Stroke Knowledge: A Nationwide, Internet-based Survey of 11,121 Inhabitants in Japan

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Abstract

Objective Stroke awareness among the general public is considered beneficial for improving stroke prevention and rapid responses to stroke onset.

Methods An internet-based questionnaire survey designed to assess the degree of understanding of strokes was administered to over 10,000 people ≥20 years of age from across Japan between November 8 to 11, 2010.

Results Valid responses were obtained from 11,121 persons aged 44.8±13.1 years. Only 10.3% of the respondents answered that they had a good understanding of what sort of disease stroke is, and only 33.8% responded that they had access to information on strokes; these proportions increased with age. The information sources included television (85.2%) and newspapers (34.1%), with newspaper use increasing with age. Among the respondents, 95.5% recognized speech disturbance and 89.5% recognized hemiplegia as symptoms of stroke; however, only 2.3% stated that they could confidently identify stroke occurrence. For responses to stroke onset, 67.0% of the responders stated that they would call an ambulance, compared to only 22.4% for transient ischemic attacks. In both cases, the proportions were higher among older respondents. A logistic regression analysis showed that the factors contributing to recommending early transportation by ambulance were knowledge of stroke symptoms (odds ratio (OR): 1.579; p=0.00), knowledge of stroke risk factors (OR: 1.294; p=0.00) and experience of living with stroke patients (OR: 1.374; p=0.00).

Conclusion Although the survey was conducted over the internet and the respondents may have tended to be relatively young, knowledge of strokes and understanding of the correct actions to take were higher among the older respondents. Overall, the knowledge of strokes was considered to be insufficient.

Key words: stroke knowledge, nationwide, internet-based survey, inhabitants in Japan


Introduction

In Japan, after a dose comparison study using duteplase and a multicenter study using a single dose of alteplase, 0.6 mg/kg alteplase was approved for use as an intravenous recombinant tissue plasminogen activator (rt-PA) to treat acute ischemic strokes in October 2005 (Japan Alteplase Clinical Trial) (1). Since then, more than 9,000 patients have been treated. The sooner rt-PA is given to an acute stroke patient, the greater the benefits, particularly if the medication is started within 90 minutes after stroke onset (2-4). However, due to prehospital delays, only 2.1-8.5% (5, 6) of all stroke patients around the world receive thrombolytic therapy such as rt-PA. In order to improve prehospital delays and reduce delays in hospital arrival times and stroke patient referrals, providing community-based stroke education is important for improving knowledge of stroke symptoms and risk factors. We therefore investigated the differences in stroke knowledge among citizens ≥20 years of age by conducting a nationwide, internet-based survey of approximately 30,000 people in Japan.

Materials and Methods

Japan is currently subdivided into 47 municipal areas: one...
to (Tokyo), one do (Hokkaido), two fu (metropolitan prefectures) and 43 prefectures. The survey participants were members of the general public between 20 and 69 years of age, excluding medical professionals, from all 47 divisions of the country. The internet-based survey consisted of a questionnaire structured to assess the degree of understanding of strokes. Participants 20 years of age and older were randomly selected from among 4.12 million general citizen monitors based on sex and age group (10-year increments), and the percentage distributions were determined for each municipal area. Based on previous standard response rates being approximately 35%, 30,000 participants were selected to ensure a sample size of approximately 10,000 responses. The survey was conducted via the internet from November 8 to 11, 2010 using a structured, self-reported questionnaire regarding stroke knowledge and sociodemographic characteristics.

