

Brain Fitness Exercises And Meditation Practice on Cognitive Skills Among School Students: An Experimental Study

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Abstract--- *The present study was to analyse the effect of brain fitness exercise and meditation practice on cognitive skills among tribal school students in Kerala, India. To achieve this purpose, a total of seventy-five (n = 75) students (age ranged between 10 to 15 years old) were randomly selected from Kerala, India and divided into three groups twenty-five (n = 25) namely, Meditation practice group (MTG), Brain fitness group (BFG) and control group (CG). The training period was twelve weeks and six days a week. The investigator used the NIMHANCE cognitive skill assessment test for the assessment of various cognitive skills. The experimental groups, meditation practice, and brain fitness exercise groups showed statistically higher increases in cognitive skills (p<0.05); The brain fitness exercise group showed a higher mean difference than the meditation group and control group didn't show any significant differences. In conclusion, 12 weeks of Meditation practice and Brain fitness exercise programmes in tribal school students results in significant improvements in cognitive skills.*

Keywords--- *Brain fitness exercises, Meditation, Cognitive skills, School students.*

I INTRODUCTION

Psychology always deals with the behavior, feelings, thoughts, and the motivation that is underlying the behavior (Lai-Yeung, 2011; Carr, 2011). At present, it has become an essential discipline in which many of the academicians and researchers are engaged. The collaboration of sports with the principles of psychology gives rise to the formation of sports psychology. Psychology always finds the connection of sports performance and training and competition, the psychology of various sports and exercises, psychological effects and environment, development of personality through active participation in sports, application of the principles of psychology in moulding the athletes (Wei-duo, 2005; Zekan et al., 2012). Sports psychology incorporates the principles of psychology to deals with the issues and problems in the area of sports as the problem faced by the athletes is somewhat unique, sophisticated, and different.

We can define cognitive ability as general mental capacity and learning from experience, which is the combination of reasoning, planning, abstract thinking, problem-solving, and complex idea comprehension (Gottfredson, 1997). For a person to have a complex fluid behaviour, consciousness and active memory are the brain skills he should possess. Attention means selecting and focussing a particular stimulus of interest, while active memory keeps a small bit of information active in mind for a short period (Jha, 2002). Through the continuous development of necessary learning abilities like concentration, remembrance, and logical reasoning, the brain skills

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always allow a child to proceed with the sensual stimulus and finally master to analyse, make comprehensions, assess, recollect and explain the relationship between things and events. Even though the development of cognitive skills is associated with a child and his heredity, most of the brain skills are educated. This underlines that logical aptitude and learning abilities can be added with systematic efforts. Around ten percent of children are substandard in grasping things because they face heavy and unpredicted trouble with reading capacity even though having proper and effortless reading perfection (Yuill & Oakhill, 1991).

Meditation is one of the oldest techniques for mind and body that has an Indian origin, which develops the calmness and relaxation, maintaining psychological balance, resist illness, increase overall health and well-being. Interactions among brain, mind, and body behaviour are focussed by meditation. At present, the concern towards the benefits of meditation is expanding readily (Barinaga, 2003; Ekman et al., 2005; Knight, 2004). The superiority of utilizing meditation as a method in treatments is explained, and the meditative technique is widely used in psychological approaches (e.g., Kabat-Zinn, 1990; Kabat-Zinn et al., 2003). Even though the thoughtful program is getting much support and has been subjected to many studies of psychological abnormalities, its potency remains a question mark (Bishop, 2002; Grossman et al., 2004). Another viewpoint on meditation is related to emotional, intellectual, and sensational due to extensive meditative practices (e.g., Carter et al., 2005; Slagter et al., 2007). Many studies propose that extended meditative training cause notable changes in the brain (e.g., Davidson et al., 2003; Lutz et al., 2004; Pagnoni & Cekic, 2007).

