Effect of Nursing Intervention by Using Physical Exercises Modules on Gait and Balance for Stroke Patients

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Abstract

Context: Cerebrovascular diseaseis the second leading cause of death and the third most common cause of disability in the world. Gait and balance disorders are one of the first patients' complaints after a stroke that significantly impact the activities of daily living, quality of life and raise the risk for falls.**Aim:** The aim of the study wasto evaluate the effect of nursing intervention by using physical exercises modules on gait and balance for stroke patients. **Methods: This** Quasi experimental was carried out on80 stroke patients at Neurology Department and Outpatient Clinics of Tanta Universal Hospitals. **Tools of data collection:** Four toolswereused for datacollectionasfollows: **Tool I:** A structuredinterview questionnaire. **Tool II:** Berg Balance Scale. **Tool III:** Time Up and Go Test. Tool **IV**-Korean version of the Modified Barthel Index. **Results:** showed that there was a statistically significant improvement in both studied groups, while highest improvement was in the study than the control group. **Conclusion:** it can be concluded that the physical exercises moduleshave a positive effective on improvement of gait, balance and performing activity of daily living as well as its effective in improving the functional outcomes. **Recommendations:** Stroke patients must perform physical exercises for improving balance, gait as well as activity of daily living and encouraging continuous supervision, guidance and evaluation of nurses' performance who caring of stroke patients in the hospital.

Keywords: Nursing intervention, physical exercises modules, gait and balance, stoke patient
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Introduction

Stroke is the devastating disease, and a medical emergency situation sometimes called a brain attack. It is the leading cause of physical, psychological and social disability in adults. Each year millions of stroke survivors have to adapt to a life with restrictions in activities of daily living as a consequence of cerebrovascular disease (Kleindorfer et al., 2021).

According to the Global Burden of Disease, prevalence of stroke in 2019 was 101.5 million people, ischemic stroke was 77.2 million, intra-cerebral hemorrhage was 20.7 million, and subarachnoid hemorrhage was 8.4 millionand there were 6.6 million deaths attributable to cerebrovascular disease worldwide. According to the Global, Regional and Country-Specific Burden of Ischemic Stroke, intra-cerebral hemorrhage and subarachnoid hemorrhage stroke in 2020, stroke was the second leading cause of disability-adjusted life-years (DALYs) worldwide and about 132.1 million of DALYS due to stroke. Stroke is a major health problem in developing countries, the prevalence rate of stroke in Egyptian population was significantly higher than other Arab countries with 250,000 individuals suffering from stroke annually in2021 (Krishnamurthi, Ikeda, & Feigin, 2020).

Stroke is an acute onset of neurological dysfunction due to an abnormality in cerebral circulation with resultant signs and symptoms that corresponds to involvement of focal areas of the brain. Stroke is defined by the World Health Organization as 'rapidly developing clinical signs of focal (or sometimes global) disturbance of cerebral function lasting more than 24 hours or leading to death with no apparent cause other than a vascular origin (World Health Organization, 2020).

Gait impairmentis a common clinical problem after stroke that an impacts performance of daily living activities and mobility. It is estimated that more than 80% have gait impairmentthat recovers with some extent in the first 2 months after stroke.Balance impairment is another challenge post-stroke patient's face, particularly in standing and about 83% of stroke survivors suffer from balance impairment (Kossi et al., 2021).

The role of stroke nurse is the key in a patient's recovery. Nurses have a balance of day-to-day clinical tasks and the assistance of functional recovery through rehabilitation.Rehabilitation nurses can help a stroke patient relearn the skills needed to carry out the basic activities of daily living and stroke rehabilitation nursing focuses on physical recovery, independence in everyday activities, lowering the risk of secondary complications and also promote patients to live with the stroke related disability (Kennedy, 2021).It is important to emphasize that there is no role conflict between nurses and physiotherapists in stroke rehabilitation and that exercise training as part of the care is necessary. Nurse can integrate the rehabilitation activities into the patient's daily routine and may not add their workload (J. Wang et al., 2021).

Significance of the study

Stroke is aserious global public health problemworldwide that generates a significant burden of illness for healthy life years lost due to disability-adjusted life-years (DALYs). Globally, there are over 80 million people currently living who have experienced stroke ("Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: A systematic analysis for the global burden of disease study 2019," 2020). With early, focused treatment, extensive physical rehabilitation programs, long-term lifestyle changes, and chances of a meaningful recovery can be maximized, so this study aimed to evaluate the effect of nursing intervention by using physical exercises modules on gait and balance for stroke patients.

