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Research Article

Studies of Herbal Medicine in Stroke: A Five-Year Bibliometric Documentation

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ABSTRACT

Indonesia remains a concerning location for the prevalence of stroke, which is considered high. The current treatment for stroke ischemia, rtPA, is costly, has side effects, and is only effective within 5 hr of onset. As a result, there is a growing interest in alternative therapies such as herbal medicine. This study examines the recent focus on herbal medicine in stroke research and aims to provide a framework for policy and strategic interventions to address this disease. We conducted a bibliometric analysis on herbal medicine in Stroke between 2017 and 2022. We retrieved published documents from Scopus by using keywords. We imported articles from Scopus, and we reported the trends. The visual analysis using VOS viewer version 1.6.18 to visualize publications on the keywords, countries, and author. China is the number one country whose authors wrote this issue. The number of articles about this issue reached a peak in 2021 and got down in mid-2022. Even though the prevalence of Stroke is high in Indonesia, none of the recent publications come from Indonesia. As the country with the most herbal medicine, Indonesia's authors should be more productive in writing about herbal medicine in Stroke.

Keywords: Bibliometric, Cerebrovascular attack, Phytomedicine, Trend.

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INTRODUCTION

Stroke increases remarkably in developed countries, especially Indonesia, and has the highest rate of disability sequelae. According to Ministry of Health Affairs data, strokes in Indonesia increased from 2012 to 2018. The problem with stroke is not the number of new cases rising, but the morbidity rate is relatively high, especially in developing countries such as Indonesia (Hasil Utama Riskesdas 2018, n.d.).

In 2019, the newest update of Global Burden Disease demonstrated that stroke is still the second highest rank of cause of death and the third rank of mortality and disability combined (or disability-adjusted life-years lost-DALYs) worldwide. The predicted global cost of stroke is over US 891 billion dollars (1.12% of the global GDP). The burden rose significantly from the second decade ago (70% raised in incident strokes, 40.3% deaths from stroke, 102.0% general strokes, and 143.0% DAYLs). Most of the burden resided in lower-income and Lower-Middle-Income Countries (LMIC). There were differences in the mortality location, prevalence, and DALYs, and the highest number in LMIC (specifically in Sub-Saharan Africa, Eastern Europe, and Asia) (Feigin *et al.*, 2022).

One of the effective treatments for stroke ischemia is recombinant prothrombin alteplase (rtpa). However, it is expensive, and this treatment works only in the golden period (5 hr). There are several side effects of its administration (Zhao *et al.*, 2019). Herbal medicine is a promising alternative solution. Many chemical tablets that work in humans come from herbal medicine, and the number reaches 25% of chemical tablets (Derkach and Tarasenko, 2021). This paper aims to present an overview trend of herbal medicine in Stroke in the last five years and hopes it could be such an insight to the development of herbal medicine in Indonesia.

METHODOLOGY

The purpose of this paper is to review research in the field of stroke research using science mapping review methodology. The review addresses the following research questions (RQ):

What are key growth trends in research on herbal medicine in Stroke?

What authors and documents in the literature on herbal medicine in Stroke have had the greatest influence over the past 5 years?

What topics in the herbal medicine literature have been studied with the greatest frequency and are currently attracting the most excellent attention?

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We conducted a bibliometric analysis on Herbal medicine in Stroke between 2017 and 2022. We retrieved published documents from Scopus by using TITLE-ABS-KEY (("herb* medicine" OR phytomedicine OR phytotherapy) AND ("stroke ischemia" OR "ischemic stroke")) AND (LIMIT-TO (SRCTYPE, "j")) AND (LIMIT-TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018)) AND (EXCLUDE (EXACT KEYWORD, "Cardiovascular Disease") OR EXCLUDE (EXACT KEYWORD, "Coronary Artery Disease") OR EXCLUDE (EXACT KEYWORD, "Heart Infarction")).

These terms were used based on previous articles about herbal medicine in Stroke. We choose Scopus as the only database because it provides the large databases across herbal medicine and has more than 75 million entries. Our search brought 105 articles after we had selected the relevant articles. We excluded all articles with keywords related to heart, cardiovascular disease, conference papers, and books. To ensure the correct articles include, two persons double-checked the articles for redundancy and inappropriate content. We used Excel and Vos viewer to analyze the data. We presented the world map of the first author's origin, the number of publications over five years, and then the other network visual graphs using Vosviewer.

