Epidemiological Characteristics and Influencing Factors of Subjective Cognitive Decline in Elderly Stroke Patients in China: A Postprint Study

Authors: Liu Ying, Shiwei Liu, Zhang Chi, Shen Ji, Yu-Shan Zhang, Zhang Jie, Sang Yingchen, Wang Youjiao, Lei Wang, Houguang Zhou, Hong Shi, Hong Shi

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Abstract

Background: China faces a severe burden of dementia, and subjective cognitive decline (SCD) serves as an early warning signal for the disease. Interventions implemented during the stage where objective cognitive impairment is not yet evident are far more effective than treatments administered after a dementia diagnosis, offering the potential to delay or even prevent disease progression. Objective: To analyze the epidemiological characteristics and influencing factors of SCD among elderly stroke patients aged 65 and older in China, providing a scientific basis for early intervention. Methods: This study was based on data from the 2024 China Adult Health Survey (CAHS) conducted between May 2023 and June 2024, including 2,647 elderly stroke patients from 31 provinces (autonomous regions and municipalities) as observation subjects. SCD was assessed using the Subjective Cognitive Decline Scale (SCD-9). Weighted complex sampling design and multivariate Logistic regression analysis were employed to explore the influencing factors of SCD. Results: Weighted data indicated that the prevalence of SCD among elderly stroke patients in China was 62.53%, with significant regional variations: 74.74% in Central China, 72.37% in Northeast China, 58.75% in Western China, and 50.14% in Eastern China. Multivariate Logistic regression analysis showed that, compared to Eastern China, the Northeast region had the highest risk (OR=1.289, 95%CI=1.189-1.398). Factors influencing SCD in elderly stroke patients included age $ $75 years (OR=1.901, 95%CI=1.805-2.001), rural residence (OR=1.072, 95%CI=1.023-1.122), low education level (primary school and below vs. high school and above: OR=0.835, 95%CI=0.787-0.887), low income (<3,000 yuan vs. $ $10,000 yuan: OR=0.828, 95%CI=0.764-0.897), anxiety (OR=1.258, 95%CI=1.184-1.338), and depression (OR=3.239, 95%CI=3.063-3.425). Conclusion: The prevalence of SCD among elderly stroke patients in China is high, with significant regional differences.

Depression and anxiety are the primary modifiable factors. Regionalized early intervention strategies targeting high-risk populations are needed to delay the progression of cognitive impairment.

Full Text

Preamble

Chinese General Practice

Abstract

In the context of the ongoing reform of the medical and health system, the development of general practice has become a core strategy for achieving the "Healthy China" initiative. This paper explores the current status, challenges, and future directions of general practice in China. By analyzing the construction of the primary healthcare system and the cultivation of general practitioners (GPs), we aim to provide a theoretical basis for improving the quality of community-level medical services.

Introduction

General practice, as a clinical secondary discipline that integrates clinical medicine, preventive medicine, rehabilitation medicine, and humanities and social sciences, plays a "gatekeeper" role in the national health system. In recent years, the Chinese government has issued a series of policies to strengthen the construction of the general practitioner workforce and promote the hierarchical medical system. However, compared to developed countries, China' s general practice still faces issues such as an insufficient total number of practitioners, uneven distribution of resources, and a need for improvement in service quality.

Current Status of General Practice in China

The development of general practice in China has transitioned from a stage of initial exploration to one of rapid expansion. Currently, the "5+3" standardized residency training model (5 years of undergraduate medical education followed by 3 years of standardized residency training) has become the main pathway for cultivating general practitioners. Furthermore, the implementation of the "contracted family doctor service" has significantly enhanced the accessibility of primary healthcare for residents.

As shown in , the number of registered general practitioners in China has seen a steady increase over the past decade. Despite this growth, the ratio of GPs per 10,000 residents still falls short of the targets set for 2030.

Challenges and Constraints

1. Professional Identity and Compensation One of the primary challenges is the relatively low social status and compensation for general practitioners compared to specialists in tertiary hospitals. This disparity often leads to low job satisfaction and high turnover rates among primary care providers.

2. Quality of Training While the quantity of training programs has increased, the quality remains inconsistent. Some training bases lack experienced clinical supervisors who truly understand the philosophy of general practice, leading to a curriculum that is overly focused on specialized hospital care rather than community-oriented health management.

3. Information Technology Integration The integration of machine learning and deep learning into primary care is still in its infancy. Although big data offers potential

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Epidemiological Characteristics and Influencing Factors of Subjective Cognitive Decline in Elderly Stroke Patients in China

Liu Ying 1, Liu Shiwei 1, Zhang Chi 1, Shen Ji 2, Zhang Yushan 2, Zhang Jie 2, Sang Yingchen 1, Wang Youjiao 1, Wang Lei 3, Zhou Houguang 4, Shi Hong 2*

1.100050 北京市，中国疾病预防控制中心（中国预防医学科学院）

Department of Geriatrics, Beijing Hospital (National Center of Gerontology); National Clinical Research Center for Geriatric Diseases; NHC Key Laboratory of Geriatrics; Institute of Geriatric Medicine, Chinese Academy of Medical Sciences, Beijing 100730, China.

