Cerebrovascular Stroke Recurrence among Critically Ill Patients at a Selected University Hospital in Egypt

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Abstract

Cerebrovascular stroke (CVS) is a fatal disease. Literature review cited that, CVS recurrence is more devastating than the first attack. The risk of recurrent CVS is up to 15 times greater than the risk of CVS and is attributed to insufficient control of risk factors and non compliance with medical advice. So that, identification of risk factors of recurrence is an important role of the critical care nurses, plays an essential role in the prevention of further stroke. Aim: to study the risk factors, frequency and severity of recurrent cerebrovascular stroke among adult critically ill patients admitted to intensive care units. Research questions: Q1- What are the risk factors of recurrent cerebrovascular stroke among critically ill patients at a selected university hospital? Q2- What are the intervals of recurrence from the first attack of cerebrovascular stroke? Q3- What is the frequency of recurrent cerebrovascular stroke attacks among critically ill patients? Q4-What is the severity rate of recurrent cerebrovascular stroke among critically ill patients?. A descriptive exploratory research design was utilized in the current study. The study was conducted at different CVS intensive care units at a selected University Hospital. A sample of convenience including all adult patients admitted to the ICU with recurrent CVS over a period of six months (80 patients) was included. Three tools were used for data collection: socio-demographic and medical data sheet, CVS risks factors assessment sheet, and the National Institutes of Health Stroke Scale (NIHSS). Results: The majority of the studied group admitted with the first recurrence of CVS, had different chronic illnesses such as hypertension (100%) & diabetes mellitus (95%). The duration of CVS recurrence ranged from two - < five years among 30% of the studied group. 36.25% of the studied group admitted with severe degree of CVS with a mean severity score of ($X = 19.17 \pm SD = 1.255$). Conclusions: uncontrollable risk factors (old age, male gender, marriage); life style risk factors (smoking, obesity, low income); chronic medical diseases (old CVS, hypertension, diabetes mellitus, ischemic heart disease, myocardial infarction, heart failure,… etc); noncompliance with prescribed drugs of chronic illnesses, abnormal laboratory investigations (high cholesterol, triglyceride, low density lipoprotein) represented the common risk factors and contributed to recurrent cerebrovascular stroke with different severity.

Key words: Cerebrovascular stroke, recurrence, critically ill patients, risk factors, severity.

1. Introduction

Cerebrovascular stroke (CVS) is one of the common, crippling, and a deadly serious neurologic disease. It is a medical emergency and a leading cause of adult disability (Furie, etal 2011). Worldwide CVS is the second leading cause of death for people above the age of 60, and the fifth leading cause of death for those above the age of 51. About 16 million persons are affected with CVS annually, with a mortality rate among up to 6 million (Ketchner, 2011). One quarter of all CVS is fatal and when not fatal, it is often disabling (Thom, Haase & Rosamond, 2011). More than 70% of cerebrovascular stroke survivors are unable to return fully to their prior occupations, in addition to having longer periods of disability before death with significant costs for individuals and society (Thom, Haase & Rosamond, 2011). In Egypt the number of those affected with CVS was estimated to be 370,000 per year, accounting for one case every 90 seconds (Alkhatib, 2011).

Early recurrence of CVS together with progression of medical instability accounts for 90% of deaths in the first week following stroke. Approximately 25% of deaths that occur in the first several years after CVS are due to its recurrence (Denny, 2011). As indicated by Al-Ghandour, (2011), there are many risk factors for CVS, the more the risk factors a person has, the greater the incidence of stroke, especially where the majority of Egyptians are vulnerable to chronic diseases. Among the most dangerous risk factors for CVS are hypertension, heart disease, diabetes mellitus, obesity, and smoking. As indicated by Hosni (2012), hypertension is the most important risk factor for CVS. According to the report of Egyptian Society of Hypertension Conference (2012),

around 25 % of the Egyptians are hypertensive, and so at greatest risk for cerebrovascular diseases, heart failure, renal failure, and so death. Concerning obesity, it became a global epidemic, and worldwide health problem. According to the WHO report (2011), and Al-Khatib, (2011), Egypt occupies the fifth place in the list of the top ten most obese countries.

