

# Effectiveness Of Task Oriented Aerobic Exercise To Evaluate The Severity Of Autism In Autism Subjects With Self- Stimulatory Behaviour

## INVESTIGATORS:

S. KEERTHNA MPT 2<sup>nd</sup> YEAR (Pediatrics), Saveetha College of Physiotherapy, Saveetha Institute of Medical And Technical Sciences.

DR.M. MANIKUMAR., MPT(SPORTS), PHD., Department of Sports Physiotherapy, Saveetha College of Physiotherapy, Saveetha Institute of Medical And Technical Sciences

## ABSTRACT

### AIMS:

- ❖ To find the effects of Task-Oriented Aerobic Exercise for Autism subjects with Self-Stimulatory Behaviour.

### OBJECTIVE:

- ❖ To find whether it reduces the Self-Stimulatory Behaviour by giving the Task-Oriented Aerobic Exercise for Autism subjects.

### METHODOLOGY:

A total of thirty subjects with Autism were selected in this study who were fulfilled the inclusion criteria such as Autism with Self-Stimulatory Behaviour, both genders, CARS rating between mild to moderate and age group between 6-12 years. The subjects were excluded with severe Autism, Autism with mentally retardation, asperger's syndrome and ADHD. The subjects were divided into two groups; experimental and control group. Experimental group were received Task-oriented aerobic exercise along with Sensory integration therapy while control group were received only the Sensory integration therapy.

### OUTCOME MEASURES:

- ❖ CARS (Childhood Autism Rating Scale)

### STATISTICAL ANALYSES:

The data will be statistically analysed using paired and independent t-test. Paired t-test will be used to compare data sets within the group and independent t-test will be used to compare the data sets between the groups.

### RESULTS:

Statistical analysis of post-test values of both groups showed the significant changes with the p values of CARS are  $p=0.0025$ .

### CONCLUSION:

In this study it have been concluded that Group A (TOAE) shows a significant improvement in the reduction of Self-Stimulatory Behaviour than Group B (SIT), which means Task-Oriented Aerobic Exercise group shows better results than sensory integration therapy group and hence null hypothesis is proved.

**KEYWORDS:** Autism, Self-Stimulatory Behaviour, Task-Oriented Aerobic Exercise.

## 1.1 INTRODUCTION

Autism is a disorder affecting brain function <sup>(3)</sup>. It is characterized by difficulty with social interaction, delayed or limited development of communication skills, and restrictive patterns of behaviour or interests <sup>(12,47)</sup>. The number of boys with this disorder is five times more than the girls <sup>(13,39)</sup>. The Centre for

Disease Control and Prevention states that the prevalence of Autism was 1 out of 150 children in 2007, it was 1 out of 110 children in 2009, and it was 1 out of 88 children in 2012, which represents a marked increase over the recent years in India <sup>(2,4,11)</sup>. 116 persons in every 10,000 population are autistic in Tamil Nadu.

The causes of the Autism are mainly idiopathic. And some literature says that causes of the Autism are a multifactorial descent encompassing both genetic predisposition and environment factors <sup>(49)</sup>. Genetic disorder are fragile x syndrome and tuberous sclerosis <sup>(23)</sup>. Some literatures suggest that causes due to pre – natal, peri – natal and post – natal. Pre – natal causes are congenital rubella syndrome, teratogen exposure, pesticide exposure. Peri – natal causes are low birth weight, abnormal gestation length (pre-term), birth asphyxia (hypoxic-ischemic insult) <sup>(52)</sup>. Post – natal causes are autoimmune disease <sup>(40)</sup>, leaky gut syndrome <sup>(40)</sup>, viral infection, amygdala developmental failure <sup>(36)</sup>, oxidative stress <sup>(29)</sup> and vitamin – D <sup>(16)</sup>. Heavy metal toxicity eg: Mercury <sup>(41)</sup>.

The pathogenesis of the Autism is clearly explaining how the signs and symptoms of autistic children is occurring at the level of brain. Neural connectivity is the early brain overgrowth and over connectivity. It mainly causes deficits in socio – emotional and communication function <sup>(17,18)</sup>.

Neural migration is which a cerebral cortex malformation occurring in the first 6 months of gestation. It causes the decrease of reelin ( a extracellular matrix protein in neuronal migration and cellular positioning) which deposits in cerebellar tissues <sup>(15,44)</sup>. Excitatory – inhibitory neural activity are which GABA receptors gene clusters are heavily implicated promoting abnormal CNS system excitability and function synaptic maintenance also shows potential relevance to Autism's pathophysiology. If decrease in GABA receptors occurs excitatory abnormalities is observed <sup>(15,42)</sup>.

