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KNOWLEDGE OF RISK FACTORS AND WARNING SIGNS OF STROKE AMONG HYPERTENSIVE PATIENTS AGED 18 YEARS AND ABOVE OBTAINING CARE IN MUHIMA HOSPITAL, RWANDA

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ABSTRACT:

Background: In 2019 stroke was the 3rd leading cause of death in Rwanda and accounted for 5.1% of all deaths, Despite efforts by Ministry of Health to control and prevent non-communicable diseases (NCDs),deaths due to stroke rose from the 7th leading cause of death in 2009 to the 3rd in 2019.

Aim: This study aims to assess the knowledge of stroke risk factors and warning signs among patients aged 18 years and above receiving hypertension care at Muhima District Hospital, Rwanda.

Materials and Methods: This was a cross-sectional study in which a total 247 hypertensive patients aged ≥18 years who were receiving hypertension care at Muhima District Hospital, Rwanda during the month of February were interviewed using self-administered questionnaires. Data was analyzed using SPSS Version 22. Descriptive statistics and multivariable analysis were conducted, with significance considered at P-value < 0.05.

Results and Discussions: A total of 247 were interviewed. The level of knowledge of stroke risk factors were as follows: 32% had low knowledge; 25.9% had medium knowledge; and 42.5% had high knowledge. Knowledge level for warning signs were as follows: 42.51% had low knowledge, 34.41% had medium knowledge , and 23.08% had high knowledge. A significant association was found between having no antecedent of stroke at home and knowledge level (P = 0.006). Overall, there was a low significant level of knowledge regarding stroke risk factors.

Conclusion: This study examined stroke risk factor and warning sign awareness among hypertensive patients aged 18 and above at Muhima District Hospital's NCD clinic in Rwanda. While many participants showed good knowledge of stroke risk factors, awareness of stroke warning signs was notably deficient, underscoring the necessity for focused educational initiatives to enhance symptom recognition in this group.

Keywords: *Risk Factors, Warning Signs, Stroke, Hypertensive Patients, Rwanda*

1. Introduction

It is estimated that one in eight deaths, that is 12% of worldwide deaths, are due to stroke(3). Stroke remains the leading cause of adult mortality and serious long-term disability in many parts of the world. In 2013, stroke caused 6.5 million deaths and 113millions DALYs globally(1). The prevalence of stroke in adult people is progressively increasing worldwide (Feigin, Norrving, et al., 2016).

Several risk factors of stroke have been documented, mostly by studies conducted in high-income. (2)found that hypertension, current smoking, diabetes, abdominal obesity, poor diet and physical inactivity accounted for more than 80% of the global risk of all types of strokes (ischemic and hemorrhagic). Other risk factors included excessive alcohol consumption. Johnson, Onuma and Sachdev, 2016 found that prevalence status of stroke was 70% of strokes and 87% of both stroke-related deaths and DALYs occurred in low- and middle-income countries. According to WHO data published in 2017, in first 20 countries with high prevalence of stroke globally, 8 are African countries where Sierra Leone and Cote d'Ivoire consist highest prevalence of stroke with 184.54 per 100,000 population ranking second after Indonesia worldwide and 171.11 per 1000,000 population ranking fifth worldwide respectively (4). Deaths from stroke and DALYs lost due to stroke are 7 times higher in low- and middle-income countries than in higher income countries(3).

In Sub-Saharan Africa (SSA), the systematic review of the studies conducted from 1980 to 2016 on the risk factors of the hemorrhagic and ischemic stroke reported that the risk factors for each type of stroke are still limited Namale et al. (2018. The study (Namale et al. (2018) reviewed five case control studies examined on hypertension, diabetes mellitus, alcohol use, HIV infection, smoking, and hypercholesterolemia as the risk factors for stroke and the stroke burden associated with household air pollution from solid fuels was highest in central eastern and western sub-Saharan Africa (5).

In Nigeria, stroke is the leading cause of medical coma and it is also the leading cause of admissions from hypertension related complications (6). The study also reports that stroke accounts for 40% of hypertensive complications in the University of Port Harcourt Teaching Hospital, Nigeria. In Tanzania, a study that was conducted in two demographic surveillance sites, Hai (rural) and Dar-es-Salaam (urban), from 2013–2016, reported that crude annual stroke incidence rates were 94.5 per 100 000 in Hai and 107.9 per 100 000 in Dar-es-Salaam(5). The study also reported, when age-standardized to the WHO world population, annual stroke incidence rates were 108.6 per 100 000 and 315.9 per 100 000 in Hai and Dar-es- Salaam respectively (5.

