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Effect of Different Therapeutic Positions on Selected vital Parameters among Patients with Stroke: Randomized Control Trial

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Abstract:
Background: Vital parameters can draw attention to impeding clinical deterioration of patient with stroke. So; therapeutic positioning is important to promote patients' functional recovery. **Aim:** to investigate the effect of different therapeutic positions on selected vital parameters among patients with stroke. **Design:** A randomized control clinical trial design was utilized. **Tools: I:** Personal and Medical Background Information Form. **II:** Observational checklist tool records the selected vital parameters. **III:** Numerical Pain Rating scale. **Setting:** at the stroke unit in one of the Cairo University hospitals-Egypt. **Sample:** 104 adult patients who were diagnosed as stroke; their Glasgow Coma Scale were 9 to15. **Results:** There was a statistically significant difference before and after performing different therapeutic positioning in relation to selected vital signs; for example, in relation to heart rate scores on the second day of semi fowler's position (T test =1.930, p- value=0.056) and respiratory rate scores on the second day of semi fowler's position (T test =2.248, p- value=0.027). In addition, there was a significant difference between the study and control groups regarding oxygen saturation scores of all positions; for example, semi fowler's position (T test =2.35 , p- value=0.020) at the third day of positioning. Furthermore, the study and control groups respectively had no pain in the following positions: for example, semi fowler's position (88.5%), (84.6%). **Conclusion:** Vital parameters were improved after therapeutic Positioning.

Keywords: Therapeutic positions, Stroke, Randomised controlled trial, Vital parameters & Nursing role.

Introduction
Cerebrovascular disorder is a comprehensive term that refers to abnormalities in the function of the central nervous system (CNS) that causes localized loss of blood flow to the cerebral parenchyma. Stroke can be categorized into two broad classifications: The first is ischemic stroke, which occurs when a vascular blockage and severe hypoperfusion occur as a result of thrombosis and accounts for approximately 85 percent of all strokes. The second type is hemorrhagic, which occurs when blood leaks into the brain or subarachnoid region **(Chandra et al., 2017). American Stroke Association (2018)** added that there is a third type of stroke, called a transient ischemic attack (TIA); it is sometimes called a "mini-stroke. "TIAs occur when the blood supply to the brain is blocked for a short time, usually no more than 5 minutes.

Medical problems are becoming more common following a stroke such as motor impairment, contractures, urine and fecal incontinence, venous thrombosis, pain, pneumonia, myocardial infarction, cardiac arrhythmias, heart failure, peptic ulcers, pressure ulcers and depression. Motor function deficits significantly affect the patients' mobility, and their daily living activities which limit their participation in social events and other professional activities. Moreover, these complications have adverse effects on the psychological and mental status of these patients and also had significant socioeconomic burden **(Laszuk, Guzel, Dlugosz & Czlonkowska, 2017; Lui & Nguyen, 2018).** The timing of post-stroke complications in relation to the commencement of the stroke is critical, since it affects prognosis and recovery of the stroke **(Alawieh, Zhao & Feng, 2018).**

Effective and early medical management of stroke is essential to prevent further cerebral damage; stroke can cause short or long-term disability. Rehabilitation aims to reinforce functional independence, reduce disability and improve quality of life of those patients had stroke **(Kuriakose & Xiao, 2020).** Following a stroke, patients often used to spend the first days of admission in bed, which put them at high risk for developing complications such as pressure ulcer, pain, and venous thromboembolism. It is now widely recommended that those who had an acute stroke, when their clinical condition permits, should be helped to sit up, mobilize and actively participate in exercise early as possible to minimize the detrimental effects of bed rest and inactivity **(Green et al., 2021).** During rehabilitation, proper positioning and early mobilization out of bed during hospitalization have shown to be associated with better functional outcomes for patients after stroke.

This may reduce the loss of muscle mass, increase muscle strength, improve neurological functioning, and improve gait function **(Norvang et al., 2018).** Therapeutic positioning is an important nursing activity for disabled patients regardless of the underlying disease **(Herisson et al., 2016).** It is defined as turning the patient from side to side when lying in bed or on a similar surface considering the body parts' alignments. Healthy individuals change positions during sleep about every 12 min **(Anchala, 2016)**. Therefore, changing the patient's position frequently reduces patient discomfort and avoids immobilization-induced complications such as contractures, pressure sores, orthostatic hypotension, pain or respiratory problems **(Logan et al., 2018).**

Therapeutic positioning is the basic principle of the newly developed positioning concept. Parts of the body are positioned as neutral as possible to avoid stretching and shortening of the muscles. All parts of the body are supported against gravity and therefore there are no cavities underneath any body parts. In addition, body parts with high or low tone are stabilized with special techniques to normalize muscle tone. In severely disabled patients, all body parts are supported against gravity and the weight of the body is distributed equally **(Pickenbrock, Ludwig, Zapf & Dressler, 2015).**

Brunser et al. (2016) clarified that lying flat head position as opposed to elevating the head increases mean cerebral blood flow velocity (CBFV) in patients with middle cerebral artery (MCA) ischemic stroke, with slight increase in intracranial pressure. The effect of different positions on blood pressure, orthostatic hypotension, pulse and respiratory rate of stroke patients are inconclusive. In patients with traumatic brain injury or cerebral hemorrhage, switching from supine to prone position improves respiratory rate, with no adverse effects on intracranial pressure or cerebral perfusion pressure. In addition **Abd El-Moaty, EL-Mokadem, & Abd-Elhy, (2017)** concluded that semi-fowler position of the 30° Head of Bed (HOB) Elevation has a positive effect on hemodynamic and oxygenation.