Brain training means a program that intends to maintain or increase cognitive abilities. The term cognitive ability mentions the component of ideal intelligence like active memory and application capability typically. Cognitive terms always consider the hypothesis that through the exercise of the brain, intellectual abilities can be sustained and enhanced (Simons et al., 2016). Physical fitness development plans, engaging with internet games or finishing mental tasks in adjustment with a training procedure, videogames that need reasoning related to visual perception and connecting objects in space and employing oneself in different activities such as music, painting, and dancing are methods of cognitive training (Diamond, 2012; Macey et al., 2011). The purpose of the study was to find out the effect of brain fitness exercise and meditation practice among school tribal students in Kerala, India.

II METHODS

II.I. Participants

To achieve this purpose, seventy-five ($n = 75$) tribal students selected from schools in Kerala, India, and divided into three groups twenty-five ($n = 25$) each were selected randomly from ages ranged between 10 to 15 years old. The present study was undertaken primarily to compare the psychological variable, cognitive skill among tribal school students. From the available literature, the following standardized test was selected and used for the collection of data. Cognitive skills and NIMHANCE cognitive skill assessment test was employed before and immediately after the training programmes.

II.II. Study Design

The research design of the study was pre and post random group design, a total of seventy-five ($n = 75$) tribal students in Kerala, India, were selected. The selected subjects were randomly assigned into three groups ($n = 25$),

namely, meditation training group, brain fitness group, and control group. The experimental groups underwent meditation training (MTG), brain fitness exercises (BFG), and control group (CG) acted as the control. The Control group did not receive any specific training. The training period was twelve weeks and six days a week. Before and after the completion of twelve weeks training the pre-test and post-test was conducted on three groups on the selected criterion variable.

II.III. Measures

II.III.I. NIMHANS Index for Specific Learning Disability

The researcher modified a tool to identify the level of cognitive intervention process in the selected sample based on the NIMHANS Index for Specific Learning Disability (Kapur et al., 2002). The tool consists of 40 items to assess the learning disability. Based on this concept, some of the items were modified, and a tool was developed to evaluate the level of cognitive intervention process in developing the cognitive skills of the students. The first part of the questionnaire consists of general information like the name of the student, school, place, class, sex, etc. The second part consists of 40 items. The investigator established content validity in this study. The items of the test were checked by the experts about its objectivity and suitability. Based on the expert's opinion, some items were omitted, and some items were modified, and then the tool was employed with 25 items. The questionnaire was developed on a four-point scale, three marks for to a greater extent, two marks for to a great extent, one mark to some extent, and 0 for not at all. The split-half method is employed to establish the reliability of the cognitive intervention scale, and the correlation coefficient was 0.83.

II.IV. Treatments

The training programmes were conducted in Kerala, India. The total duration was for twelve weeks, with six days per week. The meditation training program was started from 6 am to 8 am with proper breaks. The intensity of exercises increased after every two weeks by an increase in the repetition and set as well as the rhythm of doing the exercises. The training was given under the direct supervision of the investigator. The Brain fitness training program was scheduled for six days per week in the evening, 4 to 6, for twelve weeks. The Brain fitness training programs consisted of physical training for 10-20 minutes, brain fitness exercises, and brain games. Control Group did not undergo any form of specialized training. But they were performing their routine work.

The investigator administered the questionnaire to measure the criterion variables to the selected 75 participants. The investigator briefly explained to the subjects about the uses of the questions, the meaning of each question, and how to fill the questionnaire. The filled-in questionnaires from the respondents were collected after checking whether all the items were responded and by using the scoring key, and the total score obtained by each subject was tabulated.

II.V. Statistical Analysis

After data normality (Shapiro-Wilk test) and equality of variances, the descriptive analysis, the mean and the standard deviation were calculated for all scores were assessed and Dependent t-test was used to find out the difference among students and One-way analysis of variance (ANOVA) was used to find out the difference between

the groups. In all the cases, the 0.05 level of significance was used to test the hypotheses. The statistical software SPSS.23 for Windows was used for data analysis.