In Rwanda, stroke is a significant public health concern. In 2017, the rate of deaths due to stroke was 2100 deaths per 100,000 populations per year (7). WHO data published in 2017 indicated that death due stroke deaths were 3749 per 100,000 (8). Despite this burden of stroke in Rwanda, awareness on the risk factor has not been assessed (7).

2. Problem Statement

In Rwanda, stroke is a major public health problem. Deaths due to stroke increased from the 7th position as a cause of death in 2009 to the 3rd position in 2019. Stroke is the 3rd leading cause of death in Rwanda and accounts for a total of 5.1% of total deaths per year(9). WHO published data on stroke and revealed that deaths accounted for 6.05% in Rwanda(10). In Muhima District hospital, cases of high blood pressure are on the increase (Personal Communication, head of NCD Department).

Knowledge on stroke risk factors and warning signs is an important aspect of control. Based on Mushumba et al. (2015), effective preventive strategies of stroke like the people awareness about stroke risk factors, risk factor screening, and lifestyle modification measures are still a problem for people suffering from hypertension and eligible group of patients who are at risk of suffering from or experiencing a stroke(11). Currently, there is no documented knowledge about the risk factors and warning signs of stroke among the highest risk groups in Rwanda. The existing studies attempted to examine this knowledge among the employees at a university teaching hospital revealed that 12% and 15.2% of the participants were not aware of the risk factors and warning signs of stroke respectively (12). Therefore, there is a need to assess the knowledge of stroke risk factors and warning signs among hypertensive patients in Rwanda, particularly at Muhima District Hospital where people at risk of stroke remain high .

3. Research purpose

The main objective of this study was to assess the knowledge of risk factors and warning signs of stroke among patients aged 18 years and above obtaining hypertension care in NCD clinic at Muhima District Hospital, Rwanda.

4. Methods

Study Design

This research employed a cross-sectional study design to evaluate the level of knowledge regarding stroke risk factors and warning signs among hypertensive patients aged 18 years and above who were attending Muhima District Hospital in Rwanda.

Data Collection Techniques and Data Sources

Data collection was gathered using an interviewer-administered questionnaire. The questionnaire was divided into three sections. The first section gathered socio-demographic characteristics of the participants, the second section assessed their knowledge of stroke risk factors, and the third section evaluated their awareness of stroke warning signs. The questionnaire was adopted from previous similar studies and underwent pretesting with 20 participants to ensure its validity and reliability. The pretesting aimed to evaluate the clarity and understanding of the questions and was conducted before the main study. Only data from the main study were included in the final analysis. Data were collected on paper after obtaining permission from Mount Kenya University/Kigali and Muhima Hospital Ethics Committee. Participants were informed about the study's purpose and

procedures, and only those who signed the consent form participated. The NCD clinic at Muhima District Hospital, which sees about 320 patients per month, served as the primary source of data, with a sample of 247 hypertensive patients randomly selected from a total of 646.

Method of Data Analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 22.0. Descriptive statistics were employed to summarize the socio-demographic characteristics of the participants, expressed as frequencies and percentages. Cross-tabulations were utilized to explore the associations between socio-demographic factors and knowledge of stroke risk factors. Bivariate and multivariable analyses were conducted to test these associations further, with inferential statistical analysis performed at a 95% confidence interval and a margin of error of 0.05. Associations with p-values less than 0.05 were considered statistically significant. This comprehensive data analysis approach ensured a thorough understanding of the factors influencing knowledge of stroke risk and warning signs among the study population

5. Ethical Consideration

Permission to conduct this study was sought and obtained from Mount Kenya University School of Post Graduate. The study was reviewed by Mount Kenya University Ethical Clearance Committee (Ref: MKU/ETHICS/06/02/2024). Other required permissions were sought and obtained from relevant authorities. The research was conducted in line with the country's laws and regulations governing research Participant was given clear explanation about the study (aim, objectives, duration, and importance of participation), but there was no any motivation in terms of money, who agreed to participate signed a consent form where participation was voluntary.

6. Results

Level of knowledge on the risk factors

The first objective described the level of knowledge on the risk factors of stroke among patients aged 18 years and above obtaining hypertension care in NCD Clinic at Muhima District Hospital, Rwanda. The results are presented in table 4.2.

