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Causes, Symptoms and Treatments for Autism: Literature Review

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Abstract: In the past few years, there has been critical advance in understanding the causes, symptoms, and medications for autism spectrum disorder (ASD). This literature review aims to summarize the current understanding of autism spectrum disorder (ASD) by examining various studies and research conducted in recent years. This review will focus on the causes, effects, different symptoms, and solutions for individuals that suffer from autism spectrum disorder (ASD). The patients often experience a wide range of effects that impact their social communication, behavior, and sensory processing. Difficulties in social interaction, communication challenges, repetitive behaviors, and sensory sensitivities are common characteristics of ASD. These effects can vary in severity and manifestation from person to person, highlighting the heterogeneous nature of the disorder.Genetic factors play a significant part, with certain gene mutations and varieties contributing to the development of ASD. Moreover, natural components and pre-birth complications are also related with higher risks of ASD.The paper discusses the implications of these findings in refining our understanding of autism and ultimately developing improved interventions and support mechanisms for individuals with autism spectrum disorder.

Keywords: Autism, Etiology, Treatment

1. Introduction

Autism is a condition that affects how people communicate and interact with others. It causes the patients to have specific patterns of behavior that they do repeatedly and limit the patients range of interests or activities [1]. It's possible that autism spectrum disorder (ASD), was in existence for quite a while. But the first time it was officially recognized and diagnosed was in a published account was in 1943, by Dr. Leo Kanner who created the first service for children with mental health problems in the United States. Autism was described by Dr. Kanner when he studied 11 children in total, containing 8 boys and 3 girls, that had trouble with their emotions and connecting with others. Their symptoms were ascribed as autism.

Autism is a condition that affects how the brain develops and how someone interacts with others. It may cause issues in social interaction and communication such as maintaining eye contact, understanding social cues, and initiating and maintaining conversations. Patients may also exhibit repetitive behaviors, for example hand flapping or repeating certain words, sensory sensitivities, and intense interests in certain topics. So, due to the wide range of symptoms that may appear in autism patients, the term "spectrum" is used as the name for autism.

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According to the DMS-5, to be diagnosed with autism spectrum disorder, a child not only needs to have difficulties in these three areas in communication and interaction with others: deficits in emotion reciprocity, deficits in communication not involving words or speech, and deficits in developing and maintaining relationships with others. The child also needs to have two of four types of restricted, repetitive behaviors such as abnormal intensity of focus and fixated interests. After diagnosing autism in the patient, the patient will be given a severity level which helps figure out how severe their condition is. There are three levels of severity in total and level three suggests that the individual with autism requires very substantial support, while level one suggests that the patient requires least amount of support. These levels help doctors determine what kind of care or intervention is needed and how urgently it should be given, the right treatments and the frequencies of the patient's needs. In addition, the various levels help people decide the category, behavioral or psychopharmacological, of support or assistance can be allowed and provided to the patient daily.

Autism spectrum disorder is usually diagnosed in infants and young children, a few may be diagnosed as an adult [1]. Children often show the symptoms of autism in the first year of birth whereas a small number of children create ordinarily within the essential year and after that go through a period of backslide in communication abilities between the age of 18 to 24 months. Others may develop more subtle symptoms that become apparent as they grow older to a teenager or even an adult as more seasoned and confront expanding communication and social requests are needed in their lives.

2. Causes

The exact etiology for autism is still unknown, but due to the complicated nature of autism spectrum disorder (ASD), and the various symptoms, it's likely that there are many causes to autism spectrum disorder. While genetic factors have been speculated to contribute significantly, environmental factors also play a role [2].

Through the researches over the past decade, it is found that autism is highly heritable. A study in 2019 show that the heritability of autism is approximately 80 percent: there were over 2million individuals who had autism by inheritance out of 22156 patients [3].

