Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (51-62), Month: September - December 2024, Available at: www.noveltyjournals.com

Remedial Compliance and Quality of life among patients with Stroke

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DOI: https://doi.org/ 10.5281/zenodo.14185086

Published Date: 19-November-2024

Abstract: **Background: Stroke is a disease whose consequences have a considerable impact on the quality of the patient's life. It is a widespread disease that has a disabling impact on life and, in addition to physical changes, brings about a number of psychological and cognitive processes. Aim: To assess remedial compliance and quality of life among patients with stroke.Design: Descriptive design. Setting: The study was conducted in Neurology department at Sohag University Hospital. Sample: Convenient sample of 84 adult male and female patients who attended the neurology unit. Data collection tools: three tools were used in data collection, first tool: Structured Interviewing questionnaire for patients. Second tool: Compliance assessment questionnaire; third tool Stroke Specific Quality of Life Scale (SS-QOL). Results: This study mentioned that 76.2% of the studied patients had low compliance level with medication and 17.9% of the studied patient had high compliance level with exercise. Also, 67.9% of the studied patients had low quality of life level. Conclusion: The main findings showed that there was statistical significant positive correlation between the studied patient's compliance with medication, compliance with exercise and quality of life.**

Keywords: **Stroke, Remedial compliance, Quality of life.**

1. INTRODUCTION

Stroke is an important public health issue ranking the second among diseases causing death at global level, and the third in terms of disease burden. **(Feigin et al., 2018).** Stroke is a disease that is known by its focal neurologic deficit. It occurs when there is a disruption of the blood flow to the brain either by a clot, causing ischemic stroke or by a rupture of the blood vessels, causing hemorrhagic stroke. Stroke often leads to death or permanent disability, causing functional or neurological deficits and affects the quality of life of both patients and their families. **(Strong et al., 2019).**

According to the literature the incidence of stroke ranges from 41 to 316 per 100,000 people. **(Thrift., 2018).** According to WHO projections, if the trend in stroke incidence continues this way, in 2030, there will be 23 million stroke cases, 7-8 million deaths caused by stroke, and 5 million stroke sequelae. **(Mathers & Loncar., 2018).**

Following a stroke, the most common side effects included hemiplegia, visual problems sensory complaints, sensory-motor disorders, cognitive impairment, tonus disorders, difficulty speaking, impaired coordination, and difficulty

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swallowing. These side effects have a negative impact on maintaining daily activities and quality of life. **(Marini et al., 2017).**

Stroke is a widespread disease that has a disabling impact on life and, in addition to physical changes, brings about a number of psychological and cognitive processes. Stroke is one of the main causes of disability, and doubles the risk of dementia. **(Leys et al., 2022).**

Poor compliance is considered to be the biggest problem at present. The WHO noted that "drug non-compliance is a major problem around the world". Among patients with chronic illness, approximately 33–50% of patients do not adhere to a long-term medication regimen and exercises. **(Arnan et al., 2022)**.

Nurses play an important role as care providers and as mediators of personal recovery and multidisciplinary care, and can support stroke patients' return to an independent life. **(Gibbon et al., 2022).**

Significance of the study:

Stroke is the third leading cause of death and disability in the United States, Europe and many developing countries. As, stroke is the main cause of functional disabilities, and 20% of survivors need institutional care after 3 months, and 15% to 30% become permanently disabled. Stroke is a life-changing event that affects not only the person who may be disabled, but the entire family and other caregivers. **(Murray and A.D. Lopez., 2019).**

In Egypt, it was estimated that around 150,000 to 210,000 strokes occurred per year **(Farrag al., 2021).** According to the statistical records of Sohag University Hospital, there were 1000 patients with stroke admitted to the hospital in 2022. **(Sohag Statistical Record., 2022).**

Compliance with medication or exercise constitutes a primary factor of treatment success since suboptimal compliance is a risk factor for secondary stroke or even death. **(Wang et al., 2021).** Where non- compliance with treatment leads to increasing the number of hospital readmission and go to the emergency department. **(Suqisawa., 2019).** For that reason, it's important to evaluate level of patients' remedial compliance and quality of life in order to help them achieve better outcomes and avoid major complications related to stroke.