Table 1 Level of knowledge on the risk factors

Variables	Yes, n (%)	No, n (%)	Don't know, n(%)
Stroke happens in brain	219 (88.66%)	0 (0.00)	28 (11.34)
Stroke is due to lack of blood supply to brain	184 (74.49%)	5 (2.03%)	58 (23.48%)

Hypertension increases chance of stroke	196 (79.35%)	0 (0.00)	51 (20.65%)
Many cases of stroke occur in people under the age of 65	62 (25.10%)	107 (43.32%)	78 (31.58%)
Physical inactivity increase chance of stroke	189 (76.52%)	0 (0.00)	58 (23.48%)
Diabetes increases chance of stroke	151 (61.13%)	7 (2.84%)	89 (36.03%)
Alcohol increases chance of stroke	109 (44.13%)	92 (37.25%)	46 (18.62%)
Epilepsy increases chance of stroke	92 (37.25%)	11 (4.46%)	144 (58.29%)
Family history contributes to stroke	66 (26.72%)	98 (39.67%)	83 (33.61%)
Cigarette smoking increases chance of stroke	159 (64.37%)	0 (0.00%)	88 (35.63%)
Cardiovascular diseases increase chance of stroke	61 (24.70%)	0 (0.00%)	186 (75.30%)

Source: Primary data, (Muhima District Hospital, 2024)

Table 1 presents the results on the level of knowledge on the risk factors of stroke among patients aged 18 years and above obtaining hypertension care in NCD Clinic at Muhima District Hospital, Rwanda. Out of 247 participants, on that stroke happens in brain, 88.66% responded yes and 11.34% they didn't know. On that stroke is due to lack of blood supply to brain, 74.49% responded yes. 2.03% responded no and 23.48% they didn't know. On hypertension increases chance of stroke, 79.35% responded yes and 20.65% they didn't know. On that many cases of stroke occur in people under the age of 65, 25.10% responded yes, 43.32% responded no while 31.58% they didn't know.

On that physical inactivity increase chance of stroke, 76.52% responded yes and 23.48% they didn't know. On that diabetes increase change of stroke, 61.13% responded yes, 2.84% responded no, and 36.03% they didn't know. On that alcohol increases chance of stroke, 44.13% responded yes, 37.25% responded no, and 18.62% they didn't know. On that epilepsy increases chance of stroke, 37.25% responded yes, 4.46% responded no while 58.29% they didn't know. On that family history contributes to stroke, 26.72% responded yes, 39.67% responded no, and 33.61% they didn't know. On that cigarette smoking increases chance of stroke, 64.37% responded yes, and 35.63% they didn't know. On that cardiovascular diseases increase chance of stroke, 24.70% responded yes and 75.30% they didn't know.

Score of the knowledge about the risk factors

There were 11 questions to assess the level of participants' knowledge on the risk factors of stroke. Based on the existing literature, each knowledge question had a possible response of "Yes", "No" and "Don't know". Then, the answer (Yes) was coded as 1, while the answer (No/ Don.t know) was scored as 0 during analysis. Accordingly, the total score ranged from 0-11, with an overall greater score indicated high knowledge. Based on the modified Bloom's cut-off point, a participant who scored ≥80% (≥ 8 points out of 11 questions) on knowledge questions was considered as having high knowledge and who scored ≥ 60% (4-7 points out of 11) was considered as having Moderate knowledge while those who scored ≤30% (0-3 points out of 11) was classified as having low level of knowledge. The final scores are displayed on the figure 4.1

