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Stroke its types & risk factors: An overview

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Abstract

The objective of this review is to have an insight into economic evaluation studies in the field of stroke. Strokes are brain attacks. They occur when the blood supply to the brain gets blocked. It is a medical emergency that needs immediate medical attention. When stroke occurs, the brain does not receive enough oxygen or nutrients then causing brain cells to die. Strokes need to be diagnosed and treated as quickly as possible to minimize brain damage. Treatment is dependent on the type of stroke occurred. The most effective way to prevent strokes is through maintaining a healthy lifestyle and treating underlying conditions that could be a risk factor. Before developing new medical facilities or adapting existing facilities in the field of stroke, it is desirable to assess not only the medical, but also the economic consequences of such facilities. The more common kind, called ischemic stroke, is caused by a blood clot that blocks or plugs a blood vessel in the brain. The other kind, called hemorrhagic stroke, is caused by a blood vessel that breaks and bleeds into the brain. "Mini-strokes" or transient ischemic attacks (TIAs), occur when the blood supply to the brain is briefly interrupted. In this review a short note is mentioned about risk factors of stroke and their diagnostic tests for various types of stroke and summarizes the prevention and treatment of stroke.

Keywords: Stroke, ischemic stroke, hemorrhagic stroke, transient ischemic stroke, risk factors

Introduction

Stroke is defined by World Health Organization as "Rapidly developing clinical signs of focal (or global) disturbance of cerebral function, lasting significantly more than 24 hours or leading to death, without apparent cause besides that of vascular origin". Stroke is classically characterized as a neurological deficit attributed to an acute focal injury of central nervous system (CNS) by a vascular cause including cerebral infarction, intracerebral hemorrhage (ICH), and subarachnoid hemorrhage (SAH). Cerebrovascular strokes are those diseases in which one or more of the blood vessels of the mind are involved in the pathologic processes. Various pathologic processes commonly implicated in cerebrovascular strokes are: thrombosis, embolism, rupture of a vessel, hypoxia, hypertensive arteriolosclerosis, atherosclerosis, arthritis, trauma, aneurysm and developmental malformations ^[1].

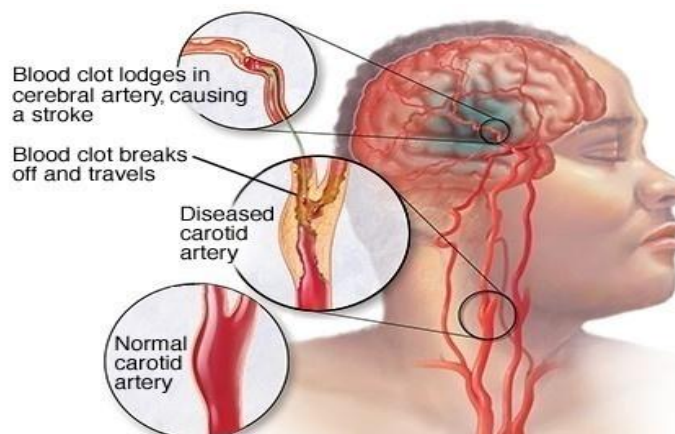


Fig 1: Brain Stroke

Types and Risk Factors

These processes may result in 3 main forms of parenchymal diseases of brainforms.

