



ASSESSMENT OF TYPES AND ASSOCIATED FACTORS OF STROKE AMONG ADULT PATIENTS ADMITTED TO ADAMA HOSPITAL MEDICAL COLLEGE, ETHIOPIA

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ABSTRACT

Background: Stroke is the abrupt onset of a neurologic deficit and attributable to a focal vascular cause. It is an alarming issue and the third leading cause of deaths globally. Stroke was considered as a disease of developed nations, but now it becomes a top priority public health problem to developing countries. However, the situation in Adama Hospital Medical College (AHMC) is not known. Therefore, this study aimed to assess the types of stroke and associated factors among adult patients attended the medical department of AHMC, 2018.

Methods: An institution based cross sectional study was conducted from February 1, 2018 to January 30, 2018 among adult stroke patients admitted AHMC. An interviewer administered questionnaire was used to collect data and patient registration book also reviewed using data extraction guideline. Descriptive statistics was done for the variables and presented in tables, figures and text. Both bivariable logistic regression and multivariable logistic regression analysis was conducted. The variables which have significant association were identified on the bases of OR, with 95% CI and 0.05 p-values to fit in to the final model.

Result- Among 242 stroke patients admitted in AHMC was involved in the study. The findings of this study revealed that 64.3% of the respondents had Ischemic stroke while only 35.7%

Hemorrhagic stroke. Age ≥ 45 years [AOR: 2.88, 95% CI: 1.42, 5.83], illiterate [AOR: 0.17, 95% CI: 0.04, 0.71], primary school completed [AOR: 0.26, 95% CI: 0.07, 0.92] and with diabetic [AOR: 2.48, 95% CI: 1.03, 5.96] had significant association with ischemic stroke. On the other hand age ≥ 45 years [AOR: 2.44, 95% CI: 1.19, 4.99], illiterate [AOR: 6.38, 95% CI: 1.48, 27.49], primary school completed [AOR: 4.70, 95% CI: 1.28, 17.24], visit the clinic more than once per month [AOR: 2.96, 95% CI: 1.18, 7.45] and had hypertension [AOR: 2.29, 95% CI: 1.03, 5.09] had significant association with hemorrhagic stroke.

Conclusion and recommendation

The present study showed that ischemic stroke was the most common type among the study participants. Age, educational status, occupation and having diabetes were independent predictors of Ischemic stroke. Whereas: age, educational status, frequency visit of health facility, and being hypertensive were independent predictors of Hemorrhagic stroke. Stroke is becoming predominant problem for developed countries in general and in Ethiopia in particular. Therefore early identification and treatment of risk factors will improve prognosis and complications

Key words- *Ischemic stroke, hemorrhagic stroke, Stroke*

1. Back ground

Stroke or cerebro-vascular accident is defined clinically as a focal or global disturbance of cerebral function of sudden onset lasting 24 hours or longer or leading to death with no apparent cause other than that of vascular origin (1). It is widely recognized that strokes are a major cause of adult disability due to both the debilitating initial symptoms and in many cases the severe long-term impairment in activities such as walking and speech. In addition to physical disabilities, the detrimental effects also extend to significant emotional burden. Indeed, a large number of stroke survivors are reported to experience depression (2).

Stroke is one of the most common causes of morbidity and mortality worldwide (3). The global incidence of stroke is estimated to be approximately 15 million new strokes per year, two thirds of which occur in low- and middle-income countries (LMICs) (3-6). The most recent estimated stroke incidence rate in Africa is 316 per 100,000 with age standardized prevalence of 981 per 100,000 populations (7). Stroke ranks as the third leading cause of death worldwide, with 5.8 million fatal cases per year. It is now being recognized as an important cause of death in Sub-

Saharan Africa (SSA) (4). Although the exact prevalence and emergency burden of stroke in these communities are not known, it has been reported to be increasing. In Tikur Anbessa specialized Hospital (TASH), stroke accounted for 23.6% of all neurological admissions (8) and 5% of all head CT indications (9).

The two main forms of stroke are ischemic stroke, where there is a sudden blockage of a blood vessel, and hemorrhagic stroke, where there is a leakage of blood out of the vessel. Both of these dangerous and life threatening conditions are related, in some way, to heart health (10). The clinical risk factors which lead to stroke are: hypertension, DM heart failure, valvular heart disease coronary heart disease and atrial fibrillation. People with high levels of bad cholesterol (LDL) and low levels high density lipoprotein (HDL) have a greater risk of stroke. Foods that have a lot of saturated fats also can contribute to obesity that increases risk of getting stroke (6) Due to the demographic and epidemiologic shifts occurring in Ethiopia, increased prevalence of risk factors for stroke are anticipated. Therefore, studying risk factors is important to address the issues related to stroke.