Nursing interventions play a vital role in the rehabilitation of a stroke patient. Stroke rehabilitation nursing focuses on physical recovery by using proper therapeutic positions and early mobilization, independence in everyday activities, reduce the risk of secondary complications as maintain normal hemodynamic status and finally promote holistic adaptation to stroke related disability **(Ahangar, Saadat, Alijanpour, Galeshi & Hosseinalipour, 2018).** Therefore, the current study aimed to investigate the effect of different therapeutic positions on selected vital parameters for a clinically feasible period of two hours among stroke patients.

Significance of the study

Cerebrovascular stroke is a leading cause of death and morbidity around the world. Stroke affects 15 million individuals worldwide each year, nearly six million people die and leaving another five million permanently disabled. Four out of five strokes occur in low- and middle-income countries. The World Health Organization predicts by the end of 2020, stroke will be the second cause of death after ischemic heart disease in developing and developed countries **(Ahangar et al., 2018 &World Heart Federation, 2018).**

In Egypt stroke accounts for 6.4% of all deaths and thus ranks the third after heart disease and gastrointestinal diseases with a crude prevalence rate of 963/100000 inhabitants. The clinical characteristics of Egyptian stroke patients are generally similar to those in other populations; stroke &its complications may be one of the major economic challenges facing the Egyptian health sector **(Abotaleb, Abdelalim & Salah, 2018).** The last annual statistics of newly diagnosed patients with cerebrovascular stroke who admitted to Al Manial university hospital at Al Kasr El Einy hospital for the three previous years (2018, 2019, 2020) are (512, 276, 192) respectively (Statistics and Medical Records Department, 2021).

Patients benefit if nurses work effectively with the therapy team in positioning and early mobilization. Nurses may give mobilizing and positioning patients a lower priority than their other nursing activities. When they change a patient's position, it might be unrelated to proper or corrected position. Nurses also due to their wide roles in patient care, member of rehabilitation team, patient's education, and nurse-patient relationship can increase the patient recovery process **(Sexton, Chan, Elliott, Stuart & Jayasuriya, 2016).**

There are scanty numbers of studies that can guide nursing practice with respect to therapeutic positioning for patients with neurological diseases. It is not clear from the studies in which position, for how long, and at what time after the onset of brain injury that the patients should be positioned to beneficially influence the vital parameters. So, in this study, the researchers addressed these questions by investigating the patients' heart rate, respiratory rate, blood pressure, oxygen saturation, and pain in different therapeutic positions of patients had stroke. Data obtained from this study can be used to help nurses assess the effect of different therapeutic positions on vital parameters among patients with stroke. It is also hoped that the findings of this study could help in improving patients' outcomes and establish evidence data based that could advance nursing practice and research.

Method

Aim of the study

The aim of the current study was to investigate the effect of different therapeutic positions on selected vital parameters among patients with stroke.

Research hypothesis

H1- There is a statistical significant difference between patients with stroke who placed in therapeutic positions and patients who placed in routine hospital positions in relation to vital signs.

H2- There is a statistical significant difference between patients with stroke who placed in therapeutic positions and patients who placed in routine hospital positions in relation to oxygen saturation mean scores

H3- There is a statistical significant difference between patients with stroke who placed in therapeutic positions and patients who placed in routine hospital positions in relation to pain intensity level.

Operational definitions

Vital parameters: Variable measurements include vital signs (heart rate, respiratory rate, systolic blood pressure, diastolic blood pressure and pulse pressure), oxygen saturation and pain.

Therapeutic positions: Turning patient's positions lying on bed for different positions as supine position, semi fowler's position, unaffected side and affected side for two hours for each position by using different supportive device and considering body parts alignments.

Design

A randomized control clinical trial design was utilized to accomplish this study purpose.

Setting

This research was carried out at a stroke unit affiliated with the neurology departments of one of Cairo University hospitals, which has a total capacity of twenty-five patients. Stroke unit care, providing early rehabilitation, improves long-term outcomes for patients following a stroke.

Sample

Total sample size of adult male and female patients admitted to the stroke unit in one of the university hospitals, Cairo Governorate, Egypt; and met the inclusion criteria were estimated by using power analysis n=N/1+N (e2); as a research population was 140 patients, based on sample size equation, the sample size equals 104 patients at 95% confidence level. Prior to the study, randomization to therapeutic positions or routine hospital positions was determined using computer- generated system' after that, the patient numbers were sorted by randomly generated numbers and thus assigned to one of the positioning technique.

Inclusion criteria:

1- Stroke patient with hemiplegia or hemiparesis during the first week of their admission to the stroke unit.
2- Adult male and female patients their ages ranged from 18 up to 60 years old.
3- Conscious patients (Glasgow Coma Scale=9-15).
4- Able to communicate with the researchers.

Exclusion criteria:

1. Severely disabled patient (motor response ≤ 3).
2. Patients with cognitive impairment or had aphasia

The two groups investigated in this study were:

Control group [GA, n = 52], who received the routine positions technique (without using supportive devices) and intervention group [GB, n =52], who followed therapeutic positions technique that maintain proper body alignment by using supportive devices as pillows under patient's bony prominence to maintain skin integrity and hand roll to prevent finger contractures; trochanter roll to prevent external rotation of the hips joints, foot board to maintain dorsiflexion of the feet thus prevent foot drop.

