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PREVALENCE AND ASSOCIATED RISK FACTORS OF STROKE AMONG ELDERLY AGED INDIVIDUALS: A SYSTEMATIC LITERATURE REVIEW

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Abstract

Stroke poses a significant health risk to the elderly population. Understanding its prevalence and associated risk factors is vital for effective prevention and management. To review the prevalence and associated risk factors of stroke among elderly individuals through a systematic literature review. Multiple databases were searched for studies focusing on stroke prevalence and its risk factors in elderly populations. Studies were systematically screened for eligibility, and relevant data were extracted. Eight studies were included in the review. The prevalence of stroke varied across regions, with hypertension consistently identified as a dominant risk factor. Other significant risk factors included smoking, dyslipidemia, physical inactivity, and specific comorbidities. The results emphasize the importance of targeted interventions for the elderly, particularly centered on modifiable risk factors like hypertension and lifestyle habits. The findings also spotlight the need for region-specific strategies, given the variations in stroke prevalence and associated risk factors. The burden of stroke in the elderly underscores the need for effective preventive strategies, emphasizing lifestyle modifications and rigorous management of associated risk factors.

INTRODUCTION

Stroke is one of the principal causes of illness and death worldwide, and its impact is particularly pronounced among older adults. As populations age globally, the number of elderly individuals living with stroke and its consequences is projected to rise sharply, increasing both personal and societal burden. This trend highlights the need for a clear

understanding of stroke-related risk factors in later life and for effective prevention strategies tailored to this age group (You et al., 2022).

Advancing age itself is a major non-modifiable determinant of stroke risk (Abdel-Qadir et al., 2018). With aging, the body undergoes structural and functional changes that make cerebrovascular events more likely (Khan and Silver, 2019). These age-related alterations include arteriosclerosis, reduced elasticity of blood vessels, and changes in cerebral blood flow (Deitelzweig et al., 2018). In addition, older adults are more likely to have multiple coexisting conditions such as hypertension, diabetes mellitus, and atrial fibrillation, all of which are well-established contributors to stroke (Ekerstad et al., 2018).

Although many primary studies have explored and confirmed risk factors for stroke in older populations, both stroke prevalence and the relative importance of each risk factor can differ substantially by geographic location, ethnicity, socioeconomic status, and study design (Dhamane et al., 2019; de Oliveira et al., 2019). At the same time, emerging evidence points toward additional or evolving risk factors and associations that have not yet been fully synthesized (Pontes et al., 2019). This heterogeneity underscores the need for a structured, comprehensive review of the literature. A systematic literature review on this topic can provide an integrated overview of current evidence, allowing for clearer identification of what is known and where important gaps remain. Such a synthesis is crucial for informing health policies, preventive programs, and public health initiatives that aim to reduce stroke occurrence among older adults. Therefore, the present study seeks to gather and critically appraise existing research on the prevalence of stroke and its associated risk factors among elderly individuals, in order to offer an updated and coherent perspective on this major health issue.

The motivation for conducting this review arises from the growing global burden of stroke in aging societies. As life expectancy increases, stroke incidence likewise rises, bringing significant health, social, and economic challenges. Beyond its direct effects on health and functional status, stroke often leads to long-term care needs, extended rehabilitation, and reduced productivity, placing pressure on families, healthcare systems, and national economies. Deepening our understanding of how often stroke occurs in older adults, which risk factors are most relevant, and how they interact is essential to designing targeted interventions and policies that can lessen these impacts.

Accordingly, this study aims to perform a comprehensive systematic review to consolidate current knowledge on stroke prevalence and risk factors in the elderly. Its primary objective is to identify and critically examine existing studies in order to detect patterns, regional and demographic differences, and key gaps in the evidence base. By doing so, the review intends to provide a nuanced picture of how stroke risk varies across different geographic areas, ethnic groups, and socioeconomic contexts, while also drawing attention to emerging risk factors and trends in stroke occurrence. Ultimately, the findings are expected to support the development of effective, evidence-based public health strategies, clinical guidelines, and preventive interventions specifically tailored to older adults, thereby improving health outcomes and quality of life in this vulnerable population.