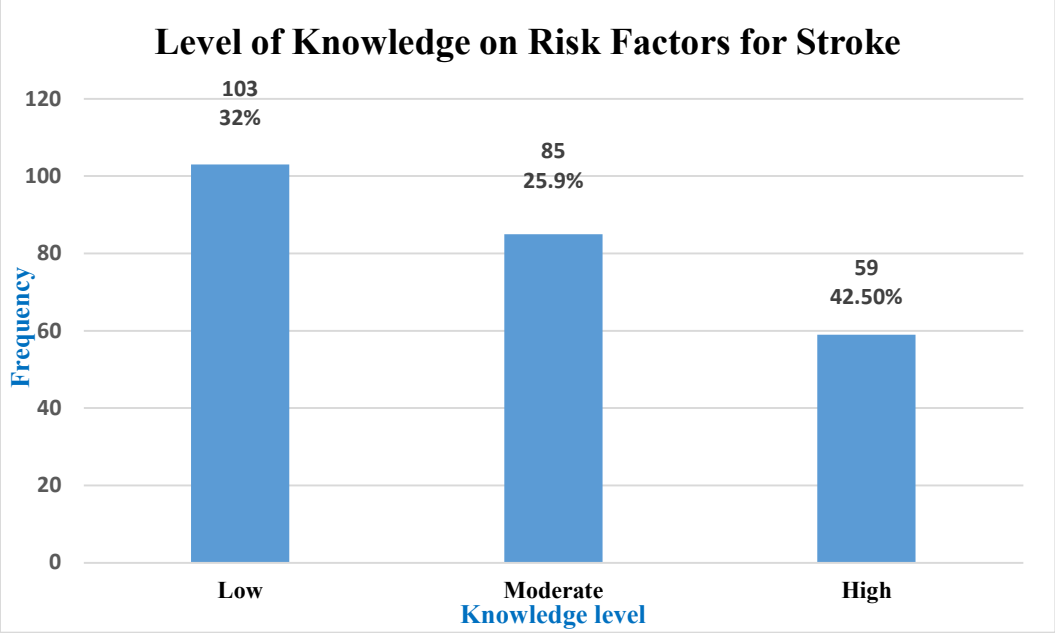

Figure 1 Level of knowledge on risk factors of stroke

Source: Primary data (Muhima District Hospital, 2024)

This diagram shows the level of knowledge on risk factors of stroke among patients aged 18 years and above obtaining hypertension care in NCD Clinic at Muhima District Hospital, Rwanda. The level of knowledge was classified into three levels namely low, medium, and high level of knowledge. The results showed that out of 247 participants, 32% of them had a low level, 25.9% of them had a medium level, and 42.5% of participants had a high level of knowledge on risk factors of stroke among patients aged 18 Years and above obtaining hypertension care in NCD Clinic at Muhima District Hospital, Rwanda.

Knowledge on warning signs of stroke

The second objective determined the knowledge on warning signs of stroke among patients aged 18years and above obtaining hypertension care in NCD Clinic at Muhima District Hospital, Rwanda. The results were presented in table 4.3.

Table 2 Knowledge on warning signs of stroke

Variables	Yes, n(%)	No, n(%)	Don't know, n(%)
Blurred and double vision, loss of vision in an eye is a warning sign of stroke	78 (31.58%)	0 (0.00%)	169 (68.42%)
Sudden headache/head pain	191 (77.33%)	0 (0.00%)	56 (22.67%)
Dizziness (vertigo)	65 (26.32%)	0 (0.00%)	182 (73.68%)
Numbness, tingling sensation, dead sensation (one sided)	41 (16.59%)	0 (0.00%)	206 (83.41%)
Sudden difficulty in speaking, speech problems	12 (4.86%)	43 (17.41%)	192 (77.73%)
Chest pain, chest tightness	0 (0.00%)	0 (0.00%)	247 (100.00%)
Loss of balance or movement coordination	198 (80.16%)	0 (0.00%)	49 (19.84%)
One sided weakness (1leg or 1arm)	201 (81.37%)	0 (0.00%)	46 (18.63%)
loss of consciousness	167 (67.61%)	0 (0.00%)	80 (32.39%)

Source: Primary data (Muhima District Hospital, 2024)

Table 2 presents the results on the knowledge on warning signs of stroke among patients aged ≥ 18 years obtaining hypertension care in NCD Clinic at Muhima District Hospital, Rwanda. Out of 247 participants, on blued and double vision, loss of vision in an eye is a warning sign of stroke, 31.58% responded yes and 68.42% they didn't know. On sudden headache/ head pain, 77.33% responded yes and 22.67% they didn't know. On dizziness (vertigo), 26.32% responded yes and 73.68% they didn't know.

On numbness, tingling sensation, dead sensation (one-sided), 16.59% responded yes and 83.41% they didn't know. On sudden difficulty in speaking, or speech problems, 4.86% responded yes,

17.41% responded no while 77.73% they didn't know. On chest pain, and chest tightness, all participants of 100.00% didn't know. On loss of balance or movement coordination, 80.16% responded yes and 19.84% they didn't know. On one-sided weakness, 81.37% responded yes and 18.63% they didn't know. On one-sided weakness loss of consciousness, 67.61% responded yes and 32.39% they didn't know.

