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Effect of a Protocol of Care on Clinical Outcomes of Patients with Acute Ischemic Stroke at Neuro Intensive Care Unit.

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Abstract
Background*: - Ischemic stroke is one of the most critical neurological problems that lead to death or permanent neurological dysfunction and long term disability. Thus, coordinated nursing care of the acute stroke patient results in improved outcomes, decreased lengths of hospital stay, costs; minimize complications, and permanent disabilities.**Aim**: - Evaluate the effect of a protocol of care on clinical outcomes of patients with acute ischemic strokeat the Neuro Intensive Care Unit.**Design:** A quasi-experimental research design. **Setting**: This study was conducted atNeuro Intensive Care Unit at Tanta Main University Hospitals. **Subjects**: A convenience sample of 80 adult patients with acute ischemic stroke and meeting all inclusion criteria, were divided into two equal groups; each group consisted of 40 patients. **Control group I:** received routine hospital care, **Study group II:** received a protocol of care.**Tools**: **(I)**:Biosocio demographic and Physiological assessment: structured interview schedule.**Tool (II)**: Clinical outcomes assessment.**Tool (III):** Acute complications observational checklist. **Results**: revealeda significant improvement in relation to airway patency, respiratory function, hemodynamic status, neurogenic function, skin, and mucous membrane integrity among the study group. Statistically significant difference was observed related to acute complications among the control and the study group. **Conclusion**: Implementing a protocol of care for patients had a positive effect on their clinical outcomes. **Recommendations**: Nursing care protocol should be implemented for all patients with acute ischemic stroke and meticulous attention is needed.*

Key words*: protocol of care, acute ischemic stroke, clinical outcomes*

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I. Introduction

Stroke is a leading cause of death and disability in the world because of the nature of the disease, which leads to a broad spectrum of the motor, sensory, and cognitive impairments. It is a leading cause of human suffering and adversely effects on the patient, his family, and society as a whole [(1)]. According to the World Health Organization (2015) [(2)], 15 million people suffer stroke worldwide each year. Of these, 5 million of them die, and another 5 million are left permanently disabled. Each year, approximately 795,000 people in the United States experience stroke [(3)]. Epidemiologic studies indicate that 82–92% of strokes in the United States are ischemic. In June 2017, the overall prevalence rate of stroke in Egypt is high with a prevalence rate of 963/100,000. The prevalence among males was higher than females with a ratio of 1.7: 1 [(4-6)].

A stroke may be defined as a neurological deficit that has a sudden onset, lasts more than 24 hours, and results from cerebrovascular disease. It occurs when there is a disruption of blood flow to a region of the brain. Blood flow is disrupted because of an obstruction or the rupture of a vessel [(7)]. Ischemic stroke results from interruption of blood flow to the brain and accounts for80% to 85% of strokes. The interruption can be the result of a thrombotic or embolic event. Thrombosis forms inside the blood vessels of the brain. Embolic sources include the heart such as cardio embolic strokes and atherosclerotic plaques in larger vessels as atheroembolic strokes. In 30 % of the cases, the underlying cause of the stroke is unknown called cryptogenic strokes [(8)].

Many factors can increase the probability of occurrence of the stroke, as hypertension, cardiac disease, diabetes mellitus, increased age, male gender, prior stroke, family history, dyslipidemia, hypercoagulability, smoking, obesity, physical inactivity, alcohol or illicit drugs, and some forms of hormone therapy. Symptoms of a stroke range from very mild to significant loss of functional abilities [(9)]. Clinical presentation of stroke varies based on the area of ischemia or infraction .Common signs and symptoms of ischemic stroke include weakness

in an extremity or on one side of the body, sensory changes, difficulty speaking or understanding speech, facial droop, headache, and visual changes [(10)].

Patients with acute ischemic stroke are at high risk of such as respiratory problems, hypertension, hyperglycemia, malnourishment, fever, pressure ulcer, urinary tract infection, and thromboembolism as deep vein thrombosis or pulmonary embolism. These worsen overall patient outcomes [(11).] A time of decreased cerebral perfusion, hypoxemia is the most rapid cause of cellular death [(12)]. Increased body temperature in the setting of acute ischemic stroke is associated with poor neurological outcomes possibly secondary to increased metabolic demands, enhanced release of neurotransmitters, and increased free radical production [(13)].

Hypoglycemia in acute stroke can be the primary cause of the deficit and can present with focal symptoms. Patients with stroke who also have elevated blood glucose have three times increased mortality and appropriate glucose control may improve these outcomes [(14)]. Hypertension is common in patients with acute ischemic stroke and is attributable to multiple factors, such as chronic hypertension, sympathetic response, and dysfunction in cerebrovascular autoregulation[(15)].

Dysphagia is very common in acute stroke. Patients should be screened within 24 hours of admission for the presence of dysphagia .Prompt screening; accurate assessment and early management are needed to prevent complications such as aspiration pneumonia, dehydration ,and malnutrition and to promote recovery of functional swallow [(16)]. Limited mobility after stroke increases deep vein thrombosis , pulmonary embolism, pressure ulcer, and urinary tract infection, which are dangerous complications that can arise in any hospitalized patient [(17)].

The management of an ischemic stroke comprises four primary goals including reperfusion of cerebral blood flow, prevention of recurrent thrombosis, neuroprotection, and supportive care. A key element of the management of patients with acute stroke is to prevent deterioration and medical complications within the first 24–48 hours [(18)]. As a member of a large multidisciplinary team, the nurse must be prepared to assume a critical role to optimize acute patient care, and move the patient to rehabilitation quickly, reduces the duration of hospitalization, and improving outcome. During the acute care phase, nursing care should focus on the continued stabilization of the stroke patient through frequent evaluation of neurological status, blood pressure management, and prevention of complications [(19, 20)].

Aim of the study was to evaluate the effect of a protocol of care on clinical outcomes of patients with acute ischemic strokeat the Neuro Intensive Care Unit**.**

Research hypothesis: Patients with acute ischemic stroke who are exposed to aProtocol of careexhibited:-

1. A positive clinical outcome as maintaining stable vital signs, normal laboratory findings such as arterial blood gases, complete blood count, blood glucose level, blood urea nitrogen and creatinine than patients who did not.

2. Improve level of consciousness,normal hydration state, normal glycemic control, showing normal swallowing reflex and no complications of immobility as deep vein thrombosis or pulmonary embolismthan patients who did not.

II. Subjects and Methods

Research design: Quasi-experimental design was utilized.

Setting: This study was conducted at Neuro Intensive Care Unit at Tanta Main University Hospitals.It consisted of two units, the first unit contains 8 beds and the second unit contains 11 beds.

