

Review Article

Efficacy of Aerobic Exercise in Reducing Stereotypic Behaviors in Individuals with Autism Spectrum Disorder: A Literature Review

Samir Al-Adawi¹, Marwan M Al-Sharbaty², Suhail Mahmoud Ahmad Al-Zoubi³

^{1,2}Department of Behavioural Medicine, College of Medicine and Health Sciences, Sultan Qaboos University, Muscat, Oman

³Department of Psychology, College of Education, Sultan Qaboos University, Muscat, Oman

DOI: <https://doi.org/10.24321/2455.7048.202614>

I N F O

Corresponding Author:

Suhail Mahmoud Ahmad Al-Zoubi, Department of Psychology, College of Education, Sultan Qaboos University, Muscat, Oman

E-mail Id:

zoubisuhail@gmail.com

Orcid Id:

<https://orcid.org/0009-0006-6671-3953>

How to cite this article:

Adawi SA, Sharbaty MM A, Zoubi SMA A. Efficacy of Aerobic Exercise in Reducing Stereotypic Behaviors in Individuals with Autism Spectrum Disorder: A Literature Review. *Epidem Int.* 2026;11(3):15-22.

Date of Submission: 2026-06-01

Date of Acceptance: 2026-07-20

A B S T R A C T

Background: Autism Spectrum Disorder (ASD) is a heterogeneous neurobiological condition that features restricted, repetitive, and stereotypic behaviour, and impairments in social interaction and verbal and non-verbal communication. Autism is caused due to genetic and environmental factors. Autism is classified into five major types: Rett's disorder, Asperger's disorder, autistic disorder, childhood disintegrative disorder, and pervasive developmental disorder not otherwise specified. Stereotypic behaviour is involuntary; sensorial self-regulation activities are present in autistic children. Aerobic exercise (AE) is described as a type of exercise that elevates the heart rate and oxygen consumption of the body. It has been seen to cause improvement in an ASD child's physical development, cognitive development, and body composition.

Aim: This article aims to present a review of the relevant literature on the efficacy of aerobic exercises on stereotypic behaviour in ASD children.

Methods: This review is based on the PRISMA guidelines. The databases used for searching the articles were PubMed and Google Scholar. Inclusion criteria were taken care of while selecting the articles. The articles between the years 2011 and 2022 were selected.

Results: In this review, ten studies were selected according to the inclusion criteria and all these studies showed the effectiveness of aerobic exercise and a decrease in stereotypic behaviour in ASD children.

Conclusion: This literature review analysed the efficacy of AE on stereotypic behaviour in ASD children. This study concluded that physical activity, which included aerobic exercise, reduced the stereotypic behaviour of children affected by ASD.

Keywords: Autism Spectrum Disorder, Stereotypic Behaviour, Aerobic Exercise, Self-Stimulatory Behaviour, Physical Activity

Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by persistent difficulties in social

interaction and verbal and non-verbal communication, together with restricted, repetitive, and stereotypic patterns of behaviour.¹ ASD is considered a complex

Epidemiology International (ISSN: 2455-7048)

Copyright (c) 2026: Author(s). Published by Advanced Research Publications



neurobiological disorder influenced by a combination of genetic and environmental factors, with neurocognitive processes playing an important role in shaping behavioural manifestations.² The estimated prevalence of ASD is approximately 6 per 1,000 individuals, with a reported male-to-female ratio of approximately 3:1, indicating a substantially higher prevalence among boys than girls.³

The aetiology of ASD is multifactorial and involves complex interactions between genetic predisposition and environmental influences.⁴ Genetic conditions associated with ASD include disorders such as tuberous sclerosis and fragile X syndrome. Environmental influences may occur during the prenatal, perinatal, or postnatal periods. Prenatal factors include exposure to teratogens and pesticides and congenital rubella infection. Perinatal factors include preterm birth, birth-related hypoxia, and abnormalities in gestational duration. Proposed postnatal factors include vitamin D deficiency, exposure to heavy metals, gastrointestinal disturbances, autoimmune conditions, viral infections, and oxidative stress.³

The biological environment, encompassing chemical, microbial, viral, and physical exposures that can directly influence physiological processes, represents another important component of environmental risk. Potential risk factors include advanced maternal or paternal age, adverse fetal conditions, perinatal and postpartum complications, medication exposure, maternal smoking or alcohol consumption, inadequate nutrition, short intervals between pregnancies, immunization-related factors, toxic exposures, and psychological stress. Certain obstetric conditions, including induced labour, absence of labour, breech presentation, fetal distress, gestational age below 36 weeks, and caesarean delivery, have also been associated with an increased risk of ASD.⁵

Historically, autism-related disorders were classified into five major categories: childhood disintegrative disorder, pervasive developmental disorder, Asperger syndrome, Rett disorder, and autistic disorder.⁶ However, contemporary diagnostic classifications have consolidated these conditions under the broader diagnosis of autism spectrum disorder.

