Scholar Publishing Group
International Journal of Health and Pharmaceutical Medicine
https://doi.org/10.38007/IJHPM.2022.030104
ISSN 2789-8393 Vol. 3, Issue 1: 36-47

Neurorehabilitation of Moderate-Intensity Aerobic Exercise for ATS Drug Dependent Compulsory Isolation Detoxification

Saade Metawa and Amaren Jaina

Mansoura University, Egypt

Keywords: ATS Research, Drug Dependence, Aerobic Exercise, Neurorehabilitation Training, Cognitive Function, Oxidative Stress

Abstract: ATS-type stimulants are highly neurotoxic and can cause significant cognitive impairment and psychotic symptoms. They are characterized by strong mental dependence and severe consequences for abuse. Therefore, it is of great significance to systematically understand the treatment method of ATS on human body, and to the treatment of ATS drugs dependent on compulsory isolation. This article focuses on the research of moderate-intensity aerobic exercise on the neurological rehabilitation of ATS-dependent drug dependence detoxification. This article uses a combination of quantitative and qualitative research to select eligible ATS abusers in a city's compulsory isolation detoxification center as the research object. Quantitative research uses the ATS questionnaire to survey new ATS abusers who meet the criteria. Qualitative research uses focus group interviews and case interviews, uses purposeful sampling, and uses semi-structured interview outlines as tools to collect and process data. The results of quantitative and qualitative research complement each other to verify and analyze and discuss together. The results of this paper show that the SOD index of people with ATS use disorder is less than that of healthy controls (14.78 ± 2.43 vs 15.98 ± 3.66, $p < 0.05$). The experimental results show that there are nerve damages in people who rely on ATS drugs for compulsory isolation and detoxification. The damages tend to continue to increase after withdrawal. Moderate-intensity aerobic exercise for 10 weeks can slow down the aggravation of nerve damages.

1. Introduction

Drug abuse is one of the most serious public health issues facing the world. In recent years, amphetamine type stimulants (ATS) have become the second largest illegal drug of abuse worldwide after cannabis. At present, China's drug abuse structure has undergone profound changes,

and the rapid spread of traditional drugs has been further curbed, while the proportion of synthetic drug abuse groups mainly based on methamphetamine and ketamine has exceeded that of heroin abuse groups. Drug abuse not only causes heavy mental and various burdens to individuals and families, but also brings great harm to society. With the rapid spread of synthetic drugs, suicide and self-mutilation caused by mental symptoms caused by drug abuse, hurt others, Extreme cases (events) such as drug driving, violent resistance to the law, and accidents and accidents have occurred from time to time.

It is currently known that amphetamine-type stimulants can cause oxidative stress damage and cognitive dysfunction to users, but there is still a lack of effective interventions for these injuries [1-2]. Therefore, this article evaluates the cognitive function of people with amphetamine-type stimulant use disorder, and uses moderate-intensity aerobic exercise to intervene in ATS drug dependent compulsory isolation drug abusers to observe changes in oxidative stress level and cognitive function before and after intervention , To provide a theoretical basis for the intervention of moderate-intensity aerobic exercise for amphetamine-type stimulant use disorder [3-4].

Xue X compared the efficacy of olanzapine and haloperidol in the treatment of acute psychiatric symptoms caused by amphetamine-type stimulants (ATS). He used the Zelen II design method for 4 weeks of open-label drug treatment. Use item 2 of the clinical overall impression scale to assess the time of onset. At the same time, a brief psychiatric rating scale (BPRS) was used at baseline and at weeks 1, 2, and 4 after treatment. In addition, adverse reactions during treatment were recorded. His experimental results showed that the onset time of the olanzapine group was significantly earlier than that of the haloperidol group. At 1 and 2 weeks of treatment, the BPRS score of the olanzapine group was significantly lower than that of the haloperidol group. There was no statistical difference in the overall effectiveness [5]. But his research period is short, and the conclusions he draws may deviate slightly from the actual situation. Li J introduced a tailor-made multi-scale program to predict the hydration free energy and solvation structure of ATS molecules by combining first-principles calculations and classical density functional theory. He proved that the multi-scale program works well on the training set with similar molecular characteristics, and it has a good consistency with the unused test set in training. Theoretical predictions can be used as a benchmark for missing experimental data. It is important to provide microscopic insights to manipulate the hydrophobicity of ATS compounds through chemical modification [6]. However, his actual verification is insufficient, and the research is still only one-sided analysis on the theoretical level. Alharbi studied cannabis and amphetamine-type stimulants because of their high prevalence, and will try to distinguish and compare their related psychotic characteristics. If the literature retrieved highlights substance-induced psychosis, especially those caused by stimulants / amphetamine / methamphetamine and cannabis / marijuana, schizophrenia-spectral disorder or schizophrenia, then it is included [7]. Although his search has led to many studies of a substance and its association with psychosis, his research refers to very few literatures that compare the substance's association. Potrikeeva O L believes that in terms of space and quantitative standards, drug use is considered an epidemic, and in terms of quality, it is regarded as a global impact on society and can be defined as community anesthesia. He introduced and analyzed various social rehabilitation methods, such as methods for forming a clear life motivation, theories and models for treating communities, behavior change, and multi-disciplinary teams as a form of rehabilitation process to control the socialization of drug users [8]. However, the method proposed by his research in practical application is insufficient in guiding thoughts, and cannot meet the practical guidance of neurorehabilitation.

