



A REVIEW ON AUTISM SPECTRUM DISORDER

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ABSTRACT:

autism spectrum disorder (ASD) is a neurodevelopmental disease characterized by social and repetitive or limited behaviours as well as communication difficulty. Autism spectrum disorder is also known as Asperger syndrome. Autism is a neurological disorder that lasts for a lifetime. The term "spectrum" describes the wide range of signs, skills, and levels of disability that individuals with Autism spectrum disorder may experience. The autism spectrum is a group of conditions that impairs people's emotional, cognitive, and social abilities. These disorders include Autistic disorder, Rett disorder, Asperger syndrome, pervasive developmental disorder, and childhood disintegrative disorder. Autism has an impact on how people perceive, communicate, and interact with others, but it's important to note that there are different views on how these impairments should be described and that not all autistic persons see themselves as impaired. They could struggle to connect words to their meanings, which makes it challenging for them to find the right words to convey their emotion.

Keywords: Neurodevelopmental disorder, Risperidone, behavioural changes, Ketogenic diet.

I. INTRODUCTION:

Autism spectrum disorder can be treated in a variety of ways, including dietary modifications, education, rehabilitation training, sensory integration, and pharmaceutical management. Risperidone is the most frequently prescribed medication for treating severe behavioural problems in autistic children. The FDA approved the medications risperidone and aripiprazole in 2006 and 2009, respectively, to treat ASD-related irritability. Risperidone should be started at a minimum age of 5 years old, while aripiprazole should be started at a minimum age of 6 years old. Risperidone and aripiprazole have been shown to reduce irritability and agitation in

children with ASD in randomised controlled studies. Although the fact that the precise origins of ASD are unknown and there is no known treatment, research has shown that symptoms can be reduced with the right care, particularly if they are discovered in infancy. Autism typically manifests in the first three years of life. Many people who are autistic also have average or above-average intelligence, while some persons on the autism spectrum also have an intellectual disability. In 1943, Kanner³ published the first description of autism in print. A year later, Hans Asperger, a physician from the University of Vienna, described a group of kids with characteristics that were almost identical to Kanner's. Aresti-Bartolome and Garcia-Zapirain examined how technology has aided studies on the treatment of ASD.

They separated the technologies into four groups:

- Virtual reality
- Specific applications
- Telehealth applications
- Robotic-based technologies.

Three study goals are taken into account for each technology category:

- Communication and interaction
- Social learning and imitation skills and
- Other miscellaneous.

Acupuncture and herbal remedies are frequently used to treat ASD in children. Both medications are atypical antipsychotics, a class of medication that has the potential to have serious side effects like sedation, weight gain, and metabolic disturbances. As a result, when using these drugs, close follow-up and monitoring by a doctor with specialised knowledge is necessary. Patients with ASD might benefit from a low-carbohydrate diet like the ketogenic diet (KD). A comprehensive study of CAM (complementary and alternative medicine) for the treatment of ASD found positive outcomes for acupuncture, massage, music therapy, and sensory integration therapy. A research of herbal remedies found that 32 different types of Chinese herbal medicine have pharmacological effects, primarily resulting in the development of the immune system, memory enhancement, gastrointestinal tract improvement, and nerve soothing. Children with autism are treated by physical therapists in a range of settings, such as the home, nursery, community, clinics, hospitals, rehabilitation programmes, fitness centres, and open-air exercise programmes. It is believed that complex interaction between genetic, environmental, and immunological variables cause ASD. Antidepressants, antipsychotics, megavitamins, thyroid hormone, serotonin reuptake inhibitors, clonidine, naltrexone, lithium, and other medications are used as therapies.

Autism spectrum disorder is the most common cause of disability in children under the age of five. Since persons with Autism spectrum disorder frequently need high levels of support, which can be expensive, this condition places a heavy financial, emotional, and physical strain on the family it affects. One of the main causes of disability in children is thought to be Autism spectrum disorder. Patients with ASD have a higher death rate, which may be related to comorbidities like epilepsy, as well as intentional and unintentional self-inflicted injuries. Autism spectrum disorder children are likely to have hearing impairment starting in infancy, according to recent studies. ASD is correlated with more than 800 genes and other genetic disorders. Children with Autism spectrum disorder experience sleep difficulties in 50–80% of cases, and behavioural dysregulation is linked to sleep disorders. Clinical assessments, counselling, diagnoses, therapeutic treatments, and treatment modalities are all influenced by behavioural and mental disorders in autism that are genetically influenced. The choice of psychotropic drugs to treat difficult behaviours or co-occurring psychiatric problems frequently seen in ASD can now be guided by pharmacogenetics testing. Researchers have concentrated on better understanding ASD and enhancing risk prediction and prevention because there isn't any clinical or epidemiological evidence for a treatment for ASD. There are numerous related genes and environmental risk factors, making the causes of ASD complicated and multifaceted. Maternal factors, including advanced maternal age (35 years), chronic hypertension, preeclampsia, gestational hypertension, and being overweight before or during pregnancy, were significantly and unfavourably associated with the risk of ASD, according to a previous umbrella review (UR) of environmental risk factors for ASD.

