Effect of Nursing Care Strategy on Functional Outcomes among Patients after First Time Stroke

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ABSTRACT

Context: Strokes are life-changing events not merely affect a person physically but also emotionally as it may result in physical disabilities, which lead to functional disabilities as difficulties carrying out daily activities as working, walking, talking, eating, bathing, with loss of energy in addition to depressive status as a result of functional disabilities. Daily nursing care strategies are essential to stroke management. Since, it can overcome spasticity and hemiplegia through sustained stretching by various positioning, repetitive performance of a specific movement, and teaching patient to use and adapt the affected limb during functional activities.

Aim: The aim of this study is to evaluate the effect of nursing care strategy on functional outcomes among patients after the first-time stroke.

Methods: A quasi-experimental design used to conduct the current study in neurology department to be followed through neurology outpatient clinic at Benha University Hospital. During the period from the beginning of February 2018 till the beginning of January 2019.Subjects: Purposive sample of 171 patients to be at the end of study period (Intervention group 72 & control group 69), recruited according to the study formula based on the total number admitted to the study settings during 2017. Tools: Two tools utilized for data collection, (1)Structured interviewing questionnaire for patients, (II)Functional outcomes scales, involving: Modified Ashworth scale, Modified Barthel index, as well as the Center for Epidemiologic Studies Depression Scale (CES-D Scale).

Results: Showed that there was highly statistically significant difference in term of increased knowledge score among the intervention group compared to controls, as well as a significantly lower degree of spasticity, a higher level of independence in performing activity of daily living (ADL), besides, lower depression score among intervention group compared to controls. It also showed a significant correlation between the degree of spasticity with both of independence in performing ADL and degree of depression among intervention group after nursing care strategy implementation.

Conclusion: The nursing care strategy was effective in improving patients' knowledge as well as the functional outcomes among intervention group revealing a significant correlation between the degree of spasticity with both independence in performing ADL and degree of depression. The study suggested continuous education and training program planned and offered regularly to stroke patients in the neurology and rehabilitation unit. Also recommended written, a simple booklet about stroke and its management should be provided & be available for patients and their families (relatives).

Keywords: First-time stroke, functional outcomes, nursing care strategy.

1. Introduction

Strokes are brain attacks. They occur when the blood supply to part of the brain is suddenly interrupted or when a blood vessel in the brain bursts, spilling blood into the spaces surrounding brain cells. Brain cells die when they no longer receive oxygen and nutrients from the blood, or there is sudden bleeding into or around the brain *(National Institutes of Neurological Disorders and Stroke, 2019)*. Many risk factors increase the chance of developing a condition, such as smoking, uncontrolled diabetes, high blood pressure, or high cholesterol. Besides, the most common symptom of a stroke is sudden weakness or numbness of the face, arm or leg, most often on one side of the body. Other symptoms include Confusion, aphasia or difficulty understanding speech; seeing with one or both eyes; difficulty walking, dizziness, loss of balance or coordination; severe headache with no known cause; fainting or unconsciousness *(World Health Organization, 2019)*.

There are two forms of stroke: ischemic - blockage of a blood vessel supplying the brain, and hemorrhagic - bleeding into or around the brain, as well as transient ischemic attacks (TIAs), happen when there is a brief reduction in blood supply to part of the brain causing symptoms, such as temporary speech loss. Generally, there are three treatment stages for stroke: prevention, therapy immediately after the stroke, and post-stroke rehabilitation. Therapies to prevent a first or recurrent stroke depended on treating an individual's underlying risk factors for stroke. Acute stroke therapies try to stop a stroke while it is happening by quickly dissolving or removing the blood clot, causing an ischemic stroke or by stopping the bleeding of a hemorrhagic stroke. Regarding, post-stroke rehabilitation helps individuals overcome disabilities that

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result from stroke damage *(National Institutes of Neurological Disorders and Stroke, 2019)*.

Strokes are life-changing events not merely affect the person physically but also emotionally. After a stroke, the time it takes to recover from a stroke varies—it can take weeks, months, or even years. Some people recover fully, while others have long-term or lifelong disabilities. So, ongoing care, rehabilitation, and emotional support can help the patient recover and may even help prevent another stroke. Where Heart-healthy lifestyle changes can help recover from a stroke and may help prevent another one, include heart-healthy eating, aiming for a healthy weight, managing stress, physical activity, and quitting smoking. Regarding rehabilitation, it may include working with speech, physical, and occupational therapists *(McIntosh, 2017)*.

Stroke may result in physical disabilities such as spasticity or hemiplegia, aphasia, dysphagia, and eye problems as vision trouble. Besides, trouble thinking and mood disorders. Such physical disabilities lead to functional disabilities as difficulties carrying out daily activities as working, walking, talking, eating, bathing, with loss of energy, appetite, speech, and vision, in addition to depressive status as a result of functional disabilities*(Ali, 2013)*.So, Physical and occupational therapists can help strengthen and stretch muscles. They also can help relearn how to do daily activities, such as dressing, eating, and bathing*(National heart, lung and blood institute, 2018)*.