Aim of the study:

The aim of the current study was to assess remedial compliance and quality of life among patients with stroke.

Research Question:

What is the level of remedial Compliance and quality of life among patients with stroke?

2. SUBJECTS AND METHOD

Research Design:

Descriptive exploratory design was utilized in the existing study

Setting:

The proposed study was conducted in the Neurology department on the third floor at Sohag University Hospital. Which consists of 5 rooms (3 female and 2 male) and each room has 8 beds.

Sample:

A convenient sample consisting of 84 patients was included in the study.

Inclusion criteria for the patients: Adult conscious male and female, patient from 35 to 65 yrs., confirmed diagnosis of stroke, did not having any educational program and Able to communicate. **While, the Exclusion criteria**; Patients with severe cognitive impairment as delirium according to physician report. , Patients with immediate brain surgery and Diagnosed with depression, or an anti-depressive treatment.

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Tools of Data Collection"

The investigator used three tools following an extensive review of literature:

Tool (I): Structured Interviewing questionnaire for patients: which was developed in a simple clear arabic language by the researcher based on literature review **(Ostwald, 2015)**. It included the following parts:

Part 1. Socio-demographic Data: It developed by the researchers and included; age, sex, level of education, occupation, residence and marital status.

Part 2. Medical History. It was developed by the researchers, constructed and reviewed utilizing the most recent and relevant literature **.**it consists of series of questions to elicit patients past medical history and composed of questions which include previous admission to hospital, onset of stroke occurrence, history of any previous neurological disease, causes of stroke, type of clot suffered by patient, disability resulting from stroke

Tool II: Compliance assessment questionnaire:

Part I: Compliance of patients with medications: This part was assessed by Morisky Medication Adherence Scale (MMAS – 8). The MMAS-8 is a self- reported scale developed by **(Morisky et al., 2008).** It is used for assessing patients' adherence level to their drugs. Eight questions were used for evaluating the patients' forgetfulness, patients understanding of the need for continued medications and if the patient felt it was inconvenient adhering to daily treatment plan.

Scoring system: A score of zero was given for a positive response while a score of one was given for a negative response for questions 1, 2,3,4,6 and 7 (Yes= 0; No= 1). Contrariwise, for item 5, a score of zero was given for a negative response while a score of one was given for a positive response (Yes= 1; No= 0). For item 8, if a patient chooses response ‘‘0”, the score is ‘‘1” and if they choose response ‘‘4”, the score is ‘‘0”. Responses ‘‘1, 2, 3” are respectively rated as ‘‘0.25, 0.75, 0.75”. The total score was eight. Patients who had a score below 6 were considered having low adherence. Patients who had a score between 6 < 8 were considered having medium adherence. While patients who had a score equal 8 were considered having high adherence.

The sum of total compliance to medication was 28 scores and then categorized into:

¬ Low compliance < 50%.

¬ Medium compliance 50% - < 70 %.

¬ High compliance ≥ 70%.

Part II: Compliance of patient's with Exercises (Slujis et al., 1993): It is used for assessing patients' adherence level to exercises. Twelve statements. The patient is asked to circle a number from 1 to 4, depending on how appropriate they felt the statement applied to them.

The items are scored on four point scale varying from 1 (agree) to 4 (disagree). The maximum score that a person can obtain in this scale is 48 and a minimum score is 12.

Score Interpretation: Total score: 48

Low compliance (12 – 23), Medium compliance (24 - 35) and High compliance (36 -48).

