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An Examination of the Physical, Psychological and Social Factors Associated with Housebound Living in Community-Dwelling Stroke Patients

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Abstract. [Purpose] The purpose of this study was to investigate the physical, psychological and social factors associated with the locomotor skills of housebound community-dwelling stroke patients. [Methods] The subjects were 78 stroke patients who had been discharged for more than six months. We classified subjects as 31 patients who had difficulty with going out by themselves and, 47 patients who could go out by themselves. We investigated psychological and social factors by questionnaire and physical factors from medical records. [Results] The number of "type 1" housebound patients were 25, and the main factor associated with "type 1" housebound was instrumental self-maintenance of the TMIG index of competence. The number of "type 2" housebound patients were 18, and the main factors associated with "type 2" housebound were the Barthel Index, expectations for rehabilitation, and presence or absence of a role in the community. [Conclusions] The factors associated with housebound were different according to type. Therefore it is necessary to tailor physical therapy to prevent a housebound condition according to locomotor skills.
Key words: Stroke, Housebound, Locomotor skills

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INTRODUCTION

Elderly people account for approximately 10% of housebound patients among community-dwelling elderly[1]. There are physical, psychological and social factors associated with housebound patients among community-dwelling elderly patients[2–4]. It is very likely that stroke patients often experience severe sequelae such as motor paralysis sensory disturbance, and higher brain function disorder. Therefore, it is predicted that the incidence of housebound stroke patients is higher among community-dwelling elderly people. However, there have so far been few studies of housebound stroke patients in Japan.

The housebound patient is classified as "type 1" housebound (housebound due to reduced locomotor skills) and "type 2" housebound (housebound

although locomotor skills are high)[1]. It is important to evaluate factors associated with being housebound according to locomotor skills in order to prevent patients from becoming housebound[1]. Few reports have addressed the physical, psychological and social factors associated with locomotor skills, thus the measures required for preventing patients from becoming housebound are unclear.

The purpose of this study was to investigate the physical, psychological and social factors associated with the locomotor skills of housebound community-dwelling stroke patients.

SUBJECTS AND METHODS

The subjects were 94 community-dwelling stroke patients (52 males, 42 females, mean age 67.5 ± 11.3 years). All patients received physical therapy at a hospital between 2004 and 2006 and had been discharged for more than six months. All patients were able to walk more than 10 m during hospitalization, regardless of the use of mobility aids such as a cane or a brace.

Patients with complications, such as higher brain function disorder or dementia who had difficulty understanding oral instructions were excluded. The final cohort included 78 patients who completed a questionnaire after discharge indicating they had no defects (45 males, 33 females; 33 left hemiplegia, 45 right hemiplegia; mean age 70.1 ± 11.1 years). The mean duration from the day of discharge to the start of the investigation was 2.6 ± 0.9 years (0.5–4.0 years).

The questionnaire was conducted by mail. The survey items included the frequency of going out, the presence or absence of care givers when subjects went out, psychological factors (fall-related self-efficacy[5], self-rated health[6], Geriatric Depression Scale simple version (GDS)[7], expectations for rehabilitation), social factors (TMIG index of competence[8], presence or absence of a role in the home, presence or absence of a role in the community, presence or absence of close friends and relatives).

A person who went out (excluding trips to hospital or outpatient service) for the purpose of shopping or walking less than once a week was defined as housebound.

The frequency of going out was determined by the direct question method with four response choices (at least once a day/about once per 2–3 days/about once a week/seldom). Subjects were also asked: "Do you need a care giver when you go out? (yes/no)". Those that required a care giver were defined as patients who could not go out by themselves and those that did not as patients who could go out by themselves. The patient's feelings concerning rehabilitation were determined. They were also directly asked whether they played any specific role in the home (yes/no) or community (yes/no) and whether they had frequent interactions with friends and/or family.

Basic information (sex, age), and the physical function of the patients during physical therapy was determined from their medical records. The patients were asked about changes in their physical activity since discharge. The average periods from onset to the measure of the physical function was 112.2 ± 20.2 days (90–182 days). The survey items included the side of paralysis, Body Mass Index, lower limb Brunnstrom Recovery Stage (BRS), 10 m walk time, and the Barthel Index (BI).

