

A Review On The Detection And Diagnosis Of Autism Spectrum Disorder

P.P. Janarthanan , M.S. Kaviya Dharshini , C. Kaviya, V. Jayapriya

Abstract— Autism Spectrum Disorder (ASD) is one of the neurodevelopmental disorder which commonly affects the children nowadays. The impact of ASD is high and it will bring harmfulness to the family and society. In our report, the various reasons for the causes of ASD is reported. The diagnosis of ASD stated the various ways to examine the abnormality by acquisition of EEG, Preprocessing, extracting the features of an EEG signal and classifying the normal and an abnormal signal. The treatments to be taken for ASD, the necessary steps to prevent ASD and how to manage the ASD affected individuals are also explained in this study.

Index Terms- Autism Spectrum Disorder, Neurodevelopmental disorder, EEG, Symptoms, Developmental Screening, Comprehensive Detection

1 INTRODUCTION

In the world there are about 23 million individuals have been with disorders which was reported by World Health organization (WHO) in 2017. Nowadays, the people in the world are suffering from various disorders such as Epilepsy, Intellectual Disability (ID), Autism Spectrum Disorder (ASD). Epilepsy will appear only in the latter ages due to some damage in brain or illness. ID is one of the neurodevelopmental disorder will results in the early stage and also it is accompanied by various harmfulness to the society and family. ASD is one of the neurodevelopmental disorder which results in an early stage and is characterized by communication and social interaction. Here in our report, the main focus is on Autism Spectrum Disorder (ASD) which the people is getting affected by it nowadays. Specifically, ASD has been diagnosed by 1.8 million individuals in the world is reported by WHO. It is diagnosed that the effect of ASD is four to five times higher than boys than in girls. The individuals with ASD first appears during infancy or childhood and there is no possibility of remission. The behaviours will become worse and there is a declination of cognitive states also be observed. Some of the affected children will be healthy and behaviours are not much worse condition, in that category of children the effects will be noticed in the latter stage of the childhood. The symptoms of the individuals will be noted at the age of six months and gradually the symptoms being developed between two to three years of age that tends to continue through adulthood and also in the muted form. ASD is not suspected by a single symptom but by a characteristics of symptoms such as deterioration in interaction, deficit in communication, restricted interests, repetitive behaviour,. And at the age of 2 – 3 years the children with ASD will have less response than a normal child. Likewise they will not respond to their own names while calling them and also they will not point at some things quickly what the normal child will not do and the

affected child will take some time to point out as it is difficult for them. And also they will have less eye contact not able to track things. At the age of 3 – 5 years, the child with ASD will do the usual things little bit quite by following their caretakers. They feel comfort with their caretakers (may be their parents or having close attachment with a person in their early age). And also, without their caretakers they feel discomfort to do things. There is a complete need of caretakers for the affected people.

2. REASON FOR ASD

Due to some changes in the malfunctions of the parents during pregnancy like consuming alcohol and smoking, the week immune status of mother results in ASD. The mother of the child is affected by some kind of viral or bacterial infections, diseases (rubella virus, measles, pox, typhoid, etc..) will also results in ASD. And also due to some genetic conditions like dysfunctions in the mutation of genes. Also a child born to an aged parents, a child under weight, Complications during birth, multiple pregnancies, Pregnancy spaced between less than one year apart.

3. DIAGNOSIS OF ASD

Diagnosing of ASD is difficult as it do not have any kind of test like blood test, urine test, etc., the clinicians will look at the child's behaviour as they perform what the normal child will not do and make diagnosis. ASD will be diagnosed at the age of six months or at the age of 2 definitely the clinicians will diagnose a child with autism according to its behaviour. There is a case where some children will not have a complete diagnosis of ASD till they grow. This delay diagnosis states that they do not have any help what they need. The diagnosis of ASD will be of the following methods such as developmental screening and comprehensive detection. In developmental screening, the children will be monitored by their parents or caretakers whether they are learning the basic skills or having delays at the specific age what the normal will usually do. During the examination, the parent are asked to play or learn with the child and the clinicians will notice the performance (how he or she walks, moves, talk) of a child. If there is any delay in the performance, then there is an intimation of ASD. So the physicians can able to report the child whether it is affected by ASD or not. And incase of comprehensive evaluation, there is a complete review of a child which includes hearing and vision screening, genetic testing, neurological testing, and other medical testing.