III RESULTS

The table 1, showed that the meditation group cognitive skills in pre-assessment ($Mean \pm SD = 35.52 \pm 5.99$) and post-test ($Mean \pm SD = 50.24 \pm 6.25$) at the 0.05 level of significance (Mean difference = 14.72, $t = 14.26$, p -value = 0.000, $p < 0.05$). In case of brain fitness group cognitive skills level in pre-assessment ($Mean \pm SD = 36.48 \pm 3.65$) and post-test ($Mean \pm SD = 53.60 \pm 4.90$) at the 0.05 level of significance (Mean difference = 17.12, $t = 16.51$, p -value = 0.000, $p < 0.05$). Finally, the control group cognitive skills level in pre-assessment ($Mean \pm SD = 34.72 \pm 6.66$) and post-test ($Mean \pm SD = 35.36 \pm 6.01$) at the 0.05 level of significance (Mean difference = 0.64, $t = 1.42$, p -value = 0.168, $p > 0.05$). These results showed statistically significant difference in Meditation group and brain fitness group between Pre-test and Post-test and Control group showed no significant differences.

Table 1: Descriptive Statistics, Mean Differences, and t-test Results on Experimental Groups and Control Group.

| Groups | n | Pre-test | | Post-test | | Mean Difference | t-ratio | p |
|--------|----|----------|------|-----------|------|-----------------|--------------------|-------|
| | | Mean | SD | Mean | SD | | | |
| MTG | 25 | 35.52 | 5.99 | 50.24 | 6.25 | 14.72 | 14.26* | 0.000 |
| BFG | 25 | 36.48 | 3.65 | 53.60 | 4.90 | 17.12 | 16.51* | 0.000 |
| CG | 25 | 34.72 | 6.66 | 35.36 | 6.01 | 0.64 | 1.42 ^{NS} | 0.168 |

Source of data: Primary source

Note. * $p < 0.05$, NS = Not Significant, MTG = Meditation training group; BFG = Brain fitness exercises group; CG = Control group; SD = Standard Deviation.

The table 2, Analysis of variance results indicate that after the training of meditation practice and brain fitness exercises programmes, post-test [$F(2,72) = 71.140$; $p = 0.000$], there is a significant improvement within the training groups than the control group. A Scheffe post-hoc test brain fitness exercises ($p = 0.000$) and meditation practice ($p = 0.000$) groups had significantly different than the control group. Brain fitness exercises group showed higher mean values than the meditation practice group.

Table 2: Analysis of Variance (ANOVA) of Three Groups on Cognitive Skills

| Test | Source | Sum of Squares | df | Mean Square | F-ratio | p |
|-----------|----------------|----------------|----|-------------|---------------------|-------|
| Pre-test | Between Groups | 38.827 | 2 | 19.413 | 0.621 ^{NS} | 0.540 |
| | Within Groups | 2249.520 | 72 | 31.243 | | |
| | Total | 2288.347 | 74 | | | |
| Post-test | Between Groups | 4711.680 | 2 | 2355.840 | 71.140* | 0.000 |
| | Within Groups | 2384.320 | 72 | 33.116 | | |
| | Total | 7096.000 | 74 | | | |

Source of data: Primary source

Note. *p< 0.05, * Significant, NS: Not Significant.

