NON-MODIFIABLE FACTORS ASSOCIATED WITH MEDICATION-ADHERENCE AMONG STROKE SURVIVORS IN LAGOS STATE, NIGERIA

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ABSTRACT: *Stroke is the world's second most common cause of mortality and the third most common cause of morbidity and disability. Recurrent strokes make up a significant number of stroke admissions to the emergency room. This condition is largely preventable by identifying and addressing the risk factors involved. Hence, this study examined the non-modifiable risk factors associated with medication adherence among stroke survivors in Lagos state, Nigeria. A descriptive cross-sectional survey was conducted using a multistage sampling technique, including 386 stroke survivors from 10 stroke rehabilitation facilities in Lagos state. A validated structured interviewer-administered questionnaire was used for data collection. Data were analyzed using descriptive statistics, Chi-square and Binary logistic regression at a significance level of 5%. The participants' mean age was 52.42 ± 12.143. Results showed that participants aged 51-60years were more likely to adhere to their medication than other age groups. The result also showed no association existed between the age of stroke survivors and medication adherence (OR = 1.119, CI = 0.941-1.332, p = 0.549), ethnicity and medication adherence (OR = 1.176, CI 0.89-1.55, p = 0.211), and the gender (OR = 1.147, CI = 0.748-1.761, p = 0.665). However, there is a significant association between number of stroke and medication adherence (OR = 0.699, CI = 0.499-0.980, p = 0.038). This study's findings highlight important gaps in the factors that influence and are associated with medication adherence. Therefore, other non-modifiable factors asides from the ones assessed in this study should be researched.*

KEYWORDS: Medication adherence, Stroke, Risk factors, Recurrent stroke.

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INTRODUCTION

Stroke is an overwhelming and incapacitating disease. It is the second leading cause of death worldwide and the third leading cause of morbidity and disability (Benjamin, Virani, & Gallaway, 2018). Despite the fact that stroke is mostly avoidable, the global incidence of stroke is increasing and knowledge of the risk factors is still poor (Feigin, 2014). Stroke has not been considered a concern in healthcare until lately (Thrift, 2014). The Global Burden of Disease data that was published in 2019 indicate that one in four people have had a stroke in their lifetime (Global Burden of Disease Stroke Collaborators, 2019). Each year, 9.6 million ischemic strokes and 4.1 million hemorrhagic strokes (including intracerebral and subarachnoid hemorrhage) are estimated to occur worldwide, with a relatively stable incidence adjusted for age in high-income countries but an increasing incidence in low and middle-income countries (GBD Stroke Collaborators, 2019). With an older population, the absolute incidence is likely to rise. In Nigeria, older research by Osuntokun et al. (1979) found low prevalence rates, however more recent studies have found higher prevalence rates (Danesi, Okubadejo & Ojini, 2007; Enwereji, Nwosu, Ogunniyi, Nwani & Asomugha, 2014; Onwuchekwa, Tobin-West, & Babatunde, 2014; Ezejimofor, et al., 2017; Sanya, et al., 2015). Danesi et al. (2007) reported a 1.14/1000 incidence rate. Stroke accounts for 64.9% to 77.6% of neurological admissions in Nigeria, according to hospital-based studies (Obiakor, Opara & Oguniyi, 2011; Eze & Kalu, 2014; Ezeala-Adikaibe, et al., 2014; Ekenze, Onwuekwe & Ezeala-Adikaibe, 2010). In Nigeria, the increased prevalence of stroke reflects the high prevalence of hypertension, diabetes, HIV/AIDS, and other stroke risk factors in the community (Ezeala-Adikaibe, et al., 2018; Ezeala-Adikaibe, et al., 2014; Ezeala-Adikaibe, et al., 2015)