Innovative point of this article: This study found that people with amphetamine-type stimulant use disorder have oxidative stress damage, and through the use of CogState tool to find objective evidence that the level of oxidative stress after withdrawal is related to their cognitive function This study intervened and explored the oxidative stress injury and cognitive dysfunction in people with

amphetamine-type stimulant use disorder. The function has no obvious improvement effect.

2. Hazards and Characteristics of Ats Drugs

2.1. Characteristics of Ats Use Obstacles

ATS dependence is a group of cognitive, behavioral and physiological symptoms. The result of self-treatment is withdrawal symptoms, increased tolerance and obsessive-compulsive disorder. The concept of ATS abuse is derived from ICD-10 classification. Abuse and dependence are hierarchical diagnosis. If ATS dependency standard is met, ATS abuse cannot be diagnosed [9-10].

The clinical characteristics of ATS dependence are relatively weak physical dependence and strong mental dependence. Physical dependence is physical dependence, mainly manifested in increased tolerance and withdrawal symptoms; mental dependence is psychological dependence, and ATS-type stimulants can induce a satisfying or euphoric sensation in users, driving them to seek this kind of Feeling and using drugs repeatedly shows a state of psychological craving [11-12]. Euphoria: After using ATS, you will soon appear energetic, energetic, and enhanced in ability to experience unspeakable pleasures, the so-called thirst of driving clouds or the conduction of body currents [13-14]. Amphetamine frustration period: After using ATS for several hours, users experience general fatigue, depression, burnout, and depression. The alternation of euphoria and positive and negative sensations during the depression period is one of the important reasons for mental dependence.

The acute pharmacological mechanism of ATS is mainly to stimulate the release of monoamine transmitters and increase the intersynaptic dopamine (DA). The long-term chronic pharmacological mechanism of ATS is complex, which can lead to changes at the molecular level, receptor, cell level and structural level. The basis of ATS's damage to the central nervous system is the toxicity to neurons. The main mechanisms are the release of dopamine (DA), glutamate-mediated excitotoxicity, oxidative stress, mitochondrial dysfunction and high fever. A large number of studies have focused on the effects of amphetamine on dopamine signal transduction and dopamine oxidation [15-16]. Under normal circumstances, dopaminergic neurons synthesize dopamine and store it in nerve ending vesicles [17]. VMAT22 transporters on the vesicles mediate the storage and release of dopamine to the synaptic space. The dopamine transporter DAT on the post-synaptic membrane mediates the weight of dopamine. Ingest to maintain dopamine balance. Methamphetamine acts to enter the cell through DAT and reverses its effect. Even if a large amount of DA in the cytoplasm flows into the synaptic space, at the same time, methamphetamine also acts with VMAT22, preventing DA from being stored in the vesicle and making the vesicle DA is released into the cytoplasm. As a result, DA in the cytoplasm and the DA in the cytoplasm are greatly increased, and DA is converted into active oxide by monoamine oxidase and self-oxidation, resulting in neurotoxicity. The release of large amounts of dopamine can excite dopaminergic nerves, resulting in drug effects such as excitement, euphoria, stereotyped behavior, and behavioral sensitivity [18]. Hyperactivity of dopamine may be related to psychiatric symptoms such as hallucinations and delusions. It may explain the clinical features that are prone to psychiatric symptoms when a large amount of ATS is abused (acute poisoning), and the psychiatric symptoms will be relieved quickly after stopping drug abuse [19-20]. In addition, methamphetamine also induces nerve excitotoxicity through glutamate and NMDA receptors[21-22].

2.2. Mental Disorders Caused by ATS

The study of the incidence of Amphetamine-Induced Psychosis due to the use of different research tools and definitions, and the inconsistency of the evaluation time point (lifetime

prevalence or current prevalence), results vary greatly, from 8% to 46 %. As many as 76% of people who suffer from methamphetamine abuse have mental symptoms [23]. Mental disorders caused by ATS can occur in the stage of acute poisoning and withdrawal, but more often in the stage of chronic high-dose drug abuse [24]. The average time from initiation of ATS to the onset of psychotic symptoms (latency period) is 5.2 years. The incubation period for abusers who inhale ATS is 1.7 years, while the incubation period for abusers who inject ATS is 4.4 years [25-26]. However, there are two points worthy of our attention: first, the psychotic symptoms caused by ATS are difficult to distinguish from the clinical manifestations of schizophrenia, which requires our attention in the clinic, and the diagnosis needs to be cautious; second, the body appears Abusers of discomfort or psychotic symptoms mostly know that these discomforts are caused by drug use, but the rate of seeking treatment is very low; third, compared with ATS abuse, ATS relies on a higher proportion of mental symptoms, when accompanied by mental symptoms, often It has an adverse effect on the treatment of substance abuse: Fourth, why do ATS users have a high proportion of illegal crimes (up to 38%)? Why do ATS abusers extend their hospitalization time? The reason is not clear. However, as a special behavioral effect of ATS-type stimulants, ATS-related mental and symptoms can be used as a breakthrough [27-28].