Subjects: A convenience sample of 80 adult patients diagnosed as acute ischemic stroke was selected and assigned based on Epi –Info program and divided alternatively into two equal groups:

Group I (**Control group):** Consisted of 40 adult patients with acute ischemic stroke had been received routine hospital care as measure vital signs change position, patient feeding ,and giving medication as prescribed.

Group II (Study group): Consisted of 40 adult patients with acute ischemic stroke had been received a protocol of care as designed and implemented by the researcher besides routine hospital care.

Inclusion criteria.

The subjects were selected according to the following criteria:

1- Adult patients range from 21-55years.
2- Patients with the first attack ofacute ischemic stroke.
3- Glasgow coma scale not less than 10.
4- Not on a mechanical ventilator.
5- Free from any previous disability neurological diseases or terminal illnesses such as epilepsy, Parkinson's disease, multiple sclerosis, Alzheimer's disease, and brain tumor.

Tools: Three tools had been used in this study.

Tool (I):Biosociodemographic and Physiological Assessment: structure interview schedule: This tool was developed by the researcher to collect thePertinent data after extensive review of relatedliterature. It consisted of three parts**:**

Part (1): Patient's socio-demographic assessment tool*:* such as code, age, sex,marital status, residence, level of education, occupation, and date of admission.

Part (2): patient's clinical data: It included data as patient's drug history, past medical history as a transient ischemic attack, cardiac diseases, diabetes mellitus, atherosclerotic diseases, obesity, smoking history and present medical history.

Part (3):Physiological assessment included *A*-Assessment of Mental Status: - Glasgow coma scale (GCS): The scale was published by **Green (2011)** [21] and used to assess the level of consciousness of patients. It measures three items as eye opening, motor response and verbal response to stimuli and assigns a number to each of the possible responses within these categories. It provides a score in the range 3-15. A score of 3 indicates the lowest; a score of 15 ranks the height. A score of 7 or less indicate a coma. A score of 8 or 9 indicates stupor, and score of 10 or 11 indicates drowsy. While a score of 12 or 13 indicates disoriented.Moreover a score of 14 or 15 indicates alert.

-Data wascomparedagainst normal values**.**

Tool (II) : Clinical outcomes assessment:- It was composed of two parts:-

Part I-Modified Rankin Scale (MRS): The Modified Rankin Scale (MRS) was developed by **Quinn**, ***et al* (2018)** [22]. It was used to assess the degree of disability in patients who have a stroke. It is an ordinal scale with 6 categories ranging from zero (no symptoms) to five (complete physical dependence). A sixth category can be added to signify death [23, 24].

Part II - National Institutes of Health Stroke Scale(NIHSS):- This tool was developed by **National Institutes of Health Stroke (2010)**[25]. It is used by healthcare providers to objectively quantify the impairment caused by a stroke. The Stroke Scalewas consisted of 11 items: - **l-Level of Consciousness (LOC)** which include (1A) LOC Responsiveness,(1 B) LOC Questions and(1C) LOC Commands**. 2- Best gaze 3- Visual 4- Facial Palsy 5- Best Motor Arm, 6- Best Motor Leg 7- Limb Ataxia 8. Sensory 9-Best Language, 10- Dysarthria, 11- Extinction and Inattention.**

Each score as specific ability put between a zero and 4. For each item, a score of zero typically indicates normal function in that specific ability, while a higher score is indicative of some level of impairment. The individual scores from each item are summed in order to calculate a patient's total NIHSS score. The maximum possible total score is 42, with the minimum total score being a zero& interpreting as followno stroke symptoms(zero), minor stroke(1-4) , moderate stroke(5-15), moderate to severe stroke (16-20),severe stroke(21-42) [26, 27].

Tool III- Acute complications observational checklist: It was composed of five parts which including:

Part1: Acute Stroke Dysphagia Screen: The Acute Stroke Dysphagia Screen was developed by **Edmiaston, etal(2010)**[28]. It is an easily administered and reliable tool that has sufficient sensitivity to detect both dysphagia and aspiration risk in acute stroke patients. Its sensitivity 91% for dysphagia, 95% for aspiration; specificity 74% for dysphagia, 68% for aspiration and reliability: κ=93.6.

Part 2:Dehydration manifestations observational checklist, it was developed by the researcher, based on review of related literature [29]. It was used to assess manifestation of dehydration, which included less frequent urination, dark colored urine, fatigue, dizziness , confusion, rapid heart rate, rapid respiration and elevated blood urea and nitrogen.

Part 3: Deep vein thrombosis and pulmonary embolism manifestations observational checklist. It was developed by the researcher, based on review of related literature [30]**.** It consisted of two parts:

A-Deep vein thrombosis manifestations assessment: - include calf pain, tenderness, skin temperature of leg, skin color, edema, distension of superficial vein, shortness of breath, chest pain.

B-Pulmonary embolism manifestations assessment: - include dyspnea, chest pain ,coughing up blood, heart Rate $\geq$ 110, Systolic BP < 100 mm Hg, Respiratory Rate $\geq$ 30, Altered Mental Status (Disorientation, lethargy, stupor, or coma), O2 Saturation < 90%.

Part 4: Bed sores observational checklist: It was developed by the researcher, based on review of related literature. [31], which included bed sores assessment: If it present or not present and sites of bed sores which included over ears, shoulders, elbows, sacrum, hips and toes.

Part 5: Urinary tract infection observational checklist: It was developed by the researcher, based on review of related literature. [32], which included hematuria, fever, chills, anorexia, malaise and cloudy malodorous urine.

-Data was compared against normal findings.

Method

1. Administrative process: - Official permission to carry out the study was obtained from the responsible authorities of the Neuro Intensive Care Unit at Tanta Main University Hospitalsthrough official letters from the Faculty of Nursing explaining the purpose of the study and data were collected over a period of 7th months,started from November to May 2019.

2. Ethical consideration: Written informed consent was obtained from patients and/or their families after the explanation of the study purpose.

- Patients Privacy and data confidentiality were assured to participants. Anonymity and patient right to be withdrawn from the study at any stage were respected.

3. Tools development: Tools I: part 1&2were developed by the researcher after review of the relevant literature, part 3was developed by **Green (2011)**and translated into Arabic**. Tool II:** Part Iwas developed by Quinn, (2007*)*. Part II was developed by the National Institutes of Health Stroke (2010) was adapted and translated into Arabic. **Tool III:** Part I was developed by Edmiaston, et al(2010),Part II, III**,** part IVand part V were developed by the researcher after review of the relevant literature.

4. Tools validity: The developed and translated tools were tested for content validity by nine experts in the Medical Surgical and Critical Care Nursing and neurology field professors. Modifications were carried out accordingly.

5. Reliability: All tools of the study were tested for reliability using alpha Cronbach's test and found to be 0.896, 0.868, and 0.831respectively for the tool I, II, III which represent highly reliable tools.

