Educational Program for Patients with Cerebrovascular Stroke: Self-Efficacy and Quality of Life

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ABSTRACT

Context: Stroke is a main cause of disability and death worldwide. Stroke can have devastating consequences for the individual and their families. The effects can be both physical, social, and psychological. One-third of people are left with long-term disabilities, which can, in turn, have effects on the quality of life and self-efficacy.

Aim: To assess the patient's knowledge, self-efficacy, and quality of life regarding ischemic cerebrovascular stroke. Moreover, develop, implement, and evaluate the effect of an educational program on self-efficacy and quality of life of patients with ischemic cerebrovascular stroke.

Methods: A quasi-experimental (one group pre/post-test) design was utilized in the current study. This study was conducted in the Intensive Neurological Care Units (Intermediate Care) and Stroke Outpatient Clinics at El Demerdash Hospital, affiliated to Ain Shams University Hospitals, on a purposive sample of 46 patients with ischemic cerebrovascular stroke from both genders, excluding patients with comorbid conditions. Tools of the data collection include a structured interview questionnaire to assess the study sample's sociodemographic characteristics, medical data, and knowledge regarding cerebrovascular stroke; the new general self-efficacy scale to assess the patients' self-efficacy; and the 12-item Stroke-Specific Quality of Life Scale (SSQOL) to assess the quality of life of patients with ischemic stroke.

Results: 67.4% and 56.5% of the studied patients had a satisfactory level of knowledge regarding cerebrovascular stroke immediately after educational program implementation and at the follow-up phase, respectively, with a statistically significant difference between pre-, post, and follow-up at p=0.000; it was improved compared to pre educational program implementation. Furthermore, 67.4% of the studied patients had high self-efficacy at follow-up compared with 28.3% immediately post-educational intervention and 21.7% preintervention, with a statistically significant difference between the three study phases (p=0.000). Moreover, 54.3% of the studied patients had a good quality of life after three months of educational program implementation compared to 15.2% after one month (p=0.000); there was a positive correlation between patients' total knowledge and their self-efficacy and quality of life.

Conclusion: The educational program implementation had a statistically significant positive effect on the studied patients' knowledge and consequently affected the self-efficacy and quality of life of the patients with ischemic stroke, supporting the stated research hypothesis. The study suggests that the current educational program be applied to patients and their caregivers about warning signs of stroke, risk factors of stroke, and how to cope with disabilities that a stroke can cause to improve their self-efficacy and quality of life.

Keywords: Cerebrovascular stroke, knowledge, quality of life, self-efficacy

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1. Introduction

Cerebrovascular stroke is a common, serious, and disabling global healthcare problem. The World Health Organization defines stroke as "A clinical syndrome consisting of 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." Stroke symptoms that last less than 24 hours are termed transient ischemic attack (TIA) *(Coupland et al., 2017).*

According to the common causes, stroke can be classified into two main types, including ischemic and hemorrhagic stroke. Ischemic stroke is the most common type of stroke (87% of cases). It is mainly caused by a sudden obstruction in the cerebral vessels due to a clot or occlusion, resulting in the blockage of blood supply to a focal brain region. Hemorrhagic stroke (13%) is the second most common type of stroke, which is characterized by releasing blood into the brain on account of the narrowing or abrupt rupturing of cerebrovascular vessels *(Zhao et al., 2021).*

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Stroke is a main cause of disability and death worldwide. Strokes affect patients' lives in many ways, both physically and psychologically, through many emotional, physical, cognitive, and social issues. The seriousness of post-stroke physical and mental impairments are the effects on the quality of life (QOL). As stroke mortality decreases, more patients have to live with multiple handicaps and impairments. So, improving the quality of life and paying greater attention to rehabilitation is increasingly important *(Tiwari et al., 2021).*

In rehabilitation, nurses aim to help patients learn, regain control over impairments and health, and improve their future perspectives. The nurses' role in rehabilitating patients with stroke includes providing care, advising, facilitating personal recovery, creating an environment for rehabilitation, and managing multidisciplinary provision. Also, the nurses are responsible for assisting and training patients in mobility and activity of daily living (ADL) and providing therapeutic interventions to prevent depression and improve QOL *(Weinstein et al., 2016).*

Self-efficacy, confidence in one's ability to perform a task or specific behavior, can help patients gain more control over important aspects of their disease. A high sense of self-efficacy leads to desired outcomes, such as improved health. Self-efficacy is positively associated with mobility, ADL, and QOL *(Torrisi et al., 2018).*

Self-efficacy is an important aspect to consider in stroke patients' daily care and rehabilitation. Continuous daily care gives nurses excellent opportunities to adopt and use self-efficacy in various care facilities such as hospitals, nursing homes, rehabilitation centers, and community home care *(Topcu & Oguz, 2017).*

There is growing evidence that enhancing self-efficacy improves the management of long-term diseases, including stroke. The strongest way of influencing self-efficacy is verbal (social) encouragement by professionals or family. Enhancing self-efficacy may have a positive influence on the mobility, activity of daily living (ADL), depression, and QOL of people with a stroke, and nurses can play an important role in these issues *(Gangwani et al., 2022).*

Stroke can be recurrent, so there is a high possibility that patients who have had a stroke will face further strokes. It has been mentioned that the risk of stroke increases after the first attack. Regarding stroke and its cause of death, nurses stand out as being obvious members of the medical community to help patients gain an understanding of stroke. Besides providing care, nurses are well placed to continually provide appropriate education to individuals to ensure stroke patients can manage themselves. Nurses can advise and educate stroke patients, leading them to practice a healthy lifestyle for a better quality of life *(Ibrahim & Nawi, 2018).*

2. Significance of the study

Egypt is the most populated nation in the Middle East, with 102,327,319 inhabitants in 2021 and an annual rate of increase of population of 1.9%. In Egypt, the overall crude prevalence rate of stroke is high (963/100,000 inhabitants), and the incidence of stroke annually is approximately 240/100,000 (250,000 new stroke patients per year). The official national statistics indicate that diseases of the circulatory system, including stroke, are the primary causes of death in Egypt, where stroke accounts for 6.4% of all deaths and ranks third after cardiovascular and gastrointestinal diseases *(Aref et al., 2021).*

According to the prevalence of stroke in Egypt, the first study was in Assiut Governorate (Nile Valley), where the age-adjusted prevalence rate was 699 out of 100,000. The second one was in the Al-Kharga district, New Valley, where the crude prevalence rate of nonfatal stroke and transient ischemic attack was 156 per 1000 population. The third one is in the Al-Quseir district, with a crude prevalence rate of 5-6 out of 1000. The fourth was done in Qena Governorate with a crude prevalence rate of 922 of 100,000, an age-adjusted local prevalence rate of 777 of 100,000, and an age-adjusted prevalence rate of the Egyptian population of 566.6 of 100,000 *(Shaheen et al., 2019).*

Patients with post-stroke disabilities are mainly accompanied by hemiplegic paralysis, aphasia, and dysphagia. Moreover, patients with stroke are vulnerable to some other impairments, including limitations in community participation, cognitive disabilities, and emotional changes. These impairments may impede recovery and lead to poor functional outcomes and decreased quality of life. Therefore, it is necessary to increase awareness among patients and their caregivers about the risk factors of stroke, how to cope with disabilities as well as the complications that a stroke can cause.

3. Aim of the study

This study aimed to evaluate the effect of an educational program on self-efficacy and quality of life of patients with cerebrovascular stroke through the following:

- Assess knowledge, self-efficacy, and quality of life of patients with ischemic cerebrovascular stroke.
- Developing and implementing educational programs for patients with ischemic cerebrovascular stroke.
- Evaluating the effect of educational program on self-efficacy and quality of life of patients with ischemic cerebrovascular stroke.

3.1. Research Hypothesis

The current study hypothesized that:

- Implementing the educational program will positively affect the self-efficacy and quality of life of patients with ischemic cerebrovascular stroke.

4. Subjects & Methods

4.1. Research Design

A quasi-experimental design (one group pre/immediately post-test and follow-up test) was utilized to meet the aim of the study. Quasi-experimental research design, also called a non-randomized controlled trial (NRCT), involves the manipulation of independent variables. Still, it lacks randomization of participants in experimental groups, which is one of the essential characteristics of the Randomized control trial (RCT). In addition, some quasi-experimental even lack a control group for comparison *(Sharma, 2018).*

4.2. Study setting

The study was conducted at the Intensive Neurological Care Units (Intermediate Care) and Stroke Outpatient

Clinics at El Demerdash Hospital, which is affiliated to Ain Shams University Hospitals. The department had eight beds.

4.3. Subjects

Based on power analysis, a purposive sample of 46 adult patients with ischemic cerebrovascular stroke was recruited for the conduction of this study from the above-mentioned settings. They were selected using the sensitive analysis according to the number of patients admitted with ischemic cerebrovascular stroke in El Demerdash Hospital in 2016 (534 cases) *(Statistical Records of the Intensive Neurological Care Units & Stroke Outpatient Clinics, 2016).*

The sample size was calculated based on power analysis. At a 95% confidence level, the estimated sample size is 46 out of 534 patients who attend the previously mentioned setting, and the Steve Thompson formula was used to calculate it *(Thompson, 2012).*

$$n = \frac{\mathrm{N\ X\ P\ (1 - P}}{\left\{\mathrm{N - 1\ x}\ \left(\frac{d^2}{z^2}\right)\right\} + p\ (1 - P)\}}$$

$$n = \frac{534\ \mathrm{X}\ 0.5\ (1 - 0.5)}{533\mathrm{x}(0.05^2/1.96)\} + 0.5\ (1 - 0.5)\}}$$

Which:
n= Sample size
N= Total society size
Z= the corresponding standard class of significance 95
d= error percentage = (0.05) = 1.96
P= percentage of availability of the character and objectivity= (0.1)
d= error percentage = 0.05
- Type I error with significant level (α)=0.5 with significant level 95%.
- Type II error by power test (1-B) = 80%.

