Impact of Life and Family Background on Delayed Presentation to Hospital in Acute Stroke

Yuta Hagiwara, MD, Takeshi Imai, MD, Koji Yamada, MD, PhD, Kenzo Sakurai, MD, PhD, Chihiro Atsumi, MD, Atsushi Tsuruoka, MD, Heisuke Mizukami, MD, Naoshi Sasaki, MD, PhD, Hisanao Akiyama, MD, PhD, and Yasuhiro Hasegawa, MD, PhD

The over-65 population stands at 29 million, more than 20% of the total population in Japan. This is the highest rate in the world. One-person households and older couple households will be increasing. The aim of the present study was to identify whether life and family background are significant factors for delayed presentation to hospital after stroke onset. A total of 253 patients (mean age, 70.7 ± 13.2 years) with stroke was examined. Patients who presented to hospital within 3 hours of onset were categorized as the early presentation group, and the other patients were categorized as the late presentation group. Life and family background were classified into 3 categories, namely 1-person households, 2-person households, and patients living with 3 or more persons. Two-person households were further subdivided by the age of family members. Multivariate logistic regression analysis demonstrated that 1-person households (odds ratio [OR]: 2.980, 95% confidence interval [CI]: 1.108-8.011) and 2-person households with individuals 65 years and older (OR: 3.059, 95% CI: 1.297-7.217) were significant independent factors for delayed presentation, in addition to stroke subtype, time of stroke onset, and route of admission. Onset-to-door time in patients with night-time onset was significantly different among different types of households. Significant delay was demonstrated in 2-person households with 2 individuals 65 years and older compared with that in patients living with 3 or more persons ($P = .038$). Our findings show that delayed presentation to hospital is more likely in stroke patients living in an elderly couple household, especially those with evening onset in an aging society. **Key Words:** Households—aged society—thrombolysis—stroke.

Introduction

The over-65 population stands at 29 million, more than 20% of the total in Japan. This rate is the highest in the world and will continue to rise. According to the 2005 census, the number of aged single persons markedly increased by 3,864,778, or 22.5%, and the number of aged-couple households had increased by 825,771, or 22.6%, from 2000.[1] The number of people over the age of 60 years in the world will also continue to expand, which is projected to reach 1 billion by 2020 and almost 2 billion by 2050, representing 22% of the world's population.[2] Intravenous recombinant tissue plasminogen activator therapy is of proven benefit in patients with acute ischemic stroke, but the indication for its use is limited to within 4.5 hours of onset.[3] In addition to this narrow time window, the effect is time sensitive, and the clinical efficacy decreases with time.[4] Several factors associated with prehospital delay in patients with acute stroke have been

From the Division of Neurology, Department of Internal Medicine, St Marianna University School of Medicine, Kanagawa, Japan.

Received March 25, 2013; revision received May 13, 2013; accepted May 30, 2013.

Disclosure: None.

Address correspondence to Yuta Hagiwara, MD, Department of Neurology, St Marianna University School of Medicine, 2-16-1 Sugao, Miyamae, Kawasaki, Kanagawa 216-8511, Japan. E-mail: shinnai@marianna-u.ac.jp.

1052-3057/$ - see front matter

http://dx.doi.org/10.1016/j.jstrokecerebrovasdis.2013.05.034

demonstrated, such as National Institutes of Health Stroke Scale (NIHSS) score on admission, stroke onset in the evening, onset at home, loss of consciousness, and referral from another institute,[5-12] but the association with household type remains uncertain.[13,14] The aim of the present study was to identify the impact of life and family background in an aging society on delayed presentation to hospital.

Patients and Methods

Data from 253 consecutive patients (163 men and 90 women; mean age, 70.7 ± 13.2 years) with acute stroke admitted to our hospital between January 2009 and December 2009 were reviewed. Patients with subarachnoid hemorrhage were excluded. Our hospital is a tertiary emergency hospital where candidates for acute thrombolysis are directly transferred by a city-wide bypass transfer protocol using the Maria Prehospital Stroke scale.[15] All citizens and general practitioners can also have access to our hospital. On admission, electrocardiogram, chest X-ray, duplex carotid ultrasound examination, brain computed tomography, and blood tests were performed in all patients. To evaluate the intra- and extracranial vasculature, 3-dimensional computed tomography angiography was performed on admission when the patients had no contraindications. Magnetic resonance (MR) imaging including diffusion imaging and MR angiography was performed within 5 days in patients without any contraindication using 1.5-T MR imaging. Based on clinical data including neuroimaging data, cardioembolic stroke was diagnosed according to the National Institute of Neurological Disorders and Stroke III classification,[16] and the other ischemic stroke patients were categorized as having noncardioembolic stroke.

Demographic data, including history, comorbidity, medical treatment before admission, functional disability before stroke onset (Rankin scale),[17] route of admission (use of emergency medical services [EMS] or referral from other hospital) and neurological deficit (NIHSS score) at admission were recorded.[18] Definitions of risk factors were as follows. Hypertension was defined as 2 or more measurements of 140/90 mm Hg or more or a previous diagnosis of hypertension and taking antihypertensive agents. Diabetes was considered present if the patient had a fasting blood glucose level of 126 mg/dL or more and hemoglobin A1c of 6.5% or more or if treatment was being provided for diabetes. Abnormal lipid metabolism was defined as total cholesterol of 220 mg/dL or more, neutral fat level of 150 mg/dL or more, or use of oral agents. Smoking was defined as a present or a previous history of an addictive smoking habit.

Stroke onset between 8:00 AM and 8:00 PM was classified as daytime onset, with stroke onset outside that time classified as night-time onset. The time of symptom onset was recorded as the witnessed time or as the time the patient was last known to be well if the stroke onset was not witnessed. Onset-to-door time was calculated by subtracting the arrival time from the onset time. When the onset-to-door time was within 3 hours, the patients were included in the early presentation (EP) group, whereas with longer times, the patients were included in the late presentation (LP) group.

This study was conducted in a single hospital, and the study protocol was approved by the St. Marianna University Bioethics Committee.

Family Background

Life and family background were investigated by trained nurses and medical social workers with face-to-face interviews of all patients and families during their hospital stay. Based on these medical records, household subtype was classified as follows.

a. One-person households
b. Two-person households
   (1) Two-person households with 2 individuals 65 years and older
   (2) Two-person households with 1 individual 65 years and older
   (3) Two-person households without any individual 65 years and older
c. Living with 3 or more persons
   (1) Three or more person households
   (2) Patients in nursing care facility or equivalent

Statistical Analyses

The subjects' characteristics are reported as mean and standard deviation (SD) unless otherwise indicated. Unpaired Student *t* tests were used to compare continuous variables, and χ^2 tests were used for nominal parameters. The Mann–Whitney test was used for data that were not normally distributed. Values of *P* less than .05 were considered significant. Multivariate stepwise logistic regression analysis was used to detect independent predictors of LP to hospital (LP group) among the parameters selected on univariate analysis. All statistical analyses were performed using the IBM SPSS for Windows version 19.0 statistical package (IBM Inc., Japan, Tokyo).

Results

There were 91 patients in the EP group and 162 patients in the LP group. The background characteristics of each group are shown in Table 1. Univariate analysis demonstrated significant differences between the 2 groups in night-time onset, type of households, route of admission, NIHSS score at admission, and stroke subtype. The total number of 2-person households with 1 individual 65 years