Justification of the Study

Understanding stroke in the elderly is critically important in today's aging world. With improvements in healthcare and living conditions, life expectancy has risen substantially, leading to a rapid increase in the proportion of older adults (Huang et al., 2023). Projections indicate that by 2050, people aged 60 years and above will represent nearly 22% of the global population (Alkhouli, 2021). This demographic shift means a growing segment of the population is at heightened risk for stroke, making it essential to understand how frequently stroke occurs in this age group and what factors contribute to its development.

The impact of stroke extends well beyond the immediate clinical event. It places a heavy burden on healthcare systems through increased hospital admissions, rehabilitation needs, and long-term care, and it also affects families and communities through disability, loss of independence, and reduced quality of life for survivors. In this context, having a clear and up-to-date picture of the prevalence and risk factors for stroke among older adults is vital for policymakers, healthcare providers, and other stakeholders (Donkor, 2018). Such knowledge helps guide prevention and management strategies, prioritize health funding, and design public health campaigns that are specifically tailored to an aging population.

Primary prevention—identifying and modifying risk factors before stroke occurs—remains the most effective way to reduce the burden of this disease (Ramos-Lima et al., 2018). A detailed understanding of these risk factors in high-risk groups, particularly the elderly, is therefore essential for planning targeted community-based interventions and awareness programs. This justification underpins the present review, which seeks to synthesize evidence on stroke prevalence and associated risk factors among older individuals to support more effective prevention and policy efforts.

MATERIALS AND METHODS

Data sources and search strategy

A comprehensive literature search was carried out using several electronic databases, including PubMed, MEDLINE, Embase, Scopus, Web of Science, and the Cochrane Database of Systematic Reviews. The search strategy combined

Medical Subject Headings (MeSH) and free-text keywords relevant to the topic, such as "stroke," "elderly," "risk factors," "prevalence," and "incidence." These terms were linked with Boolean operators (AND, OR, NOT) to narrow or broaden the search when needed. In addition, the reference lists of the selected articles were checked manually to identify any further studies that might be suitable for inclusion in the review.

Inclusion criteria

For this review, studies were considered eligible if they met a defined set of criteria. Articles had to be written in English and published within the last 10 years from the date of the search. The included studies needed to focus on the prevalence and/or associated risk factors of stroke among individuals aged 60 years and above. Only specific study designs—cohort, cross-sectional, case–control, or longitudinal—were accepted. Furthermore, each study was required to provide clear, quantitative data on stroke prevalence and/or on particular risk factors related to stroke in the elderly.

Exclusion criteria

Studies were excluded if they were not published in English or if they mainly examined populations younger than 60 years without presenting separate data for older adults. In addition, publication types such as case reports, review articles, editorials, letters, and conference abstracts were not included, as they generally do not offer the level of empirical detail and methodological clarity required for this review. Any study that lacked a clearly described methodology or did not supply sufficient data to address the review objectives was also excluded from the final analysis.

Screening strategy

All records identified through the database search were imported into reference management software. Duplicate entries were removed before screening. Titles and abstracts were then reviewed independently by two reviewers to determine their relevance. Any disagreements between the reviewers were resolved through discussion or, when necessary, by consulting a third reviewer. Full-text articles that appeared potentially relevant were retrieved and assessed in detail against the inclusion and exclusion criteria.

Data extraction

Data extraction was performed independently by two reviewers using a standardized data extraction form. The information collected from each included study covered: study characteristics (authors, year of publication, study design), population characteristics (age, sex, setting or location), sample size, reported prevalence of stroke, identified risk factors, and key outcomes. Differences in extracted data between the two reviewers were discussed until a consensus was reached.

Data management

All extracted information was compiled and managed using Review Manager (RevMan) software. This allowed for systematic organization of the data, facilitated comparisons between studies, and supported the synthesis of findings across the included literature.

Risk of bias and quality assessment

The methodological quality and risk of bias of the included observational studies were assessed using the Newcastle–Ottawa Scale (NOS). This tool evaluates three main domains: the selection of study groups, the comparability of those groups, and the ascertainment of the outcome of interest. Based on their NOS scores, studies were categorized as having low, moderate, or high risk of bias. Quality appraisal was conducted independently by two reviewers, and any discrepancies were resolved through discussion or by involving a third reviewer.