Tools:

The researchers were used three tools to gather data related to the study as follows:

1. Personal and Medical Background Information sheets of Stroke. It was developed by the researchers. This tool consisting of two parts: First part: includes personal information covering questions related to age, gender, marital status, occupation and level of education. Second part: the medical background information it includes questions related to present, past, and family history, level of dependency, motor ability, level of consciousness using Glasgow Coma Scale (GCS), received medication, and laboratory investigation were also included.
   - The Glasgow Coma Scale (GCS) is a neurological scale which aims to give a reliable and objective way of recording the state of a person's consciousness for initial as well as subsequent assessment. The scale is composed of three tests: eye, verbal and motor responses. The three values separately as well as their sum are considered. The lowest possible GCS (graded 1 in each element) is 3 (deep coma or death), while the highest is 15 (fully awake person).
2. Observational checklist tool was designed by the researchers to record the selected vital parameters (heart rate, respiratory rate, systolic, and diastolic blood pressure, pulse pressure, oxygen saturation by using pulse oximeter and pain "location and severity" using Visual Analogue Scale-VAS) of the study sample in different positions (Supine, Affected side, Unaffected side, and Semi fowler's).

3. Numerical Pain Rating scale (NPRS). It consists of a straight line with the endpoints defining extreme limits such as 'no pain at all' and 'pain as bad as it could be'. The patient is asked to mark his pain level on the line between the two endpoints. The scores of the Numerical Pain Rating scale ranged from 0 up to 10; 0=no pain, 1-3= mild pain, 4-6=moderate pain, 7-9=severe pain while 10= worst pain (McCaffery & Beebe…. et al, 1989). Its reliability was conducted by Ferraz, Quaresma, Aquino, Atra & Tugwell, (1990) with a high test–retest reliability (r = 0.96 and 0.95, respectively).

Ethical considerations

An official approval was obtained from Research Ethics Committee-Faculty of Nursing Cairo University (IRB: 00026458). In addition, an official permission was obtained from the director of stroke unit to conduct the current study. After discussing the nature and purpose of the study, written informed patients' consent was gained. Each patient had the option of participating or not participating in the present study, and they had the freedom to withdraw at any moment without any justification and without affecting the care provided. In addition, patients were informed that the information gathered will not be used in any subsequent research. By encrypting all data, each subject's confidentiality and anonymity are guaranteed.

Procedure:

Once obtaining the formal approval from the research ethics committee and the medical director of the unit, the researchers were interviewed each patient who had the inclusion criteria individually to explain the nature and purpose of the study. Then each patient was asked to sign a consent form. Baseline data were collected from all patients using the first tool. After that; every patient in the study group was positioned on various therapeutic positions for every two hours by following turning schedule such as semi fowler's, lying on unaffected side, lying supine and lying on affected side position while the control group were receiving the routine hospital positions followed by assessment of vital parameters as heart rate, respiratory rate, systolic blood pressure, diastolic blood pressure, pulse pressure, oxygen saturation and pain for both study and control groups after two hours for each position for three consecutive days at the morning shift only using tool II & III.

Statistical analysis:

A personal computer was used to code and tabulate the data. Version 23 of the Statistical Package for Social Science (SPSS) was used. Inferential and descriptive statistics were utilized in the current study, descriptive statistics included mean and standard deviation, frequency; percentage distribution; measure of dispersion; t-test and ANOVA test were also used. Statistical significance was considered at P-value < 0.05.

Results:

Statistical findings of the current study are presented in three sections as following: **Section I:** Describes personal information (Ia) and medical background (Ib) of the study and control groups. **Section II:** Delineates the **1st hypothesis** testing the difference between the study and the control groups regarding means scores of vital signs before and after therapeutic positions (Tables 1-5). **Section III:** Illustrates the **2nd hypothesis** testing the difference between both groups in relation to oxygen saturation scores before and after therapeutic positions (Table 6). **Section IV:** Clarifies the **3rd hypothesis** testing the difference between the study and the control groups according to the means scores of pain intensity level before and after therapeutic positions (Table 7).

Section (I a): Description of the personal information of the study and control groups (n= 104) (52/each).

Section (1a) displays that (30.8%) and (36.5%) of the study and control groups their age ranged between 40 to less than 50 year with mean age (43.25± 10.679), (43.23± 9.096) respectively. Male gender (51.9%) of the study group and female gender constitutes (53.8%) of the control group. According to marital status (57.7%) of the study group and (61.5%) of the control group was married. In relation to education level (36.6%) of the study group and (38.3%) of control groups can't read or write. With reference to occupation, (28.8%) of the study group were house wife and farmer, and (30.8%) of control group were farmer. In addition to residence, (57.7%) and (51.9%) of the study and control groups respectively had reside urban areas. Regarding history of smoking (69.2%) of the study group and (71.2%) of the control group had no history of smoking. There were no significant statistical differences between study and control groups in relation to personal information.

Section (I b): Description of medical background data of the study and control groups (n= 104) (52/each).

Section (Ib) illustrates that (55.8%, 88.5%, 84.6%, 90.4%) and (42.4%, 94.2%, 90.4%, 84.6%) of the study and control groups respectively had no diabetes mellitus; renal disease, musculoskeletal disease or GIT disease. While (36.5%, 61.5%) and (50.0%, 67.3%) of the study and control groups respectively had uncontrolled hypertension and neurological disease. Regarding family history of stroke (86.5%) of the study group and (78.8%) of the control group had no family history of stroke. According to Glasgow coma scale, (51.9%) of the study group had

more than 13 score, while (55.8%) of the control group their scores ranged between 11-12.With reference to motor ability, (38.5%) of the study group and (42.3%) of the control group had left side paresis. In relation to laboratory investigations (55.8%, 57.7%) of the study and control groups respectively had below normal range of hemoglobin. (78.8%) of the study group, (75.0%) of the control group had normal range of random blood sugar. Moreover (51.9%) of the study group and (63.5%) of the control group their prothrombin time test result was above normal range. There were no significant statistical differences between study and control groups in relation to medical background data.