6 -**A pilot study:** It was conducted before the actual study on 10% of the patients, to test the clarity, feasibility, and applicability of the different items of the tools .Modifications were done accordingly before the actual study. Data obtained from those patients were excluded from the current study.

- Data were collected over 7 months, started from November to May 2019.

7. The study was carried out on four phases.

1- **Assessment phase**Patients of both groups were assessed immediately on admission using the three tools to collect pertinent data throughout the period of the study.

- Assessment of the Patient's socio demographic and clinical data using the tool I (part1 &2) were collected from the patient, relative, hospital staff, and CCU records.
- Physiological assessment using the Glasgow coma scale Tool I (part 3) to assess the level of consciousness pre- implementation of the protocol of care for the study groups and pre implementation routine care for the control group. Vital signs and laboratory investigation were also assessed as blood glucose level, arterial blood gases, complete blood count, blood urea nitrogen, creatinine ,Prothrombin time and INR was done daily using the tool I (part 3).
- Clinical outcomes assessment was carried out using Tool II (part I) to assess stroke disabilities and Tool II (part II) to assess stroke severity daily pre implementation of the protocol of care for the study groups and the control group.
- Assessment of acute complications using Tool III parts I, II, III, IV, and V daily pre implementation of the protocol of care for the study groups and the control group.

2-planning phase, was formulated based on data from the assessment phase, and literature review priorities, goals and expected outcome criteria was taking into consideration when planning of patients care.

1- Maintain adequate tissue oxygenation (normal arterial blood gases, stable vital signs).
2- Improve the level of consciousness
3- Maintain normal body temperature
4- Exhibit a normal blood glucose levels.
5- Exhibit normal blood pressure.
6- Exhibit normal hydration state and ability to swallow.
7- Prevent complications of immobility as deep vein thrombosis, pulmonary embolism, bedsores, and urinary tract infection.

3-Implementation phase:- for the study group II: A protocol of care was implemented by the researcher beside routine hospital care and it was carried out for 7th days at TheNeuro Intensive Care Unit at Tanta Main University Hospitals as the following:-

A- General care for patients with ischemic stroke:

1. Maintaining adequate tissue oxygenation: Assessmentwas donethroughmonitoring respiratory rate, o2 saturation using a pulse oximeter, arterial blood gases were monitored daily and auscultation of lung sound every two hours. **Patent airway** was kept through proper neck positioning by keeping the head in a neutral

position using towel roll andelevation of the head of the bed to 30^0-40^0 degrees. O2 administration of 2–4 liters was administrated using nasal cannula or facemask. **Suction:** it was performed for the patient through nasopharyngeal and oral suctioning techniques as needed**.**

2. Improve level of consciousness: A. General neurological management:was carried outthroughthe following**:** Elevation of the head of the bed 30-40 degrees. Side rails were kept up. Body alignment was maintained through keeping the head in a neutral position, and sharp hip flexion was avoided, hemiplegic arm was elevated above the heart, hand with washcloth roll, leg positioning with trochanter roll and foot positioning was maintained with foothold boots. Prophylactic anti-epileptic agents were administered as prescribed to prevent seizure activity**. B. Safe administration of Thrombolytic therapy,** before administering thrombolytic therapy, the researcher assessed that all intravenous lines were inserted. Blood pressure was monitored during administrating IV recombinant tissue plasminogen activator (r-TPA) or during thrombotic therapy :every 15 minutes for the first 2 hours after starting, every 30 minutes for the next 6 hours, hourly until 24 hours lapsed. Blood samples had been withdrawn for Prothrombin Time (PT), Partial Thromboplastin Time (PTT), and International normalization ratio (INR) every day. Frequent neurological assessment and vital signs were assessed every two hours . Intake and output were measured hourly .Intravenous fluids as normal saline were administered at 75–100 mL/h as prescribed .If the patient had antecubital venous access, automatic blood pressure cuffs were to be used with caution . The cuff site was checked frequently, rotated, and repositioned every 2 hours.

3. Temperature management: Body temperature was measured every hour during the first 8 hours of admission, then every 4 hours if normothermia was maintained. **Hyperthermia was managed through:** Body temperature was measured every hour until return to normothermia. Excess clothing was removed and a light bed sheet was provided. Tepid baths were administered. Cold compression pads were applied to exposed skin as groin, axilla, head, and neck with alcohol for up to 20 minutes. Cooling the surrounding air by conditioner.Antipyretic medications and antibiotics were given as prescribed .

4. Blood pressure management: Blood pressure was measured every hour during the first 8 hours until normal blood pressure is maintained, then every 2 hours. Blood pressure was monitored during administrating IV recombinant tissue plasminogen activator (r-TPA) or during thrombotic therapy: Every 15 minutes for the first 2 hours after starting, every 30 minutes for the next 6 hours, hourly until 24 hours lapsed. Blood pressure was measured in lying and sitting position prior to the patient's standing for the first time. Antihypertensive medication was administered if the blood pressure remains elevated as advised.

5.Glucose management. Random blood glucose level was monitored using electronic blood glucose meters every 6 hours per day. Insulin medications were administered subcutaneously according to the patient's result and as prescribed. Close monitoring for the complications of hypo or hyperglycemia and rapid response as directed.

B-Specific care for patients with ischemic stroke:-wasincluded the following:

A- **Fluid and nutrition management**.

1-Fluid management: Complete blood count (RBCS, WBCS, platelets, and hematocrit) were monitored every day as prescribed. Patients weren't received nothing by mouth until swallowing has been assessed. Prescribed intravenous fluids were administered with accurate rate and compositions depend on fluids deficit and urine output as prescribed. Intravenous fluids were administered at a slow or moderate rate with an intravenous infusion pump to prevent too rapid administration and avoid overhydration. Intake and output records were kept every hour. Fluid intake and fluid losses were maintained relatively equal.

2- Nutrition management: Bowel movement pattern (normal, hypoactive, hyperactive) was assessed every shift through auscultationover the four quadrant of the abdomen for at least five minutes. Any abdominal distention was notified every shift. Enema was made each other day as prescribed. Laxative 5 ml of lactulose was given three times per day and discontinued if the patient has diarrhea. **Measures were implemented to manage dysphagia**:- Assess signs and symptoms of dysphagia, assessment of swallow abilities before administering any food or fluid orally using acute stroke dysphagia screen every day, once dysphagia was recognized, the nasogastric tube feedings were inserted, the position of the tube were checked before feeding, and secured in place. the head of the bed was elevated to 30-40^0 degree, the feeding was given slowly, and the feeding tube was aspirated periodically, If the patient wasn't tolerated oral or tube feeding, the physician was notified and assisted with central line placement for parenteral feeding. **Administer enteral medications as prescribed:** liquid medication diluted with a minimum of 30 ml of water, tablets were crushed to a fine powder bya pill crusher, the powder was mixed with 30 ml of water before administration, and the tube was flushed with 30 ml of water after drug administration.