In addition, up to hundreds of genes have been identified to influence the risk of ASD, increasing the percentage of the mental illness. These genes are typically involved in brain development, the functioning of neurons, and change in the sequence of DNA. Due to these genes, some children may develop genetic disorders such as Rett syndrome or fragile X syndrome, while others may suffer from genetic changes or mutations [2]. The genes contribute to the genuine shortfalls in communication, social cognition, and behavior that patients of autism frequently encounter, finally leading to autism spectrum disorder [4]. However, only 10-20% of ASD cases are accounted for gene factors. In addition, patients who have the same harmful gene changes may be analyzed at distinctive levels of seriousness [4].

So, other factors such as environmentally factors must be in consideration.

Prenatal factors such as maternal infections, exposure to certain chemicals, and advanced parental age have been associated with an increased risk of autism spectrum disorder. However, it is important to note that these factors do not solely cause ASD but may interact with genetic predispositions.

One of the main environmental factors that would increase the rate of autism spectrum disorder would be bacterial and viral infections while in pregnancy. A study that studied children born in Denmark from 1980 to 2005 that was taken place in Denmark showed that there was no connection between a mother getting an infection and the child being diagnosed with autism spectrum disorder when considering the whole pregnancy time. However, the researchers discovered a connection between a diagnosis of autism spectrum disorder (ASD) and pregnant individuals who were

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hospitalized for viral infections in the early stages of pregnancy, as well as those who had bacterial infections later on in their pregnancy [5].

In addition, a research in 2012 taken place in Denmark that consisted 96736 children born from 1997 to 2003, matured 8 to 14 show that there is not much evidence that suggest a connection between autism and common diseases or fevers that a pregnant person may have. However, the research shows that if the child's parent had a flu or a prolonged fever during their pregnancy there was a higher chance of a child being diagnosed with ASD [6].

3. Symptoms

Children with autism may experience different levels of difficulty and behave differently. A part of the children with autism have inconvenience in learning, and a few have signs of lower insights than normal children. However, the other part children with the autism are extremely smart, but they struggle with talking to others and using their knowledge in daily life. They also find it hard to fit in with other people. But generally, the symptoms of autism spectrum disorder can be broken into three primary categories: communication, enthusiastic and social challenges [7].

For communication, the main symptom is difficulties in receiving and giving out information. The symptoms for communication skills are often shown in patients early in their age. These symptoms may include poor eye contact, lacks of facial expression and poor language development [8]. Since patients usually develop different levels of language, some of them may express themselves with words, while a few with sentences, but seldom participate in converstations. A few patients are non-verbal and their discussion aptitudes incorporate eye contact, motions and have problems understanding other's feelings. Some children may grow and develop like other kids at first, but then they might start acting differently and become withdrawn or aggressive. They could also lose the ability to speak and understand language or feelings of others that they had learned before. Most of the time, children start to show signs by the time they are 2 years old [2].

Social difficulties within autism spectrum disorder individuals are related to the communication problems that occur. Patients with autism may have problems building relationships as long with participate in spontaneous conversations [7]. Due to the lack of engagement with others, individuals with autism may struggle to initiate or respond to social interactions. Some symptoms that occur in patients such as difficulties with understanding and interpreting social cues, like facial expressions, body language, or tone of voice can be a very big problem. These symptoms may cause patients to not participate in typical back-and-forth conversations, maintain eye contact, or show interest in others. They may also fail in responding to his or her name, resist snuggling and body contact. They may also seem very lonely since patients are more likely to prefer playing alone. In addition, individuals with autism may have delayed speech, or fail to communicate in sentences [8]. This can sometimes be interpreted as aloofness or lack of interest, but it is important to remember that individuals with autism may have their unique ways of engaging and building connections. These symptoms are mostly caused by the lack of communication skills, since patients are not able to identify various emotions in people around them or make eye contact. Another social problem for individuals with autism spectrum disorder would be their strict adherence to rules or schedules [7]. Many individuals with autism find comfort in structure and predictability. They may have a strong need for routines or rituals, and would become upset or anxious when the schedules are disrupted. They might insist on following specific rules or patterns in their activities, play, or daily life. Rigidity in thinking and difficulty adapting to changes can be observed in their behavior and activities. This adherence to rules or schedules provides a sense of security helps them understand the world.