So, the sample size was calculated to be 46 patients.

Patients were selected according to the following criteria:

Inclusion criteria

Adult patients with ischemic cerebrovascular stroke from both genders were able to comprehend instructions and agreed to participate in the study.

Exclusion criteria

Patients with comorbid disease (e.g., hepatic, renal disorders, coma, unconscious, or aphasia).

4.4. Tools of data collection

The data was collected by using the following tool:

4.4.1. Patient's Interviewing Questionnaire

This tool aimed to assess patients' sociodemographic data, medical history, and level of knowledge regarding cerebrovascular stroke. The researcher developed it after reviewing recent and relevant literature *Sharma (2016); Ignatavicius and Workman (2018); Hinkle and Cheever (2018).* It included three parts as follows:

The first part concerned patients' sociodemographic data. It consisted of seven closed-ended questions about patients' age, gender, marital status, level of education, employment, living conditions, caregiver data, residence, and health insurance.

The second part concerned assessing patients' medical history, including 20 closed-ended questions (past and present medical history and family history).

The third part assessed patients' knowledge of the anatomy and physiology of the nervous system, an overview of cerebrovascular stroke, self-care activities, re-equipment of the living space, nutrition, and prevention of complications. It comprised 38 questions (matching, MCQ, and true and false).

Scoring system

The scoring system for the third part was as follows: According to the patient's response, one point was given for the correct answer and zero for the incorrect one. The total score of knowledge was 38 grades. The total level of patients' knowledge scores was categorized as follows:
- ≥75% was considered satisfactory.
- <75% was considered unsatisfactory.

4.4.2. The Stroke Self-Efficacy Questionnaire (SSEQ)

This tool was adapted from *Jones et al. (2008)* and modified by the researcher to assess the self-efficacy of patients with ischemic stroke. It was translated into the Arabic language. It included 41 statements that were grouped into nine domains: Compliance with medication (6 items), body care (4 items), social role (4 items), mobility (6 items), communication (4 items), emotional behaviors (5 items), house management (4 items), springy/attentive behavior (3 items), and walking (5 items). This tool assessed patients' self-efficacy, in the pre-phase (during the first week after stroke occurrence), immediately-post educational program implementation, and at the follow-up phase (post three months).

Scoring system

The patient's responses for the 41 positive statements were ranged on the scale as follows:
- Not at all confident = 1
- Confident to some extent = 2
- Very confident = 3

The total scores for every domain were calculated by summing the patients' responses for this domain, and then the total scores of all domains were calculated. The total score for the patient's self-efficacy was 123; it was considered that the higher the score, the higher the self-efficacy. The total score was categorized as follows:
-≥75% was considered high self-efficacy.
-<75% was considered low self-efficacy.

4.4.3. The Stroke-Specific Quality of Life Scale (SSQOL)

This tool was adapted from *Kerber et al. (2013)* and modified by the researcher according to the aim of the study: to assess the quality of life of patients with ischemic stroke. It was translated into Arabic language and included 66 statements that were grouped into 12 domains: Energy (3 items), the family role (6 items), thinking (4 items), mood (7 items), personality (3 items), social role (5 items), function of the upper extremities (9 items), mobility (9 items), work

and productivity (3 items), language (7 items), vision (4 items), and self-care (6 items). This tool assessed QOL post one month and three months of educational program implementation.

Scoring system

Scoring of the SSQOL concerns the two weeks after ischemic stroke occurrence and is rated on a three-point Likert scale. The patient's responses to the 66 negative statements were as follows:

The responses for the domains of energy, family roles, thinking, mood, personality, and social roles were as follows:

- Agree = 1
- Neither agree nor disagree = 2
- Disagree = 3

The responses for the domains of upper extremity function, mobility, work/productivity, language, and vision were as follows:

- Much trouble = 1
- Some trouble = 2
- No trouble at all = 3

The responses for the domains of self-care were as follows:

- Dependent= 1
- Semi dependent= 2
- Independent= 3

The total scores for every domain were calculated by summing the patients' responses of this domain and then the total scores of all domains were calculated. The total scores for patients' quality of life were 198. The higher the score, the better the quality of life. Each domain was calculated separately, and the mean score was calculated by summing the domain scores by the item number.

4.5. Procedures

The operational design includes a preparatory phase, testing validity, tool reliability, a pilot study, and fieldwork.

The preparatory phase included reviewing the current and more recent relevant national and international related literature and theoretical knowledge of various aspects of the study using textbooks, articles, periodicals, and journals to develop tools for data collection.

Ethical Considerations: The Scientific Research and Ethical Committee of the Faculty of Nursing approved the research before initiating the study. The researcher clarified the objectives and aim of the study to patients included in the study. Patients' verbal consent to participate in the study was obtained. The researcher maintains the anonymity and confidentiality of the subjects' data. Patients were informed that they could withdraw from the study at any time.

Administrative Design: The Dean of the Faculty of Nursing at Ain Shams University issued an official letter explaining the purpose of the study to the director of the stroke intensive care unit and stroke outpatient clinic where the study was conducted to obtain their permission to conduct it.

Tool validity and reliability: Seven experts from the Medical-Surgical Nursing Department at Ain Shams University (three professors, three assistant professors, and one lecturer) ascertained the tools' content validity. They elicited their opinions regarding the tools' format, layout, consistency, accuracy, and relevance, and minor modifications were made. Test reliability was estimated statistically for the developed tools using test-retest reliability and the alpha Cronbach test.

- Patient's knowledge assessment questionnaire =0.940.
- Self-efficacy scale =0.968.
- Quality of life was =0.988.

A pilot study was conducted on five subjects (10%) to test the study tools' applicability and the feasibility of the research process. The results were used as a guide to reconstruct the changes needed in the data collection tools, and then the final form was developed. Patients of the pilot study were excluded from the study sample.

Field Work: Patients in the intensive neurological care unit who met the study criteria were included after the researcher explained the purpose and nature of the study and obtained their verbal consent before any data collection. The researcher collected the data during the morning and afternoon shifts on Monday, Tuesday, and Wednesday, three days a week. Data collection took about 12 months, starting at the beginning of September 2019 and ending at the end of August 2020.

The researcher filled in and completed the study tools in 4 phases (pre-, immediately post, one month, and three months post-implementation of the educational program).

The patient's knowledge and self-efficacy were assessed in the pre-phase (during the first week after stroke occurrence), immediately after the educational program implementation in the intermediate care unit, and at the follow-up phase (post three months) of the pre-assessment phase in the outpatient clinic.

The patient's quality of life was assessed after one month and three months of the pre-assessment phase (in the outpatient clinic). This schedule allows the detection of health problems not detected immediately after stroke, such as those that occur after the acute stage and after discharge from the hospital. These health problems were found in the follow-up phase.

The researcher started the interviewing process by introducing herself and clarifying the aim of the study. She then filled out sociodemographic data and the patient's history, which took 10-15 minutes. Then, she filled out the patient interviewing questionnaire tool to assess patient knowledge, which took 10-15 minutes for every patient. Then, she filled out the patient self-efficacy scale to assess the patient's self-efficacy, which took about 10-15 minutes.

After one month, the researcher filled out the quality-of-life scale to assess patients' quality of life, which took about 15-20 minutes for every patient. The time of data collection tools took about 45-60 minutes for every patient. The researcher reviewed each point before leaving the patient to ensure all points were noticed.

The researcher developed the educational program and designed the booklet in Arabic, covering all the following aspects briefly (e.g., anatomy and physiology of the nervous system, definition of stroke, causes, types, warning signs, risk factors, signs and symptoms, diagnostic measures, complications, medical and surgical treatment, self-care activities, re-equipment of the living space, nutrition, and prevention of complications).

Then, the researcher implemented it individually for each patient. The sessions were given to each patient

according to their health status, level of education, and understanding. The educational program consisted of four sessions (two theoretical sessions and two practical sessions), starting with greeting the patient while ensuring the patient's privacy and assessing the patient's motivation for learning.

Theoretical part involved two sessions, each ranging from 30-40 minutes/for the patient, including discussion time. The first session covered the objectives of the educational program and its outlines: background about stroke (anatomy and physiology of the nervous system, definition of stroke, causes, types, warning signs, risk factors, signs and symptoms, diagnostic measures, complications, methods of prevention of stroke). The second session covered the following items: "How to prevent post-stroke complications, proper diet, surgical and medical management of cerebrovascular stroke (CVS), and how to cope with physical, psychological, and social problems after ischemic stroke."

The practical part involved two sessions, each ranging from 30-45 minutes/for each patient, including time for discussion, demonstration, and re-demonstration for each activity. The first session covered the following practices: Self-care activities that include tips for adjusting to a new life (e.g., how to wear and take off clothes, how to eat and drink, how to prepare food, instruments that can be needed when preparing food and steps that can be followed to overcome dysphagia and difficulty of chewing); and re-equip the living space (e.g., how to prepare the living room and bedroom, instruments that can be needed when taking a shower and instruments that can help using the toilet); and the second session covered the following items: How to apply different correct body positions (e.g., supine, side-lying position) and how to do neck, face, shoulder, arm, hands, trunk, knee, thigh and foot exercises. The researcher conducted the sessions in the presence of family member, especially for the patients with double vision.