II. TYPES OF AUTISM:

The autism spectrum disorder contains five clinical subtypes that have an emotional, cognitive, and social impact: Asperger syndrome, autistic disorder, pervasive developmental disorder, Rett syndrome, and childhood disintegrative disorder.

Autistic disorder:

This condition is referred to as "classic" autism. It is what the majority of people imagine when they hear the word "autism." People with autism disorder typically exhibit odd behaviours and interests, major language impairments, and communication and social difficulties. Intellectual difficulty is common among those who have autism spectrum disorder.

Asperger Syndrome:

Those who have Asperger syndrome typically have less severe autistic disorder symptoms. They could experience social difficulties and exhibit peculiar behaviours and interests. They normally do not struggle with language issues or intellectual disabilities, nevertheless.

Disorder of Pervasive Development -

Not Otherwise Specified PDD-NOS, or "atypical autism," are other names for this condition. Atypical autism is a diagnosis given to those who partially match the requirements for Asperger syndrome or autistic disorder but not all of them. Compared to others who have autism disorder, these people usually have fewer and milder symptoms. Only communication and social issues could result from the symptoms.

Rett syndrome:

Rett syndrome (RTT) is a neurodevelopmental condition in which a period of usual development is followed by a regression of previously learned skills. A mutation (a change in the DNA) in the MECP2 gene, which is located on the X chromosome (one of the sex chromosomes), is what causes nearly all instances of Rett syndrome.

III. SOCIAL AND ECONOMIC IMPACT:

Economic and social effects ASDs can significantly limit a person's ability to function normally and engage in society. ASDs can also have a detrimental impact on a person's social life, present scholastic difficulties, and cause problems in the At least 60% of autistic people still reside with their parents, participating in society only little. Most autistic people express feelings of loneliness and isolation, and only a small percentage (between 5 and 10 percent) enjoy long-lasting friendships or other forms of social support outside of their close families. autism spectrum disorder pose a serious emotional and financial hazard to those who suffer from these conditions as well as their families. Caring for children with severe autism spectrum disorders can be challenging, especially when family support is lacking and supports are difficult to reach. Therefore, it is commonly acknowledged that caregiver involvement is essential to provide for children with ASD. While some persons with Autism spectrum disorder are able to live independently, others have severe difficulties and require support and ongoing care. At least 60% of autistic people still reside with their parents, participating in society only little. Most autistic people express feelings of loneliness and isolation, and only a small percentage (between 5 and 10 percent) enjoy long-lasting friendships or other forms of social support outside of their close families. Interpersonal interactions are hampered by autism. Families of autistic children and their families deal with a variety of difficulties. The struggle is lifelong and begins early. It is linked to various issues like those that are financial, marital, professional, and personal. These issues arise in a broader societal setting. The entire family, including the married system, the parental system, the sibling system, and the extended family system, is affected by autism, not just the parents. It's because parents don't take their kids to play dates, community events, or other family-oriented activities. Deficits in social interaction and communication are important aspects of autism, as stated in the DSM-5 and ICD-II. These two categories of impairments are related in a number of ways. Pragmatics, often known as social language, is something that students with autism frequently struggle with. Deficits in social communication increase the chance of social isolation and decrease opportunities for social participation.

Understanding autism spectrum disorder and how it impacts patients and their families better will make it simpler to identify the specific support and resources that are needed in each unique case. According to the literature, parents of children with ASD report higher levels of psychological discomfort, such as paranoia, schizophrenia, schizoid characteristics, anger, melancholy, anxiety, obsession-compulsion, and interpersonal sensitivity. The emotional components of having a kid with a handicap, comprehending a child's requirements, many parts of primary care, medical and education services, as well as financial difficulty, are just a few examples of the family and social stressors.

Due to the prevalence of autism spectrum disorder and the fact that it affects children from a variety of racial, socioeconomic, and ethnic backgrounds, many issues associated to autism spectrum disorder provide a challenge to society as a whole. Lack of social skills can have a significant negative impact on future success in relationships, career, health, and higher education, among other areas of life.

However, no study has yet demonstrated that respite care is appropriate for children with autism spectrum disorder. In 2001, a meta-analysis on the impact of respite care for children with developmental delay came to the conclusion that making sure respite care is helpful for reduction in parental stress and an increase in coping abilities. Due to their inadequate grasp of social interactions, students with ASD may find it difficult to operate in a school setting. Children with autism typically have strict and constrained play behaviors and are unable to express their play preferences, form friendships, or form peer groups. Interventions for autistic children are required to lessen parental stress and other effects on the family and functioning. A variety of resources, including treatment, self-help groups, professional parent training, and respite care, can have a good effect on the family. We can help children with ASD become more socially and adaptively adept by continuously improving educational policies and procedures.