While main symptoms of autism primarily affect communication, social interaction, and repetitive behaviors, individuals with ASD may also experience a range of emotional and behavioral challenges. However, compared to communication and social problems, the emotional problems within autism

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patients are harder to observe. When patients are not able to communicate with others successfully and express themselves clearly, many of them get frustrated or sad, which leads to emotional mental disorders [7]. Other reasons for mental illnesses in autism patients would be the pain and stress during medications. A study in 2020 about whether autism spectrum disorder has a high connection to emotional and behavioral problems (EBPs), such as depression, anxiety, and aggression [9], revealed that autism is associated with patterns EBPs. In specific, the study shows that some EBPs were side effects of autism. In addition, various symptoms of autism spectrum disorder were connected to specific emotional and behavioral problems (EBPs) [9].

4. Treatments

For the treatments of autism spectrum disorder, many parents choose behavioral intervention due to its low risk and high potential to help. The main goal for behavioral intervention is usually to help with additional health problems or to teach useful abilities for daily life. Some common behavioral interventions for ASD are applied behavioral therapy (ABA), Cognitive Behavioral Therapy (CBT) [10]. All of these treatments work well and are currently used to help with ASD.

4.1. Applied behavioral therapy (ABA)

In applied behavioral therapy (ABA) therapy, a therapist rewards good behaviors and tries to stop bad behaviors with punishments in a patient. Therapists give patients rewards to help them improve their communication, language, and other abilities [10]. When participating in ABA, the therapist will start by observing the child's behavior and then continue to evaluate the patients progress of development through giving out goals or tasks. Next, the therapist would interview with the patients' parents and give out advices to the parents for treating the child in daily life.

The main benefits for ABA are that it helps individuals with autism spectrum disorder develop behavioral skills and helps parents learn strategies for educating the children. Researches show that ABA therapy is very effective in helping autism patients develop different skills used in daily life. A study claims that ABA therapy not only helped the autistic kids improve their IQ and their behavior, but also decreased the severity of the patients' symptoms [11]. In addition, ABA provides parents with a guideline for teaching and getting along with their autistic child. For instance, it can assist parents in teaching language by dividing it into smaller parts called syllables instead of using complete words [10].

However, there are groups of scientists that argues that ABA is an unpleasant reinforcement method and it's abusive due to the ignorance to the patients' instincts. A study claims that ABA pays too much attention on preventing what the therapists consider as "problem behaviors" instead of guiding the autistic child to learn and develop new skills and strategies such as making eye contact and starting a conversation [12]. Similarly, another study suggests that whether the behaviors of the child is "normal" is very objective since it's decided by the therapist. This may cause the child to lose their instincts and their natural behaviors [13]. In addition, patients that participated in ABA may suffer from post-traumatic stress disorder (PTSD), due to the punishments during the treatment. According to a study in 2019, people who got ABA treatments were 86% more likely to have side effects that meet the criteria for post-traumatic stress disorder (PTSD) than others who didn't [14].

The concerns discussed above has caused adjustments in ABA therapy. Nowadays, therapists in ABA usually focus more on controlling the behaviors of the patient instead of trying to change their thoughts and feelings. The aim is to assist people with autism to be as independent as they can be rather than trying to change them completely.

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4.2. Cognitive Behavioral Therapy (CBT)

Cognitive behavioral therapy (CBT) is another behavioral intervention commonly used in helping autism spectrum disorder patients. The goal for this treatment is to assist people with ASD in reaching their objectives and adjusting their thoughts and actions. In this kind of treatment, the therapist tries to change what the patient believes, rather than changing who they are as a person. So, this therapy helps the patient become more independent. CBT is commonly used to treat people who have both anxiety and other disorders.