It has been established that there is a link between stroke (main risk factors for stroke) and socioeconomic position (Grimaud, et al., 2011; Krishnan, Cozier, Rosenburg & Palmer, 2010). There are several risk factors for stroke, both modifiable (e.g., food) and non-modifiable (e.g., comorbid illnesses, age, race, etc). Short-term hazards or triggers (e.g., viral events, sepsis, and stress), intermediate-term risk factors (e.g., hypertension and hyperlipidemia), and long-term risk factors (e.g., hypertension and hyperlipidemia) are all examples of risk factors for stroke (e.g., sex and race). Other modifiable risk factors are alcohol consumption, smoking, and oral contraceptive use. Stroke risk factors in young people are likely to differ from those in older people. Improved management of stroke risk factors is well established to contribute to more effective stroke treatment and prevention. Many stroke survivors, especially those with a history of hypertension, come with a recurrent stroke at hospitals due to a lack of knowledge about recurrent stroke and non-adherence to treatment regimens (Sug-Yoon, Heller, Levi, Wiggers & Fitzgerald, 2001). According to a study conducted at Lagos University Teaching Hospital (LUTH), ischemic stroke has a higher rate of recurrence and is more likely to recur within the first two years of the first stroke. Similarly, a large proportion of ischemic stroke patients on antiplatelet medication were not on doses adequate for secondary prevention (Owolabi, et al., 2015). This indicates the importance of adherence in the prevention of a recurrent stroke.

The key risk factors for recurrent stroke are the same as those for stroke onset. A stroke survivor's susceptibility to recurrent stroke is increased by these risk factors. Rafie, Kaveyani and Choghakabodi (2019) studied the risk factors for recurrent stroke in a retrospective hospital-based research. Hypertension (63.8 %), Ischemic Heart Disease (48.28 %), atrial fibrillation (36.2 %), Diabetes mellitus (32.76 %), dyslipidemia (22.41 %), cigarette smoking

(15.52 %), and Heart Failure (12.07 %) were discovered to be risk factors, accordingly. Although patients with recurrent ischemic stroke had a higher mean age, the difference was not significant. Another research in Hamadan identified hypertension, diabetes mellitus, and heart disease to be the leading risk factors for a recurrent stroke (Mazdeh, Torabian & Zafari, 2012). Despite the fact that hypertension, diabetes, and heart disease have been identified as risk factors for restroke, Mazdeh, et al. (2012) did not assess the incidence rate of the risk factors in patients with and without recurring stroke. Hypertension, atrial fibrillation, and heart valve disease were revealed to be the most important risk factors for recurrent stroke (Shamsaee, Tavangar, Chitsaz, Akbari & Saadatnia, 2012). In a study of individuals with repeated ischemic stroke in Germany, cardio-embolic causes were found to be a prevalent cause of ischemic stroke recurrence (Wolf, Sauer, Hennerici & Chatzikonstantinou, 2013).

According to a study conducted in the United States, AF and hypertension were the risk factors that led to a higher probability of ischemic stroke recurrence when considered separately (Lai, Alter, Friday & Sobel, 2000). In contrast, a research in Spain found that age was the only predictor that predicted stroke recurrence (Modrego, Mainar & Turull, 2004). AF is a frequent complication in all studies and can be fatal in cases of ischemic stroke, although it can be avoided. A yearly ischemic stroke recurrence rate of 7.1 percent was also observed in a London research, with history of myocardial infarction and AF as the outcomes of the increased risk of recurrence (Mohan et al., 2009). Previous transient ischemic stroke, atrial fibrillation, excessive alcohol intake, and hypertension were shown to be the highest risk factors in an Australian survey (Hankey, 2003). Hypertension, diabetes, IHD, dyslipidemia, AF and cigarette smoking were shown to be the most prominent risk factors in a Turkish research (Kocaman, Dürüyen, Koçer & Asil, 2015).

