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AUTISM: A CURSE ON TODAY'S SOCIETY

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ABSTRACT

Autism is a group of neurodevelopment disorders characterized by impaired communication, impaired social interaction and restricted, repetitive and stereotyped patterns of behaviours or interests in the first 3 years of life. It shows a strong male bias and found four times more in males than in females. According to a study in the US, in 2014, overall 1.68% of victims were reported to have Autism Spectrum Disorder (ASD), whereas the percentage was increased by 15% and 150% respectively over the year 2012 and 2000. Numerous genes have been discovered that have roles in ASD but still a good understanding of the pathophysiological process of ASD is not established. ASD costs are estimated to be approximately $250 billion annually in the U.S. Moreover, it is suggested that by 2025, ASD costs will rise to over $450 billion. Thus, the financial burden on families is increasing. There is no effective screening tool for proper diagnosis is available. Based on Infant Toddler Checklist (ITC) and Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-5) some tests like ADOS-G, ADI-R, CARS etc. are used for diagnosis. There are medications to cure symptoms but no single medication for ASD. However, some therapies (like ABA- Applied Behavioural Analysis, DTT- Discrete Trial Training, and Symptomatic treatments, etc.) are there that show positive responses towards improvement from a disease state. Some crucial advancement has been achieved in the last decades. Here in the work we have focused on the diagnostic methods and treatment available for the symptoms of Autism. So, it can be said that the day is not too far away when the remedy to cut the curse of autism will be in our hands.

INTRODUCTION

Autism is a group of neurodevelopment disorders known as pervasive developmental disorders. These disorders are characterized by three main conditions: impaired communication, impaired reciprocal social interaction and restricted, repetitive and stereotyped patterns of behaviours or interests in the first 3 years of life. The distinctive social behaviours include avoidance of eye contact, problems with emotional control or understanding the emotions of others, and a markedly restricted range of activities and interests [1, 2]. The current prevalence of Autism Spectrum Disorder (ASD) in the latest large-scale surveys is about 1%- 2% of the total population of the world [3, 4]. The prevalence of ASD has increased in the past two decades [5]. Although the increase in

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prevalence is partially the result of changes in the Diagnostic and Statistical Manual of Mental Disorders (DSM) and younger age of diagnosis, an increase in risk factors cannot be ruled out [6, 7]. Studies have shown, ASD has a strong male bias in its prevalence. It affects four times more males than females [8]. Their results show that girls score significantly higher in socio-emotional reciprocity and lower in restricted and repetitive behaviours than boys [9]. Some researchers have suggested there is a possibility that the female-specific protective effects against ASD might exist [10]. Literature regarding ASD with regression has grown significantly over the past 25 years. There is no universally agreed definition; however, all definitions support that regression involves the loss of a previously attained skill, such as language. At present, two specified classes of the term regression are evident in the autism literature, language, and language/social regressions [11]. Language regression refers, to the loss of verbalizations while language/social regression, indicates other social behaviour involved in addition to the language.

In 2016, there were estimated 62 million cases of ASD worldwide, accounting for a prevalence of 0.83% [12]. In terms of disease burden, ASD accounted globally for more than 9 million Years Lived with Disability and for 121 Disability Adjusted Life Years per 100,000 populations [13]. In high-income countries, ASD prevalence has been estimated to be about 1% across all ages [14]. However, According to a study in the US, in 2014, overall 1.68% of victims were reported to have Autism Spectrum Disorder (ASD), Whereas the percentage was increased by 15% and 150% respectively over the year 2012 and 2000 [15]. Therefore, ASD prevalence in the US appears to have increased in the last decades, but the causes of this surge are not yet fully understood. ASD costs are estimated to be approximately $250 billion annually in the U.S. Moreover, it is suggested that by 2025, ASD costs will rise to over $450 billion [16]. Thus, the financial burden on families is increasing. There is no effective screening tool for proper diagnosis is available. However based on Infant Toddler Checklist (ITC) and DSM-5, some diagnostic process has been developed like ADOS- G, ADI- R, CARS, GARS, DISCO and these are now used for diagnosis. There are some therapies (like ABA, Respiridone, Aripriprazole, TEACCH) that can suppress the symptoms of ASD but no drug has been found for treatment of it.

