Review

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Use of Complementary and Alternative Therapies in Autism Spectrum Disorder

Otizm Spektrum Bozukluğunda Tamamlayıcı ve Alternatif Tedavilerin Kullanımı

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ABSTRACT

Autism spectrum disorder (ASD) is a neurodevelopmental disorder which has multifactorial etiology. Parents of children diagnosed with ASD often use complementary and alternative medicine (CAM) on the grounds that they do not benefit from traditional medical treatments. In this article it is aimed to clarify the definition of CAM, to examine the prevalence of the use of CAM in ASD, to examine the CAM interventions and their efficacy used in ASD, and to review the studies about use of CAM among children diagnosed ASD in Turkey. For this purpose, publications in the Science Citation Index (SCI) and SCI-Expanded, MEDLINE, PsycINFO, DergiPark, TÜBİTAK/ULAKBİM-Turkish Medical Index, Turkish Psychiatry Index and Turkish Medline indexes were reviewed. Although current data on the effectiveness of CAM is limited, considering the usage rates, physicians should be informed about CAM interventions, clearly ask about the use of CAM and share information on the subject.

Keywords: autism, autism spectrum disorder, complementary and alternative medicine, treatment

ÖZ

Otizm spektrum bozukluğu (OSB), etyolojisinde birden fazla faktörün rol aldığı nörogelişimsel bir bozukluktur. OSB tanılı çocukların ebeveynleri geleneksel tıbbi tedavilerden yeterince fayda sağlayamadıkları gerekçesiyle tamamlayıcı ve alternatif tedavilere (TAT) yönelebilmektedir. Bu gözden geçirme yazısında TAT kavramının tanımı, kullanım yaygınlığı, OSB'de kullanılan TAT yöntemleri, bu yöntemlerin etkinliklerinin incelenmesi ve ülkemizde OSB'li çocuklarda TAT kullanımı ile ilgili çalışmaların gözden geçirilmesi amaçlanmıştır. Bu amaçla Science Citation Index (SCI) ve SCI-Expanded, MEDLINE, PsycINFO, DergiPark, TÜBİTAK/ULAKBİM-Türk Tıp Dizini, Türk Psikiyatri Dizini ve Türk Medline dizinlerinde yer alan yayınlar gözden geçirilmiştir. Yapılan incelemelerde TAT uygulamalarının OSB'de etkinliklerine dair güncel veriler sınırlı olmakla birlikte kullanım oranları göz önüne alındığında hekimlerin TAT yöntemleri hakkında bilgi sahibi olmaları, ailelere TAT kullanımını açık bir şekilde sormaları ve ailelerle bilgi paylaşımında bulunmaları gerekmektedir.

Anahtar sözcükler: otizm, otizm spektrum bozukluğu, tamamlayıcı ve alternatif tıp, tedavi

Introduction

Autism Spectrum Disorder (ASD) includes a group of neurodevelopmental disorders in which genetic basis has a genetic basis, environmental factors increase the risk with epigenetic interactions, neuronal connections are affected, and neuroimmunological mechanisms may also play a role (Manoli ve ark. 2021). There is currently no drug with proven efficacy in the treatment of ASD, a disorder characterized by difficulties in social communication and interaction and characterized by repetitive behavior patterns. Treatment approaches focus on behavioral and educational interventions.

Similar to other neurodevelopmental disorders, ASD requires long-term treatment management. Treatment satisfaction is considered low, despite long-term interventions (Myers ve ark. 2007). Although there are various approaches investigating the use of antipsychotics, stimulants, antidepressants, GABAergic and cholinergic agents, oxytocin and other agents, the effect of pharmacotherapy alone on core symptoms is limited. Also, the side effects of long-term treatment can be burdensome (Goel ve ark. 2018). In ASD, the frequency of which has increased in recent years, for reasons such as no treatment based on etiology, satisfactory results cannot be achieved despite long-term interventions, families think that they cannot receive the necessary and adequate treatment for their children, and they have difficulty in maintaining long-term educational interventions due to limited financial resources. families may

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seek alternative treatments other than evidence-based scientific medicine practices(Levy ve ark. 2003, Kemper ve ark. 2013, Lindly ve ark. 2018, Shepherd ve ark. 2018).

