



A Review on Autism Spectrum Disorders

Akash Krishna*, Gopalakrishnan

Department of Community Medicine Sree Balaji Medical College and Hospital, India

Abstract

Autism or Autism Spectrum Disorder (ASD) refers to a broad range of conditions characterised by challenges with social skills, repetitive behaviours, speech and nonverbal communication. It is not a single disorder but is broadly considered to be a multi-factorial disorder resulting from both genetic and non-genetic factors. Autism as many doctors refer to is not curable but treatable. As autism is a spectrum disorder, each autistic has his/her own strengths and challenges. It is a lifetime prevalent disorder.

This review article gives a brief idea about Autism Spectrum Disorder, especially about the etiology, severity levels, clinical symptoms, diagnosis, behavioural pattern, occurrence and treatment.

Keywords: Autism, social skills, multi factorial disorder, lifetime prevalence

Introduction

Autism is a complex neurobehavioral condition that includes impairments in social interaction, developmental language and communication skills combined with rigid repetitive behaviours [1]. The term autism was coined by Eugen Bleuler in 1911 and he used it to describe the symptoms of schizophrenia. Autism is derived from the Greek word autos, it was originally used to describe extreme social withdrawal commonly associated with psychiatric disorders. Autism was initially thought to be schizophrenia and it was not classified as a separate disease in any diagnostic manual until 1980 [2]. Autism starts affecting children who are two to three years of age and tends to persist till adulthood. A review of global prevalence of autism estimates about 62 cases per 10,000 people. The male to female ratio globally is 4.3:1. World autism day is celebrated on 2nd April every year.

Etiology

Autism spectrum disorder has no known single cause, given the complexity of the disorder and the fact that symptoms and severity varies, there are probably many causes. The causes include genetic, neurobiological and environmental related factors. Some theories have even caused a controversy of autism being caused due to vaccines.

Genetic factors

Various genes have been identified to play a role in the etiology of ASD. For instance, some autistic children can be associated with the genetic disorders such as Rett syndrome and fragile X syndrome [3]. Genetic studies also reveal that autism is more common in boys than girls due to the genetic differences associated with the X chromosome. Twin studies show a 60% to 90% rate of concordance in identical twins and 0% to 10% rate of concordance in fraternal twins [4]. Gene defects and chromosomal anomalies have been identified in 10% to 20% of the individuals with ASD. Genome wide linkage studies suggested linkages to chromosomes 2q, 7q, 15q and 16p.

Neurobiological factors

Genetic anomalies lead to malfunction in the development of brain function. The neurobiological causes include increased gray matter in the frontal and temporal lobes, decreased neural sensitivity to gaze shifts in infancy, preference for non-social versus social processing and hemispheric symmetries in event related potentials [4].

Environmental factors

Medications, certain metals, pesticides and chemicals have long been suspected to play a role in autism. Many studies have shown that chemical exposures during development in the womb have known to trigger autism [5]. Other risk factors also include alcohol, maternal metabolic conditions such as diabetes and obesity, usage of antiseizure drugs during pregnancy. Advanced age of mother or father also increases the risk of autistic child [1].

Severity levels

Autism spectrum disorder is assessed based on the severity of the patients. To determine the level if severity two things are taken into account i.e. abilities of social communication and restricted repetitive behaviours. Level 1 autistic child has issues mainly with communication and socialising with others; they aren't able to maintain a conversation like a normal person. Level 2 autistic individuals require substantial support and lack both verbal and non-verbal skills [6]. Level 3 is the most severe form of autism. Level 3 autistic individuals have behaviours which are highly inflexible and repetitive [7].

Clinical symptoms

ASD is typically noticed in 1st three years of life with deficits in social behaviours and non-verbal interactions such as reduced eye contact, facial expressions, body gestures and repetitive behaviours. Non-specific symptoms such as unusual sensory perceptions, motor clumsiness and insomnia are also manifested in autism. Associated phenomena include mental retardation, emotional indifference, hyperactivity, aggression and self-injury [8]. Repetitive behaviours include body rocking, hand flapping, gazing of hands. Some autistic children get attached to things life

*Corresponding author: Akash Krishna, Department of Community Medicine, Sree Balaji Medical College and Hospital, India, E-mail: akashkrishna@gmail.com

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insignificant ads showing in televisions and others to daily objects like vessels, books etc. There have been cases of an autistic child who got attached to a bottle and refuses to drink water from other objects. The earliest non-specific signs recognised in infancy and toddlers include irritability, passivity, disturbances with sleeping and eating followed by delays in language and social skills. At 12 months of age, autistic individuals show atypical behaviour in visual attention, imitation, social responses, motor control and reactivity [9]. By 3 years of age, the typical core symptoms such as lack of social communication and restricted/ repetitive behaviours are manifested. ASD can be easily differentiated from other psychosocial disorders in the early school years.

Diagnosis

Diagnosis of ASD involves two steps namely developmental screening and comprehensive diagnostic evaluation. Developmental screening is a short test to tell if children are learning basic skills when they should or if there is any delay in the learning process. During screening, the child's learning, behaviour, language and body language. Any noticeable defect in these might suggest ASD. A child should be screened during regular doctor visits at 9 months, 18 months and 24 or 30 months. Additional screening is required if the child shows signs similar to autistic individuals or if the child had a sibling who is autistic [10].

