

# Risk Factors Analysis in Recurrent Stroke Events: Literature Review

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## Abstract:

After the first stroke, according to epidemiological data, there is a 30% risk of recurrent stroke. That events are the population who had suffered stroke and the recurrence rate is 9 times compared to the normal population. Results of research from the Stroke Association stated that the possibility of recurrence stroke was 3.1% in 30 days, 11.1% within one year, 26.4% within five years, and 39.2% within 10 years. This literature review is intended to analyze the risk factors of recurrent stroke events. The literature review was carried out by searching for articles in 2011-2021 in Indonesian and English. There were four databases for providing electronic journal articles, namely Garuda, Google Scholar, Science Direct, and PubMed. The quality of the articles carried out using JBI's Critical Appraisal Tools. Narrative synthesized was used to analyze the data of the review. There were 6 articles synthesized in this review. The review result showed that diabetes mellitus, hypertension, cardiovascular disorders, anemia, obesity, lack of physical activity, high serum of LDL/HDL, non-adherence to treatment, lack of confidence in treatment, lack of knowledge about the disease, and gender can encourage the occurrence of recurrent stroke. Many factors cause recurrent stroke events but diabetes mellitus, hypertension and non-adherence to treatment are most widely discussed in the six articles.

**Keywords:** Recurrent Stroke; Secondary Stroke; and Risk Factors

## Introduction

Riskesdas in 2007 showed data of 8.3 per 1000 Indonesians had a stroke. Then in 2013, that number increased by 12.1%.<sup>1</sup> After the first stroke, according to epidemiological data, there is a 30% risk of recurrent stroke, with the population who had suffered a stroke having a recurrence rate of 9 times compared to the normal population.<sup>1,2</sup> The results of research from the Stroke Association stated that the possibility of recurrent stroke was 3.1% within 30 days, 11.1% within one year, 26.4% within five years and 39.2% within 10 years.<sup>3</sup>

In order to reduce the number of patients with recurrent stroke, patients need not only to understand the importance of the post-stroke rehabilitation process, but also to understand the importance of controlling risk factors. Stroke risk factors are factors that increase a person's likelihood of suffering a stroke.<sup>2,4</sup>

Knowing the importance of controlling action against risk factors for recurrent stroke. It is necessary to strengthen the role of nurses as educators and researchers. Therefore, research on risk factors associated with recurrent stroke needs to be done. There are many risk factors in various articles for recurrent stroke. However, the exact risk factors are the main thing to prevent the secondary stroke event. This is to add accurate information about risk factors for recurrent stroke, so that nurses can provide correct and effective health