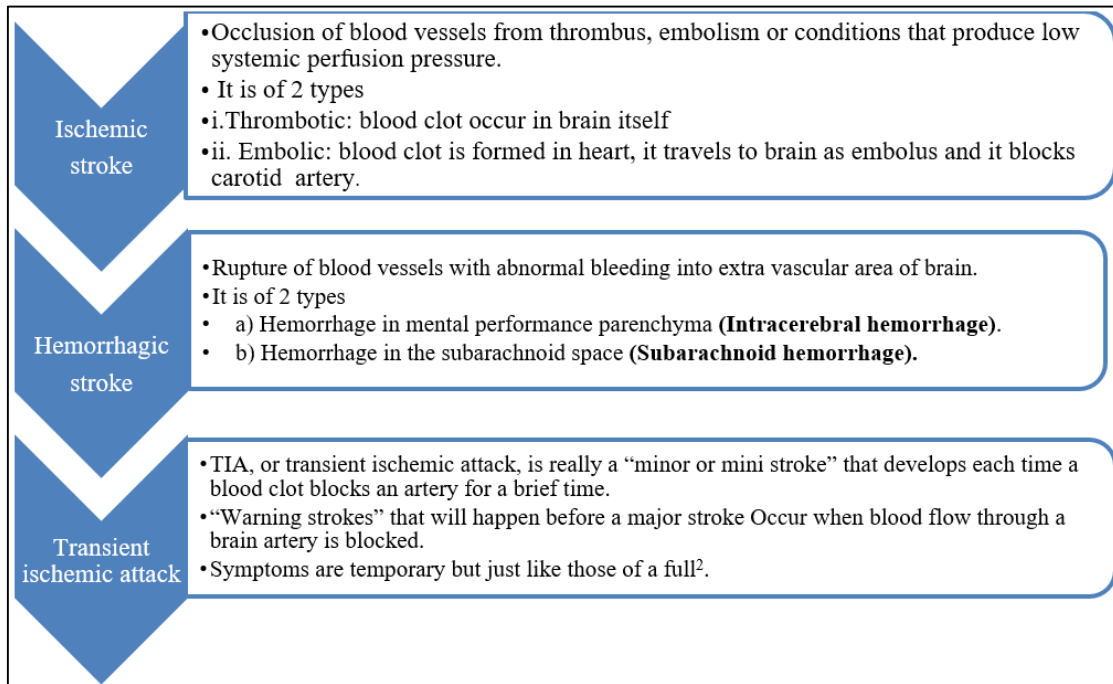


Fig 2: Types of Stroke

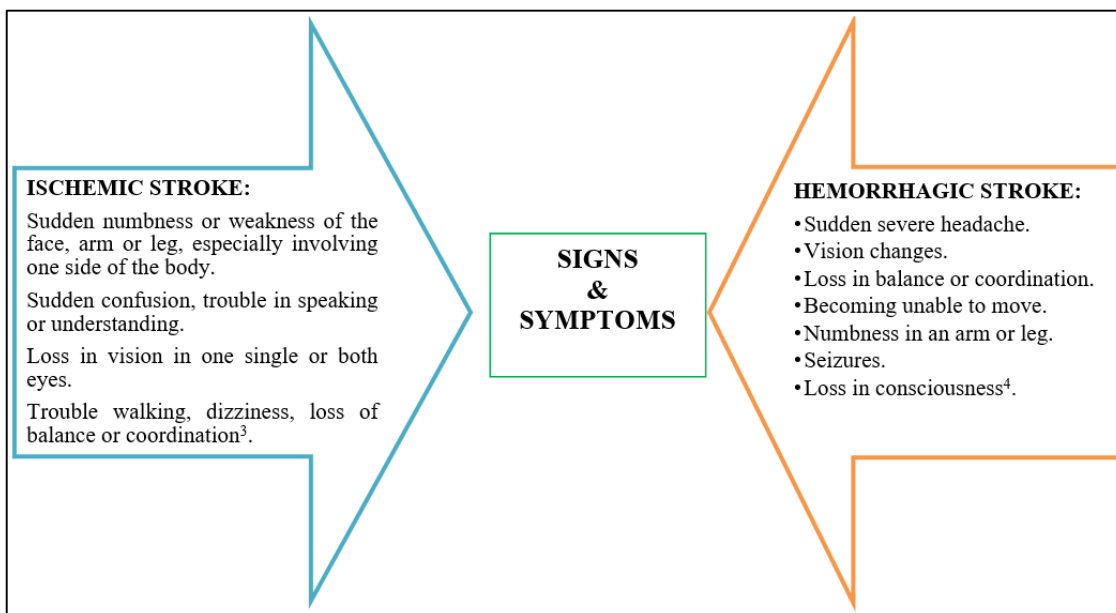


Fig 3: Signs & Symptoms of Stroke

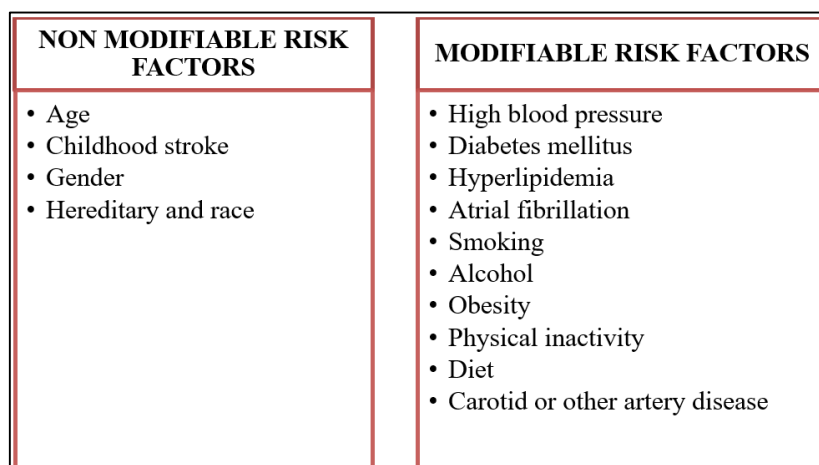


Fig 4: Risk Factors and Its Types

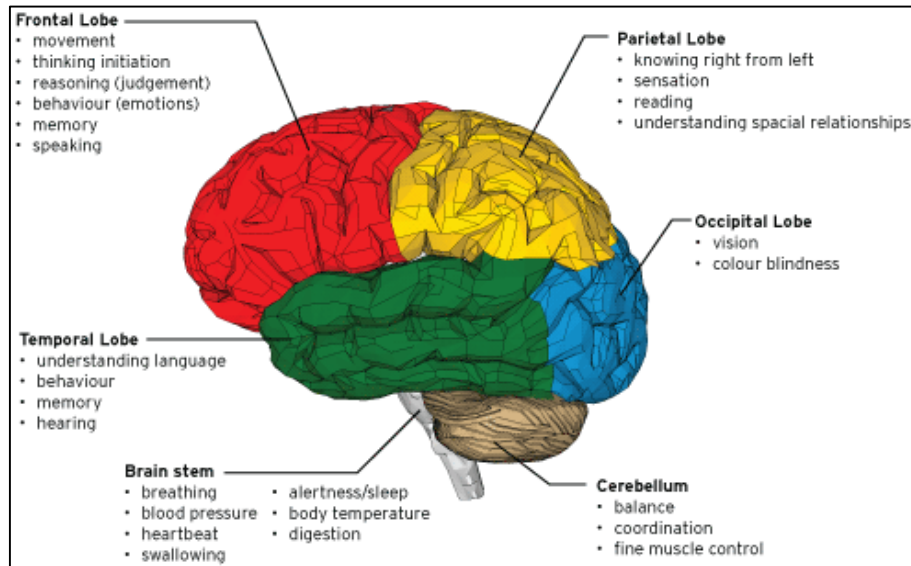


Fig 5: Areas of brain affected by stroke

Martin J O'Donnell *et al.*, aimed to establish the association of known and emerging risk factors with stroke and its primary subtypes and to assess the contribution of these risk factors to the burden of stroke and also explored the differences between risk factors for stroke and myocardial infarction. 78% with Ischemic stroke 22% with intracerebral haemorrhagic stroke, the combination of population-attributable risks (PAR) was found to be 90.3% for all stroke cases. Reduced blood pressure and smoking, and promoting the physical activity and a healthy diet, could substantially reduce the burden of stroke [5].

Deepadarshan Hulyappa *et al.*, performed a study to know the factors leading to stroke in young and outcome of these cases in a tertiary care hospital. 80.8% of them were in the age group of 30-45 years. Overweight and obesity 63.4% was the most common risk factor followed by Hypertension 50% and cigarette& tobacco use 40.3% Mortality rate was found to be 11.5% found that mortality of stroke in young cases was much less than stroke in older age group [6].

Sandhya Manorenj *et al.*, studied the prevalence, patterns, risk factors and outcome of stroke in women. Mean age of stroke in females was 57 years. Stroke was common in older women and ischemic stroke was the predominate type of stroke. Physical inactivity was the significant risk factor in women when compared to men. Women are more likely to be disabled after stroke than men [7].

Tobias Kurth *et al.*, dealt abouts smoking which is an established risk factor for ischemic stroke and subarachnoid hemorrhage (SAH), but the impact of smoking on intracerebral hemorrhage (ICH) is less clear. Never smokers and past smokers had equal rates of ICH and SAH. The effect of smoking on ICH is of about the same magnitude as the effect of smoking on ischemic stroke. Study suggests an increased risk of total hemorrhagic stroke, ICH, and SAH in current cigarette smokers with a graded increase in risk that depended on how many cigarettes were smoked [8].

