

## Factors Affecting Compliance with Lifestyle Modifications among Patients Suffering from Recurrence of Cerebrovascular Stroke

Eman Ahmed Abdullah Aziz, Naglaa El Sayed Mahdy, Sara Fathi Mahmoud  
Medical Surgical Nursing Department, Faculty of Nursing, Ain Shams University

### ABSTRACT

**Background:** Compliance to life style modifications among patients suffering from recurrent cerebrovascular stroke is very important for preventing further potential complications as recurrence of cerebrovascular stroke and facilitating recovery for those patients. This study **aimed to** assess factors affecting compliance with life style modifications among patients suffering from recurrent cerebrovascular stroke. **Design:** A descriptive exploratory design. **Setting:** stroke out patients' clinic at Tanta University Hospitals/ Egypt. **Subject:** A purposive sample of 70 adult patients, with old cerebrovascular stroke. **Tools:** 1) Stroke patients' structured interview questionnaire. 2) Patients' compliance with life style modifications assessment tool. **Results:** 64.3% of the studied patients had unsatisfactory level of compliance with life style modifications as well as 64.3% had multiple factors affecting their compliance with life style modifications. **Conclusion:** There were many factors affecting compliance among patients with recurrence CVS; the most was therapy related factors, followed by patients' related factors and disease related factors. While, health care related factors was the least. Moreover, there was a significant relation between total level of patients' compliance and both of their residence place and type of stroke. **Recommendation:** Establishing cerebrovascular stroke counseling professional team to provide knowledge about recurrent cerebrovascular stroke and its associated life style modifications.

**Key words:** Cerebrovascular stroke, Compliance, Life styles modifications.

### Introduction

Cerebrovascular stroke (CVS) is a devastating disease and a medical emergency situation sometimes called a brain attack. It is the second leading cause of death and the major cause of long-term, physical, psychological and social disability in the elderly around the world. Nearly 17 million people worldwide are affected with CVS annually with a mortality rate among them up to 6 million and another 6 million had left with permanent disability. Nearly about; one stroke

occurs every 2 seconds with about 25% of all CVS are recurrent stroke (*World Health Organization (WHO), 2018*).

Stroke is an injury to the brain that has significant effects that extend far beyond the health of individual to the family and the community. More than 70% of cerebrovascular stroke survivors are incapable of return fully normal to their prior occupation as well as having longer times of disability before death with significant costs for individuals and society including the costs of

health care services, medicines to treat stroke and missed days of work (*National Stroke Association, 2017*).

Cerebrovascular stroke (CVS) is classified into two main types: ischemic stroke about 87% occurs when the blood supply to the part of the brain is suddenly interrupted, and hemorrhagic stroke about 13% occurs when a blood vessel in the brain bursts and spilling blood into the spaces surrounding the brain cells. Both types of stroke may result in brain tissue damage and neurological deficits that persist for longer than 24 hours (*American Stroke Association, 2018*).

Regarding *Morsy, Elfeky and Ahmed, 2013*, there are many risk factors for CVS, have impact on the greater incidence of stroke especially where the majority of Egyptians are vulnerable to chronic diseases and have many risk factors that increase chance for occurrence of stroke such as: hypertension, heart disease, diabetes mellitus, hyperlipidemia, atrial fibrillation, obesity, and smoking. The dominance of these risk factors among Egyptians could be the rational of developing CVS as well as its recurrence.

Stroke causes a wide variety of neurologic deficits, depending on the location of the lesion (which vessels are obstructed), the size of the areas of inadequate perfusion, and the amount of collateral blood flow. Also stroke can have an effect on many body functions including; motor activity, intellectual function, spatial perceptual alterations, bladder and bowel elimination, personality, affect, sensation, swallowing and communication (*National Stroke Association, 2017*).

Cerebrovascular stroke is a complex disease, and about 80% of CVS can be prevented, but it requires efforts and skills of all members of the multidisciplinary team, where nurses play a pivotal role in all phases of CVS care as regard health education and prevention of disease and measure to address long term complications as well as improve

patients' outcomes, decrease lengths of hospital stay, and decrease hospital costs (*Linton, 2015*).

Compliance with life style modifications is known as the-extend to which patients' behavior changed or directed toward improvement of health after following medical instructions. Nurses serve as an educator for patients about the importance of compliance with life style modifications, and also their family members to support and encourage health behavior for better out comes and health promotion. Also; assist patients and families to take responsibility for coping with illness related functional impairment by adding to their knowledge through health education (*Kamal, et al., 2015*).

There are some factors affecting patient compliance with life style modifications should be taken into consideration include; patient related factors, health care system and providers (treatment team) related factors, therapy related factors, condition/ disease related factors, social and economic factors (*Kamal, et al., 2015*).

Patient education regarding compliance is the most essential aspect of nursing care for overall better outcomes after stroke, as it determine how well patients and families able to maintain and improve health status, restore health and cope with functional impairment, and improving decision making, self-care and patient safety (*Mahrous, 2015*).

### **Significance of the study**

---

According to the latest report of *World Health Organization (WHO), 2018*, stroke is the second leading cause of death around the world and nearly 17 million people worldwide are affected with CVS annually with a mortality rate among them up to 6 million and another 6 million had left with permanent disability.

## **Factors Affecting Compliance with Lifestyle Modifications among Patients Suffering from Recurrence of Cerebrovascular Stroke**

---

In Egypt, there is no doubt that cerebrovascular stroke is a major health concern. Whereas, there are 14.8% of total number of population are suffering from stroke, and 1600 cases died annually from it. Stroke deaths in Egypt reached 56,710 or 11.04% of total deaths. About 47% of patients had at least two or more modifiable risk factors such as (smoking, physical inactivity, hypertension, diabetes and hypercholesterolemia (*Helmiey, 2013*). So that, assessing factors affecting compliance to life style modifications among patients suffering from recurrent cerebrovascular stroke is very important for preventing further potential complications as recurrence of cerebrovascular stroke and facilitating recovery for those patients.

### **Aim of the study:**

---

This study aimed to assess factors affecting compliance with life style modifications among patients suffering from recurrence of cerebrovascular stroke through:

1. Assessing patients' knowledge regarding stroke and its associated with life style modifications.
2. Assessing patients' compliance to life style modifications.
3. Assessing the factors affecting compliance to life style modifications among patients suffering from recurrence of cerebrovascular stroke.

### **Research questions:**

1. What is the level of compliance with life style modifications among patients suffering from recurrence of cerebrovascular stroke?
2. What are the factors affecting compliance with life style modifications among patients suffering from recurrence of cerebrovascular stroke?

**The present study portrayed under the four main designs as follows:**

1. Technical design.
2. Operational design.
3. Administrative design.
4. Statistical design.

### **1. Technical design:**

It included setting, subject and tools for data collection.