Dendritic morphology is which causing abnormal assembly of synapses and dendritic spines synaptic scaffolding protein involved in the induction and maintenance of dendritic spines and it is mainly deleted in Autism subjects <sup>(35,43)</sup>. Neuroimmune disturbance it is which cause abnormal T – helper cell type, general suppression of cell – mediated immunity, subnormal levels of CD4+ lymphocytes, imbalance of antibody levels, reduced natural killer cell functions <sup>(32,34,48)</sup>.

Calcium signalling is which activity – dependent calcium influx into neurons which subsequently regulates numerous cortical excitatory synapse. It causes the defects in unbalanced excitatory – inhibitory,

GABA receptors abnormalities<sup>(22,31,35)</sup>. Mirror neurons system in which major symptoms of Autism child is seen.

MNS is located in the areas of pre – motor and parietal cells of the cerebral cortex is which fires action potential (mirror) like behaviour of others (imitation, modelling, empathy and language acquisition/evolution). It causing deficits in profound social and communication difficulty and psychosocial and behaviour disturbances (sensory hypersensitivity and excelling at visual tasks)<sup>(14,29,46)</sup>.

A major problem encountered with autistic children is their characteristic Self-Stimulatory Behaviour, which frequently interferes with on-task responding and other appropriate behaviours with stereotyped movements, repetitive behaviour, or autistic mannerisms<sup>(56)</sup>. The study says that individuals with ASD (Autism Spectrum Disorder) are more likely to have difficulties with balance, postural stability, gait, joint flexibility, and movement speed found impairment movements in 67% of children with Autism using the Henderson Test of Motor Impairment . when exercise is increased, improvement in physical health, intellectual functioning, perception, behaviour, and personality review focused on the effects of aerobic exercise on psychological variables<sup>(3,4,12,25,38,51-53,56)</sup>.

The effects of aerobic exercise on psychological variables shows the various degrees of positive changes in intellectual functioning, behaviour, and self-concept<sup>(3)</sup>. In some of the literature suggest that increased physical activity might positively influence on control stereotypical behaviours such as repetitive sequences of fixed behaviours including movement patterns (hand flapping, body-rocking, spinning or flipping of objects) and repetitive vocal sequences (echolalia)<sup>(2,51)</sup>. Some literature suggest that jogging for 8-20 min decrease self-stimulating behaviours while improving academic and work performance and in the another study found that 15-20 min of group jogging before classroom activity improved academic response in children with ASD<sup>(1,9)</sup>.

Sensory integration therapy is a form of occupation therapy that is used to planned, controlled sensory input in accordance with the child neurological needs, which usually elicit a spontaneous adaptive response the child's that integrates the senses.

The valid test used to measure the severity of Autism are reported in the literature are childhood Autism rating scale.

According to Paul SS Russell and Anna Daniel the childhood Autism rating scale is more reliable tool used in this study<sup>(56)</sup>.

According to this study “Benefits of physical activity for Autism spectrum disorders: A systematic review”. They were reviewed 11 studies provided intervention to a total of 115 participants with ASD. The result says that it reduces stereotypy or Self-Stimulatory Behaviour<sup>(3)</sup>.

According to this study “Effectiveness of Ball Exercises on Reduction of Stereotypic Behaviour of Children with Autism Spectrum Disorder with High Performance”. They were conducted the study on 16 male subjects with ASD. Group-A were given the ball exercise intervention program for 24 sessions. Group-B were given the occupational therapy activity. The result says that changes in stereotypy or Self-Stimulatory Behaviour<sup>(2)</sup>.

## AIMS AND OBJECTIVES OF THE STUDY

### 1.2 AIMS

To find the effects of Task Oriented Aerobic Exercise for Autism subjects with Self-Stimulatory Behaviour.

### 1.3 OBJECTIVES

To find whether it reduces the Self-Stimulatory Behaviour by giving the Task Oriented Aerobic Exercise for Autism subjects.

### 1.4 HYPOTHESIS

#### 1.4.1 NULL HYPOTHESIS:

There will be no significant difference obtained by giving Task-Oriented Exercise for Autism with Self-Stimulatory Behaviour.

#### 1.4.2 ALTERNATIVE HYPOTHESIS:

There will be a significant difference obtained by giving Task-Oriented Exercise for Autism with Self-Stimulatory Behaviour.

### 1.5 CLINICAL SIGNIFICANCE

Autism spectrum disorder is a biological disorder, but its genetic constitution is still not fully understood. People with Autism show abnormalities in different areas of the brain, including frontal, parietal, cerebellum, amygdale, and hippocampal regions. The children with Autism have following

symptoms of Loneliness, homelessness, failure to provide gesture-specific and echo-like repetition, inversion pronoun (use of the pronoun “you” instead of “I”), humdrum sound and words. Most of the studies concluded that by giving this task-oriented aerobic exercise will reduce the Self-Stimulatory Behaviour with autistic children with the age group of 6-12 years<sup>(10)</sup> and it is capable of applying in the clinical setup.