Results

Valid responses were received from 11,121 individuals (5,550 men; mean age: 44.8±13.1 years, range: 20-69 years) from across Japan. The breakdown according to age group was as follows: 20-29 years (1,936 respondents/968 men); 30-39 years (2,426 respondents/1,207 men); 40-49 years (2,101 respondents/1,049 men); 50-59 years (2,570 respondents/1,275 men); and 60-69 years (2,088 respondents/1,051 men). The breakdown according to occupation was as follows: office worker: 4,687 (42.1%); self-employed: 1,050 (9.4%); part-time worker: 1,546 (13.9%); university or graduate school student: 327 (2.9%); homemaker: 2,230 (20.1%); unemployed: 1,118 (10.1%); and other: 163 (1.5%). The breakdown according to educational background was as follows: university graduate: 4,935 (44.4%); junior college/vocational school: 2,484 (22.3%); high school: 3,417 (30.7%); and junior high school: 285 (2.6%). Of the participants, 6,953 (62.5%) were married and 1,651 (14.8%) were living with stroke patients.

Q1: Do you know the details about strokes? (Fig. 1)

The response, “I know the details of strokes very well,” accounted for only 10.3% of responses, while, “I know the details well,” accounted for only 33.8%, or roughly one-third, of responses. Even if both responses are regarded as indicating respondents who judge themselves as having a minimum level of knowledge, these categories add up to slightly over 40% (44.1%). Furthermore, 37.4% of the respondents were “somewhat” familiar with stroke symptoms, 16.3% were “not very well” acquainted with strokes and 2.2% were “not at all” familiar with strokes. A noticeable increase in the proportion of respondents with knowledge of strokes was observed as age increased.

Q2: Do you have sources of information regarding strokes? (Fig. 2a, b)

While most subjects (66.2%) reported having no sources of information about strokes, 33.8% had access to such information. Access to information or experience related to strokes increased with age: from 21.7% of respondents 20-29 years of age and 26.0% of respondents 30-39 years of age, to 41.0% of respondents 50-59 years of age and 46.7% of respondents 60-69 years of age (Fig. 2a).

The remaining subjects (33.8%) obtained information primarily through the television (85.2%), newspapers (34.1%),
Figure 2. a, b) Do you have sources of information regarding strokes? The majority of subjects (66.2%) reported having no information sources related to strokes (a). The remaining subjects (33.8%) obtained information through television (85.2%), newspapers (34.1%), magazines (23.5%), radio (6.1%) and lectures/meetings (5%) (b).

However, a marked difference in the percentage of respondents citing newspapers was observed: just over 20% among respondents ≤49 years of age, 38.2% of respondents 50-59 years of age and 49.9% of respondents 60-69 years of age (Fig. 2b).

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magazines (23.5%), handbills (6.6%), radio (6.1%), posters (5.1%) and lectures/meetings (5.0%). Television was by far the most common source, followed by newspapers and magazines, which were relatively common, although much less common than television. When examined by age group, the predominance of TV was similar across all age groups.
Figure 3. Which symptoms and risk factors of strokes do you know? Most subjects were aware that speech disturbance (95.5%), hemiplegia or hemisensory impairment (89.5%) and sudden severe headache (65.7%) are symptoms of a stroke. However, many were unaware of the symptoms of amaurosis, diplopia or hemianopsia (45.8%). As to risk factors, 89.1% of the subjects selected high blood pressure, 45.9% selected diabetes, 43.8% selected metabolic syndrome, 39.9% selected atrial fibrillation, 31.4% selected dyslipidemia and 30.3% selected migraine.

Figure 4. Are you confident in your ability to judge when a stroke has occurred? Although most subjects claimed to know what the symptoms of stroke are, few (0.4%) were confident that they could judge if a stroke had occurred.
a, b, c) What should you do first when a stroke or TIA occurs? Most subjects (67%) indicated they would promptly request an ambulance and transportation to the hospital at the time of stroke onset (a). However, only 22.4% of the subjects would do this in the event of a TIA (b). A logistic regression analysis (adjusted for age, sex and educational background) showed that the factors contributing to early transportation by ambulance were knowledge of stroke symptoms (odds ratio (OR): 1.579, \(p=0.00\)), knowledge of stroke risk factors (OR: 1.294, \(p=0.00\)) and experience of living with stroke patients (OR: 1.374, \(p=0.00\)) (c).
Q3: Which symptoms and risk factors of strokes do you know? (Fig. 3)

Most subjects recognized speech disturbance (95.5%), hemiplegia or hemisensory impairment (89.5%) and sudden severe headache (65.7%) as symptoms of a stroke. However, many were not aware of amaurosis, diplopia or hemianopsia (45.8%). Regarding risk factors, 89.1% of the subjects selected high blood pressure, 45.9% selected diabetes, 43.8% selected metabolic syndrome, 39.9% selected atrial fibrillation, 31.4% selected dyslipidemia and 30.3% selected migraine.

