



Original Article

Influence of caregiver understanding of their capability to perform activities of daily living, disease comprehension, and attitudes on occupational low back pain: a cross-sectional study

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Abstract. [Purpose] The aim in this study was to evaluate the impact of caregiver understanding of their ability to perform activities of daily living (ADLs), movement abilities, diseases, and attitudes on the prevalence of occupational low back pain. [Participants and Methods] A cross-sectional survey was conducted of caregivers of older adults living in residential care facilities. Of the 150 questionnaires distributed, 71 were valid. The survey collected data on demographics, low back pain status using a numerical rating scale, and familiarity with ten ADLs and five diseases (stroke, rheumatoid arthritis, fractures, Parkinson's disease, and dementia). [Results] In this study, 52% of the participants reported lower back pain. Significant factors included an understanding of repositioning in ADLs, familiarity with stroke and rheumatoid arthritis, and attitudes toward using patients' residual functions. Participants with limited knowledge of repositioning and stroke, a better understanding of rheumatoid arthritis, and those who did not consider residual function were more prone to lower back pain. [Conclusion] Our findings highlight the importance of enhancing caregiver education on ADL movements and disease specifics, particularly stroke and rheumatoid arthritis, and promoting the use of patients' residual capabilities. Improved training and information sharing among caregivers may reduce the risk of occupational low back pain.

Key words: Caregivers, Occupational low back pain, Capability activity of daily living (ADL)

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INTRODUCTION

Several developed countries are currently facing substantial challenges associated with the aging population¹⁾. Consequently, Japan is implementing a wide range of measures to address this issue, including the establishment of community-based comprehensive care systems²⁾. However, despite these efforts, the number of individuals in need of care remains relatively low, while that of individuals requiring care is growing³⁾. The gap between the care needs of the population and

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the number of caregivers available is of particular concern. The Ministry of Health, Labour and Welfare (MHLW) estimates that 2.8 million carers will be needed by 2040 when compared with 2.11 million in 2019. To address this projected shortage, measures have been implemented to secure workers and prevent turnover. One cause underlying turnover is work-related musculoskeletal symptoms (WRMSs)^{4, 5}. Darragh et al.⁶ reported that back pain was the most common musculoskeletal disorder in caregivers, followed by knee and shoulder pain. The annual economic loss in Japan due to low back pain is estimated to be up to three trillion yen⁷. Accordingly, there is an urgent need to examine measures to prevent and address occupational low back pain⁸.

In the field of care work, changing positions and assisting with transfers are associated with a high physical workload (PW), which is considered a considerable contributor to occupational low back pain^{9, 10}. Consequently, numerous studies have been conducted to identify strategies for reducing PW during these activities. A robust correlation between lifting tasks such as transfers and low back pain has been documented. Furthermore, the dissemination of information on appropriate transfer assistance techniques and the utilization of assistive devices were shown to reduce the risk of WRMSs¹¹. Likewise, manual tasks such as repositioning have also been linked to low back pain^{12, 13}. The use of sliding seats during repositioning was shown to be an efficacious method for preventing low back pain, reportedly reducing work time and improving job satisfaction^{14, 15}. Care activities must be conducted in accordance with the patient's abilities. Moreover, it is crucial to assist the patient with an awareness of their own potential activities of daily living (ADLs), referred to as "Capability ADLs". Excessive assistance not only impairs the patient's physical function but also increases the risk of low back pain to the caregiver. Accordingly, it is crucial for caregivers to possess a more comprehensive understanding of the patient's physical abilities and illnesses and to accurately assess the patient's ability to perform ADL movements to safeguard the caregiver's own body. The presence or absence of low back pain among caregivers may be related to their subjective understanding of physical function and illness. The objective of the current study was to assess the influence of caregivers' comprehension of Capability ADL movement ability, their understanding of the disease, and their attitudes toward caregiving on occupational low back pain.

PARTICIPANTS AND METHODS

This study employed a cross-sectional design utilizing a questionnaire survey as the primary data collection instrument. The participants were caregivers for older adults living in health care facilities, residential fee-homes, and special nursing homes operated by different corporations. In total, 150 questionnaires were distributed to care workers at the three facilities, with a QR code linked to the questionnaire form. Exclusion criteria for the target population were as follows: (i) under the age of 18 years and (ii) engaged in the role of a caregiver for less than two months.

