 1999). Parents of this population can download videos for free online or go to classes at studios to encourage their children to practice yoga and meditation in order to promote a relaxed state and deeper sleep (Kemper & Kelly, 2004). In addition, by seeking a Yoga professional who is also trained in the art of Ayurveda, a parent may help their child to heal themselves mentally and physically through the

physical and meditative practices of yoga, a diet based on their needs, and through practices that allow them to reach a state of increased self-awareness (Frawley, 1999).

In addition to these CAM modalities, a healthy lifestyle is essential to all when it comes to the body functioning at its best (Pelsser et al, 2010; Frawley, 1999). Without it, our sleep cycles are disturbed, we feel restless and irritable during the day, and we are prone to illness (Pelsser et al, 2010; Frawley, 1999). Proper diet and exercise are crucial components to a healthy lifestyle, especially for this population. Everybody must exercise to maintain a healthy weight, however, as was seen in the small study *The relationship of sleep pattern and physical activity in children with autism* (2005), parents should begin to have their child rest at least one hour prior to their bedtime to encourage restful sleep. In regards to diet, as is suggested in the study by Pelsser et al. (2010), certain foods may cause sleep disturbances for children with neurodevelopmental disabilities. The elimination diet involves removing the most common food allergen triggers as well as known triggers from the diet (Walsh, n.d.). These common triggers include gluten, soy, sugar, caffeine, corn, eggs, and nuts (Walsh, n.d.). By doing so, the body does not have the stress of digesting these irritating foods and may concentrate on healing other areas of the body (Walsh, n.d.). This diet may seem very limiting, which is why foods are added back to the diet one at a time to see if symptoms return (Walsh, n.d.). A food item that does not cause a return of symptoms may be kept in the diet, whereas foods that trigger a reaction must remain out of the diet for good (Walsh, n.d.). A change in diet to avoid some, if not all, of these foods and providing these children with healthy, nutritious foods that their bodies can easily digest is a vital component in the battle against sleep disturbances.

Conclusions and Recommendations

A growing concern in the population of children with neurodevelopmental disorders who also suffer from sleep disturbances is the administration of both pharmaceutical sleep aids and Melatonin. Sometimes these sleep aids are recommended or prescribed by physicians, other times, parents of this population will choose to help their child fall and stay asleep with products such as those containing diphenhydramine or Melatonin (observation, October 2014 to Present). Both diphenhydramine and Melatonin can have unwanted side effects when used improperly, such as increased hyperactivity and decreased attention span during a child's waking hours (Benadryl for infant sleep, 2006; Sleep Aids, 2014). It is therefore important for these parents to understand the consequences of administering these products to this population and have knowledge of the complementary alternative sleep aids they could utilize instead. These CAM therapies may include, but are not limited to, aromatherapy, Herbal Medicine, Reiki/Healing Touch, Yoga and Ayurveda, and a healthy lifestyle that includes a proper diet and exercise. Unlike prescription and OTC sleep aids, all of the CAM options listed have shown few to no side effects (Sleep Aids, 2014; Benadryl, 2014; Buckle, 2003; Weiss & Fintelmann, 2000; Miles & True, 2003; White, 2009; Kemper & Kelly, 2004; Frawley, 1999; Pelsser et al, 2010). Based on the above findings, complementary alternative therapies to correct sleep disturbances are, in fact, a healthier and safer option for use on children with neurodevelopmental disorders who suffer from sleep disturbances.

Recommendations

Based on the lack of current literature in regards to the use of diphenhydramine containing products as sleep aides, especially in this population, it is imperative that future research be focused on this topic. In addition, parents of children in this population should be

inquisitive of doctors as to why their child is being given a sleep aide and to ensure all necessary testing is performed to ensure the correct sleep aide is given for the most beneficial results. It is recommended that parents consult with a trained, licensed professional before administering an OTC sleep aide product to their children, whether it be a natural supplement or pharmaceutical medication. It is also the recommendation of this author to provide parents of children in this population with free educational lectures and pamphlets from doctors and special services school nurses to help them to better understand their treatment options.

It should always be recommended that a person speak with a qualified, licensed professional before beginning any new healthcare regimen. When it comes to essential oils and herbs, quality is of upmost importance. Essential oils are often adulterated with chemicals or watered down to decrease the price for the consumer or to ensure the manufacturers profit more from each sale (Lis-Balchin, 2006). A reliable distributor that provides a readout of the constituents within each essential oil batch, the source, and the Latin name of the oil being purchased is essential to ensure quality and purity. As Lis-Balchin (2006) points out in each of her essential oil monographs, the purity of the oil indicates how well the oil will perform, the therapeutic properties it holds, and potential side effects it may cause. For this reason it is highly recommended that parents seek out essential oil manufacturing companies that are reliable and used by clinical Aromatherapists. The same recommendation goes for obtaining quality herbs that are free from pesticides, fresh, organic, and have maintained their therapeutic benefits through proper processing and storage. For ideas on how and which essential oils to use for sleep disturbances, please refer to the table on page 19, Essential Oils for Sleep Disturbances or seek out the advice of a qualified aromatherapist.

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