The neuropathological basis of ASD is complex and has been associated with alterations in several regions of the central nervous system. Research has suggested that neurological and neuropsychiatric abnormalities may involve relatively subtle developmental changes in the cerebellum, limbic structures such as the hippocampus and amygdala, brainstem nuclei, and cerebral cortex, including alterations in brain volume and neuronal density.⁷ Several hypotheses have been proposed to explain the underlying mechanisms of ASD, including abnormalities in neuronal development and migration, disruption of the excitatory-

inhibitory balance, altered dendritic development and synaptogenesis, immune dysfunction, neuroinflammation, mirror-neuron abnormalities, and epigenetic mechanisms.⁸

The major clinical manifestations of ASD include impaired social communication and interaction, restricted and repetitive patterns of behaviour, stereotypic movements, and atypical responses to sensory and motor stimuli.⁹ Stereotypic behaviour, also referred to as self-stimulatory behaviour or restricted and repetitive behaviour, is frequently observed in children with ASD.¹⁰ Common manifestations include toe walking, hand or arm flapping, body rocking or spinning, finger movements, repetitive jumping, forward and backward swinging, spinning objects, repetitive sniffing, and immediate or delayed echolalia.¹¹ These behaviours may function as involuntary sensory-regulatory responses and can interfere with an individual's engagement with the surrounding environment.¹²

Aerobic exercise (AE) refers to physical activity in which oxygen-dependent metabolic processes play a major role in energy production.¹³ During aerobic exercise, increased oxygen utilization contributes to physiological and metabolic adaptations that may also influence cognitive functioning. Regular aerobic exercise has been associated with structural and functional changes in the hippocampus, a brain region involved in emotional regulation, motivation, memory, and learning, and may consequently contribute to improved quality of life. Aerobic physical activity may also promote social interaction, assist with emotional regulation, and improve attention.¹⁴

Exercise places physiological demands on the cardiovascular system and can induce changes in cerebral physiology that may enhance cognitive processing. In particular, vigorous aerobic exercise can produce rapid neurochemical changes that may prepare the brain for subsequent or ongoing learning. Evidence from motor-learning research further suggests that combining aerobic exercise with skill-based training may produce greater improvements in skill acquisition and retention than either skill practice or exercise alone.¹⁵

Despite the potential behavioural and cognitive benefits of physical activity, the available literature examining aerobic exercise specifically for reducing stereotypic behaviours in children with ASD remains limited. Therefore, the present review aims to evaluate the efficacy of aerobic exercise in reducing stereotypic behaviours among children with autism spectrum disorder.

Need of the Study

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition that can adversely affect quality of life through

difficulties in social interaction and communication, along with restricted, repetitive, and stereotypic patterns of behaviour.² The condition has been associated with complex alterations in neural mechanisms and may involve physiological, genetic, and metabolic factors, as well as environmental influences and associated medical conditions. Stereotypic behaviours commonly observed in children with ASD include repetitive head movements, arm shaking or flapping, jumping, repetitive shifting or rotation of body weight, manipulation of objects, reduced eye contact, and behaviours that may interfere with learning and participation.¹⁶

Therefore, this literature review aims to critically examine the available evidence regarding the effectiveness of aerobic exercise in reducing stereotypic behaviours among children with Autism Spectrum Disorder.

Objective of the Study

- To conduct a review of the literature on the efficacy of aerobic exercises on stereotypic behaviour for autism spectrum disorder

Materials and Methods

Study Design

This review of literature is based on the PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis) guidelines.

Inclusion Criteria

- Articles that included ASD with stereotypic behaviour
- Articles published only in English
- Articles containing full-text
- Articles including both genders

- Age group between newborn and 20 years
- Articles published from 2011 to 2022

Exclusion Criteria

- Articles published in languages other than English
- Articles published before 2010
- Articles have not included other than aerobic exercises
- Articles not related to keywords
- Articles with participants' ages above 20 years

Methodology

This literature review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Relevant studies were identified through searches of PubMed and Google Scholar using the keywords "autism spectrum disorder," "stereotypic behaviour," "aerobic exercise," "physical activity," and "self-stimulatory behaviour." Duplicate records were identified and removed during the title-screening process.