### **Research design:**

A descriptive exploratory design was used in conducting this study, which was to observe, describe, and explore aspects of situation (persons, organization, settings, or phenomena).

### **Setting:**

This study was conducted at stroke out patients' clinic at Tanta University Hospitals / Egypt, located behind Psychiatry and Neurosurgery center, at the second floor, consist of 5 clinic rooms; each clinic room had one bed, which maximum number of admitted patients was 15 cases per day.

### **Subject:**

A purposive sample of 70 adult patients, with old cerebrovascular stroke was taken to conduct this study through the following *inclusion criteria*; patients who suffering from recurrent cerebrovascular stroke and also who able to comprehend the instructions, free from another neurological disorders as (aphasia, mythenia gravis, traumatic brain injuries and disturbed in level of consciousness).

The sample size was determined considering the total number of patients (700) who had admitted during the year 2016 in the previous mentioned setting, based on the power analysis that indicate 70 patients would

be enough to conduct this study. Considering alpha type I error ( $\alpha$ ) = 5% with confidence level 95% and significance level ( $\alpha$ ) at 0.05 and power of study (power of test) 90% with type II beta error ( $\beta$ ) = 10% .

#### Tools for data collection:

Two tools were used in this study as the following:

1) Stroke patients' structured interview questionnaire: (Appendix I)

2) Patients' compliance with life style modifications assessment tool. (*Appendix II*)

#### 1) Stroke patients' structured interview questionnaire: (Appendix I)

This tool was developed by the researcher and written in a simple Arabic language after reviewing the relevant literatures and it was divided into the following four parts:

##### Part I:

• This part used to assess demographic characteristics of the studied patients such as age, gender, marital status, level of education, residence place, occupation, nature of living, and monthly income; it composed of 9 closed ended questions.

##### Part II:

• This part was concerned with assessing patients' medical data. It was developed by the researcher based on the related literature; *Mahmoud & Abd Elaziz, 2016, Lewis, et al., 2015, Linton, 2015 and Hinkle & Cheever, 2014*. It was composed of 14 close ended questions which was divided into 8 questions of present medical history included body mass index, smoking, alcohol consumption, doing exercises, type of current stroke, associated symptoms in last hospital admission, current stroke frequency and

current medical treatment.

• The total scoring of body mass index had been calculated by dividing between total body weight per double individual's length by meter. Consequently calculated as if BMI < 18 (underweight), from 19 to 24 (healthy weight), from 25 - 29 (over weight), from 30 - 39 (obesity) and > 40 (morbid obesity).

• Moreover, 5 questions for past medical history included type of previous stroke, suffering from chronic diseases, period of stroke injury, level of independency, and one question for assessing patients' family history.

##### Part III:

• This part was concerned with assessing patients' knowledge regarding stroke and its associated life style modifications. It was developed by the researcher based on the related literature *Grotta, et al., 2016, Ignatavicius & Workman, 2015, and Chapman & Bogle, 2014*.

• It included 40 yes or no questions which divided into two sections. Section (1): it included 22 questions related to information about stroke which were grouped into 6 subtitles as the following:

- a) Definition. (1 question).
- b) Types. (3 questions).
- c) Causes & Risk factors. (9 questions).
- d) Clinical manifestations. (2 questions).
- e) Diagnostic test(4 questions).
- f) Medical treatment. (3 questions).

• **Section (2):** it included 18 questions related to information about life style modifications which were grouped into 7 subtitles as the following:

## Factors Affecting Compliance with Lifestyle Modifications among Patients Suffering from Recurrence of Cerebrovascular Stroke

- a) Therapeutic regimen. (1 question).
- b) Diet regimen. (1 question).
- c) Exercises. (2 questions).
- d) Sleeping and comfort. (1 question).
- e) Coping with life stressors (1 question).
- f) Follow up. (3 questions).
- g) Patient awareness to avoid physical injury at home (9 questions).

### ➤ Scoring system:

The total score of patients' knowledge was 40 grades. One grade was given for correct question and zero for incorrect question. Based on statistical cut of point, it was considered as the following:

▪ > 60 % was considered a satisfactory level of knowledge, when the total grades were > 24 grades.

▪ < 60 % was considered an unsatisfactory level of knowledge, when the total grades were < 24 grades.

### Part IV:

• This part was developed by the researcher based on the related literature *Guidelines for the Primary Prevention of Stroke, 2016, Martino, et al., 2016, Kamal, et al., 2015, and National Stroke Association, 2015*. It included 46 statements to assess factors affecting patients' compliance to life style modifications among patients suffering from recurrence of cerebrovascular stroke. These statements distributed as the following:

a) **Patient related factors:** which included:

- Physical factors (14 statement).
- Psychological factors. (7 statements).
- Social factors. (5 statements).
- Economic factors. (6 statements).

b) **Health care team/ health system related factors.** (6 statements).

c) **Therapy related factors.** (6 statements).

d) **Disease related factors.** (2 statements).

### ➤ Scoring system:

Each statement answered by the patient through using two options, which were Yes= 1 or No= 0. The total score of the factors affecting patients' compliance to life style modifications among patients suffering from recurrence of cerebrovascular stroke was equal 46 grades which distributed as the following:

### A. Patient related factors:

1. Physical factors (14 grades).
2. Psychological factors (7 grades).
3. Social factors. (5 grades).
4. Economic factors. (6 grades).

b) **Health care team/ health system related factors.** (6 grades).

c) **Therapy related factor** (6 grades).

d) **Disease related factors** (2 grades).

### 2) Patients' compliance with life style modifications assessment tool: (Appendix II)

This tool was used to assess compliance with life style modifications among patients suffering from recurrence of cerebrovascular stroke. It was developed by the researcher after reviewing the recent related literatures; *World Health Organization (WHO), 2017, American Stroke Association 2016, National Institution of Health Stroke Scale (NIHSS) 2016, and Health Promotion & Stroke Prevention, 2014*. It included 55 statements which grouped into (6) subtitles as the following:

- Drug regimen. (11 item).
- Diet regimen. (12 item).

- Exercise regimen. (7 items).
- Sleeping and comfort regimen. (8 items).
- Coping with life stressors regimen. (9 items).
- Follow up regimens. (8 items).

➤ **Scoring system:**

The response for these statements were either Compliant which was given one score or Incompliant which was given zero score. The total score for every item were calculated by summing the patients' responses and categorized into compliant or incompliant, total grades were 55 which distributed as the following:

- Drug regimen. (11 grades).
- Diet regimen. (12 grades).
- Exercise regimen. (7 grades).
- Sleeping and comfort regimen. (8 grades).
- Coping with life stressors regimen. (9 grades).
- Follow up regimens. (8 grades).

