Recognition of stroke among community residents and the improvement after intensive health education: A cross-sectional study.

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Abstract

Background: This study aimed to investigate stroke recognition in a community population (including high risk groups of stroke) in Jinjiang District of Chengdu and to strengthen the publicity of the impact of stroke-related knowledge on the cognitive level of community residents with stroke.

Methods: By conducting an epidemiological survey, 9 communities in Jinjiang District were sampled, and a questionnaire on stroke related knowledge was designed to investigate the community residents in Jinjiang District of Chengdu City. We carried out stroke health education activities with the theme of "understanding stroke", and evaluated the impact.

Results: There were 1685 valid questionnaires, and the awareness level of stroke risk among community residents in Jinjiang District of Chengdu was 11.4%. The proportion of people who recognized that there was a risk of stroke increased with the increase in the number of risk factors (P < 0.001). Participants with three or more risk factors were aware that the risk of stroke was only 40.3%. The recognition rate of stroke warning symptoms among community residents was 29.8–59.5%. Among them, the recognition rate of common stroke symptoms such as limb weakness, language disorder and imbalance was more than 50%, and the cognitive proportion of rare symptoms including monocular or binocular blurred vision and severe headache with no known cause was only about 1%. When faced with five sudden stroke warning symptoms, the proportion of participants who chose to dial 120 was about 41.5%. Nearly 10% of the respondents chose to consult a doctor, take medicine or wait. After strengthening publicity and education, there was a significant improvement in the identification of stroke risk factors, stroke warning symptoms, and stroke management. The number of respondents who chose to dial 120 increased from 59.2% to 82.7%.

Conclusion: The cognitive level of stroke among community residents in Jinjiang District of
Chengdu is low. Strengthening publicity and education on stroke-related knowledge and post-stroke treatment can significantly improve patients’ cognition of stroke-related knowledge and enhance community residents' awareness of giving priority to dialing 120 after the onset of stroke symptoms.

Background

Stroke is the single disease with the highest disability rate. Its high morbidity, mortality, and disability rates constitute a heavy burden and a great source of pain to the society, families, and patients [1]. The number of new stroke patients in China is about 2 million every year, of which 70-80% is unable to live independently due to disability [2]. At present, the incidence of stroke in China is increasing at an annual rate of 8.7%. The nationwide annual cost for the treatment of cerebrovascular disease is more than 10 billion yuan, coupled with indirect economic losses of nearly 20 billion yuan [3]. Various health education measures have been undertaken to raise public awareness of stroke-related knowledge to reduce the incidence, mortality, and disability rates of stroke. However, the level of understanding about stroke warning symptoms and first aid systems among community residents was generally low [4-7]. There are few relevant reports in the literature from China and abroad. This study investigated the ability of community residents to identify the warning symptoms of stroke and the awareness of first aid, and the effect of strengthening health education on the recognition of stroke among community residents.

Methods

**Sampling**

We conducted a survey of 9 community residents of Jinjiang District, Chengdu from February 2017 to February 2019 (including Chunxi, Yanshikou, Niushikou, Hongsha,
Jinjiang, Lianxin, Wanke, Quan subtree, Daci temple). The subjects were permanent residents of the community (aged du from Fe; household registration was required to be considered a local and should have lived in the locality for more than 2 years).

Survey contents

Using an epidemiological investigation, combined with the literature reports from China and abroad, a questionnaire on stroke related knowledge was designed to conduct a random sampling survey among 9 community residents in Jinjiang District, Chengdu. The main outcome measures included the understanding of stroke risk factors and stroke risk, and the identification and treatment of stroke-related symptoms or signs. We aimed to carry out stroke health education activities with the theme of “understanding stroke” and evaluate the effect. Stroke knowledge was publicized in a variety of ways, including: (1) Designing and making short videos for television and short animated videos in which neurologists explained the risk factors of stroke and its prevention and treatment measures, described the main symptoms and signs of stroke (5 “Suddens”), the method of rapid identification of stroke (“Fast”), and the main symptoms and signs of stroke (5 “stroke”). The session on first aid after the onset of stroke emphasized the importance of dialing “120” immediately after the onset of stroke and the harm of delayed treatment, and invited stroke survivors to talk about their personal experience and the positive and correct treatment measures of their families (dial “120”). We used television, the Internet, WeChat, magazines, and other media channels for publicity. (2) We produced a pamphlet on stroke health education to be distributed to all families in the community, and produced posters of stroke-related knowledge to display in public places in the community. The duration of intensive stroke education activity was 1 year. The level of community stroke awareness was investigated before and after the activity, and the effect of intensive publicity was evaluated. The main evaluation indicators were: the proportion
of residents receiving stroke propaganda, the change of residents’ cognitive level of stroke-related knowledge (stroke risk factors, stroke symptoms and signs, stroke and the treatment of specific symptoms), and so on. Face-to-face interviews are conducted by uniformly trained investigators.

