Cannabidiol's Potential Role in ADHD and Autism

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Attention-deficit hyperactivity disorder (ADHD) is characterized by inattention, hyperactivity, and impulsiveness that interfere with a person's ability to socialize or perform well academically or at work. According to the American Psychiatric Association, 5% of children have ADHD.[1] The Centers for Disease Control and Prevention estimates 6.1 million children and adolescents suffer from the disorder.[2] An estimated 29.3% of children with ADHD remain diagnosed with the condition into adulthood.[3]

Attention deficit disorder (ADD) is a subtype of ADHD that does not involve excessive hyperactivity and restlessness. ADD is considered the predominantly inattentive type of ADHD.

ADHD can also occur as a comorbidity of autism spectrum disorder (ASD).[4]

The Role of the Endocannabinoid System in ADHD and Autism

Impaired dopamine transmission in the striatum is involved in the development of attention-deficit hyperactivity disorder.[5] Dopamine transmission in the striatum also influences the endocannabinoid system (ECS) through acting on CB_1 receptors.[5] Dysfunctions in dopamine's modulation of this system can lead to hyperactivity.[5] Furthermore, the endocannabinoid system is frequently impacted in ASD patients with seizures, anxiety, cognitive problems, and impaired sleep.[6] Compared with healthy controls, lower plasma levels of the endocannabinoid anandamide have been found in children with ASD; and children with ASD were more likely to have low anandamide, implicating dysfunctional anandamide signaling in the etiology of ASD.[7] This impaired anandamide signaling is thought to play a role in the social dysfunction that occurs in ASD, further linking the endocannabinoid system with this disorder.[8]

CBD Use for ADHD

Formal research on CBD's effect on ADHD is in its infancy. Clinically CBD is a powerful tool in dampening many of the presentations of ADD/ADHD. Studies investigating the use of CBD are often on symptoms that are similar to those suffered by ADHD patients and suggest probable benefit in ADHD patients as well. For example, CBD was found to improve sleep in Parkinson's patients.[9] In another study, CBD had a calming effect on patients suffering from anxiety.[10] Its relaxation effects in people with social anxiety disorder appear to be due to its influence on the limbic and paralimbic brain areas.[11] In one study of adults with ADHD using an oral spray containing both CBD and the psychoactive component of marijuana THC, cognitive performance did not improve; but there were marked improvements noted in hyperactivity, impulsivity, and inhibition measures.[12]

CBD and Autism

CBD has been found to improve many symptoms that are common to autism and other disorders. In addition to its calming effects as noted above and its ability to improve sleep, also addressed earlier in this article, CBD may improve social functioning. In two rat models of schizophrenia, it inhibited social withdrawal and reduced deficits in social interaction and cognition.[13,14] Furthermore, in a mouse model of Dravet syndrome, CBD reduced seizures and autism-like behaviors.[15]

Conclusion

Though there are limited human studies investigating the effects of CBD on ADHD and autism, there is scientific justification explaining why CBD may be supportive in these disorders. The association between the endocannabinoid system, ADHD, and autism is one factor pointing to the possibility that CBD may have a part to play and that employing strategies that impact the endocannabinoid system may lead to significant improvements. There is also growing evidence that the endocannabinoidome that describes the interplay between the human microbiome and the endocannabinoid system will undoubtingly further increase the clinical applications of CBD relative to modulation of the gut-brain axis.

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