Effect of Cognitive Rehabilitation on Improving Cognitive Function and Activities of Daily Living among Elderly Patients With Stroke at Assiut University Hospital

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Abstract
Cognitive impairment is a frequent consequence of stroke. *The study aimed* to measure the effect of cognitive rehabilitation of elderly patients with stroke on their cognitive function and activities of daily living. Quasi experimental research design were used in this study. This study was conducted at neuropsychiatric, physical medicine and rehabilitation departments at Assiut University hospital, their number were 70 elderly stroke patients aged 60 years and above, (study group, 35, control group, 35) . Six tools were utilized ,tool 1: Socio-demographic characteristics and questions about stroke tool II: Mini-Mental State Examination tool III: Digit Span tool IV: Logical memory tool V: Geriatric Depression Scale. Tool VI: Barthel Index scale. The rehabilitation program: consist of five practical session about spatial memory, attention and concentration, visual attention, fish face task and N400 task and three theoretical session about health education for diabetes mellitus, hypertension and prevention of recurrent stroke. The main result of the present study revealed that a significant statistical difference was existed between both studied groups in relation to Min Mental State Examination (P-value = 0.000*). *Conclusion:* Application of training program about cognitive impairment of stroke elderly patients have significant therapeutic effect on cognitive function, and on activities of daily living. Recommendation: Routine use of screening assessment of cognitive impairment in every stroke patient for early detection, and Health education to the elderly patients and caregivers about the possible ways of prevention of recurrent stroke and ways for controlling of diabetes and hypertension
Keywords: Cognitive rehabilitation, Elderly, Stroke patients

1.   Introduction

Stroke is the third leading cause of death and the leading cause of disability in the United States. Approximately 600,000 strokes, or brain attacks, occur in the United States each year and of these, approximately 150,000 (25%) are fatal. (Stanley & Swierzewski, 2007). According to the latest WHO data published in April 2011 Stroke deaths in Egypt reached 52,166 or 14.37% of total deaths, (WHO, 2011) .

Stroke risk factors include: Personal or family history of stroke, heart attack or transient ischemic attack (TIA), being age 55 or older, high blood pressure, high cholesterol level above 200 milligrams per deciliter (mg/dL), cigarette smoking or exposure to secondhand smoke, diabetes, being overweight (body mass index of 25 to 29) or obese (body mass index of 30 or higher), physical inactivity, and cardiovascular disease, *(Donnan, etal, 2008& Stroke Association –2013).*

Strokes may best be prevented by implementing nursing interventions to reduce risk factors, such as obesity and hypertension. Diet and nutritional management, exercise, and weight reduction are primary prevention strategies that have been effective in reducing the risk of stroke, (Wallace, 2008).

Cognitive rehabilitation offers retraining in the ability to think, use judgment, and make decisions. The focus is on correcting deficits in memory, concentration and attention, perception, learning, planning, sequencing, and judgment, (Nair &, Lincoln, 2007). In addition to speech therapy, occupational therapy, physical therapy, psychotherapy, and medication, stroke survivors may greatly benefit from Cognitive Rehabilitation (CR) treatment to decrease their cognitive deficits, (Canadian Stroke Network 2009).

Significance of the study

According to the World Health Organization, About 15 million people have a stroke worldwide annually. Five million of survivors are left permanently disabled, (WHO, 2009), with complications including motor (50–83%), cognitive (50%), language impairments (23–36%), and psychological disturbances (20%), (Paul, et al 2007). By 2020, it is projected that there will be 25 million deaths annually from CerebroVascular Disorder (CVD) worldwide, with 19million in populations from developing countries. Over 65% of stroke deaths are reported from developing countries, (Bonita, etal, 2004& Feigin, 2005).The significance of continued rehabilitation following a stroke can make the difference in a full or partial recovery. Recent studies show that rehabilitation is responsible for more than 70% of the recovery process.

Aim of the study

- To measure the effect of nursing intervention on cognitive rehabilitation of elderly patients for improving their cognitive function.

Research hypotheses

1. There will be improvement in cognitive function and activities of daily living for study group (group1) after application of nursing intervention.

Subject and Methods

Research Design:

Quasi experimental research design was used in this study.

I-Setting:

The study was carried out at three setting; Neuropsychiatric, physical medicine and rehabilitation departments at Assiut University hospital .

Sampling

Convenient sample of 70 elderly person aged 60years and above with post stroke dementia recruited from previous setting. They randomly assigned into one of two group, group I used as study group (35 elderly post stroke patients) and group II used as a control group(35 elderly post stroke patients) using closed envelop.

Inclusion criteria

1. Elderly patients aged 60 years and above with history of stroke at least (three months duration) documented by CT or MRI brain.
2. Has mild to moderate degree of dementia according to Mini-Mental State Examination.
3. Stable medical status enabling active rehabilitation treatment

Exclusion criteria

1. Presence of additional severe medical conditions preventing active rehabilitation (eg, cardiac failure, severe chronic lung disease necessitating a constant use of oxygen);
2. Patient with aphasia, agnosia
3. Patient with disturbed conscious level
4. Patients receiving anti psychotic drugs, antiepileptic and anticoagulant drugs
5. Other causes of dementia rather than stroke

II-Study Tools

Each patient was submitted to the following:

