

EFFECTIVENESS OF AEROBIC AND COGNITIVE TRAINING ON COGNITION, ANXIETY AND STRESS LEVEL AMONG HOSTEL STUDENTS

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ABSTRACT

BACKGROUND: Hostel environment is different from home environment, as they are facing many personal and interpersonal problems such as their relationship with other inmates and staffs, time management and adjustment in hostel environment and suffering with more stress and anxiety.

AIM: To find out the efficacy of aerobic and cognition training is increasing cognition along with reducing anxiety and stress among Hostel students.

METHODOLOGY: Totally 50 hostel students under selection criteria aged between 18-23 and randomly allocated equally into experimental group (Cognition and aerobic training) and control group (Aerobic training). The outcome tools Cognition Trail making test, State - trait Anxiety Inventory and Perceived Stress scale Questionnaire are measured before and after the treatment.

RESULTS: The result of the study shows that Group A Cognition and aerobic training has significant improvement in cognition and reducing stress and anxiety level ($p < 0.0001$) than Group B those who receive Aerobic training.

CONCLUSION: This study concluded that the experimental group received both cognition and aerobic training is found to be effective than the control group received aerobic training.

KEYWORDS: Aerobic training, Anxiety, Cognition training, Lumbosity, Stress.

INTRODUCTION

Hostel is a memorable moment of student life in their academic period with new experience where they will stay far away from their home. They will be surrounded with group of students come together for the learning purpose. This helps for hostel students to live independently, gain adaptability with other students, share things and able to find the solutions for the problems etc.,

(1).

The newly joining hostel students are common to develop stress and anxiety due to home sickness, dissatisfaction with hostel facilities, new relationships with others, financial problems, finds difficult to follow rules and regulations of hostel, academic and institutional problems etc. There are many articles reported that Internet has become popular among hostel students and spending more times with Facebook, WhatsApp, Instagram, and Twitter of social media affects the mental health like dissatisfaction, increase in risk of addiction, cyberbullying involvement, loneliness, fear of missing reducing cognition level and increases anxiety and stress among hostel students with 78% women reported psychiatric illness in comparison to 33% of men.

Stress is defined as disruption of the body's homeostatic in response to real or perceived threat or challenge. It is due to response of autonomic nervous and endocrine systems by producing hormones like epinephrine, norepinephrine and cortisol which increases physiological stress level. As it starts to elevate bad mood, affect behaviour and outlook of the person, uneven sleeping and eating habits leads to affect the mental health of the hostel students ⁽⁴⁾.

Anxiety is a condition characterized by an excessive and persistent sense of unpleasant feeling with physical manifestation, linked to fear and affects cognitive, affective, physiological and behavioural response system. The mediators in CNS are norepinephrine, serotonin, dopamine and GABA and Amygdala and limbic system plays an important role during anxiety. There are many health problems and major increase in psychological morbidity among hostel students ^(2,4). There are many interventions to improve the cognition and reduce stress and anxiety but in this study hostel students are going to train up with the Cognition and Aerobic training ⁽⁷⁾.

Cognitive training is boosting up of cognitive process and function like flexibility, memory, attention, speed and problem solving ⁽⁶⁾. Brain training application (Lumbosity) is a web-based "mental workout" looks like interactive video games on computer screens. There are various articles proven that positive effects on brain training application developing cognition by facilitating hippocampus and cortex area and leads to stimulation of brain derived growth factor (BDNF) and apolipoprotein E (APOE) levels which helps for developing cognition and has important role in improving memory and learning ⁽⁸⁾.

Aerobic exercise is an non-pharmacological therapy with various benefits of physical and mental health with maintaining of cardiorespiratory fitness, reduction in blood pressure and body fat, reducing negative emotional status like stress, anxiety, depression with no side effects ^(5,6). Aerobic training is associated with cortical thickness in frontal, temporal and cingulate cortex and thereby improving cognition in college students. This helps in reducing stress hormones like adrenaline and cortisol and stimulation of endorphins as mood elevators to reduce stress and anxiety ⁽¹⁰⁾. Therefore, aerobic exercise is considered as good intervention with more benefits in lower cost. The review of an article investigated about internet addiction with meta cognition among university students concluded that internet addiction has high impact on affecting the cognition level of students.