To ensure consistency and facilitate accurate interpretation and analysis, only articles published in English were considered. Studies published between 2011 and 2022 were eligible for inclusion, and preference was given to full-text articles to allow comprehensive evaluation of the available information. Studies containing unrelated keywords, published in languages other than English, or published before 2010 were excluded according to the predefined exclusion criteria. Following the application of the inclusion and exclusion criteria, a total of 10 articles were selected for the review. The study-selection process is illustrated in Figure 1.

Results

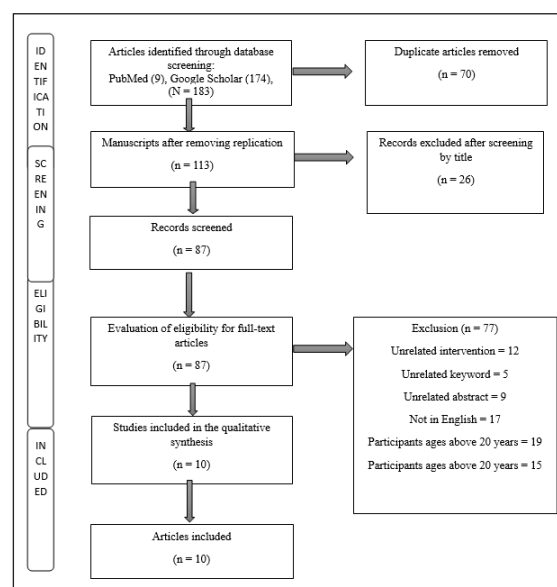


Figure 1. Flowchart of the Selection of Articles

Table I.provides an overview of the selected articles

S.No	Authors	Year	Type	Conclusion
1	Oriel et al. ¹²	2011	With-in-subject crossover study	This study employed a within-subject crossover design strategy, with a treatment group participating in aerobic exercise and a control group from four classes of students aged 7 to 11 years. Two classrooms were chosen as the treatment group, while the other two classrooms served as the control group. This study was conducted for three weeks. It showed that it was possible to improve academic performance in ASD children by providing them with exercise before participating in classroom activities. This article discussed the importance of aerobic exercise in young children with Autism Spectrum Disorders (ASD). The 15 minutes of aerobic exercise, a method that was affordable and simple to apply, provided a way to improve academic performance.
2	Mays et al. ¹⁷	2013	Review study	This study aimed to determine whether antecedent aerobic exercise (jogging) might decrease stereotypic behaviour. Two severely autistic elementary-aged students were the participants in this study. The stereotypic behaviour was reduced during instructional sessions. They conducted the interventions between Alison and Boyd and they compared the percentage of stereotypic behaviour. They had seen a minimal decline in Boyd's stereotypic conduct and a moderate decline in Allison's stereotypic behaviour. According to the result of the intervention, following their jogging sessions, both individuals spent less time behaving stereotypically than they were at baseline, indicating that aerobic exercises were effective. They concluded that simple interventions like vigorous jogging can reduce stereotypic behaviour immediately following the workout, at least for a short time.
3	Neely et al. ¹⁸	2014	Experimental study	In this study, the impacts of antecedent physical activity carried out during instruction sessions for children with ASD were examined. Due to the participants' fatigue from the exercise, two theories have been put forward to explain the impacts of antecedent exercise on stereotypy. Following antecedent physical activity that persisted until the behavioural markers of satiation occurred, there were higher levels of academic engagement and lower levels of stereotypy during the instructional sessions.
4	Young and Furgal ¹⁹	2016	Short review	This study was conducted with individual ASD children. The child performed antecedent exercises like jogging or running, trampoline exercises, and water-based exercises. According to this study, such exercises seem to have a positive effect on reducing undesirable behaviours and encouraging desired action in children with ASD. Aerobic exercise was found to increase academic performance for these children. They reported that aerobic exercise was correlated to a short-term decline in self-stimulation by stereotypic behaviour.