The most prevalent risk factors in a Chinese research were AF, hypertension and cigarette smoking (Wang et al., 2016). This is similar to the Turkish research. Even in some developed countries, cardiac factors and particularly atrial fibrillation have been identified as risk factors for ischemic stroke recurrence. However, certain disparities in risk variables for stroke recurrence were discovered, which might be ascribed to differences in active follow-up and disease management (Rafie, Kaveyani & Choghakabodi, 2019). For example, AF necessitates ongoing collaboration between the patient and healthcare providers. As a result, by concentrating on better treatment of AF, ischemic stroke and IHD, as well as aggressive follow-up, the incidence of recurrent ischemic stroke can be minimized (Rafie, Kaveyani & Choghakabodi, 2019). However, according to previous research, there has been no study in Nigeria that has documented medication adherence in relation to the non-modifiable risk factors listed in this study among stroke survivors in the prevention of recurrent stroke. Hence, the gap needs to be filled. Overall, this study therefore sought to explore non-modifiable risk factors that are associated with medication adherence in the prevention of recurrent stroke among stroke survivors in Lagos State, Nigeria.

METHODOLOGY

Study Design

A cross-sectional descriptive survey was carried out using a multistage sampling technique to select the participants. Participants were selected from ten randomly selected Local Government Area in Lagos State of which one stroke rehabilitation facility was picked from each. The study made up of 403 respondents who voluntarily participated. The sample size was determined using Leslie Kish formula for sample size. The study included only stroke survivors that have consented to participating in the research, that have had stroke within 0-24months to the date of the research, that are not in critical condition and that are 18yrs or older at the time of the research. While the study excluded the following: Stroke survivors that have had stroke more than 2 years to the date of the research; and stroke survivors with comorbidities such as diabetes mellitus and hyperglycemia, sensory impairment, and history of depression or any mental illness and stroke survivors that are not fit to respond clearly.

Research Instrument and Data Collection

The study utilized a structured interviewer administered questionnaire for data collection. The research instrument was pre-tested to ensure internal consistency and validity. The questionnaire was translated to Yoruba (the local language of the host community) in the case of those who do not understand English. This study was carried out with the help of two professional research assistants and two staff of each facility used. Incentives were given to the staff of the facility for helping coordinate the data collection process. The study was conducted between May 2, 2022 and May 15, 2022. Only 386 copies of the 403 questionnaires distributed were retrieved.

Study Variables

The independent variable is non-modifiable risk factors of stroke survivors. The dependent variable was the medication adherence level of stroke survivors.

Data Analysis

The data from this study were coded and analyzed with the IBM Statistical Product for Service Solution (SPSS) version 23. Descriptive and inferential statistics were conducted at a significant level of $P < 0.05$. Chi-square and regression analysis were also done to test the hypothesis.

Ethical Consideration

The Babcock University Health Research Committee (BUHREC) was consulted for ethical approval. Before participating in this study, each responder was asked to give their informed consent. The confidentiality of the responders was guaranteed by the researcher. The participants were not required to write their names, addresses, or any other significant information on the survey instrument. In addition, participants responded to the questionnaire on their own accord and were not forced to do so as they could stop participating at any time if they don't want to. The value of the participant to the study was explained to them, along with the research's goal, methodology, and advantages of participation, but the final choice to join

was left up to the person without any pressure. Finally, the respondents' privacy were protected while they filled out the questionnaires.

RESULTS

This study recruited four hundred and three participants during data collection, however, three hundred and eighty-six responses were utilized and analyzed for this study. This was due to the missing and incomplete filling of instrument, which rendered the instrument invalid for analysis. The response rate for this study therefore was 94%.