Each session of the educational program was conducted through teaching methods such as role play, supported by using pictures, posters, videos, and booklet as media, and clarified each item in the educational program for each patient. Every patient can ask questions in case of misunderstanding and deliver an educational program booklet after implementation. In the end, the researcher emphasized the importance of follow-up visits and informed that they would contact the researcher by telephone one and three months after being discharged from the hospital for follow-up.

Evaluation phase: This phase evaluated the effect of an educational program on the studied patient outcomes by comparing the data collected by the previously mentioned study tools. The assessment of the patient's knowledge and self-efficacy was done in the pre-phase "during the first week after stroke occurrence" immediately after educational program implementation and at the follow-up phase "post three months," while the assessment of the patient's quality of life was done after one month and after three months of the pre-assessment phase.

4.6. Data analysis

The collected data were organized, tabulated, categorized, and statistically analyzed using SPSS for Windows version 25.0 (SPSS, Chicago, IL). Data were presented in tables as numbers, percentages, and mean±standard deviation (SD). Pearson correlation analysis was used to assess the inter-relationships among quantitative variables. Kolmogorov- Smirnov test (Z-test) was used to differentiate between parametric and non-parametric data. Patients' level of knowledge and quality of life tools were parametric data, and the comparisons were determined using the Chi-square test (X^2) and paired t-test (t) for two variables with continuous data and ANOVA test (F) for more than two variables with continuous data. The self-efficacy tool was non-parametric data, and the Friedman test (X^2) was used. No significance if $p>0.05$ and significance if $p\leq0.05$.

5. Results

Table 1 shows that 39.1% of the studied subjects were between 60 and less than 70, with a mean age of 56.50±10.75, and 60.9% of patients were females. Concerning marital status, 71.7% of the patients were married. Concerning educational level, the result reveals that 43.5% of patients had basic education. Furthermore, 54.4% of the studied patients were not working.

Moreover, concerning living with whom, it was found that 91.3% of the studied subjects were living with their families. Regarding caregiver availability, it was found that 58.7% of the studied subjects had a caregiver. Concerning caregiver relations, it was found that 63% of the studied subjects had received care from others (adult children). Regarding residence, it was found that 80.4% of the studied patients were from urban areas. In addition to health insurance, it was revealed that 69.6% of the studied subjects had health insurance.

Table 2-a reveals that 52.2% of the studied subjects reported that the time since symptoms appeared is after the first four hours. Also, 93.5% of them reported that stroke side was in the left side. Moreover, 82.6%, 87%, and 89.1% reported having difficulty walking, vertigo/headache, and dysarthria symptoms, respectively, while 97.8% had paresthesia, and 54.3% had visual disturbances. Concerning smoking, the result reveals that 21.7% and 17.4% of the studied subjects were currently smokers and previously smoked, respectively, while 60.9% did not smoke because they were females. Regarding BMI, 47.8% and 43.5% of the studied subjects were overweight and obese, respectively.

Table 2-b illustrates that 47.2%, 52.8%, and 83.4% of the studied subjects had complications such as hemiplegia and hemiparesis, with the right side being the part affected, respectively. Also, it shows that 38.9%, 61.1%, 27.8%, and 63.9% of the studied subjects were suffering from negligence, dysphagia, seizures, and incontinence, respectively.

Table 3 illustrates that 63%, 87%, 50%, 34.8%, and 84.8% of the studied patients had a medical history of DM, hypertension (HTN), heart diseases, previous stroke, and TIA, respectively.

Figure 1 shows that 54.3% of the studied subjects, were having family history of stroke.

Table 4 shows that nervous system structure was known by 0% of the studied patient's pre-educational program implementation, versus 73.9% and 34.8% of them immediately post and follow-up had satisfactory knowledge, respectively. Regarding the overview of CVS, self-care activities, and prevention of complications, it was mentioned correctly by 6.5% of the study subjects before the educational program implementation versus 58.7%, 78.3%, and 73.9% of them immediately post, respectively, and 100%, 100% and 93.5% of follow up respectively had a satisfactory knowledge. Also, concerning re-equip the living space and nutrition, 13% and 8.7% of the study subjects mentioned satisfaction before the educational program implementation, versus 58.7% and 63% immediately post and 93.5% and 87% of follow-up, respectively.

Moreover, there was a highly significant difference regarding the studied patient's knowledge about nervous system structure, an overview of CVS, self-care activities, re-equipment of the living space, nutrition, and prevention of complications stroke pre-, immediately post-, and follow-up of the educational program implementation (P-value= 0.000).

Table 5 illustrates statistically significant differences in total knowledge regarding cerebrovascular stroke immediately after post-educational program implementation and at follow-up (X^2 = 64.955, $p\leq$ 0.000).

Table 6 shows that 67.4%, 73.9%, 54.3%, 43.5%, 68.7%, and 52.2% of the studied patients were having improvement in self-efficacy at follow-up of the educational program implementation at items of social roles, communication, emotional behavior, house management, springy\ attentive, and walking respectively than pre and immediately-post of the educational program implementation with a highly statistically significant improvement in the patient's self-efficacy at follow-up of the educational program implementation than pre and immediately-post ($p\leq$0.000).

Table 7 illustrates a statistically significant difference between the levels of patient's total self-efficacy among the three study phases of the educational program implementation 67.4% than pre 21.7% and immediately post it 28.3%, with a highly statistically significant difference at (X^2 = 36.857, $p\leq$ 0.000).

Table 8 shows highly significant differences in all the quality-of-life domains of the studied patients three months after the educational program compared to one month after implementation.

Table 9 illustrates that 54.3% of the studied patients had a good quality of life after three months compared with one month 15.2% of the pre-assessment phase, with a statistically significant difference at (X^2 =15.525, p= 0.000).

Table 10 shows a statistically significant positive correlation between the patients' total satisfactory knowledge and their total self-efficacy at follow-up (p=0.000) and between their total knowledge at follow-up and their total quality of life three months after the pre-assessment phase (p=0.000).

Table (1): Number and percentage distribution of demographic data among patients under study (n=46).

Variables	No.	%
Age		
40-<50 yrs.	17	37.0
50-<60 yrs.	6	13.0
60-<70 yrs.	18	39.1
≥70 yrs.	5	10.9
Mean±SD	56.50±10.75	
Gender		
Male	18	39.1
Female	28	60.9
Marital status		
Single	13	28.3
Married	33	71.7
Educational level		
Not read and write	15	32.6
Basic education	20	43.5
Secondary	8	17.4
University	3	6.5
Occupation nature		
Muscular effort	15	32.6
Mental effort	6	13.0
Not work	25	54.4
Living with whom		
Alone	4	8.7
Family	42	91.3
Caregivers' availability		
Yes	27	58.7
No	19	41.3
Caregiver relation		
Wife	12	25.9
Husband	5	11.1
Others	29	63
Residence		
Rural	9	19.6
Urban	37	80.4
Health insurance		
Yes	32	69.6
No	14	30.4

Table (2-a): Number and percentage distribution of the studied patients' present medical history (n=46).

Present health history	No.	%
Time since symptoms appear		
Within 1st 4 hours	22	47.8
After 1st 4 hours	24	52.2
Stroke side		
Right side	3	6.5
Left side	43	93.5
Symptoms		
Dysarthria	41	89.1
Visual disturbance	25	54.3
Paresthesia	45	97.8
Vertigo/headache	40	87
Difficulty walking	38	82.6
Smoking		
Currently smoker	10	21.7
Previously smoker	8	17.4
Did not smoke	28	60.9
Body Mass Index (BMI)		
Normal	4	8.7
Overweight	22	47.8
Obese	20	43.5

Table (2-b): Number and percentage distribution of the studied patients' present medical history (n=46):

Present health history	No	%
Presence of complications	36	80
Motor dysfunction		
Hemiplegia	17	47.2
Hemiparesis	19	52.8
Affected part		
Left side	3	8.3
Right side	30	83.4
Lower limbs	3	8.3
Speech		
Speech properly and clearly	13	36.1
Understand spoken/written words	36	100
Expression by writing /speech	31	86.1
Vision		
Vision weakness	9	25
Double vision	5	13.9
Negligence "one side"	14	38.9
Vision loss	0	0
Dysphagia	22	61.1
Seizures	10	27.8
Incontinence	23	63.9

Table (3): Number and percentage distribution of the studied patients regarding past medical history (n=46).

Past medical history	No.	%
Diabetes Mellitus (DM))	29	63
Hypertension (HTN)	40	87
Heart diseases	23	50
Stroke	16	34.8
Transient Ischemic Attack (TIA)	39	84.8

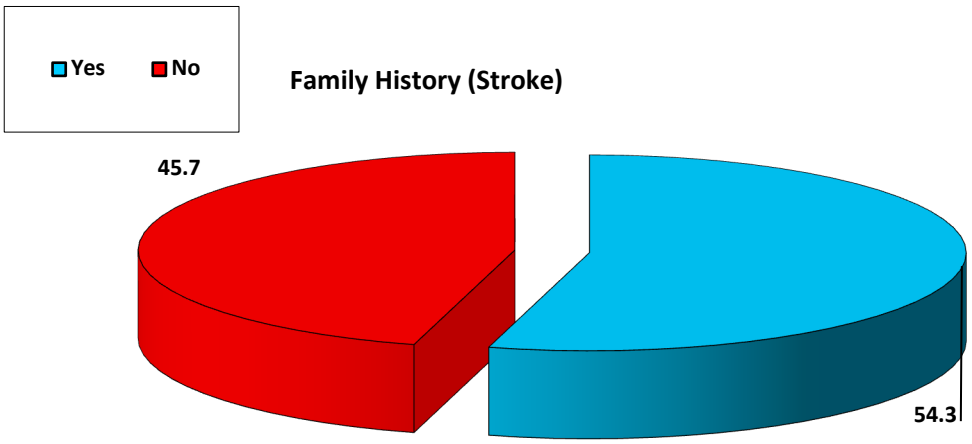

Figure (7): Percentage distribution of the studied patients, concerning family history (n=46).

