

Screening results of high-risk population of elderly cerebral stroke in a community in Pudong New Area, Shanghai

Yumei Yang

East Hospital, Tongji University School of Medicine

Lingyu Li

East Hospital, Tongji University School of Medicine

Lei Feng

Sanlin Community Health Service Center

Xi Yang

Dongming Community Health Service Center

Feifeng Liu

East Hospital, Tongji University School of Medicine

Jinqiu Yi

Sanlin Kangde Community Health Service Center

Hui Dai

Sanlin Community Health Service Center

Zheng Liu

Dongming Community Health Service Center

bei zhang (✉ zhangbei0227@163.com)

East hospital <https://orcid.org/0000-0002-5486-0941>

Research article

Keywords: risk factors, cerebral stroke, prevention strategies, elderly

Posted Date: March 9th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-16406/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

Abstract

Objective To investigate the exposure of risk factors and the characteristics of population distribution of elderly patients with high-risk of cerebral stroke in Sanlin Community, Pudong New Area, Shanghai, aiming to provide the evidence for the development of the prevention strategies for elderly patients with high-risk of stroke.

Methods From 2015 to 2017, a cluster sampling method was adopted to conduct on-the-spot investigation and related physical examinations for resident populations ≥ 65 years old in Sanlin Community of Pudong New Area. The demographic characteristics, medical history, blood lipids, fasting glucose, glycosylated hemoglobin, homocysteine and electrocardiogram were collected to screen the relative risk factors of ischemic stroke.

Results 9,195 residents were surveyed between 2015 and 2017. 1,504 residents were high-risk population and 535 residents (5.82%) had a history of transient ischemic attack or stroke. There were 969 residents (10.54%) with ≥ 3 risk factors. Risk factors were hypertension, overweight, hyperlipidemia, diabetes mellitus, stroke history, smoking history, family history, lack of exercise and atrial fibrillation in turn. Among the high-risk groups of 969 risk factors ≥ 3 , women's diabetes and hyperlipidemia exposure rate was higher than that of men, and male smoking rate and overweight were higher than females. Among the community members who participated in the screening, the detection rate of hyperhomocysteinemia for male was 63.8%, which was significantly higher than 45.7% for female.

Conclusion The detection rate of high-risk groups in people over 65 years old in Sanlin area is similar to that in other areas in Shanghai. Hypertension, overweight and hyperlipidemia are the highest exposure risk factors. There are differences in exposure to certain risk factors between men and women. There is a high detection rate of hyperhomocysteinemia in the elderly and male population. Regular follow-up management should be implemented in combination with the occurrence of risk factors in different populations in order to prevent stroke.

1. Introduction

Stroke is a severe disease that endangers human health with high incidence, high disability rate, high mortality and recurrence rate. Stroke has become the second most common cause of death and the first cause of disability in the world [1]. The risk of stroke in high-risk population is 10 times higher than that in non-high-risk population [2]. Screening the high-risk population of stroke and carrying out targeted interventions can effectively reduce the overall incidence and hazards of stroke. Age is also an important risk factor for stroke, and high-risk groups in the elderly are the key targets for stroke prevention and control. As a stroke screening base, Shanghai East Hospital affiliated to Tongji University, in conjunction with the Sanlin Community Health Service Center in 2015–2017, conducted a stroke screening test for the elderly population aged 65 and over in Sanlin area. The screening results are summarized and analyzed as follows.

2. Materials And Methods

2.1 Research subject and Methods

Sanlin Town is located in the southwest of Pudong New Area, with a registered population of 118,000 and 6 communities. This study conducted a screening of high-risk stroke patients in the elderly population in the Sanlin community. For the period from June 2015 to June 2017, the resident population ≥ 65 years in Sanlin Community were screened for risk factors of stroke. Hospital outpatient and inpatient were excluded. Participants were fully informed and then signed the project informed consent form. A cross-sectional survey of 10,943 permanent residents

of the community ≥ 65 years old was conducted by cluster sampling. A face-to-face inquiry survey and related physical examinations were conducted by trained physicians with a standardized questionnaire and standardized survey methods. We collected basic information, family history, past medical history, medication record, smoking history, drinking history, exercise. Physical examination included height, weight, body mass index (BMI), blood pressure, pulse rate, and heart auscultation. Laboratory tests included blood lipids (TG, TC, HDL-C, LDL-C), fasting blood glucose, glycosylated hemoglobin, homocysteine, and electrocardiogram.