2-Prevention of deep vein thrombosis through Bedmobility which was applied from the second day of admission until patient discharge. Elastic stockingwas applied from the second day of admission until discharge.

The stocking was applied for two hours and then removed for 4hour every shift. The patient position was changed every two hours.Subcutaneous anticoagulant therapy was administered as ordered.

3-Prevention ofpulmonary embolism.a- Deep breathing exercises were encouraged for 5-10 cycles at a time every shift. b- Oxygen administration 2-3 liters was administrated as indicated. c- Mobilization was started from the 2nd day of admission until discharge as bed mobility as prescribed before. d- Anticoagulant (Marevan and Clopex) and thrombolytic(Clexan) therapy were administered as prescribed.

4-Prevention of bedsores: All body surfaces were assessed for skin redness, irritation or break down especially bony prominence as over ears, shoulders, elbows, sacrum, hips, and toes every 6 hours. Massage over bony prominence was carried out for 15 minutes every 4 hours. The patient was turned and repositioned every 2 hours. Skin care was provided every 4 hours.

5-Prevention of urinary tract infection: Aseptic technique was used during the insertion of the urinary catheter. Hand hygiene was carried out pre/ post handling the catheter, tubing, or drainage bag. The drainage bag was maintained above the floor and hang on its container. The collection bag was emptied every 8 hours. Unnecessary handling or manipulation of the catheter was avoided. Perineal area was washed with soap and water twice a day. Urine specimen was obtained for culture at the first sign of infection.

2- Control group: was exposed to routine hospital care which included measuring vital signs, change position every two hour,oral or enteral and parenteral feeding patient, and giving medication as prescribed.

4-Evaluationphase: The evaluation was done for patients of both the control and the study group daily for 7th daysusing tool I(part 3) to evaluate physiological parameters, tool II(part I) to evaluate stroke disabilities,(part II) to evaluate stroke severity and tool IIIto evaluate acute complications .Data were analyzed to evaluate the effect of the protocol of care on clinical outcomes of patients.

III. Results:

Table (1): Percentage distribution of patients according to socio–demographic characteristics among both the control and the study group.

Characteristics	The studied patients (n=80)				χ^2 P
	Control group (n=40)		Study group (n=40)		
	N	%	N	%	
Age (in years)					
▪ 30-	5	12.5	2	5.0	2.969
▪ 40-	9	22.5	15	37.5	0.227
▪ 50-<55	26	65.0	23	57.5	
Gender					
▪ Male	26	65.0	29	72.5	FE
▪ Female	14	35.0	11	27.5	0.630
Marital status					
▪ Married	31	77.5	35	87.5	FE
▪ Widow	9	22.5	5	12.5	0.378
Level of education					
▪ Illiterate	15	37.5	12	30.0	
▪ Read and write	7	17.5	9	22.5	0.623
▪ Secondary education	12	30.0	13	32.5	0.891
▪ University or high	6	15.0	6	15.0	
Occupation					
▪ Manual work	7	17.5	7	17.5	
▪ Employee	12	30.0	11	27.5	
▪ Technical work	3	7.5	3	7.5	0.341
▪ Housewife	11	27.5	10	25.0	0.987
▪ Farmer	7	17.5	9	22.5	
Place of residence					
▪ Urban	10	25.0	17	42.5	FE
▪ Rural	30	75.0	23	57.5	0.155

FE: Fisher' Exact test

Table (1) revealed that about two third (65%) of the control group and more than half (57.5 %) of the study groups their age ranged from (50-<55) years old. **Regarding sex**, it was found that two third (65% and 72.5% respectively) of the patient in the control and study group were males. **Concerning the marital status**, it shows that about three quarters (77.5%) of a patient in the control group compared to about the majority (87.5%) of patients in the study group was married. **Regarding educational level**, it was found that more than one third (37.5) % of the control group was illiterate and more than one quarter (30 %) of the study group were illiterate respectively. **Concerning occupation**, the result showed that (30and 27.5% %) of the control group and the study group were employee respectively. **Regarding residence**, it was observed that about threequarter

(75%) of patients in the control group compared to more than half (57.5%) of patients in the study group were living in rural areas. It was found also that there was no a statistically significant difference among the control and the study group regarding age, sex, marital status, educational level ,occupation and residence as P value equal (0.227, 0.630, 0.891, 0.987 and0.155 respectively).

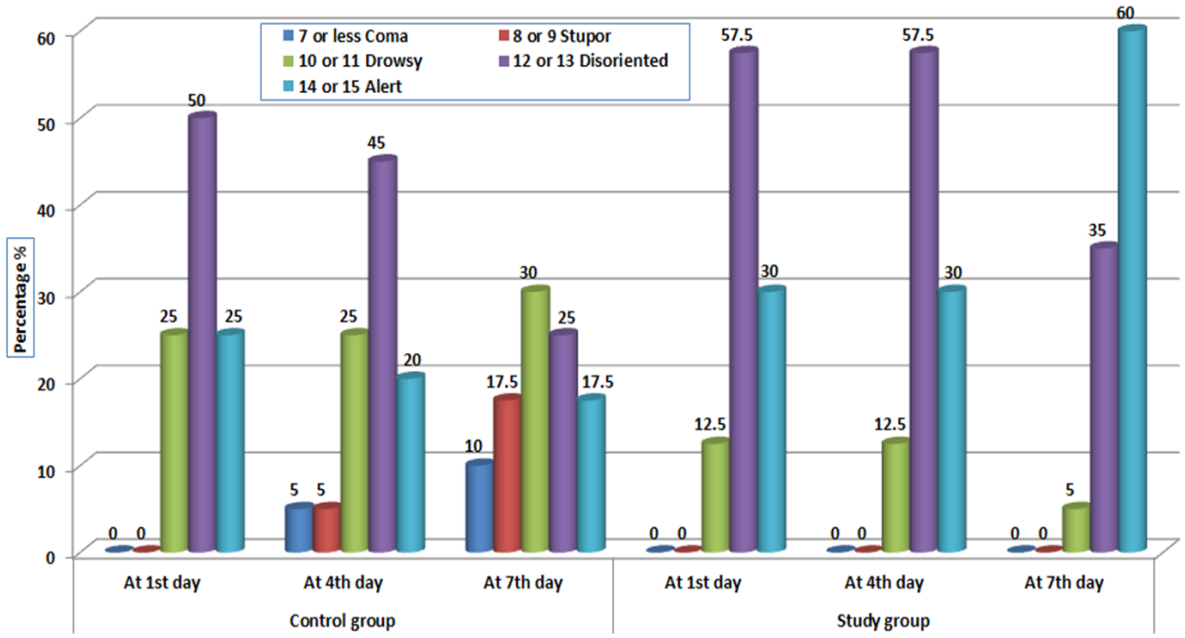

Figure (1) Percentage distribution of patients according to level of consciousness among the both the control and the study group throughout the study period.

