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Prevalence and associated factors of disability in patients with chronic pain

An observational study

Aki Fujiwara, MD*, Mitsuru Ida, MD, Keisuke Watanabe, MD, PhD, Hideaki Kawanishi, PhD, Katsuhiro Kimoto, MD, Kie Yoshimura, MD, Kozue Shinohara, MD, Masahiko Kawaguchi, MD, PhD

Abstract

The primary treatment goal of patients experiencing chronic pain has shifted from pain reduction to functional status improvement. However, the prevalence of disability and its associated factors in patients with chronic pain remain unknown.

Individuals aged ≥50 years who visited the Pain Center at Nara Medical University with chronic pain from June 2019 to May 2020 were eligible for enrollment. Patients were asked to complete the Japanese version of the 12-item World Health Organization Disability Assessment Schedule 2.0. Patient demographics, pain intensity, level of catastrophizing, anxiety, depression, and exercise habits were assessed. Multivariate logistic regression analysis was used to identify the factors associated with disability.

Of the 551 patients with a median age of 73 years, 51.5% experienced disability. Fixed factors such as age (odds ratio [OR], 1.03; 95% confidence interval [CI] 1.01–1.06, $P = .002$) and lumbar and lower limb pain (OR, 3.10; 95% CI, 1.83–5.24, $P < .001$) and some modifiable factors, including anxiety (OR, 2.06; 95% CI, 1.06–3.98, $P = .03$), depression (OR, 3.62; 95% CI, 1.92–6.82, $P < .001$), pain catastrophizer (OR, 2.94; 95% CI, 1.88–4.61, $P < .001$), numeric rating scale at the most painful site (OR, 1.29; 95% CI, 1.18–1.42, $P < .001$), exercise habits (walking (OR, 0.52; 95% CI, 0.33–0.83, $P = .006$) and working out (OR, 0.58; 95% CI, 0.34–0.99, $P = .046$), were found to be independently associated with disability.

This cross-sectional study revealed a high prevalence of disability in patients with chronic pain and identified the factors associated with disability.

Abbreviations: HADS = Hospital Anxiety and Depression Scale, NRS = Numerical Rating Scale, PCS = Pain Catastrophizing Scale, WHODAS2.0 = World Health Organization Disability Assessment Schedule 2.0.

Keywords: aging, chronic pain, disability evaluation, patient reported outcome measures, WHODAS2.0

1. Introduction

The world's population is rapidly aging. Between 2015 and 2050, the number of individuals aged ≥60 years is predicted to increase from 900 million to 2 billion.[1] In older adults, pain is a common problem that is often associated with worse health outcomes due to increasing functional impairment, disability, depression, dementia, sleep disturbance, and social isolation.[2] Traditionally, pain reduction has been the priority for patients experiencing pain. Various treatments, such as medication with or without opioids, nerve block, psychological approach, and rehabilitation, have been used for pain relief. However, the pain intensity does not always improve. In this situation, some recent guidelines have stated the importance of shifting the primary goal from reducing pain to improving the activities of daily living and the functional state. [3,4]

Although numerous self-reported measurements of disability have been developed, [5–7] the disability level cannot be compared between different pain conditions because these measurement tools are generally disease-specific. Consequently, the 12-item World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0) was developed as a standardized evaluation tool to measure health and disability across all psychiatric and medical diseases.[8] The validity and reliability of the 12-item WHODAS 2.0 have been shown in patients experiencing pain.[9] Some studies have examined the correlation between disability and pain severity in patients with acute or chronic pain.[10]

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Department of Anesthesiology, Nara Medical University, Shijo-cho, Kashihara, Nara, Japan.

** Correspondence: Aki Fujiwara, Department of Anesthesiology, Nara Medical University, 840 Shijo-cho, Kashihara, Nara 634-8522, Japan (e-mail: K119682@naramed-u.ac.jp).*

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However, definitive factors associated with disability have not yet been detected.

Thus, this study aimed to examine the prevalence of disability in patients with chronic pain and to determine the factors associated with disability.

2. Methods

This cross-sectional study was approved by the Nara Medical University Institutional Review Board, Kashihara, Nara, Japan (approval no. 2088, December 17, 2018). Written informed consent was obtained from all the patients before enrollment. This study was registered in the UMIN Clinical Trial Registry (UMIN000035149).

