

## INFLUENCING FACTORS OF STROKE AWARENESS AMONG HYPERTENSIVE PATIENTS IN COMMUNITY HEALTH CENTERS IN INDONESIA

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### Abstract

The global burden of stroke is still high, particularly in developing countries, with hypertension serves as the main risk factor. Knowledge related to stroke is essential to establish better prevention strategies. This study aimed to identify factors associated with stroke awareness among hypertensive patients in Indonesia. This was a cross-sectional study conducted in five Community Health Centers in Indonesia. We used a standardized questionnaire to assess stroke awareness and the influencing factors. The knowledge on hypertension was assessed using Hypertension Knowledge Level Scale (HK-LS). Multivariate logistic regression analysis was performed to measure factors associated with stroke awareness. A total of 457 hypertensive patients were included. Majority of patients (77.46%) had low stroke awareness. Having higher

knowledge on hypertension, higher income, and a history of previous stroke were associated with higher level of stroke awareness (odds ratio [OR] 1.878, 95%CI 1.176-2.999, p 0.008; OR 1.887, 95%CI 1.170-3.045, p 0.009; OR 5.276, 95%CI 2.210-12.594, p<0.001, respectively). This study suggests that knowledge on hypertension, income, and history of previous stroke are factors which may influence the level of stroke awareness. This emphasizes the need to provide better campaign and education program to raise stroke awareness in a community setting.

**Keywords:** stroke awareness, hypertensive patients, community health center, Indonesia

## Background

Stroke is the leading cause of morbidity and disability worldwide [1]. The global burden of stroke is still high with the estimated incidence is 15 million new cases per year, in which two thirds of them occur in developing countries [2]. The disability-adjusted life years of stroke patients was more than 87% in developing countries and this was seven times higher than in developed countries [3,4].

Indonesia has the highest rates of age-sex standardized mortality and disability adjusted life-years among South East Asian (193.3/100,000 person-years and 3,382.2/100,000 people, respectively) [5]. The average age of stroke patients in Indonesia is lower than those in developed countries [6], thus leads to higher disability rate, reduce the quality of life and more economic lost [7]. The high burden of stroke is attributable to modifiable risk factors such as behavioral, metabolic, and environmental risk factors [8]. Hence, knowledge related to stroke warning signs and risk factors is crucial to reduce the incidence of stroke and prevent subsequent mortality [9].

A recent cross-sectional study in Spain revealed that the knowledge related to the warning signs and risk factors among hospitalized stroke patients was low. Previous history of stroke and high education level were predictors which could increase the knowledge [10]. In contrast, prior study in Nigeria demonstrated different findings that the knowledge of stroke risk factors was quite high among hypertensive and diabetic patients. However, the compliance with action to do stroke prevention was sub-optimal [11].

Hypertension is the most common risk factors for stroke and the main modifiable factor attributed to disability after stroke [12,13]. The Indonesia Family Life Survey-5 (IFLS-5) reported that the prevalence of hypertension in people with the mean age of 43.3 years old was quite high, reaching 33.4%. In addition, the awareness of hypertension was low, the treatment and control were very poor [14]. These may further contribute to increase risk of stroke.

Raising public stroke awareness would be beneficial for better stroke prevention strategies, particularly for population at risk. Approximately 80% of new stroke incidence could be avoided by improving knowledge related to risk factors of stroke [15]. The knowledge about stroke as a complication of hypertension is also essential for establishing the effective prevention programs. Nevertheless, no prior studies reporting the level of stroke awareness in Indonesia. The present study aimed to identify the influencing factors of stroke awareness among hypertensive patients in Community Health Centers in Indonesia.

## Materials and Methods

### Study Design and Participants

This study had cross-sectional design. We included patients from five Community Health Centers in Banyumas Regency, Central Java Province, Indonesia during April – August 2019. These five Community Health Centers were located in rural (3) and urban (2) region, thus representing the characteristics of both populations.

Hypertensive patients aged >35 years old who came to the Community Health Centers for a routine checkup were consecutively recruited. Hypertensive patients with comorbidities such as aphasia, dementia or other neuropsychiatric diseases were excluded from the study.

A total of 457 patients were investigated in this study. All patients signed a written informed consent prior to the investigation. Ethical approval for this study has been obtained from The Medical and Health Research Ethics Committee of Dr. Moewardi General Hospital with approval number: 789/VI/HREC/2019.

### Data Collection and Measurements

We conducted a cross-sectional survey by interviewing the participants based upon a questionnaire. The questionnaire consists of four components, including demographic characteristics, knowledge on hypertension, comorbidities, and level of stroke awareness. The questionnaire was filled in by the investigators.