Figure (1) showed that about (50%, 45% and 25%) of the control group were disoriented compared to (57.5, 57.5 and 35 %) of the study group in the 1 st ,4th and 7th day respectively. Also, about (25%, 20% and 17.5%) of the control group were alert compared to (30, 30 and 60 %) of the study group in the 1 st, 4 th and 7th day respectively.

Table (2): Mean scores of laboratory investigation among both the control and the study group throughout the study period.

Laboratory investigation	The studied patients (n=80) Range Mean ± SD							
	Control group (n=40)			F P	Study group (n=40)			F P
	At 1st day	At 4th day	At 7th day		At 1st day	At 4th day	At 7th day	
1. Complete blood count WBC (4000-11000cells/mcL)	(4.40-12.60) 8.30±2.76	(0.50-12.60) 8.17±3.12	(4-12.60) 8.26±2.88	0.021 0.979	(4.30-11.80) 8.15±1.59	(4-11.80) 8.26±1.65	(4-12) 8.42±1.68	0.274 0.761
RBC (4.3-5.7) ×10⁶cells/mcL	(3.40-11) 4.77±1.13	(3-11) 4.73±1.16	(2.90-11) 4.68±1.16	0.069 0.933	(4-9.40) 5.11±1.09	(4-5.50) 4.54±0.42	(3.80-5) 4.46±0.41	**9.941 0.000***
HG (13-17gm/dL)	(10.50-17) 13.51±1.45	(4.30-17) 12.39±2.27	(7.80-17.30) 11.79±2.24	1.962 0.145	(11.50-113.50) 16.36±15.79	(11.10-16) 13.03±0.92	(10-15.50) 12.69±1.14	**7.464 0.001***
Platelets (150-450)× 10³	(106-400) 216.75±73.33	(106-420) 218.93±76.74	(105-390) 214.86±73.90	0.030 0.971	(5.90-390) 238.61±76.30	(6-1450) 273.63±205.49	(6-1450) 270.98±207.72	0.500 0.608
Haematocrit (39-50) %	(33-50) 40.55±4.90	(28-50) 40.24±5.06	(22-50) 39.89±5.47	0.163 0.849	(34-50) 41.73±5.30	(34-50) 41.74±5.16	(34-52) 41.81±5.28	0.003 0.997
2. Prothrombin time a.Patient time 12.7 second	(12-18.50) 14.40±1.90	(12.70-18.56) 14.70±1.84	(12.70-18.56) 14.72±1.84	0.378 0.686	(12.90-18.50) 14.28±1.25	(12.70-23.50) 13.97±1.89	(12.70-16.50) 13.19±0.76	**6.736 0.002***
b.INR 1:1	(0.06-1.75) 1.22±0.29	(1-1.75) 1.33±0.23	(1-1.73) 1.34±0.23	2.909 0.058	(1.07-1.75) 1.38±0.14	(1-1.66) 1.35±0.13	(1-1.59) 1.27±0.14	**6.125 0.003***
3. Random blood glucose level (80-180mg/dL)	(80-350) 159.30±73.66	(80-300) 163.00±66.32	(70-320) 161.10±64.27	0.029 0.971	(90-400) 237.95±112.82	(80-350) 197.28±93.32	(70-300) 167.03±73.93	**5.650 0.005***

* Significant at level P<0.05

Table (2) : Regarding **complete blood count** ,the result showed that there was a statistically significant difference among patients of the study group regarding **red blood cell**in the 1 st ,4 th and 7th day at p- value =0.000 and also there was a statistically significant difference between patients of the study group regarding hemoglobin in the 1 st ,4 th and 7th day at p -value =0.001 . In relation to prothrombin **time and International Normalization Rate**, it was found that a statistically significant difference between patients in the study group in the 1 st ,4th and 7th day at p - value= (0.002, 0.003) respectively. Regarding **random blood glucose level**, there was a statistically significant difference between patients in the study group in the 1 st , 4 th and 7th day at p - value =0.005 .

Table (3): Percentage distribution of patients according to the degree of disabilities among both the control and the study group throughout the study period.

Degree of disabilities	The studied patients (n=80)												
	Control group (n=40)						χ^2 P	Study group (n=40)						χ^2 P
	At 1st day		At 4th day		At 7th day			At 1st day		At 4th day		At 7th day		
	N	%	N	%	N	%		N	%	N	%	N	%	
▪ No significant disability	2	5.0	2	5.0	2	5.0		0	0.0	0	0.0	0	0.0	
▪ Moderate disability	5	12.5	4	10.0	5	12.5	5.570	1	2.5	4	10	20	50	**11.849**
▪ Moderately severe disability	18	45.0	12	30.0	9	22.5	0.473	21	52.5	18	45.5	15	37.5	**0.019***
▪ Severe disability	15	37.5	22	55.0	24	60.0		18	45.0	16	40.0	5	12.5	
Control Vs Study χ^2 **P**	5.170 0.160		**8.205 0.042***		**27.851 0.000***									

* Significant at level P<0.05* Significant at level P<0.05

Table (3) emphasized that (37.5%,55% and 60%) of the control group in the 1st day, the 4th and 7th day had severe disability respectively compared to (45%,40% and 12.5%) of the study group in the 1st day, the 4th and 7th day had severe disability respectively with statistically significant difference between patients in the study group at p =0.019. Also, it was found that there was a statistically significant difference between both the control and the study group in 4 th and 7th day as p = (0.042 -0.000 respectively).

Table (4): Percentage distribution of patients according to stroke severity among both the control and the study group throughout the study periods.

Total stroke severity level	The studied patients (n=80)												
	Control group (n=40)						χ^2 P	Study group (n=40)						χ^2 P
	At 1st day		At 4th day		At 7th day			At 1st day		At 4th day		At 7th day		
	N	%	N	%	N	%		N	%	N	%	N	%	
(1-4) Minor stroke	1	2.5	1	2.5	1	2.5		0	0.0	0	0.0	5	12.5	
(5-15) Moderate stroke	22	55.0	21	52.5	15	37.5	4.137	27	67.5	28	70.0	31	77.5	**15.525**
(16-20) Moderate-Severe stroke	12	30.0	13	32.5	14	35.0	0.658	12	30.0	11	27.5	4	10.0	**0.017***
(21-42) Severe stroke	5	12.5	5	12.5	10	25.0		1	2.5	1	2.5	0	0.0	
Range	**(4-24)**		**(4-24)**		**(4-29)**		F=1.886	**(6-22)**		**(6-22)**		**(3-18)**		**F=10.774**
Mean ± SD	**14.00±5.383**		**14.20±5.473**		**16.25±6.303**		P=0.156	**13.05±4.290**		**13.10±4.378**		**9.23±4.179**		**P=0.000***
Control Vs Study														
t	0.873		0.993		**5.901**									
P	0.385		0.324		**0.000***									

* Significant at level P<0.05 .