Daily nursing care strategies is essential to stroke management during hospitalization and, in many cases, after discharge, as it should continue to be part of the stroke patient's routine *(Armstrong, 2014)*. Since the nurse has essential roles in helping stroke patients return to daily life activities with the best utilization of their remaining physical and functional abilities. Therefore, nurses are playing important role in managing patient with stroke, since they utilize nursing strategies to overcome spasticity and hemiplegia through sustained stretching by various positioning, repetitive performance of a specific movement, and teaching patient to use and adapt the affected limb during functional activities to create lasting permanent changes *(Ali, 2013)*. As concluded in the study of *Zaky, Mohammad, El-Labban, & Ahmed, (2015)* that, education of stroke patient is necessary to achieve an optimum level of functioning.

2. Significance of the Study

Stroke is the leading cause of death and the principal cause of long-term neurological disability worldwide *(Ansari, Naghdi, Arab,& Jalaie,2018; Blackburn,Van Vliet, &Mockett, 2012; &Gregson et al., 2019)*. Only a limited number of studies have addressed the epidemiology of stroke in Egypt with no accurate national estimates of prevalence or incidence of stroke. The annual incidence of stroke in Egypt has been roughly estimated to be 150.000–210.000 *(Shehata, Ahmed, Abdelalim, & Elsherbiny, (2016)*. Approximately two-thirds of patients with stroke have profoundly impaired motor function. Reduced upper limb

function leads to significant disability that affects daily living and increases the burden on these patients and their families *(Waninge, Rook, Dijkhuizen, Gielen,& van der Schans,2011)*.So, it is essential to enhance stroke patients and their families' understanding about the course of the disease, treatment, possibilities for improvement, recovery, and rehabilitation through, evaluating the effect of nursing care strategy on functional outcomes, especially for a first-time stroke patient.

3. Aim of the Study

The present study aimed to evaluate the effect of nursing care strategy on functional outcomes among patients after the first-time stroke; this aim will be achieved through:
- Assessing patient's knowledge level regarding disease and performance of daily living activities post-stroke.
- Measuring the baseline degree of spasticity, level of independence in performing activities of daily living as well as the degree of depression post-stroke.
- Developing and implementing nursing care strategy for stroke among the intervention group.
- Evaluating its effect on functional outcomes among the studied patients after the first-time stroke.

3.1. Research Hypotheses

The following research hypotheses formulated to fulfill the aim of this study

H1: First time stroke patients' knowledge that exposed to the nursing care strategies will be significantly better compared to the controls.

H2: First-time stroke patients who exposed to the nursing care strategies will exhibit a significantly lower degree of spasticity compared to controls post-intervention.

H3: First-time stroke patients' who exposed to the nursing care strategies will exhibit a significantly higher level of independence in performing ADL compared to controls post-intervention.

H4: First-time stroke patients' who exposed to the nursing care strategies will exhibit a significant improvement in their depression score compared to controls post-intervention.

H5: There will be a significant correlation between the degree of spasticity with both of independence in performing ADL and degree of depression among studied patients post intervention.

3.2. Operational definition

Functional outcomes: Is the level of functional status which detected through the degree of spasticity, level of independence in performing ADL as well as the degree of depression

4. Subjects and Methods

4.1. Research design

Quasi-experimental design (study/control group) utilized to conduct the current study.

4.2. Research setting

This study was conducted in the neurology department and neurology outpatient clinic (for follow-up) at Benha University Hospital.

4.3. Subjects

*Type:*Purposive sample
*Size:*The sample size of patients was calculated based on the previous year census report of admission in the neurology department from *Benha University Hospital Census, 2017.*Utilizing the following formula *(Yamane, 1967).*

$$n = \frac{N}{1+N\,(e)^{2}}$$

Where:
n= sample size
N= total population (300)
e= margin error (0.05)

A total of 171 patients recruited in the current study. They were divided randomly into two equal groups. Group (1) control group included86 patients they had ordinary nursing care. Group (2) intervention group included 85 patients they received nursing care strategy, to reach at the end of the study period to 69 patients in the control group and 72 patients in the intervention group.
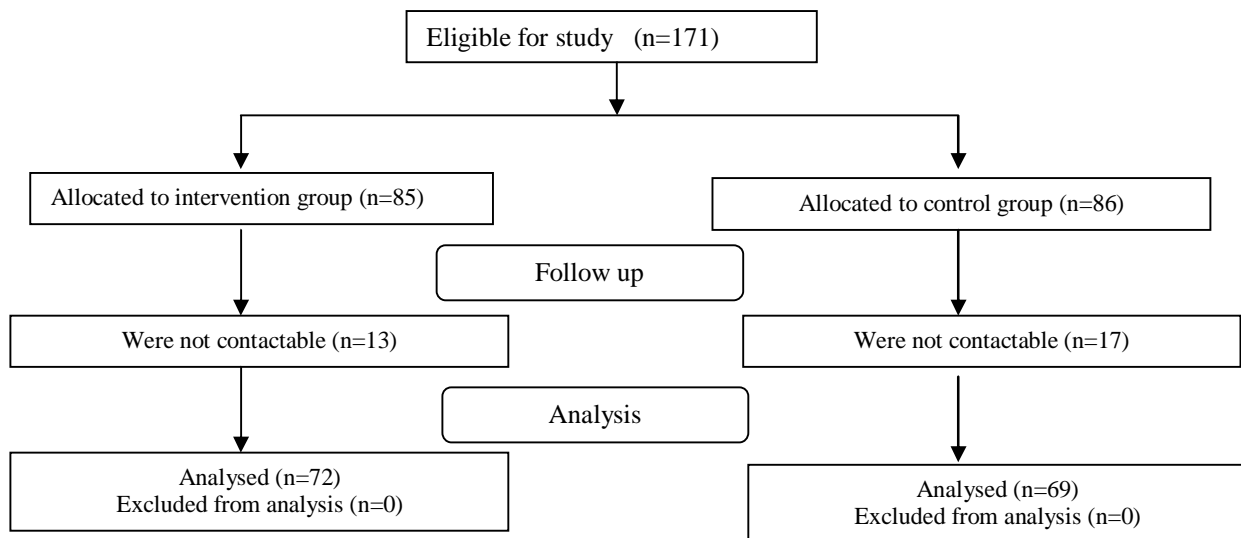

Figure 1.The process of study design.