Tool (III): Stroke Specific Quality of Life Scale (SS-QOL): It was adopted from **(Williams et al., (1999).** The SS-QOL, which is a disease-specific QOL measure, consists of 49 items encompassing 12 domains, which include energy (three questions), family role (three questions), language (five questions), mobility (six questions), mood (five questions), personality (three questions), self-care (five questions), the social role (five questions),thinking (three questions), upper extremity function (five questions), vision (three questions), and work/productivity (three questions). Each item is ranked on a five-point Likert scale in which level one means completely agreed while level five means completely disagree. The summary score of this scale is an un-weighted average of the 12 domains. Scoring system: Scoring of the SS-QOL is rated on a 5-point Likert scale. Response options are scored as 5 ("no help needed/no trouble at all/strongly disagree"), 4 ("a little help/a little trouble/moderately disagree"), 3 ("some help/some trouble/neither agree nor disagree"), 2 ("a lot of

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help/a lot of trouble/moderately agree"), and 1 ("total help/could not do it at all/strongly agree"). The SS-QOL provides domain scores and a summary score, with higher scores indicating better function. The total score ranges from 49 to 245, with higher scores indicating a better QOL.

Validity & Reliability:

Face validity of the data collection tools was reviewed by a panel of five experts in the field of medical surgical nursing and neurology medicine. Also its reliability was statistically examined. According to reliability, the instruments were tested and demonstrated good internal reliability as Cronbach′s alpha.

Pilot Study:

A pilot study was conducted on 10% of the sample to estimate the needed time for data collection and to judge the feasibility objectivity, also to test the appropriateness of content, wording, and order. No modification was done; therefore the participants of the pilot study were included in the actual research participants.

Ethical Consideration:

Written approval was obtained from the Ethics and Research Committee of the Faculty of Nursing, Sohag University. Similarly, permission was obtained from hospital administrators to conduct the study. The purpose and nature of the study, as well as the importance, were explained to the participants who met the inclusion criteria. Signed consent was obtained from the patients or their relatives who accepted to participate in the study. Furthermore, anonymity and confidentiality were assured through coding the data. Patients were assured that their participation is voluntary and they have the right to withdraw from the study at any time.

Procedure:

Data collection was conducted over a period of 9 months from beginning of from august 2023 to April 2024 after an official permission from the Research Ethical Committee in Faculty of Nursing, Sohag University was granted. All patients with stroke who were admitted at Neurology department during the period of data collection and met the inclusion criteria were included in the study. The investigator met the patients at Neurology department by introducing herself to every patient who enrolled in the study, explained the purpose and nature of the current study. Informed consent of patients or their relatives who were willing to participate in the study was taken and anonymity was assured. Confidentiality and privacy were asserted.

It took 30 minutes to interview each patient individually starting with data related to demographic and medical related part which was obtained through interviewing the patient using the first tool (Structured Interviewing questionnaire) then data related to remedial compliance was attained by using the second tool(Compliance assessment questionnaire). After that, data related to Stroke Specific Quality of Life Scale (SS-QOL) was completed to evaluate patient's level of quality of life by asking each patient about Energy, Language, Mobility, Mood, Personality, Self-Care, Social Roles, Thinking, Upper Extremity Function, Vision and work.

Data Analysis:

Data entry and analysis were done using Statistical Package for Social Science (SPSS) software version 20. Descriptive results were in the form of mean, SD, frequency, and percentage. Correlation was tested using Pearson bi-variate. Chi-Square test was used to clarify the association between qualitative variables. The Cronbach alpha test was used to assess the reliability of the developed tools. The probability level of 0.05 was adopted as the level of significance for all statistical tests done.

Results:

Table (1): Illustrates that less than half of the studied patients (45.2%) had aged from 60 years to 65 years old and more than half (56%) of them were female and were illiterate. Also, less than half 47.6% of them didn’t have work, more than two thirds of them (69%) were from rural area and less than two thirds of them (61.9%) were married.

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Table (2): Demonstrates that more than three quarters of the studied patients (79.8%) had Previous admission to hospital and most of them (92.9%) had less than 5 years of onset of stroke occurrence and hadn't any history of previous neurological disease. In addition, less than two thirds of them (61.9%) had history of smoking, more than half of them (53.6%) the causes of stroke was presence of hypertension, more than half of them (54.8%) suffered from ischemic clot and (52.4%) suffered from impaired movement.