Demographic characteristics included sex, age, education level, marriage status (married/widow), living with (family/alone), and income. Income was categorized as <minimum regional payment (MRP) or <134 USD/month, and  $\geq$ MRP ( $\geq$ 134 USD/month) based on the minimum standard income in Indonesia [16].

We measured patients' knowledge on hypertension as a risk factor for stroke by using The Hypertension Knowledge-Level Scale (HK-LS). HK-LS has high validity and reliability for measuring the level of knowledge on hypertension in adults [17]. It has been translated and validated to Indonesian version with good reliability [18]. The final scale has 22 items related to hypertension which divided into six subdimensions namely definition, medical treatment, drug compliance, lifestyle, diet, and complications. The maximum score is 22 for the entire scale. The minimum score is zero for the entire scale and for all subdimensions [17]. HK-LS was further classified as low knowledge on hypertension (HK-LS  $\leq$ 17) and high knowledge (HK-LS 18-22) [19].

Comorbidities included history of headache, medication adherence, history of hypertension (controlled/uncontrolled), history of diabetes mellitus, history of dyslipidemia, history of stroke, history of atrial fibrillation, history of heart failure, history of anxiety, and history of sleep apnea. Medication adherence was measured by five-item scale about self-reported adherence related to blood pressure medicine [20]. Patients were categorized as not adhere to the medication if the scale was  $<5$ , and adhere if the scale was 5.

In the last part of the questionnaire, we asked participants regarding their perceived health status related to stroke risk. We measured their perception using Likert scale (1-5). Scale 1 means patient was very unsure to be at risk for a stroke, scale 2 means unsure, scale 3 means patient undecided, scale 4 means sure, and scale 5 means very sure. Patients with Likert scale  $\leq 3$  were categorized as having low-level of stroke awareness, and those with Likert scale  $>3$  were having high-level of stroke awareness.

### Statistical Analysis

We performed the Chi square test to analyze the differences between categorical variables in the baseline characteristics. Factors associated with stroke awareness were measured using univariate logistic regression analysis. Subsequently, these associated factors were further analyzed using multivariate logistic regression to measure their contribution to stroke awareness after controlling the covariates. Statistical significance was indicated by a  $p$  value of  $<0.05$ . SPSS version 16 was used for all the analyses.

## Results

### Baseline characteristics

Table 1 shows baseline characteristics of participants based on the level of stroke awareness. From total 457 patients, 354 (77.46%) had low stroke awareness and 103 (22.54%) with high stroke awareness. Most of the participants were female (80.74%), aged more than 55

years (75.71%), had low education level (79.65%), had low level of knowledge on hypertension (56.02%) and had uncontrolled hypertension (85.33%). Between participants with low and high stroke awareness, there were some notably differences including knowledge on hypertension (HK-LS), income level, history of hypertension, history of diabetes mellitus, and history of stroke.

Table 1. Baseline characteristics of participants based on the level of stroke awareness.

Characteristics	Stroke Awareness		<i>p</i>
	Low (n,%)	High (n,%)	
<b>Sex</b>			
Male	66 (18.6)	22 (21.4)	0.539
Female	288 (81.4)	81 (78.6)	
<b>Age (Years)</b>			
<55	84 (23.7)	27 (26.2)	0.605
≥55	270 (76.3)	76 (73.8)	
<b>Education level</b>			
Low	283 (79.9)	81 (78.6)	0.773
High	71 (20.1)	22 (21.4)	
<b>Marriage Status</b>			
Married	258 (72.9)	70 (68.0)	0.329
Widow	96 (27.1)	33 (32.0)	
<b>Living with</b>			
Family	185 (52.3)	48 (46.6)	0.312
Alone	169 (47.7)	55 (53.4)	
<b>Income</b>			

<MRP	252 (71.2)	55 (53.4)	0.001*
≥MRP	102 (28.8)	48 (46.6)	
HK-LS			
Low	211 (59.6)	45 (43.7)	0.004*
High	143 (40.4)	58 (56.3)	
History of headache			
No	73 (20.6)	19 (18.4)	0.628
Yes	281 (79.4)	84 (81.6)	
Medication Adherence			
No	145 (41.0)	42 (40.8)	0.973
Yes	209 (59.0)	61 (59.2)	
History of hypertension			
Controlled	45 (12.7)	22 (21.4)	0.029*
Uncontrolled	309 (87.3)	81 (78.6)	
History of Diabetes Mellitus			
No	214 (60.5)	45 (43.7)	0.003*
Yes	140 (39.5)	58 (56.3)	
History of hyperlipidemia			
No	274 (77.4)	81 (78.6)	0.790
Yes	80 (22.6)	22 (21.4)	
History of stroke			
No	343 (96.9)	90 (87.4)	<0.001**
Yes	11 (3.1)	13 (12.6)	
History of atrial fibrillation			
No	314 (88.7)	91 (88.3)	0.921