2. Objective

2.1. General objective

To assess types and associated factors of stroke at Adama hospital medical college, 2019

2.2. Specific objectives

- To determine the types of stroke at Adama hospital medical college, 2019
- To identify associated factors at Adama hospital medical college, 2019

3. METHODS AND MATERIALS

3.1. Study Design and period

Institution based cross sectional study design will be used. The study will be conducted from February 1, 2018 – January 30, 2019

3.2. Source and study Population

3.2.1. Study Population

All patients attending at Adama Hospital Medical College

3.2.2. Study period

Those patients admitted in AHMC medical ward with the diagnosis of stroke from February 1, 2018 – January 30, 2018

3.3. Inclusion criteria

All patients admitted to AHMC during the study period who fulfill the World Health organization`s case definition of stroke were included in the study

3.4. Exclusion criteria

Those patients <18 years old and patient records with incomplete information were excluded from the study

3.5. Sample size determination and sampling technique

Total patients admitted to AHMC with the diagnosis of stroke from February 1, to January 30, 2018 included in the study.

3.6. Study variables

3.6.1. Dependent Variable

Types of Stroke

3.6.2. Independent variables:

Socio-demographic variables (sex, age, ethnicity)

Life style

Clinical variables (DM, HTN, atrial fibrillation heart failure, valvular heart disease)

3.7. Operational Definition

Stroke: It is clinically defined as per WHO criteria, as rapidly developing clinical signs of focal or global disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than vascular origin [7, 16, 19, 20].

Ischemic Stroke: It is evidence of a recent infarct in the clinically relevant area of the brain/confirmed cerebral infarction [15, 21].

Hemorrhagic Stroke: It occurs due to the weakening of blood vessel which would rupture and bleed into the surrounding brain tissues [22].

3.8. Data collection tool and procedure

An interviewer administered questionnaire was used for data collection. A questionnaire was prepared in English and translated into Amharic/Oromifa languages and back translated into English to check its consistency by different persons. The one in Amharic/Oromifa was pre-

tested on 10 patients in AHMC before the start of the actual data collection. Patients who were involved in pretest were not included in the actual study. Based on the findings, a necessary correction was made. Data was collected by 3 trained nurses who had data collection experiences.

3.9. Data quality assurance

To ensure the quality of data, one day training was given for data collectors. Before starting to collect data, pre-test and translation of questioner was done. Frequent follow-up was done by the principal investigator to check questionnaire for completeness and accuracy.

3.10. Data processing and analysis

Data was coded and entered into Epi Info version 7 and then exported to SPSS version 21 for analysis. The characteristics of study participants were explored using descriptive statistics. Bivariate and multivariate analyses were performed to test for associations. Variables having p value ≤ 0.25 in the bivariate analyses were entered into a multivariate analysis. Odds ratio was used to assess the strength of association and level of association determined by p. value $<0.05\%$.

3.11. Ethical considerations

This study was approved by AHMC Ethical Review Board. Then written letter was submitted to Adama Hospital Medical College medical director and Medical ward head and permission was obtained. After explaining the objective of the study verbal consent was obtained from each participant.

4. Result

4.1. Behavioral and clinical variables

This study identifies different behavioral and clinical variables. Among the study participants, 27.0% reported alcohol use and among those alcohol users 63.1% drink occasionally. Only 12.9% had history of diabetes and almost all of them have type 2. A quarter 24.1% of respondents had history of hypertension, 7.9% of respondent's level of cholesterol was high and 18.7% of them had heart problems (Table-2).