Figure (1): Shows that, 76.2% of the studied patients had low compliance level with medication, 19% of them had medium compliance with medication level and 4.8% of them had high level.

Figure (2): Reveals that 17.9% of the studied patient had high compliance level with exercise, 52.4% of them had medium compliance level and 17.9% of them had high level.

Figure (3): Shows that 67.9% of the studied patients had low quality of life level, 26.2% had moderate while, 6% of them had high quality of life level.

Table (3): Illustrates that there was no statistical significant relation between the studied patient compliance and quality of life and demographic data at ($p > 0.05$).

Table (4): Reveals that there was statistical significant positive correlation between the studied patients compliance with medication, compliance with exercise and quality of life at ($P < 0.05$).

3. RESULTS

Table (1): Frequency distribution Scio demographic data among studied patients (n=84)

Age	**No**	**%**
18≤ 30	5	6.0
30≤40	4	4.8
40≤50	20	23.8
50≤60	17	20.2
60 - 65	38	45.2
Sex		
Male	37	44.0
Female	47	56.0
Level of education		
Illiterate	47	56.0
Read and write	26	31.0
Preparatory school	1	1.2
Secondary school	10	11.9
Occupation		
Employer	34	40.5
House wife	10	11.9
Not work	40	47.6
Retired	**0**	0.0
Residence		
Urban	26	31.0
Rural	58	69.0
Marital status		
Single	2	2.4
Married	52	61.9
Widow	30	35.7

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Table (2): Frequency distribution medical history among studied patients (n=84)

Medical History	No	%
Previous admission to hospital		
yes	17	20.2
No	67	79.8
Onset of stroke occurrence		
Less than 5 years	78	92.9
5- 10 years	6	7.1
Mora than 10 years		
History of any previous neurological disease		
yes	6	7.1
No	78	92.9
History of smoking		
yes	32	38.1
No	52	61.9
Causes of stroke		
Smoking	10	11.9
Hypertension	45	53.6
Diabetes	15	17.8
heart disease	29	34.5
Obesity	12	14.3
Gene	34	40.5
Type of clot suffered by patient		
Hemorrhage	38	45.2
Ischemic	46	54.8
Disability resulting from stroke:		
Impaired sensation	15	17.8
Loss of sensation	20	23.8
Impaired movement	44	52.4
Paralysis and loss of movement	16	19.1
Mental disorder	6	7.1
Speech disorder	11	13.1
- Cognitive disorder	15	17.8
Psychological disorder	20	23.8

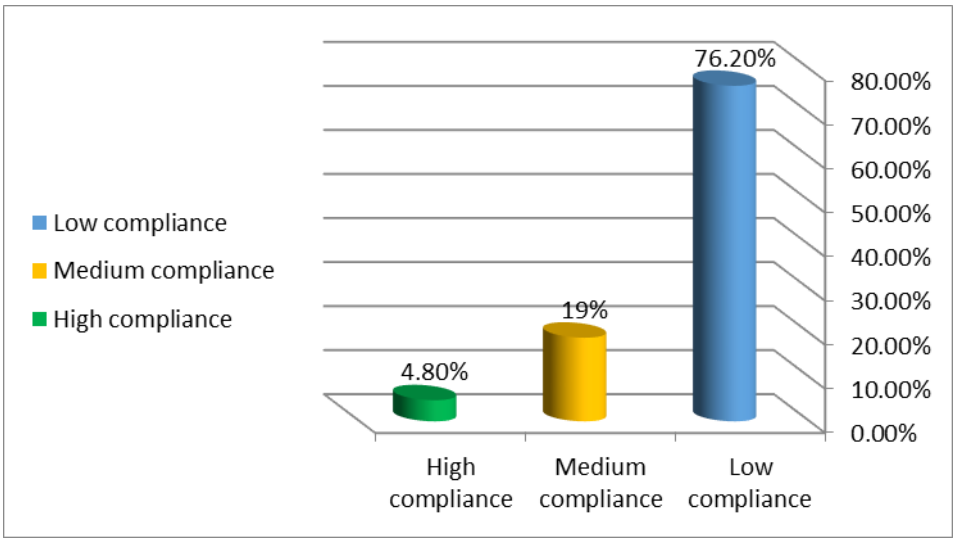

Figure (1): Distribution the total studied patient compliance with medication (n=84).

