

Effect of Aerobic Exercise on Rehabilitation of Autistic Child

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ABSTRACT

Objective: To determine the effect of aerobic exercises on cardiopulmonary endurance among Autistic child of different age groups.

Methodology: The study was RCT The sampling technique used was Non-probability convenient technique for selection then randomization was done through lottery method. The sample size of 30 was divided into two groups Group A and Group B. Group A was asked to perform stationary cycling for 5 minutes or as per their schedule of daily activities and Harvard step test. Group B was asked to perform Stationary cycling for 10 minutes with warm-up and cool-down for 5 minutes each before and after exercise. Non parametric test was applied for results.

Results : comparison of both groups showed Significant improvement in sBP, dBP, HR post training and stationary cycling speed shown significant improvement on week 5 with P value <0.05. Harvard step test post training showed significant difference with P value <0.05. CARS showed significant improvement post training in Experimental group.

Conclusion: In this study it was concluded that stationary cycling and Harvard step test are beneficial in order to manage maladaptive behavior of autism spectrum disorder. Stationary cycling with warm up 5 minutes and cool down 5 minutes protocol and Harvard step test are less demanding exercise protocol to increase cardio-respiratory fitness. There was increase in Lung volume capacities after exercise protocol.

Keywords: Autism, CARS, Harvard step test, sBP, dBP

INTRODUCTION

Autism Spectrum Disorders features a group of syndromes that are considered clinically and characteristically separate from another, but they are combined or grouped together for learning purposes, as their features often times overlap. These disorders are Autism, Asperger's Syndrome and High Functioning Autism (HFA) Pervasive Developmental Disorders (PDD) and Atypical Autism¹

As autism is linked with genetics and neurological development characterized by abnormalities in social interaction by which it is mostly defined. Autism gives opportunities to scientists and neurologist to study neurological basis or origin of social communication skills which is basic for humans for their behavior. Autistic child may be able to speak alphabet and may be able to recognize numerical numbers but may not turn up on his name or pointing something. As age progress autistic individuals have variety of outcomes with complete dependence on someone to rare examples of full time employment and living in mainstream. Autistic individuals never marry as they are mostly dependent due to their lack of communication and social skills and only form temporary and reciprocal friendships²

Parents with higher level of education and higher level of income are observed with early diagnosis of autism. Parents who can afford high are mostly seen to have diagnosed autism earlier than those who don't have higher income. With average income of parents autism diagnosis is seen to be at age averaging 8 years when they fully exhibit their lacking of social interaction and other maladaptive behaviors. Most parents prefer less number of professionals to visit to diagnose autism spectrum and in early age of infant so that early rehabilitation can be started³

Most Neurologists put their emphasis on genetics type causing Autism. Most recent advancement in this area is identification of gene that is responsible for causing Rett's Syndrome which is included in Autism Spectrum disorder. In this syndrome it causes the neuro-developmental portion of child with many characteristics like mental retardation of child with communication loss and other autistic features which are prominent during different phases of growth of child. The gene which causes Rett's syndrome is methyl -Cpg binding protein 2 gene which in short form can written as MECP2⁴. In diagnosis of autism it is also seen that parents who already have a child with

autism can predict earlier about autistic features of 2nd child. Those parents who have children with autism can predict as early as in 12 months age of their second child whether it is showing autistic symptoms or not. This is helpful in early care and rehabilitation of that child⁵

Cycling has very good effects on cognitive planning and balance improvement in children with autism spectrum disorder. It improves their coordination as well and overall better neurological involvement in activities after engaging in cycling⁶. Cycling is also very effective in sustaining physical activity in children with autism spectrum disorder. Very often children with autism seem to be skipping their physical activity due to laziness and disliking engaging in physical activity. Cycling protocol in autism spectrum disorder help autistic child to sustain physical activity on daily basis that helps them to relax also and reduce their stereotypical behavior⁷. Group aquatic exercises are also seems helpful in improving fitness level both physically and cardio-respiratory. These exercises at low intensity also prevent any traumatic injuries or fractures because chances of injury are very low in aquatic exercises. Group aquatic exercises provide good interaction between children with autism spectrum disorder. Their strength also improves with aquatic exercises⁸. These physical exercises reduce the self stimulation of these children and make them relax. In performing physical exercises major concern which in sometimes neglected is prominence or importance of effort which is exerting against time taken to perform that activity⁹

