

Case Study on Visual Perception - A Child with Suprasellar Germinoma

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Abstract: Children treated for brain tumor are at greater risk for neurocognitive late effects that produce declines in IQ, academic skills and Symptoms of attention-deficit disorder and deficits in mental processing speed, working memory, executive functioning. Occupational therapist have significant role in visual perception and its contribution to task performance. The purpose of this case study was to identify effectiveness of visual perception in a child with brain tumor; Post chemo therapy. The participant was selected on the basis of inclusion criteria and received regular occupational therapy intervention for visual perception and training visual perception through incorporation of ADL and IADL skills for 6 weeks (18 sessions). The pre-test and post-test was done using The Berry-Buktenica Developmental test of visual-motor integration- 6th edition. On comparing with the pre-test and post-test scores, the beery VMI pre-test raw score is 17 and the post-test raw score is 20, the standard score value of pre-test is 72 and the post test is 82. Thus there is an effectiveness in training visual perception with incorporated training with ADL and IADL skills.

Keywords: Brain tumor, Occupational therapy, Visual perception, paediatrics.

INTRODUCTION

A brain tumor is an accumulation of abnormal cells in the brain or central spinal canal. There are two main types of brain tumors: primary brain tumors, which originate in and generally remain in the brain, and metastatic brain tumors, which start as cancer in another part of the body and spread to the brain.

Generally, the paediatric brain tumors Attention, working memory, processing speed, new learning, visuospatial and visuomotor functioning, executive functioning, and areas of academic achievement have been found to be at particular risk. (Marsha N gragert,et.Al,2011) cognitive deficits identified in this study can result From direct tumor and surgical effects such as visual-motor and processing speed deficits Secondary to encroachment of the pyramidal tracts, indirect tumor and surgical effects such as attention and executive dysfunction due to disruption of subcortical-cortical transmission, Or late effects of adjuvant therapy such as deficits in attention, executive function and Processing speed due to white matter changes associated with adjuvant therapies. Core Deficits in attention and executive functions can subsequently affect rate of learning such that Declines are found over time in global indices such as intellectual, academic and adaptive Functioning survivors of Acute lymphoblastic leukaemia treated with chemotherapy only, still show subtle visuo-Motor deficits after having finished treatment at least 1 year Earlier. Worse visuomotor performance is restricted to conditions where higher order control is required, and is likely Due to central neurotoxic effects of the treatment (ANNEMIEKE I. BUIZER, 2005)

Occupational therapist has been concerned with visual perception and it's contribution to task performance. They have used concepts from various disciplines to develop guidelines for intervention related to visual perceptual dysfunction in children and adults. Activities of daily living (ADLs) are the routine tasks that individuals perform daily to maintain their personal hygiene, independence, and overall well-being. These activities are essential for individuals to fully engage in their daily lives and function independently. Instrumental ADLs (IADL) require a higher level of cognitive and physical functioning. Mastering IADLs is crucial for children and young adults as they transition to independent living. Being able to perform IADLs allows individuals to participate fully in their communities and leads to a better quality of life.

The visual perception frame of reference helps children who struggle to interpret and use visual sensory information. These difficulties can impact their performance in education, daily activities, play, and social interactions. The aim is to help children attend to and process visual information for better task performance.

This approach integrates theories from cognition, developmental psychology, education, including Warren's developmental hierarchy of visual perceptual skills. It uses a bottom-up approach for evaluation and intervention, viewing the visual system as interacting with other systems to process information. This involves a continuous process of input, processing, and output, with feedback leading to behavioral changes.

Regarding the effectiveness of occupational therapy for visual motor skill, shows positive evident and effective in children.(Eun-Kyoung Hong et. Al) Visual perceptual problems affect many areas of children's lives beyond education, including daily living activities (ADLs), work, play, leisure, and social interactions.

Using ADLs as a means of treatment in the home environment for six weeks could improve cognition and visual perception in patients with stroke. Twenty-four patients were randomized to receive home-based ADL and hospital-based traditional rehabilitation. The findings showed that there was a statistically significant improvement and small effect size in visual perception(En-Chi Chiu et. Al,2020). However there is no occupational therapy intervention for incorporating ADL and IADL skills to teach visual perception post chemotherapy .