In reference to diabetes, as estimated by the World Federation of Diabetes (2012), more than 65 thousand Egyptians die each year as a result of diabetes and its complications. As well, Murad, (2012) indicated that Egypt is ranked as the 13th on the world level in the prevalence of diabetes. Concerning smoking, it was revealed by the Census of Central Agency for Public Mobilization and Statistics in Egypt (2013) that around 9.4 million are smokers in Egypt, representing 17% of the total population (15 years and over). The dominance of these risk factors among Egyptians could be the rational of developing CVS as well as its recurrence. Because recurrent CVS is a complex disease, and 80% of CVS can be prevented, it requires efforts and skills of all members of the multidisciplinary team, of these are nurses who play pivotal role in all phases of CVS care to improve patients' outcomes, decrease lengths of hospital stay, and decrease hospital costs (Alberts, et al, 2009, and Shaughnessy, Michael & Normandt, 2009). Identification of causes, risk factors of recurrence and severity of CVS plays an essential role in planning effective preventive strategies and could be used as predictors of recurrence.

2. Subjects and Method
2.1. Aim of the study: to study the risk factors, frequency and severity of recurrent cerebrovascular stroke among adult critically ill patients admitted to intensive care units at a selected university hospital.
2.2. Research design: A descriptive exploratory research design was utilized in the current study.
2.3. Research questions: To fulfill the aim of this study, the following four research questions were formulated:
   Q1- What are the risk factors of recurrent CVS among critically ill patients?
   Q2- What are the intervals of recurrence from the first attack of CVS?
   Q3- What is the frequency of recurrent CVS attacks among adult critically ill patients?
   Q4-What is the severity rate of recurrent CVS among adult critically ill patients?

2.4. Setting: This study was conducted at different cerebrovascular stroke intensive care units at Cairo University Hospitals.

2.5. Sample: A sample of convenience including all adult patients (80 patients; 35 female & 45 male patients) admitted with recurrent CVS over a period of 6 months (from March to August - 2011) was included in the current study. With the following inclusion criteria: Adult patients ($\geq$18 years), of both sexes, with recurrent stroke, with or without comorbidity diseases (e.g. ischemic heart disease, hypertension, diabetes, etc….).

2.6. Tools of data collection: Three tools were utilized to collect data pertinent to the current study. Two tools were designed by the researchers (Socio-demographic and medical data sheet and CVS risk factors assessment sheet); and the National Institutes of Health Stroke Scale (NIHSS); which was developed by Walter, Robert, Gerald, Jancovic & Joseph (2004).
2.6.1. Socio-demographic and medical data sheet consists of 23 items covering five main sections: the first section is concerned with certain characteristics, such as; age, gender, marital status, place of residence, occupation, level of education, family history of stroke, financial status and smoking habits. The second section involves medical diagnosis, past medical history, time of previous stroke, type, causes of old, stroke; causes, location and severity of recent stroke & frequency of stroke. The third section involves data related to dietary history. The fourth section involves data related to life style patterns such as daily working, rest and sleeping hours and presence of psychological problems (depression, anxiety & stress). The last section is concerned with laboratory investigations, radiological studies, and other diagnostic studies.
2.6.2. CVS risk factors assessment sheet was developed by the researchers, guided by the National Stroke Association (2009). It covers two main sections; the first section is concerned with medical risk factors such as; neurological diseases (transient ischemic attacks, old stroke), cardiovascular diseases (hypertension, heart failure, myocardial infarction, arrhythmias, …), surgeries (aortic surgery, coronary artery bypass graft), blood disorders (anemia), endocrine disorders (diabetes mellitus), vascular disorders (lower limb ischemia, carotid and peripheral artery diseases) and hypercoagulability. The second section is concerned with life style risk factors such as obesity, physical inactivity and cigarette smoking.
2.6.3. The NIHS is a systematic assessment tool that provides a quantitative measure of stroke-related neurologic deficit. It was originally designed as a clinical assessment tool to evaluate acuity of stroke, determine appropriate treatment, and predict patients' outcome. NIHSS consists of 15 items related to several aspects of brain function covering six main items: level of consciousness; degree of vision; degree of movement; degree of

sensation; degree of speech and language; and the degree of attention. Stroke severity using NIHSS is classified as: no stroke = 0, minor stroke = 1- 4, moderate stroke =5-15, moderate/severe stroke = 15-20, and severe stroke = 21-42.

3. Tools validity and reliability: Tools developed by the investigators (tool I & 2) were examined by a panel of five experts in the field of Critical Care Medicine, and Critical Care and Emergency Nursing to determine whether the included items are clear and suitable to achieve the aim of the study. Concerning the National Institutes of Health Stroke Scale (NIHSS), it is a valid (r = 0.947) and reliable (mean kappa = 0.69) stroke scale.