Physical activities of moderate intensity relax them and reduce their aggressive nature. These exercises are helpful in integrating disabled child in their society as they reduce their unfamiliar behavior¹⁰. their disturbed behavioral patterns limit their participation with their normal peers and siblings due to their aggressive behavior which can cause injury to themselves or their peers or siblings. Better psychological, behavioral, social patterns will lead to better and enhanced performance in exercises which in return reduce their stereotypical behavior¹¹. Jogging seems to be effective in enhancing their response time by reducing their stereotypical behavior and also it play important role in studies and engagement in academics. Their positive effect is also observed in engagement in play activities and sports activities. Physical activity also helpful in their involvement in society and community¹²

METHODOLOGY

The Study Randomized Controlled Trial (RCT) conducted in National Autism Centre Jhelum, Rawalpindi from July 2018 to December 2018. Patients of age 01 to 15 years having mild to moderate severity of autism were included in study. Patients of autism having vitally unstable patients, Musculoskeletal Abnormalities, Any facial injury or surgery, Balance problem and autistic child having cardiac disease were excluded from study. A total of 30 autistic children were included in the study. Randomization was done by lottery method and non-probability convenient sampling technique was used. There were no drop outs in stud Experimental Group included (n=15) Autistic child and Control Group included (n=15) autistic children were analyzed. The Riphah Ethical committee and National Autism Centre approved to conduct the study in their setting. The informed consent was taken from all patients before enrollment.

Autistic children in control group will be following the same protocol as they are following in their daily Rehabilitation Protocol in their Centers. No warm up and cool down in this group. They will be doing 5 minutes of cycling 5 days a week and treadmill for 3 minutes 5 days a week in their respective centers.

Intervention for autistic children in control group will be following the same protocol as they are following in their daily Rehabilitation Protocol in their Centers. No warm up and cool down in this group. They will be doing 5 minutes of cycling 5 days a week and treadmill for 3 minutes 5 days a week in their respective centers with also performing Harvard Step test. Intervention for Experimental group includes Warm up For 5 minutes with stretching and Range of motion exercises. Aerobic Cycling protocol for 10-15 minutes followed by Cool down of 5 minutes with stretching and flexibility exercises

Structural questionnaire was used for first and final assessment. Baseline was measured at ist visit. CARS, Harvard step test, FVC, PEF, FVC1, sBP, dBP, HR, RR were calculated. Six week treatment was given (no of sessions=4). End values of variables were calculated after completion of treatment sessions.

Data was analyzed by using spss 21 version. When test of normality were applied to data, it was seen that data was dispersed and was not equally distributed. P value was less than 0.05 so non-parametric test was applied. Baseline values and end line values of variables between groups were determined by Mann-Whitney U-test.

RESULTS

Among 30 patients, 26 were male and 4 were females. Mean age was (12.73±1.62) years.

The baseline values comparison between control and experimental group Mann-Whitney U test showed non-significant results. The P value of systolic blood pressure, diastolic blood pressure, heart rate, Harvard step test and CARS was no significant.

Table 1: Pre-post mean and standard deviation of Heart rate between the groups

Variable Heart Rate	Group A N=15 Mean±SD	Group B N=15 Mean±SD	P-value
Pre Training	82.87±3.91	80.93±4.20	0.20
Post Training	81.27±3.62	78.33±3.56	0.03

Table 2: Pre-post median and inter quartile of Systolic Blood Pressure between the groups

Variable Systolic Blood Pressure	Group A n=15 Median(IQ)	Group B n=15 Median (IQ)	P-Value
Pre training	131 (5)	129 (5)	0.03
Post training	131 (3)	127 (7)	0.01

The end values comparison between control and experimental group Mann-Whitney-U test showed significant results. The P value of systolic blood pressure, diastolic blood pressure, Heart Rate post training and stationary cycling speed on

week 5, Harvard step test post training, CARS were significant, while the P value of FVC was non-significant.

