

EFFECT OF MEDITATION ON ACHIEVEMENT, ATTENTION & MEMORY OF HIGH SCHOOL STUDENTS

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ABSTRACT

This empirical study explored and found out effect of meditation on achievement (school examination marks, Odia language and arithmetic ability), attention and memory of high school students. Two hundred adolescent high school students, consisting of equal number of boys and girls, belonging to grade nine participated in the study that lasted for one academic session. The study adopted Solomon four-group design in which subjects were divided into four equal groups of 50 students each. Two groups participated in concentration meditation. While two groups, one participating in meditation and another which did not participate in meditation, were pre-tested, all the 4 groups were post tested using Odia language ability test, arithmetic test, test for span of attention and test of memory. The school examination marks of all participants were collected from school records. The data collected from all assessment tools were analysed with SPSS-20. The study proved that meditation could be effectively taught to adolescent high school students. The ANOVA calculated on the four groups found significant differences in post-test performance between the meditating and non-meditating groups. The result also established that pre-testing has impact as the meditating group with pre-testing showed better performance in post-testing among all the groups.

Keywords: Meditation, Achievement, Attention, Memory

INTRODUCTION

Adolescence is an extremely difficult period when students passes through various rapid mental and physical changes. Children and young adults go through a lot of stress (Fontana, David, Slack, & Ingrid, 1997). At a time of rapid pubertal change early adolescents experience increasing desire for autonomy (Stenberg, 1999); increasing focus on peers and social acceptance (Juvonen 2006) and increasing self consciousness (Erikson, 1968). The pressure of school, expectation of family and planning a suitable career for themselves puts them under considerable stress and tension. School related achievement goals include mastering subject matter or meeting

an achievement standard such as earning an 'A' Grade or 100 % on a test or striving for a perfect GPA. School related social goals include gaining approval from others, making personal relationship with peers, belonging and being dependable and responsible (Goodenow, 1993; Wentzel, 1998).

A lack of education in mind training at this stage will lead to adolescents develop bad mental habits. In a world where high school students are to perform to the rising expectations and put up with all the shortcomings and defects of the school system, meditation seems to hold a great promise. Meditation has been defined as a mental training that brings about long term changes in cognition and emotion (Lazar, et. al., 2005; Lutz, Greischar, Rawlings, Ricard & Davidson, 2004). It has been claimed to have miraculous powers to promote success in life, to burst stress and to boost strength. It seems to hold promise for men, women and children, to overcome their weaknesses and failures and to achieve greater success in many varied fields of life.

Meditation, its preachers and practitioners claim, can bestow positive qualities on the individuals and reduce negative ones. Rishi Patanjali who is credited with collecting, perfecting and codifying Yoga and meditation techniques in his monumental work "*Yoga Sutra*" stands out among the ancient ones while in the modern times Sri Aurobindo, Swami Yogananda, Swami Shivananda Saraswati, Swami Satyananda Saraswati, Nirmala Devi, Mata Amruta Anandamayee, Maharishi Mahesh Yogi, Sri Sri Ravi Shankar, and many more, have tried to preach meditation for fostering spirituality, learning, peace, good health, and happiness among people. According to Walsh (2001) meditation is "a family of practices that train attention in order to heighten awareness and bring mental processes under greater control." According to Shapiro (1980) "meditation refers to a family of techniques which have in common a conscious attempt to focus attention in a non-analytical way and an attempt not to dwell on discursive, ruminating thought". Meditation has been defined as 'a group of practices that self regulate body and mind, thereby effecting mental events by engaging a specific attentional set (Cahn & Polich, 2006). Roger Walsh, (2001) points out that the beginning of meditation are lost in antiquity but can be traced back to at least 3000 years.

John Dewey (1966), world's most influential philosopher of education stated that the education is the fundamental method of social progress and reform. But the ability of education to promote individual as well as social development depends upon the quality of educational system. In most countries around the world, there is wide spread dissatisfaction with the educational system, and specifically, the failure of high schools in providing adequate care and facilities for the adolescents is great concern for all. High school education and grades shape the adolescents' career and life beyond. A success at this stage is seen as a ticket to good life. Failure leads to negative social branding and further problems. So, parents, teachers and others have high

performance expectations from the adolescent learners at this stage. This puts a lot of pressures and anxiety on the adolescents.