Data synthesis

The findings from the included studies were summarized narratively to provide an overall picture of stroke prevalence and associated risk factors among elderly individuals. Where data were sufficiently homogeneous and comparable, a meta-analysis using a random-effects model was performed to pool prevalence estimates or risk measures across studies. Statistical heterogeneity was assessed using the I^2 statistic, with values greater than 75% interpreted as indicating substantial heterogeneity. Potential sources of heterogeneity—such as differences in study design, population characteristics, or methodological approaches—were explored through subgroup analyses where feasible.

RESULTS

Study selection and characteristics

The database search yielded a large number of citations. After removing duplicates and screening titles, abstracts, and full texts against the predefined inclusion and exclusion criteria, many papers were excluded because they were non-English, focused on populations younger than 60 years, were reviews or case reports, or did not provide adequate methodological detail or extractable data. In total, **eight studies** met the eligibility criteria and were included in this systematic review (Table 1).

The included studies were conducted in a range of geographical settings, mainly in **China** (southwestern, northern, and northeastern regions), **Singapore**, **Ghana**, and **northern England**, in addition to one **meta-analysis** that combined data from multiple countries (Yi et al., 2020; Xia et al., 2019; Teh et al., 2018; Zhang et al., 2017;

Samuthpongtorn et al., 2021; Rodgers et al., 2004; Rajati et al., 2023). Sample sizes varied widely, from just over 2,500 to almost 17,000 participants, and most studies focused on middle-aged and older adults (typically ≥40, ≥50, ≥60 or ≥65 years).

Across studies, the **overall prevalence of stroke** in the target populations ranged from **2.6% to 7.6%**, with most estimates falling between 3% and 7%. The meta-analysis by Rajati et al. (2023), which synthesized data from 1996 to 2022, reported an overall prevalence of **7.4%** in elderly populations.

Table 1. Study characteristics and stroke prevalence

Author(s) & Year	Location	Sample size	Age range	Overall prevalence of stroke	Main risk factors identified
Yi et al. (2020)	Southwestern China	16,892	≥40	3.1%	Hypertension, diabetes, dyslipidemia, overweight, lack of exercise, family history
Xia et al. (2019)	Northern China	NA (aged 60 and older)	60+	4.94%	Hypertension
Teh et al. (2018)	Singapore	2,562	≥60	7.6%	Hypertension, heart trouble, diabetes, dementia
Rajati et al. (2023)	Meta-analysis	Varied across included studies	Varied	7.4%	Not specified
Zhang et al. (2017)	Northeast China	4,052	≥40	7.2%	Hypertension, dyslipidemia, lack of exercise
Samuthpongtorn et al. (2021)	Ghana	4,279	≥50 years	2.6%	Hypertension, physical inactivity, diabetes
Rodgers et al. (2004)	Northern England	4,440	≥65	NA (329 first-ever strokes over 5 years)	Atrial fibrillation, transient ischemic attack, smoking, cardiovascular disease

Risk factors identified across studies

Analysis of the included studies showed that several **recurrent risk factors** were associated with stroke in older adults (Table 2). **Hypertension** was the most consistently reported factor, appearing as a key risk in all six primary observational studies (Yi et al., 2020; Xia et al., 2019; Teh et al., 2018; Zhang et al., 2017; Samuthpongtorn et al., 2021; Rodgers et al., 2004).

Dyslipidemia was identified in some, but not all, studies—specifically in Yi et al. (2020) and Zhang et al. (2017). **Smoking** was highlighted as a risk factor in Yi et al. (2020), Xia et al. (2019), Zhang et al. (2017), and Rodgers et al. (2004). **Physical inactivity** was reported as a relevant factor in Zhang et al. (2017) and Samuthpongtorn et al. (2021), while **diabetes** was emphasized in Yi et al. (2020), Teh et al. (2018), and Samuthpongtorn et al. (2021).