Table 1. Behavioral & clinical characteristics of respondents in AHMC, 2018

Variable	frequency	%
Alcohol		
No	176	73.0
Yes	65	27.0
If yes, how often		
Every day	13	20.0%
1 to 3 days/week	11	16.9
Occasionally	41	63.1
Diabetes		
No	210	87.1
Yes	31	12.9
If yes, type		
Type 1	1	3.2
Type 2	30	96.8
Hypertension		
No	183	75.9
Yes	58	24.1
Cholesterol		
No	222	92.1
Yes	19	7.9
Heart problem		

No	196	81.3
Yes	45	18.7

4.2. Types of stroke

Among all respondents the majority 64.3% had Ischemic stroke and the rest 35.7% had hemorrhagic stroke

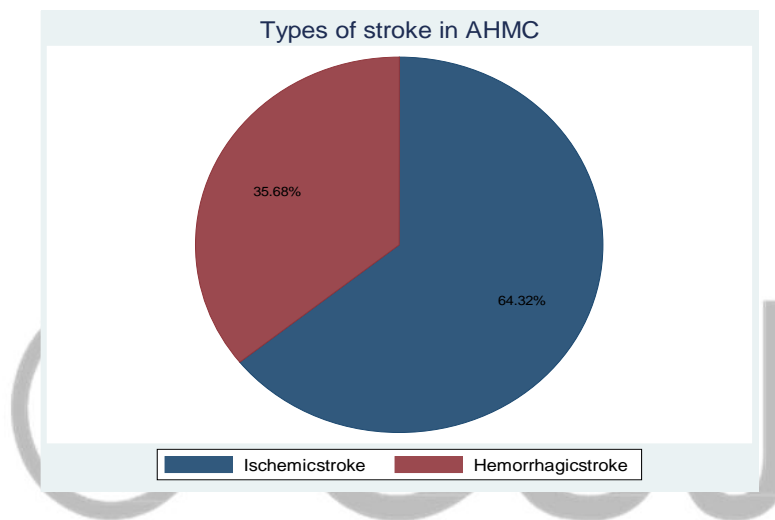


Figure 1. Types of stroke in Adama Hospital Medical College, 2018

4.3. Complications

Among the respondents 94.2% of the respondents developed at least one complication while they are on their course. Among this the most common complication was chest infection 29.1% followed by urinary retention or incontinence 22.4% (Figure 2).

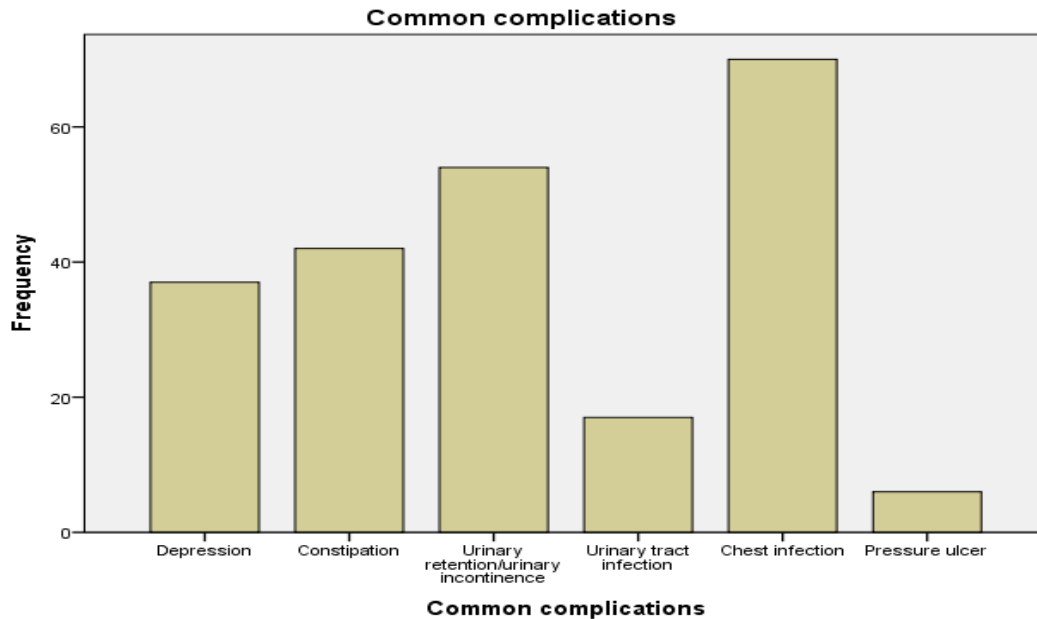


Figure 2. Common complication among stroke patients in AHMC, 2018

4.4. Factors associated with stroke

Both bivariate and multivariate logistic regression was done separately for Ischemic and Hemorrhagic stroke. The variables which had a p-value of < 0.25 in bivariate logistic regression entered in to multivariate logistic regression.