背景

The burden of dementia in China is severe. Subjective cognitive decline (SCD) serves as an early warning signal for dementia; interventions implemented during the stage where objective cognitive impairment is not yet

evident are far more effective than treatments administered after a dementia diagnosis. Such early interventions hold the potential to delay or even halt disease progression. **Objective:** To investigate the epidemiological characteristics and influencing factors of SCD in elderly stroke patients, providing a scientific basis for early intervention. **Methods:**

This study analyzed data from Chinese adults aged 65 and older.

Based on data from the 2024 China Adult Health Survey (CAHS) conducted between May 2023 and

June 2024, 2,647 elderly stroke patients across 31 provinces (autonomous regions and municipalities) were included as observation subjects. Subjective cognitive function was assessed using the Subjective Cognitive Decline 9-item (SCD-9) scale. Weighted complex sampling design and multivariate logistic regression analysis were employed to explore the factors influencing subjective cognitive decline. **Results:**

After weighting the data, the results indicated that the prevalence of subjective cognitive decline

among elderly stroke patients in China was 62.53%, with significant regional variations: 74.74% in Central China, 72.37% in Northeast China, 58.75% in Western China, and 50.14% in Eastern China. Multivariate logistic regression analysis showed that, compared to the Eastern region, the Northeast region carried the highest risk (OR = 1.289, 95%CI = 1.189–1.398). Other significant factors influencing SCD in elderly stroke patients included age $\geq$ 75 years (OR = 1.901, 95%CI = 1.805–2.001), rural residence (OR = 1.072, 95%CI = 1.023–1.122), low education level (primary school or below vs. high school or above:

OR = 0.835, 95%CI = 0.787–0.887), low income ($< 3,000$ RMB vs. $\geq 10,000$ RMB: OR = 0.828, 95%CI = 0.764–0.897), anxiety (OR = 1.258, 95%CI = 1.184–1.338), and depression (OR = 3.239, 95%CI = 3.063–3.425). **Conclusion:**

The prevalence of subjective cognitive decline among elderly stroke patients in China is high, with notable regional disparities. Depression and anxiety are the primary modifiable factors. It is essential to develop regionalized early intervention strategies targeting high-risk populations

to delay the progression of cognitive impairment. **Keywords:**

Stroke; Subjective cognitive decline; Elderly; Cross-sectional study

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Abstract

This paper presents a comprehensive study on the application of machine learning and deep learning techniques within specialized scientific domains. By integrating advanced computational models with empirical data, we demonstrate significant improvements in predictive accuracy and systemic efficiency. Our methodology emphasizes the preservation of technical rigor while ensuring the scalability of the proposed solutions. The results indicate that the integration of these technologies provides a robust framework for addressing complex challenges in modern research.

Introduction

The rapid advancement of computational power has revolutionized the landscape of scientific inquiry. Machine learning, in particular, has emerged as a pivotal tool for analyzing high-dimensional datasets that were previously considered intractable. As researchers seek to extract meaningful patterns from increasingly complex systems, the demand for sophisticated algorithmic frameworks has grown exponentially. This study aims to bridge the gap between theoretical model development and practical implementation in real-world scenarios.

1.1 Background and Motivation

Traditional analytical methods often struggle with the non-linearities and stochastic nature of modern experimental data. Deep learning, characterized by its multi-layered architectural approach, offers a promising alternative by automatically learning hierarchical representations. The motivation for this research stems from the need to enhance the reliability of these models when applied to sensitive scientific parameters, where even minor deviations can lead to significant errors in interpretation.

[Figure 1: see original paper]

Methodology

Our approach utilizes a hybrid architecture that combines traditional statistical constraints with the flexibility of neural networks. By incorporating domain-specific knowledge into the loss functions, we ensure that the model outputs remain physically consistent and mathematically sound.

2.1 Data Acquisition and Preprocessing

Data were collected from multiple high-fidelity sources to ensure a diverse and representative training set. Preprocessing involved normalization and the removal of outliers to maintain the integrity of the learning process. We define the input vector as $\mathbf{x} \in \mathbb{R}^n$ and the target output as y. The objective is to minimize the empirical risk function:

$$R_{emp}(f) = \frac{1}{n} \sum_{i=1}^{n} L(y_i, f(x_i))$$

where L denotes the loss function and f represents the mapping function learned by the network.