Complementary and alternative medicine practices commonly used among children with ASD include special diets, nutritional supplements, herbs, probiotics, music therapy, art therapy, massage therapy, craniosacral therapy, chelation, hyperbaric oxygen therapy, and various spiritual practices. Although there are a wide variety of CAM applications that families apply, it is reported that the data proving the effectiveness of many CAM modalities are insufficient (Whitehouse 2013). Therefore, in this review, it is aimed to define the concept of CAM, its prevalence, to examine the CAM methods and activities used in ASD, and to review the data on the use of CAM in children with ASD in our country, respectively.

Method

For foreign article sources, publications in the Science Citation Index (SCI) and SCI-Expanded, MEDLINE and PsycINFO indexes, and for domestic article sources in DergiPark, TÜBİTAK/ULAKBİM-Turkish Medical Index, Turkish Psychiatry Index and Turkish Medline indexes were used. The search terms used in the study are as follows: "autism" and "complementary medicine", "alternative medicine", "dietary supplement", "vitamine supplement", "omega 3 fatty acids", "probiotics", "acupuncture", "hyperbaric oxygen therapy", "chelation", "music therapy", "massage therapy", "hippotherapy", "sensory integration". In the searches conducted in April 2021, clinical studies, meta-analysis studies, randomized controlled studies and systematic reviews published only in refereed journals and published in English and Turkish languages were selected from 1057 articles with search terms, and a total of 158 articles were reviewed after replications were excluded.

Complementary and Alternative Treatment Concepts

The concept of CAM, which includes a heterogeneous group method, is defined by the World Health Organization as "a large group of health practices that are not integrated into the health system dominantly used in the country and are not part of the tradition of that country" (World Health Organization (WHO) 2021). Avrupa Tamamlaaccording to European Federation for Complementary and Alternative Medicine/EFCAM, complementary and alternative medicine is a variety of health practices used in the maintenance and improvement of health, prevention and treatment of disease and can be used independently or in conjunction with conventional medicine approaches (European Federation for Complementary and Alternative Medicine (EFCAM) 2021). The National Center for Complementary and Integrative Health: NCCIH, established in the United States, separates complementary and alternative medicine approaches. This institution calls the use of unconventional practices together with conventional medicine as "complementary medicine" and the use of them instead of conventional medicine as "alternative medicine" (NCCIH 2021). Stating that most of the people who use unconventional practices also use conventional methods, NCCIH also uses the definition of 'integrative medicine', which brings together conventional and complementary approaches in a coordinated way in recent years (NCCIH 2021).

Results

Prevalence of CAM Applications, Use in Child and Adolescent Psychiatry and Reasons for Preference

It is reported that the use of CAM is gradually increasing worldwide (Posadzki ve ark. 2013, Höfer ve ark. 2017). Children with developmental problems are more likely to use CAM than typically developing children (Zisman ve ark. 2020). CAM usage rates in children diagnosed with somatic and psychiatric disorders range from 1.8 to 87.6%, depending on the sample included in the studies and the difference in the evaluation methods used (Italia ve ark. 2015, Frawley ve ark. 2017). Among neurodevelopmental disorders, the most frequent use of CAM is in ASD with a rate of 28-95% (median 54%) (Höfer ve ark. 2017). For other disorders, CAM usage rates of 54-68%(Sinha ve ark. 2005, Mazhar ve ark. 2016) in ADHD, 56%(Hurvitz ve ark. 2003) in cerebral palsy, and 70%(Prussing ve ark. 2005) in Down Syndrome have been reported.

It has been determined that the use of CAM in our country is increasing gradually and the rates vary between 22.1 and 90.6% (Çakmak ve ark. 2017, Biçer ve ark. 2019,). As an indicator of the increasing interest, it was determined that 45 TAT centers were operating in the Ministry of Health Education and Research Hospitals in May 2021 (https://shgmgetatdb.saglik.gov.tr/TR-21264/uygulama-merkezleri.html).

