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A SHORT REVIEW ON THE CURRENT UNDERSTANDING OF AUTISM SPECTRUM DISORDERS

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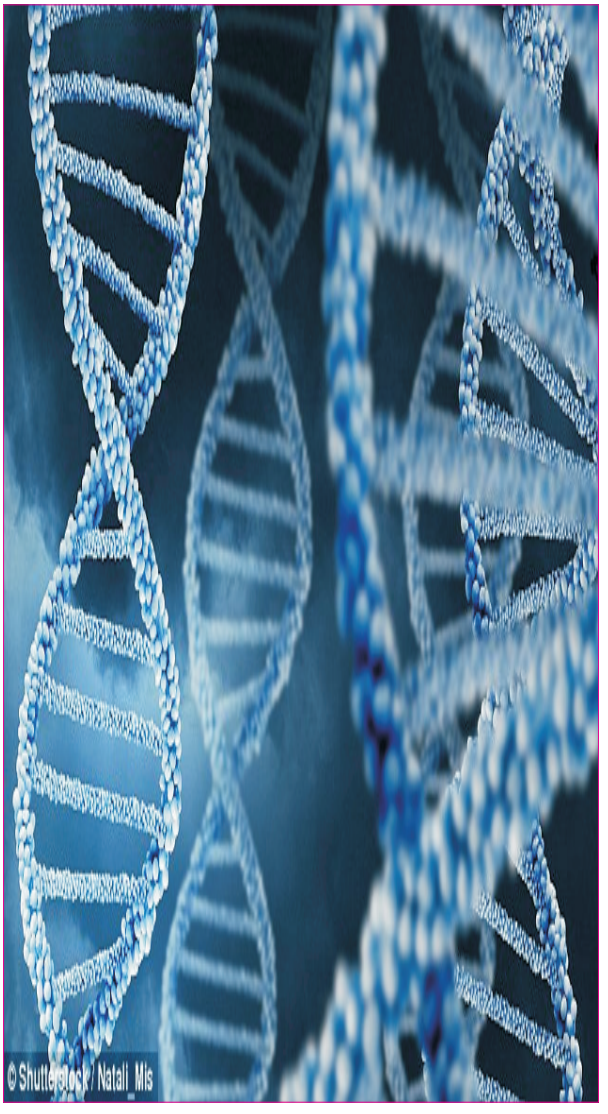

ABSTRACT:

Autism spectrum disorder (ASD) is a set of neurodevelopmental disorders characterized by a deficit in social behaviors and nonverbal interactions such as reduced eye contact, facial expression, and body gestures in the first 3 years of life. It is not a solitary issue, and it is comprehensively thought to be a multi-factorial issue coming about because of hereditary and non-hereditary hazard factors and their communication. Hereditary investigations of ASD have recognized changes that meddle with run of the mill neurodevelopment in utero through adolescence. These buildings of qualities have been included in synaptogenesis and axon motility. Late improvements in neuroimaging considers have given numerous critical experiences into the neurotic changes that happen in the mind of patients with ASD in vivo. Particularly, the part of amygdala, a noteworthy segment of the limbic framework and the emotional circle of the cortico-striatothalamo-cortical circuit, in perception and ASD has been demonstrated in various neuropathological and neuroimaging thinks about. Other than the amygdala, the core accumbens is additionally considered as the key structure which is connected with the social reward reaction in ASD. Albeit instructive and behavioral medicines have been the backbone of the administration of ASD, pharmacological and interventional medications have additionally demonstrated some advantage in subjects with ASD. Additionally, there have been reports around couple of patients who experienced change after profound cerebrum incitement, one of the interventional medicines. The key engineering of ASD improvement which could be an objective for treatment is as yet an unknown domain. Additionally work is expected to widen the skylines on the comprehension of ASD.