**Data collection**

Data were collected via a questionnaire on community residents’ stroke related knowledge. The contents mainly included: (1) the general data of the subjects: gender, age, nationality, education level, family monthly income, medical insurance, e.t.c.; (2) stroke related knowledge: stroke risk factors, warning symptoms, treatment measures of sudden symptoms, determination of post-stroke treatment, etc. The contents mainly aimed at strengthening the treatment of stroke risk factors, warning symptoms and sudden symptoms, and to determine the treatment after stroke.

**Statistical analysis**

After sorting out the data processing and survey data, the data were entered into the EPIDATA database, and then imported into SPSS version 20 (IBM Corp., Armonk, NY, USA) for statistical analysis. Count data were expressed as percentages and analyzed using the chi-square test.

**Results**

**Demographic characteristics of the respondents**

Of the 1685 respondents, there were 768 males (45.6%) and 917 females (54.4%), with an average age of 50.5 ±16.2 (range, 18–92) years.

**Relationship between the number of stroke risk factors and stroke risk recognition**

The awareness level of stroke risk among community residents was 11.4%. The proportion of participants who recognized that there was a risk of stroke increased with the increase
in the number of risk factors \( P < 0.001 \). However, only 40.3% of participants with three or more risk factors were aware of the risk of stroke (Table 1).

One hundred and fifty-four participants (9.1%) could correctly identify 1 stroke risk factor and 132 (7.8%) could correctly identify 2 stroke risk factors. One hundred and thirty-three participants (7.9%) were able to identify at least 3 stroke risk factors. Also, 1164 participants (69.1%) could not correctly identify any risk factors for stroke, of which 1061 cases (91.2%, 63.0% of the total) could not provide any answer. Of the 1685 subjects, 922 (54.7%) did not know which part of the body was affected by stroke, only 699 (41.5%) knew that stroke affected the brain, and 17 (1.0%) believed that stroke affected the heart. Forty-seven participants (2.8%) believed that stroke affected other parts (such as the hands, feet, cervical vertebrae, etc.).

**Recognition of stroke warning symptoms among subjects**

The recognition rate of stroke warning symptoms among community residents was 29.8–59.5%. Among them, the recognition rate of common stroke symptoms such as limb weakness, language disorder, and balance disorder was more than 50%. For the other two relatively uncommon symptoms, the rate of recognition of severe headaches, including blurred monocular or binocular vision and no known cause, was only about 1/3. In addition, more than 1/4 considered shortness of breath, chest pain, and panic as symptoms of stroke.

**Recognition of stroke warning signs**

When faced with five sudden stroke warning signs, the proportion of participants who chose to dial 120 was lower, and the proportion that chose to go to the hospital was similar to that of those who chose to dial 120. Nearly 10% of respondents chose others such as consulting a doctor, taking medicine, waiting, or observing.

**after strengthening health education**
There was no significant difference in the general situation of residents’ cognition of stroke before and after intensive publicity and education (Table 5). After strengthening publicity and education, there was a significant improvement in the identification of stroke risk factors, stroke warning symptoms, and stroke management. The number of respondents who would dial 120 increased from 59.2% to 82.7%.

Discussion

The results of this study showed that the awareness level of stroke risk among community residents was 11.4%, and the rate of recognition of stroke risk increased with an increase in the number of risk factors ($P < 0.001$). However, only 40.3% of participants with three or more risk factors were aware of the risk of stroke. The results suggested that community residents had a low level of awareness of stroke risk. Among all the subjects, 154 (9.1%) could correctly identify 1 stroke risk factor, and 132 (7.8%) could correctly identify 2 stroke risk factors. Also, 1164 participants (69.1%) could not correctly identify any risk factors for stroke, of which 1061 cases (91.2%, 63.0% of the total) could not provide any answer. However, a foreign demographic survey conducted in 2015 showed that 59.2% of the respondents were able to identify at least one stroke risk factor [9]. This study concluded that the community residents in Jinjiang District had a low awareness of stroke risk factors. It is necessary to strengthen the popularization of knowledge regarding stroke.

Of the 1685 subjects, 922 (54.7%) did not know which part of the body was affected by stroke, only 699 (41.5%) knew that stroke affected the brain, and 17 (1.0%) believed that stroke affected the heart. Forty-seven subjects (2.8%) believed that stroke affected other parts (such as the hands, feet, cervical vertebrae, etc.). Similar to the report of a foreign study, 35% of respondents in this study knew that the organ in which stroke occurs was the brain [10].
The recognition rate of stroke warning symptoms among community residents was 29.8–59.5%. Among them, the recognition rate of common stroke symptoms such as limb weakness, language disorder, and balance disorder was more than 50%. For the other two relatively uncommon symptoms, the recognition rate of severe headaches, including blurred monocular or binocular vision and no known cause, was only about 1. In addition, more than 1 considered shortness of breath, chest pain and panic as stroke manifestations, suggesting that community residents still lack knowledge of stroke warning symptoms. A domestic survey on the recognition of stroke among community residents in Chongqing found that the recognition rate of stroke warning symptoms was 30.7–75.6% [11]. A study of 1472 respondents found that sudden headaches (54.1%), vertigo (51.0%) and dyslexia (44.3%) were the most recognizable stroke warning symptoms [12].