Monodeep Biswas *et al.*, aims to compare risk factors and etiology of ischemic stroke in patients of Indian origin with those of the White-Americans. The commonest cause of ischemic stroke was small vessel occlusive disease, rather than large artery atherosclerosis among the White-Americans. When compared to White-Americans, The Indian-American developed stroke at a younger age, despite a lower rate of

alcohol and tobacco use [9].

Hossain MM *et al.*, evaluated the distribution of common medical conditions related to stroke among Bangladeshi patients. Most of the stroke events occurred after the age of 40 and the ischemic stroke being the most common. Hypertension, smoking, diabetes, tobacco use, and ischemic heart disease were five most common conditions related to stroke [10].

Salma N. Khan *et al.*, ascertained the frequency of risk factors for first ever stroke in patients. This study suggested that diabetes mellitus was more and underlying cardiac diseases less frequent in our patients than in the western reported series. Stroke patients consume a large part of health resources all over the world so accurate information about the incidence, risk factors, management and outcome [11].

Jayantee Kalita *et al.*, reported the etiology and predictors of outcome of ICH in young patients from North India. The mean age of the patients was 41.6 years and 23.8% were females. Hypertensive ICH patients had frequent death or disability. Hypertension is the commonest cause of ICH in young Indian adults and its outcome is related to volume of ICH [12].

Juan de Jesús Llibre *et al.*, estimated the prevalence of stroke and associated risk factors in adults aged ≥ 65 years in Havana City and Matanzas provinces, Cuba. Prevalence of stroke was 7.8%, and was higher in men. The risk profile identified includes classic risk factors plus anemia and APOE $\epsilon 4$ genotype [13].

Ernest Palomeras Soler *et al.*, reviewed data on epidemiology, pathophysiology and risk factors for both entities, considering the differences and similarities that could be found in between them. CHD and cerebrovascular disease share similar pathophysiological mechanisms and, consequently, many risk factors [14].

Shaheen Ahmed Mughal *et al.*, determined a single or multiple risk factors have a relative significance on the mortality and morbidity of stroke. Relative influence of individual risk factor or in combination was not statistically significant. The functional recovery showed no significant relative difference among patients with different risk factors [16].

Sapna E. Sridharan *et al.*, intended to assess incidence, types, risk factors, and outcome of stroke among urban and rural

dwellers of a South Indian community. One or more modifiable risk factors were identified in 90% patients. More rural male patients smoked tobacco. The case fatality rate was 24.5% for urban and 37.1% for rural populations. Compared to urban stroke patients, rural ones are less likely to be optimally investigated and treated [17].

Javed Akhter Rathore *et al.*, aimed to identify these risks factors for stroke. Various clinical variables have been investigated as risks factors of stroke. Study signifies the association of risks factors with acute stroke. Targeted interventions that reduce these risk factors could substantially reduce the burden of stroke [18].

Sabir Ali *et al.*, determined the frequency of risk factors in

patients with acute stroke at tertiary care hospital Bahawalpur. Mean age of patients was 56.79±13.943 years and was found that hypertension, diabetes mellitus, smoking and high cholesterol level were major modifiable risk factors in the development of stroke. Controlling of these risk factors might reduce the risk of stroke [19].

Suhail Ahmed Almani *et al.*, determined the frequency of various risk factors for stroke and its sub-types among males and females. In-hospital mortality was 09(09%). Mean age of patients was 56.89 years. Hypertension and smoking were the major risk factors for males, while diabetes mellitus and IHD were more common in females [20].