Aim: To evaluate the effect of nursing intervention by using physical. exercises modules on gait and balance for stroke patients.

Research hypothesis

Stroke patients who received strengthening and task -oriented exercises may exhibit improvement on balance and gait than control group. Stroke patients who received strengthening and task -oriented exercises may exhibit improvement on activity of daily living than the control group.

Subjects and methods

Research design: Quasi experimental design was utilized to conduct the study.

Setting: The study was conducted at Neurology Department and Outpatient Clinics of Tanta University Hospitals. Neurology department consists of two units and the capacity of the two units includes 13 beds for male and female patient.

Subjects: A convenience sample of 80 adult stroke patients of both sexes. The study participant was divided into two equal groups; control group, 40 adult stroke patients who received the routine hospital care and the study group who received the routine hospital care and the planned task exercises in addition to lower limb muscles strengthening exercises.

Inclusion criteria:21 - 60 years old, both sex, first stroke attack, able to perform exercises, able to walk independently or with assistance, with or without mobility aids.

Tools of data collection: Four toolswereused for datacollectionasfollows:

Tool I: A structuredinterview questionnaire

It was developed by the researcher afterreviewing of recentrelated literatures (Jeon & Hwang, 2018; J. Li et al., 2019) and includes two parts:

Part (1): Socio-demographic data such as patient's age, sex, level of education, occupation and marital status.

Part (2):Health relevant data such as date of admission to the hospital, past and present medical history, history of smoking, history of present complains, stroke type, onset of stroke, affected side, use of assistive device.

Tool II: Berg Balance Scale (BBS)

This tool was developed by**Berg et al., 1999** (Berg, 1989)and modified by **Blum et al., 2008**(Blum & Korner-Bitensky, 2008) and it was adopted by the researcher. It is used as the primary balance outcome measure for analysis. BBS has shown excellent reliability in patients with acute stroke. It has 14 items; each item was given an identified score ranging from 0 to 4 with the maximum score of 56. The higher score indicates the better balance, and the final scoring were interpreted as follows: poor balance: 0–20,acceptable balance: 21–40, good balance41–56.

Tool III: Time Up and Go Test (TUG)

This tool was developed by**Mathias et al., 1986** (Mathias, Nayak, & Isaacs, 1986)and was modified by **Flansbjer et al., 2005**(Flansbjer, Holmbäck, Downham, Patten, & Lexell, 2005) and was adopted by the researcherto evaluate the functional ability of patients. It is a largely used in the clinic to measure gait, motor speed, walking ability and physical function. TUG is a single-item test that requires the patient to stand up, walk 3 meters, turn back, and sit down again and the faster time indicates a better functional performance and the time to completion was recorded by a stopwatch. It was classified as follow: ≤ 10 Seconds indicates normal mobility, 11–20 seconds is the normal limit for disabled patients and >20 seconds is abnormal.

Tool IV-Korean version of the Modified Barthel Index (K-MBI)

This tool was developed by**Shah et al., 1992** (Shah, Cooper, & Maas, 1992)and was modified by **Jung et al., 2007**(Jung et al., 2007)and was adopted by the researcherto measures the performance

of the daily living activity (ADLs). The K-MBI has three different rating scales: a score ranging from 0–5 (bathing and personal hygiene), 0–10 (feeding, dressing, toilet use, bladder control, bowel control, and stair climbing), and score ranging from of 0–15 (chair/bed transfers and ambulation), a higher score on the K-MBI represents a higher degree of independence in performing basic ADLs and the total score is assigned a minimum of 0 and a maximum of 100 points and was categorized as follow: total dependence: 0 - 20,severe dependence: 21 - 60, moderate dependence: 61 – 90, slight dependence: 91 – 99 and independence: =100.

Method: The study was accomplished through the following steps

Administrative process

1-An official permission to carry out the study was obtainedfrom theFaculty ofNursingandwassubmittedtotheresponsible authoritiesofthe head of Tanta neurology department.

2- Ethical consideration

- Written witnessed consent was obtained from every patient included in the study after explanation the aim of the study and assuring them of confidentiality of the collected data.
- Consent approval of ethical committee was obtained in 21/10/2020.
- They were informed that participation is voluntary and that they could withdraw at any time of the study.
- Confidentiality and privacy were maintained by the use of code number instead of name.

