

## Case Report

# UNIVERSAL EXERCISE UNIT THERAPY HAS EFFECTS ON SOCIAL AND MOTOR FUNCTION OF 8 YEARS OLD HYPERACTIVE BOY WITH AUTISM SPECTRUM DISORDER

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### ABSTRACT:

A 08 years old child; know case of autism with hyperactive sub with impairments in behavioral, social and motor function was selected for therapy in universal exercise unit along with social skills training, attending skills training, self help skills training and adaptive sports activities. Pediatric evaluation of disability inventory (PEDI) was used to measure sensory functions, motor function and social function and then compared the pre-treatment and post-treatment measurements. Pre-treatment self care, mobility and social function score were 49, 40 and 45 and post treatment score were 58, 50, and 57 respectively on pediatric evaluation disability inventory scale. Result of this study showed that universal exercise combine with social skills training, attending skills training, self help skills training and adaptive sports activities can change the motor function, self help function and social function of a child with autism.

**Key words:** Autism, Sensory integration therapy, universal exercise unit

### INTRODUCTION:

Autism spectrum disorder is a group of neurodevelopmental disorders characterized by social (social skills and socialization), communicational (speech and language) and behavioral (repetitive and stereotype) limitations (1). Autism is a lifelong process (2). It is a syndrome resulting problems in cognitive, social and emotional development (3). It begins before the age of 3 years and continues the whole life (4). Prevalence rate was 14.7 per 1000 (one in 68) in 2010 among 8 years boys (5). The annual incidence rate of autism was increased eightfold in diagnosed children with autism spectrum disease between 1987 and 1992 and incidence rate was 53.7 per 10,000, 82.6/10,000 in boys and 23.6/10,000 in girls (6). Genetic causes responsible in the etiology of autism are deletions, copy number variants and mutations, whereas environmental factors are exposure of immature brain to ethyl alcohol, lead, and mercury and exposure to thalidomide, misoprostol, valproic acid, rubella infection, organophosphate insecticide and chlorpyrifos (7). Mother age and pregnancy conditions increase the risk of autism (8). Paternal obesity also associated

with increased risk of autism spectrum (9). Other risk factors are abnormal umbilicalcord , fetal distress complications , low birth weight , injury or trauma, multiple birth, maternal hemorrhage, summer birth, prematurity, congenital malformation, low 5-minut Apgar score, neonatal anemia, meconium aspiration, feeding difficulties , ABO or Rh incompatibility and hyper-bilirubinemia (10). Children with autism show a wide variety of clinical features like lack of eye contact, decrease interest in age mates and peers, unaware of others feelings or distress, hypo or hyper active responsiveness to stimuli with associative features like intellectual impairment, attention and mood disorders, seizures, gastrointestinal problems and sleep disorders. A lot of techniques, therapies and programs like educational interventions, communication interventions, and relationship based developmental model, the Play Project, son-

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rise, TEACCH, sensory integration, animal assisted therapy, neuro-feedback, patterning and packing have been used to manage the autism spectrum.

Sensory issues are very common in children with ASD and may be hyper active or hypo active in nature. Sensory modulation disorders in ASD are classified into sensory over responsivity (exaggerated response to stimuli), sensory under responsivity (slow response to stimuli) and sensory seeking behaviors (11). Sensory integration therapy, sensory diet, environmental adaptations, task modification and task analysis, social consideration and psychopharmacological treatments are used to manage the sensory problems of the children with ASD (11). Adaptation and modifications are part of daily science to find best treatment and best result to manage sensory problems. Universal exercise unit can be used as a part of sensory integration therapy in children with ASD. Universal exercise unit works on proprioception system, vestibular system and muscles of the body to integrate the senses and help to produce a coordinated response (12). Strength training in universal exercise unit improves the body strength and elastic cords supporting postures in universal exercise unit organize the sensory systems by activating proprioception system and vestibular system (13). Universal exercise unit is also known as spider cage therapy. It is used in the rehabilitation of children with cerebral palsy, spina bifida, and other neurological problems. Universal exercise unit consist pulley and suspension system. It stimulates the proprioceptors in the joint and increases the motor function and body awareness. Universal exercise unit is three dimensional cage made of iron including wires, rubber bands, pulleys, weights and belts (13). In 2008 a systemic review was conducted to find the effect of physiotherapy exercises on autism spectrum and concluded that exercise provide short term reduction in stereotypic behaviors in children with ASD (14). In 2011 a systemic review was conducted to find the effect of massage therapy in ASD and concluded that there is limited evidence of effectiveness of massage therapy on ASD (15). In 2013 a pilot study was conducted to find the effect of

