

Effect of Beta Wave Therapy on Academic Performance of ADHD Children

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ABSTRACT

Education, as a basic component of human development, captures the capability of acquiring knowledge, communicating and holds the key to progress for any inclusionary society. Attention Deficit Hyperactive Disorder (ADHD) is a pervasive chronic disorder affecting children's wellbeing. The purpose of this article is to help children diagnosed with ADHD to cope with their academic demand in an inclusive educational setup with the help of beta wave tune during exam time. Brain wave are of four types, Delta wave-1 to 3 times per second and associated with total unconsciousness and deep dreamless sleep. Theta waves-4 to 7 times a second and associated with early stage of sleep and drowsiness. Alpha wave-8 to 11 times a second and associated with peace and relaxation. Beta wave- 12 to 30 times a second and associated with increased ability to focus on external stimulus. Children with ADHD present excess theta activity and decreased beta in frontal and midline region of brain known as cortical hypo arousal leading to inattention and poor academic performance.

Keywords: *Beta Wave Therapy, Academic Performance, ADHD Children*

Neurofeedback is a treatment option for many conditions such as ADHD, anxiety, and autism spectrum disorders (to name just a few) that is an alternative to medication. Instead, by placing computer-linked electrodes on specific areas of the scalp, therapists use Neurofeedback to train brainwaves to help people function optimally. Beta wave therapy is proven to be effective to increase beta waves in brain and increased concentration, alertness and attention to external stimulus.

Brain waves are commonly grouped under four different headings: Delta waves, Theta waves, Alpha waves, and Beta waves. Delta waves are those which occur between 1 and 3 times per second, and are associated with total unconsciousness and deep, dreamless sleep. Theta waves, which occur between 4 and 7 times per second, are associated with the early stages of sleep, drowsiness, and the process of dreaming. Alpha waves occur 8-11 times per

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second, and are associated with peace, relaxation, meditation, and creativity. Lastly, Beta waves, which occur between 12 and 30 times per second, are associated with an increased ability to focus on external reality, but can also be associated to states of anxiety.

Dr. Joel Lubar, current Professor Emeritus at the University of Tennessee, spearheaded early research on the use of Neurofeedback on children with ADHD. He discovered one pattern of brain waves in children with ADHD that suggested these children had an abundance of slow brain waves - namely, theta waves - compared to the faster beta waves. While some might think that an abundance of the slower theta waves might cause signs of drowsiness, Lubar came to the conclusion that some children with ADHD become hyperactive in an attempt to wake up and counteract the effects of slow brain waves.

In order to treat this type of ADHD patient, Neurofeedback therapists will compare the strength of beta waves with the strength of the theta waves. If the power of the theta waves - the slower waves associated with drowsiness - is more than two or three times stronger than those of the beta waves, the focus becomes reducing the influence of the theta waves or increasing the influence of beta waves to create an equilibrium. By increasing the relative power of the beta waves, the nervous system will be aroused enough to pay sufficient attention to its environment, and will no longer need to compensate for the overabundance of theta waves with hyperactivity.

RESEARCH METHODOLOGY

Objective

The objective of this study was to explore how beta wave tunes intervention of 6 months and playing the tune in background during examination can help ADHD children to be more mindful and attentive during exam time for better academic result of ADHD children.

Hypotheses

For the present research purpose the following hypothesis were formulated:

HA- Exposure to beta wave tune for 1 hour twice a day on regular basis for 6 months and playing the tune in background during examination will increase the attention span of ADHD children which will lead to better academic score.

HO- There will be no significant difference between the pre and post test score of control group with reference to academic performances.

Experimental Group

Assessment	General School plus regular exposure to beta wave tune for 1 hour twice a day.	Assessment
Academic score	Duration – 6 months	Academic score

Control Group

Assessment	General School & no exposure to beta wave tune.	Assessment
Academic score	Duration – 6 months	Academic score

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Variables

Independent Variable: On the basis of above clarification and nature of problem independent variable of present study was the exposure of beta wave tune.

Dependent Variable: Dependent variable was academic performance (exam score) of ADHD children.

Population

The population of the present study consisted of the ADHD children of Bhubaneswar District of Odisha State involved in inclusive education.