IV. ETIOLOGY:

Research suggests that genetics and environment both contribute to ASD, but there is no single reason. Autism spectrum disorder is a spectrum of disorders. It is now generally accepted that it is a multi-factorial condition caused by genetic and non-genetic risk factors, as well as how they interact. In 10%–20% of people with ASD, genetic factors such as gene abnormalities and chromosomal aberrations have been identified. With a recurrence rate of 5%–8%, siblings born into homes with an ASD subject are 50 times more likely to have the disorder. If one identical twin has ASD, the other twin almost always has also in 90% of cases. In monozygotic twins, the concordance rate can reach up to 82%–92%, as opposed to 1%–10% in dizygotic twins. Among the genetic causes are tuberous sclerosis, a rare genetic illness that causes noncancerous tumor growth in the brain and other important organs, and fragile X syndrome, which is caused by a single genetic mutation that leads in intellectual incapacity. Although family studies show that idiopathic autism has a major genetic component to its etiology, concordance rates are not 100%, suggesting that environmental factors also play a role in ASD.

The Interaction of multiple complex genetic factors, including chromosomal abnormalities, copy number variation (CNV), monogenic disorders, single nucleotide polymorphisms (SNP), de novo mutations, and epigenetic processes, results in the highly heterogeneous genetic architecture of the disorder. More than 800 genes have been linked to autism through case-control research using human and animal models. The majority of ASD-related genes are those that encode for synaptic architecture and function, cell proliferation, chromatin remodeling, and transcriptional control.

Studies on risk factors associated with ASD in the prenatal, perinatal, and neonatal periods have identified gestational diabetes, maternal hypertension and proteinuria, pre-eclampsia, gestational bleeding, maternal and advanced paternal age during conception, maternal migration, abnormal fetal presentation, umbilical cord complications, and maternal folic acid deficiency during perinatal and gestational periods. However, the nature of the environmental trigger is still up for debate.

V. EPIDEMIOLOGY:

Over the past 20 years, there has been a steady rise in the prevalence of ASD documented globally. One in 160 children in the world is thought to have an ASD. According to the Centers for Disease Control and Prevention (CDC), 1.68 percent of US children who are 8 years old have an ASD diagnosis. According to the World Health Organization (WHO), 0.76 percent of people globally are thought to have ASD, which accounts for just approximately 16 percent of all children worldwide. According to estimates from the Autism and Developmental Disabilities Monitoring Network (ADDM), the prevalence of ASD more than doubled in the US between 2000-2002 and 2010-2012. The prevalence of ASD seemed to stabilize between 2014 and 2016 without a statistically significant increase, albeit it may be too soon to analyze trends in the US. Despite being present in every socioeconomic, racial, and ethnic group, ASD is not always diagnosed. More Caucasian children than Hispanic or Black youngsters are found to have ASD. Rett syndrome, Down syndrome, tuberous sclerosis, and fragile X, among others, have higher rates of comorbidity with ASD than the general population; however, these identified genetic conditions are reported for only a small proportion of all cases of ASD. A certain profile of male social functioning has been found in studies on children with sex chromosomal aneuploidy to be more susceptible to autism.

Due to an increase in the use of chromosomal microarrays, some chromosome locations, particularly those on chromosomes X, 2, 3, 7, 15, 16, and 22, are associated with an enhanced risk of ASD. The other risk factors for ASD are prematurity and older parents. Because older gametes are more likely to transmit alterations, resulting in additional obstetrical problems, including preterm.

Though a recent meta-analysis, which did not include the DSM-5 criteria, found that the true male-to-female ratio is closer to 3:1 than the previously reported 4:1, ASD is more frequent in boys. According to this study, girls who fit the criteria for ASD are more likely to go without a clinical diagnosis. Girls with autism may experience misdiagnosis, delayed diagnosis, or non-diagnosis due to the feminine phenotype. Females are also

more prone to use a technique known as "camouflaging" to hide their social impairments, which further delays a quick diagnosis. Females are also less likely to exhibit overt symptoms. The diagnosis of ASD in girls may also be hampered by gender biases and prejudices that associate the condition with men.

All racial, cultural, and socioeconomic groups experience ASD, yet the diagnosis varies widely amongst them. Children who are Caucasian are diagnosed with ASD more frequently than those who are Black or Hispanic. Even while there seems to be a decline in the discrepancies, stigma and limited access to healthcare treatments may be to blame for the ongoing disparity.

More than 70 million people worldwide have been diagnosed with autism, and the prevalence is currently believed to be between 1.5% and 2%.

VI. ASD AND OTHER DISORDER:

In many cases, ASD may be present in addition to the following conditions.