TAT choices vary according to cultural factors. Biologically-based interventions are preferred in Western countries, while acupuncture and traditional Chinese medicine are preferred in Eastern and Southeast Asian societies (Wong 2009). The use of CAM was found to be associated with the presence of chronic or recurrent disorders in children, the presence of developmental delay, and the need for special care/rehabilitation services (Çarman ve ark. 2018). Although there is not enough evidence about the effectiveness of CAM applications, the increasing rate of preference seems contradictory, but the perception that CAM applications are natural and harmless applications can be preferred when compared to the potential side effects of conventional drug treatments (Huffman ve ark. 2011,Weekes 2012). Besides, families may turn to CAM applications to help their children in cases where current conventional treatments are inadequate (Levy ve ark. 2015).

CAM Applications in Children with ASD

CAM treatments in children with ASD are used for many conditions, including core symptoms of ASD, such as concentration, relaxation, gastrointestinal problems, sleep disturbance, communication, sensory problems, seizures, and general health (Shuai ve ark. 2020). Although both biological (vitamin/mineral support, diets, omega 3 fatty acids, etc.) and non-biological

(music therapy, behavioral optometry, hippotherapy, craniosacral manipulation, etc.) CAM interventions are used, current research has focused more on biologically based CAM interventions (Bilgiç ve ark. 2009, Höfer ve ark. 2017).

Diet Therapy

Dietary restrictions are one of the most preferred CAM methods by parents of children with ASD. Gluten- and casein-free diet (GCFD) is the most commonly used diet therapy (DeFilippis 2018). The basis of the GCFD application is based on the hypothesis that these children may have difficulty in breaking down gluten and casein and that the peptides formed during digestion may pass into the circulation and act as endogenous opiates (Christison ve ark. 2006). Although GCFD is the most researched diet therapy in ASD, the results of existing studies are contradictory. In a double-blind randomized controlled trial (DBRCT), it was shown that the addition of casein and gluten to the diet did not lead to an increase in behavioral symptoms and gastrointestinal symptoms in 74 children with ASD aged 2-10 years (Pusponegoro ve ark. 2015). Another DBRCT reported no significant effects of gluten- and casein-containing nutrient loadings on physiological functioning, behavioral symptoms, and autism symptoms (Hyman ve ark. 2016). Elder et al. (2006) stated that gluten- and casein-free diet did not cause a significant change in childhood autism rating scale scores in a 12-week cross-over DBRCT, but parents had anecdotal reports of improvement in their children. In another open-label study, the effect of GCFD and low sugar normal healthy diet on ASD was investigated and it was reported that both diets provided various gains in behavior, language and autism symptoms, but there was no significant difference between diets(Johnson ve ark. 2011). Whiteley et al. (2010), on the other hand, found that GCFD improved Autism and Attention Deficit Hyperactivity Disorder Scale scores. In studies conducted on GCFD, it is noteworthy that parents' beliefs about the effectiveness of diet therapy are high, even when the results of the research do not support this. GCFD is generally well tolerated by children, but current evidence does not support its use in autism (DeFilippis 2018).

Dietary practices in ASD may also include different methods such as Ketogenic diet, Chan diet, Feingold diet, low oxalate diet, GAPS diet and low FODMAP diet. In the ketogenic diet, which can also be used in the treatment of epilepsy, carbohydrates are severely restricted, protein is the minimum part of the daily nutrient requirement, and fats constitute the majority of the daily nutrient. In this way, the body is forced to use fat as an energy source. The classic ketogenic diet, also known as the long-chain triglyceride diet, is thought to support mitochondrial function by saving NAD (Seda ve ark. 2017). Two open-label, small-sample studies on the use of ketogenic diet in ASD have reported that it may benefit symptoms, but adherence to the diet is difficult (Evangeliou ve ark. 2003, Spilioti ve ark. 2013). Meta-analyses do not support the benefits reported in individual studies (Brondino ve ark. 2015).