3-Validity of the tools

All tools were tested for content validity by nine experts of experts in the field of Medical-Surgical Nursing, Critical Care Nursing at the Faculty of Nursing, and Physiotherapist field professors and accordingly needed modifications were done.

4-Reliability statistics

Reliability of the study tools was tested by cronbach's alpha as the following: 0.874 for BBS, 0.778for TUG test and0.748 for K-MBI.

5-A pilot study was carried out on 10% of sample to test the feasibility and applicability of the developed tools, accordingly, needed modifications were done. It was excluded from the original sample.

6- Data was collected from the study patients who met the study criteria.

7-Field work of this study was executed in nine months.

8- The study was conducted in 4 main phases: pre-training assessment, planning phase, training protocol and evaluation phases:

-**Pre-training assessmentphases**

For the control and study group: - this phase the researcher was interviewing each patient after his/her admission to the hospital to collect baseline data by using Tool (I).

-**Planning phase**

This phase was formulated based on data from the assessment phase, literature review priorities, goals and expected outcome criteria was taken into consideration when planning of patient's care. **Training methods and aids:** educational methods include: - prepare needed equipment to complete work (stopwatch, glass of water, a marker pen and papers, chair, a basketball of different size, measuring tape. Discussion, demonstration and re-demonstration were used as teaching method.

Training aids include Arabicbooklet containing pictures and diagrams prepared by the researcher based on literature review (Platz, 2021)and was given to the patients as a guideline.

Implementation Phase (Training Protocol):

For control group:

All Patients of the control group was receiving only routine hospital care by neurological nursing staff.

For study group:

All Patients of the control group was receiving only routine hospital care by neurological nursing staff plus training protocol was developed and implemented by the

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researcher based on literature review (Guzik, Drużbicki, & Wolan-Nieroda, 2018; Liu et al., 2021).

Training session:- 4 sessions \ week for 2 subsequent weeks based on individual needs and tolerance the session was conducted at 30 to 45 min per session, the researcher was start withstrengthening exercise of affected lower limb prior to task training, the basic strengthening exercise was performed regularly during training sessions, the strengthening exercises were performed in supine, side lying, sitting and standing position, strengthening exercise of affected lower limb was given prior to task oriented training for 15 minutes, the tasks exercise was divided weekly: each week included a new and complicated task so that patient can easily understand the task and able to perform accurately within a week and the researcher was started with the easier form of simple task training exercises then multitask (dual) training.

Evaluation phase

Control and study group was evaluated by using tool II to assess the balance, tool III used to evaluate gait, motor speed, walking ability, tool IV used to measure the performance of the daily living activity. The control and study group will be evaluated on admission, after 2 weeks and after 3 months.

Statistical analysis of the data

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0**. (**Armonk, NY: IBM Corp**)** Qualitative data were described using number and percent.The Kolmogorov-Smirnov test was used to verify the normality of distribution Quantitative data. Significance of the obtained results was judged at the 5% level. The used tests were chi-square test, fisher's exact or Monte Carlo, Mann Whitney test, Friedman test.

Result

Table (1)shows the percentage distribution of studied groups according tosocio-demographic data. The results revealed that more than half (55.0%) of the total sample were in age group from 50-60 years, nearly three fourth (72.5%) of the control group and about two third (62.5%) of the study group were males. 75% and 70% of the control and study group respectively were married. More than half (55%) and (60%) of the control and study group respectively had secondary education, less than half (42.5% and 40%) of the control and study group respectively were employee.

Table (2)illustrates the distribution of the studied groups through period of the study post-implementation of nursing interventions according to BBS. This table revealed that more than two third (67.5%) of control group had a poor balance in admission compared to most of the same group (80%) who have acceptable balance after 3 months. Moreover, the table illustrates that more than half (55%) of the study group had a poor balance on admission compared to all patients 100% of the same group who had good balance after 3 months post-implementation of nursing interventions.

Table (3) shows distribution of studied groups through period of the study post-implementation of nursing interventions according to TUG test. This table showed that none of the patient of both groups spend 10 or less second for a 3-meter walking distance throughout the study period; moreover, the same table presented that; all patients of control group 100% consume more than 20 seconds for a 3-meter walking distance in admission compared to slightly more than half (52.5%) of the same group who spend from11-20 seconds for walking the same distance after 3 months of the follow-up. In addition, the table illustrated that all patients of the study group 100% consume more than 20 seconds for a 3-meter walking distance on admission compared to all of them who spend from 11-20 seconds for walking the same

distance after 3 months post-implementation of nursing intervention.