Socio-demographic Characteristics of stroke survivors

The proportion of the respondents in the age distribution showed that age group 51 – 60 years had the highest proportion (n = 28.5%) while there were 96 respondents (24.9%) between the ages of 61 to 70 years and only 10 (2.6%) respondents were between the ages 20 and 30 years. Two hundred and thirty-four of the respondents identified as males and 152 (39.4%) were females. The ethnic distribution showed that there were 153 (39.5%) respondents who were Yoruba; 140 (36.3%) were Igbos and 93 (24.1%) were Hausas. Over half of the respondents, 227 (8.8%) reported to have had two episodes of stroke while 105 (27.2%) respondents had only had one episode and 54 (14%) had experienced more than two episodes. Before the respondents' stroke, 210 (54.4%) were living alone; 142 (36.8%) lived with caregivers and only 34 (8.8%) lived with other people. After experiencing stroke, only 73 (18.9%) lived alone, 264 (68.4%) lived with caregivers and 49 (12.7%) lived with others (See Table 1).

Table 1: Distribution of Respondents' Socio-demographic Characteristics

S/N	VARIABLES	Frequency (n)	Percentage (%)
		N-value=386	
1	**Age**		
	20 – 30 years	10	2.6
	31 – 40 years	70	18.1
	41 – 50 years	86	22.3
	51 – 60 years	110	28.5
	61 – 70 years	96	24.9
	71 – 80 years	14	3.6
	Total	**386**	**100**
	Mean ± SD	**52.42 ± 12.143**	
2	**Gender**		
	Male	234	60.6
	Female	152	39.4
	Total	**386**	**100**
3	**Ethnicity**		
	Yoruba	153	39.6
	Igbo	140	36.3
	Hausa	93	24.1
	Total	**386**	**100**
4	**Number of Stroke**		
	Once	105	27.2

	Twice	227	58.8
	More than twice	54	14
	Total	**386**	**100**
5	**Living Arrangement Before Stroke**		
	Living Alone	210	54.4
	With Caregivers	142	36.8
	With Others	34	8.8
	Total	**386**	**100**
6	**Living Arrangement Before Stroke**		
	Living Alone	73	18.9
	With Caregivers	264	68.4
	With Others	49	12.7
	Total	**386**	**100**

Medication-Adherence of Stroke Survivors

The scale for the assessment of respondents' medication adherence was adapted from the Medication Adherence Report Scale (MARS-5). This was measured on a 40-point rating scale. Twenty-five respondents (6.5%) specified that they always took their medications only when they needed it while a third (33.7%) rarely practiced that and 121 (31.35%) sometimes did. About a quarter of the respondents (24.4%) reported that they took their medications only when they remember and 173 (44.8%) respondents sometimes practiced while 26 (6.7%) always did. Fourteen respondents (3.6%) specified that they always avoided taking their medications when traveling while 71 (18.4%) reported to occasionally do that and 146 (37.8%) sometimes did. Only forty-six respondents specified that even while busy, they never missed to take their medications while 106 (27.5%) rarely missed, 145 (37.6%) sometimes missed and 13 (3.4%) always missed. Only 35 (9.1%) respondents reported that they never altered their doses while 122 (31.6%) rarely did and 17 (4.4%) always did.

About a quarter of the total population (25.4%) specified that they rarely took their medications exactly as prescribed while 123 (31.9%) sometimes did, 98 (25.4%) occasionally did and 29 (7.5%) always did. Twenty-two respondents (5.7%) always missed a dose; 132 (34.2%) sometimes did and 91 (23.6%) occasionally did. Thirty respondents (7.8%) reported that they always take the medications more than was instructed to them while 100 (25.9%) sometimes did and 55 (14.2%) never did. Only 72 (18.7%) of the respondents never took less than was instructed for them to take of their medications while 86 (22.3%) rarely did, 81 (21%) respondents occasionally did and 50 (13%) always did (See Table 2)

Table 2: Respondents' Distribution of Medication Adherence (*n=386*)