Table (4): Comparison of patients' satisfactory level of knowledge regarding cerebrovascular stroke during the three phases of the study (n=46).

Knowledge elements	Pre		Immediately post		Follow up		ANOVA	P-
	No	%	No	%	No	%	(F)*	value
Nervous system structure	0	0	34	73.9	16	34.8	189.759	0.000
Overview of CVS	3	6.5	27	58.7	46	100	231.134	0.000
Self-care activities	3	6.5	36	78.3	46	100	175.501	0.000
Re-equip the living space	6	13	27	58.7	43	93.5	74.448	0.000
Nutrition	4	8.7	29	63	40	87	96.587	0.000
Prevention of complications	3	6.5	34	73.9	43	93.5	74.448	0.000

**F refers to repeated ANOVA test.*

Table (5): Comparison of patients' total level of knowledge regarding cerebrovascular stroke during the three phases of the study (n=46).

Total knowledge score	Satisfactory		Unsatisfactory		Friedman	P-
	No.	%	No.	%	(X^2)	value
Pre	3	6.5	43	93.5		
Immediately post	31	67.4	15	32.6	64.955	0.000
Follow up	26	56.5	20	43.5		

Table (6): Comparison of patients' high level of self-efficacy during the three phases of the study (n=46).

Self-Efficacy Items	Pre		Immediately post		Follow up		Friedman	P-
	No.	%	No.	%	No.	%	(X^2)*	value
Medication	28	60.9	34	73.9	25	54.3	28.766	0.000
Body care	12	26.1	19	41.3	17	37	16.667	0.000
Social Roles	5	10.9	8	17.4	31	67.4	41.895	0.000
Mobility & Transfer	46	100	46	100	46	100	22.412	0.000
Communication	18	39.1	15	32.6	34	73.9	46.320	0.000
Emotional Behavior	11	23.9	11	23.9	25	54.3	60.250	0.000
House management	3	6.5	7	15.2	20	43.5	44.000	0.000
Springy\Attentive Behavior	3	6.5	6	13	32	68.7	12.500	0.000
Walking	8	17.4	11	23.6	24	52.2	28.207	0.000

**X^2 refers to the Friedman test.*

Table (7): Comparison of patients' total level of self-efficacy during the three phases of the study (n=46).

Self-Efficacy Levels	Pre		Immediately post		Follow up		Friedman	P-
	No.	%	No.	%	No.	%	(X^2)*	value
Low Self-Efficacy	36	78.3	33	71.7	15	23.6	36.857	0.000
High Self-Efficacy	10	21.7	13	28.3	31	67.4		

**X^2 refers to the Friedman test.*

Table (8): Comparison of patients' quality-of-life level during the two phases of the study (n=46).

Quality Of Life dimensions	Post 1 month	Post three months	Paired	P-
	Mean±SD	Mean±SD	t-test	value
Energy	4.80±1.61	5.93±1.69	5.163	0.000
Family role	10.28±3.47	11.67± 4.64	-4.630	0.000
Thinking	8.67±1.01	8.69±1.152	-0.178	0.000
Mood	15.39±3.75	16.17±4.18	-4.323	0.000
Personality	5.80±1.64	6.08±1.81	-2.460	0.000
Social role	8.80± 2.61	10.26±3.31	-7.088	0.000
Upper limb function	15.82± 5.67	17.28±5.96	-3.467	0.000
Movement	16.00±6.17	20.08± 7.81	-5.456	0.000
Work & Productivity	5.06±1.90	5.67±2.30	-3.157	0.000
Language	15.91±4.81	17.02± 4.76	-3.886	0.000
Vision	7.89±3.12	9.13± 2.30	-4.108	0.000
Self-care	10.82±3.81	12.19± 4.16	-4.016	0.000
Total (Mean±SD)	124.08±31.19	139.13±37.62	-8.502	0.000

Table (9): Comparison of patients' total level of quality of life one month and three months from the pre-assessment phase (n=46):

Quality Of Life Level	One month		Three months		X^2	P-
	No.	%	No.	%		value
Good quality of life	7	15.2	25	54.3	15.525	0.000
Poor quality of life	39	84.8	21	45.7		

Table (10): Correlation between the studied patient's total knowledge score, patients' self-efficacy, and quality of life during the study's follow-up phase (after three months).

Variables		Total Satisfactory Level of Knowledge Follow up
Self-efficacy		
Pre	r test*	0.587
	P-value	0.000
Immediately post	r test*	0.551
	P-value	0.000
Follow up	r test*	0.630
	P-value	0.000
Quality of life		
After one month	r test*	0.584
	P-value	0.000
After three months	r test*	0.648
	P-value	0.000

** r refers to the Spearman correlation.*

6. Discussion

Quality of life is a complex concept as it is influenced by individuals' physical health, psychological state, level of independence, social relationships, beliefs, and plans for the future. Following a stroke, patients experience abrupt and dramatic changes in their daily living activities, such as self-care and loss of mobility as patients experience isolation due to loss of work and free-time activities, which may increase the risk of post-stroke depression and further worsen the functional status and quality of life and they require substantial support from others in their daily care which affects their quality of life and self-efficacy *(Topcu & Oguz, 2017).*

Self-efficacy is another factor that affects the quality of life and recovery process of stroke patients. Even though stroke survivors may have recovered physically, they may be unable to cope with the psychosocial consequences of the stroke, which may affect their self-efficacy. Self-efficacy is the confidence in one's ability to perform a task or specific behavior and how successful they may be in overcoming the difficulties they may experience in the future. There is growing evidence that self-efficacy influences all aspects of human functioning and has been recognized as a predictor of functional performance and overall recovery post-stroke *(Lo et al., 2016).*

According to the sociodemographic characteristics of the studied subjects, the present study reveals that more than one-third of the studied patients aged between 60 to less than 70 years old, with a mean age of 56.50±10.75. These results may be because old-age patients more often had a higher incidence of age-related both cerebral micro- and macro-circulatory changes, which increases the risk for stroke. Aging, in otherwise healthy individuals, is associated with numerous noticeable changes in human intracranial and extra-cranial cerebral arteries that predict the risk of future stroke. This result was in the same line as those by *Gamal et al. (2021),* in a study entitled "Effect of selected exercise program on quality of life in stroke patients," who mentioned

that the majority of the studied patients' age ranged from 50-65 years old, with a mean age of 61±3.88.

Also, this finding was supported by those of *Elbqry et al. (2019)* in a study titled "Implementing of an educational program on patients' knowledge and Self-efficacy Regarding Recurrent Cerebrovascular Stroke" which reported that most of the studied patients aged above 56 years old, with a mean age of 50 years.

Regarding gender, slightly more than three-fifths of the studied subjects were females. From the researcher's point of view, this may be because females are more likely to experience an ischemic stroke than males, and they are exposed to stressors during their personal life.

This result was similar to those of *Rancic et al. (2019),* in a study entitled "Predictors of health-related quality of life in stroke survivors after inpatient rehabilitation," who found that more than half of the stroke survivors who participated in the study were females. These results contradicted those of *Kang et al. (2019),* in a study titled "Does a mobile app improve patients' knowledge of stroke risk factors and health-related quality of life in patients with stroke? a randomized controlled trial", and found that more than two-thirds of the studied patients were males.

Concerning the marital status, this study found that nearly three-quarters of the studied patients were married. This finding may be due to the age of the studied patients, the highest percentage in late adulthood and old age, which is the age to be married. These results were similar to those of *Kharbach et al. (2020),* in a study entitled "Level of knowledge on stroke and associated factors: A cross-sectional study at primary health care centers in Morocco," who mentioned that two-thirds of the studied patients were married.

Concerning the educational level of the studied patients, the present study clarifies that nearly one-third of the studied patients could not read or write, and more than two-fifths had basic education. This finding may be due to the low socioeconomic status of the El-Demerdash Hospital patients; besides, most of the study subjects were females and homemakers. This result is supported by *Saengsuwan et al. (2017),* who found that most patients had a low educational level "lower than secondary school." This finding contradicts *Bullier et al. (2020),* who revealed that two-fifths of the studied patients had high school or university degrees in studying the "New factors that affect the quality of life in stroke patients with aphasia."

Concerning occupation, it was found that more than half of them were not working because slightly more than three-fifths of the studied subjects were females and homemakers, and slightly more than two-fifths were aged between 60 to less than 70 years old. This finding is supported by the study of *Khedr et al. (2020),* who found that two-thirds of the participants were unemployed. Also, the present study reveals that less than one-third of the studied patients had physical work. These results disagreed with those of *Szczepanska-Gieracha and Mazurek (2020),* who mentioned that more than half of stroke patients had the physical type of work before the stroke.

Concerning living with whom and caregiver availability, the present study clarifies that most studied subjects lived with their families; slightly more than half of the studied subjects had caregivers, and their adult children gave them this care. This result is probably due to the consolidated family bonding between family members in Egyptian society. These findings were supported by those of *Dharma et al. (2018),* who stated that the caregiver-patient relationship reported by the patients was two-fifths of husband/wife and children.