4. Pilot study: A pilot study was done on 10 patients to test clarity, applicability, feasibility, and to estimate the needed time to complete each tool. Needed modifications were done in the data collection tools and subjects included in the pilot study were excluded from the main study sample.

5. Protection of human rights: The current study was approved by human research, and ethical committees at the faculty of nursing – Cairo University.Official permissions to conduct the study were obtained from the medical and nursing directors of CVS critical care units. Participation in the current study was voluntary. Written consents were obtained from patients who met the inclusion criteria or their responsible family members (in case of unconsciousness or altered consciousness level) after informing them about the purpose and nature of the study. Another consent (through an e- mail) was obtained from Walter, Robert, Gerald, Jancovic & Joseph (the developer of NIHSS) to use the scale in the current study.

6. Procedure: The current study was carried out on two phases: preparation phase and implementation phase. As regards preparation phase, it was concerned with managerial arrangements to carry out the study in addition to construction and preparation of different data collection tools, and selection of the study settings. Once official permissions were granted, the researchers started the implementation phase. Each patient was interviewed once individually. Full explanation of the purpose and nature of the study was done to the patients / responsible family members, and then written consents were obtained. The researchers filled out different data collection instruments. Approximately 20-30 minutes were needed to complete each of the three different data collection instruments. Patients' assessment required obtaining data about nutritional status such as height and weight. Because of physical limitations and altered level of consciousness; patients' height, was obtained by measuring ulnar length (the distance between Olecranon process of the elbow and the Styloid process of wrist), then the measured ulnar length is compared to that in the table of Malnutrition Universal Screening Tool, (2003). Body mass index (BMI) was estimated based on specifying mid upper arm circumference (MUAC) at the midpoint between the acromion process of the shoulder and the olecranon process of elbow. If MUAC is < 23.5 cm, BMI IS likely to be <20 kg / m2. However if MUAC is > 32.0 cm, BMI IS likely to be >20 kg / m2.

7. Results:

7.1. Table (1) clarifies distribution of the studied group as regards to their socio-demographic characteristics. It shows that the age of the great majority (87.5%) of the studied group was above 55 years old, with a mean age of 69.71 $\pm$ SD =11.1. More than one half of the studied group was males, married, from rural areas and their income didn't cover treatment in percentages of (53.8%, 56.3%, 52.5% and 55%) respectively. As regards to occupation, the same table shows that, 33.8% were house wives.

7.2. Figure (1) shows percentage distribution of types of old (previous) stroke among the studied group. It reveals that, the majority (80%) of the studied group affected with ischemic stroke.

7.3. Figure (2) clarifies percentage distribution of location of recent stroke among the studied group. It indicates that most (75%) of the studied group had middle cerebral artery infarction.

7.4. Figure (3) shows time of previous stroke among the studied group. It clarifies that the great majority (87.5%) of the studied group admitted with the first recurrence of CVS.

7.5. Figure (4) shows frequency of recurrent CVS among the studied group. It displays that approximately one third (30%) of the studied group had an interval of recurrent CVS of two – less than five years.

7.6. Figure (5) clarifies percentage distribution of recent CVS severity level among the studied group. It reveals that 40% of the studied group admitted with moderate to severe degree of stroke with a mean severity score of X = 19.17 $\pm$ SD = 1.255.

7.7. Figure (6) presents smoking habits among the studied group**.** It clarifies that around half (52.5%) of the studied group were smokers. Of these 95.2% were males.

7.8. Figure (7) show distribution of the studied group as regards to their body mass index. It clarifies that more than half (57.5%) of the studied group were obese.

7.9. Table (2) clarifies Frequency of co-morbidity diseases associated with CVS among the studied group. It indicates that the studied group had hypertension, diabetes mellitus, and ischemic heart disease in percentages of (100%, 95%, & 31.25%) respectively.

7.10. Table (3) shows the relationship between severity of recent stroke and age. It indicates that more than half (n= 18, 56.25%) of the group who suffered from moderate to severe degree of CVS were at the age group of $\geq$ 75 years. A significant statistical relationship was found between severity of stroke and age at $P \leq 0.006$.

7.11. Table (4) shows the relationship between severity of recent stroke and its frequency. It indicates that more than one third (40%) of the studied group who suffered from moderate - severe stroke admitted with first stroke recurrence with a significant statistical relationship between CVS frequency of recurrence and severity at $p \leq 0.000$.