hippotherapy on motor control, adaptive behaviors and participation in children with ASD and concluded that hippotherapy have positive influence on children with ASD and postural sway significantly reduced post intervention (16). In 2014 a systemic review on sensory processing interventions for children with ASD was conducted to find the effects of sensory integration therapy techniques and they conclude that sensory integration therapies improve the child's adaptive response and improve the child performance to overcome these sensory issues (17). However literature on sensory integration therapy with universal exercise unit does not exist yet. A few case studies on universal exercise unit with intensive therapy protocols on cerebral palsy are exist. Universal exercise unit have ability to change motor function of children with spastic and athetoid cerebral palsy when combined with other physiotherapy interventions (13).

#### **CASE PRESENTATION:**

The patient age was 08 year male diagnosed with autism spectrum with hyperactive sub type. Subject history was taken from the mother. Mother was a housewife from low socioeconomic status with no previous history of a child with autism. Child was diagnosed as an autistic child at the age of 03 years. Child has no history of pervious surgery and major disease. Prior to participate in this study child was already in conductive education system and one to one session for special education segments like fine motor, self help, speech therapy, concepts and cognition.

#### **MANAGEMENT AND OUTCOME:**

Study was conducted in a special school centers in Lahore cant i.e. COMPASS (Center Of Mentally And Physically Affected Special Students), Khursheed Allam road Lahore Cant on an 8 year old male child with hyperactive ASD. Effects of study were measured in 3 months, from November, 1, 2013 to January, 31; 2014. Informed consent was taken from parents. A baseline measurement was taken by using pediatric evaluation inventory, three to ten day before the interventions. Interventions were carried out 5 days in a week for one hour daily.

Principle intervention was universal exercise unit along with social skills training, attending skills training, self help skills training and adaptive sports activities. Exercise that we used in universal exercise unit was similar to Bobath's concept (18), (19) and key postures of functional activities were kneeling with holding and throwing ball, half kneeling with ring tower activity, kneeling on foam roll, standing, half standing or one leg standing, transitions from kneeling to standing, transition from stride sitting to standing and

quadruped position with progression to tripod. Social skills training, attending skills training, self help skills training and adaptive sports activities were goal based that is listed in IEP (individual education plane) and was applied one day in a week. Measurement was taken after the 3 months of intervention, three to ten days post the interventions. Pre-intervention and post-intervention measurement was compared and a change in scored was obtained. Following protocol were used in therapy.

| Key exercises in UEU                          | Methodology                                                                                                                     | Intensity                                                              | Volume                 | Frequency        | Duration  |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------|------------------|-----------|
| Kneeling with holding and throwing ball       | Maintaining posture with the help of belts and elastic cords for 30 sec or according to ability of child, giving him challenge. | Start with minimal resistance to progress with maximum safe resistance | 03 repetitions/session | 05 session /week | 03 months |
| Half kneeling with ring tower activity        |                                                                                                                                 |                                                                        |                        |                  |           |
| Kneeling on foam roll                         |                                                                                                                                 |                                                                        |                        |                  |           |
| Standing                                      |                                                                                                                                 |                                                                        |                        |                  |           |
| Half standing or one leg standing             |                                                                                                                                 |                                                                        |                        |                  |           |
| Transitions from kneeling to standing         |                                                                                                                                 |                                                                        |                        |                  |           |
| Quadruped position with progression to tripod |                                                                                                                                 |                                                                        |                        |                  |           |
| Transition from stride sitting to standing    |                                                                                                                                 |                                                                        |                        |                  |           |

