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Low-back pain consultations shortly after entering employment and subsequent job turnover among young Japanese workers: a cohort study

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Objectives Low-back pain (LBP) that develops during the early stages of employment may adversely affect continued employment. However, whether healthcare utilization for LBP shortly after entering employment is associated with subsequent job turnover remains unclear. This study examined the association between LBP-related healthcare utilization and employment turnover among young Japanese workers.

Methods This retrospective cohort study used a multicompany medical claims database linked to occupational information and employment status. Overall, 32 749 workers aged 18–23 years were followed from employment entry until job turnover (withdrawal from employer-sponsored health insurance) or 31 March 2024. LBP consultation status was treated as a time-dependent exposure and categorized as no LBP consultation, initial consultation only, or repeated consultations. Associations with job turnover were examined using Cox proportional hazards regression models with time-dependent LBP consultation status, adjusted for age, sex, and occupational category.

Results During follow-up (median, 385 days), 6258 job turnover events were observed. Compared with workers without LBP consultations, the adjusted hazard ratios for job turnover were 1.23 [95% confidence interval (CI) 1.07–1.41] among workers with an initial consultation only and 1.57 (95% CI 1.31–1.88) among those with repeated consultations. No significant interaction was observed between LBP consultation status and occupational category (P=0.15).

Conclusions LBP-related healthcare utilization shortly after entering employment was associated with subsequent job turnover among young Japanese workers. Repeated consultations for LBP may be an early indicator of increased job turnover risk. These findings suggest the potential importance of workplace strategies to prevent and manage LBP and to support continued employment; however, further research is needed.

Key terms employment outcome; medical claims data; survival analysis; time-dependent exposure.

Low-back pain (LBP) is a leading cause of disability worldwide and represents a major public and occupational health challenge (1). The Global Burden of Disease Study has consistently identified LBP as the leading cause of years lived with disability (2, 3). LBP is also associated with reduced work ability, sickness absence, productivity loss, and substantial socioeconomic costs (1–3).

LBP commonly occurs in occupations involving high physical demands (1, 4, 5) and is characterized by a high recurrence rate (1, 6, 7). Previous studies have reported associations between recurrent back pain and exit from paid employment among middle-aged workers (8), as well as between LBP and occupational dropout among eldercare workers (9). These findings suggest that LBP may be a barrier to continued participation in working life.

The transition from education to employment is a critical period in a person's working life. Prospective studies have shown that LBP may develop soon after workforce entry (10, 11) and that both individual and

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occupational factors (10–12) contribute to its onset. Persistent or recurrent LBP has also been associated with subsequent sick leave among young workers (13). However, whether repeated LBP-related healthcare consultations shortly after entering employment are associated with subsequent job turnover remains unclear.

Medical claims databases provide an objective means of identifying LBP-related healthcare utilization in large populations, including repeated consultations (14). However, conventional Japanese medical claims databases generally lack links to occupational information and employment status, limiting their use for investigating employment outcomes.

Therefore, this study aimed to examine whether LBP-related healthcare utilization shortly after entering employment is associated with subsequent job turnover among young Japanese workers using a multicompany medical claims database linked with occupational information and employment status.

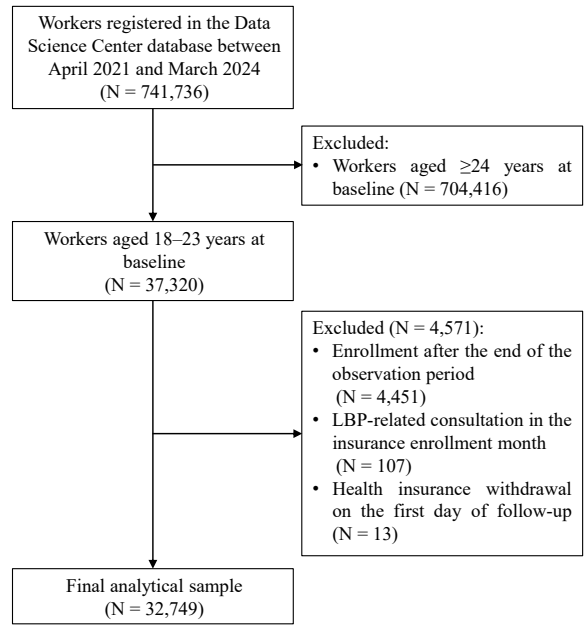


Figure 1. Flow diagram of participant selection. [LBP=low-back pain.]

Methods

Study design and population

This retrospective cohort study used an anonymized health insurance claims database maintained by the Data Science Center (DSC) of the University of Occupational and Environmental Health, Japan. In Japan, employees are generally covered by Employees' Health Insurance (EHI), a statutory health insurance system linked to employment. Healthcare providers submit claims for medical services covered by EHI to health insurance societies for reimbursement. The DSC database integrates data from 14 Japanese companies and their affiliated health insurance societies, including anonymized employee information such as age, sex, leave days, occupational characteristics, monthly medical claims, and dates of health insurance enrollment and withdrawal. These longitudinal data enable tracking of healthcare utilization and employment status over time. The DSC database has been described previously (15, 16).

The DSC database included 741 736 workers registered between April 2021 and March 2024. Of these, 37 320 newly employed workers aged 18–23 years were extracted. Workers with records outside the available data coverage periods, those with an LBP-related consultation in the insurance enrollment month (potential prior LBP consultations before enrollment), and those who withdrew from health insurance on the first day of follow-up were excluded, leaving a final study population of 32 749 workers (figure 1). Participants were followed from the date of employment until health insurance withdrawal as the outcome event, the end of the data coverage period for their respective companies, or the end of the study observation period (March 31, 2024), whichever occurred first.