The articles taken from the Scopus database were analyzed by Vos viewer 1.6.18 to answer the research questions above. We tried to have a visual graph of the trend, popular keywords, and countries.

Figure 1A: Trend in Publication in Herbal Medicine in Stroke. The publication trend increased in the last five years to the highest number in 2021. 1B. The highest number of documents per author was Kwon S (Korean). 1C. The author's affiliations in the rank sequence were Beijing University of China, Chengdu University, China Academy of Chinese Medicine, and Kyung Hae University 1D. Most of the articles were in medical journals, pharmacology, biochemistry, and chemistry. Figure 1E shows funding organization of publication.

We tried to analyze the co-authorship based on different angles, such as authors, governments, and organizations. We chose Vos Viewer among other software because it was easy to use and free to download.

RESULTS

The growth of the publication of herbal medicine in Stroke increased dramatically to 2021 (47 publications), it fell in 2022 (29), and it was less than in 2018 (38 publications) (Figure 1A). Kwon S was the author with the highest number of publications and was followed by Jing C, Jun WS, and Moon SK (Figure 1B). Beijing University of Chinese Medicine was the highest affiliation of the authors (18 publications) (Figure 1C) and followed by China Academy of Chinese Medical Sciences and Kyung Hee University (14;12 publications). The scope of the journal was still in medicine (Figure 1D). National Science of China was the organization with the highest funding frequency of publication. There was an interesting issue here: the second rank of funding sponsor was coming from Taiwan, but the number of publications of Taiwan was below China and Korea (Figure 1E).

According to Figure 2, China tops the list with the highest number of articles at 107, followed by South Korea and the United States. China also had the highest co-authors, who were connected to South Korea, Taiwan, Malaysia, Canada, the United Kingdom, and Thailand. However, the two co-authors from India and Iran were not linked with the circle from China as shown in Figure 3A, B. It was observed that there was minimal inter-organizational collaboration, with only 13 organizations collaborating out of a total of 616 organizations. The maximum number of links between the organizations was two. When it comes to co-authorship based on authors, out of 880 authors, 169 authors met the threshold of a minimum of two documents per author. Among them, 136 authors were connected to each other, with Liu J, Wang Y, and Chen Y having the greatest total link strength as shown in Figure 3D. Other authors, such as Kwon S, Ovbiagele b, and Choi Bt, were located outside the central circle as depicted in Figure 3D.

Co-citation is based on the authors (Figure 4A), and Chen Y was an author that has many co-citations in her articles (Figure 4B). Figure 4C shows network visualization based on co-occurrence on keywords, from 2267 keywords, only 597 keywords meet the criteria, and there were six clusters build. Many keywords are related to neuroprotection (Figure 4D) and many keywords are related to animal experiment (Figure 4E). Co-citation based on the author, there were 169 authors did not connect, and only 41 were connected to other authors (Figure 5).

Co-occurrence based on the keywords, the highest keywords was Stroke and connected to Chinese herbal medicine, and in between, there are high keywords related to occlusion. Keywords related to model and infarction volume, tissue, agent, survival (Figure 6).