KEYWORDS: *Autistic Disorders, Review, Neurobiology, Amygdala.*

INTRODUCTION:

Autism spectrum disorder (ASD) is a set of neurodevelopmental disorders characterized by a lack of social interaction, verbal and nonverbal communication in the first 3 years of life. The distinctive social behaviors include an avoidance of eye contact, problems with emotional control or understanding the emotions of others, and a markedly restricted range of activities and interests. The current prevalence of ASD in the latest large-scale surveys is about 1%~2%. The predominance of ASD has expanded in the previous two decades. Although the increase in prevalence is partially the result of changes in DSM diagnostic criteria and younger age of diagnosis, an increase in risk factors cannot be ruled out. Studies have shown a male predominance; ASD affects 2~3 times more males than females. This diagnostic bias towards males might result from under-recognition of females with ASD. Also, some researchers have suggested the possibility that the female-specific protective effects against ASD might exist.

A Swiss psychiatrist, Paul Eugen Bleuler used the term "autism" to define the symptoms of schizophrenia for the first time in 1912. He derived it from the Greek word αὐτὸς (autos), which means self. Hans Asperger embraced Bleuler's wording "mentally unbalanced" in its present day sense to depict tyke brain research in 1938. Afterwards, he reported about four boys who did not mix with their peer group and did not understand the meaning of the terms 'respect' and 'polite', and regard for the authority of an adult. The boys also showed specific unnatural stereotypic movement and habits. Asperger describe this pattern of behaviors as "autistic psychopathy", which is now called as Asperger's Syndrome. The person who first used autism in its modern sense is Leo Kanner. In 1943, he reported about 8 boys and 3 girls who had "an innate inability to form the usual, biologically provided affective contact with people", and introduced the label early infantile autism [12]. Hans Asperger and Leo Kanner have been considered as those who designed the basis of the modern study of autism.

ETIOLOGY :

ASD is not a single disorder. It is currently comprehensively thought to be a multi-factorial issue coming about because of hereditary and non-hereditary hazard factors and their connection.

Hereditary causes including quality deformities and chromosomal inconsistencies have been found in 10%~20% of people with ASD. Kin conceived in families with an ASD subject have a 50 times more serious danger of ASD, with a repeat rate of 5%~8%. The concordance rate comes to up to 82%~92% in monozygotic twins, compared with 1%~10% in dizygotic twins. Genetic studies suggested that single gene mutations alter developmental pathways of neuronal and axonal structures involved in synaptogenesis. In the cases of related with fragile X syndrome and tuberous sclerosis, hyperexcitability of neocortical circuits caused by alterations in the neocortical excitatory/inhibitory balance and abnormal neural synchronization is thought to be the most probable mechanisms. Vast linkage ponders recommended linkages on chromosomes 2q, 7q, 15q, and 16p as the area of vulnerability qualities, in spite of the fact that it has not been completely clarified. These chromosomal abnormalities have been implicated in the disruption of neural connections, brain growth, and synaptic/dendritic morphology. Metabolic errors including phenylketonuria, creatine deficiency syndromes, adenylosuccinate lyase deficiency, and metabolic purine issue are likewise represent under 5% of people with ASD. As of late, the connection between's cerebellar formative designing quality ENGRAILED 2 and extreme introvertedness was accounted for. It is the main hereditary allele that adds to ASD helplessness in upwards of 40% of ASD cases. Different qualities, for example, UBE3A locus, GABA framework qualities, and serotonin transporter qualities have likewise been considered as the hereditary variables for ASD.

CLINICAL FEATURES AND DIAGNOSIS :

ASD is typically noticed in the first 3 years of life, with deficits in social behaviors and nonverbal interactions such as reduced eye contact, facial expression, and body gestures. Children also manifest with non-specific symptoms such as unusual sensory perception skills and experiences, motor clumsiness, and insomnia. Associated phenomena include mental retardation, emotional indifference, hyperactivity, aggression, self-injury, and repetitive behaviors such as body rocking or hand flapping. Repetitive, stereotyped behaviors are often accompanied by cognitive impairment, seizures or epilepsy, gastrointestinal complaints, disturbedd sleep,

and other problems. Differential diagnosis includes childhood schizophrenia, learning disability, and deafness.