4.4.1. Ischemic stroke

In bivariate analysis variables like: age, educational status, marital status, occupation, Alcohol drinking status, being diabetes, having heart problem and hypertension had a p-value of < 0.25 with Hemorrhagic stroke. After controlling the confounding factors age, educational status and having diabetes were independent predictors of Ischemic stroke. Accordingly respondents whose age greater or equal to 45 were 2.88 times more likely to develop ischemic stroke compared with respondents less than 45 years of age [AOR: 2.88, 95% CI: 1.42, 5.83], on the other hand illiterate respondents were 83% less likely to develop Ischemic stroke compared with respondents who have diploma and above [AOR: 0.17, 95% CI: 0.04, 0.71] and respondents who were completed primary school were 74% less likely to develop ischemic stroke compared with respondents have diploma and above [AOR: 0.26, 95% CI: 0.07, 0.92] and Respondents who had diabetes mellitus were 2.48 times more likely to develop ischemic stroke compared with respondents who do not had diabetes [AOR: 2.48, 95% CI: 1.03, 5.96] (table 4).

Table 2- Crud and adjusted analysis of Factors associated with the presence of ischemic stroke in AHMC, 2018

Variables	Ischemic stroke		COR(95% CI)	AOR (95% CI)	P-value <0.05
	Yes	No			
Education					
Illiterate	40	34	0.49(0.29, 1.25)	0.17(.04, 0.71)	0.015
Primary	35	18	0.80(0.21, 1.44)	0.26(0.07, 0.92)	0.037
Secondary	17	8	0.88(0.25, 0.92)	0.41(0.11, 1.48)	0.173
Diploma & above	63	26	1	1	
Age					
20-44	84	60	1	1	
≥45	71	26	1.95(1.11, 3.41)	2.88 (1.42, 5.83)	0.003
Marital status					
Married	94	34	1	1	
Single	36	18	2.20(1.07, 4.54)	1.21(0.48, 3.04)	0.690
Divorced	17	8	2.93(0.94, 9.17)	2.34(0.61, 8.17)	0.223
Widowed	63	26	6.61(0.82, 53.37)	5.88(0.65, 53.09)	0.115
Occupation					
Gove. Employed	38	29	0.23(0.06, 0.86)	0.27(0.07, 1.09)	0.067
Farmer	51	31	0.29(0.08, 1.07)	0.99(0.16, 6.29)	0.995
Self employed	35	14	0.44(0.11, 1.74)	0.99(0.19, 5.17)	0.997
Student	11	1	1.94(0.18, 21.1)	3.79 (0.27, 53.3)	0.323
House wife	3	8	0.07(0.01, 0.40)	0.28(0.03, 2.59)	0.265
NGO employed	17	3	1	1	
Visit frequency					
More than once per month	22	25	0.36(0.17, 0.74)	0.46(0.19, 1.11)	0.083
Every month	41	28	0.59(0.31, 1.15)	0.66(0.29, 1.45)	0.298
Once in 2 months	28	7	1.63(0.63, 45.18)	1.94 (0.69, 5.39)	0.203
Once in 3 or more months	64	26	1	1	
Hypertension					
Yes	41	17	0.68(0.77, 2.77)	0.60(0.28, 1.31)	0.236
No	114	69	1	1	
Diabetes					
Yes	12	19	3.37(1.55, 7.36)	2.48 (1.03, 5.96)	0.043
No	143	67	1	1	

4.4.2. Hemorrhagic stroke

After controlling the confounding factors age, educational status, visit frequency, and being hypertensive were independent predictors of Hemorrhagic stroke.

Accordingly respondents whose age greater or equal to 45 were 2.4 times more likely to develop hemorrhagic stroke compared with respondents less than 45 years of age [AOR: 2.44, 95% CI: 1.19, 4.99]. Respondent's education has also significant association with hemorrhagic stroke. In this regard illiterate and respondents with primary education were 6.4 and 4.7 times more likely to develop hemorrhagic stroke compared with respondents with secondary and more [AOR: 6.38, 95% CI: 1.48, 27.49] and [AOR: 4.70, 95% CI: 1.28, 17.24] respectively. Respondents who had visit at clinic more than once per month were 2.9 times more likely to develop Hemorrhagic stroke compared with respondents who visit clinic once every three or more months [AOR: 2.96, 95% CI: 1.18, 7.45], respondents who had hypertension were 2.3 times more likely to develop Hemorrhagic stroke as compared to who had no hypertension [AOR: 2.29, 95% CI: 1.03, 5.09]