Table (4):**Regarding stroke severity**, it was found that about (30%, 32.5% and 37.5%) in the 1st, 4th and 7th day of the control group had moderate to a severe stroke respectively compared to (30%, 27% and 10%) in the 1st, 4th and 7th day of the study group had moderate to a severe stroke. Also, it was found that about (12.5%, 12.5% and 25%) in the 1st, 4th and 7th day of the control group had severe stroke respectively compared to (2.5%, 2.5% and 0%) in the 1st, 4th and 7th day of the study group had severe stroke. Moreover, there was a statistically significant difference between patients in the study group in the 1 st, 4 th and 7th day where p value =0.017, and there was a statistically significant difference between both the control and the study group in the 7th day at p- value = 0.000.

Table (5): Percentage distribution of patients according to the acute complications among the control and the study group throughout the study period.

Acute complications	The studied patients (n=80)				χ^2 P
	Control group (n=40)		Study group (n=40)		
	N	%	N	%	
• Dehydration	8	20.0	1	2.5	
• Deep vein thrombosis	15	37.5	2	5.0	
• Pulmonary embolism	8	20.0	1	2.5	**12.624 0.001***
• Bed sores	7	17.5	0	0.0	
• Urinary tract infection	4	10.0	0	0.0	

* Significant at level P<0.05 .

Table (5) **regardingacute complications**, the result showed that (20%) of patients in the control group had dehydration compared to (2.5%) of the study group. also, it was found that (37.5%) of patients in the control group had deep vein thrombosis compared to (5%) of the study group. In addition, it was found that (20%) of patients in the control group had pulmonary embolism compared to (2.5%) of the study group. Moreover, it was found that (17.5%, 10%) of patients in the control group had bedsores and urinary tract infections compared to the same percentage (0%) of the study group. Moreover, it was found that there was a statistically significant difference regarding acute complications among the control and the study group as p- value =0.001.

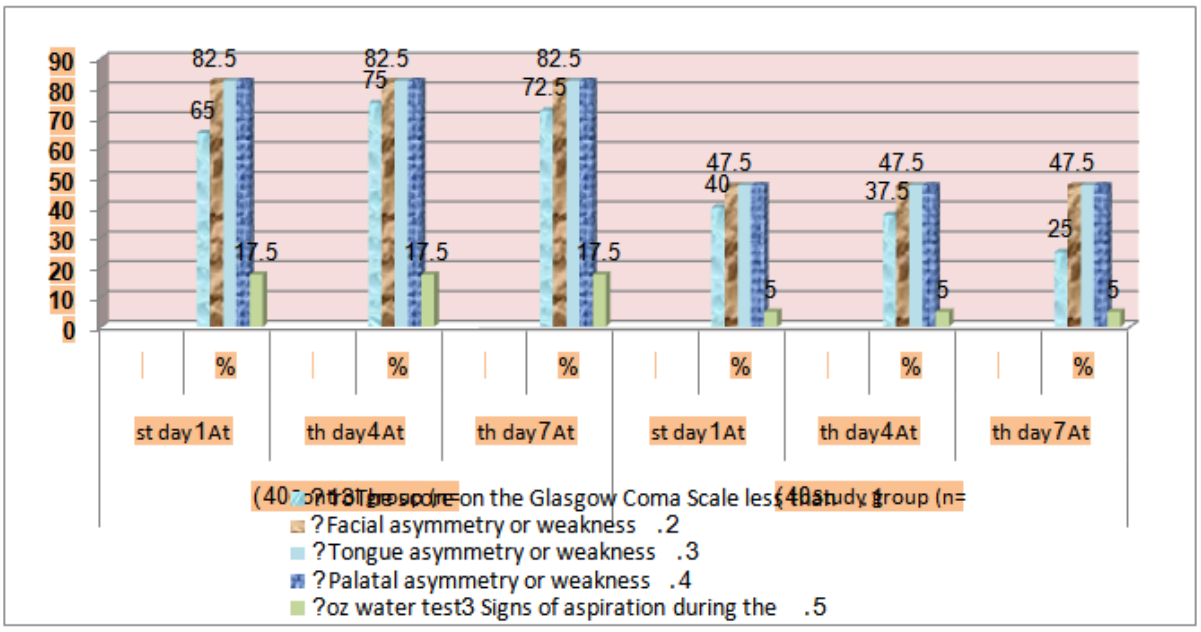

Figure (2): Percentage distribution of patients according to acute stroke dysphagia screen among both the control and the study group throughout the study period.

Figure (2) showed that **acute stroke dysphagia screen**.In relation to the score on the Glasgow Coma Scale less than 13, it was found that about (65%, 75% and72%) of the control group in the 1 st ,4 th and 7th day respectively compared to (40 %,37.5% and 25%) of the study group in the 1 st ,4 th and 7th day respectively. Also, the result showed that the majority (82.5%) of the control group compared to nearly half (47.5%) of the study group had facial, tongue, and palatal asymmetry or weakness in the 1 st ,4 th and 7th day respectively .Regarding signs of aspiration, it was found that(17.5%) of the control group compared to (5.0%) of the study group in the 1 st ,4 th and 7th day respectively.

Table (6): Correlation between total level of consciousness score, total degree of disabilities score and total stroke severity score among both control and the study group throughout the study period.

	Total NIHSS(stroke severity)score											
	Control group						Study group					
	At 1st day		At 4th day		At 7th day		At 1st day		At 4th day		At 7th day	
	R	P	r	P	r	P	r	P	r	P	r	P
Total GCS(level of consciousness) score	0.817	0.000**	0.659	0.000**	0.830	0.000**	-0.749	0.000**	-0.752	0.000**	-0.781	0.000**
Total MRS(degree of disabilities) score	0.310	0.051	0.399	0.011*	0.050	0.761	0.535	0.000**	0.493	0.001**	0.424	0.006**

r: Pearson correlation coefficient, * Significant at level P<0.05 , ** Highly significant at level P<0.01

Table (6), A high positive correlation was observed among the control group regarding the total level of consciousness score and total stroke severity score in the 1 st ,4 th and 7th day as r =(-0.817, -0.659 and -0.830) with the p-value = 0.000 respectively. also, a high negative correlation was observed among the study group regarding total level of consciousness score and total stroke severity score in the 1 st ,4 th and 7th day as r (-0.749, -0.752 and-0.781) with p - value = 0.000 respectively. In addition, it was found that there was a significant positive correlation betweentotal degree of disabilities score and total stroke severity score of the control group in the 4 th as r =0.399 with p -value = 0.011 and also, it was found that there was a significant positive correlation betweentotal degree of disabilities score and total stroke severity score of the study group as r= (0.535, 0.493and 0.424) with p- value = (0.000, 0.001 and 0.006) in the 1 st ,4 th and 7th day respectively.

