

Review Article

Alternative therapies for children's with autism spectrum disorder

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ABSTRACT

Autism is one of the major public health concerns in children around the world. Sudden behavioral changes and improper communication is considered to be most common public health hazards. Speech therapy, occupational therapy, acupuncture, chiropractic therapy and music therapies are the most recommended treatment patterns. A complete cure is not achieved by the existing conventional therapies. Patients and caretakers choose alternative therapies like herbs as a final hope in management of autism spectrum disorder (ASD). Most of the people are not aware of the drawbacks of alternative therapies. However, the selection of alternative therapies might help in communication balance as well as behavioral changes and speedy recovery. However, not all the alternative therapies lead to complete cure and Food and Drug Administration (FDA) warns false claims over the chelation therapy practice in ASD since it causes hypocalcaemia. A combination of herbal medicines with conventional treatment is known to have a positive effect in treating ASD children as well as some under-reported adverse reactions. Herbal medication, along with integrative therapy as an adjunctive to traditional treatment, also have an impact in treating children with ASD. Since the majority of the patients/caretakers are not disclosing their complementary and alternative medicines (CAM) use to their respective physicians. Physicians should give extra care and encourage the parents/caretakers to disclose their CAM practice in order to avoid false claim which results in serious adverse effects and life-threatening complications.

Keywords: Autism, Complementary and alternative medicine, Speech therapy, Herbs, Children, Occupational therapy

INTRODUCTION

Complementary and alternative medicines (CAM) are health care practices and medications that are not at all used by doctors. Complementary medicine is a group of therapeutic and diagnostic principles that are usually used together or along with conventional therapies. This is usually not recognized by the medical community as standard or conventional medical approaches.¹ Integrative medicine is an approach to the medical care that combines standard medicine with that of CAM practices which are shown to be effective and safe. This type of medicine usually treats a patient's mind, spirit and body. Usually, these CAM therapies should be evaluated with the same long and careful research process used to evaluate standard treatments.² The use of complementary and alternative medicine has a distinct role in treating several diseases.³

Various terms used to promote the CAM therapy (Figure 1). CAM is categorized into five major domains by the national center for complementary and alternative medicine (NCCAM) (Table 1).⁴

CLINICAL OVERVIEW OF AUTISM

Autism spectrum disorder (ASD) refers to the range of conditions which are characterized by some degree of impaired social behavior, language and communication along with range of interests and activities that are unique to the individual, and those the individuals repeatedly do. ASD usually begins in childhood and tends to prolong in the adolescence and adulthood. People with ASD are usually often related to other conditions including epilepsy, depression, anxiety, and attention specific hyperactivity disorder (ADHD).² Though autism can be

diagnosed at any age, it is known to be "developmental disorder", as the symptoms usually appear in the first two years of life. According to diagnostic and statistical manual of mental disorders 5 (DSM-5), a key was created by the American psychiatric association. Individuals with ASD have: difficulty in communicating and interacting with other people, restricted interests and repetitive behaviors and symptoms that hurt the individual's ability to function properly in school, work and in life too.³



Figure 1: Various terms used to promote complementary and alternative medicine.

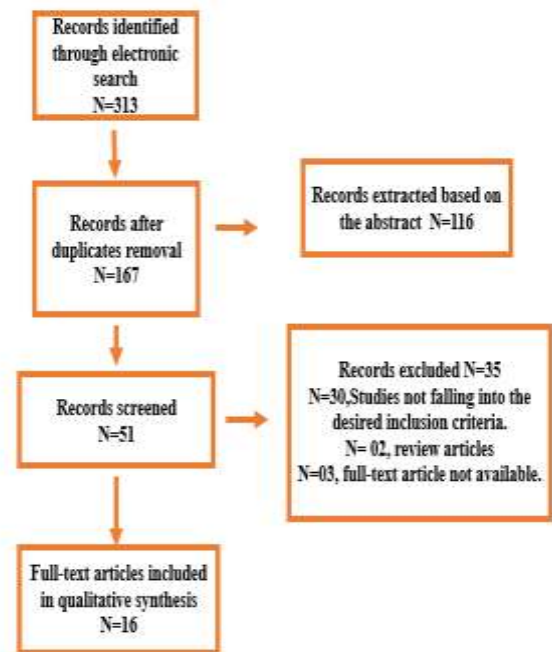


Figure 2: Flow diagram of eligible studies.