Sampling technique: Control group related assessment and routine intervention applied first in the first half of the time of data collection (1st 2.5 months). This plan applied to avoid and reduce bias during sample collection. Intervention group related assessment and study intervention applied in the second half of the data collection period (2nd 2.5 months).

Inclusion Criteria: The patients selected according to the following criteria: Age 20 years or older, both sexes (male and female), are willing to participate in the study, with first time for stroke, free from severe cognitive, physical and communication impairment as well as comorbidities such as arthritis, diabetic neuropathy, and musculoskeletal problem. Besides, they did not receive any stroke rehabilitation program and *excluded* in case of having a history of stroke before, history of tumor, or traumatic brain injury and convulsion

4.4. Tools of Data Collection

Two tools utilized for data collection.

4.4.1. Structured interviewing questionnaire (pre/post-test)

It designed by the researcher to assess the patient's socio-demographic characteristics and illness-related data as well as knowledge. It composed of three parts
Part 1: Concerned with socio-demographic characteristics of patients including; age, gender, marital status, residence, education, and occupation.
Part 2: Involved illness-related data of patients including the presence of co-morbid disease, causes of current stroke, time since stroke, physical disabilities due to stroke, and the affected side, and using assistive devices.
Part 3: Structured Knowledge questionnaire (pre/post-test): was developed by researchers after reviewing the relevant literature *Abdel Mordy, El-Hameed, Abd El-Megeed,&Abdelaal, (2015); Al- Abedi&Hamza, (2016); Shebl&Abd- El-Hameed, (2014); and Abd El-Hay, Abed Allah, & Tag El-Din, (2018)*and agreed upon by a panel of experts to assess subjects' knowledge needs in the form of multiple-choice questions and closed-ended questions.

It divided into two major sections:
Section (a): It entails knowledge questions about stroke. It comprised (11 multiple choices questions) regarding, the definition of stroke, risk factors, early and late symptoms, types, causes, complications, treatment, prevention, dietary pattern, physical therapy.

Section (b): Composed of questions to collect data about patients' knowledge regarding performance of the activity of daily living, included 30 knowledge questions (28 closed-ended and two multiple choices questions) specified to feeding, movement, bathing, grooming as well as post-stroke rehabilitation and exercises.

Scoring system: All knowledge variables weighted according to the items included in each question of multiple choices (a question that implies response with (don't know) scored as "0", and the other correct but incomplete responses in the same question had a score (1), as well as correct and complete responses, had score of (2).Concerning closed-ended questions, the wrong response was scored as "0", while the correct response was scored as "1" with a total score of 54 for the whole knowledge questionnaire.

4.4.2. Functional outcomes scales

It divided into the following parts:

Part (1): The modified Ashworth scale (MAS), adopted from *(Ashworth, 1964)* to clinically assessthe degree of spasticity that measures resistance during passive soft tissue stretching, and using. It is also velocity-dependent (the faster the limb moved, the more spasticity encountered), which performed while moving the limb at the speed of gravity, this defined as the same speed at which a non-spastic limb would naturally drop (fairly fast).

Scoring system, no increase in muscle tone had scored (0), while a score of (1) is given when slight increase in tone giving a "catch" when affected part moved in flexion or extension, but a score of (2) had given when more marked increase in tone but affected part is easily flexed, subsequently a score of (3) is given when considerable increase in tone; passive movement difficult and a score of (4) had given when limb rigid in flexion or extension.

Part (2): Modified BarthelActivities of Daily Living (ADL) index, adopted from *(Mahony&Barthel, 1965).*A measure of physical disability used widely to assess behavior relating to ten variables describing performance of activities of daily living for stroke patients or patients with other disabling conditions, as mobility (on the surface level), stairs, transfers (bed to chair and back), toilet use, bladder, bowels, dressing, grooming, bathing and feeding. So, it measures what patients do in practice, and the assessment made by anyone who knows the patient well.

Scoring system, full credits have score (100) when patient not need minimal help or supervision during performance and physically independent, while a score of (91 - 99) had given for minimal dependency, (75-90) had given when patient mildly disabled, subsequently a score of (50-74) is given when patient moderately disabled, while a score of (25-49) severely disabled and a score of (0-24) had given when patient very severely disabled and cannot perform activities of daily. ivingl

Part (3): The Center for Epidemiologic Studies Depression Scale (CES-D Scale) developed by *Radloff,(1997)*and used to assess depressive status, a short,

structured self-report measure, have been used chiefly for diagnosis at clinical intake and evaluation of the severity of illness throughout treatment. It consisted of 20 items with a possible range of scores is zero to 60, with the higher scores indicating more symptoms, weighted by the frequency of occurrence during the past week.