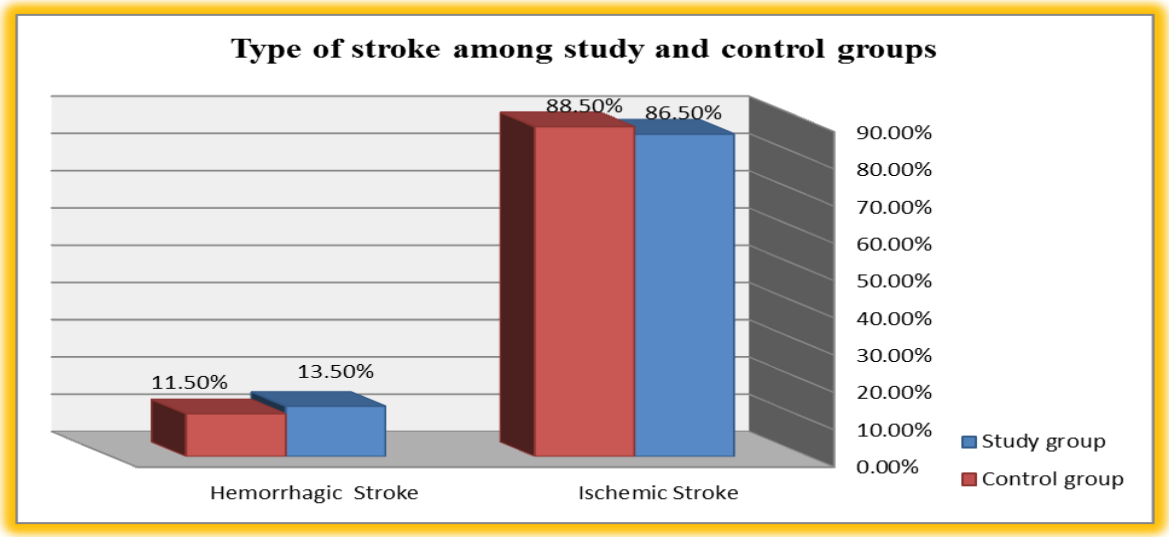

Figure (1): Type of stroke among study and control groups

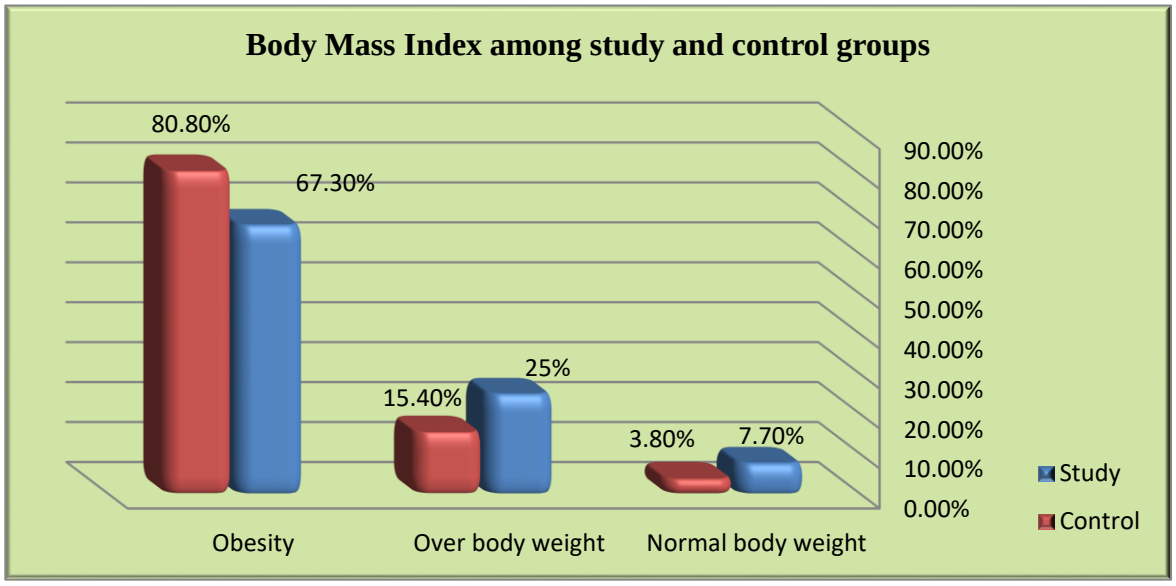

Figure (2): Body of stroke among study and control groups

Section II: Delineates the 1st hypothesis testing the difference between the study and the control groups regarding the means scores of vital signs before and after therapeutic positions (Tables 1-5)

Table (1): Comparison of Vital Signs Mean Scores Before Therapeutic Positioning among the Study and Control Groups (n= 104) (52/each).