Table (7) Correlation and effect of smoking on total level of consciousness score, total degree of disabilities score and total stroke severity score among both the control and study group in the 1st and 7th day.

		Correlation and effect of smoking on total GCS score, Total MRS score and Total NIHSS Score among the control and the study group.							
		1st day				7th day			
		Smoker	Non smoker	Ex-smoker	t p	Smoker	Non smoker	Ex-smoker	t P
Total Level of consciousness Score	Control group	12.63±1.41	12.44±1.42	12.17±0.41	0.269 0.765	11.44±2.37	10.50±3.45	10.33±1.37	0.584 0.563
	Study group	12.76±1.25	13.11±1.37	13.50±1.29	0.623 0.542	13.35±1.46	13.79±1.23	14.50±0.58	1.412 0.257
Total Degree of disabilities score	Control group	4.19±0.66	3.94±1.31	4.33±0.52	0.446 0.644	4.31±0.87	4.22±1.31	4.67±0.52	0.394 0.677
	Study group	4.53±0.51	4.37±0.60	4.25±0.50	0.598 0.555	4.18±0.39	3.95±0.52	3.00±0.00	1.202 0.312
Total Stroke severity Score	Control group	15.33±3.45	13.44±5.38	14.06±6.04	0.262 0.771	2.48±17.83	6.47±15.63	7.15±16.28	0.258 0.774
	Study group	14.35±3.64	12.16±4.57	11.75±5.12	1.407 0.258	10.47±4.14	8.21±4.55	8.00±1.83	1.455 0.246

Table (7): this table shows no statistical significant difference among the control and the study group regarding the total level of consciousness score, the total degree of disabilities score, and total stroke severity in relation to their smoking. Also, it was observed that the total scores were improved in the study group in the 7thday than the 1 st day compared to the control group.

IV. Discussion

Stroke is the second highest cause of death globally and the main cause of disability worldwide. Ischemic stroke caused by arterial occlusion which responsible for the majority of strokes. It is a lifethreatening disease that requires early recognition, management, and collaboration of all members of the health care team. So, early assessment and treatment of stroke reduces motor and cognitive deficits and lowers mortality [(33)].

Regarding sociodemographic characteristics of the study subjects, the results of the present study found that two third of the control group and more than half of the study groups their age ranged from 50-<55 years old. This finding is justified by the effect of aging which associated with numerous noticeable changes in human intracranial and extracranial cerebral arteries that predict the risk of future stroke and also, increasing the incidence of all types of atherosclerotic diseases with aging and disability. This finding was inline with **Ahangar et al (2018)** [(34)] who found that the age of ischemic stroke most probably ranges from 43-60 years. These findings also are similar to **Polett*o et al.* (2015)** [(35)]whomentioned that the mean age of the study group and control group in his study was 65 years old and all of them diagnosed as Ischemic stroke.

In relation to sex, it was found that two third of the patient in the control and study group were males, this may be related to male are at high risk more than female as a result of smoking habit and stress, this result was supported by **Sulter et al (2017)** [(36)] who concluded that more than half of the studied patients were male. Also, the current result was in the line with study done at Bangladesh by **Hossain et al (2014)** [(37)] showed that three quarter of patients were male. Meanwhile, it was in contrast with **Osama et al (2015)** [(38)] who mentioned that fifty three percent of patients with acute ischemic stroke were female.**Concerning marital status**, it shows that three quarter of a patient in the control group compared to about the majority of patients in the study group was married; this may be due to the inclusion criteria of sample selection. This result was in accordance with **Yao He et al (2015)** [(39)] who revealed three quarter of a patient in the control group compared to the majority of patients in the study group was married.

Regarding to the educational level, it was found that more than one third of the control group and more than one a quarter of the study group were illiterate. This result was in the same line with **Hossain et al (2014)** [(36)] and **Leite et al (2016)** [(40)] found that most of the study subjects of hospitalized stroke patients were illiterate. While, this finding was in disagreement with a study result aboutEvidence-based nursing interventions improve physical function and quality of life of patients with cerebral infarction was done by **Yayan (2018)** [(41)], who mentioned that more than one third of the ischemic studied patients were junior high school.

Concerning residence, the finding of the present study revealed that about three quarter of patients in the control group compared to more than half of patients in the study group were living in rural areas, this may be due to most of the study sample had low income; interferes with the access to health care facilities and leads to lack of awareness of CVS warning signs. This finding was in accordance with that of **Ennen (2019)**[(42)] who found that approximately one half of the studied group was from rural areas. Meanwhile, the current study finding was in contrast with **Habibi et al (2018)** [(43)] who found that about two third of ischemic patients were from urban areas. Also, the result was in contrast with**Teo(2013)** [(44)] who found that ischemic stroke patients who were resident in urban districts were more than 1.5 times at higher risk of developing stroke compared with residents of rural areas, which can be probably attributed to the unhealthy lifestyle practices concerning lack of physical activity and unhealthy diet.

Regarding the level of consciousness, the present study result showed an improvement in the level of consciousness among the study group than the control group, with a statistically significant difference between both the control and the study group in the 4 th and 7th day from the beginning of application of protocol of care for the study group. These results were in line with **Kocak et al. (2012)** [(45)] who found that a significant trending with GCS for prognosis in acute stroke patients in the intensive care unit concerning the outcome estimation.

Concerning laboratory investigations, the current study revealedthat there was a statistically significant difference among patients of study group regarding red blood cell, hemoglobin in the 1st, 4th, 7th day of the protocol of care. This may be related to clinical using of hemodilution in the management of acute ischemic stroke. This result was inline with**Wade (2017)** [(46)]who found that the medical group patients of ischemic strokes had high normal hemoglobin concentration (15 g/1 or more) than the patients of the control group who had lower values (< 15 g/1).

Also, there was a reduction in the mean standard deviation with a statistically significant difference among patients of study group regarding prothrombin time and International normalization rate in the 1st, 4th, 7th day; may be due to adherence to nursing protocol of care related to administration of thrombolysis. These results were in line with **Harvey (2014)** [(47)]who concluded that good INR control is important to improve patient outcomesand found that the poor control group had higher rates of annual mortality and major bleeding compared with the moderate control group and the good control group.