2.2 Model Architecture

The core of our system is based on a deep convolutional neural network (CNN) optimized for spatial feature extraction. We utilize $\mathcal{F}$ to denote the transformation layers, where each layer l computes:

$$h^{(l)}$$

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Prevalence and Associated Factors of Subjective Cognitive Decline among Older Stroke Patients in China

LIU Ying[1], LIU Shiwei[1], ZHANG Chi[1], SHEN Ji[2], ZHANG Yushan[2], ZHANG Jie[2], SANG Yingchen[1], WANG Youjiao[1], WANG Lei[3], ZHOU Houguang[4], SHI Hong[2*]

1. Chinese Center for Disease Control and Prevention (Chinese Academy of Preventive Medicine), Beijing 100050, China
2. Department of Geriatrics, Beijing Hospital, National Center for Gerontology/National Clinical Research Center for Gerontology/The Key Laboratory of Geriatrics of NHC/Institute of Geriatric Medicine, Chinese Academy of Medical Sciences, Beijing 100730, China
3. Department of Geriatrics, Medical Center on Aging of Ruijin Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai 200025, China
4. Department of Geriatrics, Huashan Hospital, National Clinical Research Center for Aging and Medicine, Fudan University, Shanghai 200040, China

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Abstract

Background Subjective Cognitive Decline (SCD) is considered a preclinical stage of Alzheimer' s disease and other dementias. Stroke is a significant risk factor for cognitive impairment; however, there is currently a lack of large-scale epidemiological data regarding the prevalence and associated factors of SCD specifically among the elderly stroke population in China.

Objective To investigate the prevalence of SCD among older stroke patients in China and to analyze the demographic, lifestyle, and health-related factors associated with its occurrence.

Methods Data were derived from a nationally representative cross-sectional study. Participants aged 60 years and older with a self-reported history of stroke were included in the analysis. SCD was assessed based on participants'self-reported persistent decline in cognitive abilities compared to their previous level of functioning, unrelated to an acute event. Multivariable logistic regression

models were employed to identify independent factors associated with SCD, adjusting for potential confounders such as age, gender, education level, and comorbidities.

Results The study included a substantial sample of older stroke survivors across various regions of China. The results indicated a high prevalence of SCD among this population. Factors significantly associated with an increased risk of SCD included advanced age, lower educational attainment, lack of regular physical exercise, and the presence of multiple chronic conditions (multimorbidity). Conversely, engagement in social activities and a healthy diet were found to be protective factors.

Conclusion SCD is highly prevalent among older stroke patients in China. Given its potential as an early indicator of future dementia, targeted screening and multidimensional interventions focusing on lifestyle modifications and chronic disease management are essential for this high-risk group.

Keywords: Stroke; Subjective Cognitive Decline; Older Adults; Prevalence; Associated Factors; China

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Introduction

As the global population ages, the burden of cognitive impairment and dementia has become a major public health challenge. Subjective Cognitive Decline (SCD) refers to a self-experienced decline in cognitive capacity relative to a previously normal status, which is not yet detectable through objective neuropsychological tests. Recent research highlights SCD as a critical window for early intervention, as individuals with SCD are at a significantly higher risk of progressing to Mild Cognitive Impairment (MCI) and Alzheimer' s Disease (AD).

Stroke remains a leading cause of disability and death in China. Post-stroke cognitive impairment (PSCI) is a common complication that severely affects the quality of life and increases the caregiving burden. While objective cognitive deficits following stroke have been extensively studied, the prevalence of subjective complaints—which may precede formal clinical diagnosis—remains under-explored in the Chinese context. Understanding the epidemiological characteristics of SCD

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Chinese General Practice

【Abstract】

Background

Dementia imposes a substantial burden in China., Subjective cognitive decline (SCD)

represents an early warning sign of dementia. Interventions initiated during this stage, prior to the onset of objective cognitive impairment, are significantly more effective than treatments administered after a formal dementia diagnosis, offering potential to delay or even prevent disease progression. Objective

To investigate the prevalence, epidemiological characteristics, and

determinants of SCD among older adults (aged ≥ 65 years) with a history of stroke in China, thereby providing a scientific basis for early intervention strategies. Methods

This study utilised data from the 2024 China Aging and Health Survey (CAHS),

conducted between May 2023 and June 2024. We included 2,647 older adults with stroke from 31 provinces (autonomous regions, municipalities). SCD was assessed using the validated Subjective Cognitive Decline-9 (SCD-9) scale. A weighted complex sampling design was applied to account for the survey structure, and multivariable logistic regression analysis was employed to identify factors associated with SCD. Results The weighted data show that the rate of SCD among elderly stroke patients in China is 62.53%, and there are significant regional differences. The rates in the central region are 74.74%, in the northeast 72.37%, in the west 58.75%, and in the east 50.14%. Multivariate analysis revealed that compared to the East region, the Northeast region

had the highest risk (OR=1.289, 95%CI=1.189-1.398). Other significant influencing factors included age ≥ 75 years (OR=1.901, 95%CI=1.805-2.001), rural residence (OR=1.072, 95%CI=1.023-1.122), low education level (primary school or below vs. high school or above: OR=0.835, 95%CI=0.787-0.887), low income (<3,000 RMB vs.

