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《原著論文》

The Relationship Between Poststroke Pain and Numbness Symptoms and Depression

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要約

目的：日本の脳卒中患者における身体的痛みおよび痺れと，鬱徴候の間の関係を調べることである。

方法：調査対象者は無作為に選ばれた西日本のリハビリテーション病院（7施設）の外来に通院する脳卒中後遺症患者101人であった。面接法による調査を行った。主な調査内容は基本属性のほか，鬱徴候，痛み，痺れなどの自覚症状の有無と部位，脳卒中のタイプ（梗塞性・出血性），慢性疾患の有無などである。なお，脳卒中患者の鬱徴候については老人鬱スケール（GDS），コーネル鬱スケール（CSDD），痛み・痺れの程度はVisual Analogue Scale（VAS），身体機能自立度はModified Barthel Index（MBI）を用いた。

調査期間は1999年8月～2000年6月であった。

結果：被験者の58％は痛みを，40％は痺れの症状を訴えていた。痛みと痺れはともに，鬱徴候の増加と強い相関関係にあった。痛みは肯定的情緒の低下，不安，食欲不振，精力減退，睡眠障害に最も強く関係していた。対照的に，痺れは，肯定的情緒の低下や不安とは関係していたが，精力減退や睡眠障害とは関係していなかった。また，痺れは，低い自尊感情，厭世観そして自殺企図など，

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観念的問題に関係していた。本調査対象者のなかで精神科の治療を受けている人は誰もいなかった。

論議：痛み，痺れおよび鬱徴候は脳卒中患者の主要な症状であると言える。しかし，本調査により，痛み，痺れ，鬱徴候といった脳卒中患者の主症状に対する治療はほとんどなされていないことが明らかになった。これらの症状に対する適切な診断と治療の必要性が示唆された。

ABSTRACT

The purpose of the present study was to examine the relationship between somatic pain and numbness, and depressive symptoms in a sample of Japanese poststroke patients (n=101). Subjects were recruited from 7 randomly selected rehabilitation facilities in western Japan. Findings revealed that 58% of subjects reported pain and 40% reported numbness. Both pain and numbness were significantly correlated with increased depressive symptoms (on the GDS and on the Cornell Scale for Depression in Dementia) even after controlling for the effects of physical disability and chronic illness. Pain was most related to decreased positive affect, anxiety, loss of appetite, loss of energy, and sleep problems. In contrast, while numbness was also related to decreased positive affect and anxiety, it did not relate to loss of energy or sleep problems. However, numbness did relate to ideational disturbances such as poor self-esteem, pessimism, and suicidal ideation. None of the subjects were receiving psychiatric care and only 30.6% were taking pain medication of any kind.

キーワード

脳卒中後遺症患者	Poststroke Patients
痛み	pain
痺れ	numbness
鬱徴候	Depressive Symptoms

I INTRODUCTION

Numerous studies have significantly and positively linked clinical depression and/or depressive symptoms to increased pain complaints [1-3]. Depressive symptoms may predict the development of pain [4]. Similarly, pain itself may predict the development of depression [5].

While the direction of the relationship between pain and depression is not always clear, it is well documented that they significantly covary. It is also well known that the common sequelae of stroke injury include both somatic pain and depressive symptoms [6-7]. The prevalence of clinical depression among Japanese poststroke patients was found to be 21.2% [8]. Pain is also prevalent, albeit less well documented, among poststroke patients [9]. Numbness is another unfortunate consequence of stroke injury but very little is known about how this condition relates to depressive symptoms. There has been little examination of pain among Japanese poststroke subjects and no research on the nature of the association between pain and numbness, and depression in this population.

The present study had two objectives. One was to examine the relationship between pain prevalence and intensity, and depressive symptoms among Japanese poststroke patients with no prior history of psychiatric disorders. If pain and depression act to amplify the effects of each other then we would expect to see significantly more pain complaints among subjects with greater depressive symptoms, ceteris parebis. In contrast, if

pain is unrelated to depressive symptoms we would expect to see no relationship between levels of pain and levels of depressive symptoms among the poststroke subjects. As the present study is cross-sectional in design, the direction of the relationship between pain and depression can not be determined. The goal is to identify to what degree these symptoms covary while controlling for other conditions that may influence either pain perceptions or depressive symptoms. There is some suggestion that physical disability, rather than its concomitant pain, is the main cause of depression in subjects with chronic pain such as stroke [10]. Therefore, the degree to which physical disability and the presence of other chronic conditions may moderate the pain/depression relationship is also examined. The second objective of this study was to examine the prevalence and intensity of numbness and its relationship to depressive symptoms among poststroke patients.