5	Olin et al. ²⁰	2017	Experimental study	This study, which involved seven autistic children under the age of 13 years, was chosen for the review. Baseline behaviour measurements and pre-exercise and post-exercise measurements were taken in this study. Participants self-selected an elliptical cycle, or treadmill ergometer for their initial workout. For the experimental conditions, four specific aerobic exercises were done continuously for 10 or 20 minutes at either a low or high intensity. The reduction of self-stimulatory behaviour in autistic children was observed after giving them shorter and less intense exercise. They concluded that low-to-moderate intensity exercises significantly reduce the stereotypic behaviour whereas high-intensity aerobic exercises may increase such behaviour.
6	Ferreira et al. ²¹	2018	Cross-sectional study	According to this study, physical exercise helps people with ASD experience decreased comorbidities as well as fewer clinical features. The programme for Children with ASD (PEP-AUT) regimen is to (1) investigate the multi-factor relationships between the metabolic profile, amount of physical activity, level of fitness, and health-related quality of life in children with ASD; (2) to evaluate how a 40-week exercise programme affected all these factors in ASD children. Modifications in the symptom profile and amount of physical activity in children were the primary outcomes. The anthropometric and metabolic profile, aerobic capacity, handgrip strength, socioeconomic status, and health-related quality of life were the secondary outcomes.
7	Keerthna and Manikumar ²²	2018	Quasi-experimental study	They conducted this study using a quasi-experimental design with 30 children diagnosed with ASD in the age group of 6 to 12 years children with mild to moderate severities. Group A was provided with task-oriented aerobic exercise and Group B with sensory integration therapy for 20 minutes each. It was concluded that Group A (TOAE) showed a significant improvement in the reduction of self-stimulatory behaviour than Group B (SIT), which meant that the task-oriented aerobic exercise group showed better results than the sensory integration therapy group.
8	Adeogun et al. ²³	2018	Experimental study	This study was conducted among 64 children diagnosed with ASD between the ages of 2 and 20 years. Aerobic exercises that improve autistic children's bilateral coordination, reaction time, and static balance were performed by them for eight weeks. It was suggested that manipulative exercises, aerobic dancing, throwing tiny balls, and catching bean bags should be incorporated into the physical education programme for the students of special schools. It was seen that frequent aerobic exercise benefits children with ASDs in terms of static balance, flexibility, bilateral coordination, response time, and BMI, but has no impact on their muscle strength.

9	Strofylla et al. ²⁴	2021	Experimental study	This study showed that an aerobic exercise programme can enhance participants' motor skills, body composition, and cognitive capacities. The Movement Assessment Battery for Children (2nd ed.) and the Cognitive Assessment System were used to assess cognitive performance. The authors concluded that a 6-month aerobic training programme was beneficial in improving the cognitive capacity to plan and balance, along with visual-motor coordination in ASD children. Also, they observed that aerobic exercises significantly altered body composition.
10	Cole ²⁵	2021	Systematic review	In this study, ten articles were reviewed that showed the effectiveness of aerobic exercises on stereotypic behaviour in ASD. The authors concluded that six studies showed a direct positive correlation between aerobic exercise and children with autism through decreased stereotypic behaviour. The other three studies provided the data that assisted in selecting the appropriate fitness tests to better understand the functioning of ASD children's cardiorespiratory system. They conducted a comprehensive analysis of primary and secondary studies involving newborns and adolescents aged eighteen years and above. These comprised articles published between 2015 and 2020 as well as a single 2008 article.

Discussion

A total of 10 studies were included in this review, comprising one systematic review, one quasi-experimental study, one cross-sectional study, one brief review, one within-subject crossover study, one narrative review, and four experimental studies. Overall, the findings indicated that aerobic exercise may have beneficial effects on children with ASD, particularly by reducing stereotypic and self-stimulatory behaviours.

A systematic review conducted by Cole et al.²⁵ included 10 studies examining the relationship between aerobic exercise and stereotypic behaviours in children with ASD. Six of the included studies demonstrated a direct association between increased aerobic activity and reductions in stereotypic behaviour. The remaining studies primarily focused on identifying appropriate physical-fitness assessment methods for children with ASD and examining cardiorespiratory functioning within this population.

A quasi-experimental study involving 30 children of both sexes, aged 6–12 years, was also included in the present review.²² Participants were divided into two groups. The experimental group received Task-Oriented Aerobic Exercise (TOAE), whereas the control group underwent Sensory Integration Therapy (SIT) for six weeks. The results demonstrated a greater reduction in self-stimulatory behaviours among children receiving TOAE compared with those receiving SIT.

A brief review reported that aerobic exercise was associated with a temporary reduction in stereotypic self-stimulatory behaviours and improvements in academic performance

among children with ASD.¹⁹ These findings suggest that aerobic activity may have immediate behavioural and functional benefits when incorporated into the daily routines of children with autism.