## 1.6 OPERATIONAL DEFINITION

**Autism with Self-Stimulatory Behaviour:** Autism Spectrum Disorder (ASD) is a lifelong neurological disorder characterized by deficits in social-communication and restrictive or repetitive behaviors (APA, 2013)<sup>(8)</sup>.

**Aerobic Exercise:** Aerobic exercise training, or conditioning, is augmentation of the energy utilization of the muscle by means of an exercise program<sup>(51-53)</sup>.

**Sensory Integration:** sensory integration therapy is a multifaceted intervention approach in which special exercises are used to strengthen sense of touch(tactile), sense of balance(vestibular), sense of where body and its parts are in space(proprioception)<sup>(37)</sup>.

## 2. REVIEW OF LITERATURE

- ❖ **Nemat Sotodehasl, Mohammad Reza Tamadon, Farhad Malek et al., (2018)** in this study “**Vitamin D deficiency and Autism; a review on recent findings**”. They reviewed 80 articles since 2006 in the electronic databases of the Web of Knowledge, EBSCO, OVID and PubMed. According to this study suggest that the value of vitamin D has no meaningful correlation with the intensity of Autism spectrum disorders.
- ❖ **Wan, Hongquan, MM, Zhang, Chunguo, MD et al., (2018)** in this study” Association of maternal diabetes with Autism spectrum disorders in offspring: A systemic review and meta-analysis”. They reviewed 12 studies provided intervention to a total of 640 participants with ASD. According to this study suggest that maternal diabetes, especially GDM, is associated with an increased risk of ASD in offspring.
- ❖ **Shane K. H. MIRAMONTEZ, Ilene S. SCHWARTZ et al., (2017)** in this study “**The Effects of Physical Activity on the On-Task Behavior of Young Children with Autism Spectrum Disorders**”. They conducted the study on 3 males participants with ASD. According to this study suggest that in general, movement (yoga and dance party) prior to journal led to higher levels

of on-task behavior during journal writing, with different activities yielding different outcomes for individual participants.

- ❖ **Abdulrahman et al., (2016)** in this study “**Benefits of physical activity for Autism spectrum disorders: A systematic review**”. They were reviewed 11 studies provided intervention to a total of 115 participants with ASD. According to this study suggest that it reduces stereotypy or Self-Stimulatory Behaviour <sup>(3)</sup>.
- ❖ **Gholamhosein Nazemzadegan et al., (2016)** in this study “**Effectiveness of Ball Exercises on Reduction of Stereotypic Behaviour of Children With Autism Spectrum Disorder With High Performance**”. They were conducted the study on 16 male subjects with ASD. Group-A were given the ball exercise intervention program for 24 sessions. Group-B were given the occupational therapy activity. According to this study suggest that changes in stereotypy or Self-Stimulatory Behaviour <sup>(2)</sup>.
- ❖ **Sonia Young and Karen Furgal et al., (2016)** in this study “**Exercise Effects in Individuals with Autism Spectrum Disorder: A Short Review**”. They were conducted the study on individual with ASD. The individual receiving antecedent exercise, jogging/running, trampoline exercise, water-based exercise. According to this study suggest that appears to have a positive impact on decreasing unwanted behaviors and promoting desired ones with children with ASD <sup>(1)</sup>.
- ❖ **Ka-Lam Sam et al., (2015)** in this study “**Effectiveness of Exercise-Based Interventions for Children with Autism: A Systematic Review and Meta-Analysis**”. They were reviewed 8 studies provided intervention to a total of 105 participants with ASD. According to this study suggest that it reduces the stereotypy or Self-Stimulatory Behaviour with improving in the physical activity.
- ❖ **Katharine Dartt et al., (2015)** in this study “**Effects of Physical Activity and Aquatics Programs on Problem Behaviours in Children with Diagnosed Disabilities and Behaviour Disorders**”. According to this study suggest that improvements in eye contact, social skills, stereotypic behaviours, and attention in children with ASD.
- ❖ **Katherine B. LaLonde et al., (2015)** in this study “**Increasing Physical Activity in Young Adults with Autism Spectrum Disorder**”. They were reviewed 18 studies provided intervention to a total of 64 participants with ASD. The study was conducted to evaluate the number of steps in daily,



weekdays, weekend day. According to this study suggest that the numbers of steps are increased in these all three evaluations with the ASD participants.