Vital Signs	Before Therapeutic Positioning								
	Study group 1st day Mean±SD	Control group 1st day Mean±SD	T- test P-value	Study group 2nd day Mean±SD	Control group 2nd day Mean±SD	T- test P-value	Study group 3rd day Mean±SD	Control group 3rd day Mean±SD	T- test P-value
Heart Rate	87.04±11.298	83.87±11.086	**1.446 0.151**	86.19±9.199	84.15±11.411	**1.003 0.318**	86.25±9.784	85.06±9.380	**0.634 0.527**
Respiratory Rate	19.90±9.475	18.10±2.395	**1.334 0.185**	18.65±3.217	17.81±3.442	**1.295 0.198**	19.42±3.322	18.56±3.220	**1.349 0.180**
Systolic blood pressure	131.15±19.36	128.08±13.72	**0.935 0.352**	129.62±18.25	130.00±14.55	**0.119 0.906**	128.27±21.303	130.58±16.499	**0.618 0.538**
Diastolic blood pressure	75.19±8.515	73.08±8.526	**1.266 0.208**	74.62±9.385	74.81±9.180	**0.106 0.916**	75.77±9.149	75.58±10.921	**0.097 0.923**
Pulse pressure	54.42±13.920	55.58±9.164	**0.499 0.619**	54.81±13.647	55.19±8.743	**0.171 0.864**	52.12±15.125	55.00±8.518	**1.198 0.234**
ANOVA P- value	**0.842 0.645**								

**P-value≤ 0.05 is significant at two tailed*

Table (2): Comparison of Vital Signs Mean Scores Regarding Therapeutic Semi Fowler's Position among the Study and Control Groups (n= 104) (52/each).

Vital Signs	Study group 1st day Mean±SD	Control group 1st day Mean±SD	T- test P-value	Study group 2nd day Mean±SD	Control group 2nd day Mean±SD	T- test P-value	Study group 3rd day Mean±SD	Control group 3rd day Mean±SD	T- test P-value
Heart Rate	87.52±8.802	85.17±11.212	**1.187 0.238**	86.31±8.868	82.54±10.945	**1.930 0.056***	84.42±9.611	87.31±11.785	**1.368 0.174**
Respiratory Rate	20.10±3.351	19.13±3.081	**1.523 0.131**	19.83±3.234	18.46±2.954	**2.248 0.027***	20.19±3.694	18.46±3.190	**2.557 0.012***
Systolic blood pressure	126.54±18.13	132.69±16.102	**1.830 0.070**	125.96±20.220	131.92±18.369	**1.574 0.119**	127.12±19.935	132.12±16.843	**1.382 0.170**
Diastolic blood pressure	74.62±9.385	76.92±10.202	**1.200 0.233**	75.00±10.000	76.15±11.907	**0.535 0.594**	72.69±8.658	76.15±9.932	**1.894 0.061**
Pulse pressure	50.38±12.828	55.00±8.044	**2.198 0.030***	51.35±14.556	55.69±9.435	**1.792 0.076**	53.27±17.118	56.15±8.438	**1.090 0.278**
ANOVA P- value	**0.960 <0.001***								

**P-value≤ 0.05 is significant at two tailed*

Table (3): Comparison of Vital Signs Mean Scores Regarding Unaffected Side Position among the Study and Control Groups (n= 104) (52/each).

Vital Signs	Study group 1st day Mean±SD	Control group 1st day Mean±SD	T- test P-value	Study group 2nd day Mean±SD	Control group 2nd day Mean±SD	T- test P-value	Study group 3rd day Mean±SD	Control group 3rd day Mean±SD	T- test P-value
Heart Rate	84.98 ±10.09	85.88±11.656	**0.423 0.673**	86.50±9.739	87.77±10.551	**0.637 0.525**	87.48±9.851	86.40±11.117	**0.523 0.602**
Respiratory Rate	19.27±3.182	18.60±3.471	**1.031 0.305**	20.08±3.469	18.46±3.702	**2.296 0.024***	20.44±2.980	18.60±3.577	**2.860 0.005***
Systolic blood pressure	129.04±17.74	131.73±18.120	**0.766 0.446**	123.27±12.323	134.04±20.025	**3.303 0.001***	126.92±17.550	130.96±19.429	**1.112 0.269**
Diastolic blood pressure	75.58±9.785	75.96±11.759	**0.181 0.856**	74.62±7.531	77.88±11.772	**1.687 0.095**	74.81±8.964	75.38±12.281	**0.274 0.785**
Pulse pressure	53.65±13.866	55.58±9.164	**0.834 0.406**	48.65±9.907	56.15±11.741	**3.520 <.001***	51.54±12.892	55.19±9.800	**1.627 0.107**
ANOVA P- value	**1.134 0.000***								

**P-value≤ 0.05 is significant at two tailed*

Table (4): Comparison of Vital Signs Mean Scores Regarding Supine Position among the Study and Control Groups (n= 104) (52/each).

Vital signs	Study group 1st day Mean± SD	Control group 1st day Mean±SD	T- test P-value	Study group 2nd day Mean±SD	Control group 2nd day Mean±SD	T- test P-value	Study group 3rd day Mean±SD	Control group 3rd day Mean±SD	T- test P-value
Heart Rate	85.60±8.377	85.02±11.112	**0.299 0.766**	87.50±9.350	88.58±10.624	**0.549 0.584**	86.54±8.498	86.63±10.960	**0.050 0.960**
Respiratory Rate	18.65±3.746	18.63±3.763	**0.026 0.979**	18.88±3.166	18.90±3.243	**0.031 0.976**	18.98±3.077	19.71±3.076	**1.211 0.229**
Systolic blood pressure	126.2±16.488	132.69±18.054	**1.883 0.063**	128.65±19.304	134.42±18.515	**1.555 0.123**	125.77±14.599	132.50±18.136	**2.085 0.040***
Diastolic blood pressure	73.85±8.202	75.58±11.099	**0.904 0.368**	74.81±8.282	78.08±11.209	**1.692 0.094**	76.15±8.202	75.96±11.248	**0.100 0.921**
Pulse pressure	53.08±14.890	56.15±11.229	**1.190 0.237**	52.88±15.125	56.54±10.457	**1.433 0.155**	50.38±9.280	56.15±9.732	**3.094 0.003***
ANOVA P- value	**1.159 <.001***								

**P-value≤ 0.05 is significant at two tailed*

Table (5): Comparison of Vital Signs Mean Scores Regarding Affected Side Position among Study and Control Groups (n= 104) (52/each).