The data collection period spanned from March to May 2024. Prior to completing the questionnaire, the respondents were provided with a research briefing sheet outlining the purpose and methodology of the study. Completion of the questionnaire was considered consent to participate in the study. This study was approved by the Ethics Committee at the Ota College of Medical Technology, Gumma, Japan (approval number: 240401).

The questionnaire was designed to provide basic information on sex, age, duration of employment, night shifts, management duties, and exercise habits. To investigate the status of back pain, the presence or absence of back pain was investigated, and the Numerical Rating Scale (NRS) and frequency of back pain per week (1–7 days/week) were assessed for patients with back pain complaints. The definition of low back pain was based on the description of Dionne et al.¹⁶ and included the following: (a) An area below the costal margin and above the inferior gluteal groove; (b) pain in the lower back, lumbar region, or gluteal region lasting more than one day (including pain and numbness in the legs); and (c) pain felt during menstruation, pregnancy, or cold with fever were excluded, with all conditions being met.

To assess the caregivers' comprehension of the Capability ADL movement ability, participants were asked to indicate the extent of their familiarity with the ability to perform 10 ADLs independently: eating, transferring, dressing, toileting, bathing, walking, wheelchair driving, stair climbing, changing clothes, and changing positions in the bed. This was assessed on a scale ranging from 1 (not at all familiar) to 10 (very familiar), and participants were asked to indicate their level of familiarity with the aforementioned activities using the above scale. Additionally, participants were asked about their understanding of five diseases (stroke, rheumatoid arthritis, fractures, Parkinson's disease, and dementia) and their associated physical symptoms. This was assessed on a scale ranging from 1 (not at all familiar) to 10 (very familiar). To ascertain the attitudes of caregivers toward care, they were invited to respond on a 10-point scale from 1 (not at all applicable) to 10 (quite applicable) to two questions: first, whether they consider and practice care methods that make use of the patient's residual functions, and second, whether they are aware of selecting the right welfare equipment for the patient.

Descriptive statistics were calculated, and logistic regression analysis was performed to examine associations with risk factors. These are summarized as odds ratios (OR) and 95% confidence intervals (CI). Logistic regression analysis was performed with the presence or absence of low back pain as the dependent variable and forced entry of the three groups as independent variables: understanding of the ability to perform ADL that can be performed, understanding of the disease, and attitude toward care. The level of significance was set at $p < 0.05$. Data analyses were performed using IBM SPSS Statistics for Windows, Version 26.0 (Armonk, NY, USA: IBM Corp. Released 2018).

RESULTS

A total of 71 responses were received, representing a response rate of 47.3%. None of the responses met the exclusion criteria (Fig. 1). The results of the basic information are presented in Table 1. Twenty-four (34%) participants were aged ≤ 40 years, 21 (30%) were aged 40–49 years, and 48 (68%) were aged ≥ 50 years. A larger proportion of the participants were female ($n=48$, 68%). Of the included participants, 37 (52%) had a complaint of low back pain. Table 2 illustrates the relationship between the presence of low back pain and each item, while Table 3 presents the results of the logistic regression analysis.

Logistic regression analysis revealed that repositioning is a significant factor in understanding the capability of ADL movement ability (OR: 1.61, CI: 1.10–2.70). Regarding the understanding of the disease, stroke (OR: 0.48, CI: 0.24–0.95) and rheumatoid arthritis (OR: 2.11, CI: 1.16–3.85) were identified as significant factors. Considering the attitudes toward care, the item inquiring whether the carer considered ways of assisting the person to utilize their residual functions was a significant factor (OR: 0.68, CI: 0.49–0.95).

DISCUSSION

The purpose of this study was to evaluate the influence of caregivers' understanding of "Capability ADL" (i.e., the ability to move from one position to another), their understanding of the disease in question, and their attitudes toward caregiving on the occurrence of low back pain. The findings of this study indicate that caregivers with a limited understanding of repositioning movement skills, lack of stroke comprehension, a high understanding of rheumatoid arthritis, and those who do not consider how to care for patients using the patient's residual functions are at an elevated risk of developing low back