- ❖ **Christopher Fox et al., (2015)** in this study “**The effects on physical exercises to improve social communication skills of adolescents with Autism**”. They were conducted study on 3 adolescents with the age group between 13 – 15 with Autism. They procedure are walking, jumping and yoga for 12 weeks of session. According to this study suggest that attempted to explore physical exercises of a 12-week winter wellness program to increase social communication skills of middle school students with ASD <sup>(4)</sup>.
- ❖ **Amel E. Abdel Karim, Amira H. mohammed et al., (2015)** in this study “**Effectiveness of sensory integration program in motor skills in children with Autism**”. They were conducted study on 43 children with the age group between 40 to 65 months. The sensory integration therapy was given for 3 sessions per week for 6 months. According to this study suggest that sensory integration therapy was effective in the treatment of autistic children as it helps these children to become more independent and participate in everyday activities <sup>(5)</sup>.
- ❖ **Mahdi Khodabakhshi, Ahmad Abedi et al., (2014)** in this study “**The Effect of Sensory Integration Therapy on Social Interactions and Sensory and Motor Performance in Children with Autism**”. they were conducted study on 24 children with ASD. They were given sensory integration therapy for 25 weeks (100 sessions). According to this study suggest that therapy based on sensory integration leads to significant reduction in some of symptoms and improved social interaction and motor and tactile performance to children with ASD <sup>(6)</sup>.
- ❖ **David A. Geier Janet K. Kern & Mark R.Giere et al., (2013)** in this study ”**A Comparison of the Autism Treatment Evaluation Checklist (ATEC) and the Childhood Autism Rating Scale (CARS) for the Quantitative Evaluation of Autism**”. They conducted study on 56 participants with ASD were diagnosed. According to this study suggest that there was a significant correlation between total ATEC and CARS scores ( $\rho = .71$ ).
- ❖ **Beth A. Pfeiffer, Kristie Koenig, Moya Kinnealey et al., (2013)** in this study “**Effectiveness of Sensory Integration Interventions in Children With Autism Spectrum Disorders: A Pilot**

**Study**". They were conducted study on 37 children with ASD. According to this stud suggest that significant progress toward individualized goals and a decrease in autistic mannerisms <sup>(7)</sup>.

- ❖ **Megan MacDonald, Phil Esposito and Dale Ulrich et al., (2011)** in this study "**The physical activity patterns of children with Autism**". They were conducted the study on 72 children with ASD between the age group of 9 – 18 years. According to this study suggest that decreased moderate to vigorous physical activity patterns as well as increased patterns of sedentary physical activity.
- ❖ **Michelle sowa, Ruud meulenbroek et al., (2011)** in this study "**Effects of physical exercise on Autism spectrum disorder: A meta – analysis**". They were reviewed 16 studies provided intervention to a total of 113 children with ASD. According to this study suggest that jogging and swimming are majorly used therapeutic intervention given to ASD participants, in which swimming has shown a greater improvement in physical activity rather than the jogging.
- ❖ **Russell Lang et al., (2010)** in this study "**Physical exercise and individuals with Autism spectrum disorders: A systematic review**". They were reviewed 18 studies provided intervention to a total of 64 participants with ASD. According to this study suggest that improvements in their academic, physical fitness, reduced stereotypy or Self-Stimulatory Behaviour <sup>(12)</sup>.
- ❖ **Paul SS Russell, Anna Daniel, Sushila Russell et al., (2010)** in this study "**Diagnostic accuracy, reliability and validity of Childhood Autism Rating Scale in India**". According to this study suggest that A CARS score of  $\geq 33$  (sensitivity = 81.4%, specificity = 78.6%; area under the curve = 81%) was suggested for diagnostic use in Indian populations. The inter-rater reliability (ICC=0.74) and test-retest reliability (ICC=0.81) for CARS were good <sup>(10)</sup>.
- ❖ **Sinclair A. Smith, Bracha Press et al., (2005)** in this study "**Effects of Sensory Integration Intervention on Self-Stimulating and Self-Injurious Behaviors**". They were conducted study on 7 children's with ASD. Daily 15-min videotape segments of the subjects were recorded before, immediately after, and 1 hour after either SI or control interventions performed during alternating weeks for 4 weeks. According to this study suggest that the sensory integration approach is effective in reducing self-stimulating behaviors, which interfere with the ability to participate in more functional activities.



### 3. METHODOLOGY

#### 3.1 STUDY DESIGN:

The study design is used in this study was Quasi experimental study.

#### 3.2 STUDY SETTING:

The study was conducted in Saveetha Medical college & hospital (CDC), Thandalam, Chennai- 602105 and Kiddo's Rehab Centre, R.E. Nagar East, 3<sup>rd</sup> street, porur- 600116.

#### 3.3 SAMPLING TECHNIQUE:

The convenient sampling technique was used in this study and the subjects were grouped through odd or even allocation.

#### 3.4 SAMPLE SIZE:

The total number of participants in the study was 30 subjects which includes

GROUP-A (TOAE) : 15 subjects

GROUP-B (SIT) : 15 subjects

#### 3.5 STUDY DURATION:

The period of intervention for each participant was one session per day; 3days per week for 6 weeks.

