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**Review Article**

**International Journal of Pharmacy and Engineering (IJPE)**

ISSN 2320-849X

**Type of article: Review Article**

**Recent Developments in Autism Spectrum Disorder: A Review of Therapies and Interventions**

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## **Abstract**

Autism, often known as autism spectrum disorder (ASD), is a neurodevelopmental disorder characterized by recurrent difficulties with speech and social interaction. The word "spectrum" refers to the great range of difficulties and assets that people with ASD have. Atypical or delayed language development. Based on preliminary evaluations, autism was found to be a rare disorder, affecting around 4 out of every 10,000 children. Although the precise origins of autism spectrum disorder (ASD) are not fully recognized, an array of neurological, genetic, and environmental factors are considered to be implicated. There is a need of extensive for the finding the factors responsible for autism. The FDA has approved aripiprazole and risperidone for the treatment of irritability in children and adolescents with ASD. For some patients, the use of fluoxetine reduces anxiety.

*Keywords-* Autism, Sensory neuron, Amygdala, fragile X syndrome & Risperidone

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## **Introduction**

Autism, often known as autism spectrum disorder (ASD), is a neurodevelopmental disorder characterized by recurrent difficulties with speech and social interaction as well as constrained or repetitive behavior. The word "spectrum" refers to the great range of difficulties and assets that people with ASD have. Atypical or delayed language development, difficulties in developing and maintaining relationships, difficulties interpreting social cues, and involvement in intense interests or recurrent behaviors are some of the key characteristics of autism. Individuals on the autism spectrum exhibit a wide range of severity of these symptoms.

Based on preliminary evaluations, autism was found to be a rare disorder, affecting around 4 out of every 10,000 children [1]. This estimate has increased from  $\sim 1/1000$  in 1988 [2] to the widely accepted prevalence of  $1/150$ – $1/200$  in 2002 for ASD [3] and  $\sim 1/500$  for the narrow diagnosis of severe autism [4]. This growth has occurred over time as diagnostic criteria have adopted a more sophisticated and broader definition of ASD. This  $1/150$ – $1/200$  value is regarded as trustworthy since it agrees with evaluations of data from various sources and population bases using various methodologies [5–7]. This indicates that compared to many other childhood diseases that are thought to be common, ASD is more prevalent [8].

## **Sign and symptoms**

It is important to note that the severity and combination of symptoms can vary widely among individuals with autism. Common signs and symptoms of autism may include: shying away from eye contact and preferring solitude; finding it difficult to empathise with others or discuss their emotions; having delayed speech and language development; for instance, they may not use words to communicate or use words far later than their siblings or peers; keep saying the same words or phrases; respond to inquiries in anely; become agitated by little deviations from the norm (like buying a new toothbrush); wave his or her hands, move back and forth, or make circles; have delayed speech and language development; for instance, they may not use words to communicate or use words far later than their siblings or peers; play with or use objects in odd ways, like spinning or continuously lining them up; react weirdly to items' tastes, smells, looks, or feels [9].

***Symptoms of autism in children:***

Autism is not always indicated by a single symptom; typically, a kid will exhibit multiple symptoms from some of the following categories:

***Actions:***

Has strange interests or attachments;

Throws unexplained tantrums

Exhibits strange motor behaviours, including flapping hands or spinning;

Finds it extremely difficult to adapt to change.

***Sensory:***

High pain and temperature tolerance;

Fear of some common noises;

Uses peripheral vision to look at items;

Fascination by moving objects.

***Interaction:***

Not pointing or waving by the end of the 12-months period;

Not answering to his or her name by the end of the 12-months period.

Inability to recognise previously used words;

Speech absence by the age of 18 months;

Absence of spontaneous phrases by the age of 24 months;

Selective hearing, or reacting to specific noises while ignoring the human voice;

Unusual language patterns, such as repeated speech [10]