(1) Anxiety

Research on comorbidities of anxiety and ATS use is limited. The lifetime prevalence of anxiety disorder among ATS abusers is 25%. An Australian study of 301 ATS abusers found that 76% had severe anxiety symptoms and 33% had panic attacks after starting ATS. The lifetime prevalence of anxiety among ATS abusers is 50%, but it is not distinguished whether it is caused by ATS.

(2) Depression

Depression is closely related to the use of ATS. The lifetime incidence of depression is 64%, but it does not distinguish whether it is caused by ATS. Compared with the general population, people who abuse ATS show higher symptoms of depression and suicide. The serious symptoms of depression are related to the amount and frequency of ATS use. ATS abusers with severe depression are more likely to use ATS during withdrawal. According to most of the above studies, increased use of ATS will cause emotional deterioration, and maintaining withdrawal status will reduce depression or relieve symptoms. The symptoms of depression in ATS abusers can lead to gender differences, and female ATS dependents have more suicide attempts than men during their lifetimes, and women have a higher rate of depression than men.

2.3. Nerve Repair Theory

After stroke, even if the patient does not undergo rehabilitation treatment, there will be some muscle strength, but the recovery of muscle strength of each muscle is significantly different. The fundamental factor causing this is: the corresponding central nerve injury after cerebrovascular accident, It also affects the peripheral nervous system. After the operation, the peripheral nervous system can be reconstructed but the central nerve cannot be regenerated. The damaged nerve center will be compensated by other regions of the brain and guide the peripheral nervous system to rebuild, due to internal and external factors. The peripheral nervous system may be reconstructed disorderly, and the connection between the motor nerve and muscle cells will also be wrong, which eventually leads to abnormal recovery of muscle strength and abnormal muscle tone. This shows that the rehabilitation of the nervous system plays a vital role in the rehabilitation process of hemiplegia. Therefore, searching for effective rehabilitation therapy in the theory of neurorestoratology is one of the key points in the study of rehabilitation methods for hemiplegia. There are many contents of neurorestoratology, mainly including nerve rehabilitation, nerve remodeling, nerve regeneration and other nerve repair forms:

(1) Nerve regeneration: Nerve regeneration is mainly the regeneration of axons of neurons, including axon growth, extension and engagement with target cells. During the process of nerve regeneration, it can be affected by the outside world, including drugs and external stimuli.

(2) Nerve remodeling: Nerve remodeling is an adaptive process of neural structure and function. Specifically, it is a process in which a neural network changes locally in order to adapt to its function.

(3) Neurorehabilitation: Neurorehabilitation is a process of neural circuit reconstruction and compensation. This process can be learned. Strengthen the way of repeated learning to complete.

2.4. Intervention Effect of Aerobic Exercise on Oxidative Stress

Oxidative stress is an important mechanism of neurotoxicity of amphetamine-type stimulants. Animal studies and clinical studies have found that the use of amphetamine-type stimulants can cause oxidative stress. METH-dependent rats' total antioxidative capacity (T-AOC) decreases and MDA increases. Similarly, there is oxidative stress in the peripheral blood of METH abusers, which is mainly manifested by the overall antioxidant capacity, the decrease of antioxidant enzymes and the increase of lipid peroxides. At present, researchers believe that improving the oxidative stress caused by amphetamine-type stimulants can reduce their neurotoxicity and help the recovery of cognitive function, mood, and sleep after withdrawal of amphetamine-type stimulants. Antioxidants and oxygen free radical scavengers have been shown to reduce oxidative stress caused by amphetamine-type stimulants. In addition, aerobic exercise can also play a role in reducing oxidative stress.

There have been many studies on exercise and antioxidants. Exercise can affect the level of oxidative stress in the body, mainly related to its form. During acute and vigorous exercise, the body's ability to scavenge free radicals is insufficient to balance the free radicals produced during exercise stress, resulting in oxidative attack and anti-oxidation imbalance, resulting in oxidative stress damage. And regular aerobic exercise will enhance the body's antioxidant capacity, reduce oxidative stress damage, can promote human health and prolong life. Studies have shown that aerobic exercise can alleviate oxidative stress on a variety of physical diseases, such as metabolic diseases, tumors, cardiovascular diseases, etc., as well as menopausal women. In addition, aerobic exercise plays a role in reducing oxidative stress in both Alzheimer disease (AD) and animal models dependent on amphetamine-type stimulants.