1. Mini-Mental State Examination (**Folstein et al., 1975**): a brief assessment of general functioning that screens for dementia. This scale include five items (orientation, registration, Attention &calculation, recall and language , the total score for this scale is 30 degree. A score less than or equal to 23 points was required for inclusion criteria for educated elderly and score greater than or equal to 21degree was required for illiterate elderly.
2. Digit Span (forward and backward) this scale validated and used by neuropsychatric department) , forward span measures simple attention, with backward span providing a general index of working memory; In forward span the researcher give the patient numbers from four to eight numbers and ask patient to forward this numbers in sequence , in backward span the researcher give the patient from four to eight numbers and ask patient to backward this numbers. The patient had impairment in the brain if know one to three numbers , moderate impairment from three to four , mild impairment from four to five and the patient had normal cognitive status if know six numbers and more.
3. Logical Memory (this scale validated and used by neuropsychatric department), immediate recall of two short stories; the researcher read for elderly stroke patients two short stories and after that ask him to recall the words of these stories. The researcher give one degree for each word recall and collect degree of theses words. A patient recall most words of two stories have a good memory for recall.
4. Geriatric Depression Scale GDS; (Brink, 1982, Yesavage ., 1983 - & Sheik ., 1986,), a test of depression commonly used in the elderly population. This scale include fifteen items if the patient take (From 0-4 the patient is normal, 5-8 mild depression, 8-11 moderate depression, 12-15 sever depression)

The Barthel Index establishes a patient's degree of independence in activities of daily living (ADL). This scale include items related to feeding, bathing, grooming, dressing, bowels, bladder, toilet use, transfers, mobility and stairs.(Barthel scores. **Shah et al., 1989** suggested that scores of 0-20 indicate "total" dependency, 21-60 indicate "severe" dependency, 61-90 indicate "moderate" dependency, and 91-99 indicates "slight" dependency).

Field work

Ethical consideration

- An ethical approval from Assuit university committee was obtained to conduct the study.

- Oral consent of each participant in this study was obtained and informed that the information obtained will be confidential and used only for the purpose of the study

Rehabilitation Program
Content of the program
The program consist of Three theoretical session about health education for diabetes mellitus, hypertension and prevention of recurrent stroke and five practical session about spatial memory, attention and concentration, visual attention, fish face task and N400 task.
**1- Spatial Memory**
- **The task:** The patient has to memorize the number of those elements and recall their number afterwards (Number of square, circle, triangle)
  -The patient has to memorize the location of those elements and recall their position afterwards.

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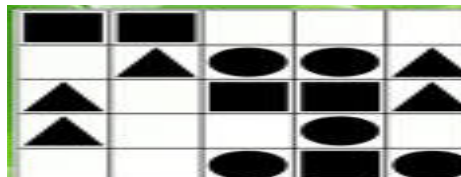
2-Attention and concentration
- **The task:** In this task, the patient needs a discriminating eye to must either locate a symbol in a grid full of intricate symbols and letters (intruder) that differs from other symbols (all of which are identical), and catch the sneaky suspect that was shown before starting the task and that does not belong.

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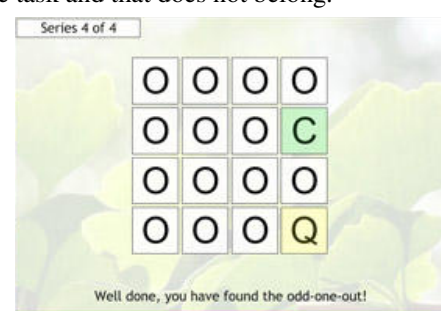
3-Visual Attention
- **The task:** In this exercise, the patient must pay close attention to two sets of characters. His task is to distinguish on the second set the characters that are different from the first set of characters.

https://www.scientificbraintrainingpro.com/programs/re
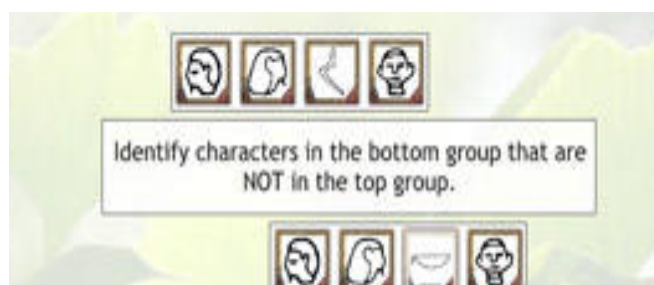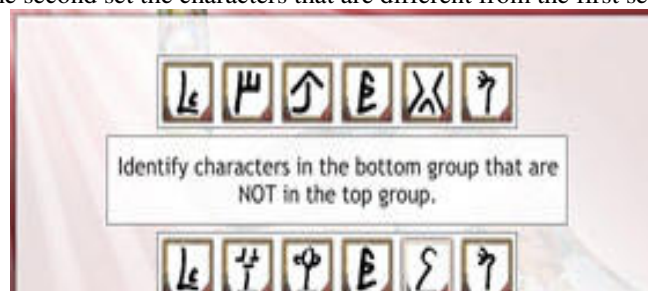
- Also the researcher training the group 1 (study group) on computerized program fish face task (visual processing) and N400 task (auditory processing).