2.2 Diagnostic criteria

Cerebral stroke is defined as cerebral hemorrhage and cerebral infarction. It refers to the diagnosis of patients with neurologists based on relevant symptoms, signs and clinical examinations. Transient ischemic attack refers to unclear speech, hemiplegia, partial sensory disturbance, monocular black sputum, dizziness, unstable walking, etc., but MRI does not show any signs of cerebral infarction. The definition of hypertension refers to the Guidelines for the Prevention and Treatment of Hypertension in China (2010 Revision): systolic blood pressure ≥ 140 mmHg and / or diastolic blood pressure ≥ 90 mmHg without antihypertensive drugs or has been diagnosed with hypertension in the hospital. A history of diabetes, dyslipidemia, and atrial fibrillation are provided by patients with a basis for a definitive diagnosis by a community-level or higher hospital. Patients who smoke more than one cigarette per day for more than one year are regarded as smokers. Overweight refers to BMI ≥ 26 kg/m². The standard of physical exercise is ≥ 3 times per week, ≥ 30 minutes each time, and lasts for more than 1 year. Those who are engaged in moderate to severe physical labor are considered to have regular physical exercise.

The definition of high-risk stroke patients is a history of transient ischemic attack or history of stroke, or risk factors for stroke ≥ 3 .

2.3 Quality Control

Shanghai is one of the best cities for community health services in China. Its community health service center has established the regulation of family doctor service, which can effectively mobilize and follow up residents to ensure the quality of screening and follow-up work. The government and the community health centers carried out the publicity and education of the residents and the on-site organization work to ensure the screening work. The Shanghai Municipal Health Planning Commission has developed a screening work manual and work plan. As one of the stroke centers, our hospital is responsible for community doctor training, on-site guidance, and results review. Community hospital doctors in the department of preventive medicine are responsible for screening and registration of high-risk populations. Family doctors in community hospitals and health service stations are responsible for the follow-up.

2.4 Statistical Analysis

The data was analyzed using SPSS 22.0 software. The description of metrological data is expressed in mean \pm standard deviation. The measurement data description is represented by the count data description is expressed as a percentage. The measurement data were compared by t test and the rate was compared by chi-square test. $P < 0.05$ is considered statistically significant.

3. Results

3.1 Demographic information

At the start point of the screening work in 2015, there were 10,943 people ≥ 65 years old in the Sanlin community. From 2015 to 2017, the number of screenings was 9,195 and the number of high-risk groups was 1,504. The proportion of high-risk groups was 16.78%. Among them, there were 535 people with a history of transient ischemic attack or stroke. The detection rate was 5.82%. 969 people in high-risk group have ≥ 3 risk factors. The detection rate was 10.54%. The age of screened residents was 72.91 ± 6.68 years old. The detection rate of male high-risk population was 18.08% (739/4073) and 14.94% (765/5122) for female.

3.2 Risk factors exposure

The exposure rate of stroke risk factors in high-risk population was hypertension (83.71%), overweight (53.86%), hyperlipidemia (42.82%), diabetes (39.83%), and stroke history (35.57%), smoking history (22.27%), family history (20.21%), lack of exercise (18.02%) and atrial fibrillation (7.05%). (Table 1)

Table 1
Exposure to risk factors for stroke in high-risk groups

Risk factors exposed	Percentage
hypertension 1259	83.71
diabetes 599	39.83
hyperlipemia 644	42.82
atrial fibrillation 106	7.05
smoking history 335	22.27
overweight 810	53.86
Lack of exercise 271	18.02
Stroke history 535	35.57
Family history 304	20.21

3.3 Distribution of risk factors among high-risk groups of different genders

Among the 969 high-risk groups with ≥ 3 risk factors the high-risk population of women with diabetes and hyperlipidemia was higher than men ($X^2 = 10.815$, $P = 0.001$; $X^2 = 43.411$, $P < 0.001$). The rate of smoking and overweight of high-risk population in male were higher than women ($X^2 = 303.821$, $P < 0.001$). (Table 2)

Table 2
Exposure of risk factors for high-risk groups of different genders

Risk factors	Male		Female		Summary		χ^2	P
	exposed	Percentage	exposed	Percentage	exposed	Percentage		
hypertension	439	87.1	413	88.8	852	87.9	0.518	0.472
diabetes	207	41.1	240	51.6	447	46.1	10.395	0.001
hyperlipemia	212	42.1	294	63.2	506	52.2	42.567	< 0.001
Atrial fibrillation	36	7.1	31	6.7	67	6.9	0.027	0.869
smoking history	258	51.2	6	1.3	264	27.2	301.31	< 0.001
overweight	318	63.1	330	50.9	648	66.9	6.416	0.011
Lack exercise	100	19.8	105	22.6	205	21.2	0.930	0.335
Family history	149	29.6	159	34.2	308	31.8	2.1825	0.140