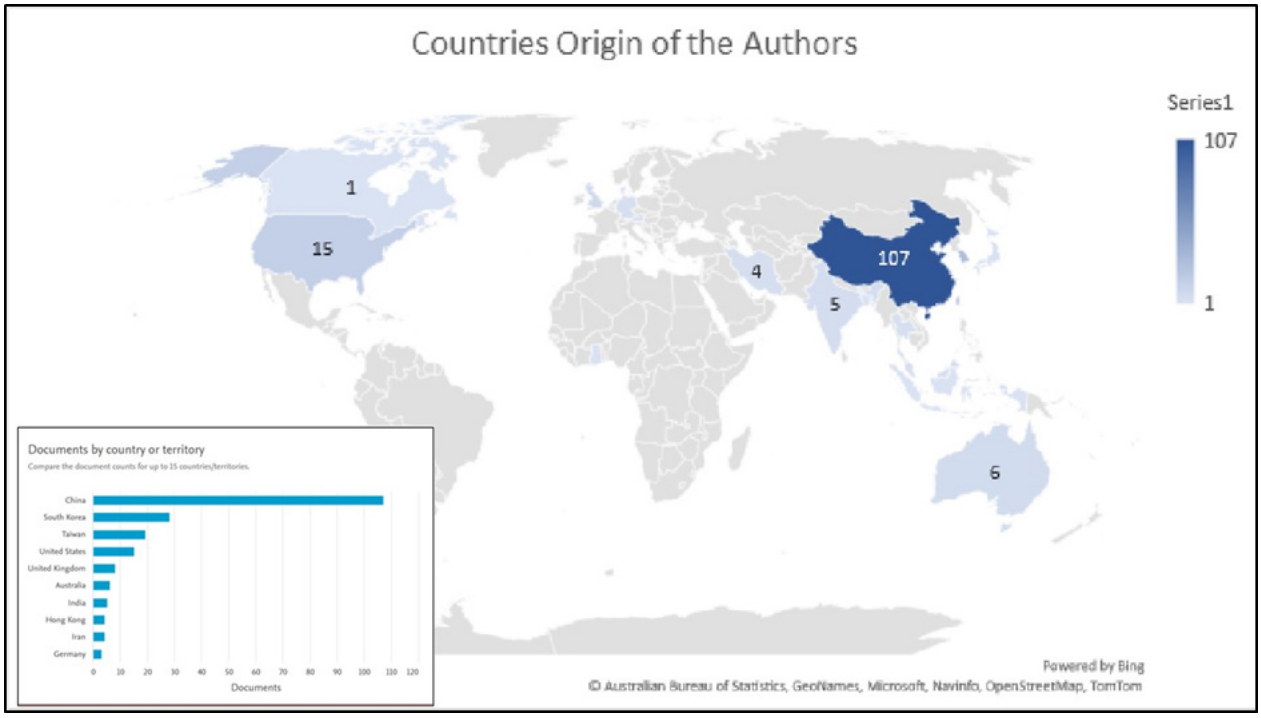

Figure 2: The United States, United Kingdom, Australia, India, Hongkong, Iran, and Germany were in the sequence. The highest publication came from China (107 articles), South Korea (28 pieces), and Taiwan (19 articles).

DISCUSSION

During the past five years, China has been the leading authors of research on herbal medicine in relation to Stroke. Following closely in second place is South Korea, with the United States coming in third. It is common in China to use Traditional Chinese Patent Medicine (TCPM) as a standard treatment for stroke ischemia. TCPM is used in both Western medicine hospitals and traditional medicine hospitals. However, there is a lack of English studies that document the safety and effectiveness of TCPM. TCPM is believed to have positive effects on vasodilation of cerebral vessels, platelet aggregation reduction, smoothing the flow of cerebral vessels, cerebral damage protection, and protection against hypoxia (Sucher and Carles, 2012).

In 2007, Wu and colleagues conducted a systematic review of 59 TCPMs, among which 22 were eligible for clinical trials. The remaining TCPMs were observational studies. All trials followed the guidelines of brain scanning to diagnose cerebral ischemia and began within 14 days after the onset. The TCPMs were available in injection and tablet forms. Unfortunately, the majority of the studies did not perform randomization, and the quality of the study methods was poor. The primary outcomes of the trials were death and adverse events, while the secondary outcomes were improvements in neurological deficits and death from any cause. The systematic review concluded that there was insufficient evidence on death or dependency. The only RCT that was eligible involved Puerarin and Shenmai injection, which examined the long-term outcome after stroke. The secondary outcome suffered from a lack of methodological detail. The study, therefore, concluded that the evidence on the effect of TCPM was insufficient (Wu *et al.*, 2007). This conclusion was in line with the Cochrane systematic review that explored Ginkgo biloba and agents Dan Shen among the 59 TCPMs discussed in the present study (Wu *et al.*, 2007; Zeng *et al.*, 2005).