#### 3.6 INCLUSION CRITERIA

- ❖ Autism with Self-Stimulatory Behaviour
- ❖ Age group between 6-12
- ❖ Both gender
- ❖ Mild to moderate (scores of 30.5 to 37)

#### 3.7 EXCLUSION CRITERIA

- ❖ severe Autism (scores of 37.5 to 60)
- ❖ ADHD (Attention Deficit Hyperactive Disorder)
- ❖ Autism with mental retardation
- ❖ Asperger's syndrome

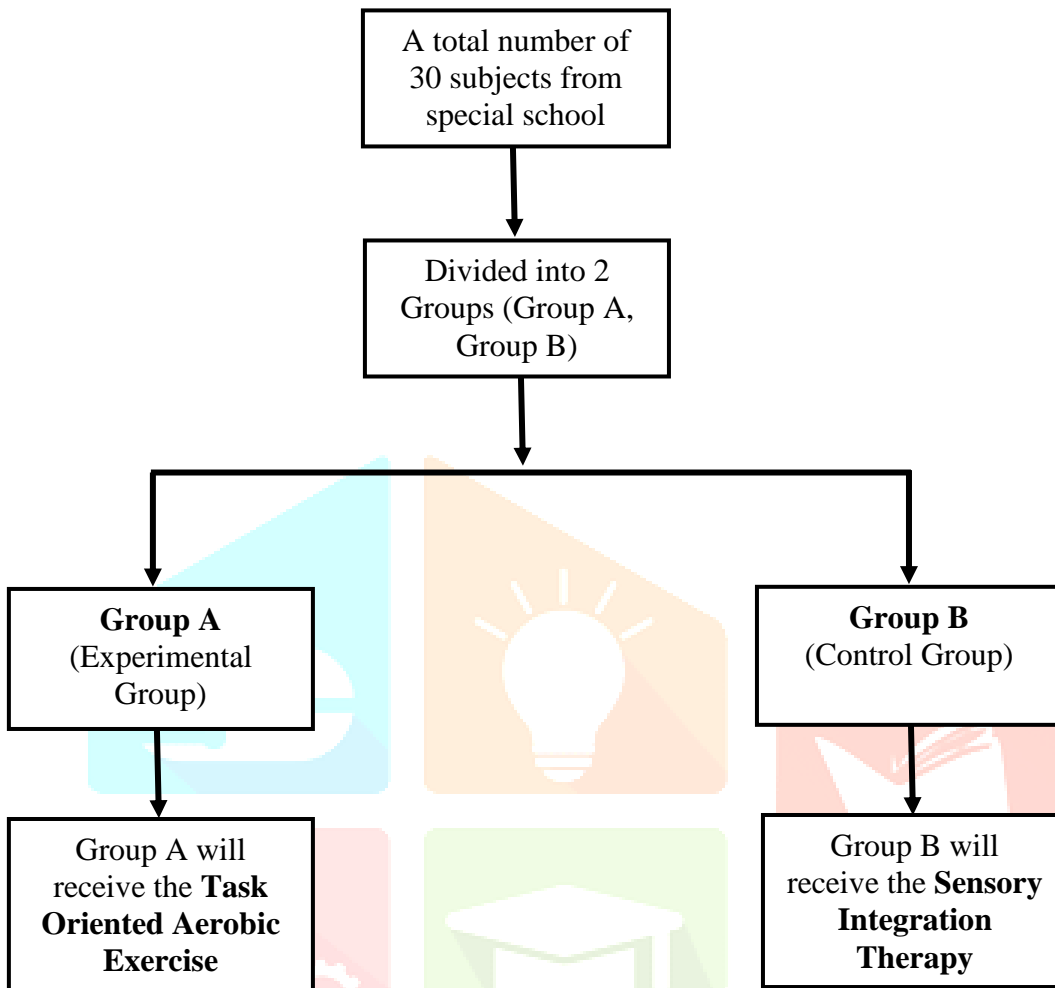
#### 3.8 MATERIALS REQUIRED

- ❖ Colour mats
- ❖ Baskets
- ❖ Colour sensory balls

#### 3.9 PROCEDURE

The subjects those who fulfill the inclusion criteria were participated in the study. A total of 30 samples will be selected from the kiddos rehab centre. Such eligible subjects were selected and allocated

into two groups. The subjects were assessed using the CARS scale. Group A (15) is an experimental group they will receive task-oriented aerobic exercise and Group B (15) is a control group they will only receive the sensory integration therapy.



