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## The effectiveness of brain gym activity on anxiety in children with dyslexia

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### Abstract

**Background:** Dyslexia is a learning disorder that involves difficulty in reading due to problems identifying speech sounds and learning how they relate to letters and words (decoding). Children with dyslexia show many emotional problems like anxiety, depression, aggression and social problems. Brain Gym exercises could be used to facilitate learning in a variety of academic areas such reading skills, oral reading, reading comprehension, memory and self-esteem.

**Objectives:** The objectives of this study were to determine Effectiveness of Brain Gym Activity on Anxiety in Children with Dyslexia using Screen for Child Anxiety Related Disorders (scared)-child Version and parent Version.

**Methodology:** Thirty participants between the age of 11 to 15 years with the diagnosis of dyslexia and having symptoms of anxiety were selected. Participants received Brain Gym Activity for 20 min per day for 3 days per week, for duration of 6 weeks. After that pre and post intervention assessments were done.

**Result:** Extremely significant difference was seen in pre and post scores scared-child Version and parent Version. Pre intervention and post intervention mean for scared-child Version was 28.5 (SD=8.984) and 21.21 (SD=6.822) and for the scared-parent Version was 26.60 (SD=7.062) and 20.82 (SD=6.487) respectively with p value <0.0001.

**Conclusion:** The children were showing anxiety on pre-assessment. The similar level of anxiety was observed by their parents. After receiving Brain Gym Activity as an intervention, their anxiety level reduced. So the Brain Gym Activity is an effective intervention to treat the symptoms of anxiety.

**Keywords:** Dyslexic children, anxiety, brain gym activity, scared-child version and parent version

### Introduction

Dyslexia is derived from the Greek language and literally means “difficulty with the words.” In 1887 first time the term dyslexia was introduced [1]. Worldwide, around 15%-20% of the population has a language-based learning disability of which 70%-80% have dyslexia [2]. The International Dyslexia Association reckons that an estimated 15%-20% of the world’s population experience at least one symptom of dyslexia or the other [3].

“Dyslexia is a specific learning disability that is neurological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede the growth of vocabulary and background knowledge” [4].

Jerome J. Schultz’s in “The Dyslexia-Stress-Anxiety Connection” IDA fact sheet described that, children with dyslexia show many emotional and social difficulties. Anxiety was one of them and comes in many forms. It can be situational (that is, specific to one kind or class of worry, like traveling or being in social situations). Individuals with dyslexia may experience marked anxiety in situations in which they feel they will make mistakes, be ridiculed, pressure from parents, stigma or made to feel foolish in front of others as well as feeling of ashamed, also the fear of failure is a factor that causes anxiety. Severe anxiety or fears in this child may land them into phobias like social anxiety disorder or social phobia and Generalize anxiety disorder or generalized phobia [4].

This anxiety in children can be measured by Depression can be assessed using Beck Depression Inventory (BDI) [5], State-Trait Anxiety Inventory (STAI) [5], Depression Anxiety and Stress Scale (DASS-42) [6] and Screen for Child Anxiety Related Disorders (SCARED) CHILD Version as well as PARENT Version [7].

How dyslexics cope and the effects of their coping have received little attention in the 100 years. Coping and the effects of coping by dyslexic children at school should not be underestimated. There are studies, which used standardized tests for self-esteem, coping and depression [8], but there are very few studies where 'the Brain Gym' a movement-based program is used to improve academic and behavior needs by promoting whole-brain learning.

Dennison and Dennison developed Brain Gym, also known as Educational Kinesiology, in the 1970s. It consists of a series of movements that activates the brain, promote neurological repatterning and facilitate whole-brain learning. The program is based on the notion that learning problems are caused when different sections of the brain and body do not work in a coordinated manner, thereby blocking an individual's ability to learn (Dennison & Dennison, 1994). To overcome this learning block, the program recommends a variety of simple movements that are intended to improve the integration of specific brain functions with body movements and helps re-educating the mind and body that would result in learning any skill more efficiently and easily [9].