Table (4) illustrates the percentage distribution of studied groups through period of the study after implementation of nursing interventions according to scores of Korean version of the Modified Barthel index (K-MBI). This table revealed that 77.5% of the patients in the control group were severely dependent on others when they admitted to the hospital compared to 70.0 % of them who were moderately dependent after 3 months of follow up. Moreover, the table illustrated that more than two third (70.0%) of the study group patients were severely dependent on other on admission which has been improved in which more than half of them (57.5%) slightly dependent and fourth (25%) were independent 3 months after implementation of nursing intervention.

Table (5) Correlation between BBS and K-MBI index and TUG Test (TUG); it was noticed that there was a significant positive correlation between BBS and K-MBI of the control group in 2 weeks and 3 months of follow up since p= 0.003 and <0.001 respectively while for the study group there was a significant positive correlation between the same two scales in 2 weeks and 3 months after implementation of nursing interventions since p=<0.001 each. Also, this table demonstrated that there was a significant negative correlation between BBS and TUG test of the control and study group in 2 weeks and 3 months of follow up since p=<0.001 each.

Table (6) shows correlation between BBS, K-MBI, TUG test, and age and stroke type of the studied patient. **For control group;** it can be summarized that that there was a significant negative correlation between BBS, K-MBI and age in the follow up 2 weeks after admission since P=<0.001, 0.005 for BBS and K-MBI respectively, in additionthere was a significant negative correlation between BBS, K-MBI and age in the follow up 3 months after admission since P=<0.001, 0.004 respectively, more over and for the same control group there was a significant positive correlation between TUG and age 2 weeks and 3 months in the follow up since p= <0.001 and 0.007 respectively. **For study group;** there was a significant negative correlation between BBS, K-MBI and age in the follow up 2 weeks after admission since P=<0.001, 0.002 for BBS and K-MBI respectively, in addition there was a significant negative correlation between BBS, K-MBI and age in the follow up 3 months after admission since P=<0.001each, more over and for the same control group there was a significant positive correlation between TUG and age 2 weeks and 3 months in the follow up since p= <0.001 each. In addition, this table shows that there was a significant positive correlation between BBS, K-MBI and ischemic stroke in both studied groups throughout the period of the study. Finally, this table shows that there was no significant correlation between TUG test and ischemic stroke in both studied groups throughout the study period where p= >005 each.

Table (1): Distribution of studied groups according tosocio-demographic data

	Socio-demographic data	Control(n = 40)		Study (n = 40)		Test of Sig.	p
		No.	%	No.	%		
1	Age (years)						
	30 – <40	7	17.5	8	20.0	χ^2= 0.114	0.944
	40 – <50	11	27.5	10	25.0		
	50 – 60	22	55.0	22	55.0		
2	Sex						
	Male	29	72.5	25	62.5	χ^2= 0.912	0.340
	Female	11	27.5	15	37.5		

3	Marital status						
	Married	30	75.0	28	70.0	χ^2= 1.504	^{MC}p= 0.807
	Single	1	2.5	0	0.0		
	Divorced	3	7.5	4	10.0		
	Widowed	6	15.0	8	20.0		
5	Occupation						
	Employee	17	42.5	16	40.0	χ^2= 1.758	0.415
	Manual work	13	32.5	9	22.5		
	Housewife	10	25.0	15	37.5		

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Table (2):Distribution of the studied groups on admission and 3 months after implementation of nursing intervention according toberg balance scale (BBS) (Overall)