Score of the knowledge about the warning signs

There were 10 questions to assess the level of participants' knowledge on the warning signs of stroke. Based on the existing literature, one question was scored 1 mark. The summation of each participant's marks was classified based on the modified Bloom's cut-off point, a participant who scored ≥70% (≥ 7 points out of 10 questions) was considered as having high knowledge level and who scored 40-60% (4-6 points out of 10) was considered as having Moderate knowledge, while who scored ≤ 30% (0-3 points out of 10) considered as having low knowledge level of warning signs. The results from each category are presented on figure 4.2.

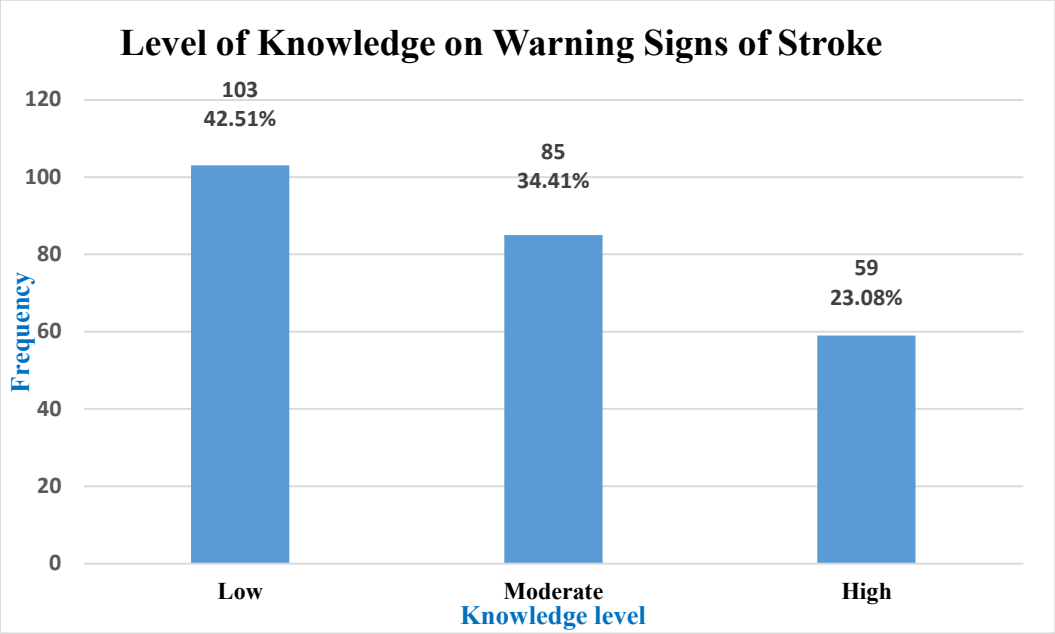

Figure 2 Knowledge on warning signs of stroke

Source: Primary data (Muhima District Hospital, 2024)

This graph shows the knowledge on warning signs of stroke among patients aged 18 years and above obtaining hypertension care in NCD Clinic at Muhima District Hospital, Rwanda. The knowledge was classified in three levels namely low, moderate, and high knowledge. The results showed that out of 247 participants, 42.51% had low knowledge, 34.41% had moderate knowledge, and 23.08% of participants had the high knowledge on warning signs of stroke among

patients aged 18 Years and above obtaining hypertension care in NCD Clinic at Muhima District Hospital, Rwanda.

Association between socio-demographical factors and knowledge on stroke risk factors

The third objective determined the association between socio-demographical factors and knowledge on stroke risk factors among patients aged 18 Years and above obtaining hypertension care in NCD Clinic at Muhima District Hospital, Rwanda. The results are presented in table 3.

Table 3 Association between socio-demographical factors and knowledge on stroke risk factors

Variables	Results		df	p value
	n	%		
Age				
18-30 years	16	6.48	3	.0639
31-40 years	29	11.74		
41-50 years	105	42.51		
51 years and above	97	39.27		
Gender				
Male	99	40.08	1	.000
Female	148	59.92		
Level of education				
Primary level	21	8.51	2	.000
Secondary level	188	76.11		
Tertiary	38	15.38		
Occupation				
Unemployed	65	26.32	3	.028
Employed	49	19.84		
Business	105	42.51		
Students	28	11.33		
Antecedent of stroke at home				
Yes	9	3.64	1	0.006
No	238	96.36		

Source: Primary data, (Muhima District Hospital, 2024)

Table 3 presents the results on association between socio-demographical factors and knowledge on stroke risk factors among patients aged 18 Years obtaining hypertension care in NCD Clinic at Muhima District Hospital, Rwanda. Considered variables were age, gender, level of education, occupation, and antecedent of stroke at home. On age, the results showed that it was not significant with p value equal .0639. On gender, results showed that it was significant with p value equal .001. On level of education also results showed that it was significant with p value equal .001, and on

occupation, it was significant with p value equal .028. On antecedent of stroke at home, the results showed that it was significant with p value equal .006 that there was not antecedent of stroke at home.