In developing countries like India school systems are awfully inadequate. Access to quality schooling remains a dream even today for the majority of our children and adolescents. Large scale school failures and school drop outs, adolescence delinquency, prevalence of mental and emotional problems among school children, etc. point to the terrible quality of life being experienced by our adolescent population. In view of the fairly large number of research studies confirming the positive influence of meditation on life of people it is normal to expect that it can also bring about positive changes in adolescent school students.

The Rationale:

The practice of transcendental meditation was shown to improve academic performance in university students, academic achievement and psychological health in high school students. While practicing meditation, students gain knowledge by direct experience rather than imposed by an outside authority. Engagement of student in learning events is the main focus of instructional technology. According to performance based measures of cognitive function, mindfulness training can enhance the ability to focus attention (Jha, Krompinger & Baime, 2007). Focused attention bears great significance in the field of learning. The faculty of voluntarily bringing back a wandering attention over and over again is the very root of judgment and will. But systematic attempt to control, train and cultivate attention is very rare. As attentional training has been central to meditative practices, incorporation of these practices into the field of school education will have great benefit.

Taking Sixty-three University of North Carolina, Charlotte students as participants Zeidan, et al. (2010) examined brief meditation training effects on cognition and mood. After four sessions of either meditation training or listening to a recorded book, participants with no past meditation practice were assessed with measures of mood, verbal fluency, visual coding, and working memory. Both interventions were helpful at improving mood but only short meditation training reduced fatigue, anxiety, and increased mindfulness. Moreover, brief mindfulness training significantly improved visuo-spatial processing, working memory, and executive functioning. Napoli, et. al. (2005) evaluated the effect of the participation in mindfulness training in 1st, 2nd and 3rd grade students' attention. The 24-week training included a series of exercises including breath work, body scan, movement and sensory motor awareness activities. Results from 3 attentional measures administered to the students showed significant differences between those who did and did not participate in the mindfulness training. Lisa Desmond (2004), teacher of pre-school children, author and meditation practitioner, states: " I have observed children who

are in pain from loss of a loved one, children who are sad, fearful, hyperactive or angry, become calm, relaxed and at peace with themselves and the world around them through meditation". She further credits meditation with helping children fall asleep and calming them when they are afraid, anxious or worried as well as helping them with learning difficulties and attention deficits. Rosaen and Benn (2006) presented evidence that students who practiced in meditation displayed greater levels of self control, self awareness, flexibility and better academic performance than peers who did not participate in meditation practice.

Kim's study (2006) showed effects of meditation on children's absorption. In her study of elementary 6th grade children who participated in 30 brain respiration meditation sessions demonstrated significantly better concentration score than the control group in both paper and pencil test and brain wave test. One study by Hall (1999) examined the effect of meditative practice on academic achievements among both college and middle school students. Hall randomly assigned 56 under graduates to two study groups, one of which included concentration based meditation. A one hour session of meditation instruction twice a week for the academic semester was provided to the meditation intervention group. Meditation was practiced for ten minutes at the beginning and end of each one hour study session, in which subjects were provided with guidance in simple attentional focusing and relaxation exercises. The participants were instructed to meditate at home and before examinations. The control group participants also met for one hour of study a week but were not given meditation training. At the beginning of the study, the groups did not differ in grade point average (GPA) but at the end of the semester, the intervention group has significantly higher GPA scores compared to the control group. Another study conducted by Tang, et. al. (2007) showed benefits of short term meditation practice. Forty undergraduate Chinese students participated in five-day meditation training. They demonstrated greater improvement in conflict scores on the Attention Network Test, an increase in immune-reactivity, higher vigour on the Profile of Mood States Scale, and a significant decrease in anxiety, depression, anger, fatigue and stress. The findings of this study were reflected in another study in Taiwan by the same researchers.

In their book "Paths beyond Ego", Walsh, Roger, Vaughan, and Fraces (1993) point out that meditation influences six common elements in the experience of transcendence - ethics, attention training, emotional transformation, motivation, perception and awareness and wisdom. It controls and stabilises attention, forbids unethical behaviour, transforms emotion, redirects motivation and fosters wisdom. Not only the meditator will experience greater emotional wellbeing and become motivated to work for the wellbeing of others, he himself will get a type of cognitive training which will lead to measurable improvement in his ability to concentrate, comprehend and master new academic materials. This attribute of meditation is responsible for enhancement in cognitive functions necessary for academic achievement. Complex cognitive

tasks that involve critical thinking, reasoning, and problem solving activity are required in high achieving academic environment. Since, significant amount of attention of anxious students is diverted into non-academic and socially maladaptive behaviour, poor academic and social performance on their part can be expected in class room. If students experience fear, hopelessness, anxiety and disappointment during learning, the association is made that learning is a stressful and threatening event. To combat this problem meditation training in the class room will help to alter the way students evaluate and react to incoming data and information. Since all the research in the field indicate toward a beneficial effect of meditation, its utilization for promoting better growth and education in students in schools cannot be ignored.