Sample

For the present research work investigator has randomly selected a sample of 70 ADHD children initially. Screening was done by the researcher with the help of special educators and psychologist to select the sample. Students with other associated conditions and other categories were dropped out purposively and out of 70 students 30 were selected with the help of purposive sampling technique. Case Studies of 30 mild intellectually disabled were taken and were then divided into experimental and control group randomly. Out of 30 children, 2 of the children from control group and 1 from the experimental group were dropped out because of parental unwillingness to allow their ward in research purpose .

Details of sample

Experimental Group	Control Group	Total
15	12	27

Tools

The tools for the present study were selected in a manner to achieve an optimum level of confidence by the investigator for the objectives of the study.

ADHD checklist

AHDD checklist id used to diagnose the participants as ADHD children.

Academic result (marks obtained in formal exams)

Question paper of a particular chapter designed by the exam department for academic evaluation.

Special attention was given to ensure that the question papers for pre test and post test is of equal difficulty level.

Beta wave tune

Procedure

School Readiness

In this research, the investigator had made a team of experts consists of teachers, special educators ,psychologist, psychiatrist parents and other therapists like SI therapists, occupational therapists etc of the children of both experimental and control group and the

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investigator herself. The team, in several sessions of meetings, had discussed on many essential areas of academic skills of each and every ADHD child involved in the study, equal input in terms of academics, and a check on medications and other therapies which the child is getting to rule out their effect and put a clear focus on the effect of only beta wave therapy.

Individual assessment was made on each ADHD child of experimental as well as control group to check the present academic status. This assessment helped investigator to know about the abilities as well as limitations of the children. The groups were then sent to the preparatory class for enhancement in readiness skills for a period of 30 days. In this preparatory class, more emphasis was given by the special educator on reading, writing and arithmetic areas of academic skills. In pre-reading concept, training of functional reading was focused at initial stage. Children of both groups were trained on sorting, identification, matching of objects, which are used or seen in immediate environment like domestic animals, shapes, colours, vehicles, fruits, flowers etc. After this training, the special educator started functional two letter words. Then the special educator had selected the words based on ability of the children and those words which have high utility in their environment. Children were also encouraged to make stories on their own through the flash cards and pictures. The need for manipulative experiences to strengthen the muscles required for writing and pencil control was also felt by the team. Hence, gross and fine motor activities of manipulations like knobs on puzzles, nuts and bolts, caps on small bottles, figure painting etc. were performed by the children. Stages of writing like scribbling, tracing, joining of dots, copying on paper sheets were also conducted on them respectively.

Similarly, readiness skill in arithmetic was also an important part in training of these children. Concrete objects were used to provide meaning for the concepts. All the contents were arranged in a sequential order through task analysis approach. Instructions were given based on practical examples of daily life for social skills. Its Utility in social and vocational context was also in the focus. Drill and practice method was used to enhance the arithmetic skills. Practical situations and experiences were provided to establish associations between them and generalize the skills. After the preparatory classes and school readiness, these children were randomly divided into experimental and control group.

Experimental Group

After completion of 30 days preparatory classes, the control group continued to take part in their routine in school without any special therapies or medications and the experimental group was introduced to the beta wave tune for 6 months on regular basis twice a day for one hour along with the normal school hours, and co curricular activities.

The investigator, gave thorough information to the teachers and key persons about the children of experimental group. The researcher discussed on their performance and abilities as well as limitations of the ADHD children in detail with general class teacher as well as with the Principal of the school.

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Before giving beta wave therapy to experimental group, pre-assessments were conducted to evaluate the academic skills and marks in a particular chapter test of both experimental and control groups using academic assessment tool that is a question paper designed by the exam department for academic evaluation of the children. A meeting with the teachers of was also made to review the procedure before starting the actual process. During the meeting suggestions regarding the procedures were incorporated. This study took place over a period of six months. In this research, investigator had worked with the children of age group 9 to 12 years.

Both the experimental and the control group ADHD children were included in a inclusive education system with equally skilled teachers and coordinators During this period support as well as follow up process was also done by the investigator regarding teaching procedure to ensure equal inputs to both the experimental and control group children. Each ADHD child was placed besides the high achievers in the classrooms.

Control Group

In the second group, which was the control group, music therapy (beta wave) was not provided. Classroom teaching methods which were generally used in schools were used for instructions. The co-curricular activities of both the groups were same. The training period i.e. the school hours were also same in school. After six months, both the groups were assessed on academic skill areas in post test evaluation through a question paper of similar level of difficulty from the same chapter but not the same question which was used in the pre test evaluation process.