3.4 Hcy test results

We define plasma Hcy > 15 mmol/l as Hyperhomocysteinemia. Among the community members who participated in the screening, the detection rate of hyperhomocysteinemia was 53.72%. The male detection rate was 63.8% and the female was 45.7%. The difference was statistically significant. There was no significant difference in the detection rate of high homocysteinemia between high-risk groups and non-high-risk groups. (Table 3)

Table 3
Comparison of detection rates of hyperhomocysteinemia in different populations

group	non-hyperhcyemia(%)	hyperhcyemia(%)	P
High-risk groups	833(55.4)	671(44.6)	
Non-at-risk population	3976(51.7)	3715(48.3)	0.385
Male	1474(36.2)	2599(63.8)	
Female	2781(54.3)	2341(45.7)	< 0.01

4. Discussion

China attaches great importance to the prevention and control of cerebrovascular diseases. In 2011, the "Stroke Screening and Prevention Engineering Committee of the Ministry of Health" was set up by the former Ministry of Health to initiate the work of stroke screening and intervention to screen the high-risk population of stroke among people over 40 years old. In recent years, many screening results have been published. The results of screening in different areas and populations are not entirely consistent. Age is a risk factor that can not be intervened of stroke, especially in the population over 65 years old, the incidence of stroke increased significantly. This study screened the

high-risk factors of stroke among community residents over 65 years old and studied the exposure of high-risk factors in this age group in Shanghai so as to provide evidence for the formulation of targeted prevention and control measures for the elderly.

Shanghai has established a relatively mature three-level prevention system for chronic diseases such as hypertension and stroke through the regulation of family doctor service. The screening results showed that the detection rate of high-risk population in Sanlin community was 16.36% which was similar to that reported by Fu Jianhui [3] in the Zhuqiao community in southern Shanghai. However, Fu Jianhui's screening target is community residents over 45 years old but the people we screened are residents over 65 years old. The detection rate of Fu's report is not lower than our detection rate, which may be related to the age reduction of risk factors such as hypertension, diabetes, hyperlipidemia and so on. The prevalence of hypertension, diabetes mellitus and hyperlipidemia did not decrease in the younger age group, so the detection rate of the high-risk group was not lower than that of older people. The results of screening in Hohhot showed that the detection rate of high-risk population over 60 years old was 26.15% [4], which was higher than that in Shanghai. It was consistent with the geographical distribution of stroke incidence in the southern part and northern part of China, suggesting that the distribution of high-risk population of stroke was also geographically different.

In our study, the exposure rate of risk factors were hypertension, overweight, hyperlipidemia, diabetes, stroke history, smoking history, family history, lack of exercise, and atrial fibrillation, decreasing accordingly. In Fu's study [3], hypertension and overweight were also the two most risk factors for exposure. Others were physical exercise, smoking, diabetes, dyslipidemia, family history of stroke, and atrial fibrillation [3]. It is suggested that the exposure rate of risk factors varies among high-risk groups of different ages. This phenomenon was also observed in a survey of a city in Sichuan Province [5]. The top three risk factors for high-risk strokes in the 70–84 years old group and the 85-year-old age group were hypertension, hyperlipidemia, and overweight, similar to our study. In the 40–54 age group and 55–69 years old patients with high risk of stroke, the top three risk factors are hypertension, smoking, and high blood lipids. It is important to perform public health education for this age group, to rationally adjust the dietary structure, and to promote a healthy lifestyle (smoking and alcohol cessation). Atrial fibrillation was the lowest risk factor in the study. During follow-up, 25.56% of the high-risk groups with cerebral infarction had atrial fibrillation, and most of them did not know that there was atrial fibrillation before the stroke. It suggests that the detection rate of atrial fibrillation is low and screening of atrial fibrillation should be strengthened.

We analyzed the exposure of risk factors for different gender. We found that among the high-risk groups with risk factors ≥ 3 , the smoking and overweight rate of male was higher than that of female. Women with diabetes and dyslipidemia of high-risk group were higher than that of male, which was consistent with Fu Jianhui's research. Smoking can cause vasospasm, increase blood pressure and accelerate arteriosclerosis, leading to cardiovascular and cerebrovascular events [6]. Abdominal obesity is an important factor in intracranial artery stenosis [7]. So it is necessary to emphasize a healthy lifestyle such as reasonable diet, weight control, smoking cessation and alcohol restriction for male high-risk groups. For women at high risk, to regular monitoring of blood sugar, blood lipid management and drug compliance should be strengthened.