II METHODS

Sample

Seven private neurological hospitals with outpatient rehabilitation clinics were randomly selected from a metropolitan area in western Japan. Stroke patients (n=101), who lived with a family caregiver, who did not also have a diagnosis of Alzheimer's dementia, and who had no previous psychiatric medical history were identified from the patient records and invited to participate in the study. The participation rate was 100% for facilities and

qualifying stroke patients. This high rate was due to the involvement of physicians at each site who helped explain the study to the participants. Samples at each site were small due to the comparatively small bed size of Japanese private hospitals which are physician owned and managed [11]. The study sample represents all stroke patients at all sites who met the study criteria and were over 45 years of age.

Protocol

Stroke patients and their family caregivers were interviewed at the outpatient rehabilitation clinic on the days when they came for treatment. The principal investigators met with the couples, explained the study, and after receiving informed consent, caregivers and care-recipients were interviewed separately. Interviews lasted approximately 40-60 minutes per subject.

Measures

Pain Intensity—was measured on a Visual Analogue Scale with a 100 mm line connecting a face representing extreme pain at the bottom with a face representing no pain (neutral expression) at the top. Subjects were asked to indicate the place on the line that most corresponded with their degree of pain. Due to the possible cognitive impairments from stroke, a visual analogue measure of intensity was preferred over a verbal response scale. Higher scores indicated greater pain intensity.

Pain Location—was measured by showing subjects front and back images of the human body and asking them to indicate

on the image, or on their own body, where their pain was located. Pain was coded in two ways. First, a yes (1) or no (0) response for the presence of pain was coded and then each pain location was coded and entered separately.

Numbness Intensity…numbness was measured on a Visual Analogue Scale (of same type described above). Again higher scores indicated more severe numbness.

Numbness Location…the location of numbness was also coded on the front and back images of the human body described above. Similarly, presence of numbness was coded yes (1) or no (0) and then each location with numbness was separately entered.

The Geriatric Depression Scale Short Form (GDS)

The GDS version used in this study was translated by Niino, Imaizumi, & Kawakami [12]. Factor analysis of the GDS has generally identified from 1-3 factors which measure depressed mood, positive affect, social withdrawal, and memory and energy. Various cut-off scores from 4 to 6 have been reported for the GDS Short Form 15 item scale. Based on the research, a cut-off score of 6 was adopted for the present study. This score was used by Ihara et al. [13] in their study of depressive symptoms among community dwelling Japanese elderly and provides a comparison. Stroke subjects with scores over 6 (coded 1) were considered to be symptomatic of depression while those with scores of 5 and lower (coded 0) were considered "normal". The total GDS score was used for the correlation and regression analyses.

The Cornell Scale for Depression in Dementia (CSDD)

A second scale was also included to measure different types of depressive symptoms. In contrast to the GDS, which primarily measures mood, the Cornell Scale [14] has 19 items that measure behaviors, physical signs, cyclic functions, and ideational disturbances in addition to depressed mood. The scale is designed for dementia subjects, including stroke subjects, who may have difficulty comprehending survey questions. The cut-off scores determined in the psychometric study by Alexopoulos et al. [14] were 7.7 for minor episodic depression, 12.6 for major depressive disorder, and 21.8 for definite depressive disorder. We adopted this scoring system.

The CSDD was translated into Japanese for the first time in this study. First, the English version was translated into Japanese by a native speaker. Next, this Japanese version was back-translated into English by another native speaker. These two versions were compared by the researchers, in consultation with a Japanese psychiatrist, resulting in the final Japanese version.

Again, higher scores indicate greater depressive symptoms. The CSDD total score was used for the correlation and regression analyses.

Other Study Variables

Physical Functional Dependence…was measured by the Modified Barthel Index (MBI) developed by Shah [15]. The MBI is a functional index that measures self-care ability in personal hygiene, bathing, feeding, toileting, stair climbing, dressing, bowel

control, bladder control, ambulation, and bed/chair transfers. Higher scores indicate greater independence. This scale was administered to the stroke patient's primary caregiver.

Chronic Illness···Data was gathered via interviews and from patient charts on chronic illnesses or conditions such as hypertension, diabetes, cardiovascular disease, liver disease, chronic back pain, kidney disease, cataracts, stomach illness, stroke or an "other" disease. As sample size was small this data was collapsed into a dummy variable of 0=disease, 1=no disease.