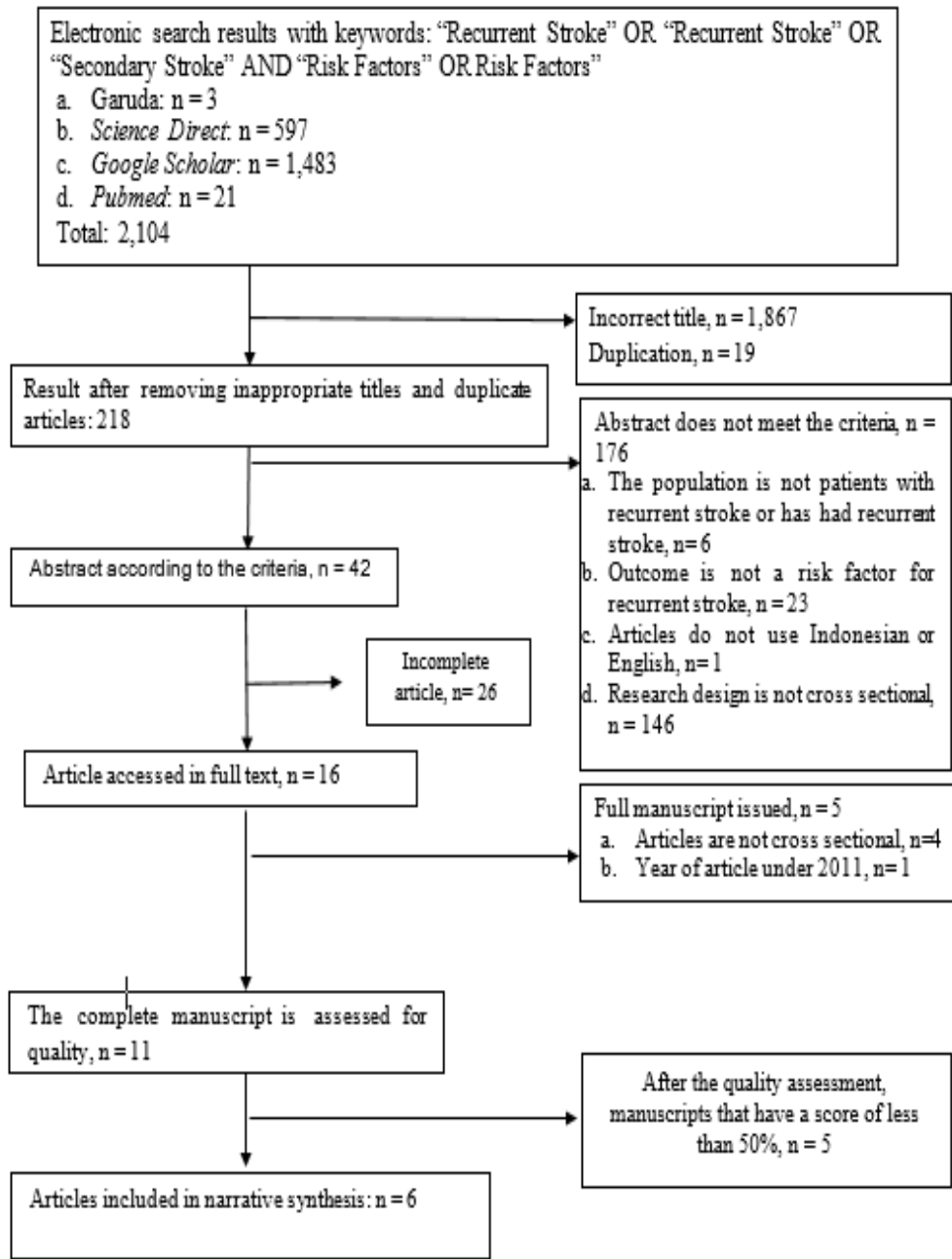
education to patients and families related to control risk factors for recurrent stroke.<sup>5</sup>

## Research Method

This research was conducted through a literature review. The literature review was carried out by searching for articles in 2011-2021. There are four databases for providing electronic journal articles, namely Garuda, Google Scholar, Science Direct, and PubMed. The keywords during the literature search were adjusted to the Medical Subject Heading (MeSH) and Indonesian thesaurus. The keywords were "Recurrent Stroke" OR "Secondary Stroke" AND "Risk Factors" OR "Risk Factors". Furthermore, the articles used in the study met the inclusion criteria set by the researcher, namely articles in the form of quantitative research with a cross-sectional study design, research articles that used the entire population of recurrent stroke patients or had experienced recurrent strokes, and the results of the research from the article were defined as the risk factors that are related or touched the occurrence of recurrent stroke. The research articles in this study were given a quality assessment foremostly by two reviewers using the Joanna Briggs Institute (JBI) cross sectional checklist sheet, then the data synthesized in narrative.

## Results

The Figure 1 describes the steps of researchers in finding, selecting, and analyzing articles in research.



