Factors Influencing Quality of Life in Stroke Patients: Focus on Eating Habits

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Background: Adherence to healthy lifestyle factors has been shown to improve outcomes after stroke. This study aimed to identify lifestyle factors about eating habits that may affect the quality of life (QOL) in elderly stroke patients. *Methods*: Fifty elderly patients with a first-ever stroke were enrolled. QOL was assessed by the Stroke and Aphasia QOL Scale-39-J. Lifestyle factors about eating habits were collected using questionnaires (Questions 1-17) for the intake of salt, calcium, magnesium, potassium, taurine, fiber, and protein, and the frequency of breakfast. *Results*: QOL of physical, communication, and psychosocial subdomains was better in the low (healthy) tertile of poststroke eating habits (Questions 1-17) compared with the high tertile of post-troke eating habits (Questions 1-17). This relationship appeared in eating habits except for salt intake but not in eating habits of salt intake and directly measured salt intake. Compared with prestroke eating habits score, poststroke eating habits score was decreased (improved) in 36 patients concerning eating habits of salt intake, but only in 12 patients concerning eating habits except for salt intake ($P < .05$ by chi-square test). Poststroke eating habits of calcium and magnesium were associated with better psychosocial QOL and better physical or energy QOL, respectively. *Conclusions*: Poststroke eating habits of calcium and magnesium were associated with QOL in elderly patients with a first-ever stroke. Since eating habits except for salt intake was poorly improved after stroke, intensive interventions regarding eating habits might be important.
Key Words: Dietary habits—QOL—red meat—Stroke and Aphasia QOL Scale-39-J—vegetable
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Introduction

Stroke is the third common cause of death, and becomes one of the major causes of bedridden elderly people and a big social problem in Japan. Lifestyle factors such as excessive salt intake, vegetable and fruit shortage, insufficient exercise, and obesity increase the incidence of stroke and deteriorate outcomes. There is an inverse association between fruit or vegetable consumption and the risk of stroke.[1] Lifestyle-associated factors are also recognized as the mechanistic drivers of atrial fibrillation which contributes to the onset of cardioembolic stroke.[2] High consumption of red meat is a potential risk for stroke,[3] and skipping breakfast is associated with a higher prevalence of obesity,[4-6] hypertension,[6] dyslipidemia,[4,7] and glucose intolerance.[4,5,7]

A dietary pattern of high intake of vegetables and fruits and adequate intake of fish and meat decreases the risk of mortality from stroke in East Asian populations.[8] In the US Health Professionals study and the Nurses' Health Study, participants who achieved healthy lifestyle choices such as not smoking, moderate intake of alcohol, a body

mass index <25, daily exercise, and a healthy diet had a reduction of stroke compared with participants who achieved none.[9] Adherence to Japanese dietary guidelines elicits a lower risk of total mortality and mortality from stroke.[10] Lifestyle intervention studies also indicate that low rates of chronic noncommunicable diseases can be attained by behavioral modification, such as adopting healthier dietary habits and regular physical exercises.[1,11]

Stroke elicit a gradable decrease in quality of life (QOL) in elderly patients, and its treatment is usually required for long-term hospitalization. Intensive interventions are reported to be effective on improving medical and behavioral risk factors.[12] Medical staff plays a large role in actively engaging stroke survivors in secondary stroke prevention. Thus, this study aimed to identify lifestyle factors that may affect QOL in elderly patients with a first-ever stroke by focusing on eating habits. Here we show that poststroke eating habits of calcium and magnesium ameliorated QOL in elderly patients with a first-ever stroke, and that eating habits concerning salt intake after stroke was improved in the most patients, whereas eating habits except for salt intake was poorly improved after stroke.

Subjects and Methods

Overview of Design

The cross-sectional study was designed to explore the structure and relationships among lifestyle factors and QOL domains such as physical health, psychological health, and social or communication relationship and environment. Data were obtained by the interview to patients according to the Stroke and Aphasia QOL Scale-39-J[13] and questionnaire for factors which affect QOL level. This study was approved by the Ethics Committee of the Hirosaki Stroke and Rehabilitation Hospital, and was performed after written informed consent was obtained from each patient.

Subjects

Table 1 shows the characteristics of patients who are going to Hirosaki stroke and rehabilitation center. Subjects are 50 patients (age; 68 ± 10), and consist of 42 men (age; 68 ± 11) and 8 women (age; 66 ± 9). Most of them are ischemic stroke, and 4 patients have both ischemic and hemorrhagic strokes. Forty-five patients have lifestyle-related diseases such as diabetes (n = 10), high blood pressure (n = 38), and dyslipidemia (n = 14). Eleven patients have atrial fibrillation, and 26 patients have smoking history.