- In fish face task the patients: This task (adapted from Myers, et al, 2000) consisted of two kinds of stimuli: antecedent and consequent (see figures 1.0 & 1.1). Four drawings of human faces of different ages and genders (woman, boy, man, and girl) represented the antecedent stimulus was. On the other hand, four drawings of fish with several colors (yellow, orange, green, and blue) represent the consequent stimulus. Both stimuli were associate with each other; the antecedent and the consequent ones. Each subject had to associate a particular human face with a particular colored fish, which were appearing on his/her screen, by clicking on the keyboard arrow either right or left (see figures 1.0) i.e., he/she had to guess which face was associated with which fish. There were two phases in this task: (i) the acquisition phase, and (ii) the transfer phase.

  (i)   In the beginning of the acquisition phase, the subject used to respond by pressing on the keyboard arrow either right or left (see figures 1.0) to indicate whether the fish on the left or on the right was associated with this particular human face. Immediately, the selected fish was circled and the correct feedback was given (see figures 1.1).By the end of this phase, after the feedback-guided training phase, anew instruction had to appear on the screen, informing the subject that the task remain the same but the feedback would not be provided any more.

  (ii)   The transfer phase consisted of forty-eight trials, of which twelve trials were representing new associations for the testing of acquired equivalence and thirty six trails. For example, the subject learned during this stage that the man was associated with orange fish while the girl was associated with red fish. These old association were presented and tested during this phase. This stage represented a new association that could be formed according to the principle of acquired equivalence.
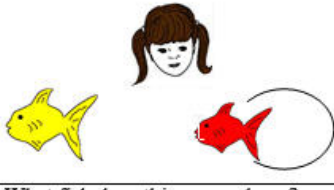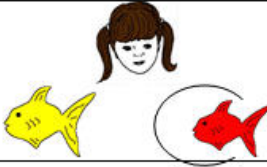

Figure1.0:Acquired Equivalence Associative learning Task(AEALT). This task is adopted from Myers, et al, 2000. This figure shows the phases of AEALT; Acquisition and Transfer phases.
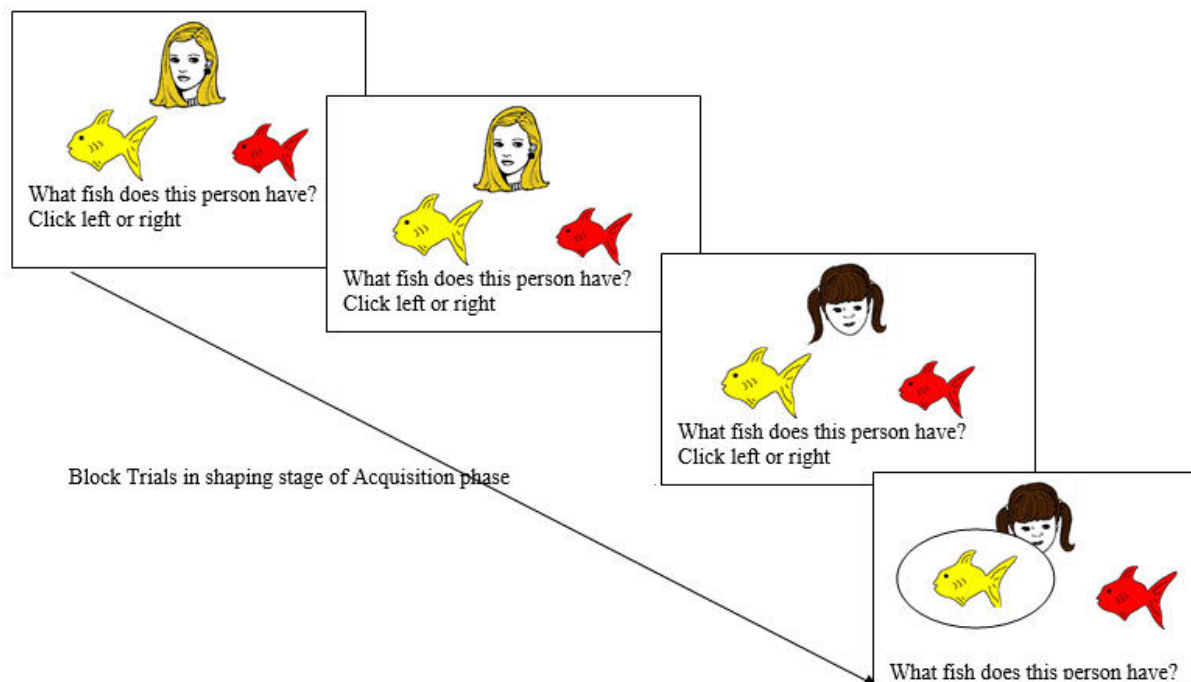
Figure1.1:Acquired Equivalence Associative learning Task(AEALT), adopted from Myers, et al, 2000. A screen represents experimental trials in an early stage of acquisition phase. This stage is called shaping and training stage. In this stage, the stimulus is represented in a human face appears on the screen. Then, the subject respond by choosing one of the colored fish either left or right. Only then the correct feedback is given.

- As regard N400 task (auditory processing) this computerized training program to improve working memory, in this task the researcher   hear the elderly stroke patients name of two things as sea and fish , boy and dog, book and pencil, hair and comb, pharmacy and drug, girl and cow, boy and cooker, queen and tiger, camel and desert, bed and pillow, cup and coffee, man and tree, lion and seller, hoarse and client and so on, after the patient hear two names from these things ask if two things similar or different. This training repeat three times in the same session for three day.

- After that give patients health education about diabetes mellitus, hypertension and prevention of recurrent stroke and also teach patients exercise to improve activities of daily living. These health education and exercises were given for both groups (study and control group) .