### TREATMENT PROTOCOL

#### GROUP A: TASK-ORIENTED AEROBIC EXERCISE

**SENSORY INTEGRATION THERAPY** for 20 minutes

The activities are

- ❖ Swing therapy (round or T- swing)
- ❖ Balance board activities (sitting and standing)
- ❖ Rope ladder
- ❖ Therapy ball activities

**JOGGING** for 15 minutes with 25ft of covering distance; activities are colourful sensory balls collection.

Time duration: 25 minutes which include warm-up and cool-down

**WARM UP EXERCISE** for 6 minutes which includes

- ❖ Walking
- ❖ Sit to stand
- ❖ Forward and backward stepping

- ❖ Forward bending activities
- ❖ Bilateral hand raising activities

#### **COOL DOWN EXERCISE** for 4 minutes

- ❖ Dance
- ❖ Massage
- ❖ Relaxed lying position

#### **GROUP B: SENSORY INTEGRATION THERAPY**

##### **SENSORY INTEGRATION THERAPY** for 20 mints

The activities are

- ❖ Swing therapy (Round or T- swing)
- ❖ Balance board activities (sitting and standing)
- ❖ Rope ladder
- ❖ Therapy ball activities

#### **3.10 OUTCOME MEASURES**

Severity of the Autism is measured by using **Childhood Autism measurement scale (CARS)** is a 15-item behaviour-rating scale designed to detect and quantify symptoms of Autism as well as to distinguish them from other developmental disabilities. Each item on the CARS is scored on a Likert scale, from 1 (no signs of Autism) to 4 (severe symptoms). The maximum CARS score is 60, and the cut-off for a diagnosis of Autism is 30. Children with scores of 30.5 to 37 are rated as mildly-moderately autistic, and 37.5 to 60 as severely autistic. According to this study “Diagnostic accuracy, reliability and validity of Childhood Autism Rating Scale in India”. The results say that a CARS score of  $\geq 33$  (sensitivity = 81.4%, specificity = 78.6%; area under the curve = 81%) was suggested for diagnostic use in Indian populations. The inter-rater reliability (ICC=0.74) and test-retest reliability (ICC=0.81) for CARS were good<sup>(10)</sup>.

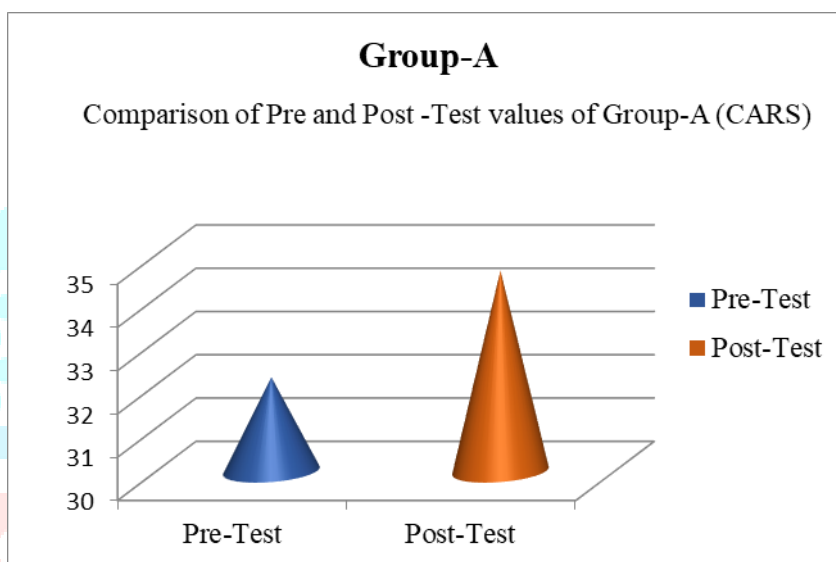
#### **3.11 STATISTICAL ANALYSIS**

The data was statistically analyzed by using descriptive and inferential statistics; mean and standard deviation was done by using paired and independent t-tests. For between groups analysis of the pre-test and post-test values unpaired t-test was used. For the analysis of within group paired t-test was used.

**Table 1: Shows the Pre and Post-Test values of CARS in Group-A**

	Pre-test	Post-test	T value	P value
<b>Mean</b>	32.167	34.633	19.8790	***
<b>Standard Deviation</b>	1.080	1.187		

(p&lt;0.0001)