Based on statistical cut of point, it was considered as the following:

- > 50 % was considered compliant, when the total grades were > 27.5 grades.
- < 50 % was considered incompliant, when the total grades were < 27.5 grades.

## **2. Operational design:**

The operational design included preparatory phase, validity, pilot study and field work.

• **Preparatory phase:**

It included reviewing of related literature, different studies and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and

magazines to the theoretical part of the study and tools for data collection.

• **Validity and reliability:**

Testing *validity* was ascertained by a group of 7 experts in medical surgical nursing specialist to determine whether the tools measure what supposed to measure. The expertise reviewed tools for clarity, relevance, applicability, comprehensiveness, simplicity and minor modifications were done. While, *reliability* of the study tools was done by Alpha Cronbach test. The reliability scores for patients' knowledge, factors affecting patients' compliance, and patients' compliance with lifestyle modifications were 0.809- 0.795- 0.859. Consequently, these values indicate high internal consistency of the used tools.

### **Ethical consideration:**

---

Ethical approval was obtained from the scientific ethical committee in the faculty of nursing at Ain Shams University before starting the study. The researcher clarified the objective and aim of the study to the patients included in the study. The researcher assured maintaining anonymity and confidentiality of the subject data. Patients were informed that they allowed choosing to participate or not in the study and that they have the right to withdraw from the study at any time without giving any reasons. Values, culture and beliefs were respected.

• **Pilot Study:**

The pilot study was conducted on 7 patients (10% of the total study sample) to test clarity, feasibility, validity, reliability and applicability of the tools used in this study. The patients who were included in the pilot study were included to the sample because no modification was done after conducting pilot study.

## Factors Affecting Compliance with Lifestyle Modifications among Patients Suffering from Recurrence of Cerebrovascular Stroke

---

### • Field work:

The purpose of the study was simply explained to the patients' who agreed to participate in the study prior to any data collection. The actual work of this study started and completed within three months from the 1st day of March 2018 and was completed by the end of May 2018. Data were collected by the researcher during patients' interview three days per week (Saturday, Sunday and Monday), at the morning shift from 9.00 am to 1.00 pm at stroke out patients' clinic at Tanta University Hospitals during the patients' attendance to the outpatient clinics for follow up.

The time needed for completing the tools was about (40 - 45) minutes for every patient. The patients assured that the information collected would be treated confidentially and that it would be used only for the purpose of the study (verbal consent was taken from the patients).

Firstly, the researcher collected data regarding patients' demographic characteristics, clinical data, knowledge regarding stroke and life style modifications, and factors affecting compliance among patients suffering from recurrent stroke through stroke patients' structured interview questionnaire. Then the researcher determined relation between compliance with life style modifications among patients suffering from cerebrovascular stroke and its recurrence.

### 3. Administrative design:

An official approval to carry out the study was obtained from the Dean of the faculty of Nursing, Ain Shams University, and Medical director of the stroke out patients' clinic at Tanta University Hospitals. An official letter was issued to medical director of the stroke out patients' clinic at Tanta University Hospitals from the Faculty of Nursing, Ain Shams University explaining the aim of the study and objectives of the research, as well as, to obtain permission for conducting this study and get better cooperation during the implementation phase of the research.

### 4. Statistical design:

The collected data were organized, tabulated, graphically and statistically analyzed using the Statistical Package for Social Science (SPSS). Descriptive statistics including frequency, distribution, mean, median, standard deviation and inter- quartile range were used to describe different characteristics. The statistical analysis was done using percentage, range, chi square ( $\chi^2$ ), and Pearson correlation coefficient (r). Also; linear correlation conducted to show correlation between knowledge score, factors affecting patients' compliance score and compliance score among the studied patients suffering from recurrence of cerebrovascular stroke.

**Significance of results was considered as follows:**

Non-significant (NS) P > 0.05  
Significant (S) P < 0.05\*  
Highly Significant (HS) P < 0.01\*\*

**Result**

**Table (1):** Percentage distribution of the studied patients' regarding demographic characteristics (n.=70).

Demographic characteristics		Studied patients (n=70)	
		N.	%
Age	From 20 > 30 years	4	5.7%
	From 30 > 40 years	10	14.3%
	From 40 > 50 years	15	21.4%
	More than 50 years	<b>41</b>	<b>58.6%</b>
Gender	Male	<b>45</b>	<b>64.3%</b>
	Female	25	35.7%
Marital Status	Married	<b>50</b>	<b>71.4%</b>
	Not Married	20	28.6%
Educational Level	Illiterate	19	27.1%
	Read and write	16	22.9%
	Moderate qualification	<b>22</b>	<b>31.4%</b>
	High qualification	13	18.6%
Residence place	Urban	23	32.9%
	Rural	<b>47</b>	<b>67.1%</b>
Occupation	Working	35	50.0%
	Not Working	<b>35</b>	<b>50.0%</b>
Nature of living	Alone	16	22.9%
	with Family	<b>54</b>	<b>77.1%</b>
Monthly income	Enough	19	27.1%
	Not Enough	<b>51</b>	<b>72.9%</b>

**Table (1):** represents that 58.6% of the studied patients were aged more than 50 years, while 64.3% were male and also 71.4% were married. Moreover, 31.4% of the studied patients had moderate qualification and about 67.1% were coming from rural area. Also 50% of the studied patients weren't having work, as well as 77.1% of them were living with their family and 72.9% of them had monthly income not enough for treatment.



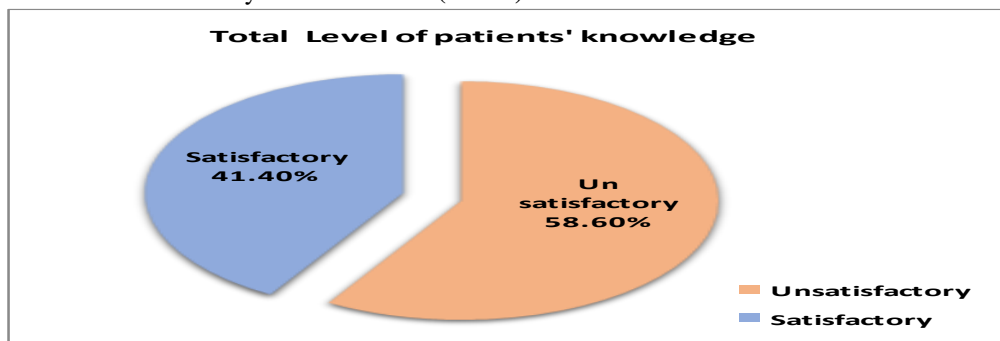
## Factors Affecting Compliance with Lifestyle Modifications among Patients Suffering from Recurrence of Cerebrovascular Stroke