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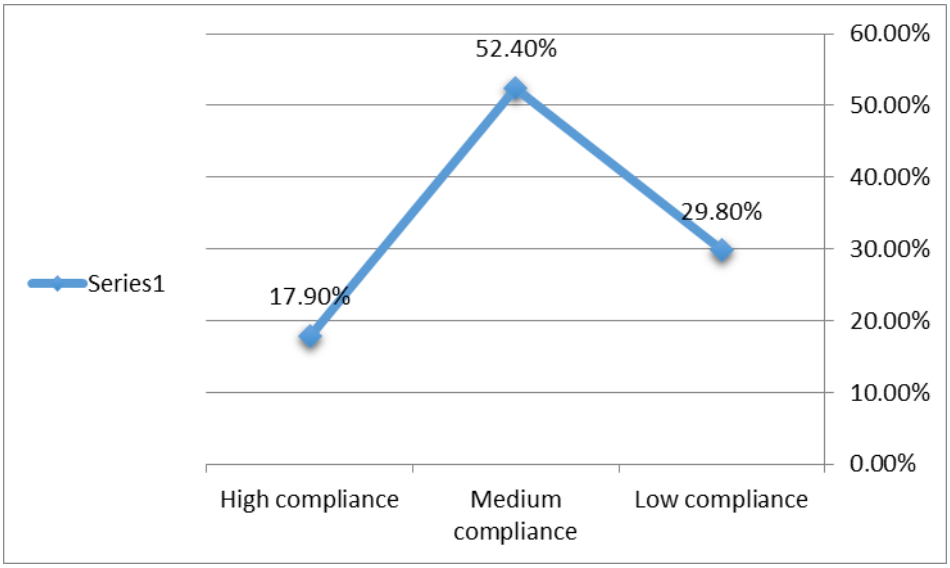

Figure (2): Distribution the total studied patient compliance with exercise (n=84).

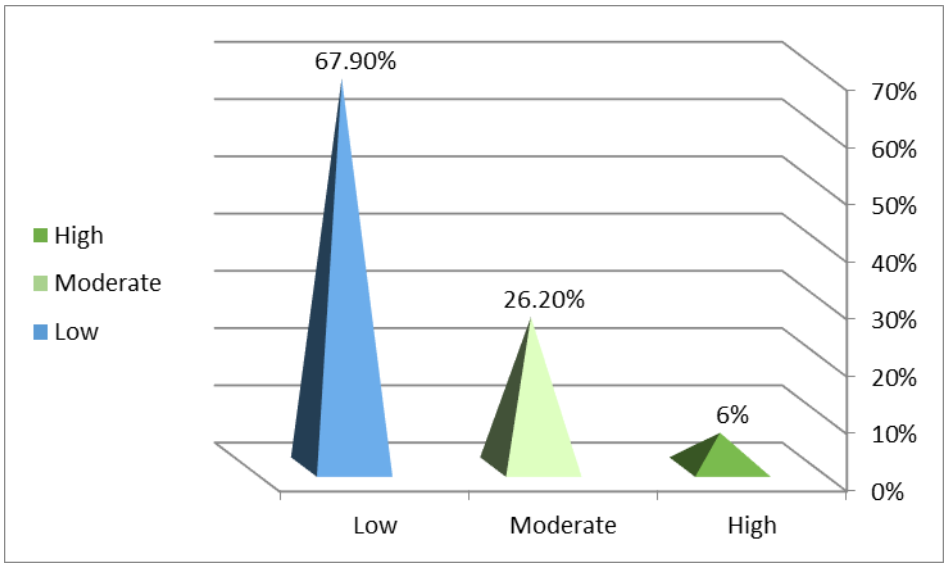

Figure (3): Distribution the total studied patient quality of life through program phases (n=84).