- Brain-related epilepsy
- Sleep disturbance
- Sensory irregularities
- Motor delay or deficiency
- Psychiatric
- Depression
- Worry
- Irritability
- Disorder of Attention Deficit/Hyperactivity
- Physical
- Digestive problems

VII. AUTISM SPECTRUM DISORDER REASON AND CAUSES:

Causes of ASD: ASD's precise causes are unknown, however research indicates that environment and genes may have significant contributors.

- ✓ Genes that may raise the chance of autism spectrum disorder are beginning to be discovered by researchers.
- ✓ People with specific genetic disorders, such as Tuberous Sclerosis or Fragile X syndrome, are more likely to develop Autism spectrum disorder.
- ✓ A lot of scientists are concentrating on how genes interact with one another and with the environment, such as family medical issues, parental age and other demographic characteristics, and complications during childbirth or pregnancy.
- ✓ As of yet, there is no evidence between immunizations and autism spectrum disorder.

VIII. BEHAVIOUR AND PSYCHIATRIC:

Genetic factors affecting autism's behavioral and psychiatric problems have an impact on clinical assessments, counseling, diagnoses, therapeutic interventions, and treatment modalities. The choice of psychotropic drugs to treat difficult behaviors or co-occurring psychiatric problems frequently seen in autism spectrum disorder can now be guided by pharmacogenetics testing. Behavioral therapies are used to educate life skills or to deal with comorbidities. Anxiety, repetitive behaviors, and poor communication skills are some of the comorbidities that are treated.

In contrast to making the patient "acceptable" to society, the major objective of treatment should be to increase independence. Additionally, any behavioral therapy aims to impart coping strategies or life skills. Behavioral therapies are used to educate life skills or to deal with comorbidities. Anxiety, repetitive behaviors, and poor communication skills are some of the comorbidities that are treated. In contrast to making the patient "acceptable" to society, the major objective of treatment should be to increase independence. Additionally, any behavioral therapy aims to impart coping strategies or life skills.

Cognitive behavioral therapy, applied behavioral analysis, the treatment and education of autistic and communication-impaired individuals, sensory-based approaches, and the Developmental, Individual Difference, Relationship-based Model/ Floortime are among the behavioral interventions frequently used with children with ASD. These strategies are all employed in ASD treatment regimens today and are all successful.

High levels of irritability (such as temper tantrums, irritation, or furious outbursts) and problem behaviors (such as physical violence against others, self-injurious behaviors, or property destruction) are frequent in autistic people. Anger may be felt more intensely in people with autism due to emotional self-regulation deficits (e.g., employing maladaptive emotion management mechanisms like perseveration or shutting down). Strong negative emotions can then lead to aggressive behaviors. Aggressive actions can also be encouraged by deficiencies in social cognition, such as erroneous appraisals or misinterpretations of social intent. Self-harming acts that have the potential to cause injury are known as self-injurious behaviors (SIBs). Specific phobias and generalized anxiety disorder are the most prevalent anxiety disorders linked to ASD, followed by social anxiety disorder and separation anxiety disorder.

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) lists confined, repetitive patterns of behavior, interests, or activities as ASD symptoms. The repetitive behaviors that characterize ASD may resemble compulsive rituals that are frequently connected to obsessive compulsive disorder (OCD) in striking ways.

IX. GENETIC CAUSES:

In monozygotic twins, there is a 90% concordance rate for autism spectrum disorder. One of the most effective genetic tools for identifying genetic anomalies in kids with developmental and behavioral problems is chromosomal microarray analysis. Copy number variations (CNV), including microduplications and microdeletions, can be found using two techniques: comparative genomic hybridization (CGH) and single nucleotide polymorphism (SNP) microarrays.

Children with Fragile X syndrome, children with CHARGE syndrome, children with Down syndrome (6–7%), and certain children with tuberous sclerosis have been found to have autistic symptoms.

Concordance increased considerably from 60-92% in monozygotic twins and 0-10% in dizygotic pairs when examination for a more extensive autistic phenotype that includes communication and social deficits was performed. This implies that interactions between multiple genes create "idiopathic" autism, but that variations in the expression of features associated with autism may be caused by epigenetic variables and exposure to environmental modifiers. The autosomal recessive gene HOXA1 is just one of many that play a role in the spectrum of autism disorders. Autism spectrum illnesses also involve other genes. Autism and the fragile X gene are linked. Due to the gene's role in cell communication and synaptic plasticity in adult life as well as the proper brain lamination during embryonic development, the reelin gene has been linked to autism. MECP2 gene mutations are the root cause of the Rett syndrome. Rett syndrome stands out as strikingly distinct from autism, which disproportionately affects girls compared to boys. The epidemiological and molecular data indicate that a large number of low-risk alleles combined with a small number of rare harmful variations account for the genetic component of autism spectrum disorder. The genetic makeup of ASD is incredibly intricate. There are between 600 and 1200 genes and genomes that have been linked to autism. Single-nucleotide polymorphisms (SNPs) in genes including NLGN3, NLGN4, NRXN1, MECP2, SHANK3, FMR1, TSC1/2, and UBE3A account for at least 5% of ASD cases. Additionally, there is substantial evidence linking rare de novo mutations in CHD8, SCN1A, SCN2A, SYNGAP1, ARID1B, GRIN2B, TBR1, KATNAL2, LAMC3, and NTNG1 to ASD. Chromosomal duplications, significant deletions, inversions, and translocations, such as the 1q21.1 duplication or deletion, 3q29 deletion, 7q11.23 duplication, 15q11-q13 deletion, 15q13.3 microdeletions, 15q11-13 duplication, 17q12 deletion, 22q11.2 deletion, and 22q13.33 duplication or deletion, make up about 10% of them.^{78,83,84} The third form of ASD variation is caused by mutations that are found in intronic and intergenic areas.