When faced with five sudden stroke warning symptoms, most of the respondents chose to send the patients to hospital emergency department (by dialing 120 or going to the hospital themselves), but the proportion who preferred dialing 120 was lower. Similar to foreign reports, a survey conducted in New York found that 33.3–72.4% of emergency calls were first made in the face of stroke warning symptoms, compared with 14–17.6% in Michigan. The results of the latest questionnaire survey on a small sample size abroad showed that 73.0% of the respondents chose to go to the hospital themselves and emergency calls comprised 43.8% and 62.6% [15], respectively. Calling the emergency system in time allows patients to arrive at the hospital more quickly and receive diagnosis and treatment (such as stroke green channels such as r-tPA thrombolytic therapy) than if they were sent to the hospital or via other transport routes.

In this study, we designed and produced television short films, animated short films and distributed health pamphlets to explain the risk factors of stroke and their prevention and
treatment measures. Through one year of intensive publicity and education, the residents’
cognitive level of stroke-related knowledge (stroke risk factors, stroke symptoms and
signs, stroke and the treatment of specific symptoms) was significantly improved. The
number of respondents who dialed the 120 emergency system increased from 59.2
percent before publicity to 82.7 percent. This study believes that through strengthening
publicity and education of stroke-related knowledge and post-stroke treatment can
significantly improve the cognition of stroke-related knowledge and enhance the
community residents’ awareness of the priority of dialing 120 after the onset of stroke. It
can effectively reduce the pre-hospital delay in patients with stroke.
The shortcomings of this study are as follows: (1) the scope of the survey is limited to
Jinjiang District of Chengdu, the sample size is limited, and the results can not reflect the
overall situation of Chengdu; (2) the closed questions used in this survey may affect some
open-ended questions that reflect relatively more open-ended questions, resulting in a
higher response rate in the evaluation of cognitive ability of stroke-related knowledge.

Conclusions
In summary, the results of this community-based survey showed that the cognitive level of
stroke warning symptoms of community residents in our city is low. In the face of sudden
symptoms of stroke, even among those who have cognitive ability to all common stroke
warning symptoms, the proportion of choosing to dial 120 is also lower. Taking measures
to further improve the cognitive level of stroke-related knowledge among community
residents can enhance the awareness of community residents to call 120 after the onset of
stroke and effectively reduce the pre-hospital delay among stroke patients.

Declarations

Abbreviations
Ethics approval and consent to participate

We obtained ethical approval for this study from the Medical and Health Research Ethics Committee in Second people’s Hospital of Chengdu. Written informed consent was obtained from all study participants.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare they have no competing interests.

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Authors’ contributions

XMZ was responsible for the concept and design of the study, data collection and the first draft of the paper and final manuscript. Ronghu Xu and Jan Wang was responsible for the concept and design of the study, the data analysis and interpretation, LYH was responsible for the data collection. All authors read and approved the final manuscript for publication.

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Tables

Table 1. Relationship between the number of stroke risk factors and stroke risk cognition

| Number of risk factors | Stroke risk cognition (%) |
|------------------------|---------------------------|
| 0                      | 7.2                       |
| 1                      | 12.4                      |
| 2                      | 21.6                      |
| ≥3                     | 40.3                      |
| Total                  | 11.4                      |

Table 2. Cognition of stroke risk factors among respondents

| Risk factor                  | n     | (%)  |
|------------------------------|-------|------|
| High                         |       |      |
| High blood pressure          | 385   | 22.8 |
| Hyperlipidemia               | 188   | 11.2 |
| Diabetes                     | 170   | 10.1 |
| Heart disease                | 125   | 7.4  |
| Unhealthy lifestyle          | 95    | 5.6  |
| Drinking                     | 90    | 5.3  |
| Smoking                      | 88    | 5.2  |
| Stroke                       | 72    | 4.3  |
| Obesity                      | 47    | 2.8  |
| Age                          | 31    | 1.8  |
| Genetic factors              | 26    | 1.5  |
| Atherosclerosis              | 19    | 1.1  |
| Vascular stenosis            | 11    | 0.7  |
| Lack of exercise             | 11    | 0.7  |
| Blood viscosity              | 9     | 0.5  |
| Gender                       | 4     | 0.2  |
| False                        |       |      |
| Emotional                    | 33    | 2.0  |
| Overwork                     | 20    | 1.2  |
| Mental stimulation           | 10    | 0.6  |
| Fall                         | 6     | 0.4  |