4.4.3. A designed nursing care strategy program for a patient with stroke

It developed by researchers based on patients' need assessment, literature review, researchers' experience and opinions of the medical and nursing experts; it was written in the Arabic language with illustrations, involving theoretical and practical content.

4.5. Procedures

The content validity had done through a panel of five experts in the medical and nursing specialty for face and content validity, and their opinions requested via an assessment form. The experts were asked to grade each item as "essential," "useful but inadequate," or "unnecessary." Modification carried out according to the panel's judgment on the clarity of sentences and appropriateness, and completeness of the content. The percentage of consensus among experts regarding structured interviewing questionnaire was 96%, functional outcomes sheet was 97%.

Pilot study conducted on 10% (17 patients) of the total sample of patients (excluded from the study sample) in order to determine the time required to complete data collection, test the feasibility of the study process. The reliability of tools tested using Cronbach's alpha, regarding its values for knowledge questionnaire sheet, modified Ashworth scale, Modified Barthel ADL index, as well as Depression Scale (CES-D Scale), were as follows: 0.95, 0.88, 0.90 and 0.86, respectively, where tools' reliability good.

Ethical considerations: This study conducted after primary approval obtained from the Ethics Committee, Faculty of Nursing, Benha University. Then official permission obtained from the head of medical departments in Benha university hospital. An explanation about the purpose of the study had given to participants. They informed that they could withdraw from the study at any time. After agreement for participation in the study, they were asked to sign a consent form. Moreover, participants reassured that all information gathered would be confidential and used only for the study.

Field of work: Once official permission to carry out the study obtained from relevant authorities after explaining its purpose. A structured interview conducted individually for patients eligible for the study (fulfilled the inclusion and exclusion criteria), in order to explain the purpose of the study, assure confidentiality, and to obtain informed written consent. Data collection extended over 11 months from the beginning of February 2018 till the beginning of January 2019.

The nursing care strategy comprised the following phases:

Assessment phase: Patients after the first-time stroke interviewed in groups before applying for the nursing care strategy program in order to collect the baseline patients' data using all study tools. This interview took about 35 to 40 minutes.

Implementation phase: The nursing care strategy implemented for patients with stroke in the mentioned setting. Patients recruited equally to either the control group or intervention group (85 patients in the intervention group & 86 patients in the control group). The patient selected according to the allocated assessment times before and after the program and fulfilling the criteria. The caregiver included in the intervention session and asked to assure that the patient follows the prescribed instructions at home and enhance the patient information.

This program conducted through 4 sessions (two theoretical and two practical). The first session carried out during assessment phase, involved (overview about strokeand rehabilitation methods) and the second session involved (principles of performing exercises after stroke and activity of daily living performance) while the third and fourth sessions involved (demonstration to patients and caregiver regarding post-stroke exercises). The researcher scheduled with them the teaching sessions, and patients divided into small groups, according to the number of hospitalized patients in the same room. The duration of each session was about 30-35 minutes, including 10 minutes for discussion.

Nursing care strategydeveloped by the researcher from literature reviews, researcher experience and opinions of the medical and nursing expertise based on patient's assessment needs to maintain health promotion for patients. The teaching booklet was revised and modified based on the expertise comments, it was written in Arabic using simple language with illustrations, and it concerned knowledge about:
- Stroke (Definition, risk factors, types, causes, early and late symptoms, preventive measures, as well as physical dysfunction following stroke).
- Recommended rehabilitation and principles for performing post-stroke exercises.
- Recommended exercises after stroke and its benefits involving (correct positioning, upper and lower limb exercises and changing position from lying to sitting and from sitting to standing).
- The activity of daily living which recommended after stroke as well as the required modifications in home circumstances for maintaining a safe environment.

Evaluation phase: Immediately after implementation of the nursing care strategy for patients after first time stroke, for evaluation of the effectiveness of the intervention, patients' knowledge was evaluated by the researcher using the study tools I, part (3) structured knowledge questionnaire, also they were evaluated for functional outcomes after three months and six months of nursing care strategy implementation using tool II functional outcome scales.

4.6. Data Analysis

The collected data were tabulated and statistically analyzed using an IBM computer and the statistical package for social science (SPSS) advanced statistics, version 20 (SPSS Inc., Chicago, IL). Numerical data expressed as mean and standard deviation. Qualitative data expressed as frequency and percentage. Chi-square test used to examine the relation between qualitative variables. For quantitative data, a comparison between the two groups made using student t-test. Pearson method used to test the correlation between numerical variables. A p-value < 0.05 was considered significant, and <0.001 was considered highly significant.

5. Results

Table (1) shows socio-demographic characteristics of patients with stroke, it was observed that, there was no significant statistical difference between both (control &intervention groups), regarding their mean age of (48.75 ± 6.12 & 49.69 ± 6.09, respectively) and more than half (50.7% & 61.1%, respectively) of both groups were males as well as, (69.6% & 59.7%, respectively) were married. Moreover (60.9% & 69.4, respectively) were residing in a rural area, and around one-third of them (40.6 % &31.9%, respectively) cannot read and write. Besides, about half of both groups were free workers (49.3% & 45.8%, respectively)

Table (2) clarifies that there was no statistically significant difference between both (control & intervention groups) regarding their illness-related data, with more than two thirds (71.0% & 80.6%, respectively) had hypertension with the leading cause of current stroke among (79.7% & 72.2%, respectively) of both groups was related to cerebral infarction, since less than one month in more than half of them (65.2% & 51.4%, respectively) , which led to right side paresis among (65.2 % & 81.9 %, respectively). That was the dominant side for (53.6% & 61.1%, respectively) on both groups. Moreover, around one-fifth of both groups (40.6% & 41.7%, respectively) depend on the support from family members

Table (3) reveals that, there was no significant statistical difference between both groups regarding their knowledge about stroke, and DLA performance scores before nursing care strategy implementation, to be a highly statistically significantly different in term of increased knowledge score among intervention group throughout the following study periods (immediate period, after three months and six months of nursing care strategy implementation).

