

Visual Integration and Processing Using Vision Therapy in Kids with Autism Spectrum Disorder

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Abstract:

The increased awareness of autism spectrum disorder (ASD) has raised many concerns for proper care and significant methodology of treatment and diagnosis of the condition which has been made a prevalent public health issue. The visual deficits cause loss in visual integration and processing that contributes to anxiety and uneasiness. However, these deficits in most cases causes hindrances in school going children. This case study brings in brief account of vision based behaviors and cognitive deficit which affect children at school primarily focusing on hypersensitivity ,hyposensitivity ,lack of eye contact ,lack of focus on objects ,poor recognition and impaired visual motor integration. The case study involves a group of children ranging from 10 to 12 years with clinical diagnosis of autism was referred for assessment of poor visual focus and insufficient response. There was a notable poor visual perception and developmental delays with concerns primarily on inability to comprehend, poor spatial organization and attention deficits. Majority of them had been previously in speech and language therapy in collation with occupational therapy. Although the current diagnosis yield poor tracking and accuracy when presented with objects, which could be possible diagnosis of ocular motility. The study revealed that poor performances in visualization task, poor gross motor coordination and fine motor coordination. Also an additional to the concurrent therapies vision therapy was recommend to improve the visual motor integrations, visualization, focus and tracking of objects. Vision therapy with strategic framework when inculcated and adapted techniques which is proven to enhance the visual processing and integration in class room for the children with ASD.

Keywords —Autism spectrum disorder, reading comprehension, vision therapy, visual information processing.

I. INTRODUCTION

Autism spectrum disorder (ASD) occurs in every 1 in 100 children ages 6-18 .As the Autism spectrum disorder implies a spectrum of characteristics with a range of abnormalities in communications which is verbal and nonverbal , social behaviour and mannerisms. The Continuous research in this spectrum disorder the abnormalities caused has become particular interest in

understanding and discovering the cardinal reason responsible for the sensory and behavioural alteration autism bring about in children .These efforts have contributed in planning foundational therapy frameworks in order to improve the setbacks and help them manage their social discomfort and other corresponding difficulties.

Several Study investigations prove that existences of sensory difficulties in children with autism have revealed that most of these individuals

would show symptoms of avoiding or being over interested in sensory stimuli such as touch, smell, sight, sound, taste when presented to them. The distress to autistic children can become frightened or they tend to become more aggressive when being exposed to the new sensory inputs in their day to day environments. The autistic groups remarkably varies with their children in the specific domain with varying neurotically contrast.[2] the common vision abnormalities are preoccupations with objects that are spinning , shiny , with lights .[2] vision is a very important sense which enables an individual connect, recognize and perceived information such disturbances can disrupt the individuals wellbeing. Moreover vision is a really important medium for school going children as it helps them to learn and guides their motor skills which we call the visual motor perception. In addition to these conditions some functional peculiarities of vision and other ocular conditions are present in majority of children with autism. In many retrospective studies about 40-50% of the autistic population have prevalent ophthalmologic condition such as amblyopia ,strabismus or refractory errors [3].Also a large portion of ASD individuals have reduced convergences that leads to avoidances and discomfort of near tasks.

II. SUBJECTS AND METHODS

This case study brings in brief account of vision based behaviours and cognitive deficit which affect children at school primarily focusing on hypersensitivity ,hyposensitivity ,lack of eye contact ,lack of focus on objects ,poor recognition and impaired visual motor integration in children with Autism spectrum disorder (ASD) . The Wachs Analysis of Cognitive Structures (WACS) exam was conducted to check the pre and post therapy prognosis after vision therapy for over a period of 6 months .This study involves a group of children (N=15) ranging from 10 to 12 years with clinical diagnosis of autism was referred for assessment of poor visual focus and insufficient response. The major complaints from their parents was that majority of their children were not able to read and comprehend in school which had possible relationship with attention deficits, poor recognition

and organizational skills. The expressed concern was to sound out words, however the understanding of the ideas was also limited. Through medical history of the study population was analysed to find if there were any other undiagnosed trauma or complaints which had a possible connection with behaviour related issues in autism spectral disorder (ASD).Pupils examination was done to find any structural abnormality ,but all of patients had round and reactive pupils with no prominent pupillary defect. Extra ocular motility was fully functional.

III. WACS TEST

The study using the Wachs Analysis of Cognitive Structures (WACS) exam was conducted to check the pre and post therapy prognosis after vision therapy for over a period of 6 months. The Wachs Analysis of Cognitive Structures (WACS) evaluation is performed to reveal the dysfunction in the in gross and fine motor coordination when asked to perform a visual task. However it was recommended that individualized program frameworks of vision therapy can be proven efficient to improve the visualization skill, tracking skill, and visual motor integration. The WACS Test was designed for toddlers with special considerations for nonverbal individuals from ages 3-6 years. There are four areas of assessment which is used for evaluation that are (1) identification of objects, (2) object design, (3) graphic design and (4) general movement. The test consists of 18 tasks that requires complementary visual, sensory perception, along with body movement. The instructions for the task which clearly separates the auditory and visual inputs to separate and identify processing deficit in the visual and auditory modality. The pre-test result of one patient is summarized in Table 1, while the post-test after vision therapy is summarized in Table 2.