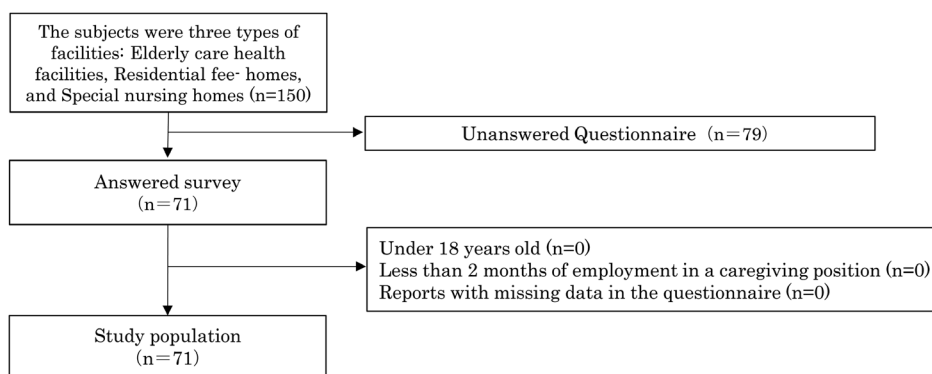


Fig. 1. Participant flow in the study.

Table 1. Target group characteristics

Variables	
Age, n (%)	
<40 years	24 (34%)
40–49 years	21 (30%)
≥ 50 years	26 (36%)
Female gender, n (%)	48 (68%)
Job history (month), mean \pm SD	132.4 \pm 92.3
Night shifts, n (%)	33 (46%)
Management tasks, n (%)	16 (23%)
Exercise routine, n (%)	28 (39%)
LBP	
With LBP, n (%)	37 (52%)
Degree of LBP (NRS), median [Q1–Q3]	5 [3–6.5]
Frequency of LBP (day/week), median [Q1–Q3]	3 [1.5–5]

LBP degree and LBP frequency items show data only for participants who had LBP. SD: standard deviation; LBP: low back pain; Q1: 1st quartile; Q3: 3rd quartile.

Table 2. Relationship between the presence or absence of low back pain and each item

	Overall (n=71)	With LBP (n=37)	Without LBP (n=34)
ADL (points), median [Q1–Q3]			
Feeding	7 [5–8]	7 [4.5–8]	8 [6–9]
Mobility (on level surfaces)	7 [5–8]	7 [4–8]	8 [6–8.3]
Grooming	7 [5–8]	6 [5–8]	7 [5–8]
Toilet use	7 [6–8]	7 [5–8]	8 [6–9]
Bathing	7 [5–8]	7 [4.5–8]	7 [5–8]
Walking	7 [5–8]	7 [5–8]	7 [6–9]
Wheelchair propulsion	7 [5–8]	7 [5–8]	7 [6–8.3]
Stairs	5 [3–7]	5 [2–7]	5 [3–7.3]
Dressings	7 [5–8]	6 [5–8]	7 [5–8]
Repositioning	7 [5–8]	7 [5–8]	7 [5–9]
Understanding of diseases (points), median [Q1–Q3]			
Stroke	6 [4–7]	5 [4–7]	6 [5–7.3]
Rheumatoid arthritis	5 [4–7]	5 [4–7]	5.5 [3.8–7]
Fracture	6 [5–7]	5 [5–7]	6 [4.75–7.3]
Parkinson's disease	6 [5–7]	6 [4.5–7]	6 [5–7]
Dementia	7 [5–8]	7 [5–8]	7 [5–8]
Attitude towards caregiving (points), median [Q1–Q3]			
Are methods of assistance that make use of residual functions considered and practised?	7 [5–8]	6 [5–7.5]	7 [6–8.3]
Are you aware of the selection of suitable welfare equipment?	5 [4–7]	5 [4–6.5]	5.5 [5–7.3]

LBP: Low back pain; ADL: Activities of Daily Living; Q1: 1st quartile; Q3: 3rd quartile.

Table 3. Risk model for the prediction by location obtained by multiple logistic regression

Independent variables	B	OR	95% CI	p-value
ADL				
Feeding	-0.07	0.93	0.51–1.71	
Mobility (on level surfaces)	-0.48	0.62	0.31–1.22	
Grooming	0.10	1.11	0.58–2.11	
Toilet use	-0.33	0.72	0.33–1.58	
Bathing	0.19	1.21	0.76–1.93	
Walking	-0.27	0.76	0.41–1.42	
Wheelchair propulsion	-0.21	0.81	0.38–1.77	
Stairs	0.01	1.01	0.75–1.37	
Dressings	0.24	1.28	0.67–2.43	
Repositioning	0.48	1.61	1.10–2.70	*
Understanding of diseases				
Stroke	-0.74	0.48	0.24–0.95	*
Rheumatoid arthritis	0.75	2.11	1.16–3.85	*
Fracture	0.27	1.31	0.75–2.28	
Parkinson's disease	-0.34	0.71	0.41–1.25	
Dementia	-0.11	0.89	0.54–1.47	
Attitude towards caregiving				
Are methods of assistance that make use of residual functions considered and practised?	-0.38	0.68	0.49–0.95	*
Are you aware of the selection of suitable welfare equipment?	-0.05	0.95	0.69–1.30	

*p<0.05.