X. PREVALENCE OF ASD:

With current estimates of 1 in 68 children in the United States having ASD, the prevalence of autism spectrum disorders has dramatically increased. This number is almost 30% higher than the Centers for Disease Control's 2012 estimate of 1 in 88 children having autism. Uncertainty exists regarding whether these figures reflect an actual rise in prevalence or whether they are the effect of more public awareness, variations in study design, or the inclusion of subthreshold instances. There is currently agreement regarding the alarming rise in prevalence during the past 20 years. The Centers for Disease Control and Prevention (CDC) began investigating the frequency of ASD in children aged 8 in six to eleven US states in 2000. The prevalence rate was first predicted to be 6.7 per 1000 people, but the most recent report, published in 2020, indicates an index of 18.6 per 1000 people. An average of 4 to 5 males to 1 woman affects the masculine sex more than the female sex. In their study, Bedford et al. (2016) found that male siblings of probands with ASD had more strongly predicted ASD than did female siblings. These predictors of autism in the first year of life included speed of attentional disengagement and variation in gaze tracking. Research suggests that undiscovered biological processes mediate this uniqueness between sexes.

XI. RISK FACTOR OF ASD:

There are numerous biochemical, genetic, and environmental risk factors connected to autism. Autism risk is increased when mothers take thalidomide and valproic acid during pregnancy. Prematurity and perinatal stress is also linked to a higher prevalence of autism. Environmental pollution may be associated with an increased prevalence of autism, however this is not conclusively proven by research. Although this has been questioned as a cause, older parents could be one risk factor. Having a sibling with ASD who is older is undoubtedly a risk factor. In a study of 86 autistic Lebanese children, it was found that autism was significantly associated with older parents, maternal discontent during pregnancy, living close to industrial areas, and prior childhood infections.

XII. SIGNS AND SYMPTOMS OF ASD:

A child with ASD might:

1. Want to be alone themselves and avoid eye contact.
2. Have problems expressing one's sentiments or understanding the emotions of others.
3. Have speech and language development delays, such as using words significantly later than siblings or peers or not using words at all.
4. Repetition of words or phrases.
5. Provide irrelevant responses to inquiries.
6. Get irritated at apparently small regular changes, like obtaining a new toothbrush.
7. Have intense, difficult-to-interrupt obsessive hobbies, such as a great desire for trains.

8. Wave his or her hands around, rock back and forth, or spin around.
9. Have unique play or use of objects, such as spinning or constantly lining them up.
10. React strangely to sounds, smells, tastes, sights, or sensations.

Autism in children's symptoms: No single indication always denotes autism; typically, a youngster will have a number of signs from a few of the following categories.

Behaviors:

1. Displays irrational tantrums
2. Displays uncommon interests or connections
3. Displays peculiar motor behaviours, such as spinning or flapping hands
4. Has a very tough time accepting change.

Sensory:

1. Terrified of some common noises.
2. Looks at things with peripheral vision.
3. An interest in moving objects.
4. High pain and temperature tolerance.

Communication:

1. Not replying to his or her name after a year.
2. By 12 months, not gesturing or pointing.
3. Loss of previously used words.
4. 18 months old with no speech.
5. By 24 months, no spontaneous utterances.
6. Selective hearing, which ignores human voices in favour of specific sounds.
7. Weird linguistic behaviours (such speech that is repeated).

Nonverbal communication issues can include trouble reading facial expressions and gestures, trouble starting and keeping up conversations, or repeated speech in people with autism spectrum disorder. They may struggle to make friends or engage with others, may not reply to their name, may avoid eye contact, or may not have the same interests as others.

XIII. DIAGNOSIS AND SCREENING:

Autism is typically identified in the early years of childhood. ASD in young children can typically be reliably identified by the age of 2, but developmental pediatricians, psychiatrists, and psychologists who are trained and skilled in evaluating people on the autistic spectrum can do so at any age. An evaluation may include interviews with the person, their family, and assistance providers as well as observations, standardized exams, or

questionnaires. The strengths and weaknesses of the person are discovered, especially in the areas of social interaction and social communication, sensory processing, and constrained and repetitive interests, activities, and behaviors. Autism is not characterized by a single behavior. There are no blood tests available right now that can identify autism.