**Table (2):** Percentage distribution regarding present medical history of the studied patients (n. =70).

Present history		Studied patients (n=70)	
		N.	%
Type of stroke	Ischemic stroke	50	71.4%
	Hemorrhagic stroke	20	28.6%
Associated symptoms	Loss of balance	41	58.6%
	Difficulty in speaking	38	54.3%
	General weakness in upper and/or lower limbs	48	68.6%
	Convulsions	14	20.0%
	Hypertension	29	41.4%
	High blood sugar	18	25.7%
	Stroke frequency	Once	31
	Twice	34	48.6%
	More than twice	5	7.1%
Current medical treatment	Anticoagulants	55	78.6%
	Anti-platelet	42	60.0%
	Anticonvulsants	15	21.4%
	Cholesterol drugs	35	50.0%
	Antihypertensive drugs	50	71.4%
	Diabetic drugs	34	48.6%

**Table (2):** revealed that 71.4% of the studied patients had an ischemic stroke, 68.6% of them had general weakness in upper and/or lower limbs, and 48.6% had a second episode of recurrent stroke. As well as, 78.6% of them had anticoagulants as a main medical treatment.

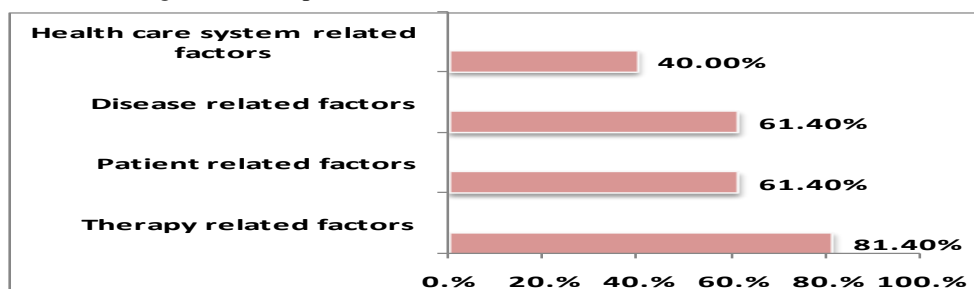
**Figure (1):** Total satisfactory level of knowledge among the studied patients regarding recurrent stroke and life style modifications (n. =70).



**Figure (1):** shows that 41.4% of the studied patients had a satisfactory level of knowledge and 58.6% of them had unsatisfactory level of knowledge regarding recurrent stroke and life style

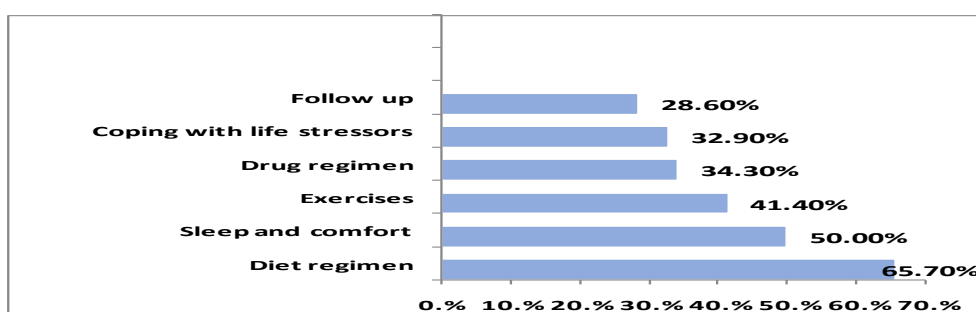
modifications.

**Figure (2):** Percentage distribution of factors affecting compliance with life style modifications among the studied patients (n. = 70).



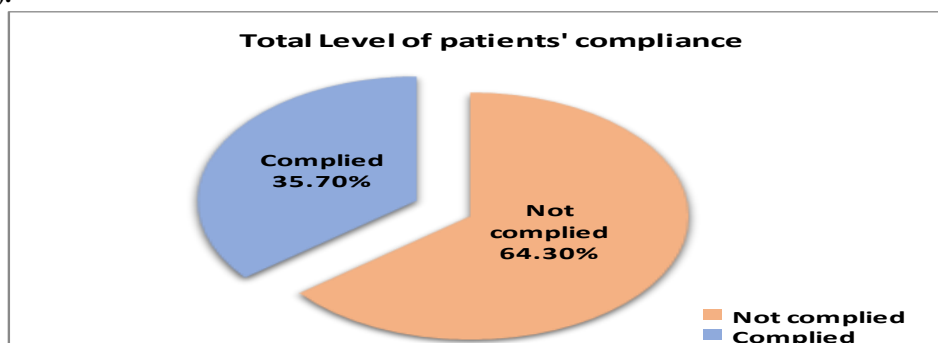
**Figure (2):** showed that 81.40% of the studied patients their compliance with life style modifications affected by therapy related factors. While, health care system related factors affecting 40% of them.

**Figure (3):** Percentage distribution of patients' compliance with life style modifications (n. = 70).



**Figure (3):** showed that 65.7%, of the studied patients had compliance regarding diet regimen. While, only 28.6% of them were compliant with follow up.

**Figure (4):** Percentage distribution of patients' total compliance with life style modifications (n.=70).



**Figure (4):** Shows that, 35.7% of the studied patients had compliance with life style modifications while 64.3% of them had no compliance.

**Factors Affecting Compliance with Lifestyle Modifications among Patients Suffering from Recurrence of Cerebrovascular Stroke**

**Table (3):** Relation between demographic characteristics and total compliance of the studied patients (n. = 70).

Demographic characteristics		Total compliance				X <sup>2</sup>	P-value
		Not complied		Complied			
		N.	%	N.	%		
Age	From 20 > 40 years	9	64.3%	5	35.7%	2.20	0.332
	From 40 > 50 years	12	80.0%	3	20.0%		
	More than 50 years	24	58.5%	17	41.5%		
Gender	Male	28	62.2%	17	37.8%	0.23	0.628
	Female	17	68.0%	8	32.0%		
Marital Status	Married	32	64.0%	18	36.0%	0.01	0.937
	Not Married	13	65.0%	7	35.0%		
Educational Level	Illiterate	13	68.4%	6	31.6%	5.93	0.115
	Read and write	13	81.3%	3	18.8%		
	Moderate qualification	14	63.6%	8	36.4%		
	High qualification	5	38.5%	8	61.5%		
Residence place	Urban	11	47.8%	12	52.2%	4.04	<b>0.044*</b>
	Rural	34	72.3%	13	27.7%		
Occupation	Working	21	60.0%	14	40.0%	0.56	0.454
	Not Working	24	68.6%	11	31.4%		
Nature of living	Alone	8	50.0%	8	50.0%	1.88	0.174
	with Family	37	68.5%	17	31.5%		
Monthly income	Enough	9	47.4%	10	52.6%	3.25	0.071
	Not Enough	36	70.6%	15	29.4%		

X<sup>2</sup> : Chi-Square test      \*significance at P < 0.05

**Table (3):** revealed that there was a significant relation between patients' total compliance with life style modifications and residence place with P value= 0.044\*. While, there is no significant relation between total compliance and age, gender, marital status, educational level, occupation, nature of living, and monthly income of the studied patients.