Phase (III): evaluation phase:

In which the elderly stroke patients evaluated in pre and after program implementation as well as after one months through filling the tools to evaluate the degree of cognitive impairment of elderly stroke patients.

- **Statistical analysis:**

Data were analyses using SPSS v.16. The following tests for significance were used, frequency, percentage, means and standard deviation, chi square. ANOVA and t-test for comparison of means. A probability level of 0.05 was adopted as a level of significance for testing the research hypothesis.

Results

Table (1): Distribution of socio demographic characteristics for both studied groups at Assiut University Hospital, 2012.

Variables	Study(n=35)		Control (n=35)		X^2	P-value
	N	%	N	%		
Age						
60-64	20	57.1	19	54.3	7.99	0.924
65-69	8	22.9	9	25.7		
70 >	7	20.0	7	20.0		
Mean ± S.D	64.22. ±5.68		65.14±6.42			
Level of education:						
• Illiterate	18	51.4	25	71.4	4.69	0.320
• ↓6 years education	12	34.3	8	22.8		
• ↑6 years education	5	14.3	0	00.0		
Sex						
- Male	18	51.4	14	40.0	.921	0.337
-Female	17	48.6	21	60.0		

Table (2): Distribution of past history, of stroke for both studied group at Assiut University Hospital, 2012.

Variables	(Study group) (n=35)		(Control group) (n=35)		X^2	P-Value
	N	%	N	%		
Past history of stroke						
• Yes (recurrent)	10	28.6	10	28.6	1.02	0.600
• NO (single)	25	71.4	25	71.4		
Type of stroke						
• Ischemic stroke	26	74.3	23	65.7	.719	0.698
• Hemorrhagic stroke	9	25.7	12	34.3		
Side of hemiplegia						
• Left side	20	57.1	16	45.7	.915	0.698
• Right side	15	42.9	19	54.3		

Table (3): Distribution of risk factors of stroke among studied group at Assiut University Hospital, 2012.

Risk factors	(Study group) (n=35)		(Control group) (n=35)		X^2	P-Value
	N	%	N	%		
Family history of stroke	6	17.1	4	11.4	.467	0 .495
High blood pressure	29	82.9	32	91.4	1.14	0. .284
Heart disease	4	11.4	2	5.7	.729	0.393
Smoking	5	14.3	7	20.0	.402	0. 526
Diabetes	20	57.1	17	48.6	.516	0.473
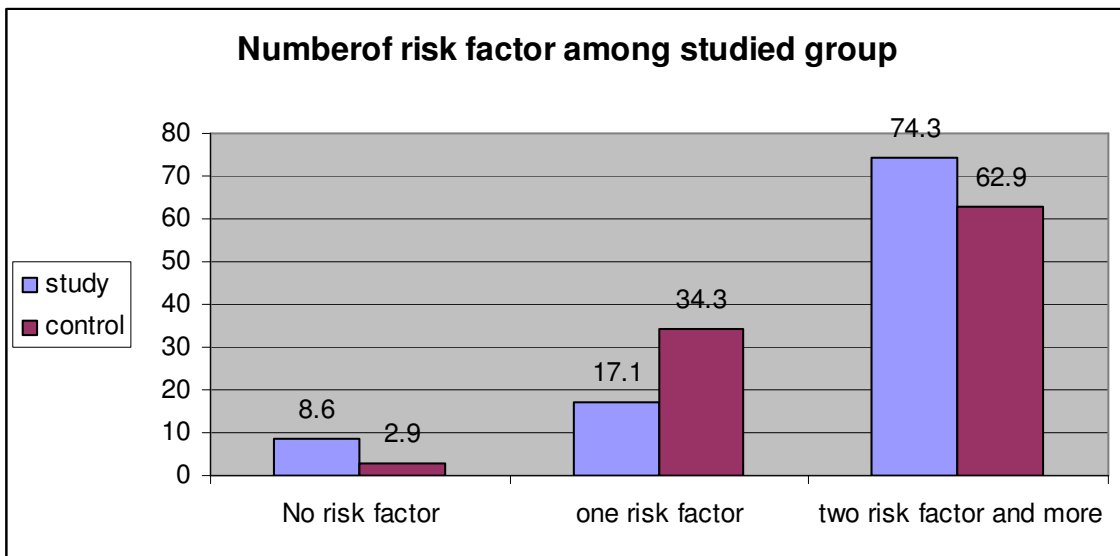
Figure: (1) Number of risk factors of stroke patients among studied groups

Table (4):Relation between studied group regarding their Mini Mental State Examination, (MMSE) in pre , post and follow up test.

MMSE	Pre test Mean ± S.D	Post test Mean ± S.D	1 month follow up Mean ± S.D	P-value1 One way ANOVA	P-value2 Two way ANOVA
Study group	19.20±2.12	22.60±.2.84	23.08±1.85	0.001*	.000*
Control group	18.00±3.21	18.22±3.14	18.45±3.06	0.08	
P-value (T-Test)	.0920	.000*0	.000*0		

Significant P=< 0.05   n.s.   P>0.05

Figure: (2) Relation between studied group regarding Mini Mental State Examination.