Table (4) shows that, there was no significant statistical difference between both groups regarding the degree of spasticity in their upper and lower extremity before nursing care strategy implementation, to be statistically significantly different after 3 and 6 months of its implementation in term of improvement in degree of spasticity among the intervention group which was reflected by its decreased scores among the intervention group than in control group.

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Table (5) clarifies that, there was no significant statistical difference between both groups regarding their level of independence while performing daily living activities before nursing care strategy implementation, to be a highly statistically significantly different after 3 and six months of its implementation in term of improvement in the level of independence among the intervention group compared to control group.

Table (6) points out that, there was no significant statistical difference between both groups regarding their depression score before nursing care strategy implementation, to be highly statistically significantly different after 3 and 6 months of its implementation in term of improvement in degree of depression among the intervention group which was reflected by its decreased scores among the intervention group than in control group.

Table (7)reveals that, there was highly statistically significant negative correlation between the degree of spasticity and level of independence in performing activities of daily living among studied patients after 6 months of implementing nursing care strategy, where the lower the degree of spasticity the higher the level of independence, also it was a statistically significant positive correlation between degree of spasticity and depression, where the lower the degree of spasticity the higher the degree of depression .

Table (1): Frequency and percentage distribution of both studied groups according to their socio-demographic characteristics, control group (n=69), and intervention group (n= 72).

Socio-demographic characteristics	Control group (n=69)		Intervention group (n=72)		chi-square	p-value
	(No.)	%	(No.)	%		
Age						
< 50 years	34	49.3	28	38.9	1.543	0.214
≥ 50 years	35	50.7	44	61.1		
Mean ±SD	48.75 ± 6.12		49.69 ± 6.09		t test = 0.915	0.362
Gender						
Male	35	50.7	44	61.1	1.543	0.214
Female	34	49.3	28	38.9		
Marital status						
Not married	21	30.4	29	40.3	1.492	0.269
Married	48	69.6	43	59.7		
Residence						
Rural	42	60.9	50	69.4	1.143	0.222
Urban	27	39.1	22	30.6		
Level of education						
Cannot read and write	28	40.6	23	31.9		
Primary	4	5.8	14	19.4	6.553	0.088
Secondary	24	34.8	21	29.2		
University	13	18.8	14	19.4		
Occupation						
Employee	21	30.4	29	40.3		
Free work	34	49.3	33	45.8	1.899	0.387
Housewife	14	20.3	10	13.9		

NB:Significant<0.05

Table (2): Frequency and percentage distribution of both studied groups according to their illness-related data, control group (n=69) and intervention group (n= 72).

Illness related data	Control group (n=69)		Intervention group (n=72)		chi-square	p-value
	(No.).	%	(No.).	%		
Presence of comorbid disease						
No	4	5.8	2	2.7		
Hypertension	49	71.0	58	80.6		
Diabetes mellitus	5	7.2	6	8.3	4.653	0.325
Heart disease	9	13.1	3	4.2		
Increased cholesterol level	2	2.9	3	4.2		
Causes of current stroke						
Cerebral infarction	55	79.7	52	72.2	1.080	0.299
Cerebral hemorrhage	14	20.3	20	27.8		
Time since current stroke						
< one month	45	65.2	37	51.4		
One month – <2 months	21	30.4	29	40.3	2.998	0.223
≥ Two months	3	4.3	6	8.3		
Physical disabilities due to stroke						
Left side paresis	24	34.8	13	18.1	5.638	0.13
Right side paresis	45	65.2	59	81.9		
Affected side						
Dominant hand	37	53.6	44	61.1	0.808	0.369
Non dominant hand	32	46.4	28	38.9		
Using an assistive device						
Do not use	6	8.7	7	9.7		
Use cane	25	36.2	26	36.1	0.154	0.985
Use wall	10	14.5	9	12.5		
Support from family members	28	40.6	30	41.7		

NB:Significant <0.05

Table (3):Comparison of knowledge score between both studied groups throughout different study periods (before, immediate, after three months and six months) of intervention,control group (n=69) and intervention group (n=72).