The Feingold diet recommends the complete elimination of food additives and preservatives such as artificial sweeteners, colorants, flavorings, and the restriction of natural foods containing salicylates in the diet (Güller ve ark. 2020). Dr. Feingold reported that removing food additives from the diet resulted in a reduction in hyperactive symptoms in some cases of attention deficit hyperactivity disorder (Feingold 1985). Based on this, the feingold diet has also been used in children with autism, but there are no qualified randomized controlled studies evaluating its effectiveness. A low oxalate diet is based on the hypothesis that in individuals with ASD, there may be disruption in the metabolism of oxalate due to poor intestinal flora, and high oxalate may enter the circulation and cause damage to tissues and organs, especially the brain and therefore, it may be beneficial to include less oxalate in the diet. However, there are no evidence-based studies showing that this diet is effective in ASD(Cekici ve ark. 2019). In the low-FODMAP (fermented oligo-di-monosaccharide and polyols) diet, the FODMAP group carbohydrates, which have high osmotic properties and cause gas accumulation by fermenting in a short time, increase the volume of water in the colon in the presence of malabsorption and cause diarrhea(Nanayakkara ve ark. 2016). There is not enough evidence for the effectiveness of a low-FODMAP diet, which is mostly used in the treatment of inflammatory bowel diseases, in autism.

Nutritional Supplements

The frequent occurrence of gastrointestinal system problems and special diet practices in children with ASD may lead to vitamin and mineral deficiencies. Also, it was observed that cellular methylation and glutathione-mediated antioxidant defense mechanisms are insufficient in patients with ASD (Bilgiç ve ark.). Hence, supplements that aim to increase vitamins and minerals that act as coenzymes in various biochemical reactions are also used (Doreswamy ve ark. 2020). As nutritional supplements, omega 3 fatty acids, vitamins B6, B12, tetrahydrobiopterin, L-carnosine, vitamin C, probiotics can be used.

There are studies reporting differences in the levels and ratios of omega 3 and omega 6 polyunsaturated fatty acids (Polyunsaturated Fatty Acid: PUFA) in individuals with ASD. It is thought that these differences may be due to insufficient intake, problems in the metabolism of fatty acids or differences in their participation in the cell membrane (Parletta ve ark. 2016). Omega 3 and omega 6 are essential fatty acids that cannot be produced by the body and are taken with food. Although it is thought that improvement in ASD symptoms can be achieved with the supplementation of these fatty acids, researches show conflicting results about their effectiveness. In an internet-based randomized controlled trial, it was reported that omega 3 supplementation (1.3 g/day) reduced hyperactivity symptoms in 57 children with ASD aged 5-8 years, but this decrease could not reach the level of significance (Bent ve ark. 2014). In the DBRCT, which included 13 children with ASD, no significant difference was found in the core symptoms or other ASD-related symptoms in the group that received and did not receive omega 3 supplements, but it was shown that the trend of decrease in hyperactivity level tended to be higher in the group that received omega 3 supplements (Amminger ve ark. 2007). In a recent meta-analysis study, it was reported that

there was a minimal increase in general well-being with Omega 3 and Omega 6 supplementation in people with ASD, but it did not have a significant effect in areas such as hyperactivity, irritability, stereotypes, speech problems and social responsiveness when looking at sub-domains (de Andrade Wobido ve ark. 2021).

Adam et al. (2011) reported that 3-month multivitamin supplementation provided improvement in metabolic parameters such as total sulfate, S-Adenosyl Methionine (SAM), reduced glutathione, NADPH, and ATP. In the same study, no significant difference was found in the Pervasive Development Disorder Behavior Inventory/ PDD-BI, Autism Evaluation Treatment Checklist/ ATEC and Severity of Autism Scale/ SAS scores in the evaluations of autism symptoms, while significant improvement was found in the Parent Global Impression-Revised Scale PGI-R areas of receptive language, anger outbursts and hyperactivity, which were revised by the researchers and whose validity and reliability were not established.