Table 1: Major five domains of CAM by the NCCAM.

Types	Sub-type	Examples
Group 1	Alternative medical systems	Homoeopathic medicine, Naturopathic medicine, Chinese medicine, Ayurveda
	Complete systems of therapies and practices	
Group 2	Mind-body interventions	Yoga, prayer, mental healing, music therapy, dance therapy, art, pet therapy, spiritual healing
Group 3	Biologically based therapies	Melatonin, vitamin-C, vitamin-B6, omega 3 fatty acids, secretin, hyperbaric oxygen therapy, chelation therapy
Group 4	Manipulative and body-based methods	PECS, chiropractic, sensory integration therapy, auditory integration therapy
Group 5	Biofield therapies	Qigong, Reiki, therapeutic touch
	Bioelectromagnetics based therapies	

The overall prevalence of ASD is 0.36% in Asia. The prevalence of ASD is increasing in Asia. ASD prevalence is higher in males than female.²⁻³ For children, the prevalence is 16.8 per 100 in 2014 with an increase till decade.⁴

ASD will not have a single cause. Depending on the symptoms and factors, Genetic and Environmental factors play a major role. In genetics, the involvement of several different genes appears. For some children, ASD is associated with Rett syndrome or fragile X syndrome, and for others, genetic changes may increase the risk of ASD.⁵ Certain genes may affect the development of the brain or the brain cells communicated with certain genetic mutations which will be inherited and the other processes occur spontaneously. The environmental factors include medications, viral infections and complications during pregnancy. Air pollutants play a role in triggering ASD.

ASD affects children of all races and nationalities, but certain factors mentioned below may increase the child's risk.

Child's gender

Boys are four times more likely to develop ASD than girls.

Family history

Families who have one child with ASD have an increased risk of having another child with an ASD.

Other disorders

Children with certain other medical conditions have more than normal risk of ASD. Tuberous sclerosis is a condition in which benign tumours develop in the brain, Rett

syndrome is a genetic condition that occurs especially in girls, and causes slowing of head growth, intellectual disability and loss of purposeful hand use, and fragile X syndrome is a disorder that causes certain intellectual problems.

Parent's age

There is a link between the children who are born to older parents and the risk of developing ASD.

Extremely preterm babies

Babies born before 26 weeks of gestation have a higher risk of having ASD.

The complications of autism spectrum disorder include problems with behaviour, communication and interaction which can often lead to social isolation, stress within the family, inability to live independently, employment problems, problems in school and successful learning, deception and being bullied.³¹

CAM THERAPIES IN AUTISM

CAM is the most common and popular therapies among adults and children with ASD.⁵ Even before the diagnosis, about one-third of the individuals with ASD have already received treatment with CAM and about 9% of the populations have received a harmful therapy like chelation.⁶ CAM is widely used by the families of children with ASD.

The primary goal of the treatment is to minimize the core symptoms and associated deficits, alleviate family distress, maximize functional independence and improve the quality of life.⁷ The usage of CAM among families with an ASD child is becoming higher, ranging from 52% to 74%. World Health Organization (WHO) has already reported the use of traditional medicine for primary health care needs. However, the selection of the therapy might depend on the various factors including, the stage of progression, types of co morbidities that the individuals might have, affordability and the safety profile of the individuals.

The individuals with disabilities education act (IDEA) makes all the treatments possible under age 3, who may be at risk for developmental problems. This includes therapies especially to improve speech and behavior. The treatments that can be beneficial to the child depends mostly on the needs and situation. The ultimate goal is to reduce the symptoms and improve the learning and development of the individual.⁷⁻⁸

In this article, we aim to focus on complementary and alternative medicine as an effective and sustainable source for the treatment of autism. In the course of study, we have done extensive literature search to provide a summarized database on available treatments in controlling and treating autism.

METHODS

Eligibility criteria

Research data gathered from the randomized control trials (RCT) which compare the outcome of placebo and treatment group (CAM therapy) in children with ASD are included in this review. The exclusion criteria were: case reports, RCT conducted in adults, animal studies, studies without standard procedures and results, and studies with indications other than ASD.