Table 3 Crud and adjusted analysis of Factors associated with the presence of ischemic stroke in AHMC, 2018-

Variables	Hemorrhagic stroke		COR(95% CI)	AOR (95% CI)	P-value
	Yes	No			
Age					
20-45 years	60	84	1	1	
≥45 years	26	71	1.95(1.12, 3.41)	2.44(1.19, 4.99)	0.015
Education					
Illiterate	34	40	2.06(1.08, 3.93)	6.38(1.48, 27.49)	0.013
Primary	18	35	1.25(0.60, 2.58)	4.70(1.28, 17.24)	0.019
Secondary	8	17	1.14(0.44, 2.97)	2.34 (0.63, 8.71)	0.204
Diploma & above	26	63	1	1	
Marital status					
Married	69	94	1	1	
Single	12	36	0.45(0.22, 0.94)	0.81(0.32, 2.03)	0.652
Divorced	4	16	0.34(0.11, 1.06)	0.44(0.12, 1.58)	0.212
Widowed	1	4	0.15(0.02, 1.22)	0.13(.01, 1.18)	0.071
Occupation					
Gove. Employed	29	38	4.32(1.16, 16.7)	4.16(0.99, 17.4)	0.050
Farmer	31	51	3.44(0.93, 12.7)	1.12(0.17, 7.39)	0.903

Self employed	14	35	2.27(0.57, 8.96)	1.02(0.19, 5.49)	0.984
Student	1	11	0.52(.005, 5.60)	0.27(0.02, 3.94)	0.336
House wife	8	3	15.1(2.47, 92.1)	4.24(0.45, 40.2)	0.209
NGO employed	3	17	1	1	
Visit frequency					
More than once per month	25	22	2.79(1.35, 5.81)	2.96(1.18, 7.45)	0.021
Every month	28	41	1.68(0.87, 3.26)	1.85(0.85, 4.01)	0.119
Once in 2 months	7	28	0.61(0.24, 1.58)	0.52(0.19, 1.43)	0.205
Once in 3 or more months	26	64	1	1	
Hypertension					
Yes	17	41	1.46(0.77, 2.77)	2.29 (1.03, 5.09)	0.042
No	69	114	1	1	
Heart problems					
Yes	19	12	3.38(1.55, 7.36)	2.12(0.90, 4.97)	0.084
No	67	143	1		

5. Discussion

Globally non-communicable diseases (NCDs) are recognized as the leading cause of morbidity and mortality which accounting for more than 60% of all deaths, including 80% in developing countries (46, 47). The two main forms of stroke are ischemic stroke, where there is a sudden blockage of a blood vessel, and hemorrhagic stroke, where there is a leakage of blood out of the vessel. Both of these dangerous and life threatening conditions are related, in some way, to heart health (7). Although there is no nationally conducted research assessment on the magnitude of stroke in Ethiopia, some hospital based researches indicated that there are an increased number of stroke patients from time to time.

This is the first study on stroke in AHMC focusing on the types and factors associated with it. The majority 64.3% (95% CI: 58.1, 70.1) of the respondents had ischemic stroke and 35.7% (95% CI 29.9, 41.9) had hemorrhagic stroke. The findings of this research were comparable with studies conducted in Northern Ethiopia 55.6% (34), Gondar University hospital 69.4% (37), Felegehiwot Hospital, Bahir Dar 56.7% (20), Shashemene Hospital 65.8% (35), Zambia 65% (44). This could be due to similarities in the study subject's soci-demographic characteristics, the methods used and sample size used in the studies.

On the contrary, Hemorrhagic stroke were more prevalent in a study done St. Paulos hospital Addis Ababa 61.3% (48), Black Lion hospital 57% (17) and Jimma hospital 51.7% (49). This difference may be the result of difference in study designs, hospital admission bias or differences in availability of diagnostic procedures, socioeconomic and risk factor profiles between the populations. The other possible differences could be differences in methodology in most of the above card review were done, but in this study a one year prospective data collection were made.

Our study found an ischemic to hemorrhagic stroke ratio of 1.82. Other hospital-based studies in Tertiary hospital, Northern Ethiopia found similarly low ischemic to hemorrhagic ratios of 1.72 (34), Addis Ababa, Ethiopia 1.58 (9), 0.63 (24), and 1.33 (17) while a study in Gondar, Ethiopia found 2.27 (37). Furthermore, a hospital based study in Kenya found an ischemic to hemorrhagic ratio of 1.06 and a hospital-based studies in Nigeria found 1.62 (50). This suggests that ischemic stroke is still the most common form of stroke in sub-Saharan Africa.