So, the aim of my study to identify the effectiveness of aerobic and Cognitive training on Cognition, anxiety and stress level among hostel students.

OBJECTIVES:

To identify the effectiveness of Aerobic and Cognitive training on Cognition, Anxiety and Stress level among Hostel Students.

HYPOTHESIS:**NULL HYPOTHESIS:**

It is hypothesized that there is no significant difference in Aerobic and Cognitive training on Cognition, Anxiety and Stress level among Hostel Students.

ALTERNATE HYPOTHESIS:

It is hypothesized that there is a significant difference in Aerobic and Cognitive training on Cognition, Anxiety and Stress level among Hostel Students.

MATERIALS AND METHODOLOGY

This is Pre and Post Experimental study was conducted on hostel students of private medical college hostels at Puducherry, which was conducted from November 2023 to February 2024. Totally 50 members were participated in this study of Group A- 25(Aerobic and cognitive training) & Group B- 25(Aerobic training) with Simple Random sampling. This study was executed after the approval from the Institute Ethical Committee.

All hostel Students those who enrolled in the study of Physiotherapy, Nursing, Bachelor of Medicine and Bachelor of Surgery and allied health students only those who interesting in participation with both male and female first and second year undergraduate hostel students with age between 18-23 years are included in this study.

Hostel students with alcohol, smoking habits, history of psychiatric illness and drug abuse, polycystic ovarian syndrome and Thyroid disease under medications, any recent surgeries, cardiovascular diseases are excluded from the study.

The Outcome measures used in this study are Cognition Trail Making Test – B (CTMT – B), State - trait Anxiety Inventory and Perceived Stress scale Questionnaire.

VARIABLES

INDEPENDENT VARIABLE: Age, Gender, Cognition and Aerobic training.

DEPENDANT VARIABLE: Cognitive Trail Making Test B, State Trait Anxiety Questionnaire, Perceived Stress Scale Questionnaire.

STUDY PROCEDURE:

Group A: (Aerobic and Cognitive training)

Aerobic training performed by walking, Jogging and Running for 30 minutes, five sessions in a week, totally for four weeks. Students are instructed to perform warm-up and relaxation stretching, which includes stretches of neck, arms, waist, wrists, leg muscles and ankle at the beginning and end of the session for five minutes.

Cognitive training is performed by lumbosity application from www.lumbosity.com which helps to develop cognitive domains like attention, thinking, memory, processing speed and problem solving. These are some of the examples of cognition exercises from Lumosity are:

Speed Match is computer-based game used to improve mainly working memory and processing speed which consists of series of colours, shapes moving rapidly (red square followed by blue triangle). The participant should indicate quickly when the previous shape matches the current shape.

Memory Matrix is computer-based game to develop visual spatial memory which it consists of brown blocks in grid of matrix and there is highlight of blue blocks for two seconds. The participant should memorize the highlighted blue block and to click it in the brown matrix. The number of targeted blocks will be more when the level is harder.

Playing Koi is also a computer-based game to develop attention by multiple objects tracking task. There are number of identical moving of fish in the pond and the participant should target the koi and to feed them with food pellet. The game gets harder when the number of koi and the speed of move gets increases.

Raindrops is an computer based game helps for problem solving which it consists of various number of rain drops, each consists of arithmetical mathematical problem questions like addition, subtraction, multiplication and division (eg; $8 - 4 = ?$). The raindrops with arithmetical questions start to fall from top and drop to hit on the ground. The participant should mentally solve the problem and should enter the answer using keyboard, before the raindrop hit into the ground. The level of the game gets harder when the number of rain drops and speed of raindrops increases.

Participants will complete cognitive training on computers by logging into the website. Duration of training session is 20 minutes a day, four session per week, totally for four weeks.