### Materials and methods

**Participants:** 30 school going dyslexic children showing anxiety was selected for the study. Children were screened according to the selection criteria. Children between the age group of 11 years to 15 years, who were having dyslexia, children and one of the parents both should understand the questionnaire and should be able to respond appropriately and who were willing to participate were selected for the study. Whereas children with low level of IQ (Below 85), mental retardation, physically challenge, with any known case of cardiorespiratory, musculoskeletal impairment and any visual and hearing impairment were excluded from the study. 2 children were excluded as one of them left school because of family problem and other was not regular in school. Hence 28 children were recruited for the study. The

study received ethical approval from the Institutional Ethical Committee (IEC) of Dr. A. P. J Abdul Kalam College of Physiotherapy, Pravara Institute of Medical Sciences. All the children's parents filled and submitted a prior informed consent form.

**Brain Gym Activity:** Intervention consisted of 20 minutes per day for 3 days in a week for total of 6 weeks, which included 10 exercise namely Cross Crawl, Neck Rolls, The Rocker, Belly Breathing, The Energizer, Brain Buttons, Space Buttons, Thinking Cap, Hook-ups and Positive Points.

**Outcome Measures:** Measurements were taken at the baseline and at the end of the study that is after 6 weeks. Level of anxiety was assessed using Screen for Child Anxiety Related Disorders (SCARED) CHILD Version. The same questionnaire in a form of Parents Version that is Screen for child anxiety related disorders (SCARED) Parent version was given to parents to confirm the level of anxiety [7].

**Data Analysis and Results:** The data was entered in the excel spread sheet tabulated and subjected to statistical analysis. Data was analyzed using Graph Pad Instat Trial Version 13.3. Descriptive statistics for all outcome measures were expressed as mean, standard deviations and test of significance such as t test. The confidence interval was set at 95% and data was considered statistically significant with  $p < 0.05$  and highly or considerably significant with  $p < 0.001$ . Out of 30 participants, 13 participants (43%) were male and 17 participants (57%) were female, receiving treatment for 6 weeks.

The mean value of SCARED-CHILD version before intervention was 28.5 and SD was 8.984, and after intervention was 21.21 and SD was 6.822. On comparing scores of pre and post intervention, it was observed that this difference was extremely significant with p value  $< 0.0001$  and t value 11.769 with 27 degrees of freedom. (Table. 1) and the mean value of SCARED-PARENT version before intervention was 26.60 and SD was 7.062, and after intervention was 20.82 and SD was 6.487. On comparing scores of pre and post intervention, it was observed that this difference was extremely significant with p value  $< 0.0001$  and t value 12.627 with 27 degrees of freedom. (Table. 2).

**Table 1:** Comparison of Pre-Intervention and Post-Intervention scared-child Version

	Mean	SD	Paired 't' test value	'p' value	Result
Pre-Intervention	28.5	8.984	11.769	<0.0001	Extremely Significant
Post-Intervention	21.21	6.822			

**Table 2:** Comparison of Pre-Intervention and Post-Intervention scared-parent Version

	Mean	SD	Paired 't' test value	'p' value	Result
Pre-Intervention	26.60	7.062	12.627	<0.0001	Extremely Significant
Post-Intervention	20.82	6.487			

### Discussion

This study aimed at evaluating the Effectiveness of Brain Gym Activity on Anxiety in Children with Dyslexia between age group of 11 years to 15 years studying in Padmashree Dr. Vithalrao Eknathrao Vikhe Patil Vidyalaya, after the period of 6 weeks duration. Total of 28 participants were included in the study.

In this study, we used Screen for Child Anxiety Related

Disorder (SCARED)-CHILD and PARENT Version, developed by Boris Birmaher *et al* in 1995. Pre-intervention mean for SCARED-CHILD Version was 28.5 (SD=8.984) and mean for SCARED-PARENT Version was 26.60 (SD=7.062), showing that children were having Anxiety Disorder as score  $\geq 25$  indicates presence of Anxiety Disorder. From the above findings it is clear that, symptoms of anxiety that are experienced by the children, were

similarly observed by their parents.