Patients' Knowledge	Control group (n=69)				Intervention group (n=72)				t- test (p-value) (1)	t- test (p-value) (2)	t- test (p-value) (3)	t- test (p-value) (4)
	Pre program $\bar{X}$±SD	Immediate post program $\bar{X}$±SD	After 3 months $\bar{X}$±SD	After six months $\bar{X}$±SD	Pre-program $\bar{X}$±SD	Immediate post-program $\bar{X}$±SD	After three months $\bar{X}$±SD	After six months $\bar{X}$±SD				
Stroke (overview)	6.97 ± 1.68	10.99± 1.43	9.81 ± 0.75	7.67 ±1.15	7.25 ±1.75	20.43 ±1.03	16.83 ±1.17	13.65 ±1.08	0.965 (0.336)	45.117 (0.001*)	42.052 (0.001*)	31.975 (<0.001*)
Performance of activity of daily living post stroke	13.68 ±2.62	15.94 ±2. 35	14.39 ±0.81	10.62 ±1.14	13.49 ±2.50	28.07± 3.04	24.89 ± 3.27	20.99 ± 3.33	-0.453 (0.65)	26.414 (0.001*)	25.916 (0.001*)	24.486 (<0.001*)
Total score of knowledge	20.65 ±3.86	26.93 ± 3.58	24.20 ± 1.35	18.29 ±1.53	20.74 ±3.01	48.50 ± 3.74	41.72 ± 4.35	34.64 ± 4.25	0.144 (0.886)	34.962 (<0.001*)	32.026 (<0.001*)	30.142 (<0.001*)

NB: Significant <0.05, * highly statistically significant at ≤0.001
(1) The difference in the mean score of knowledge before program implementation between both control and intervention groups.
(2) The difference in the mean score of knowledge during immediate post-program implementation between both control and intervention groups
(3) The difference in the mean score of knowledge after three months of program implementation between both control and intervention groups
(4) The difference in the mean score of knowledge after six months of program implementation between both control and intervention groups

Table (4):Comparison of the degree of spasticity between both studied groups throughout study periods (before, after three months, and after six months) of intervention, control group (n=69) and intervention group (n=72).

Ashworth scale	Control group (n=69)			Intervention group (n=72)			t- test (p-value) (1)	t- test (p-value) (2)	t- test (p-value) (3)
	Pre-program $\bar{X}$ + SD	After three months $\bar{X}$ + SD	After six months $\bar{X}$ + SD	Pre-program $\bar{X}$ + SD	After three months $\bar{X}$ + SD	After six months $\bar{X}$ + SD			
Upper extremity									
Elbow	0.81 ± 0.75	0.88 ± 0.65	0.88 ± 0.65	0.88 ± 0.77	0.57 ± 0.53	0.54 ± 0.50	0.495 (0.622)	-3.154 (0.002*)	-3.497 (0.001**)
Wrist	1.59 ± 0.49	1.54 ± 0.53	1.78 ± 0.53	1.46 ± 0.67	1.21 ± 0.71	1.15 ± 0.69	-1.365 (0.174)	-3.093 (0.002*)	-3.143 (0.002*)
Finger	2.22 ± 0.42	2.19 ± 0.39	2.13 ± 0.42	2.08 ± 0.58	1.81 ± 0.52	1.69 ± 0.57	-1.580 (0.116)	-4.906 (<0.001**)	-5.150 (<0.001**)
Thumb	1.64 ± 0.82	1.59 ± 0.75	1.57 ± 0.72	1.53 ± 0.93	1.28 ± 0.74	1.21 ± 0.69	-0.740 (0.460)	-2.522 (0.013*)	-3.010 (0.003*)
Lower extremity									
Hamstrings	1.01 ± 0.65	1.97 ± 0.62	0.97 ± 0.62	0.81 ± 0.74	0.71 ± 0.74	0.68 ± 0.71	-1.770 (0.079)	-2.283 (0.024*)	-2.590 (0.011*)
Quadriceps	1.71 ± 0.93	1.68 ± 0.90	1.62 ± 0.88	1.60 ± 0.49	1.31 ± 0.52	1.25 ± 0.50	-0.909 (0.365)	-3.050 (0.003*)	-3.128 (0.002*)
Gastrocnemius	2.09 ± 0.70	2.09 ± 0.61	2.04 ± 0.60	2. 03± 0.69	1.79 ± 0.56	1.63 ± 0.59	- 0.504 (0.615)	-3.003 (0.003*)	-4.152 (<0.001**)
Soleus	1.86 ± 0.90	1.81 ± 0.84	1.88 ± 0.76	1.63 ± 0.83	1.38 ± 0.54	1.29 ± 0.52	-1.583 (0.116 n.s)	-3.667 (<0.001**)	-5.446 (<0.001**)

(*) Statistically Significant at ≤0.05,(**) Highly statistically significant at ≤0.001
(1) Mean difference in the degree of spasticity before program implementation between both intervention and control groups
(2) Mean difference in the degree of spasticity after three months of program implementation between both intervention and control groups
(3) Mean difference in the degree of spasticity after six months of program implementation between both intervention and control groups

Table (5): Comparison of independence level in performing the activity of daily living between both studied groups throughout study periods (before, after three months, and after six months) of intervention. Control group (n=69) and intervention group (n=72).

Barthel index	Control group (n=69)						Intervention group (n=72)						Chi-square p-value (1)	Chi-square p-value (2)	Chi-square p-value (3)
	Pre-program		After three months		After six months		Pre-program		After three months		After six months				
	No.	%	No.	%	No.	%	No	%	No.	%	No.	%			
Total dependency	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0			
Severe dependency	38	55.1	28	40.6	0	0.0	42	58.3	14	19.4	0	0.0			
Moderate dependency	31	44.9	41	59.4	56	81.2	30	41.7	14	19.4	0	0.0	0.651 (0.957)	141.0 (<0.001*)	141.0 (<0.001*)
Mild dependency	0	0.0	0	0.0	13	18.8	0	0.0	44	61.1	29	40.3			
Minimal dependency	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	43	59.7			
Independent	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0			

(*) Highly statistically significant at ≤0.001
(1) The difference of independence in performing the activity of daily living between intervention and control group before program implementation
(2) The difference of independence in performing the activity of daily living between intervention and control group after three months of program implementation
(3) The difference of independence in performing the activity of daily living between intervention and control group after six months of program implementation

Table (6):Comparison of depression scores between both studied groups throughout study periods (pre-program, after three months, and after six months) of intervention, control group (n=69) and intervention group (n=72).