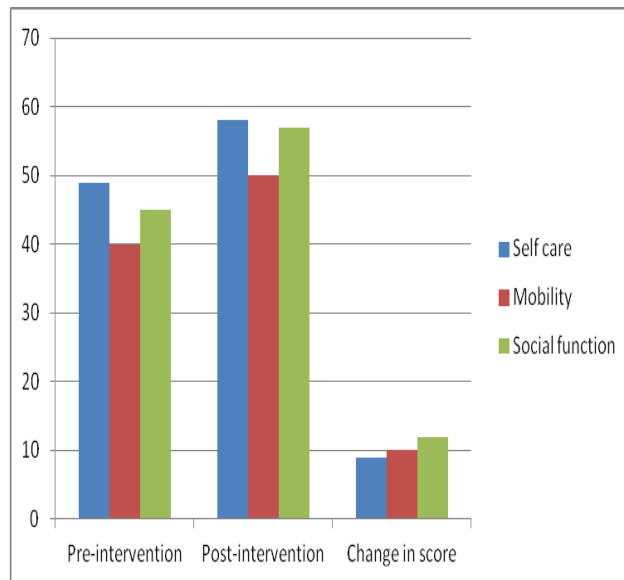
Pre-treatment self care, mobility and social function score were 49, 40 and 45 and post treatment score were 58, 50, and 57 respectively on pediatric evaluation disability inventory scale. Pre to post change in score was 09, 10, and 12 on self care, mobility and social function respectively.

|                 | Pre-intervention | Post-intervention | Change in score |
|-----------------|------------------|-------------------|-----------------|
| Self care       | 49               | 58                | 09              |
| Mobility        | 40               | 50                | 10              |
| Social function | 45               | 57                | 12              |

Above table showing pre treatment score, post treatment score and change in score on Pediatric evaluation of disability inventory.

**Graph 1:**

Graph is showing pre treatment score, post treatment score and change in score on Pediatric evaluation of disability inventory scale (self-care. Mobility, social function)

**CONCLUSION:**

Physical therapy treatment combine with other techniques can improve the can improve the social and motor function in a child with autism .However results of this study cannot be generalized whole children with spectrum but studies can be conducted to see the effects of intensive physiotherapy protocols in children with autism.

**DISCUSSION:**

Universal exercise unit also termed as spider cage have been used in children with developmental disabilities such as cerebral palsy, spina bifida and other neurological disorders. In this study it was used with combination techniques like social skills training, attending skills training, self help skills training and adaptive sports activities and it was seen that spider cage along with these interventions was able to change the sensory, motor and social function of a child with hyperactivity and autism. Results of this study is similar to literature that physiotherapy treatment in the form of exercise intervention, massage therapy, hippotherapy and sensory integration have ability to improve the sensory, motor, social

and cognitive function of children with autism (16, 17, 20-22). Moreover it is not clear the change in score is due to universal exercise unit exercises or due to social skills training, attending skills training, self help skills training and adaptive sports activities. So study can be repeated with favorable sample size and with control group.

**REFERENCES:**

1. Pennington ML, Cullinan D, Southern LB. Defining autism: variability in state education agency definitions of and evaluations for autism spectrum disorders. *Autism research and treatment*. 2014;2014:327271.
2. Matson JL, Goldin RL. Diagnosing young children with autism. *International journal of developmental neuroscience : the official journal of the International Society for Developmental Neuroscience*. 2014.
3. Cambier G, Machet L, Assouline B. [Autism spectrum disorders]. *Soins Pédiatrie, puericulture*. 2014(276):12-4.
4. Johnson CPECCoCwAIG, V.B. ed: *Autistic Spectrum Disorders in Children*. New York: Marcel Dekker, Inc., 2004:85-123.
5. Prevalence of autism spectrum disorder among children aged 8 years - autism and developmental disabilities monitoring network, 11 sites, United States, 2010. *Morbidity and mortality weekly report Surveillance summaries (Washington, DC : 2002)*. 2014;63(2):1-21.
6. Hinkka-Yli-Salomaki S, Banerjee PN, Gissler M, Lampi KM, Vanhala R, Brown AS, et al. The incidence of diagnosed autism spectrum disorders in Finland. *Nordic journal of psychiatry*. 2013.
7. Landrigan PJ. What causes autism? Exploring the environmental contribution. *Current Opinion in Pediatrics*. 2010;22(2):219-25  
10.1097/MOP.0b013e328336eb9a.
8. Kolevzon A, Gross R, Reichenberg A. Prenatal and perinatal risk factors for autism: A review and integration of findings. *Archives of Pediatrics & Adolescent Medicine*. 2007;161(4):326-33.

