

Importance of Neuropsychological Rehabilitation on Retraining Cognitive Functioning in School Going Children with Congenital Heart Disease (CHD)

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Abstract

The School going Pediatric patients with complex Congenital Heart Disease (CHD), exists a distinctive pattern of neuro developmental impairment characterized by cognitive impairment. Early rehabilitation as followup procedure postoperative consequently result in improvement of neurodevelopmental and neuro psychological outcomes in the high risk population.

To study the importance of Neuro psychological rehabilitation in retraining cognitive functioning in School going children with CHD.

Pre and Post experimental design study was carried out in 20 children between age group 6 and 7 years. The subjects were given 50 hrs (25days* 2 hours) of manualized cognitive retraining. Pre and Post intervention assessment was done using PGI scale.

Highly significant improvement was noted in cognitive skills retraining program postoperatively.

Manualized Cognitive retraining started immediately postoperatively helps to improve cognitive skills in CHD children. The Findings have implication for recommending post surgical neuropsychological rehabilitation in children with CHD. This helps the Children to cope up with academics which develop positive approach of life.

Keywords: Congenital Heart Disease, Neuropsychological Rehabilitation, Pediatric, Cognitive Retraining

Introduction:

Congenital Heart Disease (CHD) or Congenital Heart anomaly is a defect in the structures of the heart and great vessels which is present at birth. The causes for CHD being genetic and environmental but usually the combination of both. There always exists a distinctive pattern of neurodevelopmental pattern characterized by cognitive impairment in CHD. Many school survivors of infant cardiac surgeries require Neuropsychological rehabilitation services. Early screening, evaluation diagnosis in CHD population and early rehabilitation viz., neuropsychological rehabilitation as follow up procedure post operatively consequently result in improvement in neuropsychological outcomes in high risk population.

In early fetus the brain and heart develop simultaneously. The derangement of the fetal blood flow result in impaired blood flow to brain, Inturn impairing brain growth and development. Medical and surgical procedure management has resulted in significant decrease in the mortality rate but causing a declined quality of life with poor development of cognitive, emotional and behavioural skills. The important goal of this study is to define the impact of CHD on brain development, minimizing post natal brain injury and improving quality of life. Various studies reveal that 30-45% of the survivors have neuropsychological abnormality especially poor cognition resulting in poor academic performance and few suffer from scholastic disorder. Hence this study takes a forestep revealing the importance of neuropsychological rehabilitation post operatively in children with CHD. Cognitive retraining is the training given based on two important key element, they are Repetition – to make the skill automatic and Reinforcement. The Neuro cognitive domains which are considered for cognitive retraining in this study includes Remote and Recent memory, Attention and Concentration, Delay recall, Immediate recall, Verbal retention similar and dissimilar, Visual Retention, Recognition, Orientation and life skills.

The manualized cognitive retraining targets to retrain each skills separately and sequentially, increasing graded practice of activities using the method of saturation cueing followed by generalization. It makes use of person's stronger capabilities to bolster the weaker ones. The process continues with diminishing degree of assistance. A number of activities are designed to train the cognitive skills of the children with CHD which are most suited to Indian context.

Aim of The Study:

To study and compare the efficacy of cognitive retraining for enhancing the Neuropsychological Dysfunction (Cognitive Skills) in children post operated Congenital Heart Disease.

Objectivity of The Study:

- ✓ To study the extend of the neuropsychological dysfunction in children with CHD.
- ✓ Neuropsychological Rehabilitation in children with CHD retraining Cognitive skills.
- ✓ To assess the cognitive improvement pre and post cognitive training.

Procedure:

Children and parents were educated about the nature and procedure of the study. The children were enrolled in the study after obtaining parental consent. Pre intervention assessment was made. All the activities to be used in order of administration, including each program description, material requirement, set up, instruction to students, response input were complied. The first few sessions were devoted to the introduction and baseline assessment of the children. All baseline assessment was done individually. After pre intervention assessment the participants began the cognitive retraining sessions which were to be administered daily for a duration of two hours for a period of 25 days which makes 50 hours of retraining program. Post intervention the post intervention assessment was made. Manualized Cognitive retraining is effective therapeutic module for enhancing skills where remedial cognitive training have reported to have significant positive effect¹. Thus limited research along with clinical experience suggest that neuropsychological rehabilitation is important. This study is an attempt in direction to prove the importance of neuropsychological rehabilitation of cognitive skills in children with congenital heart disease where medical and surgical procedure cures the disease but neuropsychological rehabilitation work to prevent further disorder hence providing a meaning to the life they live with better and fulfilled quality of life.