**Table (4):** Relation between total compliance and both of total knowledge and total factors affecting compliance with life style modifications among the studied patients suffering from recurrent cerebrovascular stroke (n. = 70).

Relations		Total compliance level				$X^2$	P-value
		Complied		Not complied			
		N.	%	N.	%		
Total level of knowledge	Unsatisfactory	27	65.9%	14	34.1%	0.11	0.744
	Satisfactory	18	62.1%	11	37.9%		
Total factors	Yes	13	28.9%	32	71.1%	2.56	0.109
	No	12	48.0%	13	52.0%		

$X^2$  : Chi-Square test

\*significance at P < 0.05

**Table (4):** revealed that there was no significant relation between total patients' compliance with life style modifications and total knowledge whereas P value= 0.744, and between total patients' compliance and total factors affecting compliance with P value= 0.109.

**Table (5):** Relation between total compliance and type and frequency of the recent stroke among the studied patients (n. = 70).

Relations		Total compliance level				$X^2$	P-value
		Complied		Not complied			
		N.	%	N.	%		
Type of stroke	Ischemic stroke	14	28.0%	36	72.0%	4.56	0.033*
	Hemorrhagic stroke	11	55.0%	9	45.0%		
Stroke frequency	Once	14	45.2%	17	54.8%	2.33	0.311
	Twice	10	29.4%	24	70.6%		
	More than twice	1	20.0%	4	80.0%		

$X^2$ : Chi-Square test

\*significance at P < 0.05

**Table (5):** revealed that there was there was a significant relation between patients' total compliance with life style modifications and type of stroke with P value= 0.033\*. While, there was no significant relation between patients' total compliance with life style modifications and stroke frequency.

## Factors Affecting Compliance with Lifestyle Modifications among Patients Suffering from Recurrence of Cerebrovascular Stroke

---

### Discussion

---

The finding of the present study revealed that more than half of the studied patients their age were more than 50 years, from the researcher point of view this result may be due to increase risk factors with old age like hypertension, diabetes mellitus and blood vessels diseases which predisposing to increase risk for stroke. Supporting these findings by **Cecily, (2016)**, in his study about knowledge on prevention of cerebrovascular accident among patients with diabetes and hypertension in India who reported that recurrence of cerebrovascular stroke increased with age, additionally the chance of having a stroke doubling every 10 years after age of 55 years.

While, it is contradicted by **Mitchell, et al., (2015)** who found that most of the studied patients were between the age of 15 and 49 years, in their study about obesity increases risk of ischemic stroke in young adults.

Regarding to gender, the present study indicated that majority of the studied patients were male, from the researcher point of view this result may be due to excessive exposure of males to stresses of daily life. This result goes in the same line with **Panício, Mateu, Ricarte and Figueiredo, (2014)**, who carried out study regarding the influence of patient's knowledge about stroke in Brazil: across sectional study, and represented that males had a majority incidence of CVS than females as they more vulnerable for daily stressors.

While, it is contradicted by **Mahmoud, (2016)**, who carried out study about factors affecting quality of life for patients with cerebrovascular stroke, and found that more than half of the study samples were females.

The result of the present study showed that more than two third of the studied patients were married, from the researcher point of view this result may be due to culture in our society that people married at young age so most studied cases still married as well as stressful events between partners predisposing to increase risk of cerebrovascular stroke recurrence. This result agreed with **Aziz, (2017)**, who carried out study regarding quality of life of cerebrovascular stroke patients, and found that majority of the studied patients were married as a result of early time engagement of all studied patients.

The result of the present study indicated that majority of the studied patients were moderate qualification, from the researcher point of view this may be due to increase awareness for importance of education in our society. This result accepted with **Lee, Kyung, Insook, Soo, and Jung-Ho, (2014)**, who stated that majority of the patients were able to read and write, in his study about knowledge, health promoting behaviors, and biological risks of recurrent stroke among stroke patients in Korea.

While, it is contradicted by **Mahmoud and Abdel Elaziz, (2016)**, their own study title was the impact of stroke on life satisfaction and psychological adjustment among stroke patients during rehabilitation, who found that more than half of studied patients were illiterate.

The result of the present study revealed that more than two third of the studied patients had residence in rural area, from researcher point of view this result may be due to insufficient health care services, far distances to available hospitals also increase cost of transportation so there is a high risk of being vulnerable to chronic diseases.

This result accepted with **Morsy, Elfeky and Ahmed, (2013)**, their own study title was cerebrovascular stroke recurrence among critically ill patients at a selected university hospital in Egypt, who represented that majority of the studied group admitted from rural area.

While it is contradicted with findings of **Mahmoud, (2016)**, who carried out study about factors affecting quality of life for patients with cerebrovascular stroke, and found that more than half of the sample were living in urban area.

Regarding to occupation, the present study revealed that half of the studied patients were not having work, from researcher point of view this result may be due to advanced age of patients, having chronic diseases, low socioeconomic status in our society as well as post stroke effects like impaired physical mobility that make patients unable to return back to their works. This result is supported with **Aziz, (2017)**, who represented that two third of the studied patients were unemployed and need to participate in rehabilitation programs to promote health functions and enhance quality of life, in his study about quality of life of cerebrovascular stroke patients.

The result of the present study showed that majority of the studied patients lived with their families; from researcher point of view this result may be due to culture in our society that connected people with family and relatives from birth to death. This result is in agreement with **Mahmoud and Abdel Elaziz, (2016)**, who carried out study about the impact stroke on life satisfaction among stroke patients during rehabilitation, and represented that majority of the studied patients lived with their families. While, it is

contradicted with findings of **Cecily, (2016)**, who found that most of the studied patients lived alone away from their families, in his study about knowledge prevention of cerebrovascular accident among patients with diabetes and hypertension in India.

The result of the present study showed that majority of the studied patients were having monthly income not enough for treatment expenses, from researcher point of view this result may be due to low socioeconomic status of people in our society, expensive costs of therapy, increase cost of living and requirements for individuals and family.