Group B: (Aerobic training)

Aerobic training performed by walking, Jogging and Running for 30 minutes, five sessions in a week, totally for four weeks. Students are instructed to perform warm-up and relaxation stretching, which includes stretches of neck, arms, wrists, waist, leg muscles and ankle at the beginning and end of the session for five minutes.

DATA ANALYSIS:

TABLE 1: BETWEEN THE GROUP ANALYSIS OF COGNITION TRIAL MAKING TEST OF GROUP A & B:

GROUP	MEAN	SD	t - VALUE	P - VALUE
GROUP A	67.16	4.04	3.4082	<0.001
GROUP B	71.12	4.18		

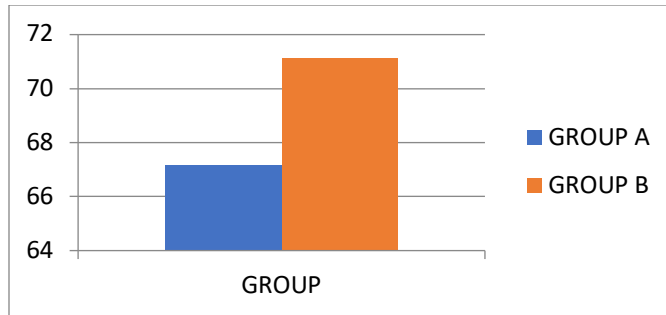


FIGURE 1: GRAPHICAL REPRESENTATION OF BETWEEN THE GROUP ANALYSIS OF COGNITION TRIAL MAKING TEST.

TABLE 2: BETWEEN THE GROUP ANALYSIS OF STATE TRAIT ANXIETY INVENTORY OF GROUP A & B:

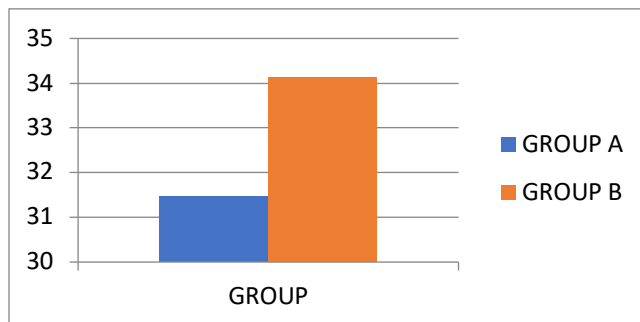


FIGURE 2: GRAPHICAL REPRESENTATION OF BETWEEN THE GROUP ANALYSIS OF STATE TRAIT ANXIETY INVENTORY.

GROUP	MEAN	SD	t - VALUE	p - VALUE
GROUP A	31.48	4.32	2.2117	<0.001
GROUP B	34.12	4.12		

TABLE 3: BETWEEN THE GROUP ANALYSIS OF PERCEIVED STRESS SCALE OF GROUP A

GROUP	MEAN	SD	t - VALUE	P - VALUE
GROUP A	17.36	3.78	1.2207	<0.001
GROUP B	18.72	4.09		

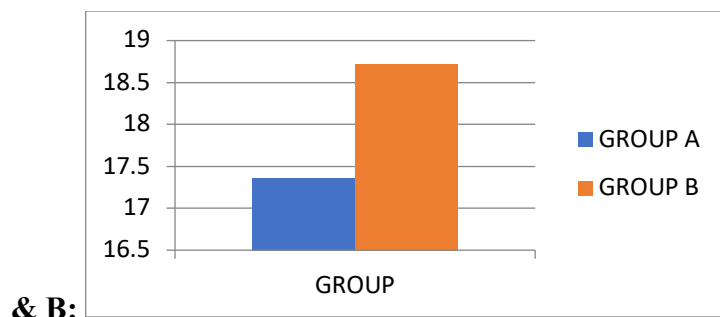


FIGURE 3: GRAPHICAL REPRESENTATION OF BETWEEN THE GROUP ANALYSIS OF PERCEIVED STRESS SCALE.