9. Murphy SK. Obesity: Paternal obesity[mdash]a risk factor for autism? *Nat Rev Endocrinol*. 2014;10(7):389-90.
10. Hannah Gardener S, Donna Spiegelman, ScDa,b, Stephen L. Buka, ScDc. Perinatal and Neonatal Risk Factors for Autism: A Comprehensive Meta-analysis. *american academy of pediatrics*. 2011;128(2):344-255.
11. Hazen EP, Stornelli JL, O'Rourke JA, Koesterer K, McDougle CJ. Sensory Symptoms in Autism Spectrum Disorders. *Harvard Review of Psychiatry*. 2014;22(2):112-24  
10.1097/01.HRP.0000445143.08773.58.
12. Farjad Afzal HIA, Hafiz Muhammad Asim, Akhtar Rasul, Asif Islam. Effects of Universal Exercise Unit Combined with Conventional Combination Therapy on Gross Motor and Functional Skills on Spastic and Athetoid Cerebral Palsy Children of Aged between 3 and 14 Years. *Int j med appl health*. 2015; Vol. 3,(No. 1).
13. Farjad A, Hafiz Ijaz Ahmed HMA, Akhtar Rasul, Asif Islam. Effects Of Universal Exercise Unit Combined With Conventional Combination Therapy On Gross Motor And Functional Skills In Spastic And Athetoid Cerebral Palsy Children. *Int j med appl health*. 2015;3(No. 1):28-34.
14. Petrus C, Adamson SR, Block L, Einarson SJ, Sharifnejad M, Harris SR. Effects of exercise interventions on stereotypic behaviours in children with autism spectrum disorder. *Physiotherapy Canada* *Physiotherapie Canada*. 2008;60(2):134-45.
15. Lee MS, Kim JI, Ernst E. Massage therapy for children with autism spectrum disorders: a systematic review. *The Journal of clinical psychiatry*. 2011;72(3):406-11.
16. Ajzenman HF, Standeven JW, Shurtleff TL. Effect of hippotherapy on motor control, adaptive behaviors, and participation in children with autism spectrum disorder: a pilot study. *The American journal of occupational therapy : official publication of the American Occupational Therapy Association*. 2013;67(6):653-63.
17. Case-Smith J, Weaver LL, Fristad MA. A systematic review of sensory processing interventions for children with autism spectrum disorders. *Autism : the international journal of research and practice*. 2014.
18. Bobath K. A neurophysiological basis for the treatment of cerebral palsy: Cambridge University Press; 1991.
19. Bobath K, Bobath B. The neuro-developmental treatment. Management of the motor disorders of children with cerebral palsy *Clinics in Developmental Medicine*. 1984(90):6-18.
20. Baranek G. Efficacy of Sensory and Motor Interventions for Children with Autism. *J Autism Dev Disord*. 2002;32(5):397-422.
21. Cermak S, Curtin C, Bandini L. Sensory Sensitivity and Food Selectivity in Children with Autism Spectrum Disorders. In: Patel VB, Preedy VR, Martin CR, editors. *Comprehensive Guide to Autism*: Springer New York; 2014. p. 2061-76.
22. Christopher Petrus SRA, Laurie Block, Sarah J. Einarson, Maryam Sharifnejad, Susan R. Harris. Effects of Exercise Interventions on Stereotypic Behaviours in Children with Autism Spectrum Disorder. *Physiotherapy Canada*. 2008(Volume 60, Number 2 /2008):134-5.

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| 1    | Sidra Manzoor | Data Analysis                |