Fundamentally clinical in nature, the diagnosis is made based on the existence of the aforementioned symptoms. Since data suggests that early identification and subsequent intervention may lead to noticeably better outcomes, early identification of ASD is essential.

The medical history, physical and neurological evaluations, mental examinations, and auxiliary tests are all carefully considered while making the diagnosis of autism. From preschool to middle childhood, autism diagnoses are remarkably consistent.

ASD is presently diagnosed using the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). In this handbook, the terms “limited, repetitive patterns of behavior, interests, or activity” and “permanent deficiencies in social communication and social interaction” are used to identify the two primary types of symptoms. To assist with the diagnostic procedure, the healthcare professional may also use specialist tools like the Autism Diagnostic Observation Schedule (ADOS) or the Autism Diagnostic Interview-Revised (ADI-R). These evaluation approaches include interviews with caretakers, direct observation, and involvement with the person being examined. Asperger’s disorder, PDD-NOS, and autistic disorder are all referred to as “autism spectrum disorders” in the most recent DSM-IV-TR. Eliciting and addressing parental concerns about the child’s development, recording and maintaining a developmental history, accurately observing the child, determining the presence of risk and protective factors, and documenting the process and results are the five elements of surveillance.

According to the child’s current age, screening instruments are used to assess the child’s visual and auditory ability, early communication and language skills, and motor skills. Even if there is no known issue, it is a standard component of some well-child visits. During routine well-child visits at these ages, the American Academy of Pediatrics (AAP) advises developmental and behavioral screening for all kids: 9 months

- 18 months
- 30 months

Additionally, the AAP advises that all children be specially evaluated for ASD at certain ages during routine well-child visits:

- 18 months
- 24 months

Research that compares your child to other kids his or her age forms the basis for screening questionnaires and checklists. Language, movement, and reasoning abilities, as well as behaviors and emotions, may be the subject of questions. A doctor, nurse, or other professional in a healthcare, community, or educational environment can conduct a developmental screening. You could be asked to fill out a questionnaire by your doctor as a part of the screening procedure. If you or your doctor has any concerns, screening should be done at intervals other than the suggested ages. If you or your doctor has any concerns, screening should be done at intervals other than the suggested ages. If a kid is at high risk for ASD (for instance, has a brother or other family member with ASD) or if behaviors occasionally linked to ASD are present, additional screening should be done. You can request that a developmental screening test be performed on your child if the healthcare practitioner does not currently do so.

XIV. TREATMENT OF ASD:

The primary goals of psychosocial treatment and educational interventions for kids with autism spectrum disorder is to maximize language development, enhance social and communicative abilities, and stop maladaptive behavior.

The underlying variation in etiology will have an impact on the development of targeted treatments, and linked genetic pathways that affect ASD are expected to be the initial targets of treatments and potentially gene therapy in the future.

Drugs used for ASD:

Medications like Metformin, Risperidone, Arbaclofen, Cannabidiol, Oxytocin, Bumetanide, Lovastatin, and Trofinetide.

Risperidone:

The Food and Drug Administration (FDA) originally approved the second-generation antipsychotic risperidone (Risperdal, Janssen, and generics) to treat irritability associated with autism.⁴ Children 5 years of age and older were covered by its approval in 2006. In comparison to placebo-treated patients, those receiving risperidone displayed lower levels of irritation ($P = 0.0001$), social disengagement ($P = 0.0001$), stereotypy ($P = 0.047$), hyperactivity ($P = 0.033$), and inappropriate speech ($P = 0.033$). In terms of preventing an ASD recurrence, risperidone outperformed the placebo ($P = 0.049$). The most frequent adverse events (AEs) were weight gain, increased hunger, anxiety, and weariness. Risperidone dosages per day ranged from 0.5 to 3.5 mg.

Oxytocin:

An endogenous hormone known as oxytocin (Pitocin, Par Sterile Products, and generics) is most famous for its function in lactation and parturition. Additionally, it has been discovered to be crucial for the development of relationships and social behavior in both people and animals. Since reduced social interaction and impaired speech are two hallmarks of ASD,¹ researchers have examined whether intranasal oxytocin can lessen these

deficits. After administering intranasal oxytocin to 17 children with ASD, Gordon and colleagues used magnetic resonance imaging to track changes in brain activity during assessments of socially and nonsocial relevant imagery. The researchers discovered that oxytocin improved brain activity in these subjects and seemed to increase their assessments of the socially significant items.

Bumetanide:

A powerful loop diuretic, bumetanide (generics) is prescribed to treat edema brought on by congestive heart failure, hepatitis, and renal illness (including nephrotic syndrome). The only adverse event associated with active therapy was sporadic moderate hypokalemia, which was managed with extra potassium. Bumetanide, on the other hand, is known to cause severe diuresis and electrolyte depletion. Therefore, during therapy, close medical supervision is necessary, and the dosage and regimen must be modified to meet the demands of each individual patient.