Degree of Depression	Control group (n=69) $\bar{X} \pm$ SD	Intervention group (n=72) $\bar{X} \pm$ SD	t- test (p-value) (1)	t- test (p-value) (2)	t- test (p-value) (3)
Pre program	49.86 ± 2.48	50.43 ± 1.97	1.531 (0.128)	-59.950 (<0.001*)	35.836 (<0.001*)
After three months	42.43 ± 2.43	19.65 ± 2.07			
After 6 months	37.07 ± 6.45	7.46 ± 2.69			

(*) Highly statistically significant at ≤0.001
(1) The difference in depression score before program implementation between both control and intervention groups
(2) The difference in depression score after three months of program implementation between both control and intervention groups
(3) The difference in depression score after six months of program implementation between both control and intervention groups

Table (7): Correlation between degree of spasticity as well as (independence level and degree of depression) among control group (n=69) and intervention group (n=72) after six months of intervention

Variables		Degree of spasticity	
Studied groups		r- test	p-value
Independence level while performing the activity of daily living (Barthel index)	*Intervention group*	*-0.406*	*<0.001**
	Control group	*-0.503*	*<0.001**
Degree of depression	*Intervention group*	*0.248*	*0.036**
	Control group	*0.304*	*0.011**

(*) Statistically significant at ≤0.05   *(**) Highly statistically significant at ≤0.001*

6. Discussion

Stroke is an important acute and disabling condition worldwide, and the management of stroke patients often requires large amounts of time and prodigious monetary and social resources. While it is tempting to focus on preventing stroke through the management of risk factors, some of the significant risk factors for stroke (e.g., advanced age) are not amenable to control *(Campanini,Merlo, &Cavazzuti, 2011; and Ansari, et al.,* *2012).*Therefore the study aimed to evaluate the effect of nursing care strategy on functional outcomes among patients after the first-time stroke.

Regarding socio-demographic characteristics, the present study revealed that there was no significant statistical difference between both (control & intervention groups), reflecting the homogeneity of both groups regarding their characteristics also more than half of both control and intervention groups their age was ≥50 years,

and more than half of both groups were males and married. Moreover, around two-thirds were residing in a rural area, and around one-third of them cannot read and write, and about half of both groups had free work.

These results agreed with the study conducted by *Ali (2013)* about the "Effect of Nursing Care Strategy on the Functional and Physical Abilities of Patients Following Stroke", and revealed that the two groups were similar in every aspect, and had the characteristics commonly encountered in stroke patients, with middle to old age and higher percent of them were women, also in accordance with the study of *Torre-Arreolas, et al., (2009)*about "Effectiveness of two rehabilitation strategies provided by nurses for stroke patients in Mexico" where, the average age of participants was 50 years,

Moreover, *Zulkifly, Ghazali, Din, &Subramaniam (2016)*declared in their study about "The Influence of Demographic, Clinical, Psychological and Functional Determinants on Post-stroke Cognitive Impairment at Day Care Stroke Center, Malaysia", that patients age ranged from 29 to 81 years (mean age: 60.46), and a higher percentage of them were males, and *Bhat, Ahmed, Sharna,& Barman (2016)* added in their study results that the majority of them were married, also stated that (70%) of studied patients were attaining lower educational qualification, which interprets that this low-level decrease the chance of access to more information about stroke as well as poor control of risk factors contribute to the rising incidence of stroke especially in developing countries.

Concerning illness-related data, it also showed that there was no statistically significant difference between both (control & intervention groups), with more than two-thirds had hypertension as the leading cause of current stroke among of both groups, and about three quarters affected by cerebral infarction. These results agreed with the study conducted by *(Das, et al., 2016)* about "Knowledge, attitude, and practice in relation to stroke: A community-based study from Kolkata, West Bengal, India" and pointed out the commonly understood risk factors were high blood pressure, diabetes, smoking, alcoholism, and family history.

In the same line *Torre-Arreolas, et al., (2009)*reported that one hundred and ten patients with stroke were enrolled and Chronic disease diagnosed in 93% of participants, with hypertension (83%) and diabetes (52%) predominating. Also the current study revealed that the right side was the most commonly affected side with paresis which frequently involved the dominant hand of study participants, which was similar to study findings of *Zaky et al., (2015),* who reported that about three fifths had right-sided paresis where the physical disability involved the dominant hand.