Study design

Study population, timing, and setting

Since very few reports with RCT evidence are documented for the application of CAM therapy in children with autism spectrum disorder.

This study includes research papers published in scientific journals from 2000.

Language

Throughout the search for literature no limitations were implemented on languages, however, the studies mentioned in this review have been published in English only.

Data source

A comprehensive literature search was conducted by two independent reviewers (AG, PL and HM) from clinicalTrial.gov, PubMed, Embase, Google scholar, Medline 2004, Central 2005, Lilacas 2004, Psyc INFO 2004, CINAHL 2004, ERIC 2004, ASSIA 2004, and SOCIO FILE – for music therapy and Cochrane Library. The search keywords were autism, autism spectral disorder, neurodegenerative disorder, behavioral changes, CAM in children, conventional therapies in autism, alternative therapies in autism, herbs in autism, occupational therapy, and music therapy. All the study data were discussed with the third reviewer (SS).

Study selection

The two independent reviewers (AG and SS) reviewed the titles and abstracts followed by full text using predefined inclusion criteria. The study selection process and reason for the omission of studies were mentioned using the preferred reporting items for systematic review and meta-analysis protocols statement flow chart. The predefined inclusion criteria were formed for the extraction of the evidence from the included studies such as first author name, study design, sample size, dose, duration, and study site. Finally, the studies were compared based on the outcomes of the placebo and the treatment group such as significant improvement in behavioral changes in the treatment group after music therapy, occupational therapy.

The quality assessments of the included studies were conducted by using the Cochrane collaborations tool for assessing the risk of bias. Flow chart explains about the data collection (Figure 2).

RESULTS AND DISCUSSION

There is a large body of evidence on the use of CAM in children with autism, including in the fields of herbal medicine and mind-body intervention. Financial obstacle

is one of the major reasons for choosing CAM. Probably one of the most underrated risks of CAM is that the physicians do not inquire about CAM and the reluctance of patients to report CAM usage.³²

In our review we observed different types of CAM used in autism (Figure 3). This study describes the dangerous practice of CAM for both "rescue" and regular autism management.



Figure 3: Different types of complementary and alternative medicine used in autism.

Behavioral and communication treatments

Applied behavioral analysis (ABA)

This is most often used in schools and clinics to help the child learn positive behaviors and reduce negative ones. There are various types of ABA depending on the situation of the individual, which includes: pivotal response training (PRT) which helps in developing a motive to learn and communicate and also monitor their behavior, discrete trial training (DTT) which uses a series of trials to teach each step. This includes simple lessons and positive brace, early intensive behavioral intervention (EIBI) which helps to learn adaptive behaviors in children and is suitable in children under five years of age, and verbal, behavioral intervention (VBI) which mainly focuses on language skills.⁸

The ABA therapy has shown many results that administered therapies. Children under the age of four who have undergone this therapy will have improved social and verbal skills, and in very little cases, there will be an increase in IQ also.¹⁰

Developmental, individual differences, relationship based approach (DIR)

This is also known as "floor time", as it makes the child get on the floor to play and do activities they wish to. This is primarily known to support emotional and intellectual

growth by letting them learn skills along with communication and emotions.

Treatment and education of autistic and related communication- handicapped children (TEACCH)

This treatment usually has visual cues like picture cards that help the child to learn skills like dressing up every day. This is literally like information is broken into smaller pieces/steps from which learning becomes easy.⁶

There as a moderate to large difference in social behavior and maladaptive behavior in the individuals. The overall effect of the intervention among all outcomes was known to be moderate while the effects seemed to increase with age.⁹

Picture exchange communication system (PECS)

This is also another type of visual-based treatment. Instead of picture cards, it uses symbols. In this way, the child learns to ask questions and communicate through special symbols. This therapy has proven improvement in communication of individuals from behavioral problems.⁷

Occupational therapy

Treatment like this will help the child to learn life skills like feeding and dressing themselves, bathing and

understanding how to relate to other people. These skills may help them live independently as they want.⁹

Naturopathic medicine

The use of chemical processes is to isolate and purify specific compounds from plants that have been used to treat ASD's and its clinical features that may contribute in improving the quality of life of the patients. Along with this, herbal treatments may also improve the core symptoms of autism.¹¹ The use of herbal medicine are still being continued in modern society for the prevention, wellbeing and treatment of various diseases including ASD.