8. Discussion:

The current study revealed that the age of the great majority of the studied group was above 55 years. These finding is in concordance with that of Wahab, et al, (2011) who reviewed stroke admissions at a tertiary hospital in Nigeria, and indicated that stroke incidence increases with age and the chance of having stroke approximately doubles for each decade of life after the age of 55. This finding is of special concern where more than half of the studied group (in the current study) were males. In this regards Joanna, Bates, Mauricio & Glymour, (2009) revealed that men had higher incidence of CVS than women, even after full risk factor adjustment. However, contradicted findings by Wahab, et al, (2011) revealed the dominance of women in experiencing CVS. Around half of the current study group was married. In this regard Joanna, et al, (2009) indicated that being never married or widowed (For both sexes) has a role in CVS recurrence. Concerning educational background, the current study revealed illiteracy among more than one quarter of the studied group. Approximately the same findings were indicated by Leite, Nunes & Correa, (2011) who found illiteracy among more than one third of patients with stroke.

As regards to residence, approximately one half of the studied group was from rural areas. This finding was in concordance with that of Ennen (2004) who approximately had the same findings. However, Tavangar, et al, (2012) indicated a contradicting finding where they found that urban population has a higher probability of stroke, hypertension, ischemic heart disease and diabetes than rural population. Being from rural areas (From the researcher's point of view) interferes with the access to health care facilities and leads to lack of awareness of CVS warning signs. Low income as well was found among approximately one half of the studied group, where their income didn't cover their treatment. In this regards Joanna, et al (2009) revealed that lower income and wealth are associated with high incidence of CVS.

As well, Toivanen (2011) and Lavado, et al (2011) revealed that, risk of stroke mortality is high in the low income group and with poverty among both women and men.

As cleared from the current study, the great majority of the studied group suffered from old ischemic stroke. This finding was in concordance with that of Morte & Guadagn, (2012) who studied genetics of ischemic stroke, stroke-related risk factors and had approximately the same findings. On the same line, was Philippe (2009) who studied predictors of recurrence after minor stroke and revealed the dominance of ischemic stroke. Increased incidence of ischemic stroke from the researchers' point of view could be due to presence of many risk factors in addition to having the great majority of the studied group above the age of 55 years. As well, Chen, Iguchi & Grotta (2011) indicated that increased vulnerability of elderly people to ischemic stroke is associated with several physiological changes that occur in the aged brain which might eventually reduce cerebrovascular reserves and increase susceptibility of the brain to vascular insufficiency and ischemic injury. The majority of studied group suffered from middle cerebral arterial infarction while a minority had anterior cerebral, vertebro-basilar and multiple infarctions. These findings are in concordance with that of Bamford, et al, (2005) who studied classification and natural history of cerebral infarction and found that more than two thirds of the studied group had large vessel ischemic stroke, while a minority had a small vessel ischemic stroke. In this regards Warren & Ruppert, (2011) found that patients with stroke involving large vessels, including the middle cerebral artery represented around half of all patients with ischemic strokes. In addition, Giosue, Sofia & Markus (2009) studied vertebral-basilar stenosis to predict early recurrent stroke and found that ischemic stroke was common in the posterior circulation among a minority.

The present study demonstrates the prevalence of obesity among more than half of the studied group. In this regards Katsiki, Ntaios & Vemmos (2011) and Abbott, Behrens & Sharp (2011) revealed that obesity can affect stroke incidence, severity and increase the risk of CVS recurrence. As well, obesity contributes to both diabetes and hypertension which are the common associated factors with stroke. This is of special concern especially where the

majority of the studied group did not follow any regular physical exercise regimen. As explained by Kiely, Wolf & Cupples, (2011), lack of regular exercise can increase the risk of obesity, diabetes, and poor circulation, and so the risk of stroke. However, Williams, (2009) documented reduced risk for stroke in those who exceeded the guideline physical activity level. Moreover, the majority of the studied group indicated their faulty dietary habits (preference of carbohydrates, fats and salts). In this regards Brinsden & Farrand (2012) confirmed the association between incidence of stroke and salty food.

As well, Eric & Dariush, (2008), reported high significant statistical relationship between the incidence of stroke, its severity and diets low in sodium, high in potassium, and rich in fruits, vegetables, whole grains, cereals, fibers, and fatty fish. However, Larsson, Virtamo & Wolk (2012) found no association between dietary fat and occurrence of stroke. As observed from the present study, one third of studied group had abnormal cholesterol, high density lipoproteins, low density lipoproteins, and triglycerides. Serum lipids were found by Islam, et al, (2012) to be significantly high among ischemic stroke patients. Hyperlipidemia as explained by Rader & Brewer, (2011) may cause blood vessels plaque building up that can loose and cause ischemic stroke.