Research methodology

The population, sample and sampling

The population of this research is children with congenital heart disease of age group 6 and 7 in MMM hospital Chennai. For sampling the sample size was selected by convenient sampling.

Research tools

The instrument used in this study, PGI memory scale. It is a standard questionnaire consisting of 10 subtests such as Recent Memory, Remote Memory, Attention and Concentration, Delay recall, Immediate recall, Verbal retention, Similar Verbal Retention, Dissimilar Visual retention and Re organization

The Analysis of Data

The data thus collected following the above design and procedure was interrupted using mean and standard deviation which was compared through paired t test using SPSS.

Research Findings

TABLE 1: Comparative analysis of the cognitive skills variables pre training and post training

Cognitive Skill	PRE TRAINING (n=20)		POST TRAINING (n=20)		T Value	P Value
	Mean	SD	Mean	SD		
Recent Memory	2.65	0.87	3.85	0.36	6.43*	0.04
Remote Memory	3.20	1.32	4.30	0.92	4.81**	0.01

Attention and Concentration	45.80	6.38	62.00	0.00	11.34*	0.02
Delay recall	3.90	0.78	7.00	1.02	13.58**	0.00
Immediate recall	6.00	2.05	10.70	0.97	14.10*	0.02
Verbal retention Similar	2.55	1.35	4.25	0.44	5.50**	0.01
Verbal Retention Dissimilar	2.55	1.35	4.20	0.41	5.47*	0.03
Visual retention	3.40	1.39	6.35	0.87	8.57**	0.00
Re organization	6.05	1.82	8.30	1.30	4.85*	0.02

* Statistically significant

** Highly statistically significant

Chart 1: Graphical representation of Cognitive skill variable during Pre training and Post training