≥ 10,000 RMB: OR=0.828, 95%CI=0.764-

0.897), anxiety (OR=1.258, 95%CI=1.184-1.338), and depression (OR=3.239, 95%CI=3.063-3.425). Conclusion

prevalence of SCD is high among older adults with stroke in China, with marked regional disparities. Depression and anxiety are major modifiable influencing factors. There is a need to develop regionalized early intervention strategies targeting high-risk populations to delay the progression of cognitive impairment.
【Key words】 Stroke; Subjective cognitive decline; Older adults; Cross-sectional study

Subjective cognitive decline (SCD) refers to an individual' s self-perceived decline in cognitive capacity despite objective neuropsychological test results that do not yet meet the criteria for cognitive impairment. Cognitive decline exists on a continuous spectrum, progressing from SCD to mild cognitive impairment (MCI) and ultimately to dementia. SCD is considered an early warning sign of dementia, particularly Alzheimer' s disease [**?**], and is associated with a significantly increased risk of future progression to MCI or Alzheimer' s disease

[?]. As the earliest and most subjective observable stage in this process, researching SCD allows for the prevention and control of cognitive impairment to be initiated much earlier. Intervening at a stage where objective cognitive impairment is not yet evident is far more effective than treatment following a dementia diagnosis, offering the potential to delay or even halt disease progression. Current research on SCD focuses primarily on Western populations or high-risk Alzheimer' s groups; however, systematic data regarding the prevalence and regional differences of SCD among elderly stroke patients in China remain scarce. Therefore, this study utilizes data from the 2024 China Aging and Health Survey (CAHS) to analyze the epidemiological characteristics of SCD in stroke patients aged 65 and older. Furthermore, multivariate logistic regression models are applied to analyze influencing factors, providing a scientific basis for reducing the national burden of dementia and achieving early warning and timely intervention for cognitive impairment.

Materials and Methods

This study is based on data from the 2024 China Aging and Health Survey (CAHS). The CAHS employed a multi-stage stratified cluster probability sampling method, conducting face-to-face questionnaire interviews via an electronic survey system between May 2023 and June 2024. The survey content included:

demographics, health needs, quality of life, geriatric syndromes, nutritional status, motor function, and cognitive function. The survey covered 31 provinces (autonomous regions and municipalities) and 178 districts (counties), ensuring a degree of national representativeness. A total of 49,193 individuals aged $\geq$ 65 years were recruited for the CAHS. Following comprehensive data cleaning, 2,647 stroke patients were ultimately included in the analysis. The CAHS was approved by the Ethics Committee of Beijing Hospital (Approval No.: 2021BJYEC-114-01), and informed consent was obtained from all participants. Inclusion criteria were: age 65 or older; permanent residents (defined as individuals who resided locally for more than 6 months in the past 12 months, regardless of household registration); and availability of key information such as stroke diagnosis and subjective cognitive assessment scales. Exclusion criteria were: individuals residing in military bases, hospitals, prisons, nursing homes, or dormitories; and those with missing key information.

1.2 评估标准

The assessment criterion for stroke was based on the question: "Have you ever been diagnosed with cerebral hemorrhage or cerebral infarction by a physician?" Subjective cognitive function in the elderly participants was evaluated using the Subjective Cognitive Decline Nine-item Questionnaire (SCD-9) [?]. Additionally, the depression and anxiety levels of the elderly population were assessed using the Patient Health Questionnaire-9 (PHQ-9) and the Generalized Anxiety Disorder-7 (GAD-7) scales, respectively [?].

1.3 区域划分

In accordance with the latest regional classification standards from the National Bureau of Statistics [**?**], this study categorizes Beijing, Tianjin, Hebei, Shandong, Jiangsu, and Shanghai,

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Zhejiang, Fujian, Guangdong, and Hainan as the Eastern region. The Central region comprises Shanxi, Anhui, Jiangxi, Henan, Hunan, and Hubei provinces. The Western region includes the Inner Mongolia Autonomous Region, Guangxi Zhuang Autonomous Region, Chongqing, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, the Tibet Autonomous Region, Ningxia Hui Autonomous Region, and the Xinjiang Uygur Autonomous Region. Finally, the Northeast region consists of Liaoning, Heilongjiang, and Jilin provinces.

1.4 统计学方法

Statistical analyses were performed using STATA 18.0. To ensure the representativeness of the findings for the general population, weighted descriptive analyses were conducted based on a complex sampling design. The weighting scheme incorporated sampling weights, non-response adjustment weights, and post-stratification weights. Prevalence estimates and their corresponding 95% confidence intervals (CIs) were calculated using survey weighting methods. Intergroup comparisons were evaluated using the Rao-Scott χ^2 test. Furthermore, a multivariable logistic regression analysis was employed to identify factors influencing mild cognitive impairment in elderly stroke patients. All statistical tests were two-sided, with the significance level set at $\alpha = 0.05$.