As well, high consumption of rich cholesterol diets are associated with elevated risk of stroke which is largely mediated by hypertension, hyperglycemia, dyslipidemia and obesity (Griep, 2011, YanPing, 2011 and Micha & Mozaffarian, 2010). Concerning the relationship between stroke severity and obesity, the current study showed that more than two thirds of the group who admitted with severe degree of stroke was obese, however, this relationship didn't reach the level of significance. However, this finding was contradicted by that of Ryu, et al (2011), who indicated an inverse relationship between Body Mass Index and stroke severity.

The present study demonstrates that more than half of the studied group is cigarette smokers, and it was obvious that the majority of the smoker group was males, reported smoking of two packets of cigarette per day and had history of smoking for more than 50 year. These findings were in concordance with that of Wolf & Hennerici, (2012) who found more than half of patients were smokers. As well Vukovic, et al, (2009) studied perception of stroke in Croatia and found that two thirds of patients were smokers. Cigarette smoking as indicated by Kawachi, Colditz & Stampfer (2011) can trigger CVS through building up of fatty substances (atherosclerosis). Storage of nicotine and carbon monoxide resulting from smoking can raise blood pressure and reduce the amount of oxygen in the cerebral blood flow. Unexpectedly, stroke severity in the current study was not affected by cigarette smoking since the smokers and the non smokers experienced stroke recurrence. However, results of the current study are contradicted with that of Hata, (2011) who suggested that smoking raise the risks of stroke, its recurrence and severity. In addition to CVS the studied group had different co-morbidity diseases such as hypertension, diabetes mellitus, and ischemic heart disease, however; a minority had myocardial infarction, heart failure, arterial fibrillation, anemia, hypercoagulable state, deep venous thrombosis, lower limb acute ischemia, carotid artery disease, peripheral disease and undergone aortic surgery, and coronary artery bypass graft surgery.

These findings were similar to that of Kamal, (2011), and Nolte, et al, (2009), who revealed that hypertension, diabetes, hyperlipidemia, and arterial fibrillation act as common associated co-morbidity with stroke. Inspite of having different comorbidity diseases, high percentage of the studied group was not completely committed to the prescribed drugs of their chronic illnesses. This is in agreement with that of Sharma, (2010) who found more than one third of patients discontinued treatment within one year and related this to cognitive impairment, and lower perceptions of medication benefits. However, Johnson, Lane, Barber & Charleston (2012), revealed contradicting findings where they documented a relationship between commitment to chronic disease treatment and stroke severity and demonstrated high level of adherence to secondary stroke preventive medications after discharge. They attributed this high compliance rates may to one-on-one stroke nurse counseling and the use of stroke instructional booklets, which include information about preventing stroke recurrence. From what have been introduced, the answer of the first research question, which is concerned with risk factors for recurrent stroke among the studied group, can be deduced.

Concerning the second research question, it was concerned with the intervals of recurrence from the first attack of stroke. In this regards the present study revealed that one third of the studied group suffered from previous CVS within a period ranged from two to less than five years, and one quarter had CVS recurrence after five years. This finding is in agreement with that of Feng, Hendry & Adams (2010) who found a two years interval for CVS recurrence.

As regards to the third research question it was concerned with frequency of recurrent stroke. In this regards, the current study showed that the majority of the studied group admitted with the first recurrence of stroke. On the same line with our findings was that of Brogaard, (2010) who found higher percentage of patients

admitted with the second recurrence of stroke. From the research's point of view; stroke recurrence could be related to old age, co- morbidity diseases, having many risk factors, and lack of commitment to prescribed medications. In relation to the fourth research question, it was concerned with severity rate of the recurrent stroke. In this regards, our study indicated that more than one third of the studied group admitted with severe degree of CVS, more than one quarter admitted with moderate to severe degree of CVS and another one quarter admitted with moderate degree of CVS. This finding is in agreement with that of Pierre, et al, (2006) who found that moderate degree of severity (NIHSS rating 6-13) among one third of studied group, and severe degree of stroke (NIHSS rating >=14) among a minority. However, Ali, et al (2010) was not in agreement with our findings, they found minor degree of CVS (NIHSS score <=4) common among their studied group.