Table 3. Cognition of stroke warning symptoms

| Warning symptoms                          | Yes     | No      | No idea or uncertain |
|-------------------------------------------|---------|---------|----------------------|
| *Difficult to speak, inarticulate or difficult to understand. | 953 (56.6) | 149 (8.8) | 583 (34.6) |
| Shortness of breath                       | 470 (27.9) | 380 (22.6) | 835 (49.6) |
| *Blurring of 1 or binocular vision        | 502 (29.8) | 336 (19.9) | 847 (50.3) |
| *Severe headache for no known cause       | 612 (36.3) | 208 (12.3) | 865 (51.3) |
| Chest pain, panic                         | 533 (31.6) | 335 (19.9) | 817 (48.5) |
| *Dizziness, difficulty walking, imbalance or uncoordinated movements | 956 (56.7) | 138 (8.2) | 591 (35.1) |
| *One side of the face or limb is numb or powerless | 1002 (59.5) | 119 (7.1) | 564 (33.5) |

Note: * Five warning symptoms of stroke

Table 4. Cognition of stroke warning signs management in subjects [n (%)]
Warning signs | Drive to hospital | Consulting a doctor | Call for 120 | Call family members | Other
--- | --- | --- | --- | --- | ---
Difficult to speak, inarticulate or difficult to understand. | 719 (42.7) | 221 (13.1) | 599 (35.5) | 48 (2.8) | 98 (5.8)
Shortness of breath | 604 (35.8) | 180 (10.7) | 769 (45.6) | 37 (2.2) | 95 (5.6)
* Blurring of 1 or binocular vision | 577 (34.2) | 270 (16.0) | 660 (40.4) | 66 (3.9) | 92 (5.5)
* Severe headache for no known cause | 723 (42.9) | 136 (8.1) | 709 (42.1) | 40 (2.4) | 77 (4.6)
Chest pain, panic | 652 (38.7) | 167 (9.9) | 702 (41.7) | 45 (2.7) | 119 (7.1)
* Dizziness, difficulty walking, imbalance or uncoordinated movements | 708 (42.0) | 128 (7.6) | 736 (43.7) | 47 (2.8) | 66 (3.9)
* One side of the face or limb is numb or powerless | 745 (44.2) | 117 (6.9) | 697 (41.4) | 47 (2.8) | 79 (4.7)

Table 5. General situation of residents

|                      | Before (n=1514) | After (n=1617) | P  |
|----------------------|-----------------|----------------|----|
| Gender               |                 |                |    |
| Male                 | 594             | 688            | 0.059 |
| Female               | 920             | 929            |    |
| Age (mean±SD)        | 51.2±15.6       | 53.4±16.6      | 0.289 |
| Nationality          |                 |                |    |
| Ethnic Han           | 1500            | 1598           | 0.493 |
| other                | 14              | 19             |    |
| Marital status       |                 |                |    |
| unmarried            | 190             | 199            | 0.418 |
| Married or cohabiting| 1147            | 1258           |    |
| Divorce or separation| 67              | 62             |    |
| Bereavement          | 110             | 98             | 0.274 |
| Degree               |                 |                |    |
| Primary schools and below | 178          | 201            |    |
| Junior middle school | 397             | 407            |    |
| High school          | 605             | 689            | 0.803 |
| College or above     | 334             | 320            |    |
| Medical insurance    |                 |                |    |
| yes                  | 1407            | 1499           |    |
| no                   | 107             | 118            | 0.306 |
| smoke                |                 |                |    |
| yes                  | 487             | 548            |    |
| no                   | 1027            | 1069           |    |

Table 6 Cognition of Stroke before and after intensive educational activities
| Item                                                   | Before (n=1514) | After (n=1617) | P       |
|--------------------------------------------------------|-----------------|----------------|---------|
| List the number of risk factors for stroke             | 2.62±1.46       | 4.18±2.07       | <0.001  |
| Answer risk factors ≥ 3 (%)                            | 628 (41.5)      | 1009 (62.4)     | <0.001  |
| List the number of stroke warning signs ≥2             | 1.28±1.25       | 1.67±1.37       | <0.001  |
| Know stroke warning symptoms ≥2                       | 542 (35.8)      | 779 (48.2)      | <0.001  |
| Answer 5 Suddens correctly                            | 138 (9.1)       | 269 (16.6)      | <0.001  |
| Answer FAST correctly                                 | 119 (7.9)       | 306 (18.9)      | <0.001  |
| Call for 120                                          | 896 (59.2)      | 1338 (82.7)     | <0.001  |

**Supplementary Files**

This is a list of supplementary files associated with the primary manuscript. Click to download.

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