HISTORY

A Swiss psychiatrist, Paul Eugen Bleuler used the term "autism" to define the symptoms of schizophrenia for the first time in 1912 [17]. It comes from the Greek word αὐτός (autos), which means self. Hans Asperger adopted Bleuler's terminology "autistic" in its modern sense to describe child psychology in 1938. Afterward, 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 movements and habits. Asperger describes this pattern of behaviours as "autistic psychopathy", which is now called Asperger's Syndrome [18]. 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 [19]. 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 a bunch of abnormalities cause a lack of neurodevelopment. The exact cause of autism and the other ASDs is still not known. The etiologic theories have changed over the years. It was once thought to be the result of faulty child-rearing. This historical psychosocial theory has been rejected, as research clearly indicates that the etiology is multi-factorial with a strong genetic basis [20].

Gene defects and chromosomal abnormality have been found in 10%- 20% of individuals with ASD [21, 22]. Siblings born in families with an ASD subject have a 50 times greater risk of ASD, with a recurrence rate of 5%- 8% [23]. The occurrence rate reaches up to 82%- 92% in monozygotic twins, whereas 1%- 10% in dizygotic twins. Genetic studies suggested that developmental pathways of neuronal and axonal structures involved in synaptogenesis altered bysingle-gene mutations [24-26]. In the cases related to fragile X syndrome and tuberous sclerosis, hyper-excitability of neocortical circuits caused by alterations in the neocortical excitatory or inhibitory balance and abnormal neural synchronization is thought to be the most probable mechanisms [27, 28]. Recently it has been found that, TSC, a disorder caused by a mutation in the TSC1 or TSC2 gene, exhibits an increased risk of autism [29].

The environmental factors can also be reasons for ASD [30]. Environmental risk factors include advanced parents' age, pregnancy complications, and maternal conditions, organic toxicants, air pollution, or medication exposure during pregnancy [31]. In the pre and postnatal periods, these factors can produce an effect on brain development. Although, determination of the causing pathway of environmental risk factors is challenging as they can act directly on the CNS or by other biological mechanisms. Cesarean section is a cause of several neurodevelopment disorders, including ASD [32]. It can directly or indirectly change the characteristics of the microbiome of the intestine of the new born which can be a leading cause of Autism [33]. Besides that, large twin studies shows that the uterine environment has an important impact on the development of the foetus and that the mother's health can deeply influence the long-term mental and physical health of the developing foetus [34]. However, researchers are now suspecting that there is a major role of multiple gene-environmental interactions in wide inter-individual heterogeneity of ASD [30]. Because of the multiple risk factors, the actual cause of Autism is very difficult to find out. That is why the main cause has still not been found out.

DIAGNOSIS

Autism is one of a group of pervasive developmental disorders. These disorders are characterized by three main conditions like impaired communication, impaired reciprocal social interaction and restricted, repetitive and stereotyped patterns of behaviours or interests in the first 3 years of life [1, 2]. ASD is diagnosed clinically based on the presence of core symptoms. Caution is required at the time of diagnosis of ASD because of non-specific manifestations in different age groups and individual abilities in intelligence and verbal domains. In early days the nonspecific signs recognized in infancy included irritability, passivity, and difficulties with sleeping and eating, followed by delays in language and social engagement. At 12 months of age, infants with ASD show atypical behaviours, across the domains of visual attention, imitation, social responses, motor control, and reactivity. There is also a 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 or repetitive behaviours and interests are manifested [35].

There are some tests to diagnose ASD based on ICD and DSM that have been developed using a parent or carer interview, child observation, or a combination of both. The ICD and DSM are both discussed on Table no 1 and the diagnostic tests based on these two are discussed at Table no. 2

TREATMENT

ASDs are lifelong chronic disabilities. Not a single medication has been found that can cure ASD. However, several groups of medications, including atypical neuroleptics, have been used to treat associated behavioural problems such as aggression and self-injurious behaviours [41,42]. Treatment of disabling symptoms such as aggression, agitation, hyperactivity, inattention, irritability, repetitive and self-injurious behaviour may allow educational and behavioural interventions to proceed more effectively [43]. There are limited treatment options to suppress the symptoms associated with ASDs, including both symptoms related to diagnostic criteria and those that are considered to be a function of comorbid mental and medical conditions known to exacerbate the severity of presentation. While there are promising indications for new medical treatments for autism [44], a recent systematic review found that while many children with ASDs are treated with medical interventions, there is minimal evidence to support the benefit of most treatments [45]. There are numerous challenges for the identification of effective treatments for ASD. Systematic reviews highlight the possibility that genetic, environmental, cognitive, and social heterogeneity in the ASD phenotype produces highly variable study samples that reduce the potential effect size of an intervention [46]. Research has shown that the most effective therapy is the use of early intensive behavioural interventions that aim to improve the functioning of the affected child. These are focused on developing language, social responsiveness, imitation skills, and appropriate behaviours. Examples of these behavioural therapies include ABA (Applied Behaviour Analysis) and TEACCH (Treatment and Education of Autistic and Related Communication Handicapped Children). The ABA approach involves teaching new behaviours by various techniques and problem in behaviours are addressed by analyzing triggers. The TEACCH approach takes advantage of relative strengths in visual information processing using strategies such as visual schedules, clearly structured and organized classrooms, and highly structured learning activities that are broken down into