   The great majority of patients (in the current study) who admitted with severe stroke were at the age group of > 75 years. A significant statistical relationship was found between stroke severity and age. On the same line, was Nakayama, Jorgensen & Raaschou, (2012), who revealed that stroke severity and mortality increase progressively with old age. As well, more than two thirds of the studied group who admitted with triple stroke recurrence was above 75 year old. This finding is in agreement with that of Gustavo & Sandra (2009), who studied stroke in the elderly, and concluded that stroke fatality and recurrence increased with old age. Moreover, it was noticed that there was a short interval (one - < sex months) between the previous and the recent cerebrovascular stroke attack among patients aged more than75 years. However, the exact relationship between stroke recurrence and age didn't reach the level of significance in the current study.

   Moreover, approximately two thirds of the group who admitted with moderate degree of stroke and more than half of those who admitted with moderate to severe degree of stroke were males. As well around one half of the group who admitted with severe degree of stroke was house wives. This finding is in agreement with that of Gunnar, et al, (2006), who documented a significant relationship between stroke recurrence and occupation. In addition, Akizumi, Kazunor, Kazuomi & Shizukiyo, (2009) found occupational stress to be associated with incident strokes and it's severity among men as compared to females. As well, the present study demonstrates that, the studied group who admitted with the third and fourth recurrence had severe degree of stroke with a significant statistical relationship between frequency of stroke and its severity. However, contradicting findings were reported by Mohamed, et al, (2012) who revealed that the frequency of strokes did not affect stroke severity.

9. Conclusion:

   Identification of risk factors of recurrent cerebrovascular stroke may lead to better secondary prevention. Among these factors are old age, smoking, excess carbohydrates, fats and salt in diets, obesity, irregular practice of physical exercise, low income, chronic medical diseases, lack of commitment to prescribed drugs, high levels of serum cholesterol, triglyceride, and LDL. Therefore, the nurse has an important role in preventing recurrent stroke through providing instructions, submission of instructional booklets, and follows up of patients who had CVS to prevent recurrence.

10. Recommendations: Based upon findings of the current study, the followings are recommended:
- Establishing a hot line for dangerous situations that could suddenly occur.
- Establishing stroke counseling teams to provide information, aid in problems resolution.
- Establishment hospital's specialized units to be concerned with teaching patients to modify their lifestyle.
- Submission of educational handouts about preventing stroke recurrence.

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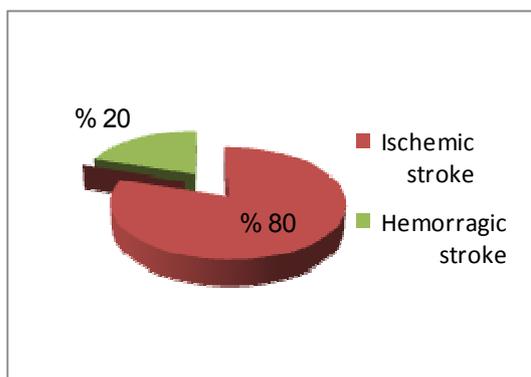
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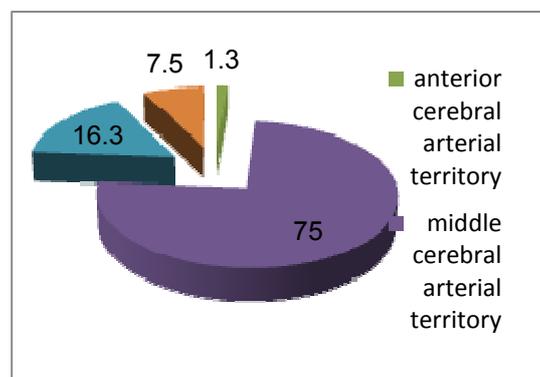
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Notes: List of tables and figures:

Table 1: Frequency Distribution of the Studied Group as Regards to their Socio-demographic Characteristics (N=80).