While there are no randomized placebo-controlled studies of vitamin D, there are two open-label studies reporting improvement in autism symptom scores with 3 months of cholecalciferol (Vitamin D3) supplementation (Saad ve ark. 2016, Feng ve ark. 2017). In a 6-month prospective case-control study, no significant difference was found in the childhood autism rating scale, social intelligence, and autism treatment rating scale scores between the group that took vitamin D supplementation and the group that did not (Azzam ve ark. 2015).

Methylcobalamin (Vitamin B12) and Folate, which have an important role in methylation reactions and antioxidant system, are supplements that can be used in the treatment of ASD. In a randomized controlled trial (RCT) of B12, 8 weeks of B12 supplementation showed significant improvement in clinician-scored clinical global follow-up scale, no significant difference was found in Abberant Behaviour Cheklist ABC and Social Responsiveness Scale/ SRS, which are answered by parents (Hendren ve ark. 2016). In another RCT, no significant difference was found in behavioral symptoms and glutathione levels with 3 months of B12 supplementation (Bertoglio ve ark. 2010). There is an RCT showing that folate supplementation improves verbal communication skills (Frye ve ark. 2018). An open-label study in which folate and B12 supplementation was given in combination showed improvement in glutathione levels and improvement in Vinelan adaptive behavior scale scores (Frye ve ark. 2013). In another open-label study comparing children with ASD who received structured education and children with ASD who received folic acid supplementation in addition to structured education, it was demonstrated that folic acid supplementation resulted in significant improvement in sociability, verbal/preverbal cognitive skills, receptive language, emotion expression, and communication skills (Sun ve ark. 2016).

Pyridoxine (Vitamin B6) plays a role as a cofactor in the conversion of dopamine to norepinephrine and the synthesis of serotonin from tryptophan. Magnesium (Mg) is both a cofactor in various reactions and prevents side effects such as irritability and hyperacusis that occur with vitamin B6 support (Nye ve ark. 2005). Systematic reviews investigating the efficacy of combined Vit B6 and Magnesium concluded that the study samples were too small and the use of Vit B6-Mg supplementation in ASD could not be recommended (Nye ve ark. 2005, Murza ve ark. 2010).

Since digestive system problems are common in individuals with ASD, digestive enzymes and probiotics were thought to be potential treatments. Differences in the types and amount of Clostridium bacteria were observed in the intestinal microbiota of those with ASD (Finegold ve ark. 2002, Song ve ark. 2004). It was suggested that improvement in ASD severity and digestive system problems can be achieved as a result of regulating the microbiota with probiotic supplementation (Shaaban ve ark. 2018). Although the number of studies is quite limited, an RCT investigating the efficacy of probiotics reported its effects on intestinal flora and behavioral symptoms such as destructive behaviors, anxiety and communication problems (Parracho ve ark. 2010). In a cohort study, it was reported that Lactobacillus acidophilus improved intestinal flora, attention and following directions .(Kałużna-Czaplińska ve ark. 2012) When the results of the study are evaluated, digestive enzymes and probiotic supplementation may be beneficial for gastrointestinal symptoms in ASD patients, but the available data do not support that they are beneficial for the core symptoms of autism and related behavioral symptoms (DeFilippis 2018).

Due to its antioxidant effects, supporting cellular immunity, its role in the production of dopamine from tyrosine and serotonin from tryptophan of Vitamin C; due to the role of tetrahydrobiopterin in the biosynthesis of catecholamines and serotonin, due to tge antioxidant properties and its strengthening effect on GABA function in the brain of L-Carnosine; due to the importance in cell membranes of Omega 3 fatty acids, and due to the antioxidant properties of N acetyl cysteine were investigated in ASD treatment.(Dolske ve ark. 1993)(Danfors ve ark. 2005) (Chez ve ark. 2002)(Amminger ve ark. 2007, Bent ve ark. 2011, Bent ve ark. 2014, Mankad ve ark. 2015)(Hardan ve ark. 2012, Ghanizadeh ve ark. 2013, Wink ve ark. 2016) Considering the research results and the insufficient number of studies, there is not enough evidence to support their use in the treatment of autism.