A cross-sectional investigation was conducted in two phases.²¹ The first phase involved a 12-week assessment of participants' clinical manifestations, metabolic activity, physical activity levels, physical fitness, socioeconomic characteristics, and health-related quality of life. The second phase consisted of a 48-week intervention period, including a 40-week physical-fitness programme, conducted in a facility specifically designed for children with ASD.

Another study investigated the effects of antecedent aerobic exercise on stereotypic behaviours in children with ASD.¹⁷ The behaviour of two children was evaluated, and the findings suggested that activities such as jogging could reduce stereotypic behaviour for a short period following aerobic exercise. Similarly, a within-subject crossover study compared treatment and control conditions and examined the effects of aerobic exercise performed over three weeks.¹² The findings indicated that performing aerobic exercise before classroom activities could improve academic performance among children with ASD.

The potential effects of aerobic exercise on stereotypic behaviours may also be explained through neurotransmitter mechanisms. According to the neurotransmitter hypothesis, abnormalities in serotonergic, dopaminergic, and gamma-aminobutyric acid (GABA) systems may contribute to the development of stereotypic behaviours in individuals with ASD. Physical activity can influence the activity and

regulation of these neurotransmitter systems and may consequently contribute to reductions in stereotypic behaviour. Exercise-induced fatigue may also temporarily decrease the expression of repetitive and self-stimulatory behaviours.²⁶

In functional analyses where stereotypic behaviour remained consistent across different environmental conditions, the behaviour was considered to be maintained by automatic reinforcement rather than being dependent on external consequences.¹⁷ Nevertheless, findings from several studies suggest that regular aerobic exercise may be a useful non-pharmacological strategy for reducing stereotypic and self-stimulatory behaviours in children with ASD. Overall, the evidence indicates that incorporating structured aerobic activities into intervention programmes may provide short-term behavioural benefits, although further well-designed studies with larger samples and standardized exercise protocols are required to establish the long-term effectiveness of this approach.

Conclusion

The efficacy of aerobic exercises on stereotypic behaviour in ASD children and the improvement in their academic performance by reducing such behaviour was evaluated in this review. This study concluded that physical activity, which included aerobic exercises, reduced the stereotypic behaviour of the children affected by ASD.