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结果

After weighting, the prevalence of subjective cognitive decline (SCD) among elderly stroke patients aged 65 and older in China was 62.53%, with rates of 64.24% in rural areas and 61.49% in urban areas. Statistically significant differences in the prevalence of SCD were observed across different regions, ages, places of residence, educational levels, monthly household incomes, and statuses of anxiety and depression ($P < 0.05$).

Specifically, the prevalence of SCD among elderly stroke patients aged 65 and older varied by region: 74.74% in Central China, 50.14% in Eastern China, 58.75% in Western China, and 72.37% in Northeast China. By age group, the prevalence was 52.48% for those aged 65–69, 70.40% for those aged 70–74, and 63.08% for those aged 75 and older. Regarding educational attainment, the prevalence was 69.15% for those with a primary school education or below, 63.07% for those with a junior high school education, and 40.37% for those with a high school education or higher.

In terms of monthly household income (excluding those who declined to answer), the prevalence was 65.98% for those earning <3,000 RMB, 59.71% for 3,000–5,999 RMB, 63.04% for 6,000–9,999 RMB, and 46.93% for $ 10,000 RMB. Furthermore, elderly stroke patients exhibiting symptoms of anxiety or depression had higher rat
> 0.05$), as shown in .

2.2 不同区域脑卒中患者主观认知功能下降情况比较

After weighting, the eastern region exhibited the lowest prevalence of subjective cognitive decline (SCD) among stroke patients aged 65 and older, at 50.14%. Statistically significant differences in SCD prevalence were observed across the eastern, central, western, and northeastern regions among various subgroups, including males ($\chi^2 = 30.854, P < 0.001$), females ($\chi^2 = 10.094, P = 0.018$), those aged 70–74 ($\chi^2 = 16.261, P = 0.001$), those aged ≥ 75 ($\chi^2 = 22.964, P < 0.001$), urban residents ($\chi^2 = 21.395, P < 0.001$), and rural residents ($\chi^2 = 37.279, P < 0.001$). Significant regional variations were also found across different educational levels: primary school or below ($\chi^2 = 24.341, P < 0.001$), junior high school ($\chi^2 = 8.156, P = 0.043$), and senior high school or above ($\chi^2 = 11.099, P = 0.011$). Furthermore, differences were significant for individuals with a BMI of 18.5–24.9 kg/m^2 ($\chi^2 = 29.636, P < 0.001$) and 25.0–29.9 kg/m^2 ($\chi^2 = 11.434, P = 0.010$), as well as those with a monthly household income of 3,000–5,999

yuan ($\chi^2 = 16.701, P = 0.001$), 6,000–9,999 yuan ($\chi^2 = 11.205, P = 0.011$), and $\geq 10,000$ yuan ($\chi^2 = 9.864, P = 0.020$). Finally, significant regional differences were observed among patients characterized by non-anxiety ($\chi^2 = 65.232, P < 0.001$) and non-depression ($\chi^2 = 33.422, P < 0.001$). These results are detailed in .

2.3 老年脑卒中患者主观认知功能下降影响因素的

Logistic regression analysis was conducted using the presence of subjective cognitive decline (SCD) in elderly stroke patients as the dependent variable (0 = No, 1 = Yes). Independent variables included in the multivariate logistic regression model were those identified as statistically significant in the univariate analysis: region, age, place of residence, education level, monthly household income, anxiety, and depression. The results of the likelihood ratio test ($P < 0.001$) and the goodness-of-fit test ($P = 0.094$) indicated that the model achieved a good overall fit. The analysis revealed that SCD in stroke patients aged 65 and older is significantly associated with region, age, residence, education level, monthly household income, anxiety, and depression.

Regarding regional differences, compared to the eastern region, the risk of SCD in elderly stroke patients increased by 6.9% in the western region (OR = 1.069, 95% CI = 1.012–1.129), 12.3% in the central region (OR = 1.123, 95% CI = 1.065–1.184), and 28.9% in the northeastern region (OR = 1.289, 95% CI = 1.189–1.398). Age was also a significant factor; compared to patients aged 65–

69, the risk of SCD increased by 26.0% for those aged 70–74 (OR = 1.260, 95% CI = 1.192–1.330) and by 90.1% for those aged 75 and older (OR = 1.901, 95% CI = 1.805–2.001). Furthermore, elderly stroke patients living in rural areas faced a 7.2% higher risk of SCD compared to those in urban areas (OR = 1.072, 95% CI = 1.023–1.122).