Previous studies have shown that exercise can also produce long-term protective effects on addicts by affecting the neurotransmitter system, synaptic plasticity, signaling molecules, nerve regeneration, and brain-derived neurotrophic factor (BDNF).Thereby reducing symptoms, reducing negative emotions such as anxiety or depression, reducing relapse, and treating drug dependence. In addition, in the preliminary study carried out in cooperation with the Shanghai Institute of Physical Education, this research group also found that aerobic exercise is effective for sleep, craving, and cognitive function in people with amphetamine-type stimulant use disorders.

3. Experiment of Nerve Rehabilitation of Moderate-Intensity Aerobic Exercise on Drug Addicts

3.1. Research Object

Taking 60 male compulsory detoxification personnel in a compulsory isolation detoxification center of a city as the experimental object, the effects of moderate-intensity aerobic exercise training on the physical form and function of male compulsory detoxification personnel were taken as the research object. All the subjects are in good health and can exercise. The selection criteria of

the test subjects are:

(1) People who have a history of drug addiction and are addicted;
(2) Complete the physical detoxification and enter the physical rehabilitation stage;
(3) Sports training can be carried out after being certified by the hospital;
(4) The subjects are all willing to participate in this activity;

3.2. Experimental Design

Communicate with the police officer responsible for the rehabilitation of drug addicts in drug addiction centers to explain the purpose of this experiment, and conduct 10-week moderate-intensity aerobic exercise training for eligible drug addicts in drug addiction centers to extract traditional drugs.There are 30 persons each of the two types of new drugs and a total of 60 persons undergoing moderate-intensity aerobic exercise training.

Arrange drug treatment personnel for 10 weeks of moderate-intensity aerobic exercise training, seven days a week, medium-intensity aerobic exercise exercises are mainly heart rehabilitation exercises and heart rehabilitation exercises, etc. Intensity is controlled by heart rate, and the heart rate of drug addicts during exercise is controlled at 55% to 77% of their maximum heart rate, which is about 110 to 150 beats / min. Exercise-based.

On the basis of consulting the relevant literature, the relevant test indicators were designed in conjunction with the physiological characteristics of the detoxification personnel. By contacting the person in charge of the detoxification center, the test equipment was delivered to the detoxification center. All the testing work was completed in the detoxification center. All the above indicators are tested before and after the intensity weekly aerobic exercise training.

3.3. Data Statistics

All data in this study were analyzed by SPSS19.0. The statistical test was a two-sided test. The level of significance was defined at 0.05. If $p < 0.05$, the statistically significant difference was considered. Statistical results are expressed as mean ± standard deviation ($x \pm SD$). Chi-square test is used for the count data. When the measurement data conforms to the normal distribution, the paired T test is used for the comparison within the group, and the independent sample T test is used for the comparison between the groups; when the normal distribution is not met, the two independent samples and two are used in the non-parametric test relevant sample inspection.

4. Discussion on Neurorehabilitation Experiments of Drug Addicts

4.1. Comparative Analysis of Oxidative Stress Levels in People with Ats Use Disorder and Healthy Controls

As shown in Table 1 and Figure 1, the level of oxidative stress at baseline in people with ATS use disorders was compared with healthy controls. At baseline, there was no significant difference ($P > 0.05$) in the total antioxidant capacity (T-AOC) of people with ATS use disorder compared with healthy controls, while superoxide dismutase (SOD), catalase (CAT), and malondi There is a significant difference between aldehyde (MDA). Among them, the SOD index of people with ATS use disorder was less than that of healthy controls (14.78 ± 2.43 vs 15.98 ± 3.66, $p < 0.05$); the CAT index was greater than that of healthy controls (0.055 ± 0.021 vs 0.028 ± 0.019, $p < 0.05$); the MDA index was greater than that of healthy controls (7.28 ± 4.91 vs 4.41 ± 2.34, $p < 0.05$).

Table 1. Comparison of oxidative stress levels between people with ATS use disorder and healthy controls at baseline ($\bar{x} \pm s$)

Item	People with ATS disabilities	Healthy control	F	P
T-AOC(U/ml)	7.93±4.67	8.42±5.33	0.206	0.653
SOD(U/ml)	14.81±2.41	15.98±3.66	4.021	0.047*
CAT(U/ml)	0.055±0.021	0.028±0.019	44.033	0.000**
MDA(nmol/ml)	7.28±4.91	4.41±2.34	10.755	0.002**

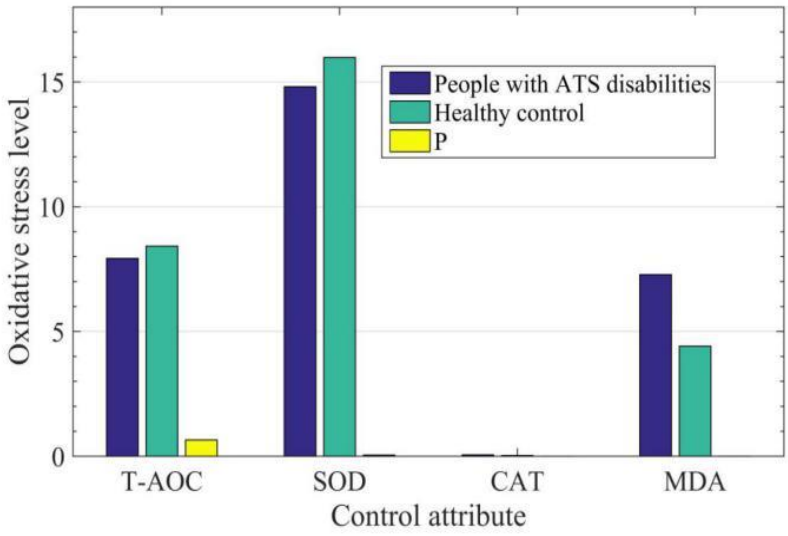

Figure 1. Comparison of oxidative stress levels between people with ATS use disorder and healthy controls