Table (5) Distribution of Barthel scale for both studied group
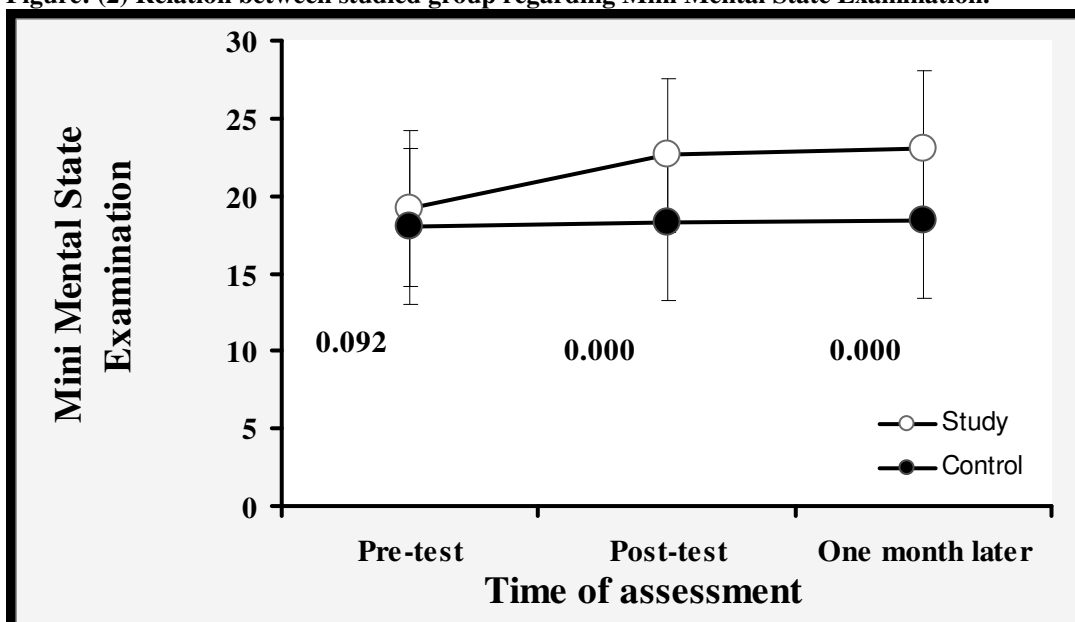
Barthel scale	Group I n=35		Group II n=35	
	Pre		Pre	
	No	%	No	%
• Total dependent(0-20)	12	34.3	8	22.8
• Sever dependent(21-60)	18	51.4	24	68.6
• Moderate dependent(61-90)	5	14.3	3	8.6
• Slight dependent(91-99)	0	0.0	0	0.0
P-value (pre test)	0.119			

Table (6):Relation between studied groups regarding barthel scale in pre , post and follow up test.

barthel scale	Pre test	Post test	1 month follow up	P-value1 One way ANOVA	P-value2 Two way ANOVA
Group I	39.85±23.15	44.00±22.45	46.14±21.38	0.001*	.000*
Group II	37.57±17.42	37.28±17.67	37.85±17.55	0.229	
P-value (T-Test)	.6420	.1690	.0600		

Significant P=< 0.05   n.s   P>0.05

igure: (3) Relation between studied group regarding barthel scale
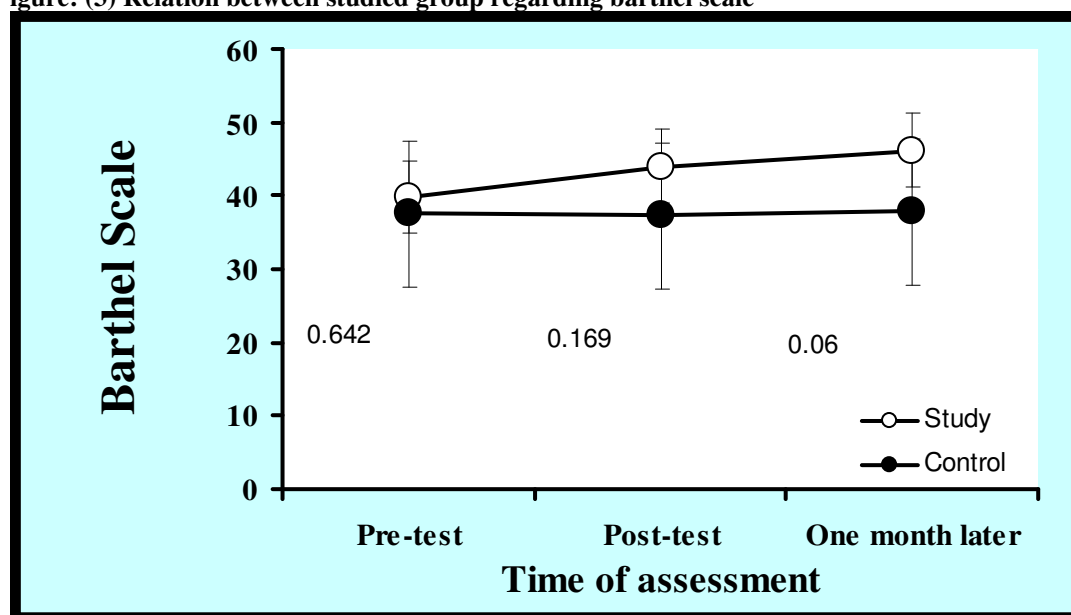
Table (7): Relation between studied group regarding Logical memory in pre , post and follow up test.