Socioeconomic factors also played a protective role. Compared to patients with an education level of primary school or below, the risk of SCD was 16.5% lower for those with a high school education or higher (OR = 0.835, 95% CI = 0.787–0.887) and 23.4% lower for those with a junior high school education (OR = 0.766, 95% CI = 0.726–0.808). Similarly, compared to a monthly household income of $<$ 3,000 RMB, the risk of SCD decreased by 19.0% for incomes of 3,000–5,999 RMB (OR = 0.810, 95% CI = 0.764–0.858), 12.5% for 6,000–9,999 RMB (OR = 0.875, 95% CI = 0.819–0.936), and 17.2% for $\geq$ 10,000 RMB (OR = 0.828, 95% CI = 0.764–0.897).

Psychological factors were strongly associated with cognitive outcomes. The presence of anxiety symptoms increased the risk of SCD by 25.8% (OR = 1.258, 95% CI = 1.184–1.338) compared to those without anxiety. Notably, the risk of SCD in elderly stroke patients with depressive symptoms was 3.239 times higher than in those without depression (OR = 3.239, 95% CI = 3.063–3.425). Detailed results are presented in .

讨论

The results of this study indicate that, after weighting, the prevalence of subjective cognitive decline (SCD) among elderly stroke patients is as high as 62.53%. This figure is significantly higher than the 40.8% reported for the general elderly population in previous Chinese studies [**?**]. This discrepancy may be attributed to the direct neurological damage caused by stroke.

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Subjectively Normal Cognitive Function

Subjective Cognitive Decline

Weighted Proportion (%)

Weighted Proportion (%)

65–69 years old

70–74 years old

$\geq$ 75 years old

Educational Level: Primary school or below

High school or above

<18.5 kg/m

18.5~24.9 kg/m2

25.0~29.9 kg/m2

≥ 30.0 kg/m

Monthly household income < 3,000 RMB

3,000–5,999 RMB

6,000–9,999 RMB

≥ 10,000 RMB

···leads to structural brain damage and the destruction of cognitive-related regions, thereby triggering cognitive decline. While acute cognitive impairment is common following a stroke, chronic cerebrovascular disease can also lead to insidious cognitive decline even in the absence of overt stroke symptoms [**?**]. Subjective cognitive decline (SCD) may serve as an early marker for vascular dementia or other cerebrovascular pathologies [**?**]. Due to the accumulation of cerebrovascular lesions, stroke patients are more susceptible to cognitive deterioration, and SCD may represent an early subjective manifestation of this process. Research indicates that the rate of cognitive decline in stroke patients is significantly···

<0.001

<0.001

<0.001

<0.001

<0.001

<0.001

The rate of decline in subjective cognitive function was faster than that of the control group without stroke [**?**], which may explain the observed differences in the rates of subjective cognitive decline. This study found regional variations in the rate of subjective cognitive decline among elderly stroke patients, with prevalence following a gradient distribution of "Central > Northeast > West > East." On one hand, these findings may stem from differences in the application of cognitive assessment tools across population studies and variations in the technical proficiency of investigators [**?**]. On the other hand, the uneven distribution of specialized medical resources may exacerbate cognitive risks; specifically, disparities in the coverage of neurologists and cognitive impairment clinics may lead to insufficient resource allocation.

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Weighted Proportion (%) | Number of Cases | Weighted Proportion (%)

Weighted Proportion (%) | Number of Cases | Weighted Proportion (%)

<0.001

65–69 years

70–74 years

≥ 75 years

<0.001

<0.001

<0.001

Elementary school and below

<0.001

High school and above

Educational attainment

<18.5 kg/m2

<0.001

25.0~29.9 kg/m2

Less than 3,000 RMB

3,000–5,999 RMB

6,000–9,999 RMB

≥ 10,000 RMB

<0.001

<0.001

<0.001

18.5~24.9 kg/m ≥ 30.0 kg/m

Monthly Household Income

Note: The weighted proportions presented in this table represent the prevalence of subjective cognitive decline (SCD) among stroke patients. The weighted proportions for patients with normal subjective cognitive function are not shown; the sum of the two categories is 100%. Due to the small sample sizes in certain cells, results should be interpreted with caution.

Patients in certain regions are more likely to miss the window for early cognitive intervention, and research has confirmed that a lack of professional follow-up accelerates cognitive decline [**?**]. Furthermore, the timeliness of emergency

treatment significantly impacts long-term cognitive function. There may be regional disparities in the rate at which patients reach medical facilities within the "golden hour" for thrombolysis. Lo et al. [**?**] emphasized that acute stroke is directly associated with accelerated long-term cognitive decline; an excessively large service radius for stroke centers may delay treatment, leading to more severe neurological damage and subsequent cognitive impairment. As a prodromal symptom of dementia, subjective cognitive decline (SCD) holds significant early warning value. However, its clinical manifestations are highly heterogeneous, potentially representing either an early manifestation of Alzheimer' s disease or a reflection of psychological vulnerability [**?**]. A study focusing on the elderly population in urban South India demonstrated that the prevalence of SCD is correlated with sociodemographic factors such as educational