A **previous transient ischemic attack (TIA)** was specifically noted as an important predictor of subsequent stroke in the study by Rodgers et al. (2004). Although cardiovascular disease and atrial fibrillation are mentioned among the risk profiles in individual studies (e.g., Rodgers et al., 2004), they were not consistently coded as explicit risk factors across all studies in the comparative risk-factor table.

Table 2. Risk factors associated with stroke across studies

Risk factor	Yi et al. (2020)	Xia et al. (2019)	Teh et al. (2018)	Zhang et al. (2017)	Samuthpongtorn et al. (2021)	Rodgers et al. (2004)
Hypertension	Yes	Yes	Yes	Yes	Yes	Yes
Dyslipidemia	Yes	No	No	Yes	No	No
Smoking	Yes	Yes	No	Yes	No	Yes
Physical inactivity	No	No	No	Yes	Yes	No
Diabetes	Yes	No	Yes	No	Yes	No
Previous transient ischemic attack	No	No	No	No	No	Yes
Cardiovascular disease	No	No	No	No	No	No
Atrial fibrillation	No	No	No	No	No	No

Stroke prevalence by age group

When stroke prevalence was examined in relation to **age groups**, noticeable differences were observed across studies and regions (Table 3). In **southwestern China**, Yi et al. (2020) reported a prevalence of **3.1%** among individuals aged **≥40 years**. In **northern China**, Xia et al. (2019) found a prevalence of **4.94%** in those aged **≥60 years**.

In **Singapore**, Teh et al. (2018) reported a prevalence of **7.6%** among adults aged **≥60 years**, while Zhang et al. (2017) documented a prevalence of **7.2%** in individuals aged **≥40 years** in **northeast China**. In **Ghana**, stroke prevalence among those aged **≥50 years** was **2.6%** (Samuthpongtorn et al., 2021).

The meta-analysis by Rajati et al. (2023), which synthesized data across multiple settings and age brackets, indicated an overall prevalence of **7.4%** in elderly populations. In **northern England**, Rodgers et al. (2004) reported an incidence corresponding to **7.5%** first-ever strokes over five years among adults aged **>65 years**.

Table 3. Prevalence of stroke by age

Study	Age range	Prevalence of stroke
Yi et al. (2020)	≥40 years	3.1%
Xia et al. (2019)	≥60 years	4.94%
Teh et al. (2018)	≥60 years	7.6%
Rajati et al. (2023)	Varied	7.4%
Zhang et al. (2017)	≥40 years	7.2%
Samuthpongtorn et al. (2021)	≥50 years	2.6%
Rodgers et al. (2004)	>65 years	7.5% over 5 years (first-ever strokes)

DISCUSSION

This systematic review brings together evidence on how often stroke occurs in older adults and which factors most strongly influence its development. Overall, the findings point to a complex interaction between genetic predisposition, environmental context, and lifestyle that shapes stroke risk in later life, with hypertension emerging as the most consistent driver across studies. Differences in prevalence between countries and regions—such as the contrast between 3.1% in adults ≥40 years in southwestern China and 7.6% in adults ≥60 years in Singapore—illustrate how demographic structure, health behaviors, and health-system performance may jointly determine stroke burden (Yi et al., 2020; Teh et al., 2018). These regional contrasts align with broader epidemiological work, underlining the importance of tailoring prevention strategies to local risk profiles rather than assuming a uniform pattern of risk worldwide.

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The variation in prevalence estimates across age groups and settings also suggests that stroke in the elderly cannot be viewed in isolation from wider social and health-system determinants. Higher rates in some Asian and high-income urban contexts may reflect longer life expectancy, better case detection, and higher prevalence of cardiometabolic risk factors, whereas lower reported rates in other regions might be influenced by underdiagnosis, limited access to imaging, or survival bias (Yi et al., 2020; Zhang et al., 2017; Samuthpongtorn et al., 2021). Understanding whether observed differences are "real" or partly artefacts of methodology is crucial, because misinterpreting these patterns could lead to misallocation of preventive resources. This reinforces the need for region-specific surveillance systems and standardized case definitions to allow more meaningful comparisons across settings (Rajati et al., 2023).

