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# Effect of acute autogenic relaxation on neurocognitive function

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**Abstract**
**Background:** Autogenic training is a desensitization relaxation technique developed by the German psychiatrist Johannes Heinrich Schultz by which a psycho physiologically determined relaxation response is obtained. Cognitive function is the mental action or process of acquiring knowledge and understanding through thought, experience and sense. It encompasses process such as attention the formation of knowledge, memory and working memory, judgement and evaluation, reasoning and computation, comprehension and production of language.
**Aim:** The aim of the present study is to investigate the effects of acute autogenic relaxation on neurocognitive function following aerobic training session.
**Method:** For the purpose of the study 48 B.ped male students were selected randomly as subject from Post Graduate Government Institute for Physical Education (P.G.G.I.P.E), Banipur, North 24 Parganas, West Bengal. Age of the students ranges from 21 to 24 years. All the subjects were divided randomly in to experimental and control groups equally. Neurocognitive test was taken by using DLST worksheets. A slow continuous running for a distance of 5 km was applied on both the groups before pre test. Immediately after aerobic running pre test was taken for all the subjects. Then experimental group undergo autogenic relaxation for 18 minutes and control group did not receive the same. Immediately after autogenic relaxation both the groups were re-tested.
**Result:** ANCOVA was applied to calculate the collected data at 0.05 level of significance and to identify the significance difference on experimental and control groups the mean critical difference was used as a post-hoc test. Not significant difference was found between experimental and control groups on DLST (digit letter substitution test) test scores after acute autogenic relaxation.
**Discussion:** Not significant difference was found on the performance of a neurocognitive task between two groups, but after receiving autogenic relaxation experimental group showed better scores then control group.
**Conclusion:** from the above result it was concluded that single session of autogenic relaxation (18 minutes) cannot produce significant effect on neurocognitive function when compared to control group.

**Keywords:** autogenic relaxation, neuroconitive function, digit letter substitution test (DLST)

## Introduction

Cognation in sports is so important because if you cannot read the game anticipates what will happen and react to stimulus then athletes effectiveness is drastically reduced. Athletes must be able to make spilt second decision under the pressure of activity or competition.

Imagine a midfielder in a soccer game receiving a pass when facing his own goal. In the last seconds before the pass, he is attentive and checks his shoulders twice to see a defender behind him and to spot open spaces. When the pass arrives, he has to make a decision based on what is stored in his working memory under time pressure. The example illustrates the cognitive demands in ball sports which include perceptive and decisive skills.

Neurocognitive function is closely linked to the function of particular areas. Neural pathways or cortical networks in the brain substrate layers of neurological matrix of the cellular molecular level. There for their understanding is closely linked to the practice of neuropsychology and cognitive neuroscience.

Cognitive function is the mental action or process of acquiring knowledge and understanding through thought, experience and sense. It encompasses process such as attention the formation of knowledge, memory and working memory, judgement and evaluation, reasoning and computation, comprehension and production of language.

Substitution tests are widely used as clinical and research tools in neuropsychology (Lezak, 1995) [4], the best known of which is the Digit Symbol Substitution Test (DSST). Substitution tasks involve visual scanning, mental flexibility, sustained attention, psychomotor speed and speed of information processing.

The Digit Letter Substitution Test (DLST) was developed from Digit Symbol Substitution Test (DSST), one of the subsets of the Wechsler intelligence scale. Substitution tests are essentially speed dependent tasks that require the subject to match particular signs, symbols, digit or letters to other signs within a specified time period. The DLST has the advantage of using letters and digits, Signs that are already well known to those taking the test. Thus there is no question of a need to learn new symbols while being tested.

Sport is associated with vigorous physical activities and prolonged exposure to vigorous physical activities is common

among athletes in certain sports. The detoriation in performance was commonly observed during the final stage of a match or performance and it has been attributed to fatigue. It has been found that increased physical arousal individuals may focus on the internal perception of discomfort, rather than on the cognitive task. So the detoriation in the cognitive task performance seen in high arousal condition (Hogervost *et al*. 1996).