Logical memory	Pre test	Post test	1 month follow up	P-value1 One way ANOVA	P-value2 Two way ANOVA
Group I	4.65±2.37	6.62±2.12	6.62±1.66	0.001*	.000*
Group II	4.37±1.92	4.42±2.03	4.37±1.86	0.757	
P-value (T-Test)	.5820	.000*0	.000*0		

Significant P=< 0.05   n.s.   P>0.05

P-value1: One way ANOVA repeated measure analysis with time factor for each group separately

P-value 2: Two way ANOVA repeated measure analysis with time factor x group

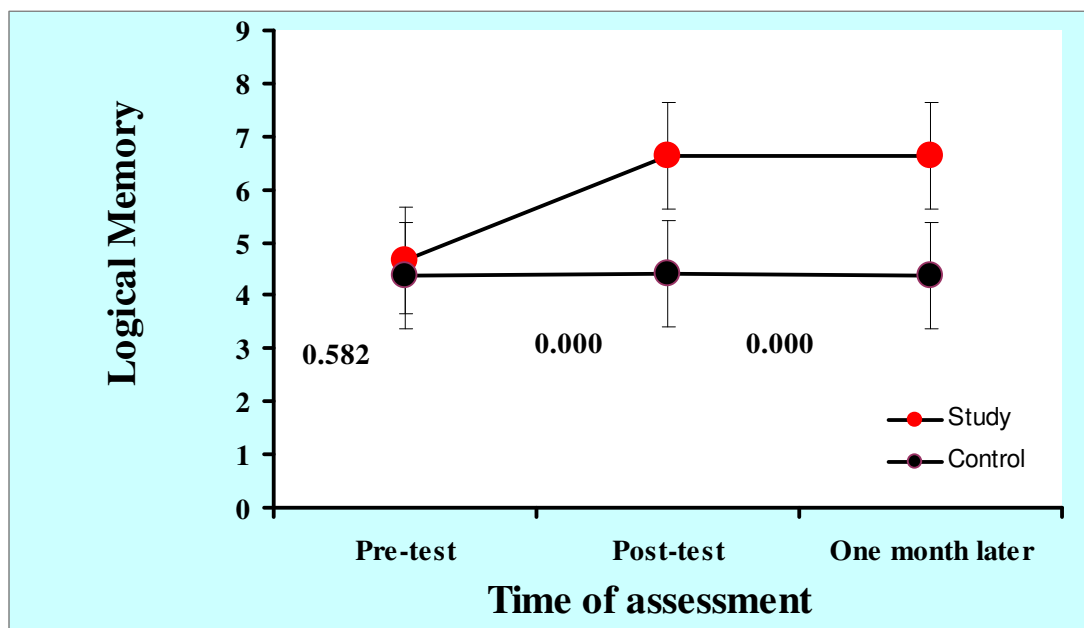**Figure: (4):Relation between studied group regarding Logical memory**

Showed statistical significant difference between pre, post test and follow up (**P-value = 0.000***) between group I & group II regarding Logical memory. Also show that no statistical significant difference between pre , post and follow up for group II (**P-value = 0.757**)

Table (8): Relation of Digit span forward for both studied groups in pre , post and follow up test.

Digit span forward	Pre test	Post test	1 month follow up	P-value1 One way ANOVA	P-value2 Two way ANOVA
Group I	2.31±1.52	3.20±1.38	3.31±1.38	0.001*	.000*
Group II	2.05±1.58	2.14±1.53	2.14±1.54	0.309	
P-value (T-Test)	0.493	0.004	0.001		

<div align="center">Significant P=< 0.05   n.s.   P>0.05</div>

P-value1: One way ANOVA repeated measure analysis with time factor for each group separately
P-value 2: Two way ANOVA repeated measure analysis with time factor x group
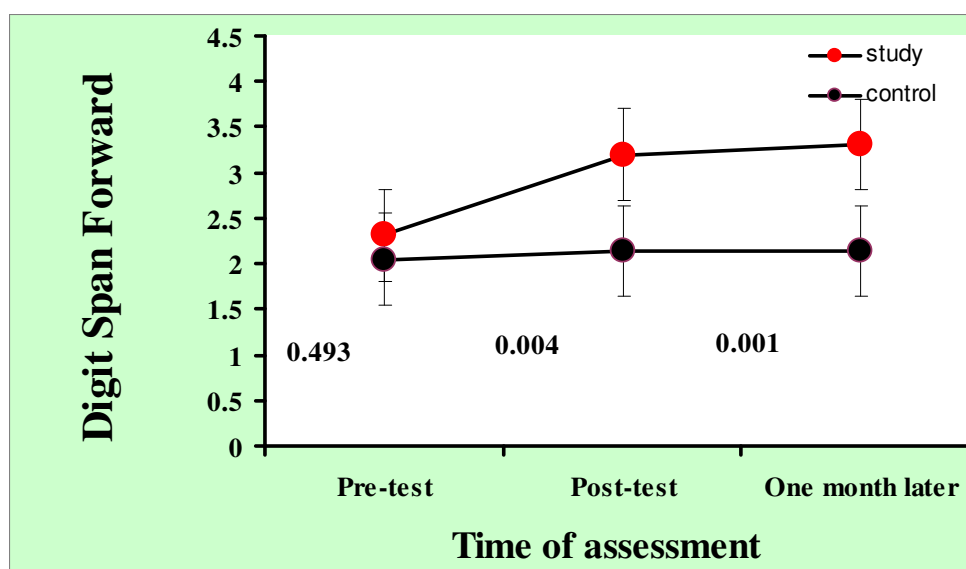
Figure: (5) Relation of Digit span forward for both studied group

Showed that there was statistical significant difference in pre, post, and follow up between group I & group II regarding   digit span forward (**P-value = 0.000***). Also show that no statistical significant difference

between pre , post and follow up for group II (**P-value = 0.309**)

Table (9): Digit span backward scale, for both studied groups in pre , post and follow up test.