Berg balance scale (BBS) (Overall)	Control (n = 40)							Study (n = 40)							Test of Sig. (p_1)	Test of Sig. (p_2)	Test of Sig. (p_3)
	On admission		After 2 week		After 3 month		Fr (p_0)	On admission		After 2 week		After 3 month		Fr (p_0)			
	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%				
Poor balance (0 – 20)	27	67.5	8	20.0	0	0.0	54.167* (<0.001*)	22	55.0	0	0.0	0	0.0	72.521* (<0.001*)	χ^2=1.317 (0.251)	χ^2=11.427* (^{MC}p=0.003*)	χ^2=53.333 (<0.001*)
Acceptable balance (21 – 40)	13	32.5	26	65.0	32	80.0		18	45.0	37	92.5	0	0.0				
Good balance (41 – 56)	0	0.0	6	15.0	8	20.0		0	0.0	3	7.5	40	100.0				
Total score																	
Min. – Max.	14.0–36.0		19.00 – 55.00		30.00 – 56.00		70.350* (<0.001*)	9.00 – 31.00		21.00 – 41.00		42.00 – 56.00		77.597* (<0.001*)	U=665.50 (0.195)	U=324.0* (<0.001*)	U=223.50* (<0.001*)
Mean ± SD.	20.70±6.11		26.55 ± 11.00		37.73 ± 8.19			19.70 ± 7.53		32.13 ± 6.60		49.13 ± 5.48					
Median	18.0		22.50		35.00			16.50		32.50		47.50					

Table (3): Distribution of studied groups on admission and after 3 months after implementation of nursing interventions according totime up and go Test (TUG)

Time Up and Go Test (TUG) (Seconds)	Control (n = 40)							Study (n = 40)							Test of Sig. (p_1)	Test of Sig. (p_2)	Test of Sig. (p_3)
	On admission		After 2 week		After 3 month		Fr (p_0)	On admission		After 2 week		After 3 month		Fr (p_0)			
	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%				
≤ 10 Seconds	0	0.0	0	0.0	0	0.0	29.158* (<0.001*)	0	0.0	0	0.0	0	0.0	60.200* (<0.001*)	–	χ^2=7.040* (0.008*)	χ^2=28.475* (<0.001*)
11 – 20 Seconds	0	0.0	7	17.5	21	52.5		0	0.0	18	45.0	40	100.0				
>20 Seconds	40	100.0	33	82.5	19	47.5		40	100.0	22	55.0	0	0.0				
Min. – Max.	23.0 – 27.0		19.0 – 25.0		17.0 – 23.0		59.250* (<0.001*)	22.0 – 27.0		17.0 – 25.0		13.0 – 18.0		75.019* (<0.001*)	U=622.500 (0.077)	U=263.0* (<0.001*)	U=18.50* (<0.001*)
Mean ± SD.	24.90 ± 1.69		23.38 ± 2.0		20.65 ± 1.63			24.30 ± 1.36		20.53 ± 2.24		15.58 ± 1.48					
Median	26.0		24.0		21.0			24.0		21.0		15.0					

Table (4): Distribution of studied groups on admission and after 3 months after implementation of nursing interventions according to scores of Korean version of the Modified Barthel index (K-MBI)

Korean version of the Modified Barthel index	Control (n = 40)							Study (n = 40)							Test of Sig. (p_1)	Test of Sig. (p_2)	Test of Sig. (p_3)
	On admission		After 2 week		After 3 month		Fr (p_0)	On admission		After 2 week		After 3 month		Fr (p_0)			
	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%				
Total dependence (0 – 20)	5	12.5	0	0.0	0	0.0	52.752* (<0.001*)	6	15.0	0	0.0	0	0.0	63.534* (<0.001*)	χ^2=0.643 (0.725)	χ^2=5.775* (^{MC}p=0.043*)	χ^2=12.552* (^{MC}p=0.003*)
Severe dependence (21 – 60)	31	77.5	13	32.5	2	5.0		28	70.0	7	17.5	0	0.0				

Moderate dependence (61 – 90)	4	10.0	24	60.0	28	70.0		6	15.0	33	82.5	7	17.5				
Slight dependence (91 – 99)	0	0.0	3	7.5	6	15.0		0	0.0	0	0.0	23	57.5				
Independence (100)	0	0.0	0	0.0	4	10.0		0	0.0	0	0.0	10	25				
Total score																	
Min. – Max.	15.0–75.0		40.0–95.0		60.0–100.0		55.445*	10.0–70.0		55.0–90.0		65.0–100.0		74.150*	U=763.50	U=553.50*	U=467.0*
Mean ± SD.	39.50 ± 15.84		68.63±13.06		83.50±11.50		(<0.001*)	40.88±16.71		75.37±11.34		91.62±9.29		(<0.001*)	(0.724)	(0.017*)	(0.001*)
Median	37.50		70.0		85.0			37.50		77.50		95.0					

Table (5): Correlation between Berg Balance Scale and Korean version of the Modified Barthel index and Time Up and Go Test (TUG)

