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A study on effectiveness of therapeutic hand exercises in improving handwriting and speed for post stroke peripheral dysgraphia [Writing Disability]

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Abstract
Introduction: The main "language center" resides in the left hemisphere of the brain, when this part of the brain is damaged by a stroke, verbal and written communication skills are diminished. Therapeutic hand writing exercises for stroke patients can help improve dysgraphia by retraining fine motor skills and cognitive functions.
Aim: The aim of the study is to evaluate the effectiveness of hand therapy in improving handwriting and speed for post stroke peripheral Dysgraphia (writing disability)
Objective: To evaluate the effectiveness of hand therapy in improving speed for post stroke peripheral Dysgraphia by using word per minute test.
To evaluate the effectiveness of hand therapy in improving handwriting for post stroke peripheral Dysgraphia by using Handwriting Legibility Scale
Method: Present study is a pre and post experimental study, involving 10 post stroke subjects with writing disability, age between 40-50yrs. An interventional program of hand exercises are given to the subject for 30mints in a day for 5days per week.As a baseline measure word per minute test and handwriting legibility scale is assessed and reassessed after 3 months.
Result: The showed a significant improvement in handwriting after the application of hand therapy.
Conclusion: The study concluded that hand therapy are effective in improving handwriting and speed for post stroke peripheral Dysgraphia.

Keywords: dysgraphia; word per minute test; hand writing legibility scale

Introduction

A stroke is defined as the sudden death of brain cells due to lack of oxygen caused by blockage of blood flow [ischemic-reduces the blood supply] or rupture of on artery to the brain [hemorrhagic-bleeding inside the brain]. The main "language center" resides in the left hemisphere of the brain [frontal lobe-cingulate cortex], when this part of the brain is damaged by a stroke, verbal and written communication skills are diminished or eliminated altogether.
The inability to write after a stroke is called dysgraphia.It's primarily caused by impaired motor control in the hand [peripheral dysgraphia] or disrupted language processing skills [central dysgraphia]. Signs and symptoms may includes

- Poor or illegible handwriting
- Incorrect capitalization
- Omitting words from sentences
- Slow writing speed
- Fatigue after writing short pieces
- Inappropriate letter sizing
- Inappropriate letter spacing
- Unusual position of the body or hands when writing
- Saying words aloud when writing them down
- Watching the hands while writing
- Tight or unusual pen grip

Therapeutic hand exercises for stroke patients can help improve dysgraphia by retraining fine motor skills and cognitive functions. The essential tools used for this study was words per minute test and handwriting legibility scale

Need For the Study

After stroke, writing ability is diminished or eliminated due to damage of "language center" resides in the left hemisphere of the brain [frontal lobe-cingulate cortex].
There is a need for regains the writing ability under this age groups [between 40-50yrs of age].Because these people are mostly workers for their family and to improves the quality of life.
And also there must be doing mostly hand involvement works like system workers, IT professionals, bank employment officers, teachers, clerks and receptionists etc. This study is conducted to improve the handwriting of post stroke patients to improve their handwriting and to return their working environment.

Aim

The aim of the study is to evaluate the effectiveness of hand therapy in improving handwriting and speed for post stroke peripheral dysgraphia (writing disability)

Objective

- To evaluate the effectiveness of hand therapy in improving speed for post stroke peripheral dysgraphia by using word per minute test.
- To evaluate the effectiveness of hand therapy in improving handwriting for post stroke peripheral dysgraphia by using Handwriting Legibility Scale

Material and Methodology

Materials

1. Ball
2. Rubber band
3. Pencil
4. Handwriting legibility scale
5. Table chair
6. Stopwatch
7. Papers
8. Hand grip strengthener [Assistive Devices]
9. Thera putty clay

Methodology

Study Design: - Pre and Post-experimental study design.
Study Setting: Neuro One Hospital Trichy.
Sampling Method: Purposive sampling method.
Sample Size: 10 subjects for the study
Duration: 30 minutes/day, 5sessions /week for 3 months.

Inclusion Criteria

- Age between 40 and 50 years.
- Post stroke males are included in the study.
- Stroke with Left hemisphere involvement
- Post stroke patients returning to clerical work

Exclusion Criteria

- Physical impairment of the upper extremity.
- Any recent trauma to the upper limb.
- Post stroke females are excluded in the study.
- Visual problem.

Measurement Tools

Word Per Minute Test

Subject were given a single sentence in English medium, and were to transcribe on an A4 sheet in one minute. Test as done in a single room with similar writing surface and seating facilities. At the end the number of words was counted and writing speed was calculated.

Handwriting Legibility Scale

The handwriting legibility scale looks at 5 measures to help quantify legibility:

- Global legality (overall impression of legibility)
- Effort required to read the written material
- Layout on the page (I.e. letter spacing, margins, word spacing, etc)
- Individual letter formation
- Alterations to the writing (i.e. correction).

Study Method

Procedure

All the participants are clearly explained about the study and a concern is taken and administered for the study. The participants are pre assessed with word per minute test and handwriting legibility scale, an interventional program of hand exercise are given to the patients for 30minute in day for 5 sessions per week and reassessed with outcome measures after 3 months.

Table 1

Structured Exercise's
▪ Exercise to improve stability of upper limb (5 repetitions each).
▪ Fine motor exercise for handwriting (5 repetitions each).
▪ Exercise to improve visual motor development (5 repetitions each).

Data Interpretation

Table 2: Represents Pre and Post Value of Word per Minute Test and Handwriting Legibility Scale

N Numbers	Word / Minute Test		Handwriting Lagibility Test	
10	PRE	POST	PRE	POST
	193	328	48	131
Mean	19.3	32.8	4.8	13.1
Sd	1.49	2.20	0.79	0.46
Mean Diff	13.5		8.3	
T Value	27		17.5	

P value is less than 0.0001 this difference is considered to be extremely statistically significant.

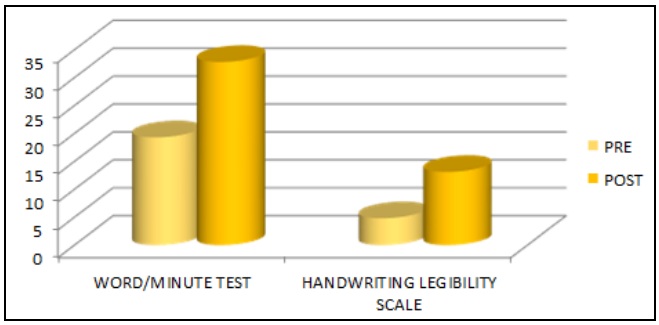

Fig 1: Represents pre and post value of word per minute test and handwriting legibility scale

Result

The result showed a significant difference in pre and post values of all outcome measure, stating that hand therapy has a definite influence in improving handwriting for post stroke patients.

Discussion

Dysgraphia is a writing disability that causes issues with handwriting and speed. It can have a significant impact on the lives of individuals. However, appropriate interventions can help people manage their symptoms and reduce the impact of dysgraphia on their lives. After stroke, writing ability is affected, there is a need for regaining the writing ability for those doing mostly hand involvement works. From the result it is proved that application of hand therapy had a significant improvement in handwriting and speed for post stroke patients with writing disability.

Conclusion

Thus the study concluded that, therapeutic hand exercises are effective in improving handwriting and speed in post stroke peripheral Dysgraphia patients.

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