Table (3): Relation between the study variables and Scio demographic data among studied patients (n=84)

Personal characteristics	Compliance of patients with medications	Compliance of patient's with Exercises	Stroke Specific Quality of Life
	M ± SD	M ± SD	M ± SD
Age			
18≤ 30	3.9500±1.462	26.2000±5.019	69.2000±5.357
30≤40	3.7500±.500	26.0000±6.928	87.7500±23.99
40≤50	4.8375±3.225	26.6500±4.976	89.2000±15.71
50≤60	3.5000±1.283	25.5882±3.7758	96.6471±27.881
60 - 65	4.0987±1.613	27.5263±4.421	95.6842±28.87
F (P)	1.051(.387)	.590(.671)	1.466(.220)
Sex			
Male	4.1689±2.6829	26.8919±4.683	95.4595±21.157
Female	4.0957±1.382	26.6809±4.4872	89.9574±28.27

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t (P)	.162(.872)	.210(.834)	.986(.327)
Level of education			
Illiterate	4.0053±1.472	26.7872±4.313	94.6383±29.73903
Read and write	4.5673±2.969	26.8462±5.104	92.8462±15.4394
Preparatory school	3.0000±2.969	29.0000±5.104	146.0000±15.4394
Secondary school	3.6750±1.414	26.3000±4.7387	75.2000±9.5195
F (P)	.714(.547)	.115(.951)	3.412(.521)
Occupation			
Employer	4.1985±2.709	27.3235±5.1388	88.2059±21.864
House wife	4.1000±1.355	24.5000±4.7667	84.3000±16.377
Not work	4.0750±1.502	26.8750±3.8509	97.9500±29.02
F (P)	.034(.967)	1.527(.223)	1.973(.146)
Residence			
Urban	4.5673±2.907	26.7692±5.124	100.9615±32.270
Rural	3.9310±1.5020	26.7759±4.312	88.5345±20.826
t (P)	1.324(.189)	.006(.995)	2.116(.937)
Marital status			
Single	5.6250 ± .530	21.0000±.0000	92.0000±.000
Married	4.0962±2.323	26.8462±4.5649	89.2115±17.937
Widow	4.0833±1.519	27.0333±4.491	97.9000±35.078
F (P)	.543(.583)	1.695(.190)	1.117(.332)

Table (4): Correlation matrix between the studied Patients' Compliance of patients with medications, Compliance of patients with exercise and Stroke Specific Quality of Life (n=84).

Study variables	**Compliance of patients with medications**		**Compliance of patients with exercise**		**Stroke Specific Quality of Life**	
	R	**P**	**r**	**P**	**r**	**p**
Compliance of patients with medications			**0.982**	**0.001****	**0.468**	**0.000****
Compliance of patients with exercises			**---**	**---**	**0.302**	**0.031***

* Statistically significant at p<0.05. ** Highly statistically significant at p<0.001.

4. DISCUSSION

Stroke is associated with deep unconstructive impacts on patients' physical, psychological and social functioning. Some of the most important impacts are limitations in physical mobility, activities and functions, and loss of independence. Moreover, stroke patients found difficulties in participating in their pre-stroke social roles, work or leisure activities. In addition to post-stroke depression, several studies have reported that stroke survivors had a higher risk of developing psychological distress, anxiety or lowered levels of self-esteem **(White et al., 2014).** So, the aim of this study was assessment of remedial compliance and quality of life among patients with stroke.