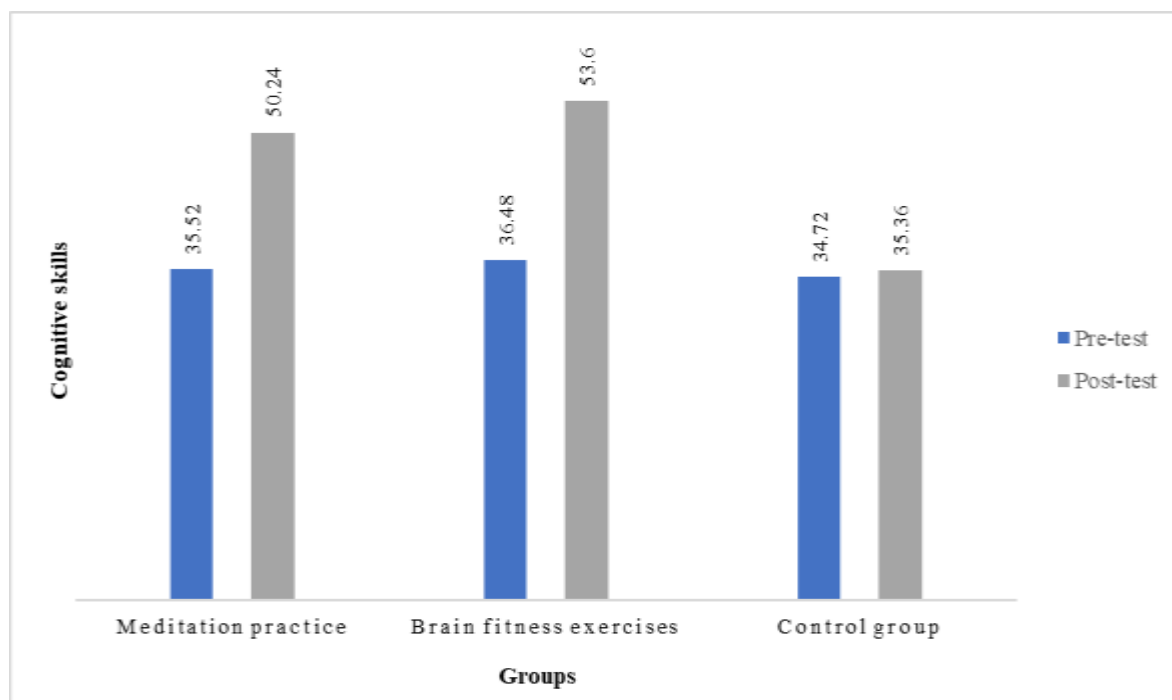


Figure 1: Pre and post-test mean scores of experimental groups and Control Group.

IV DISCUSSION

This study has shown that 12 weeks of brain fitness exercise and meditation practice groups had significant improvement in cognitive skills in tribal school students. Participants in the experimental groups (meditation practice and brain fitness exercise) improved than the control group, especially the brain fitness exercise group had a more significant effect than the other experimental group. These results of the study strongly supported that meditation practice and brain fitness exercise can be considered as a useful training method for the improvement of cognitive skills in tribal school students.

The study shows that brain fitness exercise would help to make favourable changes in the cognitive skills in tribal school students. The result reveals that the pre-test means a score of the brain fitness exercise group had increased from 36.48 to a post-test value of 53.60 (46.92% improvement). Similarly, the meditation practice group also increased from 35.52 to 50.24 (41.44% improvement). The findings of this research study were supported by similar results of the studies carried by Daffner et al. (2000) found that the frontal lobe leads the learner to reach mastery learning is visual attention to novel events. Bell et al. (2007) found that cognitive enhancement therapy, in combination with work therapy, showed improvement in working memory and executive function. Westerberg and Klinberg (2007) found that the effect of training of Work memory changes in the functional map observed in primate studies of skill learning.

Researchers have proved that meditation and brain fitness exercises are an essential component of sensory memory, implicit and explicit memory, multitasking, processing speed, audio-visual processing, and visual blending. Intervention strategies play a significant role in Cognitive skills. Aquado-Aquilar (2001) found that the two main long-term memory considering the semantic/episodic and implicit/explicitly memory dichotomies. Other findings of the studies related to cognitive therapy are Vaskinn et al. (2008); Green and Heekeren (2009); Kolb and Wishaw (1990). Clayde (2001) found that the brain learns that through repetition, the emotionality of experience influences retention, and the brain allows instructions to improve student's memory. Rocha et al. (2009) found that the cognitive intervention process constructs the quality of life and also develops an explicit and implicit domain. Assessing and identifying the cognitive skills was synchronized with the findings of the studies by Royer et al. (1993); Tefft et al. (1999); Lemons and Lemons (2013); and Ambrosio et al. (2014).

V CONCLUSIONS

The study concluded that brain fitness exercise and meditation practice is an effective technique to improve the cognitive skills among the tribal school student's. The findings of the present research highlight the importance of cognitive skills for preserving and developing the tribal school student's performance in academics and non-academics. The findings conclude that all two group's brain fitness exercises and meditation practice groups do not only vary on performance; they also distinguish themselves from the dimensions of cognitive skills.

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