Q4: Are you confident in your ability to judge when a stroke has occurred? (Fig. 4)

Although the respondents were aware of the symptoms of strokes, few (0.4%) were confident that they could judge when a stroke had occurred. The respondents who were only “somewhat” or more confident totaled just over 10%, while 44.2% responded “not very well” and 44.0% reported that they no confidence in being able to make such a judgment. When judged according to whether respondents had experience living with stroke patients, the degree of confidence was higher among the respondents who responded “yes,” although most respondents were only “somewhat” confident.

Q5: What should you do first when a stroke or TIA occurs? (Fig. 5a-c)

Most respondents (67.0%) would promptly request an ambulance and transportation to the hospital at the time of stroke onset (Fig. 5a), while only 22.4% would do the same in the event of a transient ischemic attack (TIA) (Fig. 5b). When a stroke occurs, “Immediately call an ambulance to be taken to the hospital,” was by far the most common response, at 67.0%. A marked difference existed between this response and the next most common response, “For the time being, go (advise patient to go) to your family doctor for an examination or consultation,” which accounted for 15.5%. The situation was the same when viewed by age group; however, “Immediately call an ambulance to be taken to the hospital” was more common among the older age groups, with other responses tending to be more common among the younger age groups (Fig. 5a). In addition, a logistic regression analysis (adjusted for age, sex and educational background) showed that the factors contributing to the selection of early transportation by ambulance were knowledge of stroke symptoms (odds ratio (OR): 1.579; 95% CI: 1.496-1.666; p=0.00), knowledge of stroke risk factors (OR: 1.294; 95% CI: 1.217-1.375; p=0.00) and experience of living with stroke patients (OR: 1.374; 95% CI: 1.210-1.562; p=0.00) (Fig. 5c).

With onset of TIA, “For the time being, go to your family doctor for an examination or consultation,” was generally
the most common response, accounting for just over 40% of responses. However, “Immediately call an ambulance to be taken to the hospital,” and “Rest for a few hours and check your condition before going to the hospital,” both accounted for around 20% of responses, indicating divergent responses to TIA. For responses according to age, with the exception of the 20-29 year age group, no marked differences were observed in the proportions of subjects who responded, “For the time being, go to your family doctor for an examination or consultation,” while, “Immediately call an ambulance to be taken to the hospital,” tended to increase with age (Fig. 5b).

Q6: Do you know about stroke treatment? (Fig. 6)

Regarding the respondents’ awareness of the importance of stroke prevention and treatment, the subjects were aware of the importance of stroke prevention (83.1%), early detection of symptoms (70.1%) and early treatment (47.5%) via the aforementioned information sources. Additionally, only 29.2% of the participants responded that “early rehabilitation” was important. The same trend was observed in each age group, although the proportion selecting “early rehabilitation” tended to increase with age. Moreover, the importance of early diagnosis and treatment within three hours of onset was well recognized by all age groups (75.3%). Regarding knowledge of stroke treatment, 45.5% of the subjects responded, “I don’t know,” while the remaining respondents suggested using thrombolytic therapy (approximately 30%) or endovascular therapy combined with cerebral blood flow-improving drugs (approximately 30%). By age group, the level of knowledge of each treatment option increased with age, and the proportion of “I don’t know” responses was higher among the younger subjects.

Q7: Which of these most closely resembles your image of a stroke?