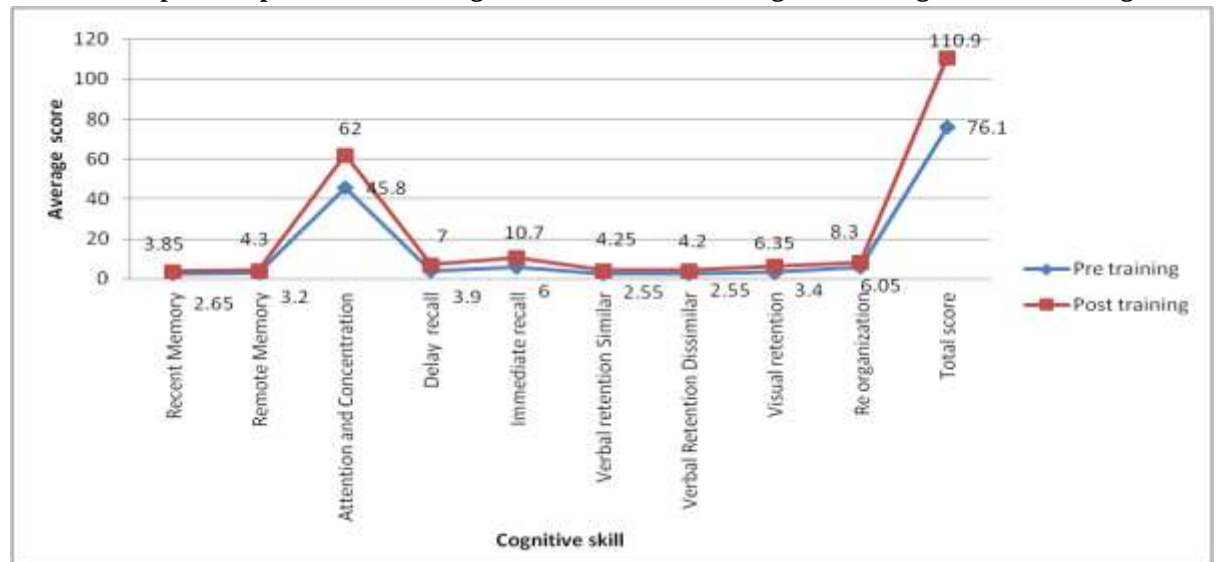


Table 1 shows the comparative analysis of the cognitive skills variables pre training and post training in 20 subjects . It is observed that the obtained t values are significant for recent memory, Attention and concentration, immediate recall verbal retention of dissimilar words and recognition at 0.05 level of significance and , the t value of remote memory , delay recall , verbal retention similar ,visual retention at 0.01 level of highly significant . Chart 1 is the Graphical representation of Cognitive skill variable during Pre training and Post training.

TABLE 2: Comparative analysis of the values obtained during the pre training and post training

Total Cognitive Score	N	Mean	SD	T value	P Value
Pre training	20	76.1	7.76	18.97**	0.00
Post training	20	110.95	2.60		

* Statistically significant

** Highly statistically significant

Table 2 shows the comparative analysis of the values obtained during the pretraining and post training . The mean of pretraining was 76.1 ± 7.76 and post training was 110.95 ± 2.60 with a t value of 0.00 which

is highly significant at P value <0.00 indicating the high effectiveness of neuropsychological cognitive retraining in children with Congenital Heart disease .

Discussion

Cognitive retraining techniques have reported to produce improvement in patient of congenital heart disease, These techniques are also used for brain injury and learning disabilities affected children. Reportedly Cognitive retraining techniques is used in enhancing the cognitive deficit in children with CHD, which plays a major role in their academic performance. As seen in result, the group of children considered for the study showed highly significant improvement in cognitive skill post training phase.

Cognitive retraining techniques (CRT) have been reported to produce improvement in patients with traumatic brain injury². They are expected to have impairment in many neuro cognitive domains and associated with neurobiological pathway which was specifically targeted by CRT. This study reveals that impairment of cognitive skills leads to impairment of scholastic performance which affects the quality of life and might lead to change in behavior and emotional changes.

Neuropsychological rehabilitation is considered to be the integral part of the management to train cognitive skills for the betterment of the academic performance. Hence probably targeting these cognitive domains using CRT one can enhance the scholastic performance of these children³. Manualized cognitive retraining modules developed for the study includes activities such as Remote and Recent memory , Attention and Concentration, Delay recall, Immediate recall, Verbal retention similar and dissimilar ,Visual Retention ,Recognition. Remote and recent memory measured in the study is the capacity to remember the recent and remote activities happening in day today life. Prolonged hospitalization of the children makes them difficult to even remember and recollect the basic information, which was found to improve significantly after the retraining program.

Attention and concentration measured in the study is the capacity to attend for a period of time even in presence of distraction. It is found that there were a significant improvement in the post training assessment . The other domain such as delay recall, Immediate recall, Verbal retention similar and dissimilar, Visual Retention, Recognition shows high significant changes and improvement after manualized training.

It indicates that prolonged hospitalization and other emotional factors plays a major indicator for high significant changes pre and post training phase. Manualized cognitive retraining induces a better emotional rappo between the child and the psychologist which changes their behavior and emotion in positive perspective, inturn acts as a positive reinforcement in retraining their cognitive skills.

The samples of the present study being small, the findings must be generalized with caution. The findings need further validation through a study with larger sample from wide range of socioeconomic strata. This study has implication for planning intervention modules for different age group of Children with CHD.

Conclusion:

Cognitive retraining over 50 hours can help to remediate cognitive skill in turn remediating the academic deficits in children and improve their scholastic performance.

The findings have implications for combining these approaches as the followup for cardiac patients aiming to improve academic performance stemming from an enhanced skill base rather than from just educational based intervention.

Practical suggestions:

The results have shown that neurological rehabilitation – Cognitive retraining can be included in treatment plan for the children affected with Congenital Heart Disease .

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