A investigate in 2020 including 2485 children and youngsters with ASD, claims that on self-reported results, there wasn't an enormous distinction between CBT medications and the control group of ASD patients. However, CBT did show significant improvement for symptoms related to autism based on reports from others, clinicians, and tasks. Furthermore, the combined results show that Cognitive Behavioral Therapy (CBT) does not have a significant impact on reducing symptoms of social and emotional issues, as reported by individuals themselves [15].

While behavioral interventions are the main way to treat autism spectrum disorder (ASD) right now, there have been some new treatments of medication including metformin, arbaclofen, cannabidiol, oxytocin and so on that focus on the brain’s functioning in the past few years. Psychopharmacological Treatments are likely to be a potential of the mainstay treatment in autism. However, it is important to note that medication is typically used to manage specific symptoms or co-existing conditions in individuals with ASD, rather than treating the core deficits of the disorder.

4.3. Medication

4.3.1. Metformin

Metformin is a medication commonly used to treat diabetes, has shown some promise in improving certain symptoms associated with ASD. The researchers found that metformin can enter the brain and has been shown to stop memory problems caused by diabetes in rats. Metformin has also been found to improve cognitive issues in different mental health disorders. In addition, it has been found to potentially improve social communication skills, reduce repetitive behaviors, and enhance adaptive functioning in individuals with ASD. In 2018, it was found that taking metformin could help people with fragile X syndrome (FXS), the main cause of intellectual disability and autism spectrum disorder (ASD), feel better in social situations, and be less likely to avoid socializing, less easily irritated, and less hyperactive [16].

4.3.2. Arbaclofen

Arbaclofen is a medication that acts on the GABA receptors in the brain, has been seen as a potential treatment for ASD. Some studies have shown advancements in communication and repetitive behaviors in individuals with ASD when using arbaclofen [17]. A study in 2016 suggested that people with Fragile X Syndrome found that a medicine called arbaclofen helped with symptoms of avoiding social interactions. The experiment involved giving some people the medicine and others a fake medicine, and then switching the groups. 150 individuals aged from 5 to 21 with autism spectrum disorder attended the experiment. During the experiment, some of the participants received arbaclofen while others received a placebo in order to compare the effects of different medication and find out how whether if arbaclofen is helpful to ASD patients. There were not any noticeable differences between placebo and the primary outcome measures. However, the result of the study shows that there was an improvement in the clinician-rated Clinical Global Impression of Severity [17]. The study found that people who took arbaclofen showed more improvement in their social skills

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compared to those who didn't. The drug arbaclofen, which activates the GABA-B receptor, helped reduce social avoidance symptoms in individuals with ASD.

However, there are two big problems that need to be addressed when studying an arbaclofen. First, it's noticed that arbaclofen may only improve symptoms in certain types of autism since it is very difficult for experimenters to focus on a specific group of patients. Second, no medication has yet been proven to solve or improve the main symptoms of autism spectrum disorder and it is uncertain which measurement can accurately show that there is an advancement in the patients' social skills [17].

Overall, while there has been growing interest in psychopharmacological treatments for ASD, more research in needed to find out if they work, if they're safe, and when they should be used for people with ASD. It is very important to use medications as complementary treatments along with other treatments and support for people with ASD to help them achieve the best results.

5. Conclusion

In conclusion, autism spectrum disorder (ASD) is a complicated mental illness that affects the developments of the brain and requires various treatments. Although behavior interventions are typically the main treatment, there is a growing interest in using medication to help manage certain symptoms or other conditions in people with ASD. Some medicines like metformin, arbaclofen have shown potential in improving certain parts of ASD symptoms, like social communication abilities, repetitive actions, and adaptive functioning. But it is noted that there is still more research required to find out if the treatments really work, and how much is the right amount to take, and the potential negative effects. The aim of the treatments no matter behavior or psychopharmacological is to offer a complete and customized way to help people with ASD who have different needs and troubles and enhance the quality of life for individuals on the autism spectrum.

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