The perception of a stroke held by the respondents did not show any marked bias. While approximately one-quarter (24.6%) of the respondents agreed with the statement that, “Recovery is possible through early intervention,” the remaining respondents focused on negative aspects such as, “The patient needs care” (15.2%), “It means being bedridden” (15.1%), “It is difficult to get back into society” (12.1%), “It means having to use a wheelchair” (5.7%) and “It means having to walk with a walking stick” (5.5%).

Discussion

Intravenous thrombolytic therapy using rt-PA was approved in the United States in 1996 and in Japan in October 2005. Since then, strokes have come to be known as “brain attacks,” and the need for urgent medical attention has been stressed. However, thrombolytic therapy can only be administered in Japan within three hours of onset of a hyperacute stroke. In order for as many people as possible to benefit from this treatment, the time from onset to the start of treatment needs to be minimized. Specifically, it is important to: 1) provide adequate education for citizens regarding stroke symptoms and early response at the time of onset, 2) facilitate close coordination among emergency rescue personnel for rapid assessment and transportation to the hospital after stroke onset and 3) establish or enhance specialized stroke hospitals or centers with the capability to administer thrombolytic therapy in every region (2, 7-15). In addition, care should be taken to familiarize oneself with the seven “D’s of Stroke Care” proposed by the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care, as these can minimize the delay between stroke onset and treatment (16). The first factor is Detection, meaning that the speed with which ordinary citizens can recognize symptoms is important. Numerous reports have also stressed the importance of rapidly identifying a stroke and calling for an ambulance or emergency personnel to decrease prehospital delay (2, 7-10, 17). Educational activities related to strokes are thus likely to be highly effective in stressing the importance of providing preventative measures and a rapid response at stroke onset. However, these studies have largely addressed the medical establishment, and few surveys of the general public have been conducted and published to date. While surveys of the general public regarding acute phase stroke and TIA patients have been conducted, no reports in the English literature have described the results of nationwide surveys. This is thus the first survey of the general public in Japan to assess the extent to which current stroke education initiatives have penetrated the general public.

The respondents were first asked to evaluate their own degree of understanding of strokes. It is possible that the low proportion of the parent population in the current study having any experience of living with stroke patients (14.8%) was associated with the fact that the proportion of people who judged themselves as having “at least a certain amount of awareness” was less than 50% (44.1%) and was particularly low among younger people. This finding confirms that educational activities aimed at the Japanese public are insufficient, particularly among young people at risk of suffering from strokes in the future.

Regarding the questions on sources of information on strokes, unfortunately only 33.8%, or roughly one-third, of the participants responded that they had a source of information on strokes, even though numerous stroke educational initiatives have been deployed in Japan. The lack of adequate access to sources of information is likely related to the aforementioned low rates of knowledge about strokes. Even with this relative lack of access to information, gathering information from television was markedly more effective than gathering information from other media sources. The results showed that educational activities such as lectures, handbills and posters accounted for approximately 10% or less of effective awareness measures. This is possibly because the people who actively attend lectures and listen carefully to what is being said or take an interest in handbills and post-
ers tend to be older people who are already concerned about strokes. Conversely, younger people, who do not know what a stroke is or are not particularly interested in this disease, as it affects people outside their immediate circle, do not typically attend lectures to seek out information. Instead, they obtain a greater amount of information from television, which tends to be poorly remembered given the way people generally watch television (i.e., relaxed and slightly unfocussed). However, future nationwide educational activities targeting young people in particular should focus primarily on television to disseminate information on strokes. In addition, cardiopulmonary resuscitation is increasingly being included in school curricula. One possibility would be to introduce stroke awareness into school education from a young age so that, in the same way, young people become familiar with strokes regardless of whether they have any specific interest in the topic.

Regarding the actual details obtained from these information sources, stroke prevention and early detection were already understood. Similarly, the importance of the temporal aspects associated with stroke onset, i.e., that an ambulance should be called immediately at stroke onset and that treatment should commence within three hours, was already recognized. However, awareness of the importance of early intervention and early rehabilitation remained insufficient. In addition, Stead et al. and Kim et al. both reported that learning of the existence of thrombolytic therapy is associated with early diagnosis by a doctor (10, 17). In the present study, however, knowledge did not extend as far as the sort of stroke treatments that are currently available, and there was no specific knowledge of endovascular therapy using the Merci Retrieval System or brain protective agents, which are the latest therapies. In the future, educating the public about the importance of early intervention and early rehabilitation would be beneficial, as would giving people the confidence to identify strokes rather than just imparting knowledge.