ASD is diagnosed clinically based on the presence of core symptoms. However, caution is required when diagnosing ASD because of non-specific manifestations in different age groups and individual abilities in intelligence and verbal domains. The earliest nonspecific signs recognized in infancy or toddlers include irritability, passivity, and difficulties with sleeping and eating, followed by delays in language and social engagement. In the first year of age, infants later diagnosed with ASD cannot be easily distinguished from control infants. However, some authors report that about 50% of infants show behavioral abnormalities including extremes of temperament, poor eye contact, and lack of response to parental voices or interaction. At 12 months of age, individuals with ASD show atypical behaviors, across the domains of visual attention, imitation, social responses, motor control, and reactivity. There is also report about atypical language trajectories, with mild delays at 12 months progressing to more severe delays by 24 months. By 3 years of age, the typical core symptoms such as lack of social communication and restricted/repetitive behaviors and interests are manifested. ASD can be easily differentiated from other psychosocial disorders in late preschool and early school years.

AMYGDALA AND ASD :

The frontal and temporal lobes are the markedly affected brain areas in the individuals with ASD. In particular, the role of amygdala in cognition and ASD has been proved in numerous neuropathological and neuroimaging studies. The amygdala located the medial temporal lobe anterior to the hippocampal formation has been thought to have a strong association with social and aggressive behaviors in patients with ASD. The amygdala is a major component of the limbic system and affective loop of the cortico-striato-thalamo-cortical circuit.

The amygdala has 2 specific functions including eye gaze and face processing. The lesion of the amygdala results in fear-processing, modulation of memory with emotional content, and eye gaze when looking at human face. The findings in individuals with amygdala lesion are similar to the phenomena in ASD. The amygdala receives highly processed somatosensory, visual, auditory, and all types of visceral inputs. It sends efferents through two major pathways, the stria terminalis and the ventral amygdalofugal pathway.

The amygdala comprises a collection of 13 nuclei. Based on histochemical analyses, these 13 nuclei are divided into three primary subgroups: the basolateral (BL), centromedial (CM), and superficial groups. The BL group attributes amygdala to have a role as a node connecting sensory stimuli to higher social cognition level. It links the CM and superficial groups, and it has reciprocal connection with the orbitofrontal cortex, anterior cingulate cortex (ACC), and the medial prefrontal cortex (mPFC). The BL group contains neurons responsive to faces and actions of others, which is not found in the other two groups of amygdala. The CM group consists of the central, medial, cortical nuclei, and the periamygdaloid complex. It innervates many of the visceral and autonomic effector regions of the brain stem, and provides a major output to the hypothalamus, thalamus, ventral tegmental area, and reticular formation. The superficial group includes the nucleus of the lateral olfactory tract.

PREFRONTAL CORTEX AND ASD :

Frontal lobe has been considered as playing an important role in higher-level control and a key structure associated with autism. Individuals with frontal lobe deficit demonstrate higher-order cognitive, language, social, and emotion dysfunction, which is deficient in autism. Recently, neuroimaging and neuropsychological studies have attempted to delineate distinct regions of prefrontal cortex supporting different aspects of executive function. Some authors have reported that the excessive rates of brain growth in infants with ASD, which is mainly contributed by the increase of frontal cortex volume. Especially, the PFC including Brodmann areas 8, 9, 10, 11, 44, 45, 46, and 47 has been noted for the structure related with ASD. The PFC is cytoarchitectonically defined as the presence of a cortical granular layer IV, and anatomically refers to the regions of the cerebral cortex that are anterior to premotor cortex and the supplementary motor area. The PFC has extensive connections with other cortical, subcortical and brain stem sites. It receives inputs from the brainstem arousal systems, and its function is particularly dependent on its neurochemical environment.