Thus, this study aims to determine the effectiveness of visual perception using ADL and IADL skill incorporated in addition to conventional visual perception therapy.

STUDY METHODOLOGY:

RESEARCH DESIGN: Case study

SAMPLING TECHNIQUE: Convenient sampling technique

CRITERIA FOR SAMPLE SELECTION:

INCLUSION CRITERIA:

- 6-12 years [Warren (1993a) presented a developmental hierarchy of visual perceptual skills]
- Brain tumor patient
- Post chemotherapy Within a year

EXCLUSION CRITERIA:

- Other cancer types
- Visual perception affected in other paediatric conditions
- Children with visual deficit
- Children with chemotherapy complications.

STUDY SETTING:

Home based therapy was done

ASSESSMENT TOOL:

The tool used to assess the visual perception, for the pre and post-test was THE BEERY-BUKTENICA DEVELOPMENTAL TESTS OF VISUAL-MOTOR INTEGRATION (6th edition)

DEVELOPMENT AND DESCRIPTION OF THE INTERVENTION PROTOCOL

Protocol has been set based on the visual perception frames of reference (Frames of reference for paediatric occupational therapy Paula Kramer -3rd edition) and occupational therapy for children -case-smith O'Brien - 6th edition)

Training has been done by incorporating ADL and IADL skills followed by regular occupational therapy intervention for visual perception.

DURATION: 45 min per day

TOTAL SESSION: 3 sessions per week for 6 weeks

VISUAL PERCEPTION	ADL and IADL
• Visual attention • Visual memory • Visual discrimination • Visual imagery	• Self-care • Home management • Community mobility

Visual perception components and ADL and IADL skills incorporated in therapy

WEEK	DAYS	PROTOCOL
1 st week	1 st day	• Demographic data • Client information collection • Study explanation • Assent form formalities • Pretest test • Build rapport
	2 nd day	• Worksheet of colour pattern copying • Ball passing and kicking to the goal • Letter identification and encircling • Right and left discrimination (donning trousers) -ADL
	3 rd day	• Dot pattern joining • Picking letters and sorting similar alphabets

		• Complex shapes copying(side to side) • Montage activity • Gardening
2 nd week	4 th day	• Matching • Puzzle • Colour sorting • Figure ground perception worksheet • Wearing and removing shirts and t-shirts
	5 th day	• Tangram • Visual closure activity- identifying the subset shapes • Identifying and placing objects on the trace • Cutting fruits
	6 th day	• Exercise • Finger painting • Pattern tracing • Tangram • Object sorting • Making bed
3 rd week	7 th day	• Exercise • Clock learning • Buds pattern copying based on colours placements • Cereal sorting
	8 th day	• Puzzle • Clock learning • Buttoning • Combing with different textured, different sized comb
	9 th day	• Visual closure activity worksheets • Tracing • Identifying foreground flowers from background and matching • Finding difference • Gardening
4 th week	10 th day	• Cutting and pasting • Spray painting within margins – boundary identification • Community mobility
	11 th day	• Memory game • Games • Cutting fruits
	12 th day	• Cereal sorting • Maze activity • Clock learning • Making bed
5 th week	13 th day	• Leaf painting and pasting • Cutting and pasting • Folding clothes
	14 th day	• Shading • Match stick pasting based on direction • Sequence following • Copying • Combing

	15 th day	• Tracing • Tangram • Puzzle • Drawing and colouring • Shirt and t-shirt donning and doffing
6 th week	16 th day	• Sorting a colour card (respected colour for respected colour) according sequential number • Matching • Ball passing and catching • Gardening
	17 th day	• Collage activity • Cutting and pasting • Unloading the vessels after washes according to sizes
	18 th day	• Free play with other kids • Post test • Community mobility

Pre-test and post-test was done using developmental test of visual-motor integration -beery VMI scale for assessing visual perception.