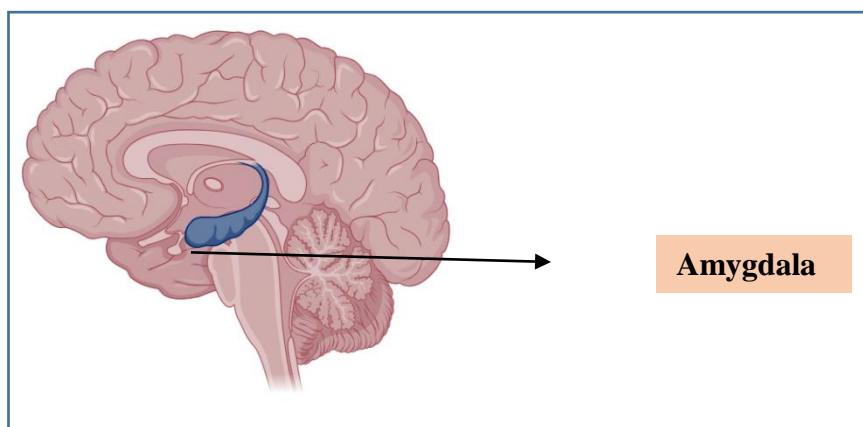
## **Causes**

Although the precise origins of autism spectrum disorder (ASD) are not fully recognized, an array of neurological, genetic, and environmental factors are considered to be implicated. There is a need of extensive for the finding the factors responsible for autism. The following are several significant factors that are believed to possess an integral part in the earliest stages of ASD.

### ***Physiological or biological factors:***

Recent studies have demonstrated that, when compared to their peers without disabilities, children with autism exhibit substantial structural and functional abnormalities and deficiencies in their brains. Let's give a few instances [11].

1. In majority of the severely affected autistic children, there is impairment in the Amygdala, a part of the brain that controls our emotional responses.



**Fig 1. Amygdala, located in the temporal lobes of the brain**

2. It has been discovered that the autistic children's brains' parietal regions—which regulate hearing, speech, and language and corpus callosum—which transfers information from one side of the brain to the other are less active than those of their classmates with disabilities who are typically disabled.

3. The frontal lobes of the cerebrum— a region of the brain involved in impulse control, problem solving, planning, and comprehending other people's behaviour— have been

observed to be significantly less active and energised in autistic youngsters than in their counterparts without the condition.

Thus, we can currently assert that there is some scientific evidence supporting the hypothesis that neurological impairments or brain dysfunctions are major causes of autism disorder [11].

***Genetic aspects:***

**Hereditary variation:** Autism has a significant hereditary component. Research studies reveal that those who have a family history of ASD are more inclined to develop the disorder themselves.

**Genetic Mutations:** Certain gene mutations and deviations might promote the risk of ASD. While some of these alterations might arise spontaneously, others might be inherited.

**Autism and its correlation with fragile X syndrome, a genetic influence:**

A genetic disease called fragile X syndrome is brought on by chromosomal abnormalities. Autism and it are shown to coexist. Since many of the characteristics associated with autism, such as difficulties in speech and language, are also present with this syndrome. stereotypical conduct, hyperarousal, and preservation. Unlike Fragile X syndrome, which is still primarily thought to be a genetic disorder, autism is distinguished by its significantly worse social and communication skills deficits, as well as its tendency to cause more variability in the developmental profiles of its affected children [11].

***Factors associated with the nervous system:***

**Brain Development:** ASD can appear as a result of abnormalities in the brain's development, especially in the early stages of foetal development.

**Imbalances in neurotransmitters:** ASD has been associated with imbalances in these substances, which are attributed to transmitting impulses in the brain.

***Immunological Factors:***

Researchers investigated into whether the immune system contributes to the development of ASD. It has been proposed that autoimmune diseases or aberrant immune reactions could be contributing factors.

### ***Environmental factors:***

**Prenatal Factors:** Certain prenatal variables, such as maternal exposure to specific medicines, chemicals, or illnesses during pregnancy, may raise the chance of autism spectrum disorder (ASD).

**Perinatal Factors:** Difficulties associated with delivery or the perinatal stage may contribute to the development of autism spectrum disorders.

**Early Childhood Factors:** Unfavorable experiences or circumstances, like exposure to certain environmental chemicals, may raise a child's chance of developing autism spectrum disorder (ASD).

### ***Epigenetic Factors:***

Changes in gene expression that do not result in modifications to the underlying DNA sequence are referred to as epigenetic changes. ASD may be influenced by epigenetic factors, according to certain research. It's important to note that ASD is a complex and heterogeneous condition, and its causes can vary widely among individuals. Additionally, there is ongoing research in this field, and our understanding of the contributing factors to ASD continues to evolve. Early diagnosis and intervention can significantly improve outcomes for individuals with ASD, but there is currently no single known cause or cure for the disorder.

## **Diagnosis**

There are numerous diagnostic tools available. Two are frequently employed in studies on autism: The Autism Diagnostic Observation Schedule (ADOS) employs observation and interaction with the kid; the Autism Diagnostic Interview-Revised (ADI-R) is a semi-structured parent interview. In clinical settings, the Childhood Autism Rating Scale (CARS) is frequently used to evaluate the severity of autism based on observations of children.