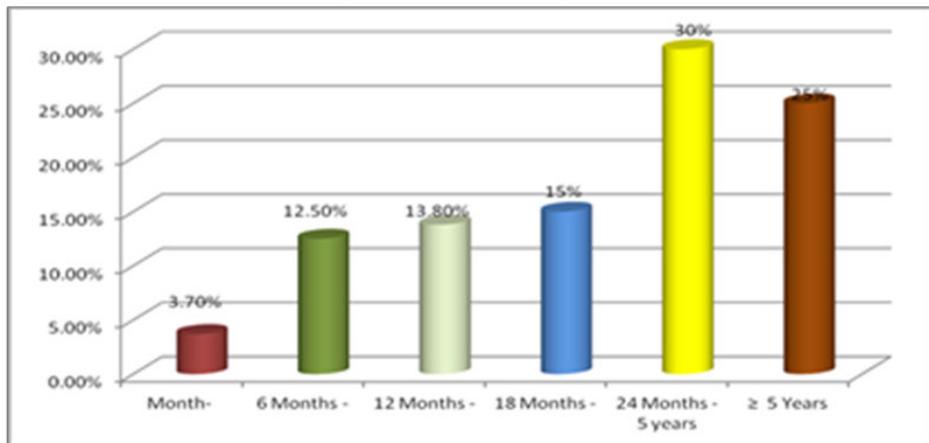| Characteristics (N=80).			
Variable		N	%
Age	35 –	4	5
	45-	6	7.5
	55-	10	12.5
	65-	20	25
	≥ 75 years old	40	50
Gender	Male	45	45.25
	Female	34	43.75
Marital status:	Single	2	2.5
	Married	43	53.8
	Divorced	4	5.0
	Widow	31	38.8
Residence:	Urban	38	47.5
	Rural	42	52.5
Occupation:	Employee	7	8.8
	Farmer	3	3.8
	House wife	27	33.8
	Commercial work	15	18.8
	Retired	12	15.0
	Don't work	16	20.0
Education:	Illiterate	23	28.8
	Primary	16	20
	Preparatory	6	7.5
	Secondary	11	13.8
	College	21	26.3
	Postgraduate studies	3	3.8
Financial status: Cover treatment		36	45%
Don't cover treatment		44	55%

Figure (1): Percentage Distribution of Types of Old (previous) Stroke among the Studied Group (N=80).
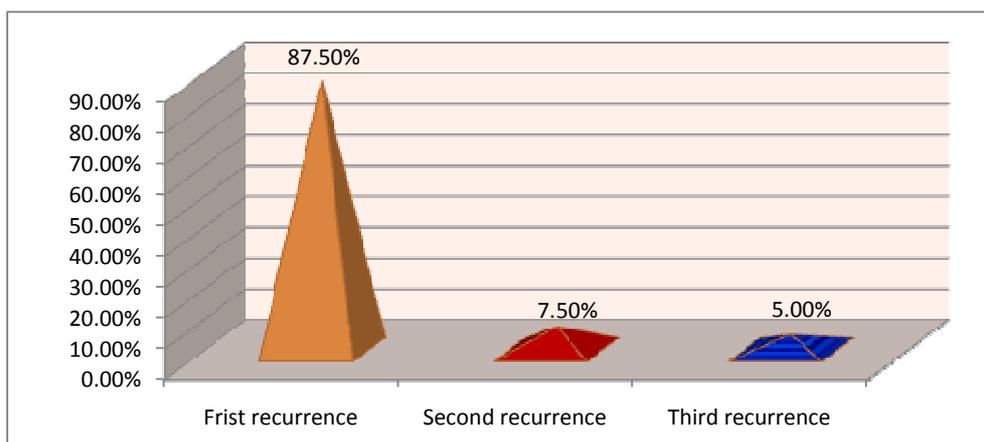
Figure (2): Percentage Distribution of Location of Recent Stroke among the Studied Group (N=80).
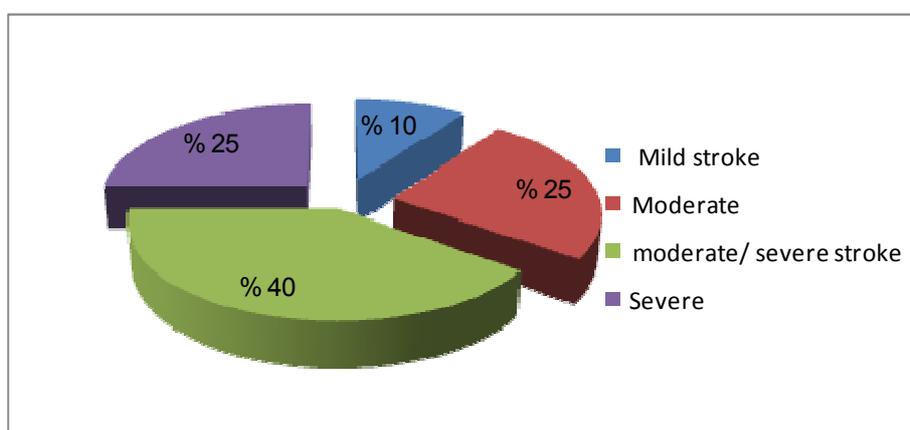
Figure (3): Time of Previous Stroke among the Studied Group (N=80).
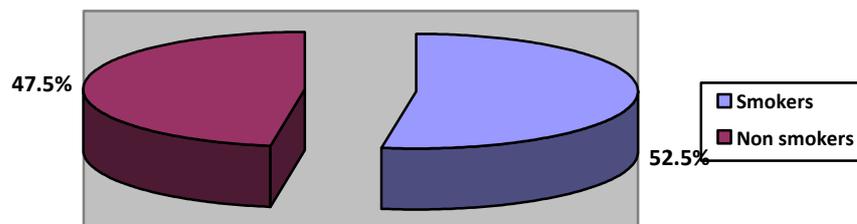