NUCLEUS ACCUMBENS AND ASD :

Besides amygdala, nucleus accumbens (NAc) is also considered as the key structure which is related with the social reward response in ASD. NAc borders ventrally on the anterior limb of the internal capsule, and the lateral subventricular fundus of the NAc is permeated in rostral sections by internal capsule fiber bundles. The rationale for NAc to be considered as the potential target of DBS for ASD is its predominant role in modulating the processing of reward and pleasure. Anticipation of rewarding stimuli recruits the NAc as well as other limbic structures, and the experience of pleasure activates the NAc as well as the caudate, putamen, amygdala, and VMPFC. It is well known that dysfunction of NAc regarding rewarding stimuli in subjects with depression. Bewernick et al. demonstrated antidepressant effects of NAc-DBS in 5 of the 10 patients suffering from severe treatment-resistant depression.

TREATMENT :

Various educational and behavioral treatments have been the mainstay of the management of ASD. Most experts agree that the treatment for ASD should be individualized. Treatment of disabling symptoms such as aggression, agitation, hyperactivity, inattention, irritability, repetitive and self-injurious behavior may allow educational and behavioral interventions to proceed more effectively.

Increasing interest is being shown in the role of various pharmacological treatments. Medical management includes typical antipsychotics, atypical antipsychotics, antidepressants, selective serotonin reuptake inhibitors, a 2-adrenergic agonists, β-adrenergic antagonist, mood stabilizers, and anticonvulsants. So far, there has been no agent which has been proved effective in social communication. A major factor in the choice of pharmacologic treatment is awareness of specific individual physical, behavioral or psychiatric conditions comorbid with ASD, such as obsessive-compulsive disorder, schizophrenia, mood disorder, and intellectual disability .Antidepressants were the most commonly used agents followed by stimulants and antipsychotics. The high prevalence of comorbidities is reflected in the rates of psychotropic medication use in people with ASD. Antipsychotics were effective in treating the repetitive behaviors in children with ASD; however, there was not sufficient evidence on the efficacy and safety in adolescents and adults. There are also alternative options including opiate antagonist, immunotherapy, hormonal agents, megavitamins and other dietary supplements.

CONCLUSION :

ASD should be considered as a complex disorder. It has many etiologies involving genetic and environmental factors, and further evidence for the role of amygdala and NA in the pathophysiology of ASD has been obtained from numerous studies. However, the key architecture of ASD development which could be a target for treatment is still an uncharted territory. Further work is needed to broaden the horizons on the understanding of ASD.

REFERENCES :

1. Fisch GS. Nosology and epidemiology in autism: classification counts. Am J Med Genet C Semin Med Genet. 2012;160C:91–103. [PubMed]

2. Elsabbagh M, Divan G, Koh YJ, Kim YS, Kauchali S, Marcín C, Montiel-Nava C, Patel V, Paula CS, Wang C, Yasamy MT, Fombonne E. Global prevalence of autism and other pervasive developmental disorders. Autism Res. 2012;5:160–179. [PMC free article] [PubMed]

3. Fombonne E. Incidence and prevalence of pervasive developmental disorders. In: Hollander E, Kolevzon A, Coyle JT, editors. Textbook of autism spectrum disorders. Washington, D.C: American Psychiatric Publishing, Inc.; 2011. pp. 117–136.

4. Robinson EB, Lichtenstein P, Anckarsäter H, Happé F, Ronald A. Examining and interpreting the female protective effect against autistic behavior. Proc Natl Acad Sci U S A. 2013;110:5258–5262. [PMC free article] [PubMed]

5. Gharani N, Benayed R, Mancuso V, Brzustowicz LM, Millonig JH. Association of the homeobox transcription factor, ENGRAILED 2, 3, with autism spectrum disorder. Mol Psychiatry. 2004;9:474–484. [PubMed]