Regarding residence, this study reveals that most of the studied patients live in urban areas; perhaps one of its most important causes is the lack of adequate control of risk factors in urban areas, "e.g., obesity, hypertension, DM" This result goes in the same line with those of *Mekuria et al. (2022),* in a study entitled "Level of knowledge, prevention practice, and predictors towards stroke among diabetic and hypertensive patients having a follow in Ethiopia," who found that two-thirds of the studied participants were from the urban community.

The study results show that more than two-thirds of the subjects had health insurance. This finding might explain the high prevalence and incidence of stroke among Egyptians, so the country provided health insurance for stroke patients. This finding is supported by the study of *Kharbach et al. (2020),* which found that three-fifths of the studied patients had health insurance.

Also, the current study's findings indicated that more than half of the studied patients reported that the time since stroke symptoms appeared after 1st four hours. This finding may be attributed to the fact that the majority of stroke patients could not identify the early warning signs that lead to a pre-hospital delay. The main reason for stroke victims' too late hospital presentation is considered their inability to recognize the symptoms of stroke, waiting for the signs to decrease by themselves, the delay in diagnosing cases, and eventually, lack of awareness of the advantages that could be obtained from early treatment of thrombolysis.

This finding agrees with *Khalil and Lahoud (2020),* who conducted a study entitled "Knowledge of stroke warning signs, risk factors, and response to stroke among Lebanese older adults in Beirut. " The study confirmed that knowledge of stroke's warning signs and symptoms is necessary to enhance the need for rapid medical calls.

These results are also supported by *Zewdie et al. (2018),* who mentioned that only less than one-fifth of the studied patients arrived at the emergency care unit within three to six hours of symptom onset, and three-quarters of them arrived over six hours after symptom onset; the median time to emergency care unit (ECU) arrival was 24 hours, with a range from one hour to 503 hours.

These findings contradicted what was reported by *Lebedeva et al. (2022),* who found that all patients had stroke onset within 24 hours before admission to the hospital; most of the patients had stroke onset 12-24 hours before admission, and less than one-fifth of them had stroke onset ≤3 hours before admission to the hospital.

Concerning the affected side, this study finds that most of the studied patients had a stroke in the left hemisphere; this may be due to the high incidence of risk factors of the study subjects as hypertension, DM, and heart disease, which can lead to atherosclerosis changes, leading to more severe LH ischemic events and large-vessel ischemic events, also cardio-embolism are more common in the LH. This study

finding aligns with those of *Serrada et al. (2021),* who reported that two-thirds of the strokes occurred on the left side. Also, this study's findings aligned with *Tollar et al. (2020),* who reported that approximately half of the strokes occurred in the left hemisphere. This finding was in contrast with *Khedr et al. (2020),* who stated that more than half of the ischemic stroke patients were in the right hemisphere.

Regarding signs and symptoms of stroke reported by the studied subjects, this study shows that the majority of the studied patients had signs and symptoms of dysarthria, paresthesia, vertigo/headache, and difficulty walking, and more than half of them had visual disturbances. This result could be explained by the patients having an unsatisfying level of awareness that these signs are warning signs of a stroke. This result is supported by *Saberian et al. (2019),* in a study entitled "Accuracy of stroke diagnosis using fast tool by emergency medical service dispatchers and technicians and its impact on transport time," who stated that the symptoms reported by the patients were, weakness, and sensory deficit. Motor disorder headaches and dizziness were the most frequent ones in sequence.

This result also follows *Romano et al. (2021)*, in a study entitled "Predictors of outcomes in patients with mild ischemic stroke symptoms," who found that the most common neurological findings of the studied patients at presentation, as defined by the NIHSS sub-items, were facial weakness, dysarthria, arm weakness, and sensory loss, respectively.

As regards to present health history concerning smoking, the current study shows that all of the studied male subjects were either currently smokers or previously smoked. This finding may be because the smoking habit is more common among the male gender and the lack of awareness about the risks of smoking, and this indicates the strong relation of smoking as an independent risk factor for stroke. This finding is guarantee with those of *Kuo et al. (2021),* in a study entitled "Continuity of care and self-management among patients with stroke", who found that two-thirds of the studied participants were currently smokers.

Regarding body mass index (BMI), this study reveals that slightly less than half of the studied subjects were overweight or obese. This finding may be due to slightly more than three-fifths of the studied subjects being females and the fact that poor healthy lifestyle practices, "e.g., poor physical exercise, unhealthy diet," may lead to obesity, which is a risk factor of stroke. *Thapa et al. (2021)* supported this finding in a study entitled "Prevalence of stroke and stroke risk factors in a South-Western Community of Nepal," which found that slightly less than half participants were overweight or obese.

Concerning the presence of complications, the current study shows that more than three-quarters of the studied subjects had complications post-stroke in terms of motor dysfunction (i.e., hemiplegia and hemiparesis), negligence, dysphagia, seizures, and incontinence. This result may be due to the arrival of those patients to the hospital's "Emergency care unit" after the first four since the onset of symptoms, called the time window of stroke management. These findings were supported by those of *Khaled et al. (2016),* in a study entitled "Quality of life after stroke in Pakistan," who stated that more than two-thirds of the studied patients suffered post-stroke complications.

Regarding past medical history, the present study shows that the majority of the studied patients had a medical history of hypertension and transient ischemic attack (TIA), half of them had having history of heart disease, and less than two-thirds of them had diabetes mellitus and more than one third had previous stroke. This finding could explain that these diseases are known risk factors for stroke. This opinion is supported by *Saengsuwan et al. (2017),* who mentioned that the failure of stroke patients to identify their risk factors may lead to a continuation of unhealthy lifestyles or poor medical compliance, leading to a higher chance of recurrent stroke.

These results are supported by those of *Mukaz et al. (2022),* who found that the majority of the studied participants had a positive history of risk factors such as diabetes, hypertension, and heart disease. These results are also in line with those of *Abedi et al. (2021),* who found that the three most common comorbidities among ischemic stroke patients were hypertension, dyslipidemia, and diabetes.

Regarding family history, the present study shows that more than half of the studied subjects had a family history of stroke; this may be due to genetic causes of conventional stroke risk factors, such as atrial fibrillation, diabetes, and hypertension, which are also associated with the risk of stroke. Moreover, evidence suggests that genetic studies could help to distinguish stroke subtypes and even contribute to patient management). These findings contradicted those of *Zewdie et al. (2018),* who found that less than half of the stroke participants had a family history.

As regards patients' satisfactory level of knowledge about nervous system structure and CVS (e.g., definition of stroke, its causes, signs and symptoms, diagnostic tests, warning signs symptoms, medical surgical treatment, and complications) during the three phases of the study, the present study finding reveals that there was a highly statistically significant difference was found between pre-, immediately-post, and follow up after the implementation of the educational program This finding might be due to the provision of theoretical knowledge about nervous system structure and CVS included in the educational program.

This result is supported by *Mekuria et al. (2022),* who found that more than two-thirds of the studied participants have a low knowledge of general concepts, signs and symptoms, risk factors, and stroke prevention strategies. Also, this result aligns with those of *Faiz et al. (2018),* in a study entitled "Patient knowledge on stroke risk factors, symptoms, and treatment options," who found that two-thirds of the studied patients had poor knowledge about treatment options for stroke. Additionally, this result is supported by those of *Wang et al. (2018),* who reported in their study about "Acute stroke patients' knowledge of stroke at discharge in China" that the level of knowledge of acute ischemic stroke patients at discharge was not high.

Concerning the patients' knowledge regarding self-care activities and re-equipment of the living space during the three phases of the study, the present study shows a highly statistically significant difference was found between pre-, immediately post, and follow-up after the implementation of

the educational program regarding patients' knowledge about self-care activities and re-equipment of the living space.

The above result may be due to the induction of theoretical guidelines on knowledge about self-care activities and how to re-equip the living space," e.g., how to wear and take off clothes, how to take a shower, balanced diet, medication, how to arrange the living room and the bedroom"; as well as how to deal with post-stroke disabilities and complications, "e.g., how to overcome dysphagia, difficulty in chewing, how to prevent recurrent stroke, prevent falling, bed sores, joint atrophy, chocking, and urinary incontinence." Moreover, high levels of disease-related knowledge help patients enhance their health-promotion behavior and promote self-care performance.

This result is supported by those of *Jang and Shin, (2019),* in a study entitled "Self-care performance of middle-aged stroke patients in Korea", who confirmed that secondary stroke-prevention knowledge affected self-care performance. In the same context, *Bailey (2018),* in a study entitled "Lifestyle modification for secondary stroke prevention," reported that a common barrier to lifestyle behavior change for stroke patients was limited insight, knowledge, and awareness of how lifestyle factors contribute to risk for subsequent stroke.

Concerning the patients' knowledge regarding nutrition during the three phases of the study, the present study shows a statistically significant difference between pre-, immediately-post, and follow-up after the implementation of the educational program. This result is supported by those of *Jingyi et al. (2021),* who found that the awareness rate of the dietary guidelines among patients with ischemic stroke was low.

Concerning the patients' knowledge regarding the prevention of complications during the three phases of the study, the present study shows a highly statistically significant difference between pre-, immediately-post, and follow-up of the implementation of the educational program regarding the prevention of complications post-stroke. This result is supported by *Soto-Camara et al. (2020),* who mentioned that patients who recognized their future risk of stroke were more likely to pursue a healthy lifestyle. Based on scientific knowledge, implementation of secondary preventive measures in stroke patients, namely, dietary modification, exercise, aspirin, statin, and an antihypertensive agent, can theoretically reduce the relative risk of recurrent vascular events by 80%.