Yes	40 (11.3)	12 (11.7)	
History of heart failure			
No	336 (94.9)	94 (91.3)	0.166
Yes	18 (5.1)	9 (8.7)	
History of anxiety			
No	350 (98.9)	102 (99.0)	0.891
Yes	4 (1.1)	1 (1.0)	
History of sleep Apnea			
No	346 (97.7)	101 (98.1)	0.846
Yes	8 (2.3)	2 (1.9)	

HK-LS, Hypertension Knowledge Level Scale; MRP, minimum regional payment.

\* $p < 0.05$ ; \*\* $p < 0.001$

Table 2 presents the univariate analysis of factors associated with high stroke awareness. Participants with high knowledge of hypertension were 90% more likely to have high stroke awareness compared with their low knowledge counterpart (Odds ratio [OR] 1.902, 95%CI: 1.221-2.963,  $p < 0.004$ ). Moreover, those with income  $\geq$ MRP, history diabetes mellitus and history of stroke were more likely to have high stroke awareness than the counterpart (OR 2.156, 95%CI: 1.374-3.383,  $p < 0.001$ ; OR 1.97, 95%CI: 1.264-3.071,  $p < 0.003$ ; OR 4.504, 95%CI: 1.953-10.390,  $p < 0.001$ , respectively). Meanwhile, participants with history of uncontrolled hypertension were 46% less likely to have high stroke awareness (OR 0.536, 95%CI: 0.305-0.944,  $p < 0.029$ ).

Table 2. Univariate analysis of factors associated with high stroke awareness

Characteristics	OR	95%CI	$p$ value
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Sex			
Male	Ref		
Female	0.844	0.491-1.451	0.539
Age (Years)			
<55	Ref		
≥55	0.876	0.530-1.448	0.605
Education level			
Low	Ref		
High	1.083	0.632-1.854	0.773
HK-Ls			
Low	Ref		
High	1.902	1.221-2.963	0.004*
Married Status			
Married	Ref		
Widow	1.267	0.787-2.039	0.329
Living with			
Family	Ref		
Alone/couple	1.254	0.808-1.974	0.312
Income			
<MRP	Ref		
≥MRP	2.156	1.374-3.383	0.001*

History of headache			
No	Ref		
Yes	1.149	0.658-2.000	0.628
Medication adherence			
No	Ref		
Yes	1.008	0.653-1.590	0.973
History of hypertension			
Controlled	Ref		
Uncontrolled	0.536	0.305-0.944	0.029*
History of diabetes mellitus			
No	Ref		
Yes	1.97	1.264-3.071	0.003*
History of hyperlipidemia			
No	Ref		
Yes	0.930	0.546-1.585	0.790
History of stroke			
No	Ref		
Yes	4.504	1.953-10.390	<0.001*
History of atrial fibrillation			
No	Ref		
Yes	1.035	0.521-2.056	0.921
History of heart failure			
No	Ref		
Yes	1.787	0.778-4.108	0.166
History of anxiety			

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No	Ref		
Yes	0.858	0.095-7.760	0.891
History of sleep apnea			
No	Ref		
Yes	0.856	0.179-4.097	0.846

HK-LS, Hypertension Knowledge Level Scale; MRP, minimum regional payment. \* $p < 0.05$ ;

\*\* $p < 0.001$

Table 3 presents the multiple logistic regression of factors associated with stroke awareness after adjustment by controlling multiple covariates. We found that knowledge on hypertension, income, and history of stroke were independently associated with stroke awareness among hypertensive patients. Participants with higher knowledge on hypertension, higher income, and history of stroke were more likely to have high-stroke awareness. History of stroke was the most dominant factor which influenced stroke awareness (OR 5.276, 95%CI:2.210-12.594,  $p < 0,001$ ).

Table 3. Multiple logistic regression of factors associated with stroke awareness after adjustment with covariates.

Variable	OR	95%CI	<i>p</i>
HK-LS (high vs low)	1.878	1.176-2.999	0.008*
Income ( $\geq$ MRP vs $<$ MRP)	1.887	1.170-3.045	0.009*
History of hypertension (yes vs no)	0.566	0.294-1.087	0.087
History of DM (yes vs no)	1.564	0.932-2.624	0.090

History of stroke (yes vs no)	5.276	2.210-12.594	<0.001**
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HK-LS, Hypertension Knowledge Level Scale; MRP, minimum regional payment; DM, diabetes mellitus. \* $p < 0.05$ ; \*\* $p < 0.001$

## Discussion

The present study shows that patients who had high-level of knowledge on hypertension, higher income, and history of previous stroke were more likely to have high-level of stroke awareness. To our knowledge, this is the first study in Indonesia which demonstrated factors contribute to the level of stroke awareness among hypertensive patients.