Conflict of Interest: None

Source of Funding: None

References

1. Srinivasan SM, Pescatello LS, Bhat AN. Current perspectives on physical activity and exercise recommendations for children and adolescents with autism spectrum disorders. *Phys Ther.* 2014 Jun;94(6):875-89. [PubMed] [Google Scholar]
2. Demetriou EA, Lampit A, Quintana DS, Naismith SL, Song YJ, Pye JE, Hickie I, Guastella AJ. Autism spectrum disorders: a meta-analysis of executive function. *Mol Psychiatry.* 2018 May;23(5):1198-204. [PubMed] [Google Scholar]
3. Watts TJ. The pathogenesis of autism. *Clin Med Pathol.* 2008;1:99-103. [PubMed] [Google Scholar]
4. Lord C, Elsabbagh M, Baird G, Veenstra-Vanderweele J. Autism spectrum disorder. *Lancet.* 2018 Aug 11;392(10146):508-20. [PubMed] [Google Scholar]
5. Bölte S, Girdler S, Marschik PB. The contribution of environmental exposure to the etiology of autism spectrum disorder. *Cell Mol Life Sci.* 2019;76(7):1275-97. [PubMed] [Google Scholar]
6. Daud SN, Maria M, Shahbodin F, Ahmad I. Assistive technology for autism spectrum disorder: a review of literature. *Proceedings of the International MEDLIT Conference;* 2018 Mar. p. 1-7. [Google Scholar]
7. Schmitz C, Rezaie P. The neuropathology of autism: where do we stand? *Neuropathol Appl Neurobiol.* 2008 Feb;34(1):4-11. [PubMed] [Google Scholar]
8. Yenkovyan K, Grigoryan A, Fereshetyan K, Yepremyan D. Advances in understanding the pathophysiology of autism spectrum disorders. *Behav Brain Res.* 2017 Jul 28;331:92-101. [PubMed] [Google Scholar]
9. Johnson CP, Myers SM; American Academy of Pediatrics Council on Children with Disabilities. Identification and evaluation of children with autism spectrum disorders. *Pediatrics.* 2007 Nov;120(5):1183-215. [PubMed] [Google Scholar]
10. Lang R, Koegel LK, Ashbaugh K, Regester A, Ence W, Smith W. Physical exercise and individuals with autism spectrum disorders: a systematic review. *Res Autism Spectr Disord.* 2010 Oct 1;4(4):565-76. [Google Scholar]
11. Hattier MA, Matson JL, Macmillan K, Williams L. Stereotyped behaviors in children with autism spectrum disorders and atypical development as measured by the BPI-01. *Dev Neurorehabil.* 2013 Oct;16(5):291-300. [PubMed] [Google Scholar]
12. Oriel KN, George CL, Peckus R, Semon A. The effects of aerobic exercise on academic engagement in young children with an autism spectrum disorder. *Pediatr Phys Ther.* 2011;23(2):187-93. [PubMed] [Google Scholar]
13. Patel H, Alkhawam H, Madanieh R, Shah N, Kosmas CE, Vittorio TJ. Aerobic vs anaerobic exercise training effects on the cardiovascular system. *World J Cardiol.* 2017 Feb 26;9(2):134. [PubMed] [Google Scholar]
14. Dhaliwal KK, Orso CE, Richard C, Haqq AM, Zwaigenbaum L. Risk factors for unhealthy weight gain and obesity among children with an autism spectrum disorder. *Int J Mol Sci.* 2019 Jul 4;20(13):3285. [PubMed] [Google Scholar]
15. Best JR. Effects of physical activity on children's executive function: contributions of experimental research on aerobic exercise. *Dev Rev.* 2010;30(4):331-51. [PubMed] [Google Scholar]
16. Ferreira JP, Ghiarone T, Cabral Júnior CR, Furtado GE, Carvalho HM, Rodrigues AM, Toscano CV. Effects of physical exercise on the stereotyped behavior of children with autism spectrum disorders. *Medicina (Kaunas).* 2019 Oct;55(10):685. [PubMed] [Google Scholar]
17. Mays MN. Using antecedent aerobic exercise to decrease stereotypic and self-stimulatory behavior in children with autism [dissertation]. Georgia State University; 2013. [Google Scholar]
18. Neely L, Rispoli M, Gerow S, Ninci J. Effects of antecedent exercise on academic engagement and

- stereotypy during instruction. *Behav Modif.* 2015 Jan;39(1):98-116. [PubMed] [Google Scholar]
19. Young S, Furgal K. Exercise effects in individuals with autism spectrum disorder: a short review. *Autism Open Access.* 2016;6(3):1-2. [Google Scholar]
 20. Olin SS, McFadden BA, Golem DL, Pellegrino JK, Walker AJ, Sanders DJ, Arent SM. The effects of exercise dose on stereotypical behavior in children with autism. *Med Sci Sports Exerc.* 2017 May 1;49(5):983-90. [PubMed] [Google Scholar]
 21. Ferreira JP, Toscano CV, Rodrigues AM, Furtado GE, Barros MG, Wanderley RS, Carvalho HM. Effects of a Physical Exercise Program (PEP-Aut) on autistic children's stereotyped behavior, metabolic and physical activity profiles, physical fitness, and health-related quality of life: a study protocol. *Front Public Health.* 2018 Mar 2;6:47. [PubMed] [Google Scholar]
 22. Keerthna S, Manikumar M. Effectiveness of task-oriented aerobic exercise to evaluate the severity of autism in autism subjects with self-stimulatory behaviour. *Int J Creat Res Thought.* 2018;6(2):36-55.
 23. Adesokan A, Ogunfeyitimi EO, Obafemi KE, Adesokan TT. Effect of physical exercise on weight reduction of students. *ASEAN J Phys Educ Sport Sci.* 2023;2(2):117-22. [Google Scholar]
 24. Strofylla G, Charitou S, Asonitou K, Koutsouki D. Efficacy of 6-month adapted aerobic program on motor proficiency, BMI and cognitive abilities of students with autism spectrum disorder: three case reports. *Open J Soc Sci.* 2021 Sep;9(9):153-66. [Google Scholar]
 25. Cole DK. The effect of aerobic exercise on children with autism spectrum disorder: a systematic literature review [dissertation]. University of Central Florida; 2021. [Google Scholar]
 26. Tarr CW, Rineer-Hershey A, Larwin K. The effects of physical exercise on stereotypic behaviors in autism: small-n meta-analyses. *Focus Autism Other Dev Disabil.* 2020 Mar;35(1):26-35. [Google Scholar]