Vital Signs	Study group 1st day Mean±SD	Control group 1st day Mean±SD	T- test P-value	Study group 2nd day Mean±SD	Control group 2nd day Mean±SD	T- test P-value	Study group 3rd day Mean±SD	Control group 3rd day Mean±SD	T- test P-value
Heart Rate	85.56±8.344	86.42±9.527	**0.493 0.623**	87.33±8.429	88.90±9.580	**0.891 0.375**	86.79±7.852	90.15±9.138	**2.014 0.047***
Respiratory Rate	19.46±2.769	19.77±3.085	**0.535 0.594**	19.60±2.644	19.79±3.368	**0.324 0.747**	19.63±3.169	19.81±2.418	**0.313 0.755**
Systolic blood pressure	126.15±15.98	132.1±17.415	**1.819 0.072**	125.58±15.264	133.65±18.997	**2.390 0.019***	124.42±12.744	133.46±19.692	**2.779 0.006***
Diastolic blood pressure	77.69±9.207	77.50±10.455	**0.100 0.921**	76.35±8.638	77.12±11.604	**0.383 0.702**	75.77±8.482	75.58±11.617	**0.096 0.923**
Pulse pressure	49.23±12.021	55.19±11.460	**2.588 0.011***	49.42±11.099	56.15±11.053	**3.099 0.003***	48.65±9.503	56.35±10.295	**3.959 <.001***
ANOVA P- value	**3.497 .000***								

**P-value≤ 0.05 is significant at two tailed*

Section III: Illustrates the 2nd hypothesis testing the difference between the study and the control groups in relation to the means scores of oxygen saturation before and after therapeutic positions.

Table (6): Comparison of Oxygen Saturation Mean Scores Before and After Therapeutic Positions among the Study and Control Groups (n= 104) (52/each).

Oxygen Saturation	Study group 1st day Mean±SD	Control group 1st day Mean±SD	T- test P-value	Study group 2nd day Mean±SD	Control group 2nd day Mean±SD	T- test P-value	Study group 3rd day Mean±SD	Control group 3rd day Mean±SD	T- test P-value
Oxygen saturation before therapeutic positions									
	94.96±11.427	96.00±10.140	**0.490 0.625**	97.02±3.878	97.96±1.546	**1.628 0.107**	97.29±4.932	98.38±1.286	**1.55 0.12**
Oxygen saturation after therapeutic positions									
Semi fowler's Position	97.73±2.206	98.77±0.899	**3.143 0.002***	97.42±3.322	98.46±1.179	**2.125 0.036***	97.38±3.476	98.58±1.109	**2.35 0.02***
Unaffected side Position	97.12±3.382	98.54±1.275	**2.839 0.005***	96.17±6.709	98.27±1.457	**2.202 0.030***	96.94±4.509	98.62±1.191	**2.587 0.011***
Supine Position	97.06±3.632	98.56±1.626	**2.718 0.008***	97.29±2.986	98.65±1.170	**3.070 0.003***	96.92±3.143	98.60±1.159	**3.602 <.001***
Affected side Position	96.63±3.453	98.63±1.138	**3.967 <.001***	96.87±3.646	98.65±1.251	**3.346 0.001***	97.33±2.806	98.77±1.198	**3.409 <.001***
ANOVA P- value	**3.496 .026**								

**P-value≤ 0.05 is significant at two tailed*

Section IV: Clarifies the 3rd hypothesis testing the difference between the study and the control groups in relation to the means scores of pain intensity level before and after therapeutic positions.

Table (7): Frequency & Percentage Distribution of Pain Intensity Level among Study and Control Group (n= 104) (52/each).

Variables	Study group		Control group		χ2	P- value
	No.	%	No.	%		
Pain intensity before intervention					**0.088**	**0.957**
Mild Pain	6	11.5%	7	13.5%		
Moderate Pain	2	3.8%	2	3.8%		
No Pain	44	84.6%	43	84.6%		
Pain intensity after semi fowler's position					**0.330**	**0.566**
Mild Pain	6	11.5%	8	15.4%		
Moderate Pain	0	0.0%	0	0.0%		
No Pain	46	88.5%	44	84.6%		
Pain intensity after unaffected side position					**1.378**	**0.240**
Mild Pain	2	3.8%	5	9.6%		
Moderate Pain	0	0.0%	0	0.0%		
No Pain	50	96.2%	47	90.4%		
Pain intensity after supine position					**1.891**	**0.169**
Mild Pain	1	1.9%	4	7.7%		
Moderate Pain	0	0.0%	0	0.0%		
No Pain	51	98.1%	48	92.3%		
Pain intensity after affected side position					**1.380**	**0.501**
Mild Pain	2	3.8%	5	9.6%		
Moderate Pain	1	1.9%	1	1.9%		
No Pain	49	94.2%	46	88.5%		

**P-value≤ 0.05 is significant at two tailed*

Figure (1): Represents that (86.50% and 88.50%) of both study and control groups respectively had ischemic stroke. In addition, there was no significant difference between both groups (χ2 = 0.088, p-value=0.767).