attainment and economic status [**?**]. Another multinational study also emphasized that the prevalence of SCD varies according to geographic region and population characteristics, necessitating assessment through unified standards [**?**]. The results of the present study are consistent with these findings. Compared to the eastern region, elderly stroke patients in the northeast region exhibited the highest risk ratio for the prevalence of subjective cognitive decline. The increased frequency of vasospasms caused by winter temperature fluctuations in the northeast may exacerbate the risk of SCD. Repeated vasospasms can promote cerebral small vessel disease, which is associated with alterations in white matter pathways related to subjective cognitive decline [**?**]. Furthermore, subclinical atherosclerosis serves as a potential intervention target for cognitive decline, and extreme climates may accelerate this pathological process [**?**].

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Results of Multivariate Logistic Regression Analysis in Elderly Stroke Patients Aged 65 and Above in China

To further investigate the independent risk factors associated with the prognosis of elderly stroke patients (aged 65 and above) in China, a multivariate Logistic regression analysis was conducted. The model incorporated variables that demonstrated statistical significance in the univariate analysis, alongside clinically relevant factors.

The results of the multivariate analysis, expressed as Odds Ratios (OR) with 95% Confidence Intervals (95% CI), identify several key determinants of patient outcomes. These findings provide a quantitative basis for understanding the complex interplay of demographic, clinical, and lifestyle factors in this specific population.

As shown in , the regression model highlights that advanced age, severity of the initial neurological deficit (as measured by the NIHSS score), and the presence of comorbidities such as diabetes mellitus and hypertension are significantly associated with poor prognosis. Conversely, early rehabilitative intervention and

higher levels of social support were found to be protective factors, significantly reducing the likelihood of adverse outcomes.

The statistical significance of these variables underscores the necessity of a multifaceted approach to stroke management in the elderly. By identifying these specific risk factors, clinicians can better stratify patients and implement targeted secondary prevention strategies to improve the quality of life and long-term recovery for this vulnerable demographic.

1.123 (1.065~1.184)

1.069 (1.012~1.129)

1.289 (1.189~1.398)

<0.001

70–74 years old

1.260 (1.192~1.330)

<0.001

≥ 75 years of age

1.901 (1.805~2.001)

<0.001

1.072 (1.023~1.122)

Region (Reference: East)

Age (Reference: 65–69 years)

Place of Residence (Reference: Urban)

Educational Attainment (Reference: Primary school or below)

0.766 (0.726~0.808)

<0.001

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0.835 (0.787~0.887)

<0.001

Monthly household income (reference: < 3,000 RMB): 3,000–5,999 RMB

0.810 (0.764~0.858)

<0.001

6,000–9,999 CNY

0.875 (0.819~0.936)

<0.001

$\geq 10,000$ RMB

0.828 (0.764~0.897)

<0.001

1.258 (1.184~1.338)

<0.001

3.239 (3.063~3.425)

<0.001

Anxiety (with "No" as the reference) and Depression (with "No" as the reference).

This study demonstrates that age ≥ 75 years, rural residence, low educational attainment, and low income are significant influencing factors for subjective cognitive decline (SCD) in elderly stroke patients. The rate of cognitive decline in elderly stroke patients is significantly faster than that in non-stroke control groups, and increasing age serves as an independent predictor of accelerated cognitive decline [**?**]; the results of this study are highly consistent with these findings. Research among the urban elderly population in India has found that the prevalence of SCD is associated with low educational levels (primary school and below) and insufficient cognitive reserve [**?**]. This suggests that education may delay the onset of SCD by enhancing cognitive reserve.

CHENG et al. [**?**] also pointed out a significant correlation between SCD and educational attainment among community-dwelling elderly individuals. A study of a Brazilian population indicated that SCD is related to socioeconomic status among modifiable dementia risk factors [**?**]. An income of $< 3,000$ yuan may represent a high-risk factor that indirectly promotes SCD by limiting access to medical resources or increasing the burden of chronic diseases. Furthermore, anxiety and depression are significantly associated with SCD in elderly stroke patients, which may be related to multidimensional pathophysiological changes. Previous studies have shown that elderly patients with depression exhibit significant hypothalamic-pituitary-adrenal (HPA) axis dysregulation, which has a longitudinal association with the deterioration of cognitive function [**?**]. In populations with subjective cognitive decline, depressive symptoms are associated with reduced hippocampal volume [**?**]. Additionally, decreased levels of brain-derived neurotrophic factor (BDNF) may directly lead to impaired synaptic plasticity; such changes have been confirmed to appear as early as the preclinical stage of Alzheimer' s disease [**?**]. Chronic vascular disease has been identified as an important mediating factor in the link between depression and cognitive decline, where flow-mediated vasodilation is reduced.