4.2. Correlation Analysis of Oxidative Stress Index and Cogstate Score for People with Ats Use Disorder

In order to understand the relationship between oxidative stress and cognitive function at baseline, a correlation analysis of the two indicators was carried out. The results showed that oxidative stress indicators were related to cognitive function. As shown in Figures 2 and 3, MDA and ISL (Verbal learning and memory, the higher the score, the better the score is negatively correlated (r =-0.269, p = 0.032), and the score of MDA and CPAL (spatial working memory, the lower the score is better) is positively correlated (r = 0.321 , p = 0.010).

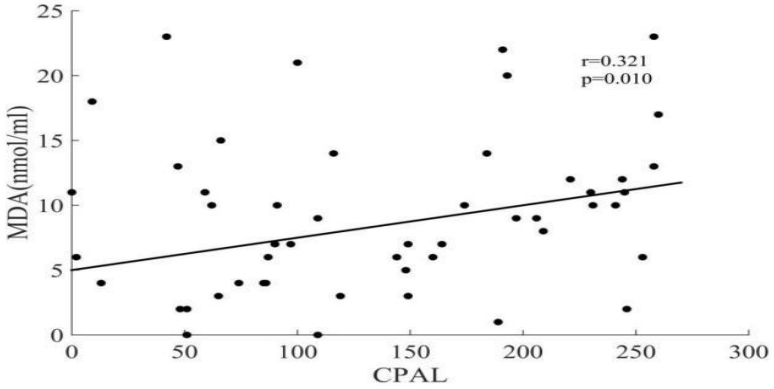

Figure 2. Correlation between MDA and CPAL score

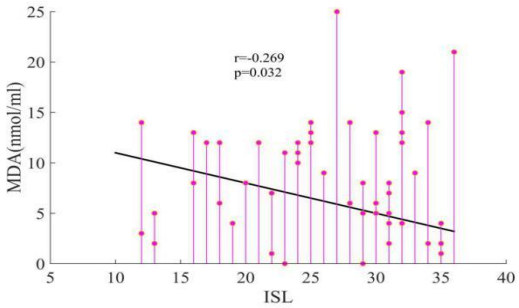

Figure 3. Correlation between MDA and ISL scores

As shown in Table 2, using the grip strength body mass index in the general data as a covariate, repeated measures analysis of variance was performed on the changes in the oxidative stress levels in the exercise and non-exercise groups. T-AOC: the interaction of time × group in exercise group and non-exercise group is not significant (p> 0.05), the main effect of group is not significant (p> 0.05), and the main effect of time is significant (p <0.05), T- AOC gradually decreases with time. SOD: The interaction of time × group in exercise group and non-exercise group is not significant (p> 0.05), the main effect of group is not significant (p> 0.05), and the main effect of time is significant (p <0.05), SOD over time, the change gradually declined. CAT: The interaction between time group and exercise group was significant (p <0.05), the main effect of time was significant (p <0.05), and the main effect of group was not significant (p> 0.05). MDA: The interaction between time group and exercise group was significant (p <0.05), the main effect of time was significant (p <0.05), and the main effect of group was significant (p <0.05).

Table 2. Oxidative stress levels at various time points in the exercise group and non-exercise group and the results of the interaction between time and group ($\bar{x} \pm s$)

Item	Dimension point	Exercise group	Non-sports group	F	P(time*group)
SOD	Datum line	15.14±2.13	14.41±2.73	0.446	0.643
	6w	13.33±3.25	12.83±3.41		
	12w	12.87±3.35	12.98±3.48		
CAT	Datum line	0.054±0.02	0.054±0.02	3.187	0.044*
	6w	0.051±0.03	0.045±0.03		
	12w	0.051±0.02	0.037±0.03		
MDA	Datum line	7.33±5.27	7.17±4.67	3.447	0.035*
	6w	8.48±4.47	9.55±5.93		
	12w	9.42±2.14	13.75±6.14		

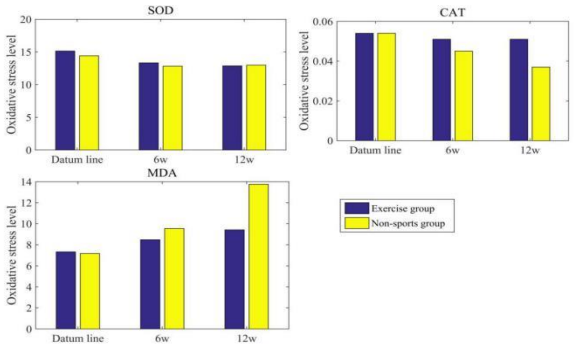

Figure 4. Oxidative stress levels at various time points in the exercise group and non-exercise group and the results of the interaction between time and group