2.1. Patient selection

Patients, aged ≥50 years, who visited the Pain Center at Nara Medical University with complaints of any chronic pain (for ≥3 months) between June 2019 and May 2020 were eligible for enrollment in this study. Patients were excluded if they were not able to complete the 12-item WHODAS 2.0 on their own, if they were attending the clinic for reasons other than pain (e.g., patients with facial nerve paralysis and sudden deafness), or if they were no longer experiencing pain. Researchers who were not involved in the analysis explained the study to the patients before they completed the questionnaires, including the 12-item WHODAS 2.0,[8] Hospital Anxiety and Depression Scale (HADS),[11] Pain Catastrophizing Scale (PCS),[12] and Numerical Rating Scale (NRS), which is a self-report pain measurement scale.

2.2. Instruments

The 12-item WHODAS 2.0 is a disability assessment tool with a recall period of 30 days. It consists of six domains (cognition–understanding and communicating; mobility–moving and getting around; self-care–hygiene, dressing, eating, and staying alone; getting along–interacting with other people; life activities–domestic responsibilities, leisure, work, and school; and participation–joining in community activities) with 12 items. The patient has five choices for each item, and the score, depending on the choice, ranged from 0 (none) to 4 (extreme). According to the WHO guidelines, a scoring system based on the item–response theory was adopted, resulting in a range of 0–100 (0 = no disability; 100 = full disability).[8] The disability severity is based on a calculated score: none (0–4), mild (5–24), moderate (25–49), severe (50–95), and complete (96–100).[13] Clinically significant functional disability is defined as a 12-item WHODAS 2.0 score ≥25.[14] Furthermore, the HADS is a self-assessment tool developed to evaluate anxiety and depression. It consists of 14 items equally divided into the anxiety subscale (HADS Anxiety) and the depression subscale (HADS Depression). In this study, patients with a HADS score ≥11 were considered to have anxiety. In contrast, patients with a HADS score ≥11 were considered to have depression.[11] The PCS consists of 13 items, each rated on a scale from 0 to 4. Points are allocated according to the answer to each item. In this study, catastrophic thinking was considered high if the total score is ≥30.[12] Pain characteristics included pain location and pain intensity measured using a numeric rating scale. The pain location was assessed using a body chart. However, the NRS of the most painful part was adopted as the representative value in cases where the pain was in multiple areas. Moreover, the main reason for visiting the pain clinic was classified according to the International Statistical Classification of Diseases and Related Health Problems 10th Edition.

2.3. Primary outcome

Our primary outcomes in this study were the prevalence of disability defined as a 12-item WHODAS 2.0 score ≥25 and its associated factors.

2.4. Variables

This study assessed age, sex, anxiety, depression, pain catastrophizing, NRS at the most painful site (range, 0–10), body region with pain (head and face, neck and upper limb, trunk, lumbar and lower limb; multiple answers allowed), comorbidities (symptomatic cerebral vascular disease and osteoporosis), exercise habits (calisthenics, walking, and working out), opioid use, benzodiazepine use, and any nerve blocks for the past 3 months.

Previous community-based prospective studies in Japan and the United States have shown that stroke is associated with the risk of disability.[15–17] Moreover, the prospective cohort study of older Japanese showed that only osteoporosis was significantly related to the incidence of disability among common chronic conditions, such as hypertension, heart disease, diabetes, stroke, and hyperlipidemia,[18] Additionally, some studies have suggested that the use of opioid and benzodiazepine is associated with disability.[19–21] Thus, in this study, we assessed two comorbidities, symptomatic cerebral vascular disease and osteoporosis, and two medicines, opioids and benzodiazepines.

2.5. Statistical analysis

The sample size of this study was calculated based on data from a preliminary study[9]. Furthermore, the prevalence of clinical disability among 353 patients aged >50 years with chronic pain was examined. Of these, 235 patients (66.6%) had a clinically significant disability (World Health Organization Disability Assessment Schedule 2.0 [WHODAS2.0] score ≥25), and 118 patients (33.3%) did not. For logistic regression analysis, the number of cases needed ≥10 times the explanatory variable for the number of cases with few outcomes. Consequently, this study included 18 variables and an estimated prevalence of 33.3%. The minimum number required to determine the factors associated with disability was calculated to be 541 patients.