RESULTS

Between the group analysis of A and B mean and SD for the Cognition Trial Making Test 67.16 ± 4.04 and 71.12 ± 4.18 and 't' value is 3.4082. The mean and SD for State Trait Anxiety Inventory 31.48 ± 4.32 and 34.12 ± 4.12 and 't' value is 2.2117. The mean and SD of Perceived Stress Scale for the pre and post values are 17.36 ± 3.78 and 18.72 ± 4.09 and 't' value is 7.7978.

After statistical analysis, the result of the study shows that there is an increase in cognition and decreases in anxiety and stress level in both groups. But there is significant improvement in experimental group A (Cognition and Aerobic training) than control group B (Aerobic training).

DISCUSSION

The experimental study conducted to identify the “Effectiveness of Aerobic and Cognitive training on Cognition, Anxiety and Stress level among Hostel Students”. This study considers about mental health of hostel students to get desirable improvement on cognition and reducing stress and anxiety by cognition training.

In this study 50 subjects were included under selection criteria; they are randomly allocated into two groups 25 each. Group A received both cognition and aerobic training and Group B received only aerobic training which includes walking, jogging, running, warm up and relaxation stretching etc.,

Cognition trail making test, State trait anxiety inventory and Perceived stress scale questionnaire are used to assess the pre and post intervention to get information cognition, anxiety and stress affected among hostel students in everyday life. There are many studies of cognition training in geriatric population and some of the prevalence findings of cognition level among college students. So, my studies are to train up hostel students those who affected with cognition, stress and anxiety and training it with new trend of web based lumbosity application with aerobic exercise and to show an improvement in cognition and reducing the stress and anxiety level.

Abdulrahman Al-Thaqib et al., reported study on computer-based cognition training improve cognition function through proteins like Apolipoprotein E (APOE) and Brain-Derived Neurotropic Factor (BDNF). The protein factors play a major role like Apolipoprotein E helps to develop and maintain neuronal function and neuronal plasticity and BDNF helps to facilitate hippocampus and cortex area, tends to improve memory and learning function of cognition. There is many research

about cognition brain training games related to improve cognitive domains like working memory, attention, processing speed and problem solving mainly on elderly people and my study to get desirable cognition improvement on hostel students those who affected with cognition function.

Gibbs et al., identified the study on stress and anxiety produces cortisol, a hormone presence with large amounts of neurotoxic with correlation between high levels of cortisol and problems in the hippocampus. This article helps to support to reduce stress and anxiety by brain training cognition games and helps for Lumbosity training to reduce cortisol, epinephrine and norepinephrine hormones and helps in reducing stress and anxiety level among hostel students.

Charles Hillman et al., has reported about aerobic training investigated that aerobic training tends to increase the grey matter in frontal lobes and dorsal anterior cingulate cortex (ACC), motor area, middle frontal gyrus, dorsolateral region of right inferior frontal gyrus and left superior temporal lobe. There are also changes in white matter volume in tracts in anterior third of corpus callosum. These are the physiological response in aerobic training which helps to improve cognition.

Jackson et al., conducted the research on stress and anxiety response by activation autonomic and endocrine system producing hormones like epinephrine, norepinephrine and cortisol level. The physiological reactions of aerobic exercise will reduce anxiety and stress by producing endorphins. So that aerobic training is effective in managing stress and anxiety level and this supports my study and recommended for further research.

Therefore, the study shows that both cognition and aerobic training is significant in improving cognition and reducing stress and anxiety.

CONCLUSION

Therefore, this study concluded that the experimental group those received both cognition and aerobic training shows significant improvement in cognition and decreases in anxiety and stress level among hostel students than the control group who received only aerobic training. The limitation of this study is about sample size is small with short duration of intervention and long term follow up was not done. The recommendation of the study can be with large sample size with frequent follow up and students can be divided and treated according to severity of stress and anxiety. The future can do with other psychological factors affecting hostel students.

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