Autogenic training is a desensitization relaxation technique developed by the German psychiatrist Johannes Heinrich Schultz by which a psycho physiologically determined relaxation response is obtained. (http:// en. m. Wikipedia)

The autogenic relaxation technique relaxes the mind to relax the body. It uses both visual imagery and body awareness to move a person in to a deep state of relaxation. The person imagines a peaceful place and then focuses on different physical sensation, moving from the feet to the head. The autogenic relaxation technique uses six "standard exercises" including self-suggestions of heaviness and warmth of the limbs, a regular and rhythmic heartbeat, coolness of the forehead, warmth in the solar plexus, and autonomic breathing. (Benson 1976) [7].

Martin *et al*. (2005) suggested that the effect of various relaxation techniques may differ on several dimensions. Benson (1976) [7]. Hypothesised that autonomic relaxation technique should have pronounced physiological effects because it involves attending to physiological sensation.

Based on previous literature the present study is an attempted to find out the effect of acute autogenic relaxation on neurocognitive function following aerobic workout session.

## 2. Methodology

### 2.1 Subject

For the purpose of the study 48 B.ped male students were selected randomly as subject from Post Graduate Government Institute for Physical Education (P.G.G.I.P.E), Banipur, North 24 Parganas, West Bengal. Age of the students ranges from 21 to 24 years.

### 2.2 Design of the study

For the experimental procedure all the subjects were divided in to two equal groups (24 students in each group).

### 2.3 Criterion measures

Neurocognitive function was measured by using Digit Letter Substitution task (DLST) worksheet. DLST test involves visual scanning, mental flexibility, sustained attention, psychomotor speed and speed of information processing.

### 2.4 Instrument

The DLST worksheet consists of an 8 rows x 12 columns array of random digits 1-9. Subjects are seated with the worksheet upside down until the start of the test. They were also given a coding sheet naming the specific letter to substitute for each digit 1-9 in the particular test, the same coding applying to an entire test group. Subjects were instructed to make their own choice of letter substitution strategy, whether horizontally, vertically, or selecting each particular digit randomized in the array one at a time. They were told to substitute as many target digits as possible in the specified time of 90 seconds. Finally, they were instructed to turn over the worksheet and start the test. Test was timed on a standard stopwatch.

Because the tests were administered with such a short intervening time interval, immediately before and after an intervention of only 18 minutes, different worksheets and coding were used for each test, with different digit-letter pairing in the key and differently randomized arrays of digits on the worksheet.3Scoring the DLST counts both the total number of substitutions attempted, and the number of wrong substitutions. Net score is obtained by deducting the wrong substitution from the total substitution.

### 2.5 Procedures

The study was conducted at P.G.G.I.P.E, Banipur, and at morning.

### 2.6 Pre- experimental session

In this session a complete test protocol was explained to the subjects. Subjects were instructed properly about DLST test. Then all the subjects were engage in a proper warm up prior to the aerobic session.

### 2.7 Experimental session

A slow continuous running for a distance of 5 km was applied on both the groups before pre-test.

### 2.8 Pre test

Immediately after the aerobic training session all the participants were instructed to go to the gymnasium where (gymnasium was free form any noise and disturbance) pre-test was taken using DLST work sheet.

### 2.9 Autogenic relaxation session

After the pre-test experimental group was instructed to stay inside the gymnasium for autogenic relaxation and control group was instructed to sit outside the gymnasium and taking rest but not engage in stretching or any kind of activity.

The autogenic relaxation training session began with the participants laying in a supine position for comfort shoes and shocks were removed. The participants were instructed to close their eyes with the leg placed apart from the body with the palm facing upward. Further they were then instructed to follow the relaxation procedure delivered by the researcher verbally. Researcher prepared himself by listening audio contained instruction based on six autogenic formulas or states (Schultz and Luthe, 1959) [8]. The duration of autogenic relaxation session lasts for 18 minutes.

### 2.10 Post test

After the completion of autogenic relaxation session all the participants (experimental group and control group) were again tested using DLST work sheet.