Univariate and multivariate logistic regression analyses were used to identify the variables associated with disability. Univariate analysis was performed using the Mann–Whitney *U*-test, chi-square test, or Fisher's exact test, as appropriate. Before executing the multivariate logistic regression analysis, Spearman's rank correlation coefficient among each variable was calculated to assess multicollinearity. The items were excluded from the explanatory variables if they had a correlation coefficient of >0.8. All variables excluding covariates with a correlation coefficient of >0.8 were included in the multivariate analysis. The variables tested were as follows: age (continuous variable), sex (female), anxiety (HADS anxiety ≥11), depression (HADS depression ≥11), pain catastrophizing (PCS ≥30), NRS at the most painful site (continuous variable), the body region with pain (head and face, neck and upper limb, trunk, lumbar and lower limb; multiple answers allowed), comorbidities (symptom-

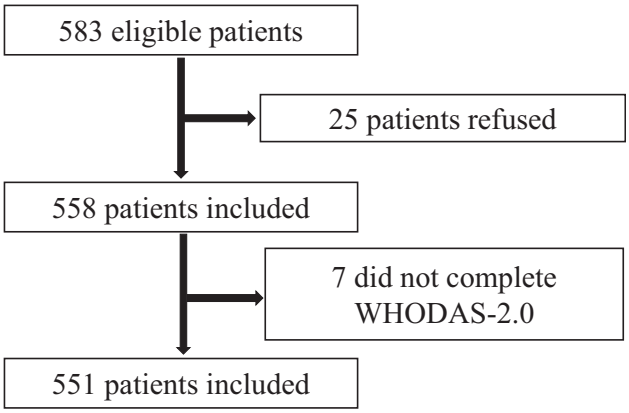

Figure 1. Flow diagram of participation.

atic cerebral vascular disease and osteoporosis), exercise habit (calisthenics, walking, and working out), opioid use, benzodiazepine use, and any nerve blocks for the past 3 months. The goodness of fit of the logistic regression for multivariate analysis was assessed using the Hosmer–Lemeshow test. The area under the receiver-operating characteristic curve was computed as a descriptive tool for measuring model bias. All data were analyzed using the Statistical Package for the Social Sciences, version 23.0 (IBM Inc., Armonk, NY, USA). *P* values $< .05$, were considered statistically significant.

3. Results

This study included a total of 583 eligible patients. Informed consent was obtained from 558 patients. Of these, 551 (response rate, 98.7%) completed the 12-item WHODAS 2.0 (Fig. 1). The median age of the patients was 73 years. The proportions of male and female patients were similar (female, 51.2%; male, 48.8%). Table 1 shows the scores and descriptive statistics for each measure with the results of univariate analysis (Table 1). The most common disease resulting in pain was lumbosacral spondylosis (Table 2). Moreover, 180 patients (32.7%) reported pain in multiple parts of the body (e.g., neck pain and lumbago). Moreover, 160 patients had more than two pain etiologies (e.g., lumbar radiculopathy and myofascial pain syndrome). Furthermore, 97 patients (17.6%) had multiple pain etiologies affecting a single part of the body (e.g., lumbar radiculopathy and gonarthrosis).

Clinically significant disability (WHODAS2.0 score ≥25) was found to be prevalent in 284 patients (51.5%). Among the 18 variables, 13 showed significant differences between the disability (+) and disability (-) groups. There were no covariates with a correlation coefficient of > 0.8 (see Table S1, Supplemental Digital Content, http://links.lww.com/MD2/A540, which shows Spearman's rank correlation coefficient between each variable). Multivariate logistic regression analysis revealed that age, anxiety, depression, pain catastrophizer, numeric rating scale at the most painful site, lumbar and lower limb pain, walking, and working out were independently associated with disability (Table 3).

4. Discussion

In this study, 51.5% of patients had clinically significant disabilities. In a community-based sample of elderly people, Wistwirlej–Sozańska et al showed a 20.8% prevalence of disability (WHODAS ≥25).[22] The result of the present study was higher than that of their study. These results suggest an association between pain and disability.

Table 1

Patients demographics and univariate analysis of the independent associated factors for disability.