- P.P. Janarthanan, Assistant Professor, Department of ECE, Kongu Engineering College
- M.S. Kaviya Dharshini, UG students, Department of ECE, Kongu Engineering College
- C. Kaviya, UG students, Department of ECE, Kongu Engineering College
- V. Jayapriya, UG students, Department of ECE, Kongu Engineering College

Electroencephalography (EEG) is a diagnosing tool that can able to predict the brain structure and can able to distinguish the patterns of brain of an ASD individual from the normal. EEG provides the necessary information such as waveform information, spectrum information and nonlinear analysis of the brain. EEG can be acquired by some hardware setups comprising of several electrodes. The authors have not used a same setup for signal acquisition. Several authors will use different setups comprising of 24 electrodes or 128 electrodes so on. As per the channels used, the processing of a signal takes place. After acquisition of a signal, the signal will be preprocessed to remove the artifacts. Then the time series and frequency based features of an EEG signal are extracted and classified using classifier. The paper (Helen et.al 2018) experimented that the EEG signal was acquired by using 128 electrodes and acquired from 188 subjects ages from 3 – 36 months. The features extracted in this paper were power spectrum analysis (Entropy, Bicoherence, Approximate entropy, sample entropy, Permutation entropy, Wavelet entropy, Coherence) and classifier used is SVM classifier and the accuracy acquired is 95% to classify the ASD subjects from the normal people. The author (Jiannan et.al 2018) experimented that the EEG signal were acquired from 104 subjects ages from 4 -6 years using 19 electrodes were placed as per 10 – 20 electrode based system. Certain features were acquired like sample Entropy, Approximate entropy, Permutation entropy, Wavelet Entropy and Coherence. The SVM linear classifier is used for the classification purpose and accuracy 91.38%. The author (Sutrisno et.al 2018) experimented that the EEG signal were acquired from 46 subjects using 23 channels. The features extracted were Standard deviation, and power, Shannon entropy and here various classifiers such as ANN, KNN, SVM and LDA were used for classification purpose with the accuracies of 87.95%, 94.62%, 86.15% and 86.92%. The final diagnosis of ASD will be done with the professionals, psychiatrist, Psychologist and speech pathologist.

4.TREATMENT AND PREVENTION

Since there is no treatment for ASD, some medications are recommended to reduce the effects such as anxiety, Aggressive behaviour, etc., the treatments recommended for ASD is behavioural intervention which will make the affected individuals to upgrade their communication and social skills. The therapy is most effective when it is started at an early age. The children with ASD have benefits while performing with multi-disciplinary team comprise of parents, teachers, psychologists, speech pathologists, and occupational therapists. The treatment for the affected individual depends on what they need. The parents are asked not to smoke and consume alcohol during the time of pregnancy. If any defect is found in the foetus in the womb, the clinicians will recommend the mother for karyotyping.

5.CONCLUSION

Even though, there are many techniques to diagnosis ASD but the high rate of accuracy of finding are not achieved so far. This complex neurodevelopmental issue, which is impacted by both hereditary and natural variables, appears to result from significant changes in cerebrum capacity. People with ASD do not have the capacity to comprehend the mental states,

intentions thoughts and sentiments, independent of the enthusiastic state. In addition, there is an amassing measure of proof recommending that an awkwardness in excitation and hindrance synaptic contributions, in addition to a brokenness in mirror neurons, could represent the loss of psychological and social capacities be seen in the people with ASD.

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