Related to Socio-demographic Data and medical data, the finding of the current study revealed that less than half of the studied patients had aged from 60 years to 65 years old and more than half of them were female. And more than half of them were illiterate may be due to illiterate patients having a misunderstanding of their medical condition, delayed diagnosis, and low self-management skills, Lack of understanding of medical instructions and low adherence to recommended treatments.

The Present study was supported by **(Ibrahim & Taha., 2020)).** who conducted a study titled" Effect of a Design Discharge Planning Program for Stroke Patients on Their Quality of Life and Activity of Daily Living" The result revealed that majority of the studied patients within age group of (50-60) years old and more than half of them were illiterate.

As regard to residence, more than two thirds of them were from rural area. In my opinion, this is due to rural area have their increased burden of chronic disease, lower health literacy and reduced access to prompt pre-hospital care.

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This result agreed with **(Zhaoqing et al. (2020),** who was studying "an epidemiological survey of stroke among rural Chinese adults" and stated that the incidence of stroke in rural areas was higher than that found in urban areas and Western countries.

Regarding causes of stroke, This study illustrated that there was more than half of them the causes of stroke was presence of hypertension, In my opinion, this is due to high blood pressure can damages blood vessel walls and makes them weaker which can then burst leading to a bleed in the brain ,it can cause blood clots or plaques to break off artery walls and block a brain artery. Also it can speed up common forms of heart disease such as an irregular heart rhythm (Atrial Fibrillation) which can lead to clots forming and travelling to the brain.

This results supported by **(Khedr et al., (2013)** studied about " Epidemiological Study and Risk Factors of Stroke in Assiut Governorate, Egypt" and stated that most of patients had one or more risk factors for stroke, hypertension being the commonest. Also this results supported by **(Zaky et al. (2015)** who conducted a study titled" Strategies of Daily Living Rehabilitative Activities for Post Stroke Patients at Minia University Hospital" and found that more than half of study group had hypertension and in the line with **(Robinson et al., (2000)** who conducted a study titled" Self-care self-efficacy, quality of life, and depression after stroke " and stated that 71% of their studied sample had hypertension.

Regarding type of clot suffered by patient, more than half of them suffered from ischemic clot. In my opinion, the reason of ischemic stroke is the most common type of stroke is that it occurs when blood clots form in areas where arteries have become narrow or blocked over time, and that arteries naturally narrow with age.

The findings were supported by **(Serda et al. 2022)** who conducted a study titled" Determining of Life Quality and Associated Factors in Stroke Patients" and reported that ischemic stroke affected three quarters of their sample. Furthermore, **(Zaky et al., 2015)** who conducted a study titled" Strategies of Daily Living Rehabilitative Activities for Post Stroke Patients at Minia University Hospital" and revealed that ischemic stroke affected majority of his study group. This finding is further supported by **(Donnan et al. 2021)**, who conducted a study titled" Clients' and Health Care Professionals' Perspectives on Post Stroke Rehabilitation Services in Tehran "and reported that ischemic strokes represent majority of all strokes, while hemorrhagic strokes represent around one third of all stroke cases.

Regarding disability resulting from stroke, more than half of patients suffered from impaired movement. In my point of view, I founded that ischemic stroke affects deep areas of the brain, including the basal ganglia and the basal ganglia are more associated with the function of voluntary muscle control.

these results were in the same line with **(Ali Z., 2022)** who was studying about "Effect of nursing care strategy on the functional and physical abilities of patients following stroke" mentioned that slightly more than one-third of stroke patients having little such as loss in mobility and speech problems which occur following stroke.

Regarding compliance of patient's with medication:

The present study show that three quarters of the studied patients had low compliance level with medication at preprogram phase that decreased to be around one fifth at post program, Furthermore, one fifth of them had medium compliance with medication level at preprogram that increased to be around two third of them at post program phase.

This result agree with **(Wang et al., 2021)** who conducted a study titled" Independent predictors of medication adherence among Singaporean patients following an ischemic stroke or transient ischemic attack" and reported that half of patients had a high level of medication adherence. Approximately less than half of patients were at a medium level. Approximately more than half of them were at a low level.