**Graph 1: Representing the Pre and Post-Test values of CARS in Group-A**

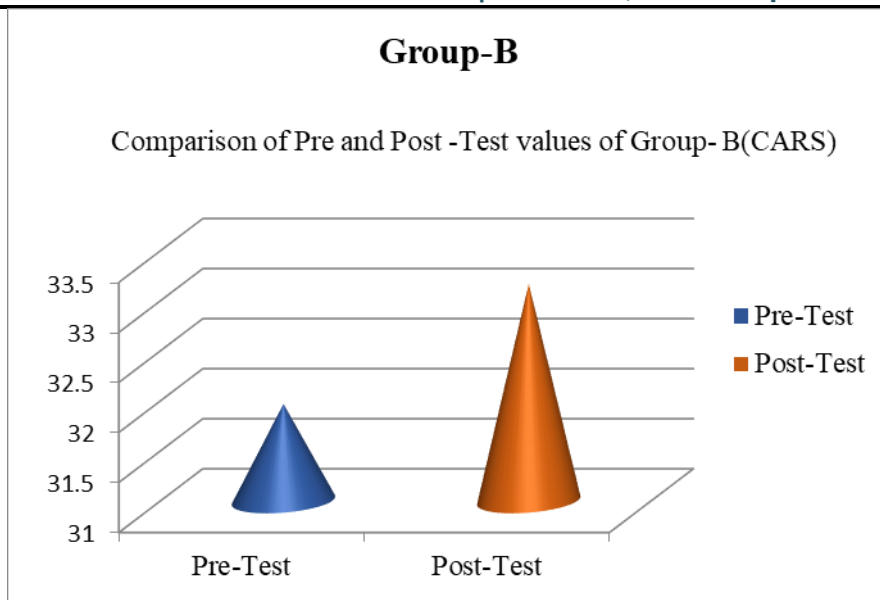
In within group analysis the Pre and Post-test value of CARS for the Group A is extremely significant in reducing the Self-Stimulatory Behaviour with the value of ( $P < 0.0001$ ).

**Table 2: Shows the Pre and Post-Test values of CARS in Group-B**

	Pre-test	Post-test	T value	P value
<b>Mean</b>	31.967	33.167	5.8290	***
<b>Standard Deviation</b>	1.109	1.234		

(P&lt;0.0001)

**Graph 2: Representing the Pre and Post-Test values of CARS in Group-B**



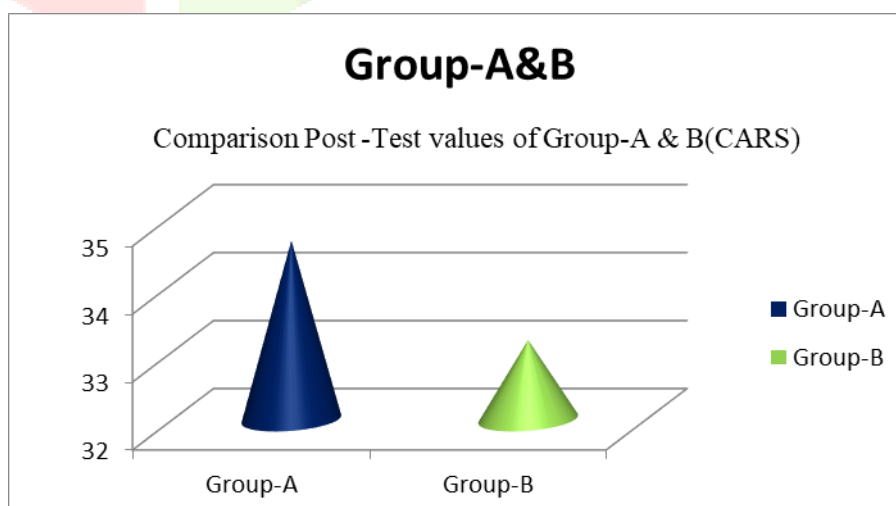
In within group analysis the Pre and Post-test value of CARS for the Group B is extremely significant in reducing the Self-Stimulatory Behaviour with the value of ( $P < 0.0001$ ).

**Table 5: Shows the Post-Test values of CARS in Group-A&B**

	Post-test	Post-test	T value	P value
<b>Mean</b>	34.633	33.167	3.3160	**
<b>Standard Deviation</b>	1.187	1.234		

( $P=0.0025$ )

**Graph 5: Representing the Post-Test values of CARS in Group-A&B**



Between the group analysis of the post-test values of CARS in both the groups shows that it is very statistically significant in reducing the Self-Stimulatory Behaviour in Group A (Task-Oriented Aerobic exercise) than Group B (Sensory Integration).

## 4. RESULTS

The collected data was analyzed using the graph pad prism 3. The mean and standard deviation of pre and post values of CARS and PEDOMETER for both Groups

Group-A (CARS) pre (32.167±1.080) post (34.633±1.187)

Group-B (CARS) pre (31.967±1.109) post (33.167±1.234).

Group-A (PEDOMETER) pre (2860.0±216.47) post (3006.67±205.17)

Group-B (PEDOMETER) pre (2786.67±184.65) post (2820.00±197.12).

Within the Group Analysis it has been shown that the pre and post values of CARS and PEDOMETER show significant improvement in group A than the group B.

Between the group analysis of pre-test and post-test values of CARS and PEDOMETER

CARS- Group-A (34.633±1.187), Group-B (33.167±1.234)

PEDOMETER- Group-A (3006.67±205.17), Group-B (2820.00±197.12)

Between group analyses the post-test values shows that Group A is more significant than Group B. After statistically analyzed, it has been there is high reduction of Self-Stimulatory Behaviour in group A (TOAE) than Group B (SIT).