The symptoms of strokes put forward by the Japan Stroke Society are hemiplegia, speech disturbance, visual field defect, cerebellar ataxia and sudden severe headaches. The Cincinnati Prehospital Stroke Scale (CPSS), which is frequently used by emergency personnel as a prehospital diagnosis scale, offers 88% specificity for detecting a stroke if facial paralysis, limb paralysis or speech disturbance is present (18). Moreover, the ACT-FAST (Face, Arms, Speech and Time) campaign has been held in the United States to educate the public about stroke symptoms. In the present study, awareness of the symptoms of speech disturbance, hemiplegia or hemisensory impairment and sudden headache was satisfactory; however, awareness of visual field defects and cerebellar symptoms was insufficient, indicating that these symptoms are frequently not considered to be associated with strokes. Emphasis therefore needs to be placed on visual field defects and cerebellar symptoms in future educational activities. Regarding whether people have the confidence to identify a stroke after understanding these symptoms, awareness at a certain level does not necessarily imply an ability to identify strokes with confidence, and most people clearly lack the confidence to identify strokes. Previous studies have reported that use of emergency medical services is related to early examination by a doctor (2, 10). In the present study, although insufficient, the initial response at stroke onset for 67.0% of the respondents would be to have the patient taken to the nearest hospital by ambulance. In particular, with the initial response to onset of TIA, even though the condition is a race against time, if symptoms disappear, the proportion of people who would have the patient taken to the nearest hospital by ambulance is extremely low, indicating low recognition of the seriousness of TIA. However, nearly half responded that, “For the time being, go to your family doctor for an examination or consultation;” therefore, receiving a diagnosis by the family doctor is considered very important in triage after TIA onset. The Japanese Guidelines for the Management of Stroke 2009 (19) newly lists suspected TIA as Grade A, stating that, “The pathogenic mechanism must be identified as soon as possible and treatment to prevent stroke must be commenced immediately.” In the EXPRESS study and the SOS-TIA trial, rapid evaluation and commencement of treatment for TIA dramatically reduced the rate of stroke onset within 90 days (20-22). In the future, the use of educational activities aimed at family doctors centering on the evaluation of symptoms at TIA onset using risk prediction scores (ABCD² score) (23) and their meaning as well as regular cooperation with hospitals specializing in acute strokes will be important for treating TIA.

Finally, with regard to the overall image of strokes, the number of people who equate strokes with a bed-ridden existence has declined. Growing numbers of people have realized that, while a stroke patient may require care, early detection and rehabilitation can reduce the after-effects of the condition.

One limitation of the present study is that because it was an internet questionnaire, data were not obtained for respondents ≥70 years of age, who are likely to find using the internet difficult and thus do not use the internet very often. However, the findings were based on a large-scale questionnaire survey with a parent population of over 10,000 and respondents from every area of Japan. Taken together, these characteristics imply that the results are a satisfactory reflection of the current situation regarding stroke awareness in Japan.

**Conclusion**

A survey of general understanding of strokes was conducted in every prefecture of Japan, with no regional bias, among more than 10,000 subjects from the general public. It is important to educate the public on strokes via television, particularly in matters such as judging when a stroke has occurred and the need to call an ambulance when a stroke or TIA has occurred. Although it is possible that the respon-
dents of this internet survey may not have actively encountered diverse information related to strokes, the survey did show that knowledge of strokes among the general public is insufficient and that public awareness of the appropriate course of action in seeking medical attention, particularly in cases of TIA onset, is also low. In the future, selecting age-appropriate information sources should be considered when implementing stroke-related educational initiatives directed at the general public.

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References