Digit span backward	Pre test	Post test	1 month follow up	P-value1 One way ANOVA	P-value2 Two way ANOVA
Group I	1.37±1.21	1.68±1.23	1.85±1.08	0.001*	.000*
Group II	1.02±1.01	1.08±.1.01	1.08±1.01	0.324	
P-value (T-Test)	0.204	0.029	0.003		

Significant P=< 0.05   n.s.   P>0.05

P-value1: One way ANOVA repeated measure analysis with time factor for each group separately

**P-value 2**: Two way ANOVA repeated measure analysis with time factor x group

Table (1): illustrate that, more than half of the studied sample (Group 1& Group II **(**7.1, 54.3%) their ages ranged from 60 to 64 years with mean of age (64.22. ±5.68) . As regards educational level, it was observed that 34.3 of the studied sample were had education less than 6 years compare to 14.3% of them were had education more than 6 years, also more than half of them (51.4,71.4%) were illiterate. Others details were illustrated in the table. No statistical significant difference was found between group I and group II as regarding sociodemographic characteristics**.**

Table (2): show that 28.6% of the studied sample had recurrent attacks of stroke and about three quarters of group I (74.3%) had ischemic stroke compare to 65.7% of group II. As regards to the affected side, more than half of group I (57.1%) their affected side were the left side compare to 45.7% of group II. No statistical significant difference was found between group 1 and group II as regarding past history, type of stroke and affected side.

Table (3): revealed that the majority of both group I & group II (82.9%, 88.6% respectively) don't have family history of stroke. As regard hypertension , it detected in the majority of the studied sample (82.9, 91.4% respectively) . More than half of group I (57.1%) and about 48.6% of group II had diabetes mellitus as risk factor of stroke. Among the group I; smoking was present at 14.3% compare to one fifth (20.0%) of group II. No statistical significant difference was found between group I group II as regarding risk factors of stroke among studied group

Figure (1): show that the majority of both group I and group II (74.3%, 62,9% respectively) had two risk factor of stroke and only (8.6%, 2.9% respectively) of group I and   group II don't' have risk factor for stroke. No statistical significant difference was found between group I & group II as regarding number of risk factors among studied group P-value=(0. 189).

Table (4) and figure (2) :shows that there was statistical significant difference in pre, post test and follow up (P-value = 0.000*) between studied group regarding Mini Mental State Examination.

Figure: (3)showed that there was statistical significant difference in pre, post, and follow up test **(P-value = 0.000***) between group I & group II regarding barthel scale . Also show that no statistical significant difference between pre , post and follow up for group II **(P-value = 0.229).**

Figure: (4) Table (7): Showed statistical significant difference between pre, post test and follow up **(P-value = 0.000***) between group I & group II regarding Logical memory. Also show that no statistical significant difference between pre , post and follow up for group II **(P-value = 0.757**)

Figure: (5) Table (8):Showed that there was statistical significant difference in pre, post, and follow up between group I & group II regarding digit span forward **(P-value = 0.000***). Also show that no statistical significant difference between pre , post and follow up for group II **(P-value = 0.309**)

Table (9):Shows relation between studied group regarding digit span backward; it was observed that there was highly statistical significant difference in pre, post test and follow up between group I & group II regarding digit span backward **(P-value = 0.000***). Also show that no statistical significant difference between pre , post and follow up for group II (P-value =0.324) This means study group improve immediately after application of the program and in follow up.

Discussion

The findings of present study showed that, the mean age group of the studied sample were 64.22. ±5.68 for group I and 65.14±6.42 for group II. More than two fifth of studied samples were males and more than half of them were females.

This result was agree with **Pakaratee, & Kongkiat, (2012)** they studied the effectiveness of home rehabilitation program for ischemic stroke upon disability and quality of life and found that the mean age group of the studied group was 67 years and 66 years for control group, more than two fifth of them were males.

Also agree with **Bernard, et al, (2007)** they studied online cognitive training improves cognitive

performance and reported that the sample was nearly evenly divided between women (58%) and men (42%).

As regarding educational level, it was observed that 34.3% of the studied sample were had education less than 6 years compare to14.3% of them were had education more than 6 years. Also more than half of studied sample (51.4,71.4% respectively) were illiterate. This may because more than half of studied sample were females and in the past the culture of educated female was absent.

Regarding past history of stroke, the finding of present study revealed that more than one quarter of the studied sample (study and control) had recurrent attacks of stroke. This result was consistent with **Lasse, et al**, **(2010)** they studied the depressive symptoms in stroke patients and reported that previous stroke was found in more than one quarter of the studied sample. This present because most elderly patients non compliance with medication regiment, and this exposure them to second attack of the disease.

As regard affected side, more than half of study group (57%) their affected side were the left side compare to 43% of control group. This result in line with Devora, & David, (2005) , and Khedr, et al, (2013). Also this result agree with Griffin, (2008) who study influence of post stroke cognitive status and social support availability on rate of functional recovery during acute rehabilitation and found that more than half of studied group their affected side were the left side compare to more than two fifth their affected side was the right side .