B: unstandardized coefficients; OR: odds ratio; CI: confidence interval; ADL: activities of daily living.

pain. To the best of our knowledge, no previous study has analyzed the relationship between caregiver back pain and the factors examined in this study. Therefore, the new findings on occupational low back pain among caregivers have crucial implications for future research and practice.

Assistive tasks such as lifting patients out of chairs and beds, repositioning them in bed, and transferring them from one bed to another have been identified as risk factors for musculoskeletal disorders^{17,18}). In addition, repositioning is required for a wide range of care activities, including pressure ulcer prevention, decubitus prevention, wound monitoring, and hygiene¹⁹). Therefore, it is likely that the more aware people are of their ADL abilities, the more physical demands will be placed on them, such as frequent repositioning for those with low repositioning ability. Despite the lack of prior research based on an understanding of the ability to perform position changes, a study examining back strain during bed work at different levels of caregiver experience highlighted that caregivers with fewer years of experience tended to mainly overuse the upper limbs and trunk during caregiving when compared with more experienced caregivers, increasing the risk of back pain²⁰). Accordingly, a lack of understanding of movement skills may contribute to an increase in PW and cause low back, as caregivers perform tasks in inappropriate postures and provide excessive assistance.

Stroke is well known to cause short- and long-term impairments in ADLs depending on its severity²¹). Patients with stroke frequently require assistance with ADLs, thereby increasing the burden on caregivers^{21,22}). Notably, 53.9% of caregivers of patients with stroke report low back pain²³). Stroke presents with a variety of symptoms, and caregiving practices are specific to stroke, especially because unilateral upper and lower limb dysfunction due to hemiplegia is the main cause of ADL impairment. The results of this study suggest that caregivers with a poor understanding of stroke are at higher risk of developing back pain. According to a systematic review of family caregivers of patients with stroke, caregivers had educational needs related to understanding the pathophysiology of stroke, how to move and lift patients, how to exercise, and how to treat stroke²⁴). It is similarly anticipated that the same will be true for nursing care facilities. In addition, it may be more challenging to grasp the nuances of stroke, an abnormality of the nervous system, than, for instance, rheumatoid arthritis, where the pathophysiology is readily discernible through outward manifestations such as deformity and pain²⁵). Iwakiri et al.²⁶) revealed that caregivers who received training in caregiving methods were more likely to lift patients manually than those who received less frequent training. Although our study did not examine caregivers' years of experience, the results provide important insights into the contribution of a better understanding of the pathophysiology of stroke to prevent low back pain in caregivers.

Attitudes toward caregiving suggested that caregivers who did not consider how to help patients with their residual function were more likely to experience low back pain. This is an important finding of our study. To utilize the patient's residual function, caregivers need to be aware of the individual patient's status. Two aspects potentially influence this understanding. The first is the sharing of information between caregivers. Interprofessional collaboration has been identified as crucial patients with chronic conditions²⁷). Improving the quality of information sharing between caregivers will help utilize the patient's residual function and reduce the risk of back pain. The second is caregiver education. The effectiveness of caregiver education in reducing the caregiver burden has been reported²⁸). Improving caregivers' knowledge and skills can improve the quality of care and reduce the risk of back pain.

One limitation of this study is that it was a cross-sectional study. Therefore, it was impossible to demonstrate a causal relationship between participant understanding and low back pain. In the future, we will consider developing initiatives to improve the understanding of the conditions, such as lectures by physiotherapists on how to treat each condition and verifying this longitudinally before and after comparisons. Subsequently, subjective data from caregivers were analysed using questionnaires. This was a subjective survey, and the validity of questionnaire items is yet to be verified. In the future, it will be necessary to clarify the relationship between patient understanding, caregiving, and back pain by observing actual caregiving situations.

Conflict of interest

There are no conflicts of interest to disclose in this study.

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