Hyperhomocysteinemia (HHcy) is an important risk factor for cardiovascular and cerebrovascular diseases. Studies have shown that for every 1 $\mu\text{mol/l}$ increased plasma homocysteine, the risk of coronary atherosclerotic heart disease increases 1.6 times and the risk of cerebral vascular disease increases 1.8 times [8]. However, the prevalence of HHcy in the elderly population especially in high-risk stroke patients, is still unclear. Our study examined the blood Hcy value of the screening population and analyzed the distribution of HHcy in the high-risk population of stroke. Our results showed that the detection rate of hyperhomocysteinemia in the elderly over 65 years old is 53.72% and the

detection rate of high-risk population is 44.6%. A survey in Xi'an showed that 53.84% of the high-risk population of stroke had HHcy. Besides, the prevalence of HHcy was higher in people over 60 years old than those under 60 years old [9]. Univariate and multivariate analysis found that age was the most important risk factor for HHcy. Our study also found that the detection rate of hyperhomocysteinemia in men was higher than that in women, which was consistent with the study by Shang [10]. Our study did not find that the proportion of Hhcy in high-risk stroke patients was higher than that in non-high-risk groups.

Our study results show that the detection rate of high-risk populations in the Sanlin area is similar to that in other parts of Shanghai. Hypertension, overweight, and hyperlipidemia are the top three risk factors for exposure. For male population, the intervention of lifestyle such as weight control, smoking cessation and alcohol restriction should be emphasized, and the management of blood sugar and lipid should be strengthened in female population. Hyperhomocysteinemia has a high detection rate in the elderly and male population. It is necessary to pay attention to the management of Hcy in this group and timely supplement of folic acid. On the basis of the above, regular follow-up management should be carried out in combination with the occurrence of risk factors in order to achieve the goal of preventing stroke.

Declarations

Disclosure statement

None declared. All authors have seen and approved the manuscript and consent for publication. No one reported any conflict of interests.

Ethics

This study is approved by ethics committee of East Hospital, Tongji University School of Medicine, Shanghai, China.

Author Contributions Statement

LYL performed the statistical analysis and drafted the manuscript. LF, XY, FFL, HD and ZL collected the data. YMY double-checked the statistical analysis. YMY and BZ designed the study, supervised the study, double-checked the statistical analysis and revised the manuscript.

Data availability statement

Data will be available upon request to corresponding authors.

Acknowledgements

This study was funded by the National Natural Science Foundation of China [grant numbers 81701039]; Young Excellent Talents in Tongji University (22120180604), and Scientific Research Projects of Shanghai Health and Family Planning Commission [Grant No. 201640388]. We thank all participants in this study.

References

1 Zhang Runhua, Liu Gaifen, Pan Yuesong, et al. Epidemiology of Stroke in the World. Chinese Journal of Stroke[J]. 2014, 9(9):767-773

- 2 Wang Yude. Strategies and Tactics for Prevention and Control of Stroke in China[J]. Journal of Medical Research, 2012, 41(2): 1- 2.
- 3 Gao Lili, Fu Jianhui, Wang Weizhong, et al. A report on a screening of high-risk population for stroke in a community of Pudong New Area, Shanghai. Fudan University Journal of Medical Sciences[J].2017, 44(1):82-86.
- 4 Zhu Run-xiu, Yuan Jun, Chang Hong,etal. Research of screening results in high-risk population of stroke in Hohhot. Chinese Journal of Evidence-Bases Cardiovascular Medicine[J].2016,8(12):1455-1457
- 5 Wang Li, Chen Jinhua, Zhao Yuzhang,et al. Screening and analysis of risk factors for stroke high risk population in hospitalized patients. Medical Journal of West China[J]. 2017, 29(6):850-853.
- 6 Li Tao, Zhang Yunling, Zhao Hui,et al. Study on the Correlativity between Smoking and Carotid Atherosclerosis for High Risk Group of Stroke. Chinese Journal of Integrative Medicine on Cardio/Cerebrovascular Disease[J].2015,13(2): 175-178.
- 7 Zhang Xu,Chang Ying , Liu Songyan. Study on the correlation between metabolic syndrome and intracranial and extracranial artery stenosis in patients with ischemic cerebrovascular disease.Chinese Journal of Laboratory Diagnosis[J]. 2017, 21(12): 2148-2150
- 8 He Y,Li Y,Chen Y,etal. Homocysteine level and risk of different stroke types:a meta-analysis of prospective observational studies.Nutr Metab Cardiovasc Dis[J].2014,24:1168-1165.
- 9 Ma Hongni,Yan Fei,Li Zaili,etal. Distribution of hyperhomocysteinemia in community population at high risk of ischemc stroke in Xi'an. Chinese Journal of Geriatric Heart Brain and Vessel Diseases[J].2015,17(8): 830-833.
- 10 SHANG Lu, SUN Fenyong. Levels of serum homocysteine in middle-aged and elderly people in Dongjing community of Shanghai and their influence factors. Laboratory Medicine[J]. 2017, 32(9): 760-764.