		Tool II: Berg Balance Scale (BBS)					
		Control (n = 40)			Study (n = 40)		
		On admission	After 2 weeks	After 3 months	On admission	After 2 weeks	After 3 months
Korean version of the Modified Barthel index	**r**	0.184	0.459*	0.536*	0.190	0.682*	0.736*
	p	0.255	0.003*	<0.001*	0.241	<0.001*	<0.001*
Time Up and Go Test (TUG)	**r**	-0.273	-0.683*	-0.637*	-0.249	-0.630*	-0.611*
	p	0.088	<0.001*	<0.001*	0.122	<0.001*	<0.001*

*: Statistically significant at p ≤ 0.05

Table (6): Correlation between Berg Balance Scale, Korean version of the Modified Barthel index and Time Up and Go Test (TUG) in relation to age and stroke type

Scale item		Age				Stroke type(Ischemic)			
		Control (n = 40)		Study (n = 40)		Control (n = 40)		Study (n = 40)	
		r_s	p	r_s	p	r_s	p	r_s	p
Tool II: Berg Balance Scale (BBS)	On admission	-0.070	0.667	-0.245	0.127	0.012	0.942	0.239	0.137
	After 2 weeks	-0.693*	<0.001*	-0.723*	<0.001*	0.226	0.161	0.570*	<0.001*
	After 3 months	-0.667*	<0.001*	-0.738*	<0.001*	0.321*	0.044*	0.647*	<0.001*
Korean version of the Modified Barthel index	On admission	-0.202	0.212	-0.082	0.615	0.086	0.600	0.083	0.609
	After 2 weeks	-0.434*	0.005*	-0.482*	0.002*	0.258	0.107	0.354*	0.025*
	After 3 months	-0.445*	0.004*	-0.550*	<0.001*	0.330*	0.038*	0.426*	0.006*
Time Up and Go Test (TUG)	On admission	0.032	0.844	0.274	0.087	-0.023	0.888	-0.016	0.922
	After 2 week	0.624*	<0.001*	0.539*	<0.001*	-0.076	0.640	-0.262	0.102
	After 3 months	0.418*	0.007*	0.545*	<0.001*	-0.068	0.678	-0.212	0.189

Discussion

Gait and balance disorders are one of the first complaints after a stroke; this can be prevented through effective nursing care strategy focusing on physical exercises to help stroke patients return back to their daily living activities with best utilization of their remaining physical and functional abilities (Rössler et al., 2020). The results showed that there was a statistically significant improvement in both studied groups,but the highest improvement was found in the study group than the control group. The following discussion shows that the physical exercises have a positive effect on improvement of gait, balance and performing activity of daily living as well as its effectiveness in improving the functional outcomes post stroke.

Regarding the socio demographic characteristics of the studiedgroups; the finding of the current study revealed that more than half of the total samples were in the age group from 50-60 years. This might be due to the fact that the incidence of stroke increases with age, which can be the beginning of an inactive lifestyle and many physiological changes which include narrowing of the blood vessels of the brain (Edzie et al., 2021). Also, this result showed that there was no statistically significant difference between both studied groups reflecting the homogeneity of the groups regarding their socio-demographic characteristics of the studied groups. This result was in accordance with **Ali et al.** (G. M. Ali, Ahmed, & Mohamed Zaky, 2021),who found that less than two- third of the studied sample were in the aged between 50-60 years.

Regarding the sex, the current study revealed that the majority of both studied groups were male. This finding is justified by the male arteries tend to be more constricted due to plaque formation from cigarette smoking compared to females' arteries (Y. Wang et al., 2019). This finding is congruent with **Abe et al.** (Abe et al., 2021) who revealed that the majority of studied patients were male. On the other hand, the result was contrasted with **Darwish et al.** (Darwish, ElShafey, & Kamel, 2021),who reported that the majority of sample were female. **In relation to marital status,** the current study showed that more than two third of both studied groups weremarried. This can be justified by married people often facing psychological stressors of social role and dissatisfaction of men with married life which put them at more risk of stroke (Lev-Ari, Gepner, & Goldbourt, 2021). This finding is in line with **Kim** (Kim, 2021), who found that about two third of the studied patients were married. This finding of the present study was contradicted with **Li et al.** (Y. Li, Cao, Liu, & Qi, 2017), who illustrated that widow is more presentable in his study sample.