This result is supported with **Mahmoud, (2016)**, who carried out study about factors affecting quality of life for patients with cerebrovascular stroke, and represented that more than three quarters of the studied sample had insufficient income. While, it is contradicted with findings of **Aziz, (2017)**, who found that more than half of the studied patients had monthly income enough for treatment, in his study about quality of life of cerebrovascular stroke patients.

Regarding the stroke type, the result of the present study revealed that, majority of the studied patients had ischemic stroke type, from researcher point of view this result may be due to advanced patients' age as well as multiple complicated risk factors in both developed and developing countries such as hypertension, diabetes mellitus, atrial fibrillation and atherosclerosis. This result accepted with **Mahmoud and Abdel Elaziz, (2016)**, who carried out study about the impact of stroke on life satisfaction among stroke patients during rehabilitation, and found that most of the studied patients were suffered from ischemic stroke type.

## Factors Affecting Compliance with Lifestyle Modifications among Patients Suffering from Recurrence of Cerebrovascular Stroke

---

The result of the present study showed that more than two third of the studied patients had general weakness in upper and/or lower limbs followed by loss balance as associated symptoms at last hospital admission. This result accepted with **Cabral, Muller, Franco, Longo, Moro and Nagel, (2015)**, who carried out study about three- year survival and recurrence after first- ever stroke: the Joinville stroke registry Brazil, and represented that majority of the studied patients were having disequilibrium followed by unilateral paresis.

While, it is in contrast to **Faiz, Sundseth, Thommessen and Ronning, (2018)**, who found that majority of the studied patients were having hypertension and blurred vision followed by aphasia as a main cause for previous hospitalization, in their study about patient knowledge on stroke risk factors, symptoms and treatment options.

Moreover, the result of the present study indicated that more than half of the studied patients had second recurrent cerebrovascular stroke which may be due to advanced patients' age, having chronic diseases and many risk factors, lack of health care facilities and lack of compliance with life style modifications. This result agreed with **Cabral. et al. (2015)**, who carried out study about three-year survival and recurrence after first-ever stroke: the Joinville stroke registry Brazil.

While, it is contradicted with **Morsy, et al. (2013)**, who found that majority of the studied patients were having first recurrent cerebrovascular stroke, in their study about cerebrovascular stroke recurrence among critically ill patients at a selected university hospital in Egypt.

The result of the present study

revealed that majority of the studied patients had received anticoagulant as a main medical treatment, this result may be due to most of studied patients had suffered from ischemic stroke type. This result accepted with **Brewer, et al. (2015)**, who carried out study about secondary prevention after ischemic stroke: the ASPIRE-S study, and reported that most of the studied patients were on anticoagulant therapy to prevent development of stroke recurrence. In contrast, **Panício, et al. (2014)**, who carried out study about the influence of patient's knowledge about stroke in Brazil: across sectional study, and found that majority of the studied patients had taken antihypertensive drugs as a main medical treatment.

The result of the present study revealed that most of the studied patients were having an unsatisfactory level of knowledge regarding cerebrovascular stroke and its life style modifications related to it. From researcher point of view; this result may be due to multiple factors such as: advanced age and low level of education of majority of the studied patients, low socioeconomic status, lack of health care services and health education in society as well as poor compliance of the studied patients with life style modifications once feeling of being well. Furthermore, health care providers have a critical and significant role in educating patients and their families about cerebrovascular stroke and its recurrence, causes and risk factors, and prevention.

This result agreed with previous study of **El baqury, (2017)**, who carried out study about factors affecting adherence to therapeutic regimens among patients with recurrent cerebrovascular stroke, and represented that overall of the studied patients had unsatisfied level of knowledge and

needed counseling from health care providers to give them health education about cerebrovascular stroke and its recurrent. Also, agreed with **Cecily, (2016)**, who found that there was an urgent plan needed for health education programs regarding stroke management and prevention, in his study about knowledge prevention of cerebrovascular accident among patients with diabetes and hypertension in India.

As well as **Kaddumukasa, et al. (2015)**, who carried out study about knowledge, attitudes and perceptions of stroke: a cross - sectional survey in rural and urban Uganda, and reported that public health education programs to enhance knowledge and awareness about stroke are urgently needed to improve effective preventive measures and increase community response toward CVS.

Contradiction to these findings, **Panício, et al. (2014)**, who carried out study about the influence of patient's knowledge about stroke in Brazil: across sectional study, and found that majority of the studied patients had satisfactory level of knowledge regarding cerebrovascular stroke and its recurrent; and said that this result due to impact of stroke awareness campaigns organization by their stroke society in their developing countries, high education and high socioeconomic status of the studied patients, availability of health care services as well as significant adherence with therapeutic regimens.

The result of the present study revealed that most of the studied patients were having multiple complicated factors affecting on their compliance with life style modifications. From researcher point of view; this result may be due to various factors such as: advanced age of the

studied patients, lack of knowledge regarding recurrent cerebrovascular stroke, low socioeconomic status, lack of health care services, and lack of time as well as overcrowded of daily activities that result in poor compliance of the studied patients with life style modifications.

This result accepted with **American Society of Consultant Pharmacists Foundation "ASCPE", (2016)**, which stated that advanced patients' age, low patients' educational level as well as lack of patients' training programs interfere with adherence to medication, in its study about an over view of medication adherence where are we today.

The result of the present study revealed that majority of the studied patients had an unsatisfactory level of compliance with life style modifications. In the researcher's point of view this result may be related to multiple complicated factors that make patients poor compliance with life style modifications once being well such as low level of education of the studied patients, lack of knowledge regarding recurrent cerebrovascular stroke and importance of compliance, lack of health care services and health education in our society, as well as low socioeconomic status.

This result accepted with **El Shamaa, (2013)**, who carried out study about factors contributing to therapeutic compliance of epileptic patients and the suggestive solutions. While, it is contradicted with findings of **Awad, et al. (2015)**, who found that majority of the studied patients had satisfactory level of compliance regarding treatment regimen, in his study about compliance of hypertensive patients with treatment regimen and its effect on their quality of life.



## Factors Affecting Compliance with Lifestyle Modifications among Patients Suffering from Recurrence of Cerebrovascular Stroke

---

The result of the present study revealed that there was a significant relation between total level of compliance with life style modifications among patients' suffering from recurrent CVS and their residence. This result accepted with **Cevik, Tekir and Kany, (2018)**, who carried out study about stroke patients' quality of life and compliance with the treatment, and found that there was a significant relations between compliance with treatment and place of residence as well as the rate of compliance with treatment was higher in those living in urban areas than rural areas due to high level of education and availability of health services.

The result of the present study revealed that there was a significant relation between total level of compliance with life style modifications among patients' suffering from recurrent CVS and type of stroke. From the researcher's point of view this result may be due to majority of the studied patients had ischemic stroke which need more treatment than hemorrhagic and also they had low socio economic status so that; their compliance with life style modifications was poor.