The housebound patients who had difficulty going out by themselves were defined as "type 1" housebound and the housebound patients who could go out by themselves were defined as "type 2" housebound. The incidence of being housebound was calculated according to type. The self-rated health was classified by four categories: I feel very fine/I feel fairly fine/I feel not so fine/I feel not fine. The GDS was classified as no depression (0–4 points), depressive tendency (5–9 points), and depression (more than 10 points). The expectation for rehabilitation was classified by four categories: I think considerably like that/I think fairly like that/I do not think like that/I do not think quite like that. The TMIG index of competence evaluates the necessary ability required for elderly people to live in the community. The TMIG index of competence contained five items to classify instrumental self-maintenance (5 points in total), four for intellectual activity (4 points in total), and four for social role (4 points in total). The patients in the housebound group ("type 1" housebound and "type 2" housebound) and non-housebound group were classified according to locomotor skills, and physical, psychological and social factors between the two groups were compared. The evaluation used two sample t-tests, namely the Mann-Whitney test, and the chi-square test for the comparison between the two groups. A logistic-regression

Table 1. Comparison between housebound group and non-housebound group according to the type

	patients that had difficulty going out by themselves (n=31)		patients that could go out by themselves (n=47)	
	"type 1" housebound (n=25)	non-housebound (n=6)	"type 2" housebound (n=18)	non-housebound (n=29)
Sex (male / female)	12/13	3/3	10/8	20/9
Age (years)	76.8 ± 8.3	68.7 ± 14.5	66.9 ± 12.7	66.5 ± 9.2
Side of paralysis (left / right)	12/13	1/5	8/10	12/17
Body Mass Index (kg/m^2)	21.9 ± 3.0	25.7 ± 8.8	22.7 ± 3.2	22.5 ± 2.5
Brunnstrom Recovery Stage of lower limb[a)]	0/1/8/6/5/5	0/0/0/3/1/2	0/0/3/5/5/5 *	0/1/0/3/11/14
10m walk time (sec)	47.8 ± 62.4	27.0 ± 17.5	16.2 ± 10.3	20.6 ± 47.7
Barthel Index (points/100)	74.6 ± 22.4	88.3 ± 7.5	87.2 ± 6.2 **	92.9 ± 9.7
Fall related self-efficacy (points/56)	22.1 ± 6.9 **	36.3 ± 6.9	39.4 ± 6.1 *	46.4 ± 9.0
Depression[b)]	2/15/8	2/4/0	1/10/7	3/14/12
Self-rated health[c)]	0/13/4/8	0/4/0/2	2/7/8/1 *	9/15/3/2
Expectations for rehabilitation[d)]	4/6/8/7	2/2/1/1	4/6/5/3 **	17/7/4/1
Instrumental self-maintenance of the TMIG index of competence (points/5)	0.4 ± 1.0 **	3.2 ± 1.8	3.0 ± 2.0	3.8 ± 1.8
Intellectual activity of the TMIG index of competence (points/4)	1.4 ± 1.4 *	2.8 ± 1.5	3.3 ± 0.8	3.7 ± 0.6
Social role of the TMIG index of competence (points/4)	0.8 ± 1.1	1.5 ± 1.5	2.7 ± 1.5	2.9 ± 1.3
Role in the home (presence / absence)	3/22	3/3	10/8	23/6
Role in the community (presence / absence)	1/24	2/4	3/15 **	17/12
Close friends and relatives (presence / absence)	11/14	2/4	10/8 *	26/3

[a)] I / II / III / IV / V / VI. [b)] no depression / depressive tendency / depression state. [c)] I feel very fine / I feel fairly fine/ I feel not so fine / I feel not fine. [d)] I think considerably like that / I think fairly like that / I do not think like that / I do not think quite like that. **: $p<0.01$, *: $p<0.05$.

analysis was used for the identification of the main factors associated with housebound, and the explanatory variables were sex and age, and the items that showed a significant difference in the univariate analyses. A logistic-regression analysis (the variable increase method: likelihood ratio) with sex and age as the explanatory variables and the items that showed a significant difference in the univariate analyses was used to evaluate the main factors associated with the housebound patients. The statistical analysis was performed with the SPSS version 17.0J software package, using a level of significance of less than 5%.