During a five-year period, Kwon S emerged as a prominent researcher in South Korea, with the highest number of published documents. Interestingly, Kwon S only collaborated with other Korean researchers, based on the co-authorship network. Korea is renowned for its herbal medicine, Chung Hyuk-Dan (CHD), which is composed of five herbal ingredients and contains 80% ethanol extract. CHD has been found to have several health benefits, including reducing cholesterol levels, blood pressure, and fat deposition in blood vessels. It also demonstrates cerebrovascular protection against ischemia and Parkinson's disease, as per a study by Park *et al.* (2016). During a five-year period, Kwon S emerged as a prominent researcher in South Korea, with the highest number of published documents. Interestingly, Kwon S only collaborated with other Korean researchers, based on the coauthorship network. Korea is renowned for its herbal

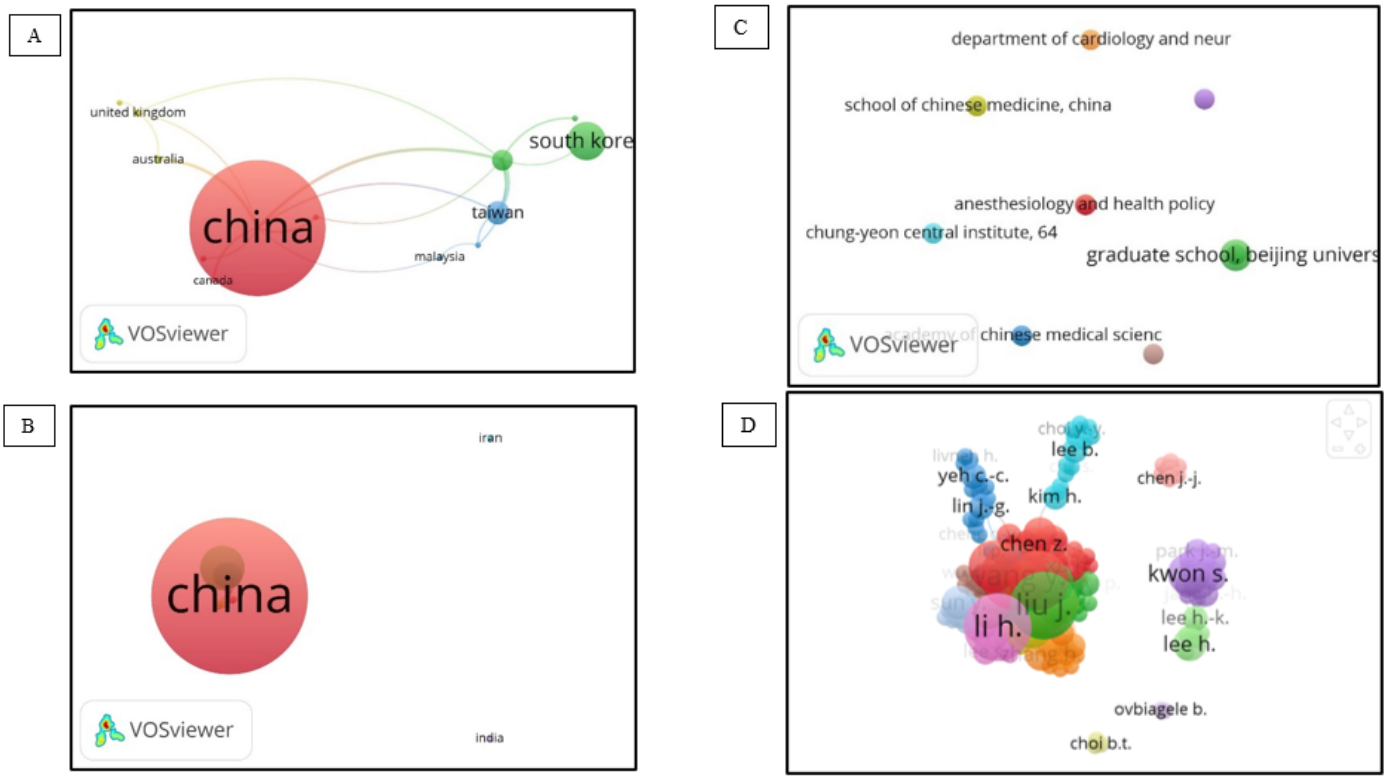

Figure 3: Network Visualization of Co-authorship based on Countries (A, B), Organization (C), and Authors (D) with minimum documents was two (A, B, D) and one paper (C).