Table 1: Types of Stroke and Its Risk Factors Identified

S. No	Type	Risk Factors Identified as per the study	Investigations ordered	Reference
1.	Ischemic stroke and Intracerebral hemorrhagic stroke	Hypertension, Current smoking, Regular physical activity, Diabetes mellitus, Alcohol intake, Psychosocial stress, Depression, Cardiac causes, Apolipoproteins B to A1	Computed tomography (CT), Magnetic Resonance Imaging (MRI)	[5]
2.	Ischemic stroke and Hemorrhagic stroke	Age, Overweight & obesity (63.4%), Hypertension (50%), Cigarette smoking & tobacco chewing (40.38%), Alcohol consumption (36.5%), Diabetes mellitus (19.2%), Family history (13.5%), Dyslipidemia (9.6%), Cardiac diseases (9.6%).	Modified Rankin Scale, Computed tomography (CT)	[6]
3.	Ischemic stroke	Smoking(0%F, 62.31%M), Alcohol(22%F, 78%M), Hypertension(80%F, 84%M), Dyslipidemia (70%F, 70M), Physical inactivity (54%F, 15%M), Diabetes (38%F, 31%M), Prior stroke (12%F, 11%M), Co-morbid illness (25%F, 17%M)	Computed tomography (CT) head and Magnetic Resonance Imaging (MRI) Brain	[7]
4.	Intracerebral hemorrhagic and subarachnoid hemorrhagic stroke	Age, Blood pressure, Hypertension, Body mass index, Exercise, Alcohol consumption, Diabetes, History of high cholesterol, Family history of MI	Computed tomography (CT)	[8]
5.	Ischemic stroke	Age, Smoking (9.7% IASP, 28.2% AWSP), Alcohol intake(0 IASP, 11.8% AWSP), Physical inactivity (93.6%IASP, 61.1%AWSP), Diabetes mellitus 64.5%IASP, 35.2%AWSP), Atrial fibrillation (9.7%IASP, 22.5%AWSP). Hypertension (87.1%IASP, 79.3%AWSP), LDLcholesterol≥130mg/dl(38.7%IASP, 30.6%AWSP) CAD(35.5%IASP, 37.5%AWSP), PVD(3.2%IASP, 6.6%AWSP),Carotid stenosis > 70%(25.8%IASP, 20.5%WASP)	Glucose, Lipids and coagulation profile, CT scans, MRI, MRA, Carotid duplex, Holter monitoring, 2D transthoracic Echocardiogram	[9]
6.	Ischemic stroke and Hemorrhagic stroke	Age, Sex, Hypertension (57.6%), Diabetes mellitus (23%), IHD (17.1%), Obesity (10.6%), Smoking (44.6%), Tobacco use (24.3%), Dyslipidemia (5.3%), OCP use (8.7%)	Computed Tomography (CT) scan, Magnetic Resonance Imaging (MRI)	[10]
7.	Ischemic stroke and Hemorrhagic stroke	Hypertension (65.8%), Smoking (43%), Diabetes (41.3%), Heart diseases (29.1%), Family history (26.7%) High cholesterol (25.5%), TIA history (24.9%)	Computed Tomography (CT)	[11]
8.	Intracerebral hemorrhagic stroke	Age, Hypertension (77%), Use of coagulants (2%), SBP at admission (4%), DBP at admission (53), Brain stem ICH (6%), Blood sugar on admission (38%), Serum creatinine on admission (0.5%), Lobar ICH (18%) Large supratentorial ICH (14%)	Magnetic Resonance Imaging (MRI), Computed Tomography (CT), Digital Subtraction Angiography (DSA)	[12]
9.	Ischemic stroke and Hemorrhagic stroke	Age, Sex (65%F, 35%M), Education (≤6 grades 24.9%, ≥7 grades 75.1%), Smoker (45.1%) or Ex-smoker (54.%), History of alcoholism (7.5%), High blood pressure (55.2%), Diabetes(18.6%), Ischemic heart disease (30.3%), Dementia (10.9%), Anaemia (19.3%)	Magnetic Resonance Imaging (MRI), Computed Tomography (CT)	[13]
10.	Ischemic stroke and Hemorrhagic stroke	Age, Sex, Ethnicity, Genetic heredity, Uncommon related factor, Hypertension, Diabetes, Dyslipidemia, Smoking, Alcohol, Obesity, Physical activity, Diet, Atrial fibrillation, Other risk factors: Hyperhomocysteinemia, Hypercoagulability, Lipoproteins, Inflammatory markers, Obstructive sleep-apnea syndrome	Computed Tomography (CT)	[14]
11.	Ischemic stroke and Hemorrhagic stroke	Age, Hypertension	Computed Tomography (CT), National Health Institute of Stroke Scale (NHSS), Modified Ranking Scale (MRS)	[15]
12.	Ischemic stroke,	Hyper tension (58.3%), Diabetes mellitus (5%),	Computed Tomography (CT)	[16]