Atypical antipsychotics, serotonin-reuptake inhibitors, alpha-2 agonists, and stimulants are some of the drugs in this group. Fragile X syndrome (FXS) is the most prevalent genetic condition that can cause autism spectrum disorder (ASD). The development of new therapies that might be beneficial for other types of ASD can be modeled after targeted treatments for FXS.

Psychopharmacological treatment:

Children and adults with ASD frequently receive psychopharmacological treatment in clinical settings. An average of one-third of people with ASD use a medicine (psychotropic or vitamin) to treat the disease or any accompanying psychiatric or behavioral issues.

Therapies Used For ASD:

These treatments generally can be broken down into the following categories

- Behavioral Approaches
- Developmental Approaches
- Educational Approaches
- Social-Relational Approach
- Psychological Approach

XV. BEHAVIOUR APPROACH:

The behavioral approaches work best for treating ASD symptoms. A popular behavioral therapy for people with ASD is called Applied Behavior Analysis (ABA). ABA encourages desirable behaviors while discouraging undesirable ones to improve a variety of abilities.

XVI. DEVELOPMENT APPROACH:

Developmental techniques concentrate on enhancing particular developmental abilities, such language or motor skills. For those with ASD, speech and language therapy is the most popular developmental therapy. The person's comprehension and use of speech and language are both improved by speech and language therapy. The Early Start Denver Model (ESDM), a comprehensive developmental strategy based on Applied Behavior Analysis concepts, was created. It is applied to kids 12 to 48 months old.

XVII. EDUCATION APPROACH:

Educational treatments are given in a classroom setting. Treatment and Education of Autistic and Related Communication-Handicapped Children (TEACCH) are based on the idea that people with autism thrive on consistency and visual learning. Visual cues or hands-on demonstrations can supplement verbal instructions.

XVIII. SOCIAL -RELATIONAL APPROACH:

The goals of social-relational therapies are to increase social competence and foster close relationships. In order to increase communication possibilities, the Developmental, Individual Differences, Relationship-Based paradigm (commonly known as "Floor time") encourages parents and therapists to follow the interests of the child. Activities that improve motivation and social interaction are a part of the Relationship Development Intervention (RDI) approach. People with ASD have the chance to develop social skills in social skills groups.

XIX. PSYCHOLOGICAL APPROACH:

Anxiety, depression, and other mental health difficulties can be managed by people with ASD with the aid of psychological techniques. One psychological strategy that emphasizes understanding the relationships between thoughts, feelings, and behaviors is cognitive-behavior therapy (CBT).

XX. NUTRITIONAL DEVELOPMENT OF ASD:

A number of parents and professionals who work with children who have an autism spectrum disorder have observed a link between the child's diet and the severity or frequency of symptomatology. Various mechanisms have been put forth to explain this association.

As of late, animal studies have shown that propionic acid (PA), a dietary short chain fatty acid and common food additive induces neuroinflammatory responses and a number of behavioral changes in rats that are similar to those seen in autism spectrum disorder. There have also been suggestions that food additives or food substances may play important roles in the etiology of ASDs. The behavioral change, along with the neuropathological and biochemical results of intravenously administering PA, all bolstered the idea that autism might be a form of systemic metabolic encephalopathy. When compared to children who are developing normally, it was discovered that children with ASD generally ate much less food. Additionally, it was shown that they consumed less protein,

calcium, vitamin B12, and vitamin D. Despite taking dietary supplements, a large portion of patients may still have deficiencies in vitamin D, calcium, potassium, pantothenic acid, and choline.

XXI. HEALTHCARE BURDEN OF AUTISM:

Autism's impact on health care According to the INCLIN study, the estimated prevalence of autism in India is 1.12 (0.74–1.68) per 100 kids. Males are 1:42 more likely than females to have autism spectrum disorder, which affects 1 in every 189 people. This means that 1 in 68 kids are now diagnosed with autism spectrum condition, placing a significant financial and medical strain on society. As a result, there are almost four times as many boys as females who have ASD, while the sex ratio seems to go down as the severity rises.

XXII. KETOGENIC DIET OF ASD:

The ketogenic diet (KD), which replicates the body's fasting condition and has been shown to be helpful in treating drug-resistant epilepsy and a few other brain illnesses, is a high-fat, moderate-protein, and low-carbohydrate diet. A KD enhanced autistic behavior, according to a rising number of studies, however the underlying processes are unknown. We discussed the neuroprotective effects of a KD in ASD, which are probably brought on by enhancements in energy metabolism, decreases in levels of oxidative stress, regulation of neurotransmitters, inhibition of the mTOR signaling pathway, and modulation of gut microbiota. A KD is probably a secure and successful ASD treatment. For instance, a KD stimulates mitochondrial biogenesis and raises levels of adenosine triphosphate (ATP) and enzymes linked to mitochondrial metabolic pathways. D-hydroxybutyrate dehydrogenase, acetoacetate succinyl-CoA transferase, and acetoacetyl-CoA-thiolase are the enzymes that convert acetyl-CoA to ketone bodies. Under fasting or starving conditions, ketone bodies, such as acetoacetate, acetone, and -hydroxybutyrate, serve as fuels and pass across the blood-brain barrier (BBB) to supply the brain. Additionally, these compounds reduce reactive oxygen species (ROS) and stop the switch in mitochondrial permeability. In the central nervous system (CNS), ketone bodies therefore have neuroprotective properties.