## **Pharmacological Therapy**

The ability of medications to lessen autism symptoms is limited. However, some might aid in the prevention of self-harm and other problematic habits. Additionally, medications may help a youngster reach a functional level so that additional treatments can be beneficial.

Autism is not treated with conventional medicine. When thinking about medications, the American Academy of Paediatrics (AAP) advises focussing on the primary one or two problematic habits.

There are generally two types of pharmacological treatments are occasionally employed to treat behaviours associated with autism.

### **Antipsychotic medications**

**Selective serotonin reuptake inhibitors (SSRIs):** Some examples of selective serotonin reuptake inhibitors (SSRIs) are sertraline, fluoxetine, and citalopram. These medications may provide relief from anxiety, sadness, and compulsive habits. SSRI side effects include increased appetite, sleeplessness, and weight gain.

Anti-convulsants such valproic acid and carbamazepine, as well as lithium. When these medications are used, occasionally aggressive children may become more stable; nonetheless, regular blood tests are necessary to check the drug's level in the body. Anticonvulsant medications have prompted a warning from the US Food and Drug Administration (FDA) regarding the possibility of suicide and suicidal thoughts. The FDA does not advise users to cease taking these medications. Rather, anticonvulsant medication users should be constantly monitored for suicidal ideation warning indications. Those who use anticonvulsants and are concerned about this adverse effect ought to consult a physician [12-13].

### **Prescription drugs**

**Table no.1 List of prescribed drugs**

<i>Class</i>	<i>Mechanism of action</i>	<i>Drug Name</i>	<i>Adverse Effects</i>
Anti-psychotics	They work on dopamine and serotonin, two chemicals that are known to transmit messages across nerve connections and are	Risperidone Aripiprazole Clozapine Olanzapine Quetiapine Ziprasidone	Exhaustion, constipation, fatigue, elevated blood sugar, and weight gain. Serious side effects, including as tremors, abnormal involuntary

	found in abnormally high concentrations in many autistic people.		movement, and rigidity, have been reported in some individuals.
Antidepressants	Antidepressants can be used to treat obsessive compulsive disorder in autism as well as depression and anxiety. The treatment of autism with selective serotonin reuptake inhibitors (SSRIs) is a frequent practice.	Fluvoxamine, Fluoxetine Citalopram Sertraline Escitalopram Nortriptyline Amitriptyline Clomipramine	Drowsiness, nausea, trembling, anorgasmia Dry mouth Increased sweating Diarrhoea Decreased libido
Stimulants	These medications mainly treat hyperactivity and inattention by acting on the dopamine pathway.	Methylphenidate Amphetamine, Dextroamphetamine	Diarrhoea Headache Mood swings Irritability Emotional outbursts Loss of appetite Insomnia.
Mood Stabilizers	This medication can be used to treat conduct disorder, impulsivity, violence, and self-harming behaviours.	Lamotrigine, Valproicacid Carbamazepine Topiramate Oxcarbazepine	Headaches Exhaustion Nausea Blurred Vision Unsteadiness
Antiepileptics	These drugs are typically recommended to treat autism-related seizures	Sodium valproate Phenytoin	Fatigue, Blurred vision Behavioural Abnormalities Nausea Impaired Motor

			Coordination
Glutamate antagonists	These agents enhance verbal, hyperactive, irritable, memory, social behaviour, and self-stimulatory behaviour.	Amantadine Memantine	Nausea Diarrhoea Agitation Hyperactivity.
Sedatives	These agents promote sedation during extremely aggressive, violent, hyperactive conditions	Promethazine Haloperidol Triclofos	Excessive sleepiness Fatigue Lethargy Particularly daytime sleepiness