	Questions	N	R	S	O	A
1	I take my medications only when I need it	74 (19.2)	130 (33.7)	121 (31.3)	36 (9.3)	25 (6.5)
2	I take my medications regularly everyday	29 (7.5)	94 (24.4)	173 (44.8)	64 (16.6)	26 (6.7)
3	I avoid taking it if I can	41 (10.6)	114 (29.5)	146 (37.8)	71 (18.4)	14 (3.6)
4	I forget to take it	46 (11.9)	106 (27.5)	145 (37.6)	76 (19.7)	13 (3.4)
5	I alter a dose	35 (9.1)	122 (31.6)	139 (36)	73 (18.9)	17 (4.4)
6	I stop taking it for a while	36 (9.3)	102 (26.4)	129 (33.4)	101 (26.2)	18 (4.7)
7	I take it exactly as prescribed	38 (9.8)	98 (25.4)	123 (31.9)	98 (25.4)	29 (7.5)

8	I miss out a dose	51 (13.2)	90 (23.3)	132 (34.2)	91 (23.6)	22 (5.7)
9	I take it more than instructed	55 (14.2)	108 (28)	100 (25.9)	93 (24.1)	30 (7.9)
10	I take it less than instructed	72 (18.7)	86 (22.3)	97 (25.1)	81 (21)	50 (13)

Level of Respondents' Medication Adherence

The level of the respondents' medication adherence was computed on a 40-point rating scale with a mean (SE) of 21.56 (0.245) and a standard deviation of 4.816. The distribution of respondents showed that only 8 (2.1%) respondents had poor level of adherence; 147 (38.1%) had average level; 220 (57%) had a good level and 11 (2.8%) had a very good level of adherence.

Table 3: Level of Respondents' Medication Adherence

Medication Adherence	Frequency		Measure	Mean	SE	SD
	N	%				
Poor	8	2.1	40 points	21.560	0.245	4.816
Average	147	38.1				
Good	220	57				
Very Good	11	2.8				
Total	386	100				

Association between Variables

The association between the independent and dependent variable were tested using the Chi-square test of independence. Results showed no association existed between the age of stroke survivors and medication adherence (X^2 = 4.004, p = 0.549), ethnicity and medication adherence (X^2 = 3.111, p = 0.211) and the gender (X^2 = 0.187, p = 0.665). Although, an association was found between number of stroke and medication adherence (X^2 = 4.950, p = 0.038). Further analysis was carried out using binary logistic regression. Results showed that ethnicity of the stroke survivors was the strongest predictor to medication adherence (OR = 1.176, CI 0.89-1.55, p = 0.211) followed by gender (OR = 1.147, CI = 0.748-1.761, p = 0.665), age (OR = 1.119, CI = 0.941-1.332, p = 0.549) and number of stroke (OR = 0.699, CI = 0.499-0.980, p = 0.038).

Association between age and medication adherence

Table 4: Association between age and medication adherence

| Age | Medication-adherence | | X² | P-value |
	Adherence (%)	Non-adherence (%)		
21-30	6 (1.6%)	4 (1%)	4.004	0.549
31-40	37 (9.6%)	33 (8.5%)		
41-50	49 (12.7%)	37 (9.6%)		
51-60	72 (18.7%)	38 (9.8%)		
61-70	60 (15.5%)	36 (9.3%)		
71-80	7 (1.8%)	7 (1.8%)		
Total	231 (59.8%)	155(40.2%)		

Ethnicity vs Medication adherence

Table 5: Association between Ethnicity and medication adherence

| Ethnicity | Medication-adherence | | X² | P-value |
	Adherence (%)	Non-adherence (%)		
Yoruba	49 (12.7%)	44 (11.4%)	3.111	0.211
Igbo	98 (25.4%)	55 (14.2%)		
Hausa	84 (21.8%)	56 (14.5%)		
Total	231 (59.8%)	155(40.2%)		

Number of Stroke vs Medication Adherence

Table 6: Association between Number of stroke and medication adherence

| Number of Stroke | Medication-adherence | | X^2 | P-value |
	Adherence (%)	Non-adherence (%)		
Once	72 (18.6%)	33 (8.5%)	4.590	0.038
Twice	128 (33.2%)	99 (25.6%)		
More than twice	31 (8%)	23 (6%)		
Total	231 (59.8%)	155(40.2%)		