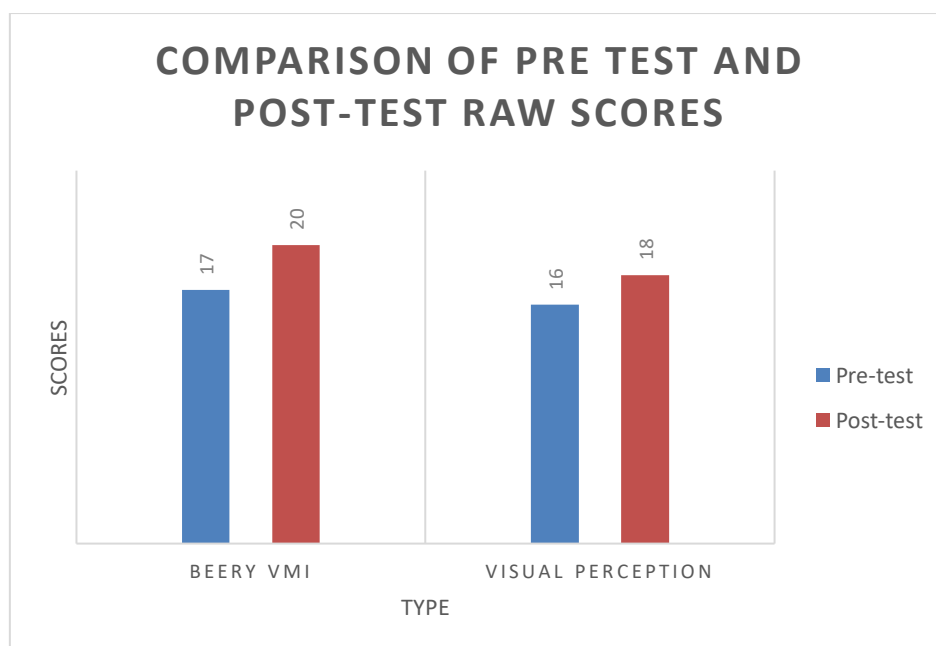
RESULT AND DISCUSSION:

RAW SCORE	Pre test	Post test
Beery VMI	17	20
Visual perception	16	18

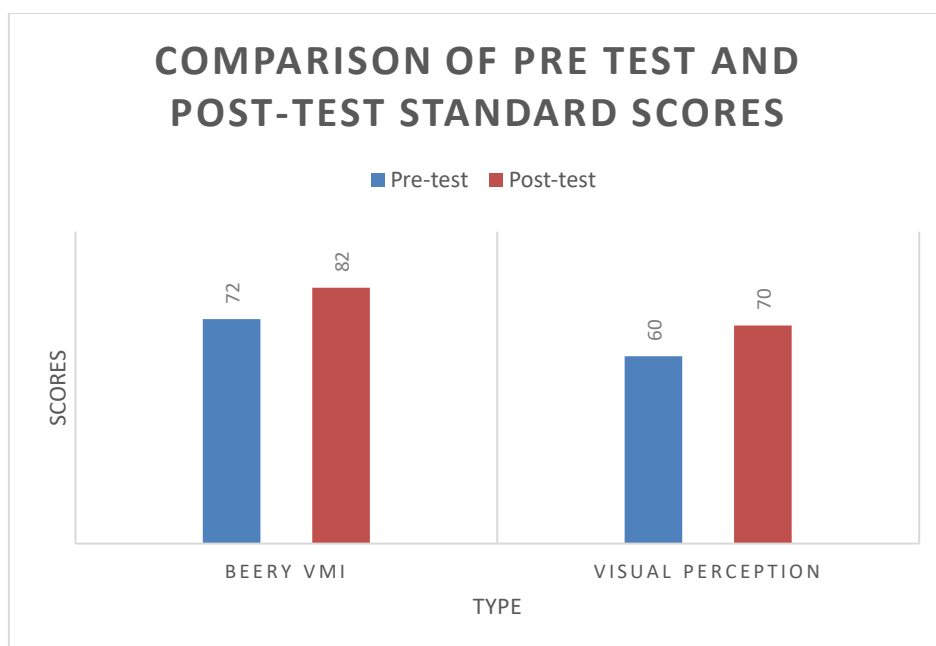
TABLE 1: Comparison of pre test and post test raw scores