Concerning to occupation; the current study showed that about half of the total sample wereemployee.This finding was in accordance with **El Tallawy et al.** (El Tallawy et al., 2015)**,** who report that less than half of the sample was employee. **In relation to past medical history,**the current study showed that the majority of the total sample had hypertension and diabetes mellitus as a past medical history. This is justified by all stroke patients suffering from cerebral vessel disease which is associated with hypertension and diabetes mellitus (Alloubani, Saleh, & Abdelhafiz, 2018). This finding was supported by **Abd El-Aziz et al.** (Wahdan Abd El-Aziz, A Al-Metyazidy, Elsayed Mansour, & M Weheida, 2021) who reported that more than half of the studied patients in both control and study group suffering from diabetes mellitus and hypertension as a past medical history. This finding was contraindicated with **Gan et al.** (Gan et al., 2017)whofound that the majority of the studied patients suffering from atrial fibrillation and hyperlipidemia as a past medical history.

Regarding the berg balance scale (BBS); the current study revealed that the highest improvement of the total mean score of BBS was at 3 months after implementation of nursing interventions for the study than control group**.** This result was consistent with **Rose et al.** (Rose, DeMark, Fox, Clark, & Wludyka, 2018), who showed that the mean score of BBS increased at 3 months post intervention than pre-intervention for the experimental group.

In relation to time up and go test (TUG); the current studyshowed that that all patient in control group consumed more than 20 seconds for 3-meter walking distance on admission comparing to more than half of the same group who spent from 11-20 seconds for walking the same distance after 3 months of follow up. Also, the result of the present study revealed that the entire study group patients spent more than 20 seconds for 3-meter walking distance on admission compared to all patients of the same group who takes a time from 11-20 seconds for walking the same distance 3 months after implementation of nursing intervention.Moreover, the result showed that the mean total scores of TUG time decreased in the study group than the control group after following of the physical exercises. This result was in line with **Ali et al.** (M. Ali, Khan, & Asim, 2020), whoillustrated that the TUG test time decreasedafter the interventionsoftask-oriented circuit training than pre-intervention for the study group.

In relation toKorean version of the Modified Barthel Index (K-MBI), the result of the present study revealed that the patients' activities of daily living measured by K-MBI increased after application of physical exercises by the study group patient than control group.Also, the finding of the current study found that more than half of the study group slightly dependent on others and one quarter of them dependent on themselves comparing to more than two third of the control group who are moderately dependent on others after 3 months of follow up. Moreover, this result represents that the highest improvement in the mean total scores of K-MBI is in the study more than the control group after implementations of physical exercises. This result is in accordance with **Taha and Ibrahim**(Taha & Ibrahim, 2020), whorevealed that more than half of the studied patients are mildly dependent 3 months after implementation of planning program**.**

Correlation between BBS with K-MBI and TUG test, this result showedthat there was a significant positive correlation between BBS and KMBI of both studied groups throughout the period of the study. Also, this result representedthat there was a significant negative correlation between berg balance scale and time up and go test and its good indicator of improvement. This result was corresponding with **Lee et al.** (Lee et al., 2015)who reported thatBBS had statistically significant positive correlation with K-MBI. This result contradicted with **Choiand Lee** (Choi & Lee, 2020) who mentioned in his study that there was a significant positive correlation between BBS and TUG test.

Correlation between BBS, K-MBIand TUG Test in relation to age and stroke type; this result showed that there was a significant negative correlation between berg balance scale, K-MBI and age. Moreover, this result shows that there was a significant positive correlation between BBS, K-MBI and ischemic stroke. Additionally, the result of the present study represented that there was a significant positive correlation between TUG test and age. This result was corresponding with**Chiu et al.** (Chiu et al., 2021) who showed that there was a significant negative correlation between BBS, KMBI and age.This result was in contrast

with **Alghadir et al.** (Alghadir, Al-Eisa, Anwer, & Sarkar, 2018) who documented that there was a significant negative correlation between BBS scores and type of stroke.

Conclusion

Based on the findings of the present study; The physical exercises have a positive effective on improvement of gait, balance and performing activity of daily living as well as its effectiveness in improving the functional outcomes post stroke attack.Also, the findings focusing on the importance of using strengthening and task -oriented exercises.

Recommendations

Up on the completion of this study it can be recommended that:

- All stroke patients must perform physical exercises as an improving balance, gait as well as activity of daily living.
- The study should be replicated on large sample size to be generalized and use other balance assessment tools among patients after stroke.

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