Other Control variables···Data was collected via interviews and from patient charts on age, sex (1=male ; 2=female), type of stroke (infarction vs. hemorrhagic), aphasia, presence of right or left paralysis, duration of illness (in months), average daily hours of care, and marital status (as virtually all subjects were married this variable was dropped from the analysis).

Subjects were also asked if they were currently receiving psychiatric treatment and if they were currently taking any prescription or over-the-counter pain medications.

Statistical analysis was performed with SPSS version 9.

III FINDINGS

Table 1 reports on stroke sample demographics and scale scores. There were no significant differences between sexes on any of the study variables. Depressive symptoms were high : 62% of subjects scored greater than 6 on the GDS, which indicates the need for further evaluation for clinical depression. Similarly, 58.9% scored greater than 4.8 on the Cornell Scale for Depression

Table 1 Stroke Patient Characteristics for Entire Sample

	Male (N=55)	Female (N=46)	Total (N=101)
Sex	54.50%	45.50%	
Mean Age	68.88 (8.9)	69.91 (12.09)	69.35
Aphasia	75.50%	59.50%	68.80%
Hemorhagic Stroke	53.70%	46.30%	50.50%
Infarction	46.30%	53.50%	49.50%
Left-Sided Paralysis	57.40%	52.40%	55.70%
Right-Sided Paralysis	38.90%	42.90%	40.20%
Mean MBI Score	67.84 (28.30)	63.83 (33.36)	65.96
Chronic Illness	68%	37.20%	53.80%
Mean Months Post-Stroke	65.46 (78.1)	42.85 (59.0)	55.66 (70.49)
Pain Prevalence	53.70%	62.20%	58%
Mean Pain Intensity	30.1 (31.0)	31.0 (36.6)	31.34 (33.34)
Numbness Prevalence	42.60%	37.80%	40%
Mean Numbness Intensity	20.9 (29.5)	30.15 (34.6)	24.92 (31.26)
Mean GDS Score	6.3 (3.1)	7.34 (3.4)	6.8 (3.29)
Percent$\geq$6 on the GDS	62%	61%	62%
Mean CSDD Score	5.62 (4.99)	7.72 (5.92)	6.65 (5.51)
Percent$\geq$4.8 on the CSDD	50.0%	67.5%	58.9%
Percent receiving mental health treatment	0%	0%	0%

Values in ( ) represent standard deviations where applicable.

in Dementia (CSDD). None of the subjects were receiving any mental health treatment and only 30.6% of subjects with pain were taking pain medication of some kind.

Table 2 reports on the prevalence of pain and numbness by location. As can be seen from the table, both pain and numbness are prevalent with 58% of the stroke subjects reporting pain and 40% reporting numbness. Numbness was most prevalent in the lower parts of the extremities such as hands and feet while pain was most prevalent in the shoulders and uppers arms. Pain and numbness were highly correlated (**Table 3**) but not universally shared by subjects.

Table 2 Pain and Numbness Prevalence by Location among Stroke Subjects

	Pain Location	Numbness Location
Any Location	58%	40%
Shoulders, upper arm, elbow	16%	2%
Lower arm, hand	8%	10%
Hips, thigh area, knee	14%	0%
Lower leg, ankle, foot	14%	11%
Whole Right Arm	3%	3%
Whole Left Arm	3%	5%
Whole Right Leg	4%	2%
Whole Left Leg	7%	4%
Whole Right Side	5%	4%
Whole Left Side	3%	7%
Abdominal area	4%	1%
Head	3%	0%
Back, lumbar region	2%	0%

Note : Location percentages do not sum to 100 as more than one location could have been coded for subjects. However, categories are mutually exculsive so if a subject had both upper and lower left arm pain then only the "whole left arm" category was coded.

We also examined the relationship between pain and numbness intensity and respective locations (data not shown). In general, pain and numbness intensity were reported highest in the right shoulder and upper arm areas. In order to comprehend the magnitude of the degree of pain and numbness among stroke patients we administered the same Visual Analogue Scales to a convenience sample of nonstroke community dwelling elderly [16].

Twenty-six percent of the community subjects reported some type of pain, this is roughly half the prevalence among the poststroke subjects. However, mean pain intensity was significantly lower ($p = .000$) among community dwelling elderly (8.07 compared to 31.34 among poststroke subjects).

As expected, the community sample reported no numbness.