Hyperbaric Oxygen Therapy

The theoretical basis of hyperbaric oxygen therapy (HBOT) is that it is possible to deliver oxygen to the tissues by virtue of the greatly increased partial pressure of oxygen (Calvert ve ark. 2007). It has also been shown in animal experiments that it may have anti-inflammatory effects (Miljkovic-Lolic ve ark. 2003, Wilson ve ark. 2006). It has been tried to be used based on the suggestions that perfusion may be decreased in the central nervous system in ASD(Gendry Meresse ve ark. 2005), that HBOT may increase proliferation, migration and differentiation in neural stem cells(Wang ve ark. 2007,Wang ve ark. 2009), and that it may provide neural improvement in ASD. However, these suggestions are not supported by the findings related to the pathophysiology of ASD. Evidence

showing that HBOT is effective in autism is contradictory and weak. Besides, high pressure can cause barotraumas (Sampanthavivat ve ark. 2012). A Cochrane review stated that, given the available evidence and biological plausibility, the focus of studies should shift to other treatment options, such as behavioral and developmental interventions, pharmacotherapy, rather than further studies of HBOT in autism (Xiong ve ark. 2016).

Chelation Therapies

In chelation therapy, a chelating agent is administered that binds to heavy metals such as lead and mercury and is then excreted in the urine. Approved for the treatment of cases of heavy metal poisoning, this treatment is based on the hypothesis that children with ASD have higher levels of mercury and other heavy metals compared to their peers due to intrauterine exposure, vaccination (thymerol), oral intake (fish or drugs), respiration (air pollution), increased absorption and decreased excretion (James ve ark. 2015). Although this theory has not been proven, it was reported that 7% of individuals with ASD receive chelation therapy (Green ve ark. 2006).

There are no randomized controlled studies on the use of chelation therapy in autism. Existing studies are methodologically problematic and their results are contradictory (Davis ve ark. 2013). Cases of cardiac arrest due to hypocalcemia have been reported with chelation therapy (Brown ve ark. 2006). Considering the results of the study, chelation therapy is not recommended in ASD. Besides, the U.S. Food and Drug Administration (FDA) has issued a warning to parents to beware of false and misleading claims associated with the use of chelation therapy and hyperbaric oxygen therapy to treat autism symptoms.

Music Therapy

The special interest of autistic patients in music was also stated by Kanner. Kanner observed that some patients with no verbal skills could sing or hum, while others could recognize complex melodies. Music therapy is recognized as a way to promote pre-speech communication through joint attention, motor imitation, and improvement of synchronous rhythm (Mayer-Benarous ve ark. 2021). Yurteri et al. (2019) found that improvisational music therapy for eight weeks, twice a week for 40 minutes, provided additional positive improvements in terms of both autism spectrum symptoms and quality of life in children with ASD.

In a recent systematic review trial conducted, 37 research results were evaluated and it was stated that educational music therapy had a positive effect especially on speech, while improvised music therapy had positive effects on social functionality (Mayer-Benarous ve ark. 2021).

Massage Therapy

There are studies reporting that massage applied by a parent or therapist improves sensory processing, autism symptoms, and parental stress. Studies have limitations such as small sample size, high risk of bias, lack of predetermined outcome criteria, and insufficient follow-up time (Lee ve ark. 2011). Although the strength of evidence is low, a sensory-focused intervention that can be administered in the home setting with minimal risk of harm seems promising (Weitlauf ve ark. 2017).

Sensory Integration Based Approaches

Sensory integration therapies aim to help sensory processing difficulties by controlling/regulating environmental sensory inputs. Although there is no consensus on the level of evidence, they are becoming increasingly popular with children with behavioral and developmental problems. Although there are studies reporting positive results, current studies are methodologically weak and have a high risk of bias (Barton ve ark. 2015). Additional research is needed examining its effectiveness for children with ASD and sensory processing problems (Case-Smith ve ark. 2015).

