

Effectiveness of Aerobic Exercise on Depression and Aptitude Among College Students

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Abstract:

➤ Background:

Depression is a common mental health problem among college-going students and is associated with impaired academic performance, reduced motivation, and decreased cognitive functioning. Increasing academic pressure, lifestyle changes, and psychosocial stressors contribute to the rising prevalence of depression in this population. Aerobic exercise is a simple, cost-effective, and non-pharmacological intervention that has been shown to improve mental health and cognitive functioning. However, limited studies have evaluated the effectiveness of aerobic exercise on both depression and aptitude among college-going students.

➤ Methodology:

The study was carried out at RVS College of Physiotherapy. Ethical approval was obtained, and informed consent was taken from all participants prior to the study. Twenty college-going students aged 17–25 years with a Hamilton Depression Rating Scale score greater than 14 were selected using purposive sampling. A pre-test and post-test experimental study design was adopted. All subjects underwent a structured aerobic exercise program for a duration of nine weeks. Depression was assessed using the Hamilton Depression Rating Scale, and aptitude was assessed using the Differential Aptitude Test. Pre-test and post-test values were recorded, and the collected data were analysed using paired *t*-test.

➤ Results:

The calculated paired 't' value for depression was 32.37 and for aptitude was 39.82, which were greater than the corresponding 't' table value at the 0.005 level of significance. The results showed a statistically significant reduction in depression scores and a significant improvement in aptitude scores following the aerobic exercise intervention.

➤ Conclusion:

Nine weeks of aerobic exercise is effective in reducing depression and improving aptitude among college-going students.

Keywords: Depression, Aerobic Exercise, Aptitude, College Going Students, Hamilton Depression Rating Scale, Differential Aptitude Test.

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I. INTRODUCTION

Depression is a mood disorder that causes a persistent feeling of sadness and loss of interest. Because of false perceptions, nearly 60% of people with depression do not seek medical help. Twelve-month prevalence of major depressive disorder is approximately 7%, with marked differences by age group. The prevalence in 18- to 29-year-old individuals is threefold higher than the prevalence in individuals aged 60 years or older. Females experience 1.5-

to 3-fold higher rates than males beginning in early adolescence¹.

According to a 2017 survey, around 16 percent of college students attributed depression as a factor affecting their academic performance. Depression adversely affects interpersonal relationships and academic performance. The occurrence of depression among college students has risen in the past decade, and many students consider mental health problems as major barriers to their academic success².

Cognitive impairment is frequently observed in patients suffering from depression. Impaired cognition has been estimated to occur in around two-thirds of depressed patients. Consistent with this, several systematic reviews have demonstrated cognitive deficits in patients suffering from depression. This previous systematic review and meta-analysis demonstrated that cognitive impairment, particularly affecting the domains of executive function and attention, is a core feature of depression that persists during remission in the absence of clinically relevant symptoms of low mood³.

Aptitude refers to an individual's natural ability, talent, or potential to perform specific tasks, acquire certain skills, or excel in particular areas. Unlike knowledge or learned abilities, aptitude is often considered inherent or innate, although it can also be developed and refined through practice and experience. Aptitude plays a significant role in educational and vocational contexts, influencing academic performance, career choices, and personal development⁴.

Diagnosed depression was associated with a 0.49 point, or half a letter grade, decrease in student GPA, while treatment was associated with a protective effect of approximately 0.44 points⁵.

There are some treatment options available to treat depression such as medications including selective serotonin reuptake inhibitors (SSRIs), atypical antidepressants, Tricyclic antidepressants (TCAs); brief psychotherapy including cognitive-behavioural therapy, interpersonal therapy; electroconvulsive therapy and so on¹.

Depression can also be treated by strength training, balance training, flexibility training, relaxation techniques, functional physical activities, aerobic exercises⁶.

Exercise training is commonly considered as a positive and useful intervention in relieving suffering and pain. There is a strong direct connection between physical health and mental health so that either of them may cause a remarkable impact on the other. Physical exercise can exert strong positive effect on mental health. Exercise training, such as aerobic exercises, not only promote the individual's physical health, but also may influence his/her mental condition. As physical and mental status are generally mutually dependent, reduction in physical abilities may cause a decrease in self-esteem, which is a set of abilities, competence and characteristics that an individual believes he/she owns. Among general population, physical exercise is considered as an effective antidepressant; in addition, people who suffer from moderate to more severe depression benefit from exercise comparably, and exercise has equal effect on men and women with different age ranges⁷.

According to these findings, a meta-analysis of 23 trials, including 997 participants, revealed that exercise had a moderate to large effect as an independent treatment on the reduction of depression symptoms in comparison to various control types⁸.

The antidepressant effects of exercise have been attributed to a wide range of mechanisms, including neurogenesis, neuroendocrine, autoimmune, cortical structural changes, and oxidative stress. In order for exercise to be effective in treating depression, it may be necessary to raise brain-derived neurotrophic factor (BDNF), a mediator of neurogenesis and neuronal survival. Walking, jogging, biking, and cycling were the most common types of aerobic exercise interventions. The majority of studies, which involved 18 RCTs, involved walking as the most frequent method of exercise. walking was protective against depression, even at "low" levels of activity. Walking for more than 40 min and less than 20 min at an average pace is associated with a reduction in depression risk of 17% and 6%, respectively⁹.