## 5. DISCUSSION

This study was selected for the purpose of finding the effectiveness of task-oriented aerobic exercise in Autism children with Self-Stimulatory Behaviour. So, in order to reduce the Self-Stimulatory Behaviour need regular task - oriented aerobic exercise for Autism that will reduce the severity of the Autism.

Bromley et al showed vit - D deficiency in the period of pregnancy is associated with increased risk of ASD in childhood, may also related to serotonin levels in the brain. Nernakawa et al says that 25 - hydroxy vit - D serum levels is getting decreased. Hypovitaminosis D causes the neurodevelopmental disturbances. Vit - D acts as a neurosteroid which strong up regular neural growth factors and its detected in brain in embryogenesis. other major factors causing Autism are genetic and environmental factors. Nemet et al suggest that Autism is more prevalent in dark - skinned people. Gail williams et al says that insufficient sleep can result in daytime sleepiness, learning problems and behavioural issues such as hyperactivity. Researchers shows that sleep disturbances occur in 44-83 % of ASD children. Kalak et al suggest that



improvement in the quality of sleep among adolescents following 3 weeks of morning jogging, more vigorous exercise led to increased sleep.

Lang.koegel et al suggest that negative behaviour in ASD appears in several forms for many reasons. Any action performed by a child which is not in line with the norms and expectations of peoples living in the society.

Rosenthal malek et al says that stereotypical behaviour are often hypothesized to occur because the behaviour itself produces pleasant feeling in ASD (Body - rocking, arm flapping and spinning in circles).

Lang et al suggest that increase in aerobic exercise can significantly decrease in self - stimulatory behaviour and also improving attention span and Mageausson.J.E et al suggest that engaging in regular physical activity has the potential to improve general emotional well - being.

Amel.E suggest that sensory integration therapy is also shows a significant reduction in self - stimulatory behaviour and it also shows the increase in attention, concentration, behavioural improvement and it also works on vestibular and tactile sensation.

Gholamhosein et al suggest that motor activity is considered as an efficient tool that influences stereotypical behaviours by providing similar sensory feedbacks. Stereotypical behaviour generated through sensory feedback will be retained after performing these gestures, and such movements may be replaced or eliminated by gestures that create similar feedback. The overlap between the taught movements and format movements in reducing or eliminating stereotypes was also more. Physical activity can increase academic assignments and significant reduction has been shown in blood serotonin concentration after the long - term motor engagement.

Russell Lang et al suggest that vigorous exercise has a more pronounced effect than milder less strenuous exercise. The amount of time required to return to baseline levels ranged between 40 to 90 mints. Information's regarding the procedure used to teach exercise to individual with ASD was limited. However, many incorporated activities, such as jogging, that may not require extensive teaching procedure. Abdul Rahman et al suggest that the strongest evidence from the current review supports the benefits of physical activity related to improve social relation with surrounding community, significant improvements in emotional and social functioning motor developmental enhancing motor skills.

Pancy et al suggest that the most common behavioural improvement associated with increase in exercise was reduced stereotypy or self - stimulatory behaviour. However, the mechanism of action for these improvements is not clear. Possible explanation for the decrease in negative behaviour is that fatigue resulting from exercise leads to decrease in all behaviour.

Twisting, turning at the same time stimulates the CNS and to increase blood flow to the brain and it also increase the heart rate, leading to faster heartbeat, which in turn strengthen the heart muscle. The circulatory systems pumps blood efficiently and it also increase O<sub>2</sub> consumptions, size of the ball, such as colour options can be influenced by the stereotypes of children, game highlights the level of excitement, joy and entertainment and fun play.

Beth hands et al suggest that steps taken per day was not used to quantify exercise in any of those studies making direct comparisons impossible. The steps per day is 10,000 steps have been reported in the school.

In further studies investigations can also be undertaken considering in different age group as I have only considered the ASD children with the age group between 6-12 years and also difference in gender of ASD children might also make the bias in the results and conclusion in effectiveness of improvement in ASD children's; the number of boys with this disorder is five times more than the girls.

## 6. CONCLUSION

In this study it have been concluded that Group A (TOAE) shows a significant improvement in the reduction of Self-Stimulatory Behaviour than Group B (SIT), which means Task-Oriented Aerobic Exercise group shows better results than Sensory Integration Therapy group and hence null hypothesis is proved.

## 7. LIMITATIONS AND RECOMMENDATIONS

### LIMITATIONS:

- ❖ Small sample size was taken.
- ❖ The study duration was only consequent 6 days were taken.
- ❖ Only two outcome tool was used in this study.
- ❖ Long - term follow up was not done.

### RECOMMENDATIONS:

- ❖ Sample size should be increased.
- ❖ Future study should be conducted in a longer duration.
- ❖ More than two outcome tools should be used for future research.

❖ Long-term effect of task-oriented aerobic exercise can be studied.

## 8. REFERENCES

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