The present study is an exploratory investigation into the effects of meditation on academic and cognitive characteristics of adolescent high school students. The primary motive is to find out if meditation can help students grow and learn better overcoming the handicaps imposed upon them by the inadequate facilities of a schooling system. Though most research in this area is new, meditation offers promise for application in the educational field where creativity, good socio-personal relationship, motivation, morality, values and other psychological virtues may enhance learning and educational climate. The present study is a humble attempt to enquire into effects of meditation on school achievement, Odia language and arithmetic skills, memory and attention span.

OBJECTIVES

The major objective of this study is to find out effect of meditation on achievement, memory and attention.

The following are the specific objectives of the study.

1. To study the effect of meditation on school examination marks of high school students.
2. To study the effect of meditation on Odia language score of high school students.
3. To study the effect of meditation on arithmetic ability of high school students.
4. To study the effect of meditation on memory of high school students.
5. To study the effect of meditation on span of attention of high school students.
6. To review the available literature on effect of meditation.

METHOD

Design: The present study aimed at finding the effect of meditation on high school children.

Hence, it was decided to use both experimental and control groups in the study. A modified Solomon's four group design, in which all the four groups were naturally occurring student groups, was conceived as it was found suitable to analyze the effects of meditation thoroughly. Four naturally occurring student groups of equal size were taken for the purpose of the study. Group 1, the experimental group, was to receive experimental treatment and was to be subjected to both pre- and post-tests. Group 2 the control group which was subjected to both pre- and post-tests but no experimental treatment was given to the group. Group 3 received experimental treatment and was subjected to post test. Group 4 was to be post tested only. All the four groups belonged to the same grade and were taken from two schools belonging to the same town. The pre-test and post-test scores of the groups were to be compared and contrasted to find the effect of meditation on the subject's characteristics under investigation.

Table -1

Groups	Pre-test	Treatment	Post-test
1	Yes	Yes	Yes
2	Yes	No	Yes
3	No	Yes	Yes
4	No	No	Yes

Sample: The sample comprised of 200 students, four groups of 50 students each, taken from two Government high schools from Bargarh town in western Orissa. Since they are both Government high schools the students attending them are from a cross section of the population of the town. Students from almost all sections of the population are represented in these schools. It was for this reason that the subjects were drawn from these schools.

Table -2

The group	No. of boys	No. of girls	Total no	Grade	Mean age
Group - 1	25	25	50	IX	14
Group - 2	25	25	50	IX	14
Group - 3	25	25	50	IX	14
Group - 4	25	25	50	IX	14

Tools: The tools and techniques were used to assess achievement are i) School examination scores ii) Odia language ability test iii) Arithmetic ability test

2. Span of attention test & 3. Memory test

School Examination scores

In order to measure level of academic achievement of the subject it was thought appropriate to use school examination marks as one of the indices for level of academic achievement as it is the school examination mark that command the most respect. To supplement the school examination two achievement tests were constructed and used in two core school subjects i.e. language (Odia) and mathematics. It was thought that a combination of all these marks will become a strong index for the academic performance of the subjects. Since all the subjects belong to grade-IX aggregate marks secured in the school examination after grade-VIII were collected from the school records as a measure of pre testing score for academic achievement of the subjects. Likewise, aggregate mark secured by the subjects in the examination at the end of grade-IX were collected from school records to be used as a post testing score for academic achievement of subjects.

Test in Odia

The test in Odia which is the mother tongue of participants was prepared keeping in view measuring the language fluency, vocabulary, and grammar of the subjects. The Odia test is a 47-item objective type test consisting of multiple choice items as well as questions seeking very short answers. To construct the test a total of 75 test items were initially prepared by the investigator. This preliminary draft was refined and then the test was placed before five subject experts and teachers of Odia for thorough scrutiny. From among all the 100 questions a total 25 questions were finally retained on the advice of the experts and teachers. Thereafter the test was tried out on a group of 10 students to ascertain if the test worked perfectly. The test posed no problems. The time limit of 45 minutes was fixed to complete the test. The test carries 50marks and the scores of subjects can vary between 0 and 50 marks.