**Figure 1.** Article networking flow

**Table 1** Data Extraction of Recurrent Stroke Risk Factors

No	Article Title	Authors	Year	Country	Instrument	Design	Research result
1.	The Relationship between Belief and Adherence to Secondary Preventive Therapy on Recurring Stroke Events	Eva Annisa, Abdul Gofir, and Zullies Ikawati	2015	Indonesia	Questionnaire	<i>Cross Sectional</i>	Researchers found there was a significant intercourse between belief in treatment and the occurrence of recurrent stroke ( $p = 0.002$ ). The group with low adherence was 12.4 times more likely to have recurrent stroke. Patients with TDS 140mmHg and TDD 90mmHg showed a significant intercourse with the occurrence of recurrent stroke $p < 0.05$ .
2.	<i>Knowing of Stroke Risk Factors and Warning Signs in Patients with Recurrent Stroke or Recurrent TIA in Thailand</i>	Jittima Saengsuwan, Pathitta Suangpho, Somsak Tiamkao.	2017	Thailand	Questionnaire	<i>Cross Sectional</i>	Patients with high disability are associated with low knowledge about stroke and it affects the incidence of recurrent stroke $p = 0.03$
3.	Relationship between Risk Factors and Compliance with Therapy With Ischemic Stroke Incidence.	Bambang Bhayu Herlambang, Ahmad Rizal Ganiem, and Aih Cahyani.	2017	Indonesia	Patient medical records (clinical diagnosis of recurrent ischemic stroke with CT scan images) and patient or family history.	Analytical descriptive with cross-sectional design	Hypertension and DM were involved with recurrent ischemic stroke either concurrently or alone with a relative risk of 2.47 and 2.12. The risk of recurrence stroke in patients who do not adhere to therapy is 2.5 times greater than patients who adhere to therapy.
4.	<i>Oxidized Low-Density Lipoprotein to High-Density Lipoprotein Ratio Predicts Recurrent Stroke in Minor Stroke or Transient Ischemic Attack</i>	Anxin Wang, PhD, Shiyu Li, MD Nan zhang, BS Liye Dai, MD Yingting Zuo, Ms	2018	China	Questionnaires and laboratory examination results. patient or family history.	<i>Cross Sectional</i>	The research indicates that there is a correlation between high serum oxLDL/HDL levels and the occurrence of recurrent stroke in TIA or minor stroke patients. $P < 0.05$
5.	<i>The Risk Factor of Recurrence Stroke Among stroke and Transient Ischemic Attack Patients in Indonesia</i>	Listian Prisilia Rahayu, Serlina, Diwa Agus Sudrajat, Gina Nurdina, Elis Nurhayati Agustina, and Putri Tri Antika.	2019	Indonesia	Questionnaire: Barthel Index, NIHSS score sheet, The Stroke self-efficacy scale. Form to describe the respondents	<i>Cross Sectional</i>	Risk factors for recurrent ischemic stroke were cardiovascular disorders, hypercholesterolemia, obesity, physical activity, and DM with $p < 0.05$ . The prominent factor was obesity (OR=0.616).
6.	<i>Increased Risk of Recurrent Ischemic Stroke in Anemic Patients</i>	Shraddha Sanghani, Tilak Ram, Nishat Tanvi, Doddi Neusha and Y.	2020	India	Medical records	<i>Cross Sectional Study</i>	There was a significant relationship or intercourse between anemia as an independent risk factor for recurrent ischemic stroke with $p$ value = 0.0015. There is an intercourse between gender and the occurrence of recurrent ischemic stroke $p < 0.001$ .

## **Discussion**

### **The relationship of uncertainty and non-adherence to therapy with the case of recurrent stroke**

Non-adherence to therapy is associated with recurrent stroke.<sup>3,4</sup> Herlambang et al's research stated that patients who did not comply with post-stroke treatment had a 2.5 times greater risk of experiencing recurrent stroke events in a faster time. It shown that this is in line with one research that is compiled by Anissa et al. which stated that subjects with low adherence were 12.4 times more likely to have recurrent strokes than subjects with high adherence. Patients who are unsure of their treatment have a low level of adherence to their therapy. This is driven by patient concerns about the long-term side effects of the drugs. They think and feel that they take too many drugs. So, those patients stop the treatment or reduce their drug consumption without discussing it with their doctor<sup>3</sup> Uncertainty about treatment which results in low adherence to treatment after a stroke is a risk factor of recurrent stroke. Another risk factor for recurrent stroke is diabetes mellitus.

