Using Oxytocin as a Therapy For Individuals with Autism Spectrum Disorder

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Abstract

Autism Spectrum Disorder (ASD) is a disorder with many symptoms ranging from a lack of social skills and communication to repetitive actions and behaviors. . The disorder is characterized by a large spectrum, making it difficult to diagnose, due to the wide variety of symptoms it can portray in affected people. ASD poses a challenge on a worldwide scale due to lack of information regarding causes or curative treatment. Though there are no acknowledged cures, there are many types of therapies for children with ASD - all aimed at improving their symptoms ("Autism spectrum disorder", 2022). One possible treatment option that is being researched is 'Oxytocin Therapy'. Oxytocin therapy utilizes oxytocin -a hormone/chemical messenger that promotes qualities of recognition, trust, and bonding which leads to its positive enforcement of social interactions in people (DeAngelis, 2008). These qualities are what led to the development of a hypothesis that this hormone could be administered in a therapeutic form to improve the social functioning in those diagnosed with ASD (Ford, n.d.). This neuropeptide is administered intranasally and has been researched mostly in young children and teenagers. The results from these studies prove to be controversial as they display both positive as well as negative findings. Hence, further research needs to be conducted on oxytocin therapy before a comprehensible conclusion can be made on its outcome.

Introduction

In 2018 it was established that an average of 1 in 4 children are diagnosed with autism spectrum disorder by the CDC ("Data and statistics", 2022). Autism spectrum disorder (also known as ASD) is a neurodevelopmental disorder characterized by difficulties in social communication and interaction ("Autism spectrum disorder", 2022). Patients diagnosed with autism have a large number of symptoms and behavioral abnormalities. These symptoms include: social impairment with communication difficulties along with repetitive and characteristic behaviors. Specifically, signs of this include attention deficits such as failing to respond to one's name when called, lack of eye contact, and an abnormal range of speech (no speech or fluent speech that may be awkward or inappropriate). Repetitive behaviors may include certain bodily or speech ticks as well as an obsessive/deep interest in ideas or concepts which are intriguing to the patient("Autism spectrum disorder", 2022).

Doctors and clinicians categorize the disorder into different types based on these symptoms. One type of ASD is known as high functioning autism (HFA) which is also known as level 1 autism, and another type is known as low functioning Autism (LFA) which is also called level 3 autism. (Fredericks, 2008). Patients with high functioning autism are able to read, write, and speak efficiently and are able to perform basic life skills such as eating and getting dressed. They show incredible persistence, can recognize patterns, and pay attention to detail. However, they experience difficulties with social interaction, are hypersensitive to their environment, display uncoordinated movements, and lack desire for a routine. ("What is Asperger Syndrome?", n.d.). Level 2 includes the same symptoms, but more severe, with marked deficits in social interaction and verbal display. Level 3 is characterized by the most prevalent symptoms which characterizes it as low functioning autism. These symptoms include severe deficits in social interaction and verbal communication ("Autism diagnosis criteria", n.d.). Patients diagnosed with level 3 ASD are typically in need of full time aides and/or intensive therapy (Holland, 2018).

Children and adults with low functioning autism (LFA) will commonly show pronounced symptoms including limited social abilities, repetitive behaviors, and restrained communication skills. Research indicates that 25-50 percent of individuals with LFA will never be able to achieve the skill of functional speech in their lifetime. Patients diagnosed with LFA also tend to have more memory impairments as compared to patients with HFA (Ni Chuileann & Quigley, 2012).

Typically, ASD is diagnosed during childhood. If symptoms are very apparent, diagnoses can be made at the early age of 18 months of age. This early diagnosis can be sought if the child shows signs of ASD at the age of 6 to 12 months. However, it is also possible for autistic symptoms to emerge and subside by the age of 24 months (WebMD Editorial Contributors, n.d.).

Although ASD is not curable, there are many treatments (including medications and a variety of different therapies) that can alleviate its symptoms. One new type of therapy - known as Oxytocin Therapy - has been recently researched and is considered effective in treating individuals with ASD.

Oxytocin - also known as alpha-hypophamine - is a hormone/chemical messenger that is produced in the hypothalamus and is transported and stored in the posterior pituitary gland. Subsequently, the pituitary releases the hormone into the bloodstream in response to a trigger. The secretion of oxytocin from the pituitary gland relies on the activity of neurons within the hypothalamus - excitation of these neurons leads to the release of oxytocin into the

bloodstream (“Oxytocin”, n.d.).