	Total (n = 551)	Disability (-) (n = 267)	Disability (+) (n = 284)	*P* value
Age(year)	73.0[13]	72.0[12]	73.5[14]	.014
Female	282 (51.2)	121 (45.3)	161 (56.7)	<.01
The score of 12-item WHODAS2.0	25.0[31.3]	10.4[12.5]	42.0[20.8]	<.01
Anxiety	6.0[6]	4.0[4]	8.0[5]	<.01
Depression	7.0[6]	5.0[5.5]	8.0[5]	<.01
Pain Catastrophizing Scale	30.0[17.0]	25.0[15.0]	42.0[20.8]	<.01
NRS at the most painful site	6.0[4.0]	4.0[4.0]	7.0[3.0]	<.01
Body region with pain				
Head and face	75 (13.6)	44 (16.5)	31 (10.9)	.06
Neck and upper limb	196 (35.6)	92 (34.5)	104 (36.6)	.66
Trunk	160 (29.0)	61 (22.8)	99 (34.9)	<.01
Lumber and lower limb	375 (68.1)	148 (55.4)	227 (79.9)	<.01
Comorbidities				
Symptomatic cerebrovascular disease	29 (5.3)	14 (5.2)	15 (5.3)	>.99
Osteoporosis	51 (9.3)	16 (6.0)	35 (12.3)	.01
Exercise habit	341 (61.9)	190 (71.2)	151 (53.2)	<.01
Calisthenics	199 (36.1)	107 (40.1)	92 (32.4)	.06
Walking	210 (38.1)	133 (49.8)	77 (27.1)	<.01
Working out	160 (29.0)	92 (34.5)	68 (23.9)	<.01
Medication				
benzodiazepines	127 (23.0)	50 (18.7)	77 (27.1)	.02
opioid	136 (24.7)	50 (18.7)	86 (30.3)	<.01
Nerve blocks for past 3 months	325 (59.0)	141 (52.8)	184 (64.8)	<.01

Median [interquartile range] or number (%).

NRS = Numerical Rating Scale, WHODAS = World Health Organization Disability Assessment Schedule.

Table 2

The main reason for visiting our pain clinic.

ICD10	Disease	n	%
M47.86	Lumbosacral spondylosis	99	18.0
M48.06	Lumbar spinal stenosis	88	16.0
G53.0	Pastzoster neuralgia	79	14.3
M47.82	Cervical spondylosis	57	10.3
M51.1	Lumbar and other intervertebral disc disorders with radiculopathy	37	6.7
G50.0	Trigeminal neuralgia	22	4.0
S32.0	Fracture of lumbar vertebra	16	2.9
G64	Other disorders of peripheral nervous system	16	2.9
S33.6	Sprain and strain of sacroiliac joint	13	2.4
M75.0	Adhesive capsulitis of shoulder	10	1.8
S13.4	Sprain and strain of cervical spine	10	1.8
M89.0	Algoneurodystrophy	10	1.8
M43.1	Spondylolisthesis	9	1.6
I73.9	Peripheral vascular disease	9	1.6
M48.02	Cervical spinal stenosis	8	1.5
T81.8	Other complications of procedures, not elsewhere classified	7	1.3
M50.1	Cervical disc disorder with radiculopathy	6	1.1
G50.1	Atypical facial pain	5	0.9
M17	Gonarthrosis	5	0.9
M54.5	Low back pain	5	0.9
Others	Others	40	7.3
Total		551	100

ICD = International Classification of Diseases.

Previous studies have examined the association between disability and various factors. [22–25] We analyzed 18 variables that included both physical and psychological factors. The results of this study revealed that aging, severe pain, lumbar and lower limb pain, depression, anxiety, catastrophizing, and no habit of walking or working out were more likely to be associated with disability. In this study, the factors associated with disability can be divided into fixed and potentially modifiable factors. Specifically, modifiable factors include psychological factors (e.g., depression, anxiety, pain catastrophizing, and exercise habits). We also evaluated the strength of the association between disability and each factor. As a result, depression (odds ratio [OR], 3.62; 95% confidence interval [CI], 1.92–6.82, $P < .001$), lumbar and lower limb pain (OR, 3.10; 95%CI, 1.83–5.24;

Table 3

The result of multivariate analysis.