Table 7: Association between Gender and medication adherence

| Gender | Medication-adherence | | X^2 | P-value |
	Adherence (%)	Non-adherence (%)		
Male	**138 (35.8%)**	**96 (24.9%)**	**0.187**	**0.665**
Female	**93 (24.1%)**	**59 (15.3%)**		
Total	**231 (59.8%)**	**155(40.2%)**		

Table 12: Binary logistic regression analysis showing non-modifiable factors as predictors of medication adherence

| Independent Variables | B | S.E | P-value | Exp (B) | 95% CI. for EXP(B) | |
					Lower	Upper
Age	.113	.089	.204	1.119	.941	1.332
Gender	.137	.218	.529	1.147	.748	1.761
Ethnicity	.162	.139	.245	1.176	.895	1.545
Number of stroke	-.358	.172	.038	.699	.499	.980
Constant	.126	.580	.828	1.134		

DISCUSSIONS

Stroke is an overwhelming and incapacitating disease. Recurrent stroke makes up a significant number of stroke admissions at the emergency room and it is largely preventable by identifying and addressing the risk factors. This current study examined the non-modifiable factors associated with medication adherence among stroke survivors in selected stroke rehabilitation centers in Lagos state, Nigeria.

Adherence to Medications

The level of adherence to treatment in this study was moderate with about 60% of the respondents scoring above average on the measure computed. The proportion of respondents who were not adhering to medications was a concern as this is a huge risk of a recurrent stroke. A similar finding was reported in a study by Kim, Bushnell, Lee and Han (2016) in which less than 50% of participants adhered to medications. Non-adherence to medication is a multifaceted issue that encompasses the doctor-patient relationship, medication education, healthcare access issues, concurrent medical conditions, medication-related side effects, a complex medical regimen, drug cost, and socioeconomic considerations. Individual responses showed that a high proportion of stroke survivors recruited for this study got social support from family and friends. The result of this study is similar to findings reported by Pan, Hu, Wu and Li (2021). However, a study by Adisa, Olajide and Fakeye (2017) in Ibadan reported findings which were contrary to the findings of this study.

Association between age of stroke survivors and medication adherence

Findings from this study show that the mean age was 52.42 years which was lower than the age reported by Nwoha et al (2021) in Imo state but similar to the age reported by Ademuyiwa and Okubadejo (2021). Furthermore, we set out to find whether a significant association exists between age of stroke survivors and medication adherence. The study found no significant association between overall age and medication-adherence (OR=1.12; CI = 0.94-1.33; p = 0.204). This is similar to a study by Bader, Koprulu, Hassan, Ali and Elnour (2015) and Behnood-Rod et al. (2016) who reported that there was no significant association with medication-adherence and age. However, Alraheem, Hassan and Ahmed (2019) contradicted this findings and revealed that age has significant association with the level of medication adherence. Moreover, there was a significant association between age and medication adherence when traveling (OR= 1.013, CI 0.99-1.03, $p = 0.014$).

In addition, the age group 51-70years are 2.03 times more likely to adhere to medication compared to the other age groups (OR = 2.026; CI 0.64-6.43). This finding is similar to a study by Krueger et al. (2015) who found that the older participants, the higher the medication adherence. This could be as a result of older patients being thought to receive more support regarding medication management and compliance due to visible symptoms of the progressed disease. Older patients may also have a greater health belief in the severity of disease and have more experience with their medications (Cohen et al., 2012).