Comprehensive diagnostic evaluation is done if diagnostic screening of the child shows risks of ASD. It includes hearing and vision screening, genetic testing, neurological testing and other medical tests. Other tests also include blood lead testing, Wood's lamp exam etc. [11]. Differential diagnosis for ASD is very important as many disorders such as schizophrenia, congenital rubella syndrome, cornelia delange syndrome, lesch nyhan syndrome and other disorders have symptoms very similar to ASD [12].

Behavioural pattern

A toddler or adult with autism spectrum disorder may have limited, repetitive patterns of behaviour, interests or activities, including any of those signs:

- Performs repetitive movements, like rocking, spinning or hand flapping
- Performs activities that would cause self-harm, like biting or head-banging
- Develops specific routines or rituals and becomes disturbed at the slightest change
- Has problems with coordination or has odd movement patterns, like clumsiness or walking on toes, and has odd, stiff or exaggerated visual communication
- Is fascinated by details of an object, like the spinning wheels of a toy car, but doesn't understand the general purpose or function of the object
- Is unusually sensitive to light, sound or touch, yet could also be indifferent to pain or temperature
- Doesn't engage in imitative or make-believe play
- Fixates on an object or activity with abnormal intensity or focus
- Has specific food preferences, like eating only a few foods, or refusing foods with a specific texture

As they mature, some children with autism spectrum disorder become more engaged with others and show fewer disturbances in behaviour.

Some, usually those with the smallest amount severe problems, eventually may lead normal or near-normal lives [13]. Others, however, still have difficulty with language or social skills, and therefore the teen years can bring worse behavioural and emotional problems.

Occurrence

It's estimated that worldwide 1 in 160 children has an ASD. This estimate represents a mean figure, and reported prevalence varies substantially across studies. Some well-controlled studies have, however, reported figures that are substantially higher. The prevalence of ASD in many low- and middle-income countries is thus far unknown [14].

Based on epidemiological studies conducted over the past 50 years, the prevalence of ASD appears to be increasing globally. There are many possible explanations for this apparent increase, including improved awareness, expansion of diagnostic criteria, better diagnostic tools and improved reporting.

Discussion

Treatment

Each autistic individual features a unique set of symptoms and behaviour and hence each child should receive treatment that meets their specific needs. Applied Behaviour Analysis (ABA) is one among the most widely accepted therapies for individuals affected with autism spectrum disorder. ABA is best when children are younger than the age of 5 though it is beneficial for adults too. ABA helps teach social, motor, and verbal behaviours, also as reasoning skills, and works to manage challenging behaviour [1]. It's supported teaching these skills through observation and positive reinforcement. Sensory-based approaches to treating Autism Spectrum Disorders (ASDs) consider correcting or improving the body's abnormal response to external stimuli. For several individuals with an ASD, the required filtering of unimportant sensory input doesn't happen. The streaks of sunshine coming through the window blinds may be mesmerising, while the low hum of the heater could also be unbearably irritating. This inability to dam out normal "background" stimuli sometimes produces a state of "sensory overload" in individuals with an ASD, disrupting their ability to focus and concentrate, which are necessary skills for learning and communicating. The problem is not with one specific sense, but with how multiple senses are experienced all directly.

Auditory Integration Training (AIT), which was developed in France in 1982, involves treating an individual with an ASD through their sense of hearing. In AIT, musical sounds are washed through a filtering apparatus that alters them, emphasising some tones and reducing the intensity of others, while the person receiving the treatment listens through top quality headphones [15]. In theory, the brain has got to work to re-integrate the filtered sounds, and becomes better connected and ready to integrate in every way through this process. The hope is that the treatment won't merely lessen hypersensitivity to sound, but will end in an overall improvement in behaviour and attention. Although there are several variations of AIT therapy, it generally involves a ten day course of twice-a-day half hour treatments.

Complications

Autistic children thanks to defects in social qualities have many complications in leading a normal life. Such complications include:

- Social isolation.
- Unsuccessful learning.
- Employment issues.

- Stress within the family.
- Inability to measure independently.

Conclusion

While an entire understanding of ASD is still growing, through comprehensive and collaborative efforts we may begin to spot additional pieces of the ASD puzzle that can be linked with our existing current knowledge to grow a clearer picture of these disorders. The collaboration of multiple domain-experts is going to be required to effectively analyse the growing genetic and epidemiological data being collected. The intention is to grow new ideas, collaborations, and possibilities for future research during this field, between current autism spectrum researchers and other scientists. Additionally to improving the understanding of the etiology of ASD, methodologies developed for the ASD field have the potential for expanding and improving the study of other common, complex disorders.

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Conflict of Interests

All authors declare no competing interests.

Author Contributions

All authors planned the study. MH screened control patients and performed mixed meal testing. KA and PW did PET/CT readings. MH, KA, and PW did the analysis and wrote the first draft of the manuscript. All authors critically proved data, edited and approved the manuscript.

Data Availability

All data is available from the corresponding author on request.

Ethics Approval

The study was approved by the local ethics committee (Ethikkommission Nordwest-und Zentralschweiz, Basel, Switzerland, and EKBB 163/12).

Consent to Participate

Informed consent was obtained from all individual participants included in the study.

Consent to Publish

All authors approved the manuscript for submission.

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