manageable, visually organized steps [47]. These are some following methods of treatment of ASD some of them have proven their usefulness (discussed in Table no. 3) and some of them will possibly prove their usefulness and still under trial period (discussed in Table no. 4).

Table 1: ICD and DSM

Classification methods	Release Date	Based On	Ref
ICD- 10 (International Classification of Diseases and Related Health Problems - Tenth Revision)	1990 ICD- 11 in 2018	1) communication 2) social interaction 3) presence of restricted	[36]
DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, fifth edition)	2013	1) social communication 2) restricted	[36]

Table 2: Diagnostic tests based on ICD and DSM

Diagnostic Test	Release Date	Assessment parameters	Duration of test	Applied age group	Ref.
ADOS- G (Autism Diagnostic Observation Schedule - Generic)	1989 Commercially available in 2011	1) social interaction 2) communication 3) play 4) imaginative use of materials	30 to 60 minutes	Under 6 years	[36, 37]
ADI-R (Autism Diagnostic Interview - Revised)	1994	1) reciprocal social interaction 2) communication and language 3) restricted and repetitive stereotyped interests and behaviours	2 to 18 months	At least 24 months	[38]
CARS (Childhood Autism Rating Scale)	Second edition in 2010	1)Relationship with people 2)Imitation 3)Emotional response 4)Body use 5)Object use 6)Adaptation to change 7)Visual Listening response 8)Taste-smell-touch response and use 9)Fear and nervousness 10)Verbal communication Non-verbal communication activity level 11)Level and consistency of intellectual response, General impressions	5 to 10 minutes	2 to 4 years	[36]
DISCO (Diagnostic Interview for Social and Communication Disorder)	2012- 2013	1) Family andmedical background 2) Infancy 3) Developmental skills 4) Repetitive, stereotyped activities 5) Emotions 6) Maladaptive behaviour 7)Interviewers' Judgement of quality 8) questions considering other psychiatric disorders 9)forensic problems	3 days	3 to 11 years	[39]
GARS (Gilliam Autism Rating Scale)	Third edition 2013	1) social Interaction 2) Communication 3) stereotyped behaviours 4) developmental Disturbances.	5- 10 minutes	3 to 22 years	[36]
3di (Developmental, Dimensional, and Diagnostic Interview)	2004	1) Severity 2) frequency 3) comorbidity	90 minutes	6 to 16 years	[40]

Table 3: Reported beneficial therapies

Non biological therapy			
Therapy	**Types**	**Description**	**Ref**
ABA-Applied Behavioural Analysis	Discrete Trial Training (DTT)	Typically conducted in a one-to-one situation at a desk or table with minimal distractions. It consists of five parts 1) cue, 2) prompt, 3) response, 4) consequence, 5) inter-trial interval.	[48]
	Early Intensive Behavioural Intervention (EIBI)	Based on the principles of applied behaviour analysis. Delivered for multiple years at an intensity of 20 to 40 hours per week for younger than 3-5 years of age.	[49]
	Verbal Behavioural Intervention (VBI)	Focused on developing and using strategies in natural settings that will be beneficialfor naturalistic teaching approaches.	[50]
	Pivotal Response Training (PRT)	Based on behaviour analysis principles to improve social communication skills. It targets areas such as motivation, responsiveness to multiple self-management, and social initiations.	[51]
Biological therapy			
Therapy	**Types**	**Description**	**Ref**
Symptomatic treatments (Psycho Pharmacological Agents)	Respiridone	First drug to be approved by the US FDA for the symptomatic treatment of irritability, deliberate self-injury, and aggressive behaviour in children of more than 5 years with ASD	[52]
	Aripriprazole	Aripiprazole has also been approved by the FDA for the treatment of irritability in autistic children aged 6-17 years. It can reduce stereotypy, irritability, and hyperactivity in children aged 6-17 years	[53]