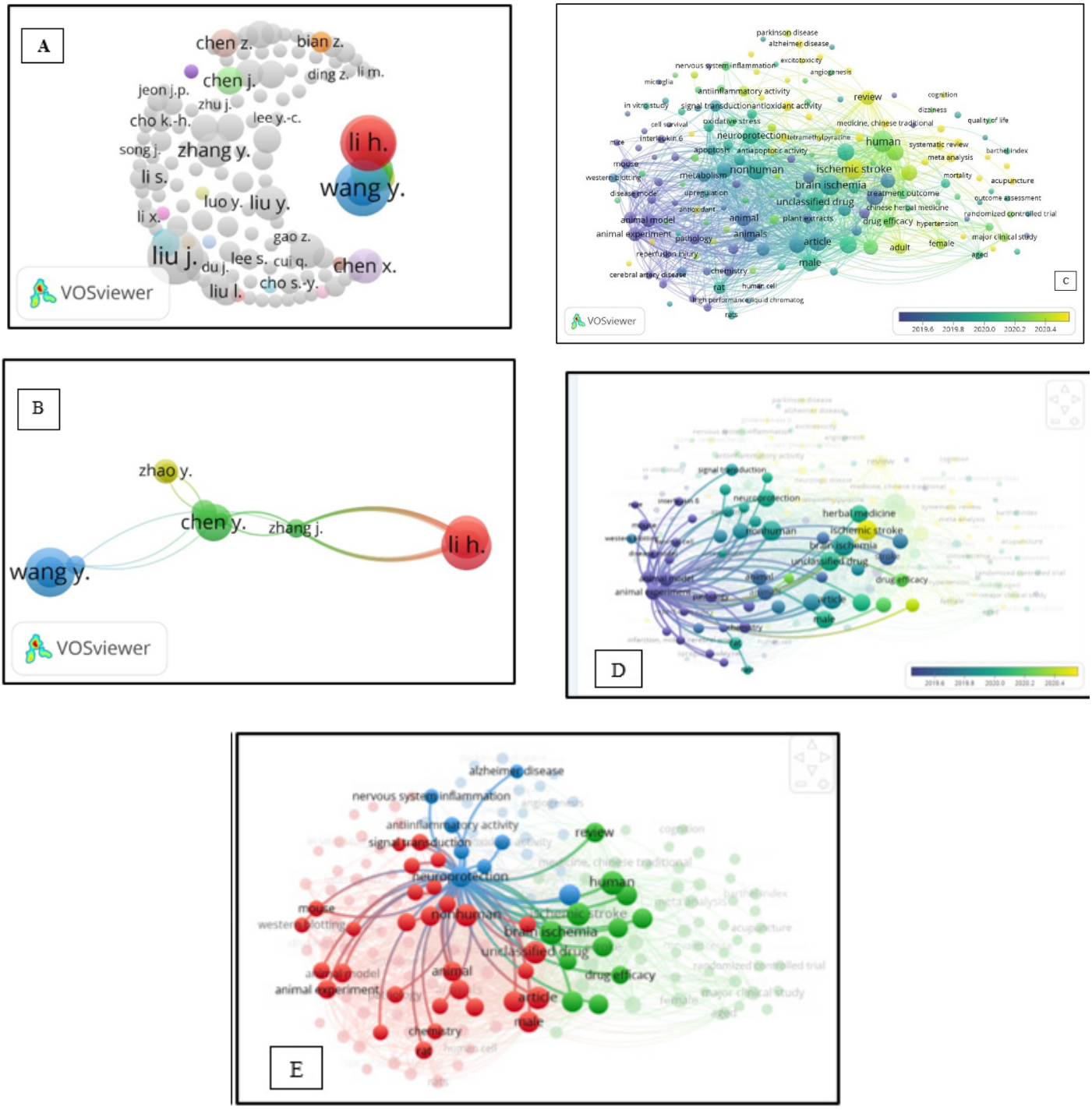

Figure 4: A, B. Co-citation is based on the authors (4A), and Chen Y was an author that has many co-citations in her articles. 4C. Network visualization. Co-occurrence based on keywords, from 2267 keywords, only 597 keywords meet the criteria, and there were six clusters—4D. Many keywords are related to neuroprotection—many keywords are related to animal experiment 4E.