Figure (2): Shows that (67.30% and 80.80%) of the study and control groups respectively suffering from obesity, with mean of BMI (30.98 ± 3.691) for the study group, and (33.31 ± 4.161) for the control group. In addition, there was no statistical significant difference between both groups (χ2 = 2.494, p-value=0.287).

Table (1): Shows that there was no statistically significant difference between the study and control groups before therapeutic positioning in relation to vital signs scores (ANOVA=**0.842**, p- value=**0.645**).

Table (2): Clarifies that there was a statistically significant difference between the study and control groups in relation to heart rate scores on the second day of semi fowler's position (T test =1.930, p-value=0.056) and respiratory rate scores on the second and third day of semi fowler's position (T test =2.248, p- value=0.027) (T test =2.557, p-value=0.012) respectively and also pulse pressure scores on the first day of semi fowler's position (T test =2.198, p- value=0.030).

Table (3): Illustrates that, there was a statistically significant difference between the study and control groups in relation to respiratory rate scores on the second and third day of the unaffected side position (T test =2.296, p- value=0.024) (T test =2.860, p-value=0.005) respectively and also systolic blood pressure scores on the second day of the unaffected side position (T test =3.303, p- value=0.001). Moreover, there was a statistically significant difference between the study and control groups regarding pulse pressure scores on the second day of unaffected side position (T test =3.520, p-value=<.001).

Table (4): Clarifies that there was a statistically significant difference between the study and control groups in relation to systolic blood pressure scores on the third day of the supine position (T test =2.085, p-value=0.040) and also pulse pressure scores on the third day of the supine position (T test =3.094, p-value=0.003).

Table (5): Illustrates that there was a statistically significant difference between the study and control groups in relation to heart rate scores on the third day of the affected side position (T test =2.014, p-value=0.047) and also systolic blood pressure scores on the second and third day of the affected side

position (T test =2.390, p- value=0.019) (T test =2.779, p- value=0.006) respectively. Furthermore, there was a statistically significant difference between the study and control groups regarding pulse pressure scores on the first, second, and third day of the affected side position (T test =2.588, p- value = 0.011), (T test =3.099, p- value=0.003), (T test =3.959, p- value=<.001) respectively.

Table (6): Illustrates that there was no a statistical difference between the study and control groups according to oxygen saturation mean scores before therapeutic positions. there was a statistically significant difference between the study and control groups regarding oxygen saturation scores on the first, second and third day of all the following positions; semi fowler's position (T test =3.143, p-value=0.002) (T test =2.125, p- value=0.036) (T test =2.35 , p- value=0.020) respectively; unaffected side position (T test =2.839, p- value=0.005) (T test =2.202, p- value=0.030) (T test =2.587, p-value=0.011) respectively. Additionally, supine position (T test =2.718, p- value=0.008) (T test =3.070, p- value=0.003) (T test =3.602, p-value=<.001) respectively; affected side position (T test =3.967, p- value=<.001) (T test =3.346, p-value=0.001) (T test =3.409, p- value=<.001) respectively.

Table (7): Illustrates that, there was no significant differences between study and control groups regarding pain intensity level before and after intervention as (84.6%) of the study and control groups had no pain before therapeutic positioning. Furthermore, the study and control groups respectively had no pain in the following positions: semi fowler's position (88.5%), (84.6%) unaffected side position (96.2%) (90.4%); supine position (98.1%) (92.3%) and affected side position (94.2%), (88.5%).

Discussion

Positioning patients correctly; is a crucial aspect of nursing practice and the main concern of the nurse in a stroke care unit that maintaining a patient's neutral body alignment as well as physiologic safety and prevent complications of immobility, injury. The current study finding revealed that, there was no significant difference between study and control groups regarding personal information as more than one third of the study and control groups their age distributed between forty to less than fifty years old and more than half of the study and control groups were male and female respectively. This finding was comparable with **Ali., Ahmed & Zaky, (2021)** who evaluated the Effect of Changing Selected body Positions on Oxygen Saturation among Patients with Acute Stroke and reported that less than two- third of the studied sample their mean of age was (47.91) and more than half of the stroke cases were male. As **Pniak et al., (2021)** confirmed that, the risk of a stroke in young women is low; however, with age, both the incidence of and mortality associated with strokes gradually increase in the female population. Also, **Roy-O'Reilly & Louise-McCullough, (2018)** who conduct a study to understand the effect of sex and age on ischemic stroke pathology found that, patient age modifies the influence of patient sex in ischemic stroke. Early in life, the burden of ischemic stroke is higher in men, but stroke becomes more common and debilitating for women in elderly populations. Furthermore; nearly thirty percent of both groups were house wife and farmer which reflect their residence as about forty percent of the study and control groups came from rural area.

In addition, there was no significant statistical difference between study and control groups according to medical background information as half of the studied group and about forty percent of the control group had no diabetes mellitus but had uncontrolled hypertension. This may explain the fact that there is a direct relationship between uncontrolled hypertension and both hemorrhagic and ischemic types of stroke **(Aiyagari, 2016)**. Further, **(Du et al., 2019)** who assessed the stroke risk associated with different BP levels, according to age, sex, and stroke type shed light on the overall stroke risk increased with increasing SBP and DBP levels, regardless of patient sex or stroke type. Also, **Vitt, Trillanes & Hemphill (2016)** who studying management of blood pressure during and after recanalization therapy for acute ischemic stroke reported that, hypertension may be a marker of stroke severity, where spontaneously elevated blood pressure may serve as a compensatory mechanism to maintain cerebral perfusion.