Test in Arithmetic

The arithmetic ability test was randomly selected from all the topics of arithmetic text book appropriate for grade IX. A total 75 test items were initially prepared and given to five subject experts and teachers for their opinion and approval. After getting their opinion finally 30 test items carrying a total of 60 marks were retained for administration. The test in arithmetic was also tried in the same manner as it was for odia test. After the tryout the time to complete the test was fixed for 45 minutes. The questions represent the topics such as HCF, LCM, time and work, time and distance, profit and loss and interest.

Test of memory

To assess memory a delayed recall test was used. Russel (1979) considers this to be a more difficult test of memory. The test material consists of standard nonsense syllable of three letters, e.g. XOL, YIP which were selected from a prepared list (Baddley, 1993). A total of 10 nonsense syllables were randomly taken for administration. Exposure time for each syllable was five seconds. The correct answer carry one mark and wrong answer a zero.

Span of attention

Span of attention is measured by an apparatus called tachistoscope. When visual stimulus is presented to the subject with this apparatus, subject gets a very brief view of the stimulus. The subject then has to respond by uttering the stimulus digit. Five sets of cards, four in each set were prepared. The first set had four cards with a 3-digit number in each card. The second set had four cards each with a 4-digit number. Likewise all the five sets of cards were prepared with each set of four cards having 3-digit to 7-digit numbers. Hence, twenty cards in total were taken for the administration. On one side of each card one category of digits was written clearly in visible size. The size of each digit and the distance between each digit were kept equal. All the cards were to be exposed for once only through the tachistoscope in a random order. Span of attention is calculated by adding up the fractional values to the basal value for correct responses. Basal value indicates the series of letters or digits which are correctly attended to and prior to which the subject has not committed any mistake. The fractional value is the score when the subject responds only a fraction of the four digits correctly in a set of cards.

Conduct of Experiment

All necessary permissions were secured from both the schools which were to participate in the study. The students in grade-IX of both the schools on which the study is to be conducted were contacted in groups in their own class and a rapport was established with them. All students in group-I i.e. the experimental group secured consent from their parents to participate in the study. However, group-IV which was to be post-tested only was contacted just before the post- test. After the pretesting in all the variables, the two experimental groups, group-1 and group-3, were given meditation training in concentration meditation.

The meditation program continued for one academic session. Both the schools willingly utilized one period of 45 minutes duration everyday for the meditation programme. In the first high school the meditation programme took place at 3pm to 3.45pm and in the second school from 4pm to 4.45pm. The instructor who was engaged to impart meditation training to the subjects was yoga and meditation instructor in a Government managed college. He has a diploma in yoga

from Bihar School of Yoga. The meditation class was held in sufficiently large halls of the two schools. The participants were asked to keep their stomach empty before and during meditation. The halls where meditation classes were held had both natural light and artificial over head lighting. Both halls were silent with no bad odor or no noise coming from outside. The halls had fresh circulating air from four open windows. The participants were supplied with yoga mats to sit on. In order to meditate every day they learned first a suitable meditational posture. The detailed instructions for meditation were given by the instructor. After giving experimental treatment to the Group 1 and Group 3, the investigator conducted a post-testing in all the variables taken for the study on all the subjects of both experimental and control groups.

RESULTS

Data collected through pre- and post- tests for all the five variables were subjected to descriptive, correlational and inferential statistical analyses. The Mean and Standard Deviations of all the five variables of all the groups on both the pre- and post- tests shows that school examination score, the meditating group has shown significant improvement on all other variables. Inter-correlations indicate a high and positive correlation among all the academic and cognitive variables. The ANOVA done on five scores showed significant differences among the group means in most of the cases leading to rejection of the null hypothesis.