Pre test environment

Experimental Group

Question paper of equal difficulty level to be solved by the child without beta tune playing in the background.

Control Group

Question paper of equal difficulty level to be solved by the child without beta tune playing in the background

Post test environment

Experimental Group

Question paper of equal difficulty level to be solved by the child with beta tune playing in the background.

Control Group

Question paper of equal difficulty level to be solved by the child without beta tune playing in the background.

Statistical Analysis

In the present study, to find out the significant difference between Pre and post assessment ADHD children, Mean, Standard Deviation (SD) and Paired Sample 't' test were used.

RESULT

Table 1: Showing Mean, SD and 't' values between pre & post test scores of Experimental Group for marks obtained in the academic test

Measure	Group		Mean	SD	SEM	t	Sig.level
Academic score	Pre test	5	41.54	14.94	4.31	7.26	P<0.01
	Post test	5	52.40	13.20	3.81		

Results of the Table 1 summarized that mean value of marks obtained in the exam is to be found for Pre test session M=41.58 (SD=14.94) after the training period the value of Post test session is M=52.41 (SD=13.20), this shows there is a significant difference and the 't' value is 7.26($p<.01$). It reveals that now the group responded much more in academic performance after the beta wave therapy.

Table 2: Showing Mean, SD and 't' values between pre & post test scores of Control Group for marks obtained in the academic test

Measure	Group		Mean	SD	SEM	t	Sig.level
Academic score	Pre test	2	41.83	14.86	4.29	1.91	NS
	Post test	2	42.09	14.92	4.30		

Lastly, results of the Table 2 summarized that mean value of marks obtained in the exam is to be found for Pre test session M=41.83 (SD=14.86) after the training period the value of Post test session is M=42.08 (SD=14.92), this shows there is a insignificant difference and the 't' value is 1.91($p>.05$). It reveals that this group has not increase much more in their academic performance.

DISCUSSION

In the present investigation, an attempt was made to understand the Significance of beta wave tune in ADHD Children. Results are discussed in relation to similarities and differences found between present study and the research works of others. Outcome of study also confirmed (Ha1) Exposure to beta wave tune for 1 hour twice a day on regular basis for 6 months and playing the tune in background during examination will increase the attention span of ADHD children.

Potential benefits and mechanism of action of music (beta wave) therapies have been evidenced through research and continue to be explored. Compared to pharmacological treatment, music therapies have little to no unwanted side effects. There is little cost compared to clinical therapy since the only cost is for training or sessions that are typically conducted in groups. It can be practiced at home or school. Families and teachers can access videos online or purchase videos from reliable sources as resources to guide the therapy.

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It can be done anywhere and at any time. It is counterintuitive that it has positive effects on ADHD symptoms because theta to beta ratios are typically increased in ADHD. It improves symptoms because of the quantity of brainwave activity, which leads to the learned skill to control attention and focus to a specific purpose or action. Further study of whether persons with ADHD can perform meditation and mindfulness more effectively because of their naturally increased theta activity is worth exploration. How mind-body therapies affect neuroanatomical and neurotransmitter function may also support its therapeutic use.

Thus, confirmation of hypotheses concluded that increased attention span is linked positively with better academic result of ADHD children. On contrary, academic performance did not vary much in control group and the difference is not significant which can be attributed to chance factor.

CONCLUSION

Potential benefits and mechanism of action of beta wave therapy have been evidenced through research. It can be used effectively to yield better academic result from ADHD learners. Compared to pharmacological treatment, beta wave therapy has no unwanted side effects. There is little cost compared to clinical therapy since the only cost is for training or sessions that are typically conducted in groups. It can be practiced at home or school. Families and teachers can access videos online or purchase videos from reliable sources as resources to guide the therapy. It can be done anywhere and at any time.

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Limitations

Small sample size. More research needs to be done with larger samples and better controlled environment.

Implications

The following recommendations were made on the basis of present findings and conclusions:

1. Educational and mental health institutes should organize in-service short term courses, workshops and conferences for general teachers on Special education. These teachers training program should help inculcate positive attitudes among teachers and provide knowledge and skills to handle ADHD students in regular classrooms. In-service training through seminars, workshops or short term courses enable teachers to acquire knowledge and skills for successful inclusion.
2. Inclusion program should include the trainings of the parents of differently able children, normal developing children and participation of the parents into the activities seems more likely to be successful inclusion.

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Conflict of Interest

The authors colorfully declare this paper to bear not conflict of interests

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