Table 4: Hypothesis based reported therapy for partial benefits

Non biological therapy			
Therapy	**Type**	**Description**	**Ref**
Treatment And education of Autistic and children (TEACCH)		It includes important elements such as the organization of the physical environment, predictable sequence of activities, routines with flexibility, structured activity systems, and visually structured activities. It also provides clinical services such as social play and recreation groups, parent support groups and training, diagnostic evaluations, individual training for high functioning autistic groups, and supported employment	[54, 55]
Developmental Models	Denver Model	It uses interpersonal relationships, play and activities toremediate the main deficits in imitation, emotion sharing.	[56]
	Early Start Denver Model (ESDM)	ESDM is an integrative program that utilizes a combination of relationship-based and developmental approaches plus ABA programs. It includes parents as therapists.	[57]
	Developmental Individual Difference (DIR)	It focuses on "floor time" play sessions and other strategies that enhance relationships and emotional and social interactions in order to facilitate cognitive and emotional development. It also addresses deficits in motor planning and sequencing, auditory processing and language, visual spacing processing, and sensory modulation	[54]
	Relationship Developmental	This, allows the child to discover the value of positive interpersonal activity and thus helps him or her to become more motivated in learning the skills to	[54]

	Intervention (RDI)	sustain this relationship	
	Responsive Technology (RT)	This is implemented by parents in order to address the language, cognitive, and social-emotional needs of young children with developmental problems	[58]
Picture Exchange Commutation System (PECS)		The purpose is to teach children with autism to initiate communication by handing a picture to a communication partner in exchange for the desired item. The picture may be used instead of or in conjugation with speech	[59]
Social ABCs by parents or caregiver		The treatment group experienced a favourable response in these features: (1) child functional vocal responsiveness to parent prompts, (2) child vocal initiations, (3) parent smiling and (4) fidelity of implementation	[60]
Parents Mediated Communication		parents are trained by the therapist with the aim to first increase parental sensitivity and responsiveness to child communication and reduce mistimed parental responses	[61]
Caregiver Mediated Communication		In this method caregivers actively coached the children everyday activities like watering plants, grooming, and helping with laundry	[62]

Biological Therapy

Therapy	**Types**	**Description**	**Ref**
Potential Psychopharmacologic Agents	Stimulants	stimulants such as methylphenidate improves symptoms of hyperactivity, impulsivity, and inattention in children with ASD	[63]
	α Adrenergic Agonist	Alpha-2 adrenergic agonists such as guanfacine and clonidine have been used to manage symptoms of hyperactivity, impulsivity, and inattention in children with ASD	[64]
	Serotonin Specific Reuptake Inhibitors	Fluoxetine in children with ASD showed beneficial results in reducing repetitive and other maladaptive behaviors	[65]

CONCLUSION

Autism is now a very common neurodevelopment disorder characterized by three core deficits: impaired communication, impaired reciprocal social interaction and restricted, repetitive and stereotyped patterns of behaviours or interests. It affects children aged less than 3 years. Sometimes lack off of importance the diagnosis of Autism becomes late. The prevalence rate is around 1 in 68 and continuously increasing in the US. With increasing the number of autism affected children and the treatment cost the burden on the families is increasing. The proper cause of ASD is still not known and there is no actual treatment to fully cure this disorder. However, we live in the era of modern science where the medical field has shown tremendous growth. There is not a possible treatment for Autism but now the symptoms can be treated by different therapies that have been discussed above. Autism is a lifelong disorder so it is very necessary to identify it as soon as possible so it is very important for parents to understand the problems. It is an era of internet, so for educating the parents about the disorder, there are many websites like "autism-society.org", "autismspeaks.org", "helpguide.org", "cdc.gov" etc. For increasing the awareness of Autism some organizations like "Autism-India, Autism Society of India, National Autistic Society, Autism Speaks, Autism Society of America, Autistic Self Advocacy Network, Organization for Autism Research, Autism Research Institute, Autism Europe, Autism for freedom, etc." are working very hard and they are also getting their results of hard work.

Every year on 2nd April "World Autism Awareness Day" is celebrated to educate people and to increase awareness about Autism all over the world.With these many advancements, it can be said that the day is not too far away when the remedy to cut the curse of autism will be in our hands.

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Nil

CONFLICT OF INTEREST

The authors declare no conflict of interest

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