Association between gender of stroke survivors and medication adherence

Regarding gender, we found that male stroke survivors were more adherent to medication as compared with females. We also found that male stroke survivors were more non-adherent to medication compared to females. This is in agreement with other studies by Hyre, Krousel-

Wood, Muntner, Kwasaki and De-Salvo (2007) and Ramli, Ahmad and Paraidathathu (2012). In contrast, Holt et al. (2013) showed no differences between the gender regarding adherence to medication and Shah et al. (2009) found that females were more non-adherent to medication than males. In addition, we found no significant association between gender and medication adherence (*OR* =1.147, CI = 0.75-1.33, P = 0.529). This is similar to a study by Eticha, Teklu, Ali, Solomon and Alemayehu (2015) who showed there was no significant association between gender and medication adherence among patients. However, our study found a significant association between gender and missing out a dose. The plausible explanation for this result could be because the male gender dominated the sample population.

Association between ethnicity of stroke survivors and medication adherence

The study participants were people from the three major ethnic groups in Nigeria (Yoruba, Igbo and Hausa). The result showed that the Hausa group were less likely to adhere to medications in the prevention of recurrent stroke compared to all other groups while the Igbo ethnic group are 1.09 times likely to adhere to their medication compared to all other ethnic groups (OR= 1.099, CI = 0.67-1.81). This is similar to a US study that reported ethnic disparities in medication-adherence among respondents (Xie, St. Clair, Goldman & Joyce, 2019). In addition, we found no significant association between ethnicity and medication adherence. However, there was a significant association between ethnicity and taking medications more than instructed (OR= 1.178, CI = 0.889-1.561, p= 0.006). Overall, there was no significant association between ethnicity and medication adherence (OR= 1.176, CI = 0.895-1.545, p = 0.245)

Association between number of stroke of stroke survivors and medication adherence

Findings from the study show that the majority of the respondents in this study had experienced more than two episodes of stroke with 58.8% of the total population having at least two episodes. This gives an indication that these respondents may have experiences on stroke recurrences. The findings also showed that those who have had two episodes of stroke are likely to adhere to their medication compared to those with a lesser number of episodes. This study revealed that there was a significant association between the number of strokes and medication adherence. However, the number of strokes does not predict medication adherence in stroke survivors (OR= 0.699, CI = 0.499-0.980, p = 0.038). Furthermore, significant association showed between the number of strokes and avoiding the medication especially when traveling. The study also revealed that people who had two episodes of stroke were less likely to adhere compared to other groups. This could be because they dominated the sample population. This could also indicate that the stroke survivors might feel less motivated to continue medications if there is little sign of physical recovery.

CONCLUSION

Medication adherence is a key to secondary prevention in patients with stroke. Poor medication adherence can lead to recurrence, disability, or even death in stroke survivors. Therefore, this study reviewed the non-modifiable factors associated with medication-adherence among stroke survivors. We conclude from this study that the modifiable factors assessed in the study such as age, ethnicity, gender and number of strokes have no significant association with medication-adherence. The study shows that respondents were at risk of a recurrent stroke even

having had a previous stroke event. Due to personal, cultural, and environmental constraints, even when patients acknowledge the need for behavioral change, information does not always translate into instant behavior change. Given that the risk factors looked at in this study will not facilitate practice of medication adherence among stroke survivors in this study area, there is a need to evaluate other predictors and adopt measures to increase adherence. Also, health facilities should intensify efforts to provide quality information for aid adoption of sustainable lifestyles modification strategies among survivors. These findings from this study highlight an important gap in the factors that influence and are associated with medication adherence. Therefore, other non-modifiable factors aside from the ones assessed in this study should be reviewed. Also, the findings showed that the older age group are more likely to adhere to medications which explained that social support could be the plausible reason. Hence, families, friends and support groups may be included in health education programs to influence modifiable factors such as health beliefs of survivors as well as support management of current conditions.

Further research on predictors such as social support, attitudes, health belief and knowledge is recommended as this will strengthen the body of knowledge concerning recurrent stroke. Further qualitative and quantitative studies are needed to assess factors which influence the adherence to medication among stroke survivors in this study area to provide in-depth understanding of the survivors' chances of successful health outcomes as well as associations between these variables.

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