Measures

The stroke and Aphasia QOL Scale-39-J tool consists of 39 items covering 4 subdomains: physical, communication, psychosocial, and energy. The subdomain and overall mean scores range from 1 to 5, with higher scores indicative of better health-related QOL.

Table 1. *Patient profile*

		Patients (n= 50)
Age (years)		68 ± 10
Gender (M/W)		42/8
Type of stoke, n (%)	Ischemic stroke	
	Cardioembolic	4 (8)
	Lacunar	8 (16)
	Atherothrombotic	8 (16)
	Unclassified	25 (50)
	Hemorrhagic stroke	1 (2)
	Ischemic and hemorrhagic Stroke	4 (8)
Risk factor, n (%)	Diabetes	10 (20)
	Hypertension	38 (76)
	Dyslipidemia	14 (28)
	Atrial fibrillation	11 (22)
	Smoking history	26 (52)

To determine factors which affect QOL in the stroke patients, additional questionnaire was designed as follows. The eating habits in additional questionnaire consist of 17 parts. (1) Is it more frequent to simmer than grill when you eat fish? (2) Do you eat pickles every day? (3) Is it more frequent to pickle long time when you pickle? (4) Do you eat miso soup every day? (5) Is it more frequent to put than coat when you use the seasoning? (6) Do you eat between meals every day? (7) Do you eat instant food every day? (8) Is it more frequent to drink noodles soup when you eat noodles? (9) Do you eat out every day? (10) Is it more frequent to eat bread than rice? (11) Do you skip meals every day? (12) Do you eat foods high in calcium (cheese, yogurt, etc.) every day? (13)Do you eat foods high in magnesium (hijiki seaweed, sesame, curry powder, etc.) every day? (14) Do you eat foods high in potassium (apple, banana, etc.) every day? (15) Do you eat foods high in taurine (scallops, squid, clams, octopus, etc.) every day? (16) Do you eat foods high in dietary fibers (spinach, burdock, hijiki seaweed, etc.) every day? and (17) Do you eat foods high in protein (seaweed, dried shrimp, roasted soybean flour, natto, etc.) every day?

Questions 1-10 score ranges from 1 to 5, with lower scores indicative of low salt intake. Question 11 score ranges from 1 to 5, with lower scores indicative of high frequency of breakfast, Questions 12-17 score ranges from 1 to 5, with lower scores indicative of much intake of calcium, magnesium, potassium, taurine, fiber, and protein.

To investigate the changes in eating habits after sroke onset, not only poststroke but also prestroke eating habits were asked using the additional questionnaire.

Urine was collected when the patients visited the clinic, and 24-hour urinary excretion of salt was measured. Basic demographic and comorbidity information was abstracted from the patient's medical chart by trained abstractors.

Statistical Analysis and Ethical Considerations

Results were expressed as mean ± standard deviation. Differences in subdomain or item scores of the Stroke and Aphasia QOL Scale-39-J were examined among the tertiles of patients with various scores of eating habits by Kruskal-Wallis analysis of variance test using SPSS. Differences in items were analyzed by chi-square test or Fisher's exact probability test. A *P* value less than .05 was considered statistically significant.

Results

Relationship Between Dietary Habits or Lifestyle and QOL

Table 2 shows the association between the total score of eating habits (Questions 1-17) and QOL. The total score of poststroke eating habits (Questions 1-17) was associated with QOL (physical, communication, and psychosocial). Each QOL score was higher (better) in the first (low) tertile of the total score of poststroke eating habits (Questions 1-17) compared with the third (high) tertile of the total score.

Table 3 shows the association between the total score of eating habits except for salt intake (Questions 11-17) and QOL. The total score of poststroke eating habits except for salt intake (Questions 11-17) was associated with QOL (physical, and communication). Each QOL score was higher (better) in the first (low) tertile of the total score of poststroke eating habits except for salt intake compared with the third (high) tertile of the total score.

In contrast, the total score of poststroke eating habits for salt intake (Questions 1-10) was not associated with QOL (total, physical, communication, psychosocial, and energy). Twenty four-hour urinary excretion of salt was not associated with QOL, either.

Table 4 shows the changes in eating habits score concerning salt intake and other items such as intake of calcium, magnesium, potassium, taurine, fiber, and protein by stroke. Compared with prestroke eating habits score, poststroke eating habits score concerning salt intake (Questions 1-10) was decreased (improved) in 36 patients, whereas poststroke eating habits except for salt intake (Questions 11-17) was decreased (improved) in only 12 patients (*P* < .05 by chi-square test).