As shown in Table 2 and Figure 4, due to the significant interaction of CAT and MDA time × group, a simple effect analysis was conducted to compare the differences between different groups at the same time point and the same group at different time points On the difference. CAT: fixed group, the analysis of the intervention effect with time as the independent variable showed that the CAT concentration of the non-exercise group gradually decreased with time. At 10 weeks, the CAT concentration was less than the baseline, and the CAT concentration of the exercise group did not change significantly with time; fixed time, Analysis of the intervention effect with group as independent variable showed that there was no significant difference in CAT concentration between the two groups at baseline and at week 5, and the CAT concentration in exercise group was higher than that in non-exercise group at week 10 of exercise. MDA: fixed group, analysis of intervention effect with time as independent variable showed that the MDA concentration in the non-exercise group gradually increased with time, the MDA concentration was greater than the baseline level at 10 weeks, and the MDA concentration in the exercise group also gradually increased with time ,and the MDA concentration was greater than the baseline level at 10 weeks; at a fixed time, the analysis of the intervention effect with the group as the independent variable showed that there was no significant difference in the MDA concentration between the two groups at baseline and 5 weeks, and the MDA concentration in the exercise group at 10 weeks of exercise Less than non-sports group.

4.3. Analysis of the Effect of Moderate-Intensity Aerobic Exercise Training on Blood Routine of Compulsory Detoxification Personnel

Before the training, an independent sample T test was performed on the traditional drug detoxification group and the new drug detoxification group. As shown in Table 3, there was no significant difference in the blood routine indicators of the traditional drug detoxification group and the new drug detoxification group before training ($P > 0.05$). By performing paired T test on the traditional drug detoxification group and the new drug detoxification group, after 10 weeks of training, the detoxification personnel had white blood cells and lymphocytes compared with those before the training. Percentage, percentage of neutrophils, absolute value of neutrophils, red blood cells and platelets are significantly different ($P <0.05$), through independent sample T test for traditional drug detoxification group and new drug detoxification group, detoxification personnel after 10 After weekly exercise training, there was no significant difference in blood routine indexes between the traditional drug detoxification group and the new drug detoxification group ($P> 0.05$).

Table 3. Comparison of blood routine before and after training in traditional drug treatment group and new drug treatment group

Index	Traditional Drug Detoxification Group		New Drug Detoxification Group	
	Before training	After training	Before training	After training
White blood cells(*10^9/L)	7.12±1.46	6.76±1.82*	7.67±1.64	5.99±1.34#
Lymphocyte percentage(%)	30.26±6.07	32.63±7.77*	29.05±7.81	34.99±6.31#
Neutrophil percentage(%)	59.28±6.35	3357.03±7.83*	60.89±6.10	55.23±6.57#
Eosinophil percentage(%)	2.24±1.36	2.59±1.83	1.75±1.89	2.52±1.55
Percent basophil(%)	0.47±0.15	0.43±0.17	0.43±0.17	0.31±0.31
Absolute value of lymphocytes(*10^9/L)	2.77±3.84	2.23±0.48	2.08±0.42	2.41±0.53

The indexes selected for the test of immune function in this paper are white blood cells, lymphocyte percentage, neutrophil percentage, eosinophil percentage, basophil percentage and absolute lymphocyte value. Compared with before training, there were significant differences in the

white blood cell, lymphocyte percentage, neutrophil percentage, neutrophil absolute value, red blood cell and platelet count between the traditional drug treatment group and the new drug treatment group (P <0.05), The percentage of white blood cells, lymphocytes, percentage of neutrophils, and absolute value of neutrophils are the main indicators of immune function, red blood cells are the main indicators of blood oxygen transport capacity, and platelet count is the main indicator of blood coagulation function. The training has a significant effect on improving the immune function, blood oxygen transport capacity and blood coagulation function of the traditional drug detoxification group and the new drug detoxification group. Gym training is mainly based on small and medium-intensity aerobic training, which improves the content of platelet count and helps improve the blood coagulation function of drug addicts.

5. Conclusion

This study conducted a 10-week follow-up of the cognitive function of people with amphetamine-type stimulant use disorder, and found that the exercise group and the non-exercise group only improved in GML, and the remaining cognitive items did not improve significantly. Improving the cognitive function of people with impaired use of amphetamine-type stimulants can help disease recovery and reduce relapse, so it is particularly important to find effective interventions. In this study, through the 10-week moderate-intensity aerobic exercise for people with amphetamine-type stimulant use disorder, it was found that the cognitive function of addicts has not been significantly improved, which may be related to the setting of the intervention time in this study.