Concerning knowledge about stroke and performance of the daily living activity, the present study pointed out that, there was no significant statistical difference between both groups regarding their knowledge scores about stroke and performance activities of daily living and regarding the whole performance before program implementation, to be a highly statistically significantly different, in term of increased knowledge score among intervention group

throughout the following study periods (immediate period, after three months and six months of program implementation, supporting the first research hypothesis This reveals the simplicity and effectiveness of implemented strategy in improving knowledge not for immediate but it retained among intervention group throughout follow up periods. This result agreed with the study conducted by *Hattachot, (2017)*about "Effects of Discharge Planning program on Knowledge and Activities of Daily Living of Stroke Patients in Stroke Unit Udonthani Hospital" and showed that before receiving the discharge planning program both control and experimental groups were similar in knowledge and activities of daily living (P-value = 0.72, 0.56). After the use of the discharge planning program, the experimental group had more knowledge and better activities of daily living than the control group, which was statistically significant at (p-value = 0.001, 0.001)

Pointing to the degree of spasticity, the present study revealed that there was no statistical significant difference between both groups regarding the degree of spasticity in their upper and lower extremity before program implementation, to be statistically significantly different after 3 and 6 months of program implementation in term of improvement in degree of spasticity among the intervention group compared to the controls, which was reflected by its decreased scores among the intervention group than in control group, supporting the second research hypothesis. This result reveals that education is the key to successful treatment of diseases, and minimize its impact also, and providing an effective education can alter behavior and empowering the patient to make positive changes in their health status. This result agreed with that of *Zaky, et al., (2015),* who revealed that, a decrease in patients' degree of spasticity according to Ashworth scale after application of strategy (post-test II) more than in pre-test and post-test I in study group higher than the control group.

Concerning the independence level in performing activities of daily living, there was no statistical significant difference between both groups regarding their level of independence while performing daily living activities before program implementation, to be highly statistically significantly different after 3 and 6 months of program implementation in term of improvement in level of independence among the intervention group compared to control group, supporting the third research hypothesis, which reflect the effectiveness of the caring program that involves instructional content and training exercises for maintaining their functional level, it also involves the caregiver in the educational session that might enhance and empower the patients.

This result agreed with *Chao, Qiang, & Ping(2012)*, who mentioned in their study about "Effects of different intensities of arm rehabilitation training on the functional recovery of hemiplegic upper extremity" that an increase in the intensity of arm training might improve the motor function of the arm after stroke, also is congruent with that of *Torre-Arreolas, et al., (2009)*, who examined changes over time (baseline, one, three and six months) in the both

study and control groups with regard to the baseline (Barthel index), and revealed that there was a relevant improvement from a dependent functional status to independent in last evaluation which was evident among the intervention group.

Pointing to degree of depression, the current study clarified that, there was no statistically significant difference between both groups regarding their degree of depression before program implementation, to be highly statistically significantly different after 3 and 6 months of program implementation, supporting the fourth research hypothesis, this may be due to the association between physical and psychological status. This association was evidenced by the current study findings, where there was a statistically positive correlation between the degree of spasticity and depression. This result agreed with the study conducted by *Zulkifly, et al., (2016)* who reported that, the mean depression score was higher in the physically and cognitively impaired group which might indicate that depressive symptoms were associated with post-stroke impairment, also *Saxena,Yong, Fong,&Koh, (2018)* added in their study results that, depression and Barthel index scores indicated significant differences between both studied groups after intervention.

Regarding the correlation between spasticity with both of independence in performing ADL as well as the degree of depression, the statistically significant negative correlation between the degree of spasticity and level of independence in performing activities of daily living as well as a statistically significant positive correlation with depression among studied patients after six months of implementing the program, supporting the fifth research hypothesis. These findings emphasized the relation between muscle strength in both upper and lower extremity and performance of daily living activities independently, which will be reflected on depressive status among patient after the first-time stroke.

This result matching of a study conducted by *Anthony, (2012)* and mentioned that spasticity is a common feature of the upper motor neuron syndrome following stroke. It can affect the quality of life (QoL) involving psychological dimension and can be both diverse and highly detrimental to daily functioning. Spasticity can result in urinary incontinence; limit sexual intimacy; interfere with walking, sitting, and standing; and generally reduce a person's ability to undertake activities of daily living (ADLs). Also, *Zaky et al.,(2015)*stated thata highest strong negative statistically significant correlation was found in upper and lower extremities (Elbow, wrist, fingers, hamstrings, quadriceps, gastrocnemius, soleus) level of spasticity and Barthel index and *Sommerfeldm, Eek, Svensson, Holmqvist,& von Arbin,(2004)* added in their study about "Spasticity after Stroke Its Occurrence and Association with Motor Impairments and Activity Limitations", and focused on the occurrence of spasticity and its association with motor impairments. Three months after stroke, the patients who were not spastic had statistically significantly better motor and activity scores than patients, who were spastic.

7. Conclusion

Implementing nursing care strategy for patients after stroke was effective in improving their knowledge about disease process and performing activity of daily living as well as its effectiveness in improving the functional outcomes, and improving depression among intervention group than in control group as well as there was significant correlation between degree of spasticity with both independence in performing ADL and degree of depression among intervention group after nursing care strategy implementation.

8. Recommendations

Based on the results of the study, the following recommendations are suggested :
- Health educational program should be provided to patients with stroke involves the needed knowledge and practices before hospital discharge.
- Continuous educational and training program planned and offered regularly to stroke patients in the neurology and rehabilitation unit.
- Written, simple booklet about stroke and its management should be provided & available for patients and their families (relatives).
- Training programs for patients and at-risk population about stroke and its management to be planned by nurse gerontologist and specialists in hospitals and offered regularly.
- Replication of the current study on larger probability sample is recommended to achieve generalizability and broader utilization of the designed program.

9. Acknowledgment

10. References

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