### 2.11 Statistical procedure

ANCOVA was applied as a statistical tool to calculate the collected data at 0.05 level of significance and to identify the significance differences on experimental and control groups the mean critical difference was used as a post-hoc test.

## 3. Results

**Table 1:** Analysis of covariance of the mean of DLST scores between experimental and control groups

| Mean | Experimental Group | Control Group | Sources of Variances | SS | Df | MSS | F- ratio |
|---|---|---|---|---|---|---|---|
| Pre-test | 43 | 48.25 | Among | 330.75 | 1 | 330.75 | 3.55 |
| | | | Within | 4288.5 | 46 | 93.23 | |
| Post-test | 56.125 | 46.45 | Among | 1121.34 | 1 | 1121.34 | 3.30 |
| | | | Within | 15607.91 | 46 | 339.30 | |
| Adjusted Post-test | 55.183 | 46.562 | Among | 1029.29 | 1 | 1029.29 | 2.97 |
| | | | Within | 15546.21 | 45 | 345.47 | |

Significant at 0.05 level of confidence
Tab- $F_{0.05}(1, 46) = 4.05$, $F_{0.05}(1, 46)$ 4.05

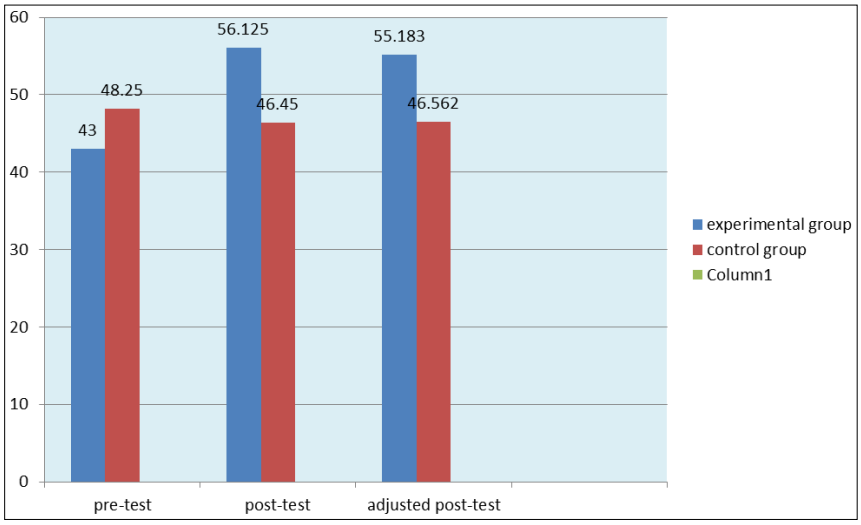


**Fig 1:** Mean of the DLST scores between experimental and control group

From the table -1 it was clearly revealed that the table value was greater than the calculated value, so there was no significant difference on DLST scores between experimental and control groups after acute autogenic relaxation.

## 4. Discussion

The objective of the present study was to investigate the effect of acute autogenic relaxation on neurocognitive function following aerobic training session (5km slow continuous running). The result of the present study indicated that there was no significant improvement in neurocognitive test scores after acute autogenic relaxation session in experimental group compared to control group, but there was an improvement found in DLST scores in pre and post test scores in experimental group. The reason may be the students were received autogenic relaxation for first time so they not master in this technique. One study conducted by Eason *et al*. 1986, concluded that mastery of relaxation is useful for athletes to maintain optimal attention. Indeed relaxation training has been shown to benefit individuals by increasing attention, reducing anxiety, blood pressure, breathing frequency, heart rate and improving concentration. In a previous study conducted by Borkovec and Sudes, 1979 opined that the significant effects of relaxation training will only be experienced after the trainee has mastered the technique.

## 5. Conclusion

From the above result and discussion it was concluded that the single session of autogenic relaxation of 18 minutes is not enough for significant improvement of the neurocognitive function but the mean scores improved after receiving of autogenic relaxation in experimental group, so long term effect of autogenic relaxation may be produce significant results and could be further investigated.

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