While, it is contradicted with findings of **Kaddumukasa, et al. (2015)**, who carried out study about knowledge, attitudes and perceptions of stroke: a cross - sectional survey in rural and urban Uganda, and found that there was no significant relation between patients' total level of compliance with life style modifications among patients' suffering from recurrent CVS and type of stroke.

The result of the present study revealed that generally; there was no

knowledge and total compliance as knowledge positively affected compliance and good compliance was associated with

significant correlation between total level of knowledge, total factors and total compliance regarding cerebrovascular stroke and its recurrent. Only health care team and health system related factors have a statistically highly significant positive correlation with total knowledge. This result accepted with **El baqury, (2017)**, who carried out study about factors affecting adherence to therapeutic regimens among patients with recurrent cerebrovascular stroke, and found that there was a significant correlation between total adherence score and health care system related factors affecting adherencescore.

The result of the present study revealed that there was a weak statistically non-significant correlation between patients' total level of knowledge and total compliance regarding recurrent cerebrovascular stroke. This result accepted with **El-Khawaga and Abdel-Wahab, (2015)**, who carried out study about knowledge, attitudes, practice and compliance of diabetic patients in Dakahlia, Egypt, and represented that there was a negative weak significant correlation between patients' knowledge and practice and this could be explained on basis of knowledge practice gap as adequate knowledge didn't necessarily determine good practice especially in developing countries where many culture factors play a role.

While, it is contradicted by **Akoko, Fon, Ngu, and Ngu, (2017)**, who carried out study about knowledge of hypertension and compliance with therapy among hypertensive patients in the Bamenda Health District of Cameroon: across sectional study, and found that there was a significant relation between patients' total level of

good blood pressure control.

---

**Conclusion:**

---

**Based up on the results of current study, it concluded that:**

Less than two third of the studied patients who suffering from recurrent CVS had unsatisfactory level of knowledge and hadn't compliance with life style modifications. As well as there were many factors affecting their compliance with life style modifications; the most was therapy related factors, followed by patients' related factors and disease related factors. While, health care related factors was the least. Moreover, there was a significant relation between total level of patients' compliance and both of their residence place and type of stroke.

---

**Recommendations:**

---

- Replication of the study on large sample and in different hospitals settings in order to generalize the result.
- Establishing health education programs in the hospital concerned with teaching patients importance of compliance and modifying their life styles, as well as knowing how to overcome factors affecting compliance with life style modifications as possible.
- Establishing a hot line for serious conditions that could abruptly occur.
- Submission of educational handouts, posters, booklets and brochures about recurrent cerebrovascular stroke and its associated life style modifications.

---

**References**

---

**Akoko, B. M., Fon, P. N., Ngu, R. C., & Ngu, K. B. (2017).** Knowledge of hypertension and compliance with therapy among hypertensive patients in

the Bamenda Health District of Cameroon: a cross-sectional study. *Cardiology and therapy*, Vol (6), No (1), p. 53-67.

**American Society of Consultant Pharmacists Foundation "ASCPE". (2016).** Overview of Medication Adherence. Where Are We Today? Retrieved from: [http://www.adulteducation.com/overviewofmedicationadherence\\_4.html](http://www.adulteducation.com/overviewofmedicationadherence_4.html). Accessed on 12/1/2018.

**American Stroke Association (2016).** What is stroke? Retrieved from: <http://www.stroke.org.UK/what-stroke/> Accessed on 15/10/2017.

**American Stroke Association (2018).** Stroke types. Retrieved from: <http://www.stroke.org.UK/stroke-types>. Accessed on 15/1/2018.

**Awad, E.Y., Gwaied, E., Fouda, L., & Esaa, E. (2015).** Compliance of Hypertensive Patients with Treatment Regimen and Its Effect on Their Quality of Life. *Journal of Nursing and Health Science*. Vol (4), No (2), p. 411-419.

**Aziz, A. (2017).** Quality of life of cerebrovascular stroke patients at (EL-Hadra) Orthopedic and Traumatology University Hospital, Neuro psychiatry Department, and (AL-Yawm AL-wahed) outpatient clinics at the Main University Hospital, in Alexandria. Master Thesis, Faculty of Nursing, Alexandria University, p. 35-37.

**Brewer, L., Mellon, L., Hall, P., Dolan, E., Horgan, F., Shelley, E., ... & Williams, D. (2015).** Secondary prevention after ischemic stroke: the ASPIRE-S study. *BMC neurology*, Vol (15), No (1), p. 216.

**Cabral, L., Muller, M., Franco, C. S.**

---

## Factors Affecting Compliance with Lifestyle Modifications among Patients Suffering from Recurrence of Cerebrovascular Stroke

---

- Longo, A., Moro, C., & Nagel, V. (2015).** Three- year survival and recurrence after first- ever stroke: the Joinville stroke registry Brazil. *Clinica Neurologica de Joinville Stroke Registry*, University of Joinville, Rua Otto Boehn, Brazil. Retrieved from: <http://www.Creativecommons.org/publicdomain/zero/1.0/> Accessed on 14/10/2017.
- Cecily, S. H. (2016).** Knowledge on Prevention of Cerebrovascular Accident among Patients with Diabetes and Hypertension in India. *International Journal of Science and Research (IJSR)*. Vol (5), Issue 3 ISSN (Online).
- Cevik, C., Tekir, O., & Kaya, A. (2018).** stroke patients'quality of lifeand compliance with the treatment. *acta medica*, vol (34), p. 839.
- Chapman, B. & Bogle, V. (2014).** Adherence to medication and self-management in stroke patients. *British Journal of Nursing*. Vol (23), No (3), p. 158-166.
- El baqury, M. (2017).** Factors affecting adherence to therapeutic regimens among patients with recurrent cerebrovascular stroke at Neuropsychiatry department at Suez Canal University Hospital, Master Thesis, Faculty of Nursing, Suez Canal University, p. 111-129.
- El Shamaa, E. T. (2013).** Factors Contributing to Therapeutic Compliance of Epileptic Patients and the Suggestive Solutions. *Journal of Biology, Agriculture and Healthcare*, Vol (3), No (3), p. 22-30.
- El-Khawaga, G., & Abdel-Wahab, F. (2015).** Knowledge, attitudes, practice and compliance of diabetic patients in Dakahlia, Egypt. *Euro J Res Med Sci*, Vol (3), No (1).
- Faiz, K. W., Sundseth, A., Thommessen, B., & Rønning, O. M. (2018).** Patient knowledge on stroke risk factors, symptoms and treatment options. *Vascular health and risk management*, Vol (14), No (37).
- Grotta, J., Albers, G., Broderick, J., Kasner, S., Mendelow, D., Sacco, R., ... & Wong, L. (2016).** *Stroke: Pathophysiology, Diagnosis, and Management*. 6<sup>th</sup> ed. Elsevier and Book Aid international, Canada, p. 388-442.
- Guidelines for the Primary Prevention of Stroke "GPPS". (2016).** Guideline forHealthcare Professionalsfrom the American Heart Association/American Stroke Association. P. 5-86. Retrieved from: <http://stroke.ahajournals.org>. Accessed on 12/12/2017.
- Health Promotion and Stroke Prevention Tool (2014).** Patient's adherence with lifestyle modifications assessment tool.Retrieved from <https://www.stroke.org/> Accessed on 10/10/2017.
- Helmiey, E. (2013).** Needs and concerns for stroked patient at Benha University Hospital, Master Thesis, Faculty of Nursing, Benha University, p. 15.
- Hinkle, J. & Cheever, K. (2014).** Brunner & Svddarth's Textbook of Medical Surgical Nursing. 13<sup>th</sup> ed. Walters Kluwer. Lippincott Williams and Wilkins, Philadelphia. p. 1972-1994.
- Ignatavicius, D. & Workman, L. (2015).** *Clinical Nursing Judgment Study Guide for Medical Surgical Nursing: Patient Centered Collaborative Care*. 8<sup>th</sup> ed. USA: Elsevier Health Science, p.981-997.
- Kaddumukasa, M., Kayima, J., Ddumba, E., Mugenyi, L., Pundik, S., Furlan, A. J., ... & Katabira, E. (2015).**