Herbs

The use or need of plant-based drugs is increasing in recent years. Herbal medicines are always preferred treatment option by the patients or as an adjunctive to conventional treatment.¹¹

In some individuals, oxidation stress will be triggered by environmental pro-oxidant factors in autism patients. To decrease the oxidative stress, green tea therapy using camellia sinensis extract. This extract contains catechins along with gallic acid, chlorogenic aid, caffeic acid and flavonol derivatives which are other constituents of green tea. Based on about 10 studies, the most commonly used herbal medicines are panax ginseng, *Acorus gramineus*, *Schisandra hinensis*, *Poriacocos* and *Glycyrrhiza uralensis*. There is a study which says that *P. ginseng* has improved abnormal behaviors in animal models of autism.¹⁸ A new study from Japan has suggested a herbal remedy which may relieve behavioural changes in children and adolescents. This herbal remedy is called yokunkansan, which is a combination of seven different Japanese herbs.¹⁹ The study says that the use of this Japanese herb is well tolerated and is known to significantly improve irritation and agitation by eight weeks and hyperactivity by 12 weeks.

Speech therapy

This therapy helps to improve the child's communication skills. A certain group of children will be able to learn verbal communication skills, while others learn it with the help of gestures or picture boards.¹⁰

Sensory integration therapy

This therapy is highly effective, and if the individual gets upset by the things like certain sounds, bright lights or feeling of being touched. This can help them to deal with all these sensory information.⁹ This therapy usually uses play activities which are used to know how the brain

responds to sight, touch, sound and movement. All the studies showed improvement in several autistic symptoms. There are only two studies that used standardized form of sensory therapy.

Chiropractic therapy

Chiropractic therapy is popularly and widely used CAM by the individuals of ASD. In a study performed by Khorshid, compares two types of chiropractic care (Table 2). There was a significant improvement found in the atlas orthogonal group. There is evidence in this work but doesn't have a control group to compare with.²⁰ There has been a severe adverse effect that is associated with pediatric spinal manipulation, which includes vertebral dislocation, subarachnoid hemorrhage.²¹

Acupuncture

Acupuncture is one of the forms of traditional Chinese medicine. This is usually performed by placing needles in the skin and the tissues at certain points. There are two randomized studies that have been published on acupuncture for autism.²² Acupuncture is usually considered to be safe, even if there are adverse events like pain, infection or even organ damage due to improper needle placements (Table 3).²³

Music therapy

Music therapy is known as a systemic process in which the physician helps the individuals to promote health, sing musical song experience and the bond that develops through the dynamic changes. Music therapy in autism represents a variety of non-verbal shared language that enables both verbal and non-verbal individuals to learn communication.²⁴⁻²⁵ It is known to promote communication and expression. It also increases adaptive social skills in children with Autism and improves the quality of the parent–children relationship. There are about 15 studies made on music therapies for autism patients.²⁶ It has reported that there are significant improvements in some studies and no improvement at all in certain studies. Some of the therapies have been listed (Table 4).

Why further research is needed to witness CAM therapy?

CAM is used in various chronic illness, where the patient faces critical illness(cancer patients) with which they are not bothered about its side effects and serious adverse drug reaction. Most of the patients preferred CAM for their self-satisfaction. Herbs are widely used as alternative therapies, but herbs are often reported with ADRs in many studies, from the national pharmacovigilance of Swedish reported that from 259 adverse reactions are related to natural products and herbal medicines.²⁸

Table 2: Sensory integration therapy and chiropractic therapy in autism children.