Chinese General Practice

The impairment of endothelial function is highly consistent with the pathological features of vascular dementia [**?**], suggesting that endothelial dysfunction may exacerbate neurotoxicity through cerebral hypoperfusion. Reduced heart rate variability in anxious individuals is directly associated with impaired neurovascular coupling [**?**]; such autonomic nervous system dysfunction may promote cerebral small vessel disease by increasing blood pressure variability. Furthermore, both disrupted sleep architecture and psychological stress may contribute to cognitive decline [**?**].

This study has several limitations. First, the cross-sectional design prevents the inference of causal directions for the identified associations (such as those between anxiety or depressive symptoms and subjective cognitive decline); reverse causality bias may exist, and the current data cannot distinguish these temporal relationships. Second, the SCD-9 scale relies on participants' subjective reports, which may be influenced by cultural factors or response bias in self-reported information. Additionally, the questionnaire did not include specific clinical data such as the duration of stroke. Future research should prioritize the collection of detailed clinical course and complication data by establishing community-based cohorts of elderly stroke patients. Regular follow-up of their cognitive and psychological states would allow for precise tracking of the objective conversion rate from subjective cognitive decline to mild cognitive impairment or dementia, as well as an analysis of whether baseline psychological symptoms serve as independent predictors of this conversion.

In response to the regional differences in subjective cognitive decline among elderly stroke patients, we recommend the formulation of precision prevention and control strategies. In Northeast China, efforts should focus on implementing winter cerebrovascular protection programs and establishing community cognitive health stations to address extreme climates and population aging. In Central China, the current shortages in medical resources and lags in health-related poverty alleviation should be addressed through "Grade A Tertiary Hospital 1+1" assistance programs, the construction of mobile stroke units, and the coordination of cross-province medical follow-ups. In Western China, "horseback health projects" in pastoral areas, health promotion in religious venues, and digital health leapfrog initiatives should be launched to overcome the challenges of sparse populations and low health literacy. Meanwhile, Eastern China should further upgrade smart health management and export standardized expertise. Concurrently, three major support systems—special financial funds, talent mobility, and dynamic evaluation—should be established. By selecting typical regions for initial pilot programs, a replicable "Chinese-style cognitive health management model" can be formed. This approach aims to reduce the incidence of subjective cognitive decline, alleviate the national burden of dementia, and contribute to the "Healthy China 2030" initiative.

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Zhang Jie, Zhou Houguang, Wang Lei, Sang Yingchen, and Wang Youjiao were responsible for manuscript review and data organization/validation. Shi Hong was responsible for research guidance, manuscript review, and funding support. All authors have approved the final version of the manuscript.

The authors declare no conflicts of interest. Liu Ying: https://orcid.org/0009-0003-2893-6345

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Chinese General Practice

Abstract

In the context of modern healthcare systems, general practice (GP) serves as the cornerstone of primary health services. This field focuses on providing comprehensive, continuous, and personalized care to individuals, families, and communities. With the rapid development of medical technology and the increasing complexity of chronic disease management, the integration of advanced computational methods has become essential. This paper explores the current state of general practice in China, emphasizing the role of digital health and data-driven decision-making in improving patient outcomes.

Introduction

General practice is a clinical secondary discipline that integrates clinical medicine, preventive medicine, rehabilitation medicine, and humanities and social sciences. Unlike specialized medicine, which focuses on specific organ systems or disease categories, general practice emphasizes a holistic approach to health. In China, the strengthening of the primary healthcare system has led to a significant shift in how medical services are delivered, moving from hospital-centric models to community-based care.

The integration of machine learning and deep learning into general practice offers transformative potential. These technologies can assist general practitioners (GPs) in early diagnosis, risk stratification, and the development of personalized treatment plans. By leveraging large-scale health data, researchers can identify

patterns that were previously inaccessible through traditional statistical methods.

Methodology and Data Analysis

The application of quantitative models is crucial for understanding epidemiological trends within community populations. For instance, the probability of a specific health outcome can be modeled using various statistical frameworks. Consider a scenario where we evaluate the risk factor $\mathcal{F}$ for a population subset. The relationship between the observed variables can be expressed through the following mathematical representation:

$$P(y|x) = \frac{\exp(\beta_0 + \sum_{i=1}^{n} \beta_i x_i)}{1 + \exp(\beta_0 + \sum_{i=1}^{n} \beta_i x_i)}$$

In this model, x_i represents the clinical indicators of the patient, while β_i denotes the weight assigned to each factor. Such models allow GPs to quantify risk levels more accurately than subjective assessment alone. Furthermore, the use of $\bar{b}$ as a baseline parameter helps in normalizing data across different demographic groups.

As shown in , the comparative analysis of diagnostic accuracy between traditional methods and AI-assisted tools indicates a significant improvement in sensitivity when deep learning models are

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