	intracerebral hemorrhagic stroke	Hyper tension + Diabetes mellitus (11.9%), Hyper tension + Ischemic Heart Disease (5.1%), Diabetes Mellitus + Ischemic Heart Disease (0.8%), Hypertension + Diabetes Mellitus + Ischemic Heart disease (2.0%), Ischemic Heart Disease (1.3%), VHD (1.5%)		
13.	Ischemic stroke, intracerebral hemorrhagic stroke & SA stroke	Hypertension (81.6%U, 89.0%R), Diabetes mellitus (48.7%U, 55.7%R), Smoking, (22.8%U, 39.3%R), Dyslipidemia(25.3) 29 (26.7), Atrial fibrillation (8.7%U, 4.9%R)	Computed Tomography (CT)	[17]
14.	Ischemic stroke and hemorrhagic stroke	Age, Sex (M-76.6%CI, 23.4%ICH) (F75.5%CI, 24.4%ICH), Hypercholesterolemia (75.2%CI, 24.8%ICH), Hypertension (72.4%CI, 27.6%ICH), Smoking(76.4%CI, 23.6%ICH), Cardiac Disease (77.4%CI, 22.6%ICH), Diabetes ((73.5%CI, 26.4%ICH), Atrial Fibrillation ((87.0%CI, 13%ICH)	Computed Tomography (CT) Echocardiography Modified Ranking Scale (MRS) GCS	[18]
15.	Ischemic stroke And Hemorrhagic stroke	Hypertension (56.3%CI,70.6%CH, 40%SAH), Diabetes mellitus (21.9%CI, 20.6%CH, 20%SAH), Smoking (21.9%CI, 16.2%CH, 10%SAH), Ischemic heart disease (7.8%CI, 5.9%CH,), Previous stroke (17.2%CI, 4.4%CH, 0%SAH), High cholesterol (10.9%CI, 17.6%CH,)	Computed Tomography (CT) Magnetic Resonance Imaging (MRI)	[19]
16.	Ischemic stroke and Hemorrhagic stroke	Hypertension (35% M, 24%F), Diabetes Mellitus (13%M, 16% F), Hypercholesteremia (9%M, 10% F), Smoking (18%M, 1%F), Sedentary Life Style (8%M, 9%F), Ischemic Heart Disease (6%M, 10%F), Previous Stroke (6%M, 6%F)	Computed Tomography (CT) Modified Resonance Imaging (MRI)	[20]
17.	Ischemic stroke And Hemorrhagic stroke	Hypertension (32.22%), Diabetes mellitus (11.37%), Hyperlipidemia (7.10%), Smoking (4.73%), Ischemic heart diseases (9%), Hypertension + Diabetes (12.79%), Hypertension+Hyperlipidemia (6.16%) Diabetes + Smoking (2.36%) Diabetes + Hyperlipidemia (5.68%) Hypertension + Smoking (3.76%) Atrial fibrillation (3.31%) Hypertension+Diabetes+Hyperlipidemia (0.47%) History of warfarin/heparin (0.00%)	Computed Tomography (CT)	[21]

Conclusion

Stroke is frequent, recurring, and is more often disabling than fatal. The importance of preventive measures for a disease that has identifiable and modifiable risk factors must be emphasized. A large international epidemiological study of stroke that requires routine neuro imaging is feasible in countries of low and middle income. Targeted interventions that reduce blood pressure, smoking, promote physical activity and a healthy diet, could substantially reduce the global burden of stroke. This article demonstrated the substantial role of risk factors like overweight & obesity, hypertension, cigarette smoking / tobacco consumption and alcohol consumption in stroke in young and its causes. In India and other developing countries, an alarming increase in the incidence of stroke has been observed owing to an increase in expected life with rising trends of those risk factors. Previous studies have shown a poor understanding of stroke among patients with established risk factors for stroke and in community at large. The stroke due to risk factors may be reduced but requires proper management and counseling of patients. Stroke can be prevented by maintaining healthy lifestyle and medications. Lifestyle recommendations include: Controlling high blood pressure (hypertension), Lowering the amount of cholesterol and saturated fat in your diet, Quitting tobacco use, Controlling diabetes, Maintaining a healthy weight, Eating a diet rich in fruits and vegetables, Exercising regularly, Drinking alcohol in moderation, Treating obstructive sleep apnea. Medications include: Anti-platelet

drugs (aspirin), Anticoagulants (heparin and warfarin, Coumadin, Jantoven). As study subjects were not aware regarding common risk factors and warning apparent symptoms of stroke, there is a need to develop health education modules, programs to improve the awareness of stroke both at primary and secondary healthcare levels, elimination of poverty, regular use of medication and changes in life style.

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