The roles of oxytocin span in variety. One significant role of the hormone is specifically to trigger contractions of the uterine wall and lactation during childbirth. Not only does oxytocin stimulate the muscles within the uterus to contract but also boosts production of prostaglandins - which sustain these contractions. The psychological effects of these increased levels of oxytocin during childbirth can lead to “reducing pain and anxiety, enhancing well-being, and promoting interaction and bonding with the child” (Doherty, n.d.). Oxytocin is also known to play a role in facilitating social-interactions with others and can encourage their ability to affiliate with others. Stressful situations can also boost levels of oxytocin in the body. This response has been linked with low norepinephrine levels, blood pressure, and heart rate (DeAngelis, 2008). The hormone is capable of enhancing trust or suspicion, affiliation or aggression, sexual arousal, and learning and memory (Ford, n.d.). The role oxytocin has within social bonding and stress regulation is what led researchers to hypothesize that oxytocin could be utilized as an effective therapy for those with ASD (DeAngelis, 2022).

Oxytocin Therapy for Autism Spectrum Disorder

Oxytocin therapy aims to optimize the circuits that underlie social deficits in those with ASD while improving reward, motivation, and learning in them (Guastella, 2016). Nature Reviews Neurology states that, “oxytocin increases the salience of social stimuli and fine-tunes neural processes so that an organism can better attend and respond to those stimuli”(Ford, n.d.). Specifically, oxytocin facilitates the flow of social information from incoming sensory signals. This information is encoded in the regions involved with cognitive processes such as reward, learning, and memory.

The method of administration of this treatment would be through a nasal spray. This method of therapy was observed and analyzed through many different studies and trials. One randomized double-blind clinical trial studied oxytocin’s effect on children with ASD conducted by Yatawara et al. In this trial, 31 children aged 3-8 and affected with ASD were used as participants. These participants were randomly assigned drug kits which either had an oxytocin nasal spray or a placebo spray. The first dose started with 3 IU (International Units) twice a day and gradually increased to 12 IU twice a day (full dose) by day 7. 15 of the participants had ‘oxytocin then placebo’ and 16 had ‘placebo then oxytocin’. This treatment lasted for a total of 5 weeks. The participants’ oxytocin levels were measured before and after the treatment and their behavior was observed (Yatawara et al., 2015).

Results of this experiment revealed that children aged 3-8 with autism had an improved social responsiveness - as rated by their care-giver - over a 5 week course of oxytocin treatment. This study shows how there can be significant improvements caused by this new form of therapy, however another study experimenting with the effects of oxytocin with individuals with autism did not show as promising results.

Another study published in the New England Journal of Medicine was conducted using 290 participants aged 3-17 years diagnosed with autism spectrum disorder. These participants were administered 24-40 international units of intranasal oxytocin or placebo twice a day for a maximum of 24 weeks. Clinical questionnaires were completed by the parents/guardians of the participants in 4 week intervals. The data provided by 277/290 participants had shown that the administration of oxytocin had no effect on ASD symptoms (Sikich et al., 2021).

The ability of oxytocin to penetrate through the blood/brain barrier and diffuse intracerebrally has been questioned due to its short half-life. Instead of the chronic supplementation route, researchers wonder if enhancing oxytocin signaling could be a promising treatment. In addition to solely supplying the participants with doses of oxytocin, researchers speculate whether pairing this intranasal dose with cognitive and behavioral therapy would prove to be an effective method (Ford, n.d.).

Another randomized, double-blind, placebo-controlled study utilized 19 adult participants diagnosed with high functioning autism or Asperger’s disorder - 16 males. These participants were aged 33 years with a standard deviation of 13. The subjects were randomized to a dose of 24 IU (6 puffs) intranasal oxytocin twice daily for 6 weeks. Their social and cognitive function was measured using the Diagnostic Analysis of nonverbal Accuracy, and repetitive behaviors were measured through Repetitive Behavior Scale Revised. Molecular Autism states that “secondary measures included the Social Responsiveness Scale, Reading-the-Mind-in-the-Eyes Test and the Yale Brown Obsessive Compulsive Scale – compulsion subscale and quality of life (World Health Organization Quality of Life Questionnaire – emotional/social subscales). These tests were conducted every 2 weeks. Results showed that based on the scores of the measurement scales, improvements occurred in social cognition and quality of life after the full 6 weeks of dosage (Anagnostou et al., 2012).

Conclusion

The skewed results obtained from the research conducted so far indicates that utilizing oxytocin as a therapy needs to continue being researched. A multi-level meta-analysis conducted by Huong et al and published in The Journal of Neuroscience and Biobehavioral Reviews highlights the promise of using oxytocin as a new generation therapeutic to address core social impairments in ASD (Huang, 2021). There is still much that needs to be studied about the direct effects of oxytocin on one’s actions and attitudes before a clear determination can be made on whether this therapy will be useful in improving the symptoms in those diagnosed with ASD. Future studies should involve larger numbers of participants with wider spectrums of race, age, and gender represented in order to see if these traits affect the results oxytocin therapy can have on its user with ASD. There must be a wider pool of participants with diversity in age as well as gender to see if these traits affect the results oxytocin can have on its user with ASD.

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