### Non -Prescription Drugs:

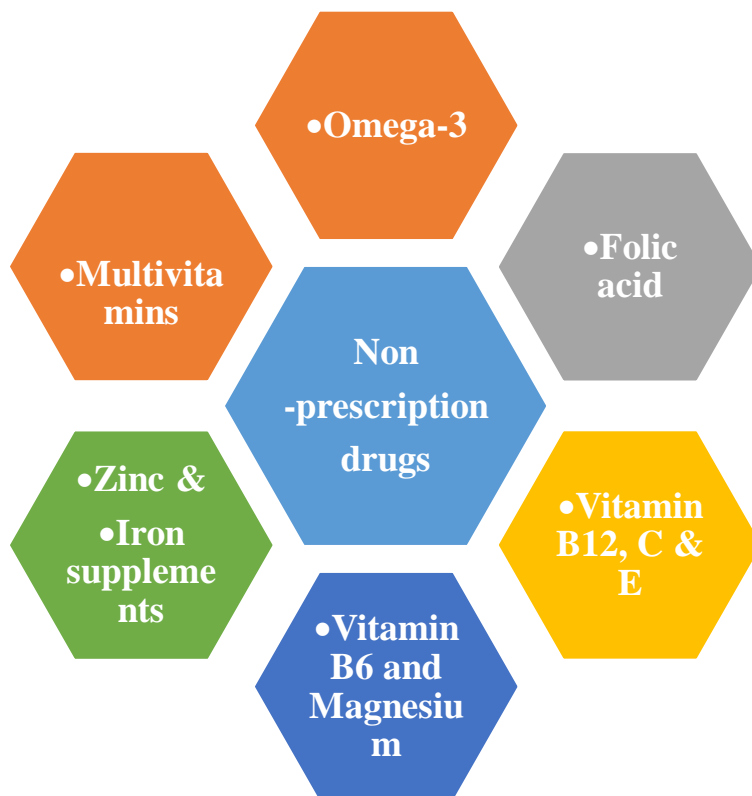
These mostly consist of vitamin and mineral supplements that may aid in reducing a number of autistic symptoms.

### Non-pharmacological therapy

**Behavioural Management Therapy for Autism:** Most of the time, behavioural therapy is founded on applied behaviour analysis (ABA), which is a method that is highly recognised for its ability to monitor a child's development in terms of strengthening his or her skill. The following are some of the several forms of ABA that are frequently used to treat autism spectrum disorder (ASD):

(a) **Positive Behavioural Support(PBS):** PBS seeks to understand the cause of a child's specific problematic behaviour. It aims to alter the surroundings, provide knowledge, and implement other adjustments that enhance a child's pleasant experience with appropriate behaviour.

(b) **Teaching using Discrete Trials (DTT):** DTT uses a methodical, controlled approach to teach skills. The instructor gives the student encouraging remarks to help them apply their new abilities.



(c) **Pivotal Response Training (PRT)**: Its objective is to enhance a few "pivotal" abilities, like initiative in communication and motivation. These aid in the child's acquisition of numerous other abilities and situational management [14].

**Cognitive Behavior Therapy for Autism**:The relationship that exists between ideas, feelings, and behaviours is the main emphasis of cognitive behaviour therapy.Treatment for cognitive behaviour therapy is divided into distinct stages. It is also tailored to each patient's strengths and shortcomings, though. Additionally, it can improve an autistic person's ability to identify emotions and manage social settings [14, 15].

**Occupational Therapy for Autism**:Occupational therapy finds strategies to work within and maximise the requirements, talents, and interests of individuals with autism spectrum disorder (ASD), assisting them in doing daily chores. Instruct students in personal hygiene basics like eating and dressing [16].

**Speech-Language Therapy for Autism**:People with autism spectrum disorder (ASD) can benefit from speech-language therapy by developing their social and communication

skills.[17] Some persons can benefit from this kind of therapy by developing their spoken or verbal abilities, which include: Naming objects and people correctly; Providing clearer explanations of feelings and emotions; Using words and phrases more effectively; Increasing speech tempo and rhythm; Communicating with visual symbols [17].

***Social Skills Training for Autism:***They must communicate with other people. It entails putting desirable habits into practice and rewarding them. Children in elementary school can enhance their social skills by participating in the Children's Friendship Training intervention, which focusses on conversation, excellent sportsmanship, and acting as gracious hosts during playdates [18].

***Physical Therapy for Autism:***Exercises and activities used in physical therapy help to strengthen muscles, correct posture, and enhance balance. For instance, the goal of this kind of therapy is to assist a child in developing strength and muscle control so that the youngster may play with other kids more easily [19].

## **Conclusion**

Deficits in verbal and social communication as well as repetitive and stereotypical behaviours that cannot be attributed to a general neurodevelopmental delay characterise autism spectrum disorders. There are many degrees of severity. Everyday life is impacted by the illness. Recent discoveries of genes that predispose to autism as well as established syndromes have been connected to these disorders through genetic investigations. New developments in neuroimaging, notably diffusion tensor imaging, have revealed the involvement of white matter tract areas implicated in socio-emotional processing. The FDA has approved aripiprazole and risperidone for the treatment of irritability in children and adolescents with ASD. For some patients, the use of fluoxetine reduces anxiety. Social integration into conventional nurseries and schools, as well as early identification and intervention with ABA, speech, psychomotor, and occupational therapy, are critical components. The cornerstones of ensuring better results and a greater likelihood of full integration into society continue to be early diagnosis and intervention with therapy.

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Received: January 28<sup>th</sup> 2025, Accepted: February 11<sup>th</sup> 2025  
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