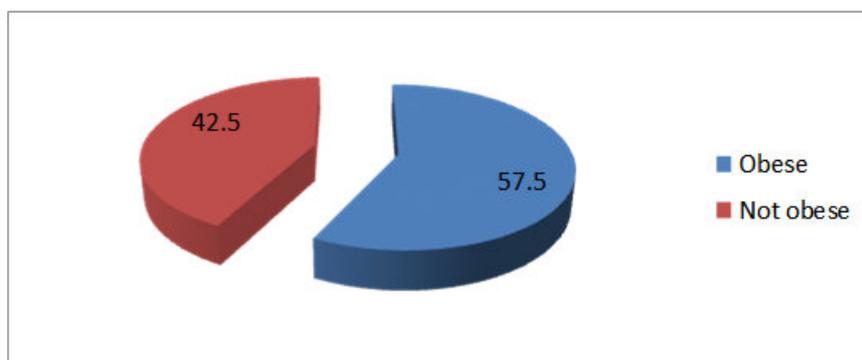**Figure (4): Frequency of Recurrent CVS among the Studied Group (N=80).**

Figure (5): Percentage Distribution of Recent CVS Severity Level among the Studied Group (N=80).

Figure (6): Smoking Habits among the Studied Group (N=80).

Figure (7): Percentage Distribution of the Studied Group as Regards to their Body Mass Index (N=80).

Table (2): Frequency Distribution of the Studied Group as Regards to Co-morbidity Diseases (N=80).

Comorbidities	N	%
Cardiovascular disorders:		
Hypertension	80	100
Ischemic heart disease	25	31.25
Old myocardial infarction	12	15
Heart failure	12	15
Arterial fibrillation	17	21.25
Open heart surgery: Aortic surgery	4	5
Vascular disorder: Deep venous thrombosis	12	15
Lower limb acute ischemia	11	13.75
Carotid artery disease	13	16.25
Peripheral artery disease	6	7.5
Dyslipidemia	26	32.5
Endocrine: Diabetes mellitus	76	95
Blood disorder: Anemia	7	8.75
Hypercoagulability	11	13.75

Table (3): Relationship between Severity of Recent Cerebrovascular Stroke and Age (N=80).

Age Group	Severity of Recent Stroke								Total		χ^2	P Value
	Mild Stroke		Moderate		Moderate/ Severe Stroke		Severe		N	%		
	N	%	N	%	N	%	N	%				
35 -	2	20	2	10	0	0.0	0	0.0	4	5		
45 -	2	20	1	5	2	6.25	1	5	6	.57		
55 -	2	20	4	20	4	12.5	0	0.0	10	.512		
65-	2	20	7	35	8	25	3	15	20	25	27.247	0.006***
>75years	0	0.0	6	30	18	56.25	16	80	40	50		
Total	8	10	20	25	32	40	20	25	80	100		

*** High significant statistical difference

Table (4): Relationship between Severity of Recent Stroke and its Frequency among the Studied Group (N=80).

Severity of Recent Stroke	Frequency of Stroke						Total		χ^2	P Value
	Twice		Triple		Quadra					
	N	%	N	%	N	%				
Mild Stroke	8	11.4	0	0.0	0	0.0	8	10		
Moderate	20	28.6	0	0.0	0	0.0	20	25	34.286	0.000****
Moderate to Severe	32	45.7	0	0.0	0	0.0	32	40		
Severe	10	14.3	4	100	6	100	20	25		
Total	70	87.5	4	5.0	6	7.5	80	100		

**** High significant statistical difference