With reference to Body Mass Index, the current study finding verified that most of the study sample were obese and diagnosed as ischemic stroke and almost two third of them had other neurological diseases. **Quiñones-Ossa (2021)** in the study titled Obesity and Stroke: Does the Paradox Apply for Stroke? Mention that, obesity predisposes a risk for developing vascular diseases like stroke. Further, it has been established that for a BMI greater than 20, an increase by every unit adds to the ischemic stroke risk by 5% and also the relation between stroke risk increase in obese patients is related to the amount of adipose tissue and a repository of inflammatory cells that lead to subsequent atherosclerosis promoted by hyperglycemia and insulin resistance.

Around half of the study group and more than half of the control group their Glasgow coma scale score ranged between eleven to twelve and the rest of them

their score was thirteen and above, the researchers interpreted that as those patients had mild to moderate degree of brain injury which is consistent with the current study' inclusion criteria. This finding supported by **Healy, (2019)** who found that, as patients' neurological exam worsens and GCS scores decrease, cerebral oximetry index (Cox) values also worsen or increased. These results may support that increasing severity of neurological injury is associated with more impaired cerebral autoregulation whereby cerebral blood flow is perfusion pressure dependent.

Moreover, more than fifty percent of the sample either the study or the control groups their hemoglobin level below normal while prothrombin time above normal. This finding explained by **Sfredel et al., (2018)** who investigate "Blood Coagulation Following an Acute Ischemic Stroke" as between 5% to 10% of stroke cases were identified as been caused by a primary coagulopathy the fact that fibrinogen has been showed to be elevated in stroke patients which is an indication that certain coagulability changes may be taking place, Also, **Mohamed & Babiker (2021)** observed significance increase in the mean of fibrinogen level in case group when compared to the control group, and insignificance with age, gender, family history, hypertension and smoking.

Regarding assessment of the vital parameters before intervention the current study finding clarified that, there was no statistically difference between the study and control groups before therapeutic positioning regarding vital parameters (vital signs, oxygen saturation and pain intensity level) mean scores; as both study and control groups still on the same routine hospital care. Concerning the first hypotheses; the current study findings highlighted that, there was statistically significant differences after performing different therapeutic positioning in relation to selected vital signs as heart rate, respiratory rate and pulse pressure scores were decreased on the second day, second and third day and the first day respectively after therapeutic fowler's position when compared to pre-intervention. Accordingly, after the unaffected side therapeutic position, respiratory rate was decreased on the second and third day, while systolic blood pressure and pulse pressure scores were decreased on the second day than before.

With regard to the practicing of supine position there was a significant change in systolic blood pressure and pulse pressure scores on the third day. Whereas, the heart rate decreased on the third day, systolic blood pressure on the second and third day and pulse pressure scores on the first, second, and third day after performing the affected side therapeutic position. This finding might be interpreted as patients on therapeutic position maintaining body parts alignments improved vital signs. Which incongruent with **Pickenbrock, Zapf & Dressler (2015)** who found that, in neither of the groups did heart rate, breathing frequency and blood pressure change significantly after the intervention compared to before and concluded that, positioning does not influence heart rate, breathing frequency and blood pressure. While **Anchala, (2016)** supported this finding when conduct a Study to Assess the Effect of Therapeutic Positions on Hemodynamic Parameters among Critically Ill Patients and represents the comparison of parameters in post-test between the study and control groups in left lateral position. In systolic blood pressure there was a significant difference in the mean scores between the study group and control group in the left lateral position.

Pertaining to oxygen saturation the study finding proved the second hypothesis and illustrated that, there was a statistically significant difference between the study and control groups regarding oxygen saturation scores on the first, second and third day of all the following positions: semi fowler's; unaffected side; supine and affected side positions. According to **Ali, Ahmed & Zaky (2021)** who studying the Effect of Changing Selected body Positions on Oxygen Saturation among Patients with Acute Stroke; concluded that the semi-sitting position is the best position than other positions in improving oxygen saturation after one hour from positioning among stroke patients. Also **Anchala, (2016)** found that, there was a significant difference in oxygen saturation in semi fowler's position.

The current finding revealed no change in pain intensity level before and after performing therapeutic positions which is contrary to the third hypothesis as all patients of the study and control groups had no pain before and post intervention either traditional routine hospital positions or therapeutic positioning. This might be interpreted as the two different positions (hospital routine & therapeutic positions) had no effect on pain intensity level which explained by Stanford health care (2022) as stroke keeps blood from reaching the brain and leads to brain tissue damage. On the other hand, about 10% of people who experience a stroke eventually develop pain that is called post-stroke pain (after the part of the brain typically affected) and it is a disease origin. Also **Chun Tang, et. al, (2019)** confirmed that, Central post-stroke pain (CPSP), a type of neuropathic pain, is caused by damage to the central nervous system during cerebrovascular accidents and is one of the common sequelae of stroke.

Conclusion:

Vital parameters (Heart rate, breathing rate, blood pressure and oxygen saturation) were improved after therapeutic Positioning.

Nursing Implication: This study shows that nurses can apply different therapeutic positioning according to patients' comfort and preference or to prevent any problems related to positioning. And there is no risk of basic vital parameters

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