Concerning the studied patient's total knowledge regarding CVS during the three phases of the study, the present study reveals that most of the studied patients had an unsatisfactory level of knowledge regarding CVS pre-educational program implementation. In contrast, two-thirds of the studied patients had satisfactory knowledge regarding CVS immediately after the educational program implementation. More than half of the studied patients had satisfactory knowledge regarding CVS in the follow-up phase after the educational program's implementation, with a statistically significant difference observed among the three study phases. This finding could be attributed to the effectiveness of the educational program that positively affects the patient's knowledge.

Also, the researcher followed up with the patients by phone and tried to determine whether they were following what was written in the booklet.

This result is supported by those of *Elbqry et al. (2019),* who found that the studied patients had a satisfactory level of overall knowledge regarding recurrent cerebrovascular stroke (definition, causes and risk factors, types, clinical manifestation, diagnostic studies, treatment modalities, complications, and causes of recurrent) at the post- and follow-up phases of educational program implementation.

Also, this finding goes in the same line with those of *Isuru et al. (2022),* who found that half of the studied stroke patient's awareness about CVS was not satisfactory, and stroke patients are at high risk of recurrent stroke. Additionally, *Kang et al. (2019)* supported this result. They found that most of the studied patients' knowledge of stroke risk factors improved after providing a health education booklet and a stroke health education mobile.

The current study's results support the research hypothesis that implementing the educational program will positively affect the self-efficacy and quality of life of patients with ischemic cerebrovascular stroke.

Concerning patient's self-efficacy during the three phases of the study, a highly statistically significant difference was found between the pre-, immediately-post, and follow-up phases of the implementation of the educational program, and the present study shows an improvement in the patient's self-efficacy at items of (Medication, body care, social roles, mobility and transfer, communication, emotional behavior, house management, springy\attentive behavior, and walking) post educational program implementation and follow up than pre. This finding may be referred to the improvement in the knowledge level about stroke and self-care activities post-stroke, increasing the patient's motivation to follow booklet instructions.

This finding is supported by those of *Wiguna et al. (2021),* in a study entitled "The effect of self-efficacy-based education on the daily care of stroke patients and its implications with counseling," who reported that almost two-thirds of the studied stroke patients had low self-efficacy before the educational intervention.

Also, these findings are supported by those of *Asmirajanti et al. (2019),* who mentioned that nurses who provide education regarding the function, composition, and side effects of a drug and adverse reactions improved patient satisfaction and reduced their stress and anxiety.

Concerning the studied patients' total self-efficacy during the three phases of the study, the findings of the present study illustrate that more than two-thirds of the patients with stroke had a highly statistically significant improvement in their total self-efficacy level at follow-up of the educational program implementation than pre- and immediately post-educational program implementation.

From the researcher's point of view, low levels of the patients' self-efficacy pre education program implementation may be due to patients' fear of disability, death, fear of losing their jobs, being dependent on their families. Also, the researcher helps the patients to increase their self-efficacy by setting short-term and clear goals, providing emotional support, increasing their self-confidence, and providing

constant motivation through telephone calls during the follow-up phase to achieve adaption to their psychosocial difficulties caused by stroke.

This result is supported by those of *Mudgal et al. (2021),* in a study entitled "Effects of Health Promotion Model-Based Visual Learning Module on self-efficacy and health promotion behavior of stroke survivors: A non-randomized controlled trial," who observed a marked improvement in self-efficacy after 4 and 12 weeks of intervention with the Model-Based Visual Learning Module.

This result was also in agreement with a study by *Lo et al. (2016)* entitled "Effectiveness of a self-efficacy enhancing stroke self-management program on promoting recovery of community-dwelling stroke survivors," which found a significant improvement in self-efficacy and health-related quality of life at the 8-week follow-up assessment.

Additionally, *Denny et al. (2017)* added that the education nurses gave following a stroke positively impacted patients' functional, psychosocial, and emotional well-being and increased their knowledge of the risk factors for stroke, increasing their self-efficacy and social involvement.

This study reveals a highly significant improvement in patients' quality of life regarding energy, family role, thinking, mood, personality, social role, upper limb function, movement, work and productivity, language, vision, and self-care at follow-up (after three months) than one month after the implementation of the educational program. From the researcher's point of view, this result may be because after one month of stroke occurrence, the patient is still facing physical and mental consequences, and the normal healing process will take time until the patient recovers, so the patient has having poor quality of life. On the other hand, the researcher followed the patients and their caregivers by telephone for one and three months after being discharged from the hospital. Furthermore, the researcher was planning with the caregiver daily life activities for their patients, which led to improved daily activities, resulting in improvements in all quality of life domains.

This result is supported by those of *Alotaibi et al. (2021),* in a study entitled " Assessment of the stroke-specific quality of life scale in KFHU, Khobar," who reported that the overall QOL is relatively high six months post-stroke occurrence at items of family role, mood, social role, mobility, work and productivity, language, and self-care.

These findings contradicted those of *Yeoh et al. (2019),* in a study entitled "Quality of life loss associated with first-time stroke," who found a significant decrease in QoL at three and 12 months post-stroke and a reduction at three months was associated with the reduction in all five health dimensions (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression); reductions remaining at 12 months were limited to dimensions of mobility, self-care, usual activities, and anxiety/depression.

Concerning the total quality-of-life of the studied patients, the current study illustrates that more than half had good quality-of-life levels after three months than one month of the pre-assessment phase, with a statistically significant difference. From the researcher's point of view, this result may be due to the effectiveness of the educational program on the study subjects about how to deal with complications post stroke, "e.g., hemiplegia, negligence, dysphagia." Moreover, the majority of the studied subjects were living with their families, and three-fifths of them had caregivers, which explains that there might be good emotional support and, effective family care, patient attention to follow-up at stroke outpatient clinics all contribute to improving the QoL of patients after stroke.

These results are supported by those of *Topcu and Oguz (2021),* in a study entitled "Evaluation of self-efficacy and quality of life of stroke patients," who found that the experimental group with an educational booklet and monthly follow-up had higher quality of life scores than the patients in the control group. These results also aligned with *those of Dharma et al. (2018),* in a study entitled "The functional capacity and quality of life among stroke patients by family caregiver empowerment program based on Adaptation Model," who found that the quality of life of the intervention group in the sixth month after program intervention was better than that of the control group, with a significant difference.

Regarding the study variables, there was a statistically significant increase in the total level of knowledge, total self-efficacy, and quality of life of the studied patients in the follow-up phase. From the researcher's point of view, improving knowledge increases self-efficacy, which in turn increases activities of daily living, improving quality of life.

Regarding correlations between total level of knowledge and patient self-efficacy, the current study's results reveal a positive correlation between patients' total level of knowledge and their self-efficacy. This result might be due to the increase or improvement in patients' knowledge, increasing their willingness to adopt lifestyle changes and participate in rehabilitation, leading to increased self-efficacy.

This result is supported by those of *Sitio et al. (2020),* in a study entitled "The effect of health education on self-efficacy on post-stroke patients," who found that there was a correlation between higher levels of general self-efficacy and higher levels of performing activities of daily living were associated with higher levels of health literacy.

Regarding correlations between total level of knowledge and patient's quality of life, the current study revealed a positive correlation between patient's total level of knowledge and their quality of life. This result reflects the positive influence of the educational program on improving the knowledge of patients and their caregivers and active participation from the study subjects and their caregivers during theoretical and practical sessions discussed throughout the educational program's implementation. From the researcher's point of view, knowledge is the most important strategy to enhance the quality of life, in which patients with satisfactory knowledge might be more compliant with follow-up, medication, and healthy lifestyle, which is considered a predictor for good QoL.

This finding is in line with *Taha and Ibrahim (2020),* who, in a study titled "Effect of a design discharge planning program for stroke patients on their quality of life and activity of daily living," found a positive correlation between patients' knowledge, quality of life, and activity of daily living with a statistically significant difference.

Moreover, *Martini et al. (2022)* confirmed that education, specifically in knowledge about medical stroke

rehabilitation, is among the most associated factors for quality of life amongst post-stroke patients.

7. Conclusion

Based on the study findings, it can be concluded that:

Regarding the patient's total knowledge of cerebrovascular stroke, it was found that slightly more than two-thirds of the studied patients had a satisfactory level of knowledge immediately after implementing the educational program. Concerning self-efficacy, more than two-thirds of the studied patients had a high level of self-efficacy in the follow-up phase. Moreover, it was concluded that more than half of the studied patients had good total quality of life in the follow-up phase.

Implementing the educational program had a statistically significant positive effect on the studied patients' knowledge. Consequently, it affected the self-efficacy and quality of life of the patients with ischemic stroke, supporting the stated research hypothesis.

8. Recommendations

Based on the results of the current study, the following recommendations are suggested:

Periodical assessment of quality of life and self-efficacy of the patients with stroke. Identify factors that affect the quality of life and self-efficacy of patients with stroke and how to deal with these factors.

The use of mass media has an important role in creating positive health awareness about cerebrovascular stroke, including causes, modifiable risk factors, warning signs of stroke, prevention, risks of complications, and how to cope with post-stroke disabilities.

Also, posters containing warning signs of stroke are published in different healthcare settings and general places.

Continuous educational programs for all patients with stroke and their caregivers at different hospitals regarding cerebrovascular stroke to improve their knowledge and how to cope with potential stroke disabilities, which in turn affects their quality of life.

Effective, well-organized stroke rehabilitation should be delivered early by specialist stroke teams and with sufficient intensity, which in turn improves the quality of life of the patients with stroke.

Close involvement of the individuals and their families in decision-making about disease management to improve patient's psychological state and their self-efficacy.

An Arabic booklet about cerebrovascular stroke should be available for all ICU patients, their caregivers, and nursing staff in all settings.