RESULTS

Twenty-five of 31 patients were "type 1" housebound who had difficulty with going out by themselves. The incidence of the "type 1" housebound was 80.6%. The "type 1" housebound group had significantly lower fall-related self-efficacy, instrumental self-maintenance of the TMIG index of competence, and intellectual activity of the TMIG index of competence than the non-housebound group ($p<0.05$; Table 1). A logistic-regression analysis showed that the main factors associated with "type 1" housebound was instrumental self-maintenance of the TMIG index of competence (odds ratio: 0.358, 95% confidence interval: 0.180–0.714). The Hosmer-Lemeshow test showed $p = 0.923$; (Table 2-1).

Eighteen of 47 patients were "type 2" housebound who could go out by themselves. The incidence of the "type 2" housebound was 38.3%. The "type 2" housebound group had a significantly lower BRS, BI, fall-related self-efficacy, self-rated health, feelings of expectation for rehabilitation than the non-housebound group. In addition, the "type 2" housebound group had a significantly higher ratio of patients without a role in the community and friends than the non-housebound group ($p<0.05$; Table 1). The logistic-regression analysis showed that the main factor associated with "type 2" housebound was BI (odds ratio: 0.905, 95% confidence interval: 0.829–0.988), expectations for rehabilitation (odds ratio: 2.982,

Table 2. Result of logistic-regression analysis

2-1. Result of logistic-regression analysis in the "type 1" housebound

Item	Unit change	odds ratio	95% confidence interval
Instrumental self-maintenance of the TMIG index of competence **	1	0.358	0.180–0.714

Variable increase method The Hosmer-Lemeshow test showed p = 0.923
Object variable
Presence or absence of housebound (Presence, 1 / absence, 0)
Explanation variables
Sex (male, 0 / female, 1), Age, Fall-related self-efficacy (14–56 points), Instrumental self-maintenance of the TMIG index of competence (0–5 points), Intellectual activity of the TMIG index of competence (0–4 points). **:p<0.01.

2-2. Result of logistic-regression analysis in the "type 2" housebound

Item	Unit change	odds ratio	95% confidence interval
Barthel Index *	1	0.905	0.829–0.988
Expectations for rehabilitation *	1	2.982	1.217–7.308
Presence or absence of a role in the community *	1	10.291	1.672–63.356

Variable increase method The Hosmer-Lemeshow test showed p = 0.795
Object variable
Presence or absence of housebound (Presence, 1 / absence, 0)
Explanation variables
Sex (male, 0 / female, 1), Age, Brunnstrom Recovery Stage of lower limb, Barthel Index (0–100 points), Fall-related self-efficacy (14–56 points), Self-rated health (I feel very fine; 1 / I feel fairly fine; 2 / I feel not so fine; 3 / I feel not fine; 4), Expectations for rehabilitation (I think considerably like that; 1 / I think fairly like that; 2 / I do not think like that; 3 / I do not think quite like that; 4), Role in the community (Presence, 0 / Absence, 1), Close friends and relatives (Presence, 0 / Absence, 1). *:p<0.05.

95% confidence interval: 1.217–7.308), presence or absence of a role in the community (odds ratio: 10.291, 95% confidence interval: 1.672–63.356). The Hosmer-Lemeshow test showed p = 0.795; (Table 2-2).

DISCUSSION

The incidence of "type 1" housebound in community-dwelling stroke patients was approximately 80% of the total population of those who could not go out by themselves. The incidence of the "type 1" housebound in community-dwelling stroke patients was higher than the incidence of housebound patients in community-dwelling elderly people[1]. The main factor associated with "type 1" housebound in community-dwelling stroke patients was the instrumental self-maintenance aspect of the TMIG index of competence. Patients with low instrumental self-maintenance are likely to become "type 1" housebound. Preliminary studies found that those with low instrumental self-maintenance frequently progress to "type 1" housebound in community-dwelling elderly people[4]. Instrumental self-maintenance evaluates Instrumental Activities of Daily Living (IADL) such as shopping, and preparation for eating[8]. IADL require physical function and cognition that it are higher than in self-care such as eating or dressing[9]. IADL are low in stroke patients due to sequelae such as motor paralysis or sensory disturbance. Therefore stroke patients are frequently characterized as "type 1" housebound because their opportunity or ability for going out for the purpose of shopping decreases. However, it was difficult to determine whether the decrease in instrumental self-maintenance was the factor which led to their becoming housebound or whether it was a result of being housebound because this study was a case-control study. A cohort study is necessary to examine the association of housebound patients and instrumental self-maintenance. The "type 1" housebound group had a significantly lower fall-related self-efficacy than the non-housebound group. The fall-related self-efficacy evaluates the confidence of an individual without falling based on

activities associated with ADL and the IADL. A low fall-related self-efficacy reduces the opportunities for an individual to go out[10]. Therefore, stroke patients with a low fall-related self-efficacy are often classified as "type 1" housebound.