Likewise **(Fang et al., 2022)** who conducted a study titled" Effects of continuous nursing on rehabilitation compliance, living quality and daily living ability of patients with acute ischemic stroke " and pointed that the compliance rate of the continuous nursing group majority of patients was significantly higher than that of the conventional nursing group.

Regarding Compliance of patient's with exercises:

The present study reveals that around one fifth of the studied patient had high compliance level with exercise at preprogram that increased to be majority of them at post program. While, around one third of them had low compliance level at preprogram.

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This result similar to **(Hussain et al., 2022)** who conducted study titled" Exercise Compliance in Patients with Stroke Following Physical Therapy Treatment" and reported that study showed that there was little to moderate level of compliance to exercise in patients with stroke following physiotherapy intervention.

On the other hand this finding contradicted by **(Tanveer et al., 2022)** who conducted study titled" Compliance in Patients with Stroke Following Physical Therapy Treatment" and reported that there was little to moderate level of compliance to exercise in patients with stroke following physiotherapy intervention.

Regarding quality of life for stroke patients:

The present study show that shows that two third of the studied patients had low quality of life level at preprogram phase that increased to be around one fifth at post program phase, while, two third of patients had high quality of life level at post program. This is in line with **(Baminidevi, 2022)** who conducted study titled" Comprehensive Stroke Education Program (CSEP) on knowledge and quality of life among patients with stroke and burden among caregivers " and concluded that there was an improvement in all 12 domains of SSQoL after one month and three month than preprogram.

Also the result was in the same line with **(Serda et al.,2022)** who conducted study titled" Determining of Life Quality and Associated Factors in Stroke Patients" and revealed that all parameters of short form 36 score of studied patient have a significantly improvement than control group and supported by **(Kamel et al., 2020)** who conducted study titled" Health Related Quality of Life in Stroke Survivors Measured by the Stroke Impact Scale" and concluded that there is an improvement in all domains of quality of life after three months.

The present study illustrates that there was no statistical significant relation between the studied patient compliance and quality of life and demographic data. This result similar with **(Aziz et al., 2023)** who was studying about" Determinants of the quality of life in Egyptian patients with cerebrovascular stroke by using the stroke specific QoL questionnaire" and concluded that there was a highly significant relation between socio-demographic characteristics and the patient's quality of life (QOL), especially age, employment status.

Also, These results are not consistent with **(Abo El-Ata et al., 2019)** who was studying about" Quality of Life For Patients with Cerebrovascular Stroke" and concluded that there was statistical significance relationship between the age, education, marital status, work, and the quality of their overall lives).

Furthermore, this study finding revealed that there was statistical significant positive correlation between the studied patient's compliance with medication, compliance with exercise and quality of life. These results were in agreement with the study performed by **(Lee et al., (2020)** about "Relationships among medication adherence, lifestyle modification, and health-related quality of life in patients with acute myocardial infarction: a cross-sectional study" and stated that there was significantly associated with medication adherence and lifestyle modification.

5. CONCLUSION

The current study found that majority of the studied patients had low compliance level with medication and exercise. As well as, two third of the studied patients had low quality of life level may be due to level of knowledge and Patients' beliefs about the seriousness of their disease are important factors for treatment adherence. Therefore, individuals who have chronic medical conditions as stroke need to adhere medication and exercise to manage their condition and improve their quality of life.

6. RECOMMENDATIONS

Based on the results, this study recommended the following suggestions:

- Additional researches are required to support the current results for generalization.
- Interventions that promote positive reinforcement of the value and necessity of compliance with therapeutic regimen should be emphasized.
- Strategies to improve quality of life and sustain adherence levels are required including counseling offered to patients who are deteriorating or experience periodic exacerbation of symptoms.
- Establishment of a web site, including all information pertained to stroke.

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Vol. 11, Issue 3, pp: (51-62), Month: September - December 2024, Available at: www.noveltyjournals.com

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