Replication of the research study on a large probability sample is recommended to achieve more generalization.

9. References

Abedi, V., Avula, V., Razavi, S. M., Bavishi, S., Chaudhary, D., Shahjouei, S., Wang, M., Griessenauer, C. J., Li, J., & Zand, R. (2021). Predicting short and long-term mortality after acute ischemic stroke using EHR. *Journal of the Neurological Sciences, 427*(1), 117560. https://doi.org/10.1016/j.jns.2021.117560

Alotaibi, S. M., Alotaibi, H. M., Alolyani, A. M., Abu Dali, F. A., Alshammari, A. K., Alhwiesh, A. A., Gari, D. M., Khuda, I. K. M. Q., & Vallabadoss, C. A. (2021). Assessment of the stroke-specific quality-of-life scale in KFHU, Khobar, A prospective cross-sectional study, *Neurosciences (Riyadh, Saudi Arabia)*, *26*(2), 171–178. https://doi.org/10.17712/nsj.2021.2.20200126.

Aref, H., Zakaria, M., Shokri, H., Roushdy, T., El Basiouny, A., & El Nahas, N. (2021). Changing the landscape of stroke in Egypt. *Cerebrovascular Diseases Extra*, *11*(3), 155-159. https://doi.org/10.1159/000521271

Asmirajanti, M., Hamid, A. Y. S., & Hariyati, R. T. S. (2019). Nursing care activities based on documentation, *BMC Nursing*,*18*(suppl. 1), 32. https://doi.org/10.1186/s12912-019-0352-0

Bailey, R. R. (2018). Lifestyle modification for secondary stroke prevention. *American Journal of Lifestyle Medicine, 12*(2), 140–147. https://doi.org/10.1177/1559827616633683

Bullier, B., Cassoudesalle, H., Villain, M., Cogne, M., Mollo, C., De Gabory, I., Dehail, P., Joseph, P. A., Sibon, I., & Glize, B. (2020). New factors that affect quality of life in patients with aphasia. *Annals of Physical and Rehabilitation Medicine, 63*(1), 33-37. https://doi.org/10.1016/j.rehab.2019.06.015

Coupland, A. P., Thapar, A., Qureshi, M. I., Jenkins, H., & Davies, A. H. (2017). The definition of stroke. *Journal of the Royal Society of Medicine, 110*(1), 9–12. https://doi.org/10.1177/0141076816680121

Denny, M., Farhaan, S., Vu, K. Y. T., Sharrief, A. Z., & Savitz, S. I. (2017). Video-based educational intervention associated with improved stroke literacy, self-efficacy, and patient satisfaction. *PloS one, 12*(3), e0171952. https://doi.org/10.1371/journal.pone.0171952

Dharma, K. K., Damhudi, D., Yardes, N., & Haeriyanto, S. (2018). Increase in the functional capacity and quality of life among stroke patients by family caregiver empowerment program based on adaptation model. *International Journal of Nursing Sciences, 5*(4). 357-364. https://doi.org/10.1016/j.ijnss.2018.09.002

Elbqry, M. G., Sherif, W. I., Mahdy, N. E., Gaballah, S. & Altantawy, A. M. (2019). Effect of educational program on knowledge, adherence, and self-efficacy among patients with recurrent cerebrovascular stroke. *Journal of Nursing and Health Science, 8*(4): 42–51.

Faiz, K., Sundseth, A., Thommessen, B., and Ronning, O. (2018). Patient Knowledge On Stroke Risk Factors, Symptoms, and Treatment Options. Vasc. Health Risk Management, 14(2018), 37–40. https://doi.org/ 10.9790/1959-0804104251

Gamal, M. M., Ahmed, G. M., Abdel Rahman, A. M., Tawfik, R. M., & Elzanaty, M. Y. (2021). Effect of selected exercise program on quality of life in stroke patients. *The Medical Journal of Cairo University, 89*(5), 1883-1888. https://doi.org/10.21608/mjcu.2021.203299

Gangwani, R., Cain, A., Collins, A., & Cassidy, J. M. (2022). Leveraging factors of self-efficacy and motivation to optimize stroke recovery. *Frontiers in Neurology*, 13(823202). 1–11. https://doi.org/10.3389/fneur.2022.823202

Hinkle, J. & Cheever, K. (2018). *Brunner and Suddarth's Textbook of Medical-Surgical Nursing*, 13th ed., India, Wolters Kluwer. Pp. 1712-1735.

Ibrahim, W. N., Nawi, S. M., Al-Mahmood, S. M. A., Othman, N. (2018). Stroke patients' adherence to nurses' advice and their quality of life after admittance to Hospital Tengku Ampuan Afzan, *International Journal of Care Scholars, 1*(1), 1–4. https://doi.org/10.31436/ijcs.v1i1.36

Ignatavicius, D., & Workman, L. (2018). *Medical-surgical Nursing: Concepts for Interprofessional Collaborative Care*, 9th Ed., Canada, Elsevier Health Sciences. St. Louis. Pp. 927-955

Isuru, A., Hapangama, A., Ediriweera, D., Samarasinghe, L., Fonseka, M., & Ranawaka, U. (2021). Prevalence and predictors of new-onset depression in the acute phase of stroke. *Asian Journal of Psychiatry, 59*(1), 102636. https://doi.org/10.1016/j.ajp.2021.102636

Jang, D. E., & Shin, J. H. (2019). Self-Care Performance of Middle-Aged Stroke Patients in Korea. *Clinical Nursing Research, 28*(3), 263–279. https://doi.org/10.1177/1054773817740670

Jones, F., Partridge, C., & Reid, F., (2008). The stroke self-efficacy questionnaire: Measuring individual confidence in functional performance after stroke. *Journal of Clinical Nursing, 17*(7B), 244–252. https://doi.org/10.1111/j.1365-2702.2008.02333.x

Kang, Y. N., Shen, H. N., Lin, C. Y., Elwyn, G., Huang, S. C., Wu, T. F., & Hou, W. H. (2019). Does a mobile app improve patients' knowledge of stroke risk factors and health-related quality of life in patients with stroke? A randomized controlled trial. *BMC Medical Informatics and Decision Making, 19*(1), 282. https://doi.org/10.1186/s12911-019-1000-z

Kerber, K. A., Brown, D. L., Skolarus, L. E., Morgenstern, L. B., Smith, M. A., Garcia, N. M., & Lisabeth, L. (2013). Validation of the 12-Item Stroke-Specific Quality of Life Scale in a bi-ethnic stroke population. Journal of Stroke Cerebrovascular Diseases: The official journal of National Stroke Association, 22(8), 1270–1272. https://doi.org/10.1016/j.jstrokecerebrovasdis.2012.08.011

Khalil, H. M., & Lahoud, N. (2020). Knowledge of stroke warning signs, risk factors, and response to stroke among Lebanese older adults in Beirut. *Journal of Stroke and Cerebrovascular Diseases: The Official Journal of National Stroke Association*, 29(5), 104716. https://doi.org/10.1016/j.jstrokecerebrovasdis.2020.104716

Kharbach, A., Obtel, M., Achbani, A., Bouchriti, Y., Hassouni, K., Lahlou, L., & Razine, R. (2020). Level of knowledge on stroke and associated factors: A cross-sectional study at primary health care centers in Morocco. *Annals of Global Health, 86*(1), 83. https://doi.org/10.5334/aogh.2885

Khedr, E. M., Abdelrahman, A. A., Desoky, T., Zaki, A. F., & Gamea, A. (2020). Post-stroke depression: Frequency, risk factors, and impact on quality of life among 103 stroke patients—hospital-based study. *The Egyptian Journal of Neurology, Psychiatry and Neurosurgery, 56*(66). https://doi.org/10.1186/s41983-020-00199-8.

Kuo, N. Y., Lin, Y. H., & Chen, H. M. (2021). Continuity of care and self-management among patients with stroke: A cross-sectional study. *Healthcare, 9*(8), 989. https://doi.org/10.3390/healthcare9080989

Lebedeva, E. R., Ushenin, A. V., Gurary, N. M., Gilev, D. V., & Olesen, J. (2022). Diagnostic criteria for acute headache attributed to ischemic stroke and sentinel headache before ischemic stroke. *The Journal of Headache and Pain, 23*(11), https://doi.org/10.1186/s10194-021-01372-x

Lo, S. H., Chang, A. M., & Chau, J. P. (2016). Translation and validation of a Chinese version of the Stroke Self-Efficacy Questionnaire in community-dwelling stroke survivors. *Topics in Stroke Rehabilitation, 23*(3), 163–169. https://doi.org/10.1080/10749357.2015.1122265

Martini, S., Ningrum, D. A. S., Abdul-Mumin, K. H., & Yi-Li, C. (2022). Assessing quality of life and associated factors in post-stroke patients using the World Health Organization abbreviated generic quality of life questionnaire (WHOQOL-BREF). *Clinical Epidemiology and Global Health, 13*(2022), https://doi.org/10.1016/j.cegh.2021.100941

Mekuria, A. B., Kifle, Z. D., & Melak, A. D. (2022). Level of knowledge, prevention practice, and predictors of stroke among diabetic and hypertensive patients having a follow-up at the University of Gondar Comprehensive Specialized Referral Hospital, Northwest Ethiopia. A cross-sectional study. *Clinical Epidemiology and Global Health, 13*(2022), https://doi.org/10.1016/j.cegh.2021.100950