Variables	Odds ratio	95% Confidence interval	*P* value
Age (year)	1.03	1.01 – 1.06	.002
Female	1.20	0.77–1.86	.41
Anxiety	2.06	1.06–3.98	.031
Depression	3.62	1.92–6.82	<.001
Pain catastrophizer	2.94	1.88–4.61	<.001
NRS at the most painful site	1.29	1.18–1.42	<.001
Body region with pain			
Head and face	0.63	0.30–1.28	.20
Neck and upper limb	1.08	0.66–1.76	.75
Trunk	1.32	0.80–2.16	.26
Lumbar and lower limb	3.10	1.83–5.24	<.001
Comorbidities			
Symptomatic cerebrovascular disease	0.95	0.35–2.54	.92
Osteoporosis	1.47	0.68–3.18	.32
Exercise habits			
Calisthenics	0.89	0.54–1.46	.65
Walking	0.52	0.33–0.83	.006
Working out	0.58	0.34–0.99	.046
Medication			
Benzodiazepines	1.45	0.85–2.46	.16
Opioid	1.30	0.85 – 2.32	.31
Nerve block	0.80	0.84 – 1.99	.32

NRS, Numeric Rating Scale.

The Hosmer–Lemeshow test did not reject a logistic regression model fit ($P = .77$). The explanatory model based on these variables had an area under the receiver operating characteristic curve of 0.86 (95% confidence interval, 0.82–0.88). No value exceeded the expected value by 3 ±standard deviation.

$P < .001$), and pain catastrophizer (OR, 2.94; 95%CI, 1.88–4.61; $P < .001$) were the top three factors associated with disability. The findings suggest that both physical and psychological treatments are important in the prevention of disability. Moreover, the lumbar region and lower limbs should be prioritized over other body areas for pain management.

A systematic review examined the effect of education in facilitating chronic pain knowledge in adults.[26] The effectiveness of education alone in reducing disability was not conclusive due to limited evidence. Considering this, education should be delivered in conjunction with other pain management approaches. Kuroda et al. examined the effect of a preventive exercise program for functional disability and showed that the group who participated in the exercise program had a significantly lower incidence of functional disability than the non-participating group.[18] Moreover, a review article concluded that exercise modalities (e.g., aerobic exercise, strength/resistance exercise, coordination/stabilization exercise, motor control, and Pilates) could effectively reduce pain and disability compared with minimal, passive/conservative, or no intervention.[27]

Further studies are needed to prove the effectiveness of pain treatment such as medication and nerve block, combined with exercise interventions and psychological therapy for the prevention of disability.

This study has several limitations. First, the results could not be generalized because the participants seemed to have more severe pain or more comorbidities than the community cohort. However, investigating patients with severe dysfunction is important for suppressing the progression of dysfunction. Second, the level of disability by etiology (e.g., neuropathic pain or nociceptive pain) could not be assessed. Patients could not be classified by etiology because 32.7% of patients in this study had several pain regions with more than two etiologies (e.g., lumbar radiculopathy and myofascial pain syndrome). Third, the results showed that walking and working out were independently associated with disability. However, it could not be determined whether the patients with no habit of walking or working out were likely to be with disability or if the patients with disability had given up the habit of exercise. Lastly, we did not examine social factors (i.e., social support, satisfaction with participation in social roles, social isolation, and self-perceived ability to perform social roles and activities). A previous study has shown the association between social factors and the physical and psychological functioning of individuals with chronic pain.[28]

In conclusion, this study revealed a high prevalence of disability in patients with chronic pain and age. Anxiety, depression, pain catastrophizer, numeric rating scale at the most painful site, lumbar and lower limb pain, and no habit of walking or working out were independently associated with disability. These results suggest that we should treat both physical and psychological factors simultaneously to prevent disability. A future longitudinal study to identify the most significant factor/s influencing the development of functional disability and set priorities for chronic pain treatment is warranted.

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Author contributions

Conceptualization: Aki Fujiwara, Mitsuru Ida, Masahiko Kawaguchi.
Data curation: Aki Fujiwara, Keisuke Watanabe, Katsuhiro Kimoto, Kie Yoshimura, Kozue Shinohara.
Formal analysis: Mitsuru Ida.
Methodology: Aki Fujiwara, Keisuke Watanabe.
Software: Hideaki Kawanishi.
Supervision: Masahiko Kawaguchi.
Writing – original draft: Aki Fujiwara.
Writing – review & editing: Mitsuru Ida, Keisuke Watanabe, Masahiko Kawaguchi.

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