Concerning type of stroke about three quarters of study group had ischemic stroke compare to two thirds of control group , also more than one quarter for study group compare to more than one third of control group had hemorrhagic stroke.

This result similar with Fawi, et al (2009) who studied the characteristics of hospitalized stroke patients and case fatality in Upper Egypt Governorates Areas (Sohag, Qena, Aswan). Hemorrhagic strokes reported in more than one third of cases. Also this result was agree with Griffin, (2008)

Khedr, et al,(2013) Reported that there was a significantly higher prevalence of ischemic than hemorrhagic stroke and hypertension being the commonest risk factor then diabetes mellitus second in epidemiological study and risk factors of stroke in Assiut Governorate, Egypt: Community-Based Study , this agree with result of the present study.

Concerning risk factors the result of the present study revealed that the majority of both studied groups don't have family history of stroke . This result was in line with Tamer, (2009) who study the acute cerebrovascular stroke cases admitted to Alexendria main university hospital and found that the majority of studied sample don't have family history of stroke.

 As regard hypertension , it was detected in the majority of the studied sample . This result was agree with Suchat, et al, (2011) who study prevalence of stroke and stroke risk factors in Thailand and found that hypertension was recorded in the majority of the studied sample.

In the present study diabetes mellitus was reported in more than half of study group and about half of control group. Also smoking was present at less than one fifth of study group compare to one fifth of control group. This result was disagree with Fawi, et al (2009) who study case fatality in Upper Egypt governorates areas (Sohag, Qena, Aswan) found hypertension in less than half of studied sample and diabetes mellitus in less than one quarter this may because small sample of the current study also smoking was found in more than one third of studied sample this contrast with the result of current study this may because half of studied sample were females. This present because age related changes in elderly people (taste sensation decrease especially in salt and sweet food and also bad habits in diet, may exposure them to hypertension and diabetes)

Regarding number of risk factors of stroke among studied groups less than three quarter of both studied groups had two risk factor of stroke this result was in line with Khedr, et al, (2013) who reported that less than three quarter of studied sample had one or more risk factors for stroke.

Bernard, et al, (2007) they studied online cognitive training improves cognitive performance and reported that significant improvement in all cognitive domains(P-value = 0.000*). Cha& Kim, (2013). They studied effect of computer-based cognitive rehabilitation (CBCR) for people with stroke and found that (CBCR) is effective on improving cognitive function after stroke. This result was agree with result of present study.

Concerning barthel scale this result shows that more than half of both studied groups were severe dependent before starting the program in barthel scale items. This result was agree with El-Shater, (2008). Who reported that more than half of study group were had severe functional impairment. This because cognitive impairment following stroke can reduce a person's independence in performing basic activities of daily living (ADL) such as eating, dressing, and toileting as well as instrumental ADL such as housework and social interactions also this agree with Zinn, et al,(2004) and Burton et al,(2009). After application of the program this percent improved in study group only this because the effectiveness of the rehabilitation program. P-Value 0.000*

Regarding digit span forward and digit span backward ; it was observed that mild cognitive impairment patients had poorer performance on the digit span (forward backward) this may because age, and education of studied sample.

In the present study there was highly statistical significant difference between pre, post test and follow

up (P-value = 0.000*). This because the effectiveness of the rehabilitation program. This result was agree with Glenn, et al, (2009) they studied a cognitive training program based on principles of brain plasticity and found memory/attention improvement was significantly greater in the experimental group than in the control group and significantly greater improvements in the experimental group (word list total score, word list delayed recall, digits backwards, letter–number sequencing.

Weerasak , et al, (2007), they studied digit span and verbal fluency tests in patients with mild cognitive impairment and normal subjects in Thai-Community and found mild cognitive impairment patients had poorer performance on the digit span(forward backward) this result was in the same line of result of present study.

As regards logical memory; it was observed that mean logical memory for group I was 4.65±2.37 and 4.37±1.92 for group II as baseline data, after application of the program there was mild improvement in group I (6.62±2.12).There was statistical significant difference between pre, post test and follow up (P-value = 0.000*). Also show that no statistical significant difference between pre , post and follow up for group II (P-value = 0.757)This means group I improve after application of the program and in follow up. This result was agree with Donald, et al, (2006) they studied cognitive rehabilitation in elderly and found improvement in logical memory.

Conclusion
Based on the results and research hypothesis of the present study, it can be concluded that:
- Elderly Patients with post stroke dementia have a significant impact on physical and psychological status of stroke patient. Hypertension and diabetes mellitus were a major risk factor for stroke. Most stroke patients had moderate depression and were dependent in activities of daily living. Application of nursing intervention program about cognitive impairment of stroke patients have significant therapeutic effect on cognitive function, and on activities of daily living.

Recommendation
Based on the results of the present study, the following recommendations are suggested:
1. Routine use of screening assessment of cognitive impairment in every stroke patient for early detection.
2. The nature of the impairment should be determined, and its impact on activity and participation should be explained to patients.
3. Proper and update neurorehabilitation of early cognitive compromization, and all cognitive rehabilitation tasks   should focus on improving real life functioning.
4. Health education to the elderly patients about the possible ways of prevention of recurrent stroke and ways for controlling of diabetes and hypertension.
5. Replication of the study on a larger probability sample acquired from different geographical areas in Egypt to figure out the main aspects of this problems. And generalize the result.

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