Multivariable Analysis for predictor of knowledge on stroke risk factors

The factors that were found to be associated with the knowledge level during the bivariate analysis with 95% confidence level, and 0.005 margin of error were re-entered into the secondary multivariate analysis to exclude the potential confounders. These factors were level of education of the participants, and antecedents of the stroke at home.

Table 4 Multivariable Analysis for predictor of knowledge on stroke risk factors

Variables	COR (95%Ci)	p value	AOR (95% CI)	p value
Level of education				
Primary level	Ref		Ref	
Secondary level	1.27(0.51-3.19)	.605	1.06(0.37-3.03)	.914
Tertiary level	3.16(1.53-6.55)	**.002**	3.64(1.66-7.94)	**.001**
Antecedent of stroke at home				
No	3.20(1.69-6.08)	**.001**	3.63(1.82-7.23)	**.001**
Yes	Ref		Ref	
Level of knowledge on risk factors of stroke				
High	3.66(1.48-9.05)	**.005**	2.73(1.01-7.39)	**.048**
Moderate	1.39(0.75-2.59)	.293	0.93(0.46-1.87)	.831
Low	Ref		Ref	

COR= Crude Odds Ratio; CI = Confidence Interval; AOR= Adjusted Odds Ratio

Source: Primary data, (2024)

Table 4 presents the results of Multivariable Analysis for the predictor of knowledge on stroke risk factors. Holding the confounding factors, tertiary level of education and absence of antedecent of stroke at home were significantly associated with knowledge of risk factors of stroke.

7. Discussions

In this study, a majority of the respondents knew many risk factors of stroke. (88.66 %) knew that stroke happens in the brain, and that hypertension increases the risk of stroke (79.35). These results are consistent to what have been reported in Saudi Arabia and few other settings(14). Surprisingly, this study showed that 42.5% had high knowledge regarding the risk factors of stroke, inconsistent with the results of the study conducted in Ethiopia where on 18.3 % of the participants have good knowledge(15).The difference might be related to the educational level of the participants.

Surprisingly participants in this study had no idea that numbness, tingling sensation, dead sensation (83.41%); Sudden difficulty in speaking, speech problems (77.73%), Chest pain, chest tightness

(100.00%) are among the warning signs of stroke. Unlike what had been reported in previous studies(16). Therefore, the education of patients with NCD at Muhima district hospital is highly emphasized.

Regarding the overral knowledge on the warning signs of stroke, this study showed that only 23.08% of the participants had high knowledge, Comparable findings were reported by Workina, A. et al., where in their study 20.26% also did not know at least one warning sign of stroke(17). This indicate the need for raising awareness about stroke among patients and possibly general population.

The multivariable analysis indicated that, tertiary level education had a significant positive association with the knowledge level of stroke risk factors [AOR 3.64; 95%CI 1.66-7.94; P value .001], well-aligned results because the more patients attain high education, the more attention is given to the health education session and positive health attitude. The same findings had been recorded during the study conducted in Ethiopia(15).

On antecedent of stroke at home, no stroke at home were 3.20 items [AOR 3.63; 95%CI 1.82-7.23; P value .001], it was likely that there was no antecedent of a stroke at home. Kharbach, A., et al., also indicated that no history of among relatives were associated with a lower level of knowledge of atroke (OR4.42; 95%CI: 2.81-6.96)(18). These findings highlight that regardless of many socio-demographic characteristics including age, gender, marital status, and occupation all patients aged 18 years and above obtaining hypertension care in the NCD Clinic at Muhima District Hospital should have regular education sessions on stroke, risk factors, and warning signs.

8. Conclusions

Stroke remains a leading cause of adult mortality and long-term disability worldwide. This study assessed the knowledge of stroke risk factors and warning signs among hypertensive patients aged 18 years and above at the NCD clinic of Muhima District Hospital, Rwanda.

The findings revealed a significant portion of participants had high knowledge of stroke risk factors, suggesting that awareness campaigns could further enhance community understanding. However, knowledge of stroke warning signs was notably low among many participants, highlighting the need for targeted educational efforts to improve awareness and recognition of stroke symptoms in this population.

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Conflict of interest statement

The author declares no conflicts of interest.

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