On the contrary hemorrhagic stroke is relatively more dominant in other parts of the world. For example, the American Heart Association estimates a ratio of 7.33 among the North American population (51). Dietary, environmental, and genetic factors probably play important roles in these differences, as well as a higher prevalence of untreated hypertension in sub-Saharan African populations. As the health and lifestyle of the Ethiopian population transitions, the pattern of CVD may also shift towards a pattern dominated by ischemic stroke.

Factors associate with stroke

In this study age, educational status, occupation and having diabetes were independent predictors of Ischemic stroke. Whereas: age, educational status, visit frequency, and being hypertensive were independent predictors of Hemorrhagic stroke.

In this study respondent's whose age greater or equal to 45 years were more likely to develop ischemic stroke compared with 45 years of age. The findings of this research was in line with studies conducted in Felegehiowt Hospital (20) and North West Ethiopia Gondar (37) older age (>50 years old) was factor associated with stroke. Age and chronic diseases have direct correlation due to physiology/biological, environmental and life style/behavior related factors. As a result of this fact, there is higher healthcare seeking complains/frequent facility visit and poor healthcare service satisfaction among elders in most of the time.

One hypothesis we found most plausible is that education may protect against disease by influencing lifestyle behaviors, problem-solving abilities and values (52). Such skills and assets that may accompany higher educational attainment include positive attitudes about health, access to preventive health services (53-55), membership in peer groups that promote the adoption or continuation of positive health behaviors, and higher self-esteem and self-efficacy (56, 57).

Low educational attainment may probably translate into a low income. More than a quarter of our patients had no basic education. In this research respondent's educational status had significant association with ischemic and hemorrhagic stroke. However, the level of significance was opposite. The finding showed low level of education was preventive in ischemic stroke whereas respondents with low level of education had increased risk of developing hemorrhagic stroke. The reason for this difference could be when there is higher educational attainment control rates of hypertension and diabetes will increase gradually. The relationship between high hemorrhagic stroke incidence and low educational status found in this study, has not been fully elucidated, but may be related to inequalities in access to health care that need for hypertensive patients, poor adherence to treatment, as well as dietary factors.

Diabetes is a well-established risk factor for stroke. It can cause pathologic changes in blood vessels at various locations and can lead to stroke if cerebral vessels are directly affected. Diabetes is an important modifiable risk factor for stroke, especially ischemic strokes. Hyperglycemia during the acute stroke phase is associated with poor outcomes in both ischemic and hemorrhagic strokes. In this research people with diabetes mellitus were found to be in higher chance to get stroke than non-diabetic patients. This is because both diabetes and cardiac cases have a direct impact on circulation and can cause stroke. These co-morbidities were also reported as factors to stroke by several studies elsewhere (17-19, 21).

In this study hypertension has a significant association with hemorrhagic stroke. This finding is consistent with studies conducted by different researchers (15, 37, 50) Tanzania (58) and Cuba (43) where hypertension was the most common risk factor to stroke. Different studies identified hypertension by far the most common modifiable risk factor for hemorrhagic stroke. Even though we haven't assessed the treatment history, our experience and other studies from SSA tells us that most patients with hypertension are either previously undiagnosed or are not appropriately treated.

6. Conclusion and recommendation

Conclusion

The present study showed that ischemic stroke is the most common type among the study participants. Age, educational status, occupation and having diabetes were independent predictors of Ischemic stroke. Whereas: age, educational status, frequency visit of health facility, and being hypertensive were independent predictors of Hemorrhagic stroke. .

Recommendations

Stroke is becoming predominant problem for developed countries in general and in Ethiopia in particular. Therefore early identification and treatment of risk factors will improve prognosis and complications. Strategies at Health facilities by far community awareness for early screening and management of risk factors like hypertension and Diabetes mellitus should be given priority.

ACKNOWLEDGEMENT

My great thank goes Daniel G/tsadik for his continuous support, constructive comments throughout the study. Grateful thanks to staff members of AHMC, data collectors, and study participants for their cooperation in the success of this work .My wife, Sr Shasho Negassa for generating new ideas and continuous support.

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