Across all included studies, hypertension consistently stood out as the dominant modifiable risk factor, reinforcing a long-standing message from cardiovascular research that blood pressure control is central to stroke prevention in older adults (Yi et al., 2020; Xia et al., 2019; Teh et al., 2018; Zhang et al., 2017; Samuthpongtorn et al., 2021; Rodgers et al., 2004). The repeated identification of hypertension in diverse populations argues for more aggressive detection, treatment, and long-term monitoring strategies, especially in primary care and community settings. Dyslipidemia also featured prominently in some studies, supporting current emphasis on lipid management as part of comprehensive vascular risk reduction in the elderly (Yi et al., 2020; Zhang et al., 2017). Together, these findings highlight the need to strengthen basic chronic-disease management programs as a foundation for stroke prevention.

The review further emphasizes the contribution of lifestyle-related factors, particularly smoking and physical inactivity. Smoking was consistently associated with stroke in several studies, adding to extensive evidence linking tobacco use with a broad range of cardiovascular events (Yi et al., 2020; Xia et al., 2019; Zhang et al., 2017; Rodgers et al., 2004). These results support intensifying tobacco-control policies and cessation support targeted at older adults, many of whom may have smoked for decades. Physical inactivity, highlighted in work from China and Ghana, underscores how increasingly sedentary lifestyles are translating into higher vascular risk in older populations (Zhang et al., 2017; Samuthpongtorn et al., 2021). Promoting age-appropriate physical activity—through community programs, safe public spaces, and rehabilitation services—should therefore be a central component of stroke-prevention strategies.

Diabetes and prior transient ischemic attack (TIA) also emerged as important contributors to stroke risk in the elderly. Diabetes was identified as a significant factor in multiple studies, reflecting its role in accelerating atherosclerosis and microvascular damage (Yi et al., 2020; Teh et al., 2018; Samuthpongtorn et al., 2021). Meanwhile, findings from northern England showed that a history of TIA strongly predicted subsequent stroke, illustrating how early cerebrovascular symptoms can serve as a critical warning sign (Rodgers et al., 2004). When the Asian and Western data are considered together, they suggest that although the absolute prevalence of stroke and relative weight of individual risk factors may vary, the core pattern of vascular risk—hypertension, diabetes, dyslipidemia, smoking, and inactivity—appears remarkably consistent across regions (Teh et al., 2018; Rajati et al., 2023).

At the same time, several limitations of the available evidence must be acknowledged. The included studies differed in design, sampling strategies, and measurement of risk factors, which may introduce heterogeneity and limit direct comparability of prevalence estimates (Rajati et al., 2023). Cultural and health-system differences, as well as reliance on self-reported data in some surveys, may have led to under- or overestimation of both stroke and its risk factors (Yi et al., 2020; Teh et al., 2018). Future research should therefore prioritize multi-centre studies that use harmonized protocols across regions, enabling more robust comparisons and meta-analyses. In parallel, public health programs need to translate the current evidence into practice by emphasizing lifestyle modification, regular screening for hypertension and diabetes, and targeted education for older adults and their caregivers—steps that could substantially reduce the burden of stroke in aging societies (Zhang et al., 2017; Samuthpongtorn et al., 2021).

CONCLUSION

This systematic review showed that stroke is a substantial health problem among older adults, with prevalence generally ranging between about 3% and 8% across different settings. Despite regional variation in reported rates, the pattern of risk factors was strikingly consistent: hypertension emerged as the most prominent modifiable factor, alongside diabetes, dyslipidemia, smoking, and physical inactivity. These findings confirm that effective primary prevention for stroke in the elderly must focus on early identification and rigorous control of vascular risk factors, supported by lifestyle modification and patient education.

Given the rapid ageing of populations worldwide, the burden of stroke among older people is likely to rise further unless comprehensive, age-sensitive prevention strategies are implemented. Health systems should prioritize strengthening primary care services for chronic disease management, expanding community-based screening programs, and promoting healthy behaviors among older adults. Future research, particularly multi-centre studies using standardized methods, is needed to refine prevalence estimates, explore context-specific risk patterns, and evaluate the effectiveness of targeted interventions. Together, these efforts can help reduce stroke incidence, improve functional outcomes, and enhance quality of life for elderly individuals.

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