II. METHODOLOGY

Review board of RVS College of Physiotherapy, Coimbatore, has approved this pre and post experimental study and a written consent was obtained from all the participants after giving clear instructions regarding treatment procedure and its implications. The study was conducted in RVS College of Physiotherapy, Sulur, Coimbatore, Tamil Nadu, India. 20 college students with depression rating by Hamilton Depression Rating Scale greater than 14 score were selected for the study. They were treated with aerobic exercises in 3 sessions per week for continuous 9 weeks. Before and after completion of 9 weeks treatment intervention, depression was measured by Hamilton depression rating scale and aptitude were measured by differential aptitude test. College students with the Hamilton depression scale score of >14 between the age of 17 to 25 years with no history of major condition that prevent doing aerobic exercises were included for the study and all the confounding variables were clearly identified and controlled.

➤ *Hamilton Depression Rating Scale (HDRS)*

Depression was assessed using the Hamilton Depression Rating Scale, a standardized 17-item instrument. Participants completed the questionnaire, with each item scored from 0 to 4 according to symptom severity. The total score was calculated to determine the severity of depression before and after the intervention.

➤ *Differential Aptitude Test*

Aptitude was assessed using the Differential Aptitude Test, which evaluates seven domains: Clerical speed and accuracy, Language usage, Numerical ability, Abstract reasoning, Mechanical reasoning, Spatial relations, and Verbal reasoning. The test was administered under standardized, timed conditions, and the total score was converted into a percentage to determine the participant's overall aptitude level.

➤ *Aerobic Exercises*

Participants underwent a supervised aerobic exercises programme comprising walking, jogging, cycling, jumping jacks and skipping. Each session lasted approximately 45 minutes, including a 10-minute warm-up, 10 minutes of walking, 10 minutes of jogging, 5 minutes of cycling, 2

minutes of jumping jacks, 3 minutes of skipping and 1 minute of rest between exercises followed by a cool-down. The programme was conducted three session per week for nine weeks, with exercise intensity maintained at a moderate level according to the participant's tolerance.



Fig 1 Walking



Fig 2 Jogging



Fig 3 Cycling



Fig 4 Jumping Jacks



Fig 5 Skipping

III. DATA ANALYSIS AND RESULTS

Table 1 Mean Value, Mean Difference, Standard Deviation, Paired 'T' Value Between Pre-Test and Post-Test Scores of Depression and Aptitude

Variable	Measurement	Mean	Mean difference	Standard deviation	Paired 't' value
Depression	Pre-test	17.55	8.1	1.11921	32.37*
	Post-test	9.45			
Aptitude	Pre test	61.43	16.22	1.82	39.82*
	Post-test	77.65			

*0.005 Level of Significance

The study was conducted to find the effectiveness of aerobic exercises on depression and aptitude among college going students.

The calculated paired t-test values for depression and aptitude were 32.37 and 39.82, respectively. As both calculated t-values exceeded the critical t-value of 2.861 at the specified significance level, the findings indicate a statistically significant difference in depression and aptitude following nine weeks of aerobic exercise among college students.

IV. DISCUSSION

The aim of the study was to find out effectiveness of Aerobic exercises on depression and aptitude among college students. 20 subjects were included and Aerobic exercise were given. The age group of college students were 17 to 25 years. Following protocol was used in the subjects,

Treatment duration: 45 minutes; walking 10 minutes, jogging 10 minutes, cycling 5 minutes, jumping jacks 2 minutes, skipping 3 minutes. Exercises are preceded by a warm-up session of 10 minutes and with relaxation of 1 minute between each exercise.

The antidepressant effects of exercise have been attributed to multiple physiological and neurobiological mechanisms, including enhanced neurogenesis, modulation of neuroendocrine function, immunological regulation, cortical structural adaptations, and reductions in oxidative stress. An inverse relationship exists between depression and cardiorespiratory fitness (CRF), with individuals experiencing depression consistently demonstrating poorer CRF compared with the general population. Furthermore, low to moderate levels of CRF are associated with an increased risk of developing depression. Evidence indicates that low cardiovascular fitness at 18 years of age is linked to a higher likelihood of severe depression in adulthood. Among individuals with severe mental illnesses, aerobic exercise has been shown to significantly improve CRF. Additionally, exercise-based interventions produce clinically meaningful improvements in CRF in patients diagnosed with depression⁹.

In this current study aerobic exercise showed significant differences after the intervention in depression and aptitude. Hence it is concluded that Aerobic exercises are effective on

depression and aptitude among college students. The statistical result of this study shows that aerobic exercise is effective in improving depression and aptitude among college students. Hence, the research hypothesis was rejected.

V. CONCLUSION

An experimental study was conducted to investigate that effectiveness of aerobic exercise on depression and aptitude among college students.

20 subjects were participated effectively in the aerobic exercise plan for 9 weeks and has shown significant result in pre and post-test. The statistical results shows that there is significant increase in depression and aptitude among college students.

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