Correlation Between Age of Stroke Patients and Mental Imagery to Improve Hand Function

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Highlights:

- Correlation of age and mental imagery to improve hand function between stroke patients
- Wolf motor function test was used.

Abstract:

Mental imagery is the rehearsal of a physical task mentally, without execution of any physical task. The technique triggers the similar neurons (mirror neurons) of brain as are triggered by physical performance of the task.

Objective:

To find correlation between age of stroke patients and mental imagery to improve hand function.

Methodology:

A sample of 50 patients was selected from DHQ hospital Jhelum. The inclusion criteria were as follows; age 55-75, gender (male and female), and stroke duration more than 12 months. Patients of age below 55 and above 75, patients with parietal stroke were excluded from study. Patients were treated with mental imagery technique for 10 weeks, $P<0.05$.

Results:

Both male and females were included in study. Sample consisted of 67% females and 33% male. Mean age of participants was 56.42 ± 1.36. WMFT was used as outcome measure. Post treatment mean WMFT score was 57.9. Pearson Correlation was used to find out correlation between age and mental imagery outcome.

Conclusions:

It was concluded that no correlation is present between age and mental imagery ability of older adult stroke patients. Older adults were benefited with mental imagery technique and a significant improvement in hand function of stroke patients was found.

Key words:

Mental imagery technique, conventional physical therapy, chronic stroke, hand function

Introduction:

Stroke is the neurological deficit occurred due to impedance of blood supply to brain[1]. The brain damage caused by a stroke may result in the loss of cerebral function. Its chances of occurrence and level of severity increases with passing years of age[2]. The condition affects all aspects of a patients' personality. Physical, cognitive, social and communication of a patient is affected after stroke. In clinical perspective following defects are likely to occur after stroke, consciousness level, sensor and motor impairments of upper extremity and lower extremity, cognition and perception disorders[3]. Motor defect could be complete loss i.e. paralysis or incomplete i.e. paresis. Paresis is present in 80-90 percent of stroke patients[4]. Stroke patients cannot start or control movement because they cannot generate enough force needed to perform activity.[5] The severity of paresis depends on the level of injury and the part of the brain involved and[6] the fluctuation of functional motor units recruited. Post stroke motor impairments result in permanent disabilities among stroke patients[7]. Performance of a motor skill needs the information about the position of body part in space. The information regarding the spatial location of body parts comes from two major sources i.e.[8] efferent and afferent system. The efferent system appraises the "forward model". This forward model ultimately estimates the dynamic location of body parts. The second system i.e. afferent system provides gen about the location of body parts by obtaining feedback from sensory system.[9] The combination of these two systems is hypothesized to generate an on-

line, real-time symbol of the body position that is termed as "body schema"[10]. Mental imagery (M.I.)[11] is a thinking method in which actions are cerebrally aroused devoid of obvious movements. Behavioral and functional magnetic resonance imaging researches indicate a decrease in explicit mental imagery [12]ability for example the cognitive practice of finger opposition along normal aging[13]. Stroke mostly affects older adults.[14] Any intervention claiming benefit for stroke patient must be effective for older adults. Mental imaginary is a novice intention claiming surprising benefits for motor function recovery of stroke patient's inability of stoke patients to mentally rehearse any task would be a serious limitation of MI for stroke patients[15]. This study was conducted to rule out any correlation between mental imagery and age of stroke patients.[16]

Methodology:

A correlational study was conducted on a sample of 50 patients, selected through simple random sampling; sequence was generated by computer generated method. Patients were selected from social security hospital Lahore. Patients with 10 degree of active flexion in affected wrist and digits, score above 70 on modified mini mental scale examination, stroke for more than 12 months, age 55-75, were included in study. Patients having more than 2 score on modified Ashworth spasticity scale for elbow, wrist, hand and finger, stroke involving parietal lobe were excluded from study[17]. Study outcome was measured on Wolf motor function test. Five Pre-stroke autonomous activities of patients; grasping a cup, turning a page, holding a spoon, holding a pen and combing hair were selected for mental imagery. Patients were involved in mental imagery task for 30 minutes, five days in a week for ten weeks.[18].

Results:

Data was collected from both males and females, 33% population was male and 67% population was female. Mean age of the participants was 56.42±1.36, minimum age of the participants was 56 and maximum age was 64. Chronic stroke patients were included in study, mean stroke duration of patients (in months) was 18.21±1.35, Minimum stroke duration was 14 months and maximum stroke duration was 22 months. Outcome was evaluated using wolf motor function test at three levels, before treatment value of WMFT score was 39.12. Measurement was retaken on 5th weeks and the mean score of participants was 50.22. End of treatment mean WMFT score of patients was 57.9. Enhancement in score indicated hand function improvement of stroke patients. Repeated measure ANOVA was applied to evaluate any significant difference before and after treatment. The results of the test indicated significant difference in pretest and post text scores (table 1). Pearson correlation test was applied to find out any correlation between ages and post treatment score of WMFT. Pearson score 0.110, P>0.05 indicated no correlation between age and mental imagery ability (table 2).

	Mean	Std. Deviation
Age	56.42	1.13
Stroke duration (in months)	18.21	1.35
WMFT-Baseline	39.12	1.3
WMFT- 5 Weeks	50.22	2.3
WMFT-End	57.9	1.6

Table 1 Mean Scores

		Age	WMFT
Age			
	Pearson Correlation	1	0.150
	Sig. (2tailed)		0.703
	N	50	50
WMFT	Pearson Correlation	0.150	1
	Sig. (2tailed)	0.703	1.3
	N	50	50

Table 2 Mean Scores

Discussion:

Old age is significantly associated with atrophy of brain cells resulting in decline in the ability to reproduce events and images. This concept is often linked with the patient's ability to practice mental imagery for therapeutic purpose. Many studies have reported an additional neuronal

activation in the occipito-temporal regions of older adults. This augmented neuronal activation results activation of compensatory mechanisms among older adults that allow them to perform behavioral tasks similar to young people. This activation is more prominent when the task involves motor representation, despite that the task is performed implicitly. Scott et al conducted a study to find out any possible decline in mental imagery ability with age, the results indicated that mental I agree ability of older adults is compromised with age and cannot be used for rehabilitation purpose[19]. In contrast to this Moulin et al in 2010 conducted a study to find out the effects of normal aging on vividness of mental imagery. They reported that level of mental imagery vividness does not change with age; however the quality of imagery is affected[20]. The results of current study agree with the results of study conducted by Moulin et al, the results showed little to no correlation between age and mental imagery ability of stroke patients. A significant difference was found in pre-treatment and post-treatment values of the participants, and augmented WMFT score provides evidence for improved hand function in older adults after treating them with mental imagery.

Conclusions:

It was concluded that no correlation is present between age and mental imagery ability of older adult stroke patients. Older adults were benefited with mental imagery technique and a significant improvement in hand function of stroke patients was found.

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