Research Article

Study of auditroy reaction time in autism

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Abstract

Background and objective: Autism spectrum disorders are behaviourally defined disorder affecting 1 in 88 individuals. It is a complex neurodevelopmental disorder. The reaction time is an indirect index of processing capability of central nervous system and also a simple means for sensory and motor performance. **Material and methods:** The present study was conducted in Dept. of Physiology, MGM'S Medical College and Aurangabad. The study included 20 autistic children from "Arambh" autistic school and 20 normal children in the age group 10 to 15 years were taken for the control match. Auditory reaction time was determined by using an instrument reaction time apparatus designed by Anand agency, Pune. The data was statistically analyzed by using students paired "t" test. **Result:** Auditory reaction time was significantly increased in ASD children as compared with control. **Conclusion:** There is significant increase in auditory reaction time. Also delay in MSI in autism.
Key Word: auditory reaction time, autism,sensory processing.

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Received Date: 23/02/2015 Revised Date: 01/03/2015 Accepted Date: 05/04/2015

Access this article online

Quick Response Code:

Website: www.statperson.com

Volume 5
Issue 2

INTRODUCTION

Autism spectrum disorders are behaviorally defined disorder affecting 1 in 88 individuals.[1,2] It is a complex neuro developmental disorder. It is characterized by qualitative impairments in language and social skills as well as presence of restricted, repetitive and stereotyped patterns of behavior, interest and activities.[3] Infantile autism was described for first time by Leo Kanner as autistic disturbances of affective contact.[4] There are many etiologies that contribute to the autism spectrum disorder, phenotype including genetic variation, environmental exposures, and prematurity. There also exist considerably phenotypic variations involving space of language, development, presence of epilepsy,and cognitive ability.It is been found that they give atypical behavioral response to sensory information. More than 96% of children with ASD report hyper – and hyposensitivities in multiple domains.[5] Reaction time has physiological significance and is simple and non invasive test to see the functions of peripheral as well as central neural structures. The reaction time is an indirect index of processing capability of central nervous system and also a simple means for sensory and motor performance.[6] The time interval between the application of stimulus and appearance of voluntary response by a subject is defined as reaction time. It involves stimulus processing, decision making, and response programming. Therefore, we have taken the study to see the effect of auditory reaction time in autistic children.

MATERIALS AND METHODS

The present study was conducted in Dept. of Physiology, MGM'S Medical College and Aurangabad. The study included 20 autistic children from "Arambh" autistic school and 20 normal children in the age group 10 to 15 years were taken for the control match.

METHODOLOGY

After obtaining ethical clearance, a proper written informed consent was taken from the parents of autistic children. The procedure was explained and trial was given before taking the reading. Auditory reaction time was determined by using an instrument reaction time

How to cite this article: Prafullata S Bhakare, Sangita R Phatale, Aruna Vinchurkar. Study of auditroy reaction time in autism. *International Journal of Recent Trends in Science and Technology* April to June 2015; 5(2): 56-58 http://www.statperson.com

apparatus designed by Anand agency, Pune. All the tests were done in a quiet room at room temperature of $27C^0$. For auditory reaction time, stimulus was given in the form of beepi.e tone and click. In built digital chronoscope is present on examiners side to measure the reaction time in milliseconds. An average of three readings was taken. The data was statistically analyzed by using students paried 't' test.

RESULT

Table 1: Showing mean value and SD of auditory reaction time(msec) in autism and control

Reaction time	Control (N= 20) Mean ± SD	Autism (N=20) Mean ± SD	t - value	Significance
ART (msec)	0.36 ± 0.06	3.40 ± 0.61	22.2	P= 0.0001 Significant

Table 2: Showing mean age and percentage of male female ratio of autism.
[control where of same age and number i.e ratio also kept same]

Sex	Mean age	N (Total= 20)	Percentage
Male	11.5 years	17	85%
Female	11.5 years	3	15%

DISCUSSION

Our study showed statistically significant prolongation of auditory reaction time as compared to healthy age match controls. We didn't get exact matching study on auditory reaction time in autism with simple reaction time apparatus but there were few studies done on event related potentials in autistic on auditory choice reaction time task.[7] In accordance with the studies conducted by ELYSA J Marco. *et al.* done on sensory processing in autism, the incoming auditory stimuli from vestibular cochlear nerve travel to the processing structure in brainstem (cochlear nuclei and superior olivary complex)and midbrain (inferior colliculus).[5] Auditory brainstem response literature reports varying and contradictory findings. Some study shows no differences in central transmission, latency, nor amplitude.[8,9] In contrast, other studies have shown prolonged latencies in child and adolescent ASD.[10,11] Both of these studies found significantly longer III - V inter-peak latency thought to represent neural conduction time between cranial nerve VIII and lateral lemniscus. Work done by Russo *et al.*[12,13] with ASD children found typical brainstem responses to clicks. There are measurable differences in early auditory pathway especially with increase in complex stimuli. The neurophysiological studies of auditory processing in autism do suggest a typical neural activity as early in the processing stream as the primary auditory cortex. Whitehouse and Bishop[14] suggest, these differences may be a result of top – down inhibitory processes mediating encoding and early sound processing. Autism spectrum disorders perform poorly during conditions that require collapsing information across multiple modalities. Atypical perceptual experience in ASD are believed to be due to an inability to properly filter or process simultaneous channels of visual, auditory and tactile inputs.[15] There is evidence that sensory illusions requires proper concentration of input across multiple domains operate at different levels in ASD compared with typical developing children. The sequence of activity in brain during MSI (multi sensory integration)seems to deviate in children with autism particularly within the latter stages of processing when sensory information is collapsed.[16,17] There is a delay in both magnitude and latency of activity in brain which leads to multisensory processing deficits in ASD.[18] Children with autism may have more difficulty with automatic processing of information and may already rely more heavily on already overloaded attention and working memory based networks such that when the stimuli reach and exceed capacity, the processing system fails.[8, 19]

CONCLUSON

Auditory reaction time was prolonged in ASD as compared to control. ART is a simple useful physiological parameter to study neurophysiological auditory processing in autism. It shows defect in brain activity during MSI in ASD children. We suggest that difference in sensory auditory processing may actually cause core feature of autism such as language delay. However further studies is required in this field.

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Source of Support: None Declared
Conflict of Interest: None Declared