Mudgal, S., Sharma, S. K., Chaturvedi, J., & Chundawat, D. S. (2021). Effects of Health Promotion Model-Based Visual Learning Module on stroke survivors' self-efficacy and health promotion behavior: A non-randomized controlled trial. *Journal of Neurosciences in Rural Practice, 12*(02), 389-397. https://doi.org/10.1055/s-0041-1727407

Mukaz, K. D., Dawson, E., Howard, V. J., Cushman, M., Higginbotham, J. C., Judd, S. E., Kissela, B. M., Safford, M. M., Soliman, E. Z., & Howard, G. (2022). Rural/Urban differences in the prevalence of stroke risk factors: A Cross-sectional analysis from the REGARDS Study. *The Journal of Rural Health, 38*(3), 668–673. https://doi.org/10.1111/jrh.12608

Rancic, N., Mandic, M., Bogdanovic, D., Kocic, B., & Lazarevic, K. (2019). Predictors of health-related quality of life in stroke survivors after inpatient rehabilitation, *Research Square*. https://doi.org/10.21203/rs.2.18990/v1

Romano, J. G., Gardener, H., Campo-Bustillo, I., Khan, Y., Tai, S., Riley, N., Smith, E. E., Sacco, R. L., Khatri, P., Alger, H. M., Mac Grory, B., Gulati, D., Sangha, N. S., Craig, J. M., Olds, K. E., Benesch, C. G., Kelly, A. G., Brehaut, S. S., Kansara, A. C., Schwamm, L. H., … MaRISS Investigators (2021). Predictors of outcomes in patients with mild ischemic stroke symptoms: MaRISS. *Stroke, 52*(6), 1995–2004. https://doi.org/10.1161/STROKEAHA.120.032809

Saberian, P., Tavakoli, N., Hasani-Sharamin, P., Aghili, M., & Baratloo, A. (2019). Accuracy of stroke diagnosis using FAST (Face, arm, speech, time) tool by emergency medical service dispatchers and technicians and its impact

on transport time. *Archives of Neuroscience, 7*(1), e98691. https://doi.org/10.5812/ans.98691

Saengsuwan, J., Suangpho, P., & Tiamkao, S. (2017). Knowledge of stroke risk factors and warning signs in patients with recurrent stroke or recurrent transient ischemic attack in Thailand. *Neurology Research International, 2017*(1), 8215726. https://doi.org/10.1155/2017/8215726

Serrada, I., Hordacre, B. & Hillier, S. (2021). Recovery of body awareness after stroke: An observational study. *Frontiers in Neurology, 29*(2021). 1-9. ttps://doi.org/10.3389/fneur.2021.745964

Shaheen, H. A., Abdel Wahed, W. Y., & Hasaneen, S. T. (2019). Prevalence of stroke in Fayoum Governorate, Egypt: A community-based study. *Journal of Stroke and Cerebrovascular Diseases: The official journal of National Stroke Association, 28*(9), 2414–2420. https://doi.org/10.1016/j.jstrokecerebrovasdis.2019.06.031.

Sharma, S. K. (2016). *Lippincott manual of medical-surgical nursing adaptation of Nettina: Lippincott manual of nursing*, 10th Ed., India, Wolters Kluwer. Pp. 663-760

Sharma, S. K. (2018). *Nursing Research and Statistics, Quasi-Experimental Research Design*, 3rd Ed., Elsevier Health Sciences, India. Pp.185–189.

Sitio, R., Elvin, S. D. & Nirwan, N. (2020). The effect of health education on self efficacy on post stroke patients. *Journal Mutiara Ners, 3*(1), 48–54.

Statistical Records of the Intensive Neurological Care Units & Stroke Outpatient Clinics, (2016). Ain Shams University Hospitals. Ain Shams University.

Soto-Cámara, R., González-Bernal, J. J., González-Santos, J., Aguilar-Parra, J. M., Trigueros, R., & López-Liria, R. (2020). Knowledge on Signs and Risk Factors in Stroke Patients. *Journal of Clinical Medicine, 9*(8), 2557. https://doi.org/10.3390/jcm9082557

Szczepanska-Gieracha, J., & Mazurek, J. (2020). The role of self-efficacy in the recovery process of stroke survivors. *Psychology Research and Behavior Management*, *13*, 897–906. https://doi.org/10.2147/PRBM.S273009.

Taha, A. S., & Ibrahim, R. A. (2020). Effect of a design discharge planning program for stroke patients on their quality of life and activity of daily living. *International Journal of Studies in Nursing, 5*(1), https://doi.org/10.20849/ijsn.v5i1.724

Thompson, S. K. (2012). Sampling. 3rd ed. John Willey & Sons. The USA.

Thapa, L., Shrestha, S., Kandu, R., Ghimire, M., Ghimire, S., Chaudhary, N. K., Pahari, B., Bhattarai, S., Kharel, G., Paudel, R., Jalan, P., Chandra, A., Phuyal, S., Adhikari, B., Aryal, N., & Kurmi, O. (2021). Prevalence of stroke and stroke risk factors in a South-Western Community of Nepal. *Journal of Stroke and Cerebrovascular Diseases, 30*(5), 105716.
https://doi.org/10.1016/j.jstrokecerebrovasdis.2021.105716

Tiwari, S., Joshi, A., Rai, N., & Satpathy, P. (2021). Impact of stroke on quality of life of stroke survivors and their caregivers. A Qualitative Study from India, *Journal of Neuroscience in Rural Practice, 12*(4), 680–688. https://doi.org/10.1055/s-0041-1735323

Tollar, J., Nagy, F., Csutoras, B., Prontvai, N., Nagy, Z., Torok, K., Blényesi, E., Vajda, Z., Farkas, D., Tóth, B. E., Repa, I., Moizs, M., Sipos, D., Kedves, A., Kovács, Á., & Hortobagyi, T. (2020). High frequency and intensity rehabilitation in 641 subacute ischemic stroke patients. *Archives of Physical Medicine and Rehabilitation, 102*(1), 9-18. https://doi.org/10.1016/j.apmr.2020.07.012

Topcu, S. (2021). Evaluation of self-efficacy and quality of life of stroke patients. *Journal Nursing Science, 4*(3), 114–121. https://doi.org/10.54189/hbd.993300

Topcu, S., & Oguz, S. (2017). Self-efficacy and quality of life after stroke. *Journal of Human Sciences, 14*(2),1388-1396.

Torrisi, M., De Cola, M. C., Buda, A., Carioti, L., Scaltrito, M. V., Bramanti, P. Manuli, A., De Luca, R., & Calabro, R. (2018). Self-efficacy, post stroke depression, and rehabilitation outcomes. Is there a correlation? *Journal of Stroke and Cerebrovascular Diseases: The official journal of National Stroke Association*, *27*(11), 3208–3211. https://doi.org/10.1016/j.jstrokecerebrovasdis.2018.07.021

Wang, M. D., Wang, Y., Mao, L., Xia, Y., He, Q., Lu, Z. X., Yin, X. X., & Hu, B. (2018). Acute stroke patients' knowledge of stroke at discharge in China: A cross-sectional study. *Tropical Medicine & International Health: TM & IH, 23*(11), 1200-1206. https://doi.org/10.1111/tmi.13148

Wiguna, R. N., Ritarwan, K., Sitohang, N. A., & Sinaga, H. P. (2021). The effect of self-efficacy-based education on the daily care of stroke patients and its implications with counseling. *KONSELI: Jurnal Bimbingan dan Konseling (E-Journal), 8*(2), 241-250. https://doi.org/ 0.24042/kons.v8i2.9221

Winstein, C. J., Stein, J., Arena, R., Bates, B., Cherney, L. R., Cramer, S. C., Deruyter, F., Eng, J. J., Fisher, B., Harvey, R. L., Lang, C. E., MacKay-Lyons, M., Ottenbacher, K. J., Pugh, S., Reeves, M. J., Richards, L. G., Stiers, W., Zorowitz, R. D., & American Heart Association Stroke Council, Council on Cardiovascular and Stroke Nursing, Council on Clinical Cardiology, and Council on Quality of Care and Outcomes Research (2016). Guidelines for Adult Stroke Rehabilitation and Recovery: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. *Stroke, 47*(6), e98–e169. https://doi.org/10.1161/STR.0000000000000098

World Population Review (2024). Egypt Population 2024, Available at https://worldpopulationreview.com/countries/egypt accessed on 20-9-2024, at 4.30 pm.

Yeoh, Y. S., Koh, G. C., Tan, C. S., Tu, T. M., Singh, R., Chang, H. M., De Silva, D. A., Ng, Y. S., Ang, Y. H., Yap, P., Chew, E., Merchant, R. A., Yeo, T. T., Chou, N., Venketasubramanian, N., Lee, K. E., Young, S. H., Hoenig, H., Matchar, D. B., & Luo, N. (2019). Health-related quality of life loss associated with first-time stroke. *PloS one, 14*(1), e0211493. https://doi.org/10.1371/journal.pone.0211493

Zewdie, A., Debebe, F., Kebede, S., Azazh, A., Laytin, A., Pashmforoosh, G., & Hassen, G. W. (2018). Prospective assessment of patients with stroke in Tikur Anbessa Specialised Hospital, Addis Ababa, Ethiopia, *African*

Journal of Emergency Medicine, Revue Africaine de La Medecine D'urgence, *8*(2018), 21–24. https://doi.org/10.1016/j.afjem.2017.11.001

Zhao, S., Wu, W., Wu, P., Ding, C., Xiao, B., Xu, Z., Hu, Y., Shen, M., & Feng, L. (2021). Significant increase of erectile dysfunction in men with post-stroke: A Comprehensive Review. *Frontiers in neurology, 12*, 671738. https://doi.org/10.3389/fneur.2021.671738