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Indonesia's researcher Stand Point in Herbal Medicine in Stroke

This study focused on the use of phytomedicine in treating Stroke in Indonesia. The study centered on the effects of Gotu Kola, a plant native to Indonesia, which has been found to have the potential to prevent and treat Stroke diseases. A

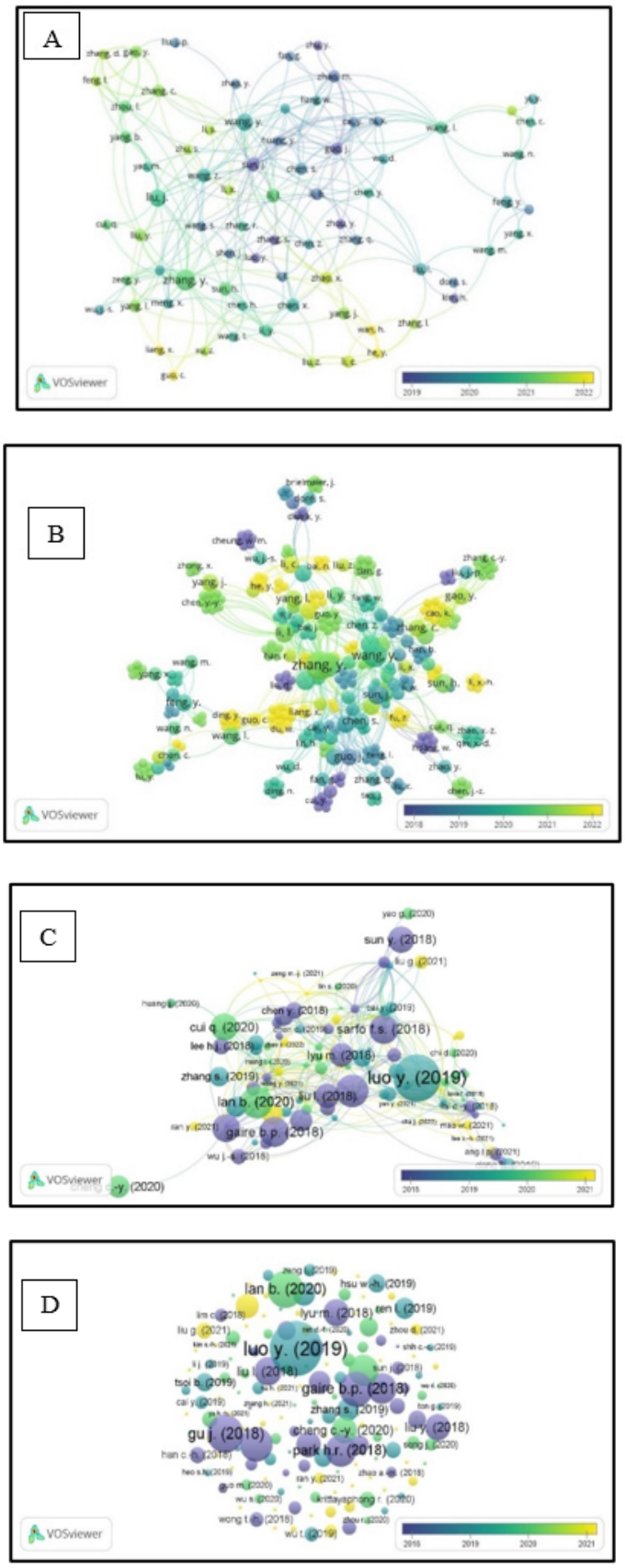

Figure 5: Co-occurrence based on authors (A, B) The dominant authors who published their articles were Zhan and Luo Y (Figure 5 C, D).