Since poststroke eating habits except for salt intake was associated with QOL (physical, communication, and psychosocial), we examined the relationship between each poststroke eating habits score (17 items) and QOL. Table 5 shows the association between eating habits of calcium (Question 12) and QOL. The score of poststroke eating habits of calcium was associated with psychosocial QOL. Psychosocial QOL score was higher (better) in the low score group of poststroke eating habits of calcium compared with the high score group of poststroke eating habits of calcium. Table 6 shows the association between eating habits of magnesium (Question 13) and QOL. The score of poststroke eating habits of magnesium was associated with physical and energy QOL. Physical and energy QOL scores were higher (better) in the low score group of poststroke eating habits of magnesium compared with the high score group of poststroke eating habits of magnesium.

Discussion

The major findings of the present study were as follows. Post-stroke eating habits except for salt intake were

Table 2. *Association between the total score of eating habits (Questions 1-17) and QOL*

	Eating habits score	Total	*P* value	Physical	*P* value	Communication	*P* value	Psychosocial	*P* value	Energy	*P* value
After stroke	L	4.61 ± .33		4.85 ± .22		4.67 ± .52		4.43 ± .57		3.81 ± .86	
	M	4.23 ± .47	.01	4.51 ± .58	.01	4.50 ± .62	.03	4.01 ± .64	.04	3.18 ± .91	.17
	H	4.01 ± .67		4.34 ± .66		4.23 ± .68		3.67 ± 1.04		3.21 ± .94	

L: first (low) tertile, M: second (middle) tertile, and H:third (high) tertile.

Table 3. *Association between the total score of eating habits except for salt intake (Questions 11-17) and QOL*

	Eating habits score	Total	*P* value	Physical	*P* value	Communication	*P* value	Psychosocial	*P* value	Energy	*P* value
After stroke	L	4.60 ± .26		4.87 ± .18		4.64 ± .51		4.41 ± .53		3.89 ± .80	
	M	4.33 ± .42	.02	4.64 ± .36	.01	4.61 ± .47	.05	4.08 ± .76	.05	3.16 ± .92	.07
	H	3.92 ± .69		4.19 ± .75		4.14 ± .77		3.63 ± .98		3.15 ± .94	

L: first (low) tertile, M: second (middle) tertile, and H: third (high) tertile.

Table 4. *Changes in eating habits score concerning salt intake and other items after stroke*

	Decrease (improvement)	No change or increase (no improvement)
Salt-related score	36	14
Others-related score	12	38

associated with QOL (physical and communication). The low score of poststroke eating habits of calcium and magnesium (much consumption) was associated with high psychosocial QOL and physical or energy QOL, respectively. Compared with prestroke eating habits score, poststroke score of eating habits except for salt intake was decreased (improved) in only 12 patients. QOL was positively correlated with each other.

Lifestyle Factors Influencing QOL

Adherence to healthy lifestyle factors, such as salt restriction, adequate fruits and vegetables consumption, regular physical activity, moderate alcohol intake, maintenance of a healthy body mass index, and abstinence from smoking, has been shown to reduce stroke incidence and to improve poststroke outcomes.[14,15] Higher baseline vegetable consumption was associated with the reduction in cardiovascular disease risk.[16] Meta-analysis study also demonstrated an inverse association between fruit and vegetable consumption and the risk of stroke.[1,17,18]

We tested the hypothesis that salt intake may affect QOL in stroke patients. The result showed that eating habits concerning salt intake (Questions 1-10) after stroke was not associated with QOL. Twenty-four-hour urinary

excretion of salt was not related to QOL, either. Thus, salt intake is associated with hypertension and stroke onset, but is not necessarily involved in poststroke QOL (total, physical, communication, psychosocial, and energy).

Instead, post-stroke eating habits except for salt intake were associated with QOL (total, physical, and communication). Because most poststroke eating habits except for salt intake is related to changing the body to alkalosis, we investigated which foods are associated with QOL improvement. It was clarified that patients who took calcium and magnesium had better QOL in Tables 5 and 6. We therefore speculate that taking more foods containing calcium and magnesium improves poststroke QOL. Although it is important to restrict salt intake, this study potentially suggests that it is more important to take more foods containing calcium and magnesium which make alkalosis.