The incidence of "type 2" housebound in community-dwelling stroke patients was approximately 40% of the patients who could go out by oneself. The incidence of "type 2" housebound in community-dwelling stroke patients was higher than the incidence of housebound patients in community-dwelling elderly people[1]. The factor associated with "type 2" housebound in community-dwelling stroke patients was hospitalized BI. The patients with a low hospitalized BI tended to become "type 2" housebound. The physical function in this study was evaluated during hospitalization. The rehabilitation was continued until the patient was discharged after an evaluation of the physical function. In addition, the continuation of rehabilitation after discharge was not examined in detail. Therefore, the changes in the physical function of the patients could not be sufficiently investigated. However, the change in the physical function of stroke patients slows three months after onset[11,12]. In addition, the patients with recurrence of stroke and complications that could influence the physical function after discharge were excluded from this study. Therefore, we think that the physical function at the time of discharge and housebound after the discharge should be equivalent. Another factor associated with "type 2" housebound was the expectation for rehabilitation. The patients who did not expect to attain rehabilitation easily progressed to "type 2" housebound. Low expectations reduce the motivation to exercise or walk. Therefore, the daily physical active mass of the patients decreases leading to patients becoming housebound. The presence or absence of a role in the community was also associated with "type 2" housebound. The patients without a role in the community easily became "type 2" housebound. Participating in the community would increase opportunities to go out. It is very likely that stroke patients experience diminished physical function and cognition. Therefore, the patients normally receive social support, such as care services. It is necessary to provide an environment where stroke patients can be offer social support to prevent the development of "type 2" housebound patients in community-dwelling stroke patients.

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REFERENCES

1) Shinkai S, Fujita K, Fujiwara Y, et al.: Prevalence and characteristics of different types of homeboundness among community-living older adults. Nippon Koshu, 2005, 52: 443–455(in Japanese).
2) Imuta H, Yasumura S, Fujita M, et al.: Homebound elderly in a Japanese community: related factors and change of mobility. Eisei Zasshi, 1998, 45: 883–891(in Japanese).
3) Fujita K, Fujiwara Y, Kumagai S, et al.: The frequency of going outdoors, and physical, psychological and social functioning among community-dwelling older adults. Eisei Zasshi, 2004, 51: 168–180(in Japanese).
4) Shinkai S, Fujita K, Fujiwara Y, et al.: Predictors for the onset of different types of homeboundness among community-living older adults: two-year prospective study. Eisei Zasshi, 2005, 52: 874–885(in Japanese).
5) Suzuki M, Kanamori M, Uchida A, et al.: Reliability and validity of a scale developed to measure self-efficacy related to fear of falling among elderly persons. Japanese journal of geriatric psychiatry, 2005, 16: 1175–1183.
6) Sugisawa H, Sugisawa A: Development of research on self-rated health in the united states. Eisei Zasshi, 1995, 42: 366–378(in Japanese).
7) Sheikh JI, Yesavage JA: Geriatric Depression Scale (GDS): recent evidence and development of a shorter version. Clinical Gerontologist, 1986, 5: 165–172.
8) Koyano W, Shibata H, Nakazato K, et al.: Measurement of competence in the elderly living at home: development of an index of competence. Eisei Zasshi, 1987, 34: 109–114(in Japanese).
9) Otomo A: Effects of functional impairment and social factors on ADL in persons with postapoplectic sequelae living at home. Physical Therapy Japan, 1999, 26: 192–198.
10) Yasuko M, Yoshitaka S, Shuichiro W, et al.: Factor of fear of falling among the community dwelling elderly. Rigakuryoho kagaku, 2008, 23: 413–418(in Japanese).
11) Andrews K, Brocklehurst JC, Richards B, et al.: The rate of recovery from stroke and its measurements. Int Rehabil Med, 1981, 3: 155–161.
12) Jorgensen HS, Nakayama H, Raaschou HO, et al.: Recovery of walking function in stroke patients: the copenhagen stroke study. Arch Phys Med Rehabil, 1995, 76: 27–32.