Moderate-intensity aerobic exercise training can significantly reduce the fat content, fat rate and visceral fat levels of traditional drug addiction workers and new drug addiction workers, increase muscle content and balance body composition. Moderate-intensity aerobic exercise training can significantly improve the cardiovascular function, glucose and lipid metabolism levels and blood metabolic function of traditional drug detoxification workers and new drug detoxification workers, but there is no significant difference between the groups. Moderate-intensity aerobic exercise can effectively reduce the anxiety and depression levels of patients with ATS drug dependence and improve negative emotions. Compared with drug therapy, moderate-intensity aerobic exercise can achieve the effect of drugs to improve anxiety and depression.

The study of the clinical characteristics of mental disorders caused by ATS is for stimulant drug addiction and withdrawal treatment. Its clinical characteristics are related to the severity of addiction, depression, anxiety and stress. The more dangerous the degree of mental disorder caused by ATS, the higher the severity of addiction, the greater the degree of depression, the greater the degree of anxiety, and the more significant the stress situation. People with amphetamine-type stimulant use disorder have oxidative stress damage, and the damage tends to increase after withdrawal. Moderate-intensity aerobic exercise for 10 weeks can slow down the trend of nerve damage caused by drug dependence.

Funding

This article is not supported by any foundation.

Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

References

[1] Crevelin, E.J., Salami, F.H., Alves, M.N.R., et al.(2016) Direct Analysis of Amphetamine Stimulants in a Whole Urine Sample by Atmospheric Solids Analysis Probe Tandem Mass Spectrometry. Journal of The American Society for Mass Spectrometry, 27(5):944-947. https://doi.org/10.1007/s13361-016-1349-5

[2] Wright. J., Kenneally, M.E., Edwards, J.W., et al. (2015) Adverse Health Effects Associated with Living in a Former Methamphetamine Drug Laboratory - Victoria, Australia, MMWR. Morbidity and mortality weekly report, 2017, 65(52):1470-1473. https://doi.org/10.15585/mmwr.mm6552a3

[3] Singh, D., Mamat, R.B., Narayanan, S., et al. (2019) Prevalence of Amphetamine-Type Stimulants (ATS) use among clients in primary and private Methadone Maintenance Treatment (MMT) program in Kuantan, Malaysia . Journal of Substance Use, 24(4):1-6. https://doi.org/10.1080/14659891.2019.1642409

[4] Song, A., Yang, J., (2018) Determination of Six Amphetamine-Type Stimulants in Urine Samples Using Electro-Enhanced Single Drop Microextraction-Gas Chromatography. Se pu = Chinese journal of chromatography, Zhongguo hua xue hui, 36(8): 803. https://doi.org/10.3724/SP.J.1123.2018.03021

[5] Xue, X., Song, Y., Yu, X., et al. (2018) Olanzapine and Haloperidol for The Treatment of Acute Symptoms of Mental Disorders Induced by Amphetamine-Type Stimulants: A randomized controlled trial. Medicine, 97(8): e9786. https://doi.org/10.1097/MD.0000000000009786

[6] Li, J., Fu, J., Huang, X., et al. (2016) Predicting Hydration Free Energies of Amphetamine-Type Stimulants with a Customized Molecular Model. Journal of Physics: Condensed Matter, 28(34): 344001. https://doi.org/10.1088/0953-8984/28/34/344001

[7] Alharbi, F.F., El-Guebaly, N. Cannabis and Amphetamine-type Stimulant-induced Psychoses. Addictive Disorders & Their Treatment, 2016, 15(4): 190-200. https://doi.org/10.1097/ADT.0000000000000086

[8] Potrikeeva, O.L., Suprun, N.G., Ispulova, S.N., et al. (2017) Social Rehabilitation of Drug Addicts in Russia: Problems of Organization at the Current Stage and Prospects for Further Development. Man in India, 97(11): 489-500.

[9] Aliakbar, P., Bin, H.A.H.J., Tajularipin, S., et al. (2016) Effectiveness of Cognitive-behavioral Therapy in the Treatment of Iranian Male Drug Addicts at a State Rehabilitation Center. Global Journal of Health Science, 9(1): 94-. https://doi.org/10.5539/gjhs.v9n1p94

[10] Guerreiro, M.M. (2016) Attention Deficit-Hyperactivity Disorder in Patients in Rehabilitation of Drug Addiction. Arquivos de Neuro-Psiquiatria, 74(12): 951-952. https://doi.org/10.1590/0004-282x20160182

[11] Choi, G.H., Ko, H., Pedrycz, W., Singh, A.K., & Pan, S.B. (2020). Recognition System Using Fusion Normalization Based on Morphological Features of Post-Exercise Ecg for Intelligent Biometrics. Sensors, 20(24), 7130. https://doi.org/10.3390/s20247130

[12] Qin, Q., Yang, X., Zhang, R., Liu, M., and Ma, Y. (2022). An Application of Deep Belief Networks in Early Warning for Cerebrovascular Disease Risk. Journal of Organizational and End User Computing (forthcoming). https://doi.org/10.4018/JOEUC.287574

[13] Baringbing, A.T.D.P., Wimardhani, Y. (2020) Oral Cancer Awareness of Recovering Drug Addicts in the National Narcotics Board Drug Rehabilitation Center in The Republic of Indonesia. Open Journal of Stomatology, 72(5): 228-233.