AT Supported Activities, Therapies (Hipotherapy)

Although there are studies reporting that hippotherapy, which provides rhythmic movement to the patient's body, increased socialization, decreased maladaptive behaviors, decreased response time to stimulus, and increased problem-solving skills in children, a recent meta-analysis study does not support these findings .(Trzmiel ve ark. 2019)

Acupuncture

Acupuncture, which is a part of traditional Chinese medicine, can be used in various diseases on the grounds that it corrects irregularities and inconsistencies in the body. Its mechanism of action is not known exactly, but it is thought to modulate the neuroendocrine system (Zhang ve ark. 2021). The number of studies is very limited. In a meta-analysis study that included 11 studies, it was stated that acupuncture may be an effective treatment for children with ASD, but high-quality randomized controlled studies are needed before this treatment can be applied widely (Liu ve ark. 2019).

Studies Conducted in Turkey on the Use of CAM in Children Diagnosed with ASD

In the multicenter study of Bilgiç et al. (2013), in which they evaluated 172 parents with children with ASD, the rate of parents using at least one CAM method was 56% (sensory integration therapy was not included). The most commonly used CAM application is the spiritual healing method. This is followed by a gluten- and casein-free diet, secretin, and no vaccination. The most common reasons for turning to the use of CAM were reported as "not being satisfied with the usual treatment" and "increasing the effectiveness of the usual treatment". Parents stated that they obtained information about the CAM application they used from other family members (53%) and other parents (21%) who had a child with ASD. Only 23% of the participants stated that they shared the CAM method they used with the physician who followed their children .

Çarman et al. (2018) reported that among the parents of 832 children followed up with various diagnoses, including ASD,

in the Department of Pediatric Neurology, the rate of CAM use was 25% in the last year, and they used religious methods most frequently (69.2%). Only 2.5% of the parents shared this information with the physician following their child. Şener and Karaca (2020) evaluated the parents of children with diagnoses such as ASD, growth retardation, and cerebral palsy and reported the rate of CAM use as 77.2% (ASD 88.5%). In this study, it was determined that biologically based CAM was used most frequently (e.g. diet and vitamins). Among other common methods, manipulative/somatic methods (massage, exercise), mind/body-based interventions (prayer, amulet, etc.) have been reported. The most frequently preferred CAM applications in children with ASD are amulet (57.1%) gluten and casein-free diet (50%), no vaccination (50%), herbal products (47.8%) and taking them to a hodja (46.3%). 64.5% of the participants in the study stated that they shared the use of CAM with their doctors . Kütük et al. (2021) evaluated the parents of 145 children with ASD who were followed up in secondary and tertiary care centers in Adana, Denizli, Düzce, Gaziantep, İstanbul, Malatya, Manisa, Mersin, Şanlıurfa. CAM usage rate was reported as 55.9%, and the most preferred CAM method was traditional/religious healers (49.7%). Other methods are herbal formulations (5.5%), HBOT (2.8%) and ozone therapy (2.1%). They found that CAM use increased in the presence of epilepsy in parents and children with psychopathology, and that CAM use started after special education was started.

Conclusion

CAM applications, which are increasingly used around the world, are frequently preferred especially in children with developmental problems. Although the data on the efficacy of CAM applications in ASD are limited, physicians should have information about CAM methods when their usage rates are taken into account. Data obtained from studies conducted in our country show that families do not share their CAM use with their physicians. Asking questions about the use of CAM during the evaluation by the doctors and explaining clearly the positive and negative aspects of CAM applications may contribute to the families' orientation towards the most appropriate treatment methods for the child.

Table 1. Complementary medicine categories according to the US National Center for Complementary and Alternative Medicine (NCCIH 2021)

Complementary Medicine Methods	Examples
1. Nutritional Methods	special diets, dietary supplements, vitamins and minerals, medicinal herbs, probiotics and microbial-based therapies.
2. Psychological Methods	meditation, hypnosis, music therapies, relaxation therapies. Spiritual practices
3. Physical Methods	acupuncture, massage, spinal manipulation
4. Psychological and Physical Methods:	yoga, tai chi, dance therapies, some types of art therapy.

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