Correlations Between Pain and Depression

Table 3 reports correlations between all study variables. As can be seen from the table, both pain presence and intensity were significantly related to greater depressive symptoms as measured on the CSDD. Numbness presence and intensity were related to greater depressive symptoms on both the GDS and the CSDD. Pain and numbness did not relate to level of physical disability (MBI) or chronic illness. Furthermore, neither GDS nor CSDD total scores related to MBI.

The correlations between pain and numbness and each of the individual GDS and CSDD items were also examined (matrix not reproduced due to size). Pain presence and intensity correlated significantly with GDS items regarding positive affect. Persons with greater pain were more likely to report not being in good spirits (GDS 5) and not feeling happy most

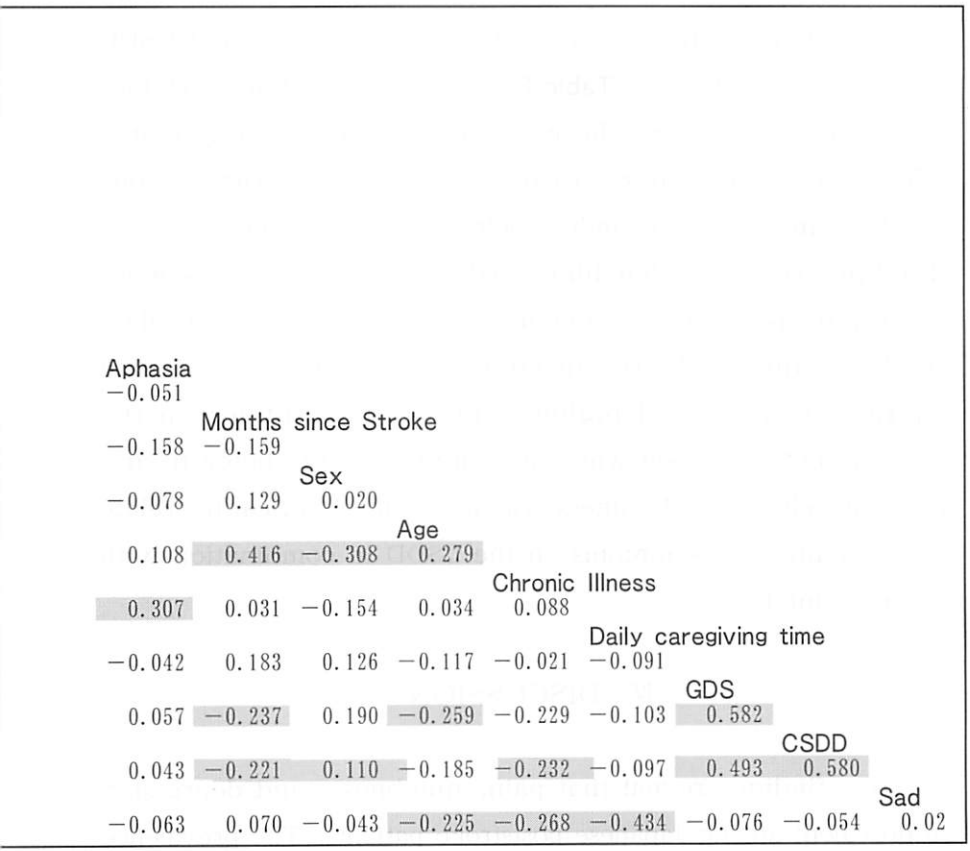
Table 3 Correlations between Study Variables

	Pain Present	Numbness Present	Pain Intensity	Numbness Intensity	Stroke Type	Paralysis
Numbness Present	0.364					
Pain Intensity	0.657	0.208				
Numbness Intensity	0.387	0.729	0.432			
Stroke Type	−0.229	−0.097	−0.241	−0.130		
Paralysis	0.175	0.011	0.031	−0.033	0.066	
Aphasia	0.017	−0.094	0.039	−0.101	−0.044	0.154
Months since Stroke	−0.200	−0.146	−0.157	−0.124	0.012	−0.040
Sex	0.086	−0.049	0.047	0.102	0.047	0.052
Age	−0.180	−0.247	−0.188	−0.215	0.371	0.037
Chronic Illness	−0.152	−0.060	−0.157	0.003	0.023	−0.030
Daily cargiving time	0.040	−0.098	0.017	−0.122	0.158	0.093
GDS	0.181	0.184	0.097	0.248	−0.143	−0.010
CSDD	0.268	0.214	0.233	0.258	−0.060	−0.104
Sadness VAS	0.238	0.237	0.180	0.288	−0.001	−0.014
MBI	−0.081	0.036	−0.140	−0.035	−0.039	0.191

Spearman'sRho. Shadedareasindiciatesignificanceatthe p = .05levelorgreater (two-tailed).

of the time (GDS 7). On the CSDD, pain presence and intensity were significantly correlated with anxiety and physical signs such as appetite loss, weight loss, lack of energy, and difficulty falling asleep.