Julia M. Carroll *et al.*, conducted study on an assessment of anxiety levels in dyslexic students in higher education. They found that the dyslexic children in higher education showed anxiety levels that are well above than anxiety shown by students without learning difficulties. This anxiety is not limited to state anxiety and anxiety in academic tasks but extends to many social situations. They recommend that assessment of emotional well-being should form part of the assessment of need for dyslexic students entering higher education <sup>[10]</sup>.

For these symptoms of anxiety, the children received 10 Brain Gym Activities as a form of intervention for about 20 minutes per day, for 3 days per week for 6 weeks duration. After receiving intervention, the post-intervention data was collected. The post-intervention result showed that, the mean was 21.21 (SD=6.822) for SCARED CHILD Version and mean was 20.82 (SD=6.487) for SCARED PARENT Version. By using test of significance it is proved that, there is extremely significant improvement seen after intervention in both SCARED CHILD and PARENT Version with p value <0.0001 and t value 11.769 with 27 degrees of freedom (Table.1) and p value <0.0001 and t value 12.627 with 27 degrees of freedom (Table. 2) respectively. Evidently, Brain Gym Activity is an effective intervention for symptoms of anxiety in dyslexic children.

It is said that, the Brain Gym Activity activates brain for academic skills and behavioral/postural correlates by <sup>[11]</sup> simple movements that relieves stress naturally and quickly enhances brain function. It integrates the left and right hemispheric function of brain and brings about whole brain learning. It controls emotional stress that is so often created in new learning situations. It prepares brain to learn <sup>[12]</sup>. During periods of increased stress, as adrenalin levels rise, a lowering of electrical potential across the nerve membrane occurs, preparing the body for fight or flight. In this state, the body reacts in order to survive, focusing electrical energy away from neocortex and to the sympathetic nervous system. The Brain Gym Activity activates the neocortex, thus refocusing electrical energy back to the reasoning centers. This stimulates parasympathetic function and decreases the release of adrenalin. By increasing the electrical threshold across the nerve membrane, thought and action are again coordinated <sup>[11]</sup>.

The stressed learner can go into a homolateral learning state, in which the dominant brain hemisphere takes over most mental processes. Under stress, the non-dominant hemisphere shuts down up to 75% or 80%. As a result, the learner no longer has full access to the functions of non-dominant hemisphere. One-sided learning occurs. Brain Gym can reduce these learning blocks by consciously activating the whole brain/body system, and lessening the fight/flight reaction. When learning is easy and stress-free, the learner regains his/her innate interest in learning and their self-esteem is heightened <sup>[12]</sup>.

However, The stress and learning process are inter-related. So if the learning is affected then it causes stress in children. There are many studies, which concentrated on improving the academic performance using Brain Gym but there are no studies, which concentrated on behavioral aspect of children with dyslexia. So in present study we aimed at improving their behavioral aspect, which is anxiety using Brain Gym Activity in dyslexic children.

## Conclusion

From the above study it was concluded that, the children were showing anxiety on pre-assessment. The similar level of anxiety was observed by their parents. After receiving Brain Gym Activity as an intervention for 6 weeks duration, their anxiety level reduced. So the Brain Gym Activity is an effective intervention to treat the symptoms of anxiety. Hence, null hypothesis is rejected and alternative hypothesis is accepted because the intervention is effective in alleviating symptoms of anxiety.

## Limitation of the study

1. Only one school was included in the study.
2. This study included small sample size.
3. No follow up after 6 weeks was planned for this study so long term effect of intervention could not be measured.

## Recommendation

1. Study including larger number of schools can be undertaken so as to generalize the results to whole population.
2. Future study can be conducted with larger sample size and with long-term follow up.

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