The WACS test is a very useful and creative visual based test which helps in assessing the visual spatial abilities and it has been proven an efficient method of analysis for over 3 decades. As a part of the study evaluation, body awareness and spatial organization are assessed. The patient were asked to

draw a picture of a person with as many body parts with details. Each patient came up with different structural orientation and disjoined the extremities from the body. This distortion of body of the awareness of the body is a typical diagnosis of reduced bilateral functioning and poor motor coordination which many cause self-stimulation. Self-stimulating actions such as hand flapping and finger flicker are relevant autistic characteristics. It is thought that self-stimulation of the individual gives more proprioception information to the brain in identifying and recognition of body parts. Using the results of WACS the test was able to give additional information about overall visual spatial and vision integration deficits.

TABLE I
Pre WACS TEST before vision therapy.

Subtest	Not significant	Approaching	Mastered
1. Identification of objects			
Color identification ,visual		X	
Hand identification, visual		X	
Shape identification, visual		X	
2. Object Design			
Block stacking	X		
Block construction	X		
Peg board figuring		X	
Puzzle board	X		
3. Graphic Design			
Stick construction ,on pattern	X		
Stick construction , random pattern		X	
Graphic control		X	
Form reproduction , visual	X		
4. General movement			
Body mapping random trial	X		
Body mapping according to commands	X		
Line walking		X	
Hoping left leg	X		
Hoping right leg	X		
Skipping	X		
Body balancing		X	

TABLE II
Post WACS TEST after 6 months from initial test

Subtest	Not significant	Approaching	Mastered
1. Identification of objects			
Color identification ,visual			X
Hand identification, visual			X
Shape identification, visual		X	
2. Object Design			
Block stacking		X	
Block construction		X	
Peg board figuring		X	
Puzzle board		X	
3. Graphic Design			
Stick construction ,on pattern			X
Stick construction , random pattern			X
Graphic control		X	
Form reproduction , visual		X	
4. General movement			
Body mapping random trial		X	
Body mapping according to commands		X	
Line walking		X	
Hoping left leg		X	
Hoping right leg		X	
Skipping		X	
Body balancing			X

A. Result

This case study illustrates how distinct challenge it is to structure a vision therapy program based on individual perceptions level of gross motor and functional abilities in ASD. There was a evident improvement of N= 10 out of N= 15 ,which is 60% of the children in the showed evident prognosis when comparing the pre and post WACS test results .These techniques needs to be applied in appropriate training intervals in order to develop the child's visual perception. Vision therapy undoubtedly provides frameworks to build efficient skills which can be of greater value to children with developmental delays and disorders (Table 1 and

Table 2). A personalized program of vision therapy (VT) is recommended, provided on the current abilities and disabilities of the patients to be study before the recommendation is being made. Thereby increasing their visual motor functioning they show elevated levels of attention and focus in class room, along with elevated body awareness, gross motor and fine motor functioning.

B. Discussion

TheRecent studies have revealed evidences that vision therapy has helped in improvement of control of eye movements and also visual dysfunctions like convergence insufficiency and accommodative dysfunction [20-23] .However, till date there is very less case reports that specifies the efficacy of therapy in the cerebral palsy populations is found. Although in Duckman's study there is an evidences of 9 patients who have shown positive response when undergoing vision therapy with diagnosis of cerebral palsy have shown significant prognosis in occulo-motor , accommodative and visual skills [26]. Another study conducted by Vasche and Dudley that aimed to explore the effectiveness of the framework in the vision therapy which was designed for a male child which recorded and improved subjective and objective visual perception skill with increased tracking and attention. In a yoked prism study conducted with autistic children by Kaplan and his colleagues, resulted with improved visual motor tasks, posture and body orientation. [28-30]. Studied conducted by Cook, Harris and Gormley addressed the very basic question that raised the efficacy of the designed vision therapy that undoubtedly increased the quality of the life and also has enhanced many daily activity standards of children with special needs.

IV. CONCLUSIONS

The visual perceptual; insufficiencies cause the patients to show poor outcomes in reading and comprehending to the given set of information's. However autism presents several challenges in therapies which requires managing the concurrent ranges of specialties combined with vision therapy

techniques in order to help in developing in comprehension abilities and improve the visual perceptions of the patient. There are literatures and case reports that describe the visual processing challenges in autistic patients which has shown significant improvement when there is a correct intervention used for treating the patients. The variability and complexity of the population, with combined conditions needs to enormous efforts in seeking appropriate care for the patients. Though such patients reaching age adequate performances, proficiency and improvement that is equivalent to others of their age is still possible, at can greatly contribute to improve their quality of daily activities. At many occasions autistic individuals require personalized care that is often complicated and tough. Today Optometrists have developed strategic programs to address visual motor compensation for children suffering from visual perception loss by vision therapy helping them develop more accurate and precise visual motor skills that help to enhances visual skill in their day to day activities. There are however little literature which can be used as an evidences in proving the success rate of the therapy to patients with autism spectrum disorder. To conclude autistic patients with poor visual perception should be considered for VT in order to improve their life style and quality.

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