Table 3: Mean scores of all the 5 variables in both the pre and post tests for the 4 groups (N=50 per group)

Sl. No	Scores	Gr 1 Pretest		Gr-1 Post test		Gr-2 Pretest		Gr-2 Post test		Gr-3 Post test		Gr-4 Post test	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1	School Exam	159.72	5.43	189.18	6.11	161.12	6.22	165.26	5.16	164.82	4.77	166.46	4.98
2	Test in Odia	16.96	7.41	23.92	6.6	18.58	8.2	21.38	7.63	20.56	7.32	19.8	7.62
3	Test in Arith	18.58	7.95	25.58	7.99	19.56	8.75	23.23	9.16	20.62	7.13	18.86	8.1
4	Test In Memory	4.12	1.22	8.36	1.17	4.44	1.54	6.12	1.49	5.99	1.32	5.23	1.55
5	Span of Attn	4.94	0.64	5.86	0.58	4.68	0.81	4.66	0.82	5.57	0.66	4.91	0.63

Table 4: One-way ANOVAs among the six group mean scores

Sl.No	Variables	Sources	Sum of Squares	df	Mean Square	F	p
1	School Exam	Between Groups	29206.5600	5	5841.3120	195.0525	0
		Within Groups	8804.5307	294	29.9474		
		Total	38011.0907	299			
2	Test in Odia	Between Groups	1309.43	5	261.886	4.676	0
		Within Groups	16464.82	294	56.003		
		Total	17774.25	299			
3	Test in Arith	Between Groups	1717.387	5	343.477	5.096	0
		Within Groups	19814.16	294	67.395		
		Total	21531.547	299			
4	Test In Memory	Between Groups	87.8	5	17.56	9.046	0
		Within Groups	570.68	294	1.941		
		Total	658.48	299			
5	Span of Attn	Between Groups	60.942	5	12.188	24.823	0

Summary of results

(1) Meditation could be effectively taught to adolescent high school students with positive and beneficial influence on the participating students. (2) Meditation enhanced memory of high school students significantly. High school students with meditation practice were found to have better memory than those who did not have meditation practice. (3) Meditation increased span of attention of high school students significantly. High school students who practiced meditation

were found to have better span of attention than those who did not practice meditation. (4) High school students participating in meditation programme improved their Odia language ability significantly. (5) High school students participating in meditation programme improved their arithmetic ability significantly.

CONCLUSION & IMPLICATIONS

The results strongly suggest that practice of meditation improves memory of adolescent high school students. Collectively, attention and memory constitute the cognitive domain. Development of these two faculties is closely related not only to academic achievement but to maintain psychological wellbeing of all segments of population. The present study found positive effect of meditation on these fundamental cognitive faculties and these findings are backed by number of theoretical and empirical investigations and findings. Results of the study are in line with earlier research results of Kozhevnikov, et. al. and Newberg, et. al.(2001). The studies led by Newberg, Alavi, Baime, Pourdehnad, Sanntanna and d'Aquilli,(2001), Hotzel, Ott, Hempel, Wolf, Stark et al.(2007), Pegnoni and Cekic (2007), Lutz, Greischer, Rawlings, Ricard and Davidson (2004) provided significant evidence that meditation has a significant impact on cognitive structures associated with attention, concentration, processing of dissonant or painful experiences and emotional self-regulation. Since paying attention to information, instructions and learning activities in the classroom is essential for academic success it seems reasonable to conclude that mental training that increase a student's attentional capacity would enhance academic performance.

So far as academic achievement, which bears utmost significance for adolescent high school students, is concerned, some prior studies (Hall, 1999; Franco, Manas, Kangal & Gaalego, 2010) have established positive beneficial effects of meditation. This study also confirmed the beneficial effect of meditation on two important academic variables - language and arithmetic ability. There is a need to undertake further rigorous studies to draw conclusions regarding the role which meditation can play in improving students' academic ability.

Although meditation has been in use since ancient times modern scientific research into this area is of recent origin. Indian Psychology of Yoga and meditation contain valuable information on psychological health and exceptional abilities and prescribed methods for cultivating them. Research suggests that meditation and Yoga have effects ranging across Psychology, Physiology and Bio-Chemistry and can enhance both psychological and physical health (Walsh, 2001). The results of the present study are quite encouraging to suggest that participation in meditation programme is useful for the students in enhancing the cognitive capacities. These results of the present study have important implications for the theory of cognitive psychology. This study

have important implications for practical application in the fields of adolescent development, educational and school practices, intervention programmes for adolescent students under remedial teachings, for slow learners and backward students.

ACKNOWLEDGEMENT

The author is grateful to the headmaster and all teachers of George High School and Government Girls High School for the necessary permission to conduct the study. The author expresses heartfelt thanks to all the teachers and students for their support and cooperation.

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