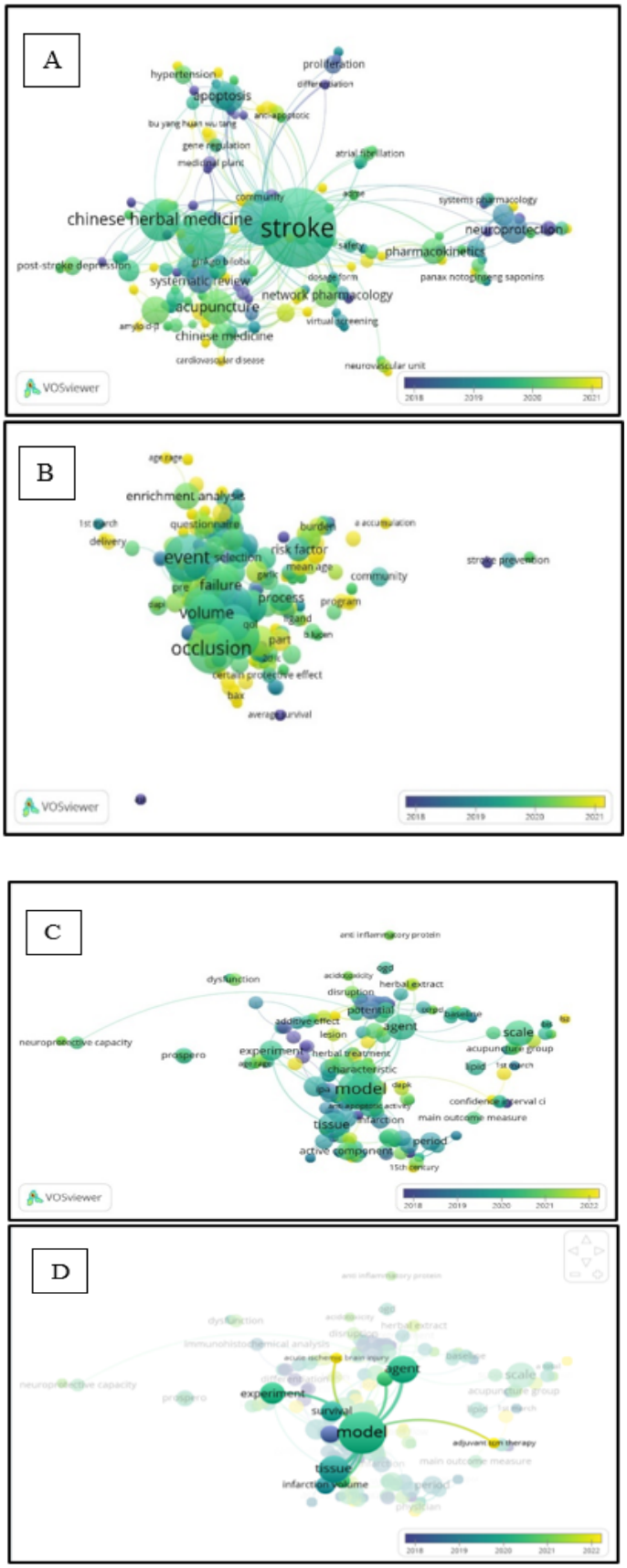

Figure 6: Co-occurrence based on keywords. The most common keyword is Stroke (A). (B) keywords center on the occlusion (C) centered on the model (D) correlation between the model and experiment.

preliminary double-blind study was conducted on 48 ischemic stroke survivors with cognitive issues. They were given a daily dosage of 750 mg and 1000 mg or 3 mg of acid folate for six weeks. The study found that the therapy significantly improved mental problems compared to the control group, with Gotu Kola showing greater potential than folic acid in enhancing memory. The study also reported no adverse effects. This marks an initial step towards treating cognitive deficits in Stroke patients using herbal medicine (Farhana *et al*., 2016).

Indonesia is known for its traditional Jamu medicine, which has been well researched empirically. However, the potency of Jamu in minimizing the effects of Stroke ischemia has not been adequately explored (Woerdenbag and Kayser, 2014). With Indonesia being a country rich in phytomedicine and the prevalence of Stroke on the rise, more research is necessary to provide empirical data on the treatment of Stroke. It is essential for the government and stakeholders to collaborate and create a research environment that promotes herbal medicine research in Stroke treatment.

CONCLUSION

In conclusion, although Stroke is prevalent in Indonesia, there has been little recent research conducted in the country. As the country with the most herbal medicine, Indonesian authors should focus on being more productive in writing about herbal medicine in treating Stroke.

ACKNOWLEDGEMENT

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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