Moreover, there was a statistically significant difference among patients of study group regardingblood glucose levelin the 1st, 4th, 7th day; this may be due to adherence to the efficacy and safety of insulin management which contributes to target blood glucose level. These results were inline with

Weir et al. 2019[48],**Lewandowski &Barsan 2019**[49], **National Stroke Foundation 2010**[50], **Anderson et al. 2017**[51] they mentioned that hyperglycemia following stroke is also associated with increased mortality and/or decreased functional outcome and blood glucose level over 8 mmol/l is a known predictor of mortality following stroke (adjusted for age, stroke severity and stroke type). Also, present results were in line with **Walters (2014)** [52] who found that glycemic control for 48 hours is feasible and well tolerated in acute ischemic stroke after application of interventionwith insulin in hyperglycemic studied Patients.

Regardingthe degree of disabilities, a high reduction in the percentage of the patients had severe disability noted in the study group in the 1st day, the 4th and 7th day compared to the patients in the control group in the same period. Also, it was found that there was a statistically significant difference between both the control and the study group related level of disability in the 4 th , and 7th day, which may be due to following of the protocol of care for patients in acute stage. These Results were in line with **Middleton et al (2011)** [53] who showed that irrespective of stroke severity, the intervention of acute stroke patients were significantly less likely to be dead or dependent (MRS ≥2) at 90 days than control in acute stageafter implementation of multidisciplinary supported evidence-based protocols initiated by nurses .

Regarding stroke severity,The present findings showed that thetotal level of severity scoreswas decreased and showed more improvement in the 1st, 4th, and 7th day among the study groups who had moderate to a severe stroke and severe stroke compared to their control .Also, there was a statistically significant difference between patients in the study group related to the total level of National Institute of Health Stroke Scale scores in the 1 st, 4 th and 7th day. Moreover a positive statistically significant difference between both the control and the study group on the 7th day.This result was supported by**Yayan (2018)** [41] who concluded that in a study aboutEvidence-based nursing interventions improve physical function and quality of life of patients with cerebral infarction that post evidence-based nursing interventions, the total severity scores of the study group were significantly lower than the control group ($P < 0.01$). Also, the present result was in line with **Kummarg et al(2018)** [54] who found that the severity scores through 24 hours after implementation of the nurse case management group were significantly improved as compared with that of the control group (p=.001).

Regarding acute complications of ischemic stroke, the present study result showed that less than one quarter of patients in the control group had dehydration compared to the minor of the study group. Also, it was found that more than one third of patients in the control group had deep vein thrombosis compared to minority of the study group. Besides that, it was found that less than one quarter of patients in the control group had pulmonary embolism compared to minority of the study group. Also, it was found that less than one quarter of patients in the control group had bed sores and urinary tract infections compared to none of the study groups.

Moreover, it was found that there was a statistically significant difference in acute complications of ischemic stroke patients between the control and the study group .This result was in agreement with**Akhtar et al (2015)** [55] and **Ingeman et al (2011)** [56]who found that before the introduction of the stroke protocol, aspiration pneumonia, pressure sores, and bladder infections were the most commonly recorded complicationswitha significant reductionof this complicationin post protocol application phase**.**

Concerning acute stroke dysphagia screen, it was found that about two third of the control group had the Glasgow Coma Scale scores less than 13compared to one third of the study group in the 1 st ,4 th and 7th day respectively. Also, the result showed that majority of the control group compared to nearly half of the study grouphad facial,tongue, and palatal asymmetry or weakness in the 1 st , 4 th and 7th day respectively .Regarding signs of aspiration, it was found that less than one quarter of the control group had aspiration signs compared to the minor of the study group in the 1 st ,4 th and 7th day respectively. This result was in accordance with **Martino et al (2015)** [57] who reported that in acute stroke, the prevalence of dysphagia has been reported between more than one quarter to two third of the sample of the stroke patients. In addition, this result was in line with **theNational Stroke Foundation (2013)** [58] which found that there were significant improvements in safe swallowing and documentation of nil orally status increased by 13·8% which indicating increased awareness of nil orally status. Also, the current result was in line with **Lewandowski &Barsan (2019)** [49] they concluded that there was an increase in patients who underwent to swallow assessment before oral intake again highlighting the importance of safe swallowing following a stroke.

The result showed a high positive correlation was observed among the control group regarding total Glasgow coma scale scores and total stroke severity in the 1 st ,4th and 7th day respectively. Also, a high negative correlation was observed among the study group regarding total Glasgow coma scale scores and total stroke severity in the 1 st ,4th and 7th day respectively. Moreover, it was found that there was a significant positive correlation betweenthetotal degree of disabilities score and the total stroke severity of control group in the 4 th day .Meanwhile, it was found that there was a significant positive correlation betweentotal degree of disabilities score and total stroke severity score of study group in the 1 st ,4 th and 7th day respectively.

This result was in line with **Osama(2015)**[38]who found that for every one point increase in stroke severity score there was an estimated 15% increased odds of experiencing in hospital mortality ($p< 0.001$) and for every one point increase in GCS total score, there was an estimated 39% reduced odds of experiencing in

hospital mortality (p< 0.001) .Also, **Ahmed et al(2013)**[59], found that the study group who received protocol of care had good functional outcome than the control group (p<0.001).Also,inline with **Mohanty et al (2016)**[60]who demonstrated that patients of the current study has a disabilities degree that can be used as prognosticate functional outcomes at admission and at follow up.

It was found that the increase in total scores of the Glasgow coma score, and decreasing in disabilities degree score and stroke severity scores concerning their smoking in the study group in the 7th day than the 1 st day compared to the control group with no a statistically significant difference among the control and the study group. This result was in line with **Kurmann et al (2018)**[61]who concluded that no significant association between smoking status and clinical outcomes was observed . The present result also was in line with **Youssef et al(2013)** [62]who found that stroke severity in his study was not affected by cigarette smoking since the smokers and the nonsmokers experienced stroke recurrence. However, results of the current study are contradicted with that of **Hata et al (2011)** [64]who suggested that smoking raises the risks of stroke, its recurrence, and severity.

V. Conclusions

Based on the results of this study, it can be concluded thatprotocol of care has a positive effect for clinical outcomes of patientsregarding a significant improvement concerning airway patency, respiratory function, neurogenic function, skin and mucous membrane integrity among the study group, an improvement in level of consciousness. Moreover high reduction in the percentage of the patients had severe disability noted. Also, total level of stroke severity scoreswere decreased and showed more improvement among the study group.It was found that there was a statistical significant difference in acute complications of ischemic stroke among the study group than the control group.

Recommendations Based on the finding of the current study, the following recommendations are derived:

1. Stroke assessment scales should be available in the intensive care unit and should be used immediately on patient admission.
2. Nursing care protocol should be implemented for all patients with acute ischemic stroke and meticulous attention is needed.
3. Developing a simplified and comprehensive booklet including guidelines about the protocol of care for patients with acute ischemic stroke should be available at ICU and stroke unit.
4. The study should be replicated on large probability sampling in different settings to generalize the results.

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