Lifestyle Intervention

When we interviewed about eating habits, there was no association between prestroke eating habits and QOL. However, poststroke eating habits were associated with QOL. Furthermore, we assessed the poststroke changes in eating habits concerning salt intake or other 7 items related to low grade metabolic alkalosis. It is intriguing that compared with prestroke eating habits score, the score of poststroke eating habits concerning salt intake was decreased (improved) in 36 patients, whereas the score of poststroke eating habits except for salt intake was decreased (improved) in only 12 patients. This suggests that advice for taking more foods containing minerals may be necessary to improve QOL in poststroke patients. However, evidence for meta-analysis suggested that there was no significant difference in fruit and vegetable consumption in intervention group compared to control,[19,20]

Table 5. *Association between eating habits of calcium and QOL*

	Eating habits score	Total	P value	Physical	P value	Communication	P value	Psychosocial	P value	Energy	P value
After stroke	1	4.49 ± .39		4.69 ± .48		4.57 ± .59		4.42 ± .50		3.63 ± .83	
	2,3,4	4.24 ± .53	.13	4.53 ± .65	.20	4.51 ± .58	.34	3.99 ± .74	.03	3.18 ± .91	.41
	5	4.06 ± .68		4.44 ± .56		4.29 ± .71		3.61 ± 1.03		3.30 ± 1.06	

Table 6. *Association between eating habits of magnesium and QOL*

	Eating habits score	Total	P value	Physical	P value	Communication	P value	Psychosocial	P value	Energy	P value
After stroke	1,2	4.64 ± .26		4.86 ± .19		4.76 ± .45		4.44 ± .49		4.02 ± .81	
	3	4.31 ± .43	.04	4.68 ± .44	.01	4.51 ± .48	.06	4.08 ± .81	.12	3.04 ± .75	.05
	4,5	4.07 ± .65		4.34 ± .67		4.29 ± .74		3.80 ± .92		3.28 ± .97	

indicating that correction of vegetable shortage is difficult by intervention which provided education regarding medication and the importance of compliance. This might explain the present results that poststroke changes in eating habits except for salt intake was observed in few patients. More intensive intervention might be needed.

We did not ask about preference of white or red meat in this study. High consumption of red meat has been suggested to negatively impact on human health, but too less red meat consumption is also harmful. Red meat has been long established as an important dietary source of protein and essential nutrients including iron, zinc, and vitamin B$_{12}$.[21] Therefore, moderate consumption of red meat as part of a balanced diet may positively influence nutrient intake, whereas too less red meat consumption will not be beneficial for human long-term health.

In the present study, frequency of breakfast (Question 11) was not associated with QOL. Concerning frequency of breakfast, however, skipping breakfast was reported to be associated with not only a higher prevalence of cardiovascular risk factors,[4-7] but also risks of total stroke and cerebral hemorrhage.[22] The omission of breakfast contributes to overactivity in the sympathetic nervous system and leads to elevated blood pressure in the morning.[23] Conversely, a rapid decrease in systolic and diastolic blood pressure after having breakfast was shown in a randomized crossover design.[24] Therefore, eating breakfast everyday is important to reduce the frequency or duration of high blood pressure in the morning to prevent cerebral hemorrhage.[22] A number of studies also showed a blood pressure reduction by breakfast intake.[25]

Nutritional intervention approaches to avoiding saturated, partially hydrogenated trans fats, cholesterol, and refined sugars, and eating at least 2 servings of fruits, 3 servings of vegetables, and 20 g of fiber per day. However, studies have shown that adherence to such lifestyle factors is poor among stroke survivors,[14] because lifestyle practices are difficult once these individuals have returned home. An occupational therapy approach should be originally designed for older adults living independently, which focuses on incorporating healthy and meaningful lifestyle practices into individuals' daily lives.[26] Several counseling-based lifestyle interventions in nonstroke populations have been effective in promoting lifestyle change.[27-29] More intensive, targeted lifestyle interventions appear to be more effective in increasing individuals' lifestyle knowledge[27] and well-being.[28] The interventions in which nurses had a primary role were effective on improving medical and behavioral risk factors such as physical activity, diet, medication adherence, as well as knowledge of risk factors as part of secondary prevention of stroke.[12] Therefore, intensive interventions which provided education regarding medication and the importance of compliance might be important for mixed effect on eating habits.[30,31]

There is a limitation to generalize the obtained results because we investigated at only 1 hospital and interviewed small-sized subjects. In addition, the patients were limited to have less impaired physical function.

In conclusion, poststroke eating habits of calcium and magnesium were associated with QOL in elderly patients with a first-ever stroke. Since eating habits except for salt intake was poorly improved after stroke, intensive interventions regarding eating habits might be important.

Compliance with Ethical Standards

Ethical Approval

All procedures were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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