Type of CAM	Author	Year	Type	Sample size	Comparators	Dose	Outcome
Sensory integration therapy	Fazlioglu et al ⁹	2008	Randomized parallel-group	N=30 M-24 F-7	Control N=15	24-45 min sessions	Significant improvement
	Thompson et al ¹⁰	2011	Open label	N=50 M-26 F-24	Nil	A focus based observation	Significant improvement
Chiropractic therapy	Khorshid et al ²⁰	2006	Randomized parallel-group	3-5 months	N=14 M-13 F-1	Full spine SMT N=7	Significant Improvement

SMT: spinal manipulative therapy, 1. the atlas orthogonal upper cervical spinal manipulative therapy, 2. full-spine, spinal manipulative therapy, in children with autism.

Table 3: Acupuncture therapy in children's with ASD.

Author	Year	Type of study
Chan et al ²²	2009	Randomized parallel-group
Wong ²³	2010	Randomized double-blind placebo-controlled parallel-group

Table 4: Music therapy in children's with ASD.

Author	Year	Type of study	Duration	Sample size	Comparators	Dose	Outcomes
Arezin²⁴	2011	Randomized crossover	Five weeks	n=5 M:F=5:1	Non-music interactive play	18 sessions; 10 minutes each	Significantly more interaction during the music therapy
					Independent play		
Farmer²⁵	2003	Randomized parallel group	Three days	n=10 M:F=9:1	Music therapy sessions	5 sessions; 20 minutes each	Significant increase in the verbal response.
Gattino et al²⁶	2011	Randomized single-blind crossover	Eight months	n=14 M:F=24:0	Clinical routine activities	20 thirty-minute sessions weekly	No statistical difference between the two groups.
Thomas²⁷	2003	Randomized cross over	12 weeks	n=6 M:F=5:1	Playtime (interact with the child with toys and verbal response to a child's behaviour	12 fifteen minute session	Significant improvement in social adaptation and initiating behaviours.

To avoid dangerous drug-induced complications, FDA warns certain false claims in the management of ASD

The FDA has warned a several companies that have improper claims about specific marketed products which were meant for treating or curing autism or autism-related symptoms. These therapies can eventually lead to severe complications. Some of these therapies are mentioned below.

Chelation therapy

Chelation therapy involves products that are known to cleanse the body of toxic chemicals and heavy metals by binding and removing them from circulation. These come

in various forms that include sprays, suppositories, capsules, clay baths and liquid drops. FDA has approved chelating agents for specific uses that include reading lead poisoning and iron poisoning. Hospital pharmacies should continue the stocks of Na₂EDTA as it has a risk of hypocalcaemia with an ongoing safety review by the FDA. Thus pharmacists, nurses and other health care providers must ensure that during chelation therapy to children Na₂EDTA shouldn't be administered.²⁹

Hyperbaric oxygen therapy

This oxygen therapy involves breathing oxygen in the pressurized chamber and has been approved by the FDA

for certain and specific medical uses, which include decompression sickness suffered by drivers.

Detoxifying day baths

The products used are known to draw out pollutants, chemical toxins and heavy metals from the body when added to bathwater. These are advertised falsely as producing dramatic improvement for autism core symptoms.

Various other products

These products include MMS (chlorine di oxide), essential oils, and raw camel milk. These have been marketed for the use of autism related symptoms, but there are no evidences that proves the safety and effectiveness of these advertisements.^{30,31} CAM (marketed classical herbal) products are not always required to prove the safety profile of their products.³³ Overall, high quality RCTs are required to assess the effectiveness of CAM for autism management.

A study conducted by Raja et al in a multi-specialty hospital, where 32% of patients did not know the causes of their illness and they could not name their prescribed medications.³⁴ Above results indicate that patient and caregiver education is one of the main factors which is associated for proper understanding of the illness along with the improvement of quality of life.

CONCLUSION

CAM therapy is gradually increasing in ASD patients because parents help their children and appreciate them to have alternative treatment at least once in their lifetime as a final hope as well as to build a personalized Autism management program. Herbal medication, along with integrative therapy as an adjunctive to traditional treatment, also has an impact in treating children with ASD. Since the majority of the patients and caretakers are not disclosing their CAM use to their respective physicians, it may result as a dangerous, life threatening complication. More clinical studies are needed to witness the safety of CAM therapy. Most importantly, this short review recognizes significant knowledge gaps that can be resolved by future studies. This current information can help narrow the gap between what patients want and what practitioners generally provide for autism management.

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