- Knowledge, attitudes and perceptions of stroke: a cross-sectional survey in rural and urban Uganda, *BMC Res Notes*. Vol (8), No (1), p. 2-7.
- Kamal, K., Shaikh, Q., Pasha, O., Azam, I., Islam, M., Memon, A., ... & Khoja, S. (2015).** Improving medication adherence in stroke patients through Short Text Messages (SMS4Stroke)-study protocol for a randomized, controlled trial. Vol (15), No (157), p. 2-9. Retrieved from: <https://bmcneurol.biomedcentral.com/articles/10.1186/s12883-015-04132>. Accessed on 2/3/2018.
- Lee, R. H., Kyung, O., Insook, C. H., Soo, H., & Joung-Ho, R. H. (2014).** Knowledge, health-promoting behaviors, and biological risks of recurrent stroke among stroke patients in Korea. Department of Nursing, College of Medicine, Inha University, Incheon, Korea, *Japan Journal of Nursing Science*. Vol (1), No (2), p. 112-120.
- Lewis, S., Dirksen, S., Heitkemper, M., Buncher, L & Camera, I. (2015).** *Medical Surgical Nursing: Assessment and Management of Clinical problems*. 8<sup>th</sup> ed. USA: Elsevier Health Science, p.1460-1475.
- Linton, A. (2015).** *Introduction to Medical Surgical Nursing*. 6<sup>th</sup> ed. USA: Elsevier Health Science, p.638-642.
- Mahmoud, M. (2016).** Factors affecting quality of life for patients with cerebrovascular stroke at the neurology and physiotherapy outpatient clinics at Ain Shams University Hospital, Master Thesis, Faculty of Nursing, Ain Shams University, p. 86-91.
- Mahmoud, S., & Abdel Elaziz, A. N. (2016).** Impact of stroke on life satisfaction and psychological adjustment among stroke patients during rehabilitation. *Life Science Journal*. Vol (13), No (3), p. 7-17.
- Mahrous, F. M. (2015).** Factors Affecting Compliance of Hypertensive Patients toward Treatment Regimen. *Life Science Journal*. Vol (12), No (10), p. 62-68.
- Martino, M., Alagna, M., Cappai, G., & Mataloni, F. (2016).** Adherence to evidence-based drug therapies after myocardial infarction: is geographic variation related to hospital of discharge or primary care providers? A cross-classified multilevel design. *British Medical Journal*. Vol (6), No (4), p. 2-9.
- Mitchell, A. B., Cole, J. W., McArdle, P. F., Cheng, Y. C., Ryan, K. A., Sparks, M. J., ... & Kittner, S. J. (2015).** Obesity increases risk of ischemic stroke in young adults. *Stroke*, Vol (46), No (6), p. 1690-1692.
- Morsy, W., Elfeky, H., & Ahmed, R. (2013).** CVS Recurrence among Critically Ill Patients at a Selected University Hospital in Egypt. *Journal of Biology, Agriculture and Healthcare*. Vol (3), No (13), p. 4-29. Retrieved from: [http://scholar.cu.edu.eg/?q=hanaa/files/cvs\\_paper.pdf](http://scholar.cu.edu.eg/?q=hanaa/files/cvs_paper.pdf). Accessed on 3/12/2017.
- National Institution of Health Stroke Scale (NIHSS) (2016).** Patient's adherence with lifestyle modifications assessment tool. Retrieved from: <http://www.stroke.org/we-can-help/healthcare-professionals/improve-your-skills/tools-training-and-resources/training/nih>. Accessed on 15/12/2017.
- National Stroke Association (2015).** Medication Adherence and Compliance. Talking stroke-related medications on time and as directed. Retrieved from: <http://www.stroke.org/stroke->
-

## Factors Affecting Compliance with Lifestyle Modifications among Patients Suffering from Recurrence of Cerebrovascular Stroke

---

resources/library/medication-adherence-and-compliance.

**National Stroke Association (2017).** Effects of stroke. Retrieved from: [http://www.strokeassociation.org/STROKEORG/AboutStroke/AboutStroke\\_UCM\\_308529\\_SubHomePage.jsp](http://www.strokeassociation.org/STROKEORG/AboutStroke/AboutStroke_UCM_308529_SubHomePage.jsp). Accessed on 14/12/2017.

**Panício, I, M., Mateu, L., Ricarte, F, L., & Figueiredo, M. (2014).** The influence of patient's knowledge about stroke in Brazil: across sectional study. Departamento de Neurologia e Neurocirurgia, Universidade Federal de

Sao Paulo, Sao Paulo, SP, Brazil. *Ark. Neuro-Psiquiatr.* Vol (72), No (12), p. 12-19.

**World Health Organization (WHO) (2017).** The global burden of stroke. Retrieved from [http://www.who.int/nmh/ncd/global\\_burden\\_stroke/en/](http://www.who.int/nmh/ncd/global_burden_stroke/en/). Accessed on 20/12/2017.

**World Health Organization (WHO) (2018).** What is cerebrovascular stroke and what is meaning of compliance? Retrieved from [http://www.who.int/topics/cerebrovascular\\_accident/en/](http://www.who.int/topics/cerebrovascular_accident/en/). Accessed on 12/12/2018.