Table 3. Association of various factors with monthly transportation payment

Item	Content	<5000 yen		5000–10 000 yen		≥10 000 yen		*P* value[a]
		n	%	*n*	%	*n*	%	
Age	<65 years	40	23.3	5	11.6	3	15.8	0.197
	65–74 years	70	40.7	16	37.2	9	47.4	
	≥75 years	62	36.0	22	51.2	7	36.8	
Sex	Male	59	34.3	17	39.5	5	26.3	0.981
	Female	113	65.7	26	60.5	14	73.7	
Time since PD onset	<8.0 years	99	57.6	21	48.8	11	57.9	0.481
	≥8.0 years	73	42.4	22	51.2	8	42.1	
Time since PD diagnosis	<5.0 years	92	54.1	25	58.1	15	79.0	0.106
	≥5.0 years	78	45.9	18	41.9	4	21.0	
Hoehn and Yahr stage	<3	77	44.8	46	44.2	20	36.8	0.648
	≥3	95	55.2	19	55.8	7	63.2	
Degree of dysphagia	<11	126	73.7	30	69.8	13	68.4	0.508
	≥11	45	26.3	13	30.2	6	31.6	
BMI	<18.5	26	15.1	3	7.0	2	10.5	0.363
	18.5–24.9	111	64.5	31	72.1	11	57.9	
	≥25.0	35	20.4	9	20.9	6	31.6	
Employed	No	153	90.0	42	97.7	17	89.5	0.202
	Yes	19	11.0	1	2.3	2	10.5	
Single households	No	150	87.2	36	83.7	16	84.2	0.522
	Yes	22	12.8	7	16.3	3	15.8	
Utilization of system for patients with intractable disease receiving financial aid for treatment	No	63	36.6	12	27.9	2	10.5	0.029
	Yes	109	63.4	31	72.1	17	89.5	
Utilization of long-term care insurance system	No	100	58.1	25	58.1	9	47.4	0.578
	Yes	72	41.9	18	41.9	10	52.6	
Utilization of system for patients with physical disability certificate	No	120	69.8	22	51.2	10	52.6	0.012
	Yes	52	30.2	21	48.8	9	47.4	
Hospital admission for PD treatment	No	128	74.4	20	46.5	6	31.6	<0.001
	Yes	44	25.6	23	53.5	13	68.4	
Monthly medical payment	None	22	12.8	2	4.7	1	5.3	<0.001
	<5000 yen	116	67.4	19	44.2	11	57.9	
	≥5000 yen	34	19.8	43	18.4	7	36.8	
Annual income	<2.0 milion yen	66	39.3	15	34.9	2	10.5	0.160
	2.0–3.9 milion yen	76	45.2	24	55.8	11	57.9	
	≥4.0 million yen	26	15.5	4	9.3	6	31.6	

BMI, body mass index; PD, Parkinson's disease.
[a]Using the Kruskal-Wallis test.

Table 4. Multivariable-adjusted odds ratios of factors associated with monthly transportation payment among PD outpatients

Item	OR	95% CI
Utilization of system for patients with intractable disease receiving financial aid for treatment	1.68	0.73–3.87
Utilization of system for patients with physical disability certificate	1.02	0.48–2.16
Hospital admission for PD treatment	4.74	2.18–10.32
Monthly medical payment	4.01	2.23–7.51

CI, confidence interval; OR, odds ratio; PD, Parkinson's disease.

As shown in Table 4, even after adjusting for potential confounding variables found to have a significant relationship in the univariate analysis (see Table 3), hospital admission for PD treatment was significantly positively associated with monthly transportation payment (OR 4.74; 95% CI, 2.18–10.32). Amount of monthly medical payment was also significantly positively associated with monthly transportation payment (OR 4.01; 95% CI, 2.23–7.51).

DISCUSSION

The system for patients with an intractable disease receiving financial aid for treatment started for PD patients in 1978,[13] and utilization of this system was significantly inversely associated with monthly medical payment in our study, even after adjustment for potential confounding variables. This system might be effective in the reduction of payments among PD patients, especially in advanced PD patients with higher medical payments.

The Hoehn and Yahr stage has been shown to be significantly positively associated with medical expenditure in previous studies conducted outside of Japan, such as those conducted in the United Kingdom,[23] China,[24] Finland,[25] the Czech Republic,[26] Germany,[27] and the United States.[28] However, Hoehn and Yahr stage was inversely associated with monthly medical payment in our study in Japan, although the significance disappeared after controlling for potential confounding variables. This fact might indicate that PD patients with more severe Hoehn and Yahr stages are more

likely to be financially supported by the public support system in Japan.

The long-term-care insurance system started in 2000,[14] and utilization of this system was significantly inversely associated with monthly medical payment, although the significance disappeared after controlling for potential confounding variables. Because this system has been shown to be effective in increasing utilization of care services, such as frequency of nurses visiting PD patients at home,[16] this system might be effective in reducing medical payments among PD outpatients by providing for care at home without financial conflict.

Although the system for patients with an intractable disease receiving financial aid for treatment does not support transportation costs, financial support for transportation has been provided through the system for patients with physical disability certificates.[29] However, these reimbursements do not seem to be enough, because using this system was not associated with reduced transportation payment in this study. Further, higher transportation payment was shown to be associated with increased likelihood to be hospitalized as a PD inpatient in this study. Transportation problems have been reported to delay and discourage hospital attendance.[30] A significantly higher frequency of transportation problems was also reported in the elderly, especially those with lower incomes.[12] Patients who receive home oxygen therapy[31] and patients with severe congenital heart disease[32] have claimed that they have been mostly unsatisfied with the high costs of transportation. Since the burden of transportation payments among PD patients has been scarcely reported in Japan, further investigation is required.

Several limitations should be discussed. First, we were unable to determine a causal relationship due to the cross-sectional design. Second, our study subjects were recruited from three medical institutions in Hokkaido that are known for their quality of care in PD treatment, so their social supports for treating PD patients may be better than at other institutions. Therefore, our results may not be representative of all Japanese PD patients.

Because our data were obtained through the questionnaire, measurements of monthly medical payments as well as monthly transportation payments were not precise, but approximate. The data depended on the PD outpatient and for example, by whether they included medical payments other than PD treatments in the monthly medical payment or not, whether they included payment for taxi usage in the monthly transportation payment, and whether they answered monthly payment using an average or for a specific month. Furthermore, we did not reference medical payment records from each institution, although such a strategy would more accurately estimate the amounts of medical payments. Finally, our categorizations of the two outcome variables may not have been appropriate, because the obtained results were not uniformly distributed among the categories. Further study with a more refined study design is necessary to overcome these limitations.

In conclusion, Japanese public financial supporting systems may be associated with reduction in out-of-pocket medical payments among PD outpatients. However, the existing systems may not adequately cover transportation costs, and higher transportation payments may be associated with an increased risk of hospitalization.

ONLINE ONLY MATERIAL

Abstract in Japanese.

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