COMMUNICATIVE DISORDERS AND AUDIOLOGIC EVALUATION IN CHILDREN WITH AUTISTIC FEATURES

Thesis submitted for partial fulfillment of the Master degree in Phoniatrics
by

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بسم الله الرحمن الرحيم

{قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ}

[البقرة: (32)]

Abstract

I-Introduction and Rationale: Autism is one of the pervasive developmental disorders which constitute a group of developmental disorders of the brain characterized by qualitative impairments in verbal and non verbal communication, social interaction and social imagination with restricted range of interests and often stereotyped repetitive behaviors and mannerism. The assessment of auditory processing in autistic patients using techniques such as otoacoustic emission (OAE), auditory brainstem response (ABR), N100 and P300 still remains to be challenged. ***II-Aim of the work:*** to assess some of the phoniatric and audiologic results in autistic children. ***III-Subjects and Methods:*** Each subject in this study (25 autistic children and 25 age matched control group; age ranging from 4-9 years) was subjected to transient and distortion product otoacoustic emissions (OAE), auditory brainstem evoked response (ABR), P300 and N100. Our subjects were also subjected to communication assessment, Intelligent Quotient (I.Q.), Childhood Autism Rating Scale (C.A.R.S) and Sensory Integrative Dysfunction questionnaire. Comparison between the patient and control groups was performed. Correlations between each of these tests and the other tests were also performed. ***IV-Results:*** There was a significant difference between autistic and control groups as regards some of the ABR IPLs and amplitudes, P300 and N100 results. There was a correlation between ABR abnormalities with communication function and auditory sensory integration function. There was a significant correlation between N100 and verbal and non verbal communication abilities only. While there was also a significant correlation between P300 latency and amplitude and each of the following: I.Q., C.A.R.S., dynamic assessment of verbal and nonverbal communication, sample of communication function and means and sensory integration dysfunction. ***V-Conclusion:*** Autistic children presented with normal hearing sensitivity and cochlear function. ABR results revealed a delay in brainstem propagation. The auditory deficits were more consistently manifested in higher aspects of processings in terms of delayed N100 and P300 latency and small P300 amplitude. N100 is a correlate of the level of communication and language development rather than a marker of autism. P300 abnormalities affect verbal and nonverbal communication, mental development, autistic features and sensory integration function in autism. ***VI-Recommendations:*** ABR may be an important prognostic indicator and an objective tool to monitor the progress of auditory training programs. N100 can be used as a valuable tool to evaluate the prognosis of communication intervention programs. P300 can be used as a prognostic method to investigate differential responding to various interventions.

Key words:

Autism, Otoacoustic emission, Auditory brainstem response, N100, P300, Sensory integration dysfunction, Childhood Autism Rating Scale.

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List of Abbreviations

- ASD Autistic Spectrum Disorder
- AD Autistic Disorder
- AUT Autistic Spectrum
- ABA Applied Behavior Analysis
- ADHD Attention Deficit Hyperactivity Disorder
- AEPs Auditory Evoked Potentials
- ABR Auditory Brainstem Response
- ALEPs Auditory Long-Latency Evoked Potentials
- AMEPs Auditory Middle-Latency Evoked Potentials
- BA Brodmann's Area
- BAEP Brainstem Auditory Evoked Potential
- C.A.R.S Childhood Autism Rating Scale
- CBF Cerebral Blood Flow
- CDD Childhood Disintegrative Disorder
- CNS Central Nervous System
- DPOAE Distortion Product Otoacoustic Emission
- DSM Diagnostic Statistical Manual
- EEG Electro-encephalography
- ERPs Event Related Potentials

- I.Q Intelligent Quotient
- IHC Inner Hair Cell
- IPLs Interpeak Latencies
- LH Left Hemisphere
- MEG Magneto-Encephalography
- MMN Mismatch Negativity
- MMR Measles-Mumps-Rubella
- MRI Magnetic Resonance Imaging
- OAE Otoacoustic Emission
- OCB Olivo Cochlear Bundle
- OHC Outer Hair Cell
- PDD Pervasive Developmental Disorder
- PDD-NOS Pervasive Developmental Disorders Not Otherwise Specified
- PET Positron Emission Tomography
- PLS Pre-school Language Scale–Fourth Edition
- RDLS Reynell Developmental Language Scale
- RH Right Hemisphere
- SIB Self Injurious Behaviors
- SPC Sensory Perceptual Checklist – Revised
- SPECT Single Photon Emission Computed Tomography

- TEACH — Treatment and Education of Autistic and related Communication Handicapped Children/adults
- TOAE — Transient Otoacoustic Emission
- TOM — Theory of Mind

Introduction and Rationale

Autism is one of the pervasive developmental disorders which constitutes a group of developmental disorders of the brain, characterized by qualitative impairments in verbal and non verbal communication, social interaction and social imagination with restricted range of interests and often stereotyped repetitive behaviors and mannerism ***(Szatmari, 2003).***

Autism has been the subject of increasing attention from the media, clinicians, and the general public over the past few years. Autism is now the fastest growing disability in the United States. It is more common than pediatric cancer and diabetes combined ***(Baird et al., 2003)***, It affects sensori-motor and cognitive domains ***(Perry et al., 2007).***

According to the Diagnostic Statistical Manual DSM-IV, five disorders are identified under the category of pervasive developmental disorders: Autistic disorder, Rett's disorder, Asperger's disorder, Childhood disintegrative disorder and pervasive developmental disorders not other wise specified ***(Gillberg and coleman, 2000).***

There are multiple causes of autism: genetics, neuronal maldevelopment in the cerebellum and certain limbic structures and abnormalities in neurotransmitters ***(Rapin and Dunn, 2003).***

The question of etiology of autism remains elusive primarily due to the fact that autism does not result from a single dysfunction but is multifaceted in nature. Consequently, attempts to elucidate the underlying