Table 3: Pre-post Median and Inter quartile of Diastolic Blood Pressure between the groups

Variable Diastolic Blood Pressure	Group A n=15 Median(IQ)	Group B n=15 Median (IQ)	P-Value
Pre training	85 (3)	83 (4)	0.09
Post training	83 (5)	81 (3)	0.02

Table 4: Pre-post Median and Inter quartile for Respiratory rate between the groups

Variable Respiratory Rate	Group A n=15 Median (IQ)	Group B n=15 Median (IQ)	P - value
Pre training	19 (1)	19 (2)	0.08
Post training	19 (1)	18 (2)	0.48

Table 5: Week wise Median and standard deviation stationary cycling distance between the groups

Variable Stationary cycling distance	Group A N=15 Mean±SD	Group B N=15 Mean±SD	P-value
Week 1	740.47±323.48	774.00±489.60	0.826
Week 2	781.93±354.34	895.67±474.89	0.463
Week 3	751.33±294.44	891.00±512.85	0.368
Week 4	774.60±353.31	948.13±544.75	0.309
Week 5	720.40±316.07	873.67±420.82	0.269
Week 6	720.40±309.16	874.33±471.07	0.299

Table 6: Week wise Mean and standard deviation for Stationary cycling Speed between the groups

Variable Stationary cycling distance	Group A N=15 Mean±SD	Group B N=15 Mean±SD	P-value
Week 1	740.47±323.48	774.00±489.60	0.826
Week 2	781.93±354.34	895.67±474.89	0.463
Week 3	751.33±294.44	891.00±512.85	0.368
Week 4	774.60±353.31	948.13±544.75	0.309
Week 5	720.40±316.07	873.67±420.82	0.269
Week 6	720.40±309.16	874.33±471.07	0.299

DISCUSSION

In this study it observed the effects of clinical exercise rehabilitation in autism spectrum disorder. This study explain that with use of high intensity aerobic exercise Cardiorespiratory fitness improved but this study didn't measured their vitals like heart rate, respiratory rate and blood pressure. In our study cardio-respiratory fitness improved with the use of 2 techniques combined that are aerobic exercises like stationary cycling with warm-up and cool-down before and after exercise and with Harvard step test. Vital signs like heart rate has significant result in group B. Systolic and Diastolic blood pressure has significant results in group B. Respiratory rate has significant result in group B

A randomized control trial study in which cardiopulmonary fitness and strength training were determined by using aerobic exercise training using stationary cycling with maximum target heart rate was 65%-70% and strengthening exercises by using light weight lifting and one repetition weight. The results shows increase in aerobic capacity of autistic children. In our study P value came as 0.001 in Group B patients which shows significance in results. The major difference in comparison with above mentioned study is that they used only stationary cycling to measure Cardiorespiratory fitness while in our study 2 techniques was used for fitness which includes stationary cycling with warm-up and cool down before and after exercise and Harvard step test to measure fitness index score¹³

This study explains that with use of aerobic exercises like swimming behaviors of autistic child decreased after performing swimming exercises in experimental group. Their overall social skills and aquatic skills were also improved. In our study behaviors of autistic child is improved after exercise in Group B. In our study

with the use of stationary cycling with warm-up and cool down before and after exercise and Harvard step test behaviors of autistic children improved socially. Their level of fear to exercises seems too decreased significantly after intervention¹⁴

CONCLUSION

Aerobic exercise with Harvard step test was effective in behavior modification, academic engagement, and cardiorespiratory rehabilitation of autism.

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