Numbness presence and intensity were significantly correlated with not being satisfied with life (GDS 1) and not feeling it is wonderful to be alive (GDS11). On the CSDD, numbness, similar



to pain, was significantly correlated with anxiety, and loss of appetite and weight. However, in contrast to pain, numbness was also significantly correlated with agitation and with suicidal ideation and pessimism. In addition, unlike pain, numbness did not correlate with lack of energy and difficulty falling asleep.

Regression Analysis

To determine if pain significantly contributed to depression

scores after controlling for chronic illness and functional level (MBI score) a stepwise regression model predicting GDS and CSDD total scores was tested (**Table 4**). The independent variables entered in step 1 were chronic illness and MBI score. In step 2, the pain and numbness variables were entered separately, one at a time, in order to examine their individual effects.

Findings revealed that higher GDS and CSDD scores were significantly predicted by numbness intensity, after controlling for illness and disability. In addition, the presence of pain significantly predicted higher depressive symptoms on the CSDD. Functional level was not a significant predictor in any of the models. Chronic illness was found to significantly relate only to depressive symptoms on the CSDD in combination with numbness intensity.

Ⅳ DISCUSSION

Firstly, findings reveal that pain, numbness, and depression are prevalent among Japanese poststroke patients. The prevalence of GDS scores greater than or equal to 6 among our sample was 2.6 times the rate found by Ihara et al. [13] in their study of community dwelling elderly Japanese. Similarly, the prevalence of pain among stroke subjects was found to be twice that among a sample of community dwelling healthy Japanese elderly. In addition, mean pain intensity was significantly higher among stroke subjects as compared to healthy elderly (31.34 vs. 8.07) [16]. Secondly, we found that as pain and numbness increased, depressive symptoms also increased, even after

Table 4 Stepwise Regression Models for Predicting Depression Scale Scores

Depression Scales	Standardized Beta Coefficients							Model R^2
	Step 1			Step 2				
	Chronic Illness	MBI	Stroke Type	Pain Intensity	Pain Present	Numbness Intensity	Numbness Present	
Sadness VAS	−0.297	−0.01	0.073	0.125				R^2=.113
	−0.288	−0.016	0.094		0.192			R^2=.132
	−0.326	−0.045	0.1			0.306		R^2=.185
	−0.301	−0.049	0.058				0.262	R^2=.166
GDS	−0.084	−0.095	−0.102	0.083				R^2=.038
	−0.071	−0.097	−0.079		0.173			R^2=.058
	−0.101	−0.13	−0.083			0.269		R^2=.155
	−0.087	−0.119	−0.112				0.199	R^2=.070
CSDD	−0.183	−0.005	0.004	0.208				R^2=.086
	−0.178	−0.039	0.027		0.245			R^2=.099
	−0.251	−0.047	0.035			0.3		R^2=.144
	−0.196	−0.052	−0.031				0.192	R^2=.081

Note : For Step 2, the pain and numbness variables were entered one at a time. Values in shaded areas were significant at the p=.05 level or greater.24

controlling for the effects of physical disability and chronic illness. Pain was most significantly related to decreased positive affect and physical symptoms such as loss of energy, appetite and weight, and problems with sleep. In contrast, while numbness was also significantly related to decreased positive affect, it also related to ideational disturbances. Subjects with increased numbness were more likely to feel poor self-esteem, be pessimistic, and have suidical ideation.

V CONCLUSION

As stated above, the direction of the relationship between pain and depression among stroke subjects can not be determined from this study. However, as subjects had no prior psychiatric history it could be assumed that both pain and depressive symptoms were concurrent with stroke injury. The findings show that pain and depression, and particularly numbness and depression, do significantly covary.

Findings also reveal that both pain and numbness, and depression are undertreated among Japanese poststroke patients. This research serves to call attention to the need for assessment, evaluation, and treatment of these unfortunate conditions among Japanese poststroke patients. Whether decreasing patient's pain and/or depressive symptoms will help to reduce the high degree of burden reported by Japanese stroke family caregivers [17] is also a question worth investigating.

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