In this study we found that the majority of the participants had low-level of stroke awareness. This finding is in accordance with prior studies which showed that most participants were not fully aware of stroke and its risk factors [15,21,22]. Moreover, the level of stroke awareness in the present study was positively associated with the level of knowledge on hypertension. Therefore, the reason why most of our patients had low stroke awareness was due to poor knowledge on hypertension. This may endanger their health status as patients could not prevent the future risk of stroke.

Corroborates with our findings, previous study reported that 78.3% patients had inadequate knowledge, 21.7% had moderate knowledge, and none of them had adequate knowledge on hypertension and stroke prevention [23]. Another cross-sectional study on hypertensive patients also demonstrated that 75.1% of participants had poor knowledge on stroke prevention [24]. Knowledge on hypertension is crucial to prevent increasing incidence of hypertension and to maintain normal blood pressure control [25]. Hence, knowledge deficits contributes to inadequate control of hypertension and poor medication adherence [19] which further increase the risk of stroke. Furthermore, two studies investigating the knowledge about

stroke warning signs and risk factors in patients with acute cerebrovascular disease [26] and history of previous stroke [27] revealed similar findings.

In the present study, we also found that higher income was positively associated with stroke awareness. This finding is supported by prior study using data from the 2017 National Health Interview Survey in United States which showed that individuals with low income were more likely of not being aware of all stroke symptoms [28]. The level of monthly income is a factor that could predict stroke knowledge. Higher income is associated with good stroke knowledge [29]. Moreover, another cross-sectional study in Spain demonstrated that socioeconomic status including educational level, income, and employment status are independent factors for sufficient knowledge of stroke [30]. Patients with higher income are more likely to have better and prompt health-seeking behavior when they are being at risk of stroke [31].

Stroke awareness in this study is also influenced by having history of stroke. In accordance with our finding, a cross-sectional study among stroke patients in Spain reported that history of prior stroke was associated with higher knowledge on stroke warning signs and risk factors [10]. Another study showed that stroke survivors or patients with history of previous stroke were more likely to have more awareness on stroke warning signs including sudden numbness or weakness, sudden difficulty speaking or understanding speech, sudden dizziness, and sudden severe headache [32]. The contributing factor for higher stroke awareness among patients with history of prior stroke is the adequate information received during they stayed on hospital, from admission until discharge. This permits them to recognize the signs, symptoms, and risk factors of stroke which could prevent further delay in seeking care [10,27,33].

Results in the present study contribute to providing more evidence that stroke awareness is still insufficient in community setting. This indicates an urgent need to disseminate stroke education and awareness campaigns in Indonesia, particularly targeting people who have the

higher risk of stroke. Nevertheless, this study has some limitations. First, stroke awareness in the present study was only related to the participants' perceived health status of being at risk of stroke, using a "yes-no" questions. The investigation related to their knowledge on stroke warning signs was not explored. The cultural belief and perception regarding stroke and the risk factors for each participant were not either investigated. Second, duration of hypertension was not included in the analysis. In addition, we did not analyze whether the patients had end-stage complications or not. Taken together, these may lead to bias and different findings. Third, the participants in this study were recruited only from five Community Health Centers in a region in Indonesia. Therefore, the findings need careful interpretation for generalization. Finally, we only used cross-sectional design. Thus, we could not provide the causal relationship between stroke awareness and the influencing factors although the direction of the association was consistent with prior studies.

## Conclusions

Stroke awareness among hypertensive patients were still low. Knowledge on hypertension, income, and history of previous stroke are factors which may influence the level of stroke awareness among hypertensive patients. This emphasizes the need to provide better campaign and education program to raise stroke awareness in a community setting.

## Funding

This study received no external funding.

## Acknowledgement

The authors would like to thank the supporting staffs in five Community Health Centers in Banyumas (Puskesmas Purwokerto Timur, Purwokerto Utara, Kembaran, Sumbang, and

Baturaden) for their technical supports. We are also grateful to the participants who provided their consent for participation in this study.

### Author Contributions

Conceptualization, IS and ASU; methodology, IS, ASU, ANV; software, IS, ANV; validation, IS, AI, YS; formal analysis, ASU, ANV; investigation, IS, ASU; resources, IS and ASU; data curation, ASU; visualization, ANV; supervision AI and YS; writing-original draft preparation, IS; writing-review and editing, IS and ANV.

### Conflict of Interest

The authors declare no conflict of interest.

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