[14] Jamshidi, F., Nazari, I., Malayeri, H.T., et al. (2016) Pattern of Drug Abuse in Addicts Self-Referred Drug Rehabilitation Centers in Khuzestan Province-Iran, 2014-2015. Archiwum medycyny sadowej i kryminologii, 66(1): 1-12. https://doi.org/10.5114/amsik.2016.62330

[15] Heidari, M., Ghodusi, M., Akbari, F.A., et al. (2018) Self-Esteem and Locus of Control in the Initial and Final Stages of Drug Withdrawal among Addicts Attending Rehabilitation Centers. Rawal Medical Journal, 43(2): 309-313. https://doi.org/10.1097/ADT.0000000000000128

[16] Camargo, C.H.F., Dornelles, Tarcísio Fanha, Barszcz, K., et al. (2016) Attention Deficit Hyperactivity Disorder and Drug Addiction Rehabilitation Patients. Arquivos De Neuro Psiquiatria, 74(12): 1003-1007. https://doi.org/10.1590/0004-282x20160163

[17] Ngassam, R.G.N., Ung, L., Ologeanu-Taddei, R., Lartigau, J., Demoly, P., Bourdon, I., Molinari, N., and Chiriac, A.M. (2022). An Action Design Research to Facilitate the Adoption of Personal Health Records: The Case of Digital Allergy Card. Journal of Organizational and End User Computing(forthcoming). https://doi.org/10.4018/JOEUC.288551

[18] Bertolazzi, A., Zanier, M.L. (2018) The Discretionary Treatment of Drug Addiction in Prison. Salute E Societa, 17(1): 59-72. https://doi.org/10.3280/SES2018-001005

[19] Azmi, A.A., Hussin, H., Ishak, S.I.D., et al. (2018) Drug Addicts: Psychosocial Factor Contributing to Relapse. MATEC Web of Conferences, 150(6): 05097. https://doi.org/10.1051/matecconf/201815005097

[20] Arora, P.C., Ragi, K.G.S., Arora, A., et al. (2019) Oral Health Behavior and Treatment Needs among Drug Addicts and Controls in Amritsar District: A Case-controlled Study. Nervenhlkunde, 10(02): 201-206. https://doi.org/10.4103/jnrp.jnrp_309_18

[21] Zhen-Song G., Ze-Hua C., Ling-Na L., et al. (2016) Rehabilitation Effect of Methadone Maintenance Combined with Cognitive-Behavioral Therapy and Family Synchronization Health Education for Drug Addicts. Journal of Community Medicine, 50(15): 9019-9026.

[22] Salmeh, K., Louni, A.S., Vahid, A. (2018) Dental and Oral Health Status of an Iranian Population of Drug Abusers: A Comparative Study. Tropical Journal of Pharmaceutical Research, 17(3):559-. https://doi.org/10.4314/tjpr.v17i3.24

[23] Abedallah Zaid Abualkishik, Sundus Naji AL-Aziz, (2022) The Regulation and Influence of Physical Exercise on Human Body's Neutrosophic Set, Respiratory System and Nervous System, International Journal of Neutrosophic Science, Vol. 18, No. 3, pp: 111-124 (Doi : https://doi.org/10.54216/IJNS.1803010)

[24] Fu. X., Chen, K., Liao, X., et al. (2017) Case Report: Surgical Removal of a Migrated Needle in Right Ventricle of an Intravenous Drug User. Substance Abuse Treatment Prevention & Policy, 12(1): 51. https://doi.org/10.1186/s13011-017-0134-1

[25] Oscar Terán-Mendoza, Sira-Ramos D., Jesús Guerrero-Alcedo, et al. (2016) Frontal Symptoms, Self-Perceived Stress, and Subjective Memory Complaints in Substance Abusers. Rev neurol, 62(7): 296-302. https://doi.org/10.33588/rn.6207.2015298

[26] Lebedev, M.A., Nicolelis, M.A.L., (2017) Brain-Machine Interfaces: From Basic Science to Neuroprostheses and Neurorehabilitation. Physiological Reviews, 97(2): 767-837. https://doi.org/10.1152/physrev.00027.2016

[27] Carrico, A.W., Nil, E., Sophal, C., et al. (2016) Behavioral Interventions for Cambodian Female Entertainment and Sex Workers Who Use Amphetamine-Type Stimulants. Journal of Behavioral Medicine, 39(3): 502-510. https://doi.org/10.1007/s10865-016-9713-2

[28] Wang, Y., Yan, K.J., Fan, C.X., et al. (2019) Altered Functional Connectivity of the Nucleus Accumbens Subdivisions in Amphetamine-Type Stimulant Abusers: A Resting-State Fmri Study. Bmc Neuroscience, 20(1): 66. https://doi.org/10.1186/s12868-019-0548-y