Disaccharidases and hexose transporter levels were found to be lower in ASD patients with GI symptoms, which shows that carbohydrate digestion issues may play a role in the physiopathology of ASD individuals. Thus, ASD patients may benefit from a low-carbohydrate diet like the ketogenic diet (KD). A ketogenic diet (KD) is a high-fat, moderate-protein, low-carb diet that improves energy metabolism.

KD is a substantially successful epilepsy therapy. Patients with refractory epilepsy aged 1 to 18 treated for 4 months with a KD experienced a 56% decrease in mean seizure frequency. Although there is relatively little information on clinical investigations using a KD as a treatment for ASD, it may also alleviate several core autistic characteristics and comorbidities. Beta-hydroxybutyrate (BHB) levels in the blood and urinary ketones must be used to measure a KD's effectiveness. According to certain data, a KD helped ASD patients with their core characteristics.

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According to a case study of a youngster with ASD, a KD boosted the child's IQ and improved electroencephalogram readings. Although a KD-induced decrease in seizures will improve the quality of life for those with epilepsy, including those with ASD, it is not linked to changes in the behaviors of people with ASD. The behavioral signs of ASD are not significantly affected by antiepileptic medications.

Following KD treatment, various blood parameters changed, including over expression of beta-hydroxy butyrate, HDL, LDL, and cholesterol and down regulation of eosinophils. Only the rise in HDL, the percentage of eosinophils, and the decline in white blood cell count were able to predict the outcomes of a modified KD regimen in ASD patients.

Side effects of ketogenic diet:

The majority of ASD kids are picky eaters, which causes them to have feeding issues. As a result, it is challenging to use a KD with ASD kids. The long-term use of a KD in children has certain unwanted effects as well. Constipation, vomiting, lack of energy, and hunger are the main side effects of KD treatment in children. Kidney stones, hyperlipidemia, and hyperuricemia are negative side effects with late onset. The inhibition of physical development in children with a KD is a major adverse impact. Long-term KD treatment reduced growth as measured by z-scores for height, but did not affect growth as measured by z-scores for weight. Height deceleration could result from a KD. A KD has been frequently used in children with refractory epilepsy, albeit severe adverse effects are rare. KD is a safe and successful treatment for people with ASD, despite the absence of trials with bigger samples of ASD patients.

XXIII. CLINICAL FEATURES OF AUTISM:

The onset of ASD symptoms often happens by age 3, though they may not completely develop until school age or later. According to some study, symptoms may also appear between the ages of 6 and 18 months. Children with more severe conditions are more likely to be recognized and accurately diagnosed at younger ages than milder instances. Early indicators of autism include the absence of babbling by 12 months, the inability to wave bye-bye by 12 months, the absence of single words by 16 months, the absence of spontaneous two-word phrases (not only echolalic) by 24 months, and the loss of any language or social skills at any age.

XXIV. PHARMACIST ROLE:

Pharmacists are responsible for ensuring that the patient, parent, or caregiver is aware of each medicine, how to use it, the rules for monitoring it, and any possible interactions or side effects. They must also take any necessary action. Due to possible interactions between CAM use and prescription drugs, pharmacists should ask about it. In addition to providing patients with pharmacological information, pharmacists can also do research and assess the available data to help them make well-informed decisions. In addition to talking about drug use, pharmacists

should also address ASDs and how to manage them and suggest services for parents or other caregivers. A close relationship must be built between the pharmacist and the parent or other caregiver of a kid with an ASD in order for the pharmacist to fully comprehend each patient's needs and deliver the best possible care. Finally, pharmacists ought to participate in the patient's medical care team. Pharmacists who interact with patients frequently can recognize and investigate drug non-adherence, communicate with healthcare professionals, and evaluate patient response to therapy. Additionally, pharmacists can collaborate with patients to create goals that will help them manage their ASD and any accompanying symptoms.

XXV. CONCLUSIONS:

Autism spectrum disorder should be seen as a complicated disorder. It should be standard practice to screen all young children for autism spectrum disorder. From birth to age 5, developmental monitoring is crucial for all young children. There are several degrees of severity. Today's quality of life for many children and adults with ASD is better than it was 50 years ago. Even after accounting for the disparities in who would fulfill the diagnostic criteria, there are more adults with ASD who can speak, read, drive, complete their education, and reside in the neighborhood.

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