### **The intercourse between diabetes mellitus and the occurrence of recurrent stroke**

Diabetes mellitus is also associated with recurrent stroke.<sup>4,5</sup> Rahayu et al said patients with Diabetes Mellitus have a 1.45 times higher risk than patients without DM. This is supported by the research of Herlambang et al, which states that DM is a risk factor for recurrent stroke, either alone or in conjunction with other risk factors. This is because of metabolic disorders in DM patients can trigger a stroke.<sup>6</sup>

### **Relationship of hypertension with the occurrence of recurrent stroke**

Apart from diabetes mellitus, hypertension is also an incident factor for recurrent stroke.<sup>3,4</sup> This is because of hypertension is able to accelerate the accumulation of fat in and under the lining of the artery walls that clog blood vessels and cause a stroke to occur.<sup>6</sup>

### **The relationship of lack of knowledge with the occurrence of recurrent stroke**

Lack of knowledge about stroke can encourage the continuation of an unhealthy lifestyle and low adherence to the treatment process. So, the risk of recurrent stroke is even greater. Hence, it is necessary to conduct health education that emphasizes stroke risk factors owned by patients to improve patient compliance with treatment and recommended lifestyle modifications.<sup>7</sup>

### **Relationship of obesity, hypercholesterolemia, lack of physical activity, and high levels of oxidized HDL/LDL serum with the occurrence of recurrent stroke**

Obesity, hypercholesterolemia, and lack of physical liveliness are related with the occurrence of recurrent stroke because they can trigger atherosclerosis.<sup>5</sup> In addition to these factors, high levels of oxidized HDL/LDL serum also take a place in the occurrence of atherosclerosis because it can cause oxidative stress. So, that high levels of oxidized HDL/LDL serum are also a risk factor for recurrent stroke.<sup>8</sup>

### **The intercourse between sex and the occurrence of recurrent stroke**

Shanghani et al's research found that men with anemia were more prone to recurrent strokes than women.<sup>9</sup> This is in line with Suiroaka's opinion which states that the

risk of men having a stroke is 20% higher than women.<sup>6</sup>

### **The intercourse between anemia and the occurrence of recurrent stroke**

Anemia which is a condition of low hemoglobin levels than normal is said to be a sign of a poor prognosis for several cardiovascular disorders, including stroke. Decreased oxygen-carrying capacity of blood in anemic patients plays a primary mission in the pathophysiology of ischemic stroke. Anemia plays a role in exacerbating the ischemic state of the brain in patients after an acute ischemic event.<sup>9</sup>

### **Conclusions**

The results of a review of six articles showed that diabetes mellitus, hypertension, cardiovascular disorders, anemia, obesity, lack of physical activity, high serum oxLDL/HDL, non-adherence to treatment, lack of confidence in treatment, lack of knowledge about the disease, and gender can encourage the occurrence of recurrent stroke. Then DM, hypertension, and nonadherence to treatment were mentioned in two of the six articles, respectively, as risk factors for recurrence stroke.

There are no more articles which are discussed about risk factors for the case of recurrent stroke in haemorrhagic, so, the next researchers are expected to be able to review the risk factors which are relate with recurrent hemorrhagic stroke such as old age and hypertension (Schmidt, 2016) . Then, for educational institutions, it is hoped that they can add subject matter related to risk factors for recurrent stroke into teaching materials for medical-surgical nursing courses or other appropriate fields. Furthermore, health professionals, especially nurses, are expected to be able to use the results of

this study as a basis for conducting health education related to risk factors for recurrent stroke to patients and their families.

### **Conflict of Interest**

There is no conflict of interest in this study.

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