STANDARD SCORE	Pre test	Post test
Beery VMI	72	82
Visual perception	60	70

TABLE 2: Comparison of pre test and post test standard score



GRAPH 1 : Comparison of pre test and post test scores



GRAPH 2: Comparison of pre test and post test standard score

Upon comparing the pretest and post-test scores, the results revealed significant improvement in both the Beery VMI and visual perception assessments. Specifically, in the Beery VMI, the pretest raw score was 17, which increased to 20 in the post-test. This change is further highlighted by the standard scores, which rose from 72 in the pretest to 82 in the post-test, indicating a considerable enhancement in visual-motor integration skills.

Similarly, the visual perception assessment showed notable progress. The raw scores improved from 16 in the pretest to 18 in the post-test. This improvement is reflected in the standard scores as well, which increased from 60 to 70. These changes suggest that the children's visual perception abilities enhanced over the course of the intervention. These comparisons clearly indicate that there was a significant improvement in both visual-motor integration and visual perception among the children with brain tumors, supporting the effectiveness of the intervention. The rise in both raw and standard scores from pretest to post-test demonstrates that the children's visual and motor integration, as well as their visual perception skills, benefitted positively from the intervention. This underscores the importance of targeted therapeutic strategies in improving visual functions in children affected by brain tumors. This underscores the importance of targeted therapeutic strategies in improving visual functions in children affected by brain tumors.

During the intervention period, the child exhibited a wide range of behaviors, often displaying unpredictable and interesting reactions. Although there was mild improvement in visual perception, the child's behaviors remained erratic and challenging to interpret within the short six-week intervention period. This intervention was conducted three days a week, which proved insufficient both for effective therapy and for building rapport with the child.

The child frequently demonstrated unwillingness to participate, often behaving as though attending therapy under compulsion. This reluctance appeared to stem from feelings of anger, frustration, irritability, and psychological distress, resulting in difficulty focusing on tasks. The child frequently resisted activities, displaying strong opposition, and at times, cursing and showing arrogance towards parents, caregivers, and occasionally the therapist. This resistance and behavioral issues, characterized by stubbornness and a controlling demeanor, were exacerbated by the parents and caregivers, who did not attempt to modify her behavior due to her health condition. This led to complete dependence on them for self-care activities.

During therapy sessions, the child's emotions and behaviors varied widely. On some days, she outright refused to participate, while on other days, she showed interest or appeared tired and disengaged, responding very slowly. Particularly in activities like gardening and community mobility, the child showed minimal interest, making these sessions especially challenging.

CONCLUSION:

The result of this study shows an positive evident. Thus concluding that ,there was a significant improvement in both visual-motor integration and visual perception

among the children with brain tumors, supporting the effectiveness of the intervention.

LIMITATIONS:

- ❖ The drawback of the study is the relatively short intervention period, which limited the ability to interpret and explore the results thoroughly. Patients with brain tumors require individualized, client-centered therapy combined with group therapy, which necessitates a longer duration to be effective.
- ❖ Since this study is a case study, the findings cannot be statistically generalized to a larger population.
- ❖ A holistic approach is essential for achieving more effective outcomes.
- ❖ The study did not account for confounding variables such as gender and specific tumor types. These factors could influence the outcomes and should be considered in future research to provide a more detailed understanding of the intervention's effectiveness.

RECOMMENDATION:

1. Future studies should involve a larger and more diverse population to enhance the generalizability and robustness of the study findings.
2. Implementing holistic interventions by occupational therapists is recommended for achieving more effective outcomes in children with brain tumors.
3. Consider conducting interventions in clinical or hospital settings tailored to meet the specific needs of the child, which may facilitate better engagement and compliance.
4. Future studies should explore different age groups within the 6-12 range, considering Warren's hierarchical development of visual perception, as well as diverse genders and various types of brain tumors to account for potential differences in treatment outcomes.

DECLARATION: *The authors have no conflict of interest*

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