This study was approved by the Ethics Committee of the University of Occupational and Environmental Health, Japan (Approval ID: ER24-051). The requirement for written informed consent was waived because this retrospective cohort study used anonymized medical claims data. Instead, an opt-out procedure was implemented by publicly disclosing information regarding the study, including its purpose, methods, and opportunities for participants to decline participation, on the research laboratory website. This study was conducted in accordance with the principles of the Declaration of Helsinki.

Variables

Exposure was a consultation for LBP, identified from medical claims using the International Classification of Diseases, 10th Revision (ICD-10). LBP consultations were defined as claims containing a diagnosis of lumbar spondylosis (M47.8), other specified intervertebral disc displacement (M51.2), lumbago with sciatica (M54.4), or low back pain (M54.5), including suspected diagnoses. LBP consultation status was treated as a time-dependent exposure and categorized into three states: no LBP consultation, initial consultation only, and repeated consultations. Participants contributed person-time to the no-LBP-consultation category until their first LBP consultation, after which they were

reclassified into the initial-consultation-only category; following a further LBP consultation, participants were reclassified into the repeated-consultation category for the remainder of follow-up.

The primary outcome was job turnover, defined as withdrawal from the employer-sponsored health insurance system. Because employers in Japan are generally required by law to enroll employees in employer-sponsored health insurance, withdrawal from the system was used as a proxy for job turnover.

Age, sex, and occupational category were extracted from the DSC database and included as covariates in the multivariable analyses to account for potential confounding. These factors may be associated with both LBP-related healthcare consultations and job turnover. Occupational category was classified into six groups: finance and insurance, healthcare and social welfare, manufacturing, public administration, transportation and postal services, and wholesale and retail trade. Age was treated as a continuous variable, whereas sex and occupational category were treated as categorical variables.

Statistical analyses

Baseline characteristics were summarized according to the LBP consultation status. Continuous variables were calculated as mean and standard deviation (SD), and categorical variables were calculated as numbers and percentages.

Follow-up duration was summarized using the median and interquartile range (IQR), along with total person-years of observation. The association between LBP consultation status as a time-dependent exposure and job turnover was examined using Cox proportional hazards regression models (17) with robust standard errors to account for repeated observations within individuals (clustered by participant ID). Two models were used, and hazard ratios (HR) and 95% CI were calculated: Model 1 was unadjusted and Model 2 was adjusted for age, sex, and occupational category. Model 2 was designated as the primary analysis. The proportional hazards assumption was evaluated using Schoenfeld residuals. The potential effect modification by occupational category was assessed by including an interaction term between LBP consultation status and occupational category.

All analyses were performed using R version 4.5.2 (R Foundation for Statistical Computing, Vienna, Austria). All statistical tests were two-sided, and a *P*-value <0.05 was considered statistically significant.

Results

Baseline characteristics of study participants

Of the 32 749 participants [mean (SD) age 21.3 (1.7) years; 55.0% male], 94.0% had no LBP consultation [mean (SD) age 21.3 (1.7) years], 4.0% had an initial consultation only [mean (SD) age 21.4 (1.7) years], and 2.0% had repeated consultations [mean (SD) age 21.6 (1.6) years]. Compared with the no-LBP-consultation group, the initial-consultation-only and repeated-consultation groups had a higher proportion of female workers and a higher proportion of workers employed in the healthcare and social welfare sectors (Table 1).

Association between LBP consultation status and job turnover

The median follow-up duration was 385 days (IQR, 364–730 days), with a total of 48 077 person-years of observation. Table 2 presents the association between time-dependent LBP consultation status and job turn-

Table 1. Baseline characteristics of early-career workers (aged 18–23 years) according to low-back pain (LBP) consultation status.

	Overall (N=32 749)		No LBP consultation (N=30 794)		Initial consultation only (N=1294)		Repeated consultations (N=661)	
	N	%	N	%	N	%	N	%
Sex								
Female	14 746	45.0	13 687	44.4	661	51.1	398	60.2
Male	18 003	55.0	17 107	55.6	633	48.9	263	39.8
Occupational category								
Finance and insurance	409	1.2	380	1.2	17	1.3	12	1.8
Health care and social welfare	2703	8.3	2433	7.9	161	12.4	109	16.5
Manufacturing	15 642	47.8	14709	47.8	654	50.5	279	42.2
Public administration	1241	3.8	1138	3.7	73	5.6	30	4.5
Transportation and postal services	4103	12.5	3846	12.5	156	12.1	101	15.3
Wholesale and retail trade	8651	26.4	8288	26.9	233	18.0	130	19.7

Table 2. Time-dependent Cox regression analysis of the association between low-back pain (LBP) consultation status and job turnover (N=32 749). [CI=confidence interval; HR=hazard ratio.]

	N	Case	%	Model 1 [a]		Model 2 [b]	
				HR	95	HR	95% CI
Consultation status							
No LBP consultation	30 794	5930	19.3	Ref		Ref	
Initial consultation only	1294	201	15.5	1.24	1.08–1.42	1.23	1.07–1.41
Repeated consultations	661	127	19.2	1.67	1.40–2.00	1.57	1.31–1.88

[a] Model 1 was unadjusted.

[b] Model 2 was adjusted for sex, age, and occupational category.

over. During the follow-up, 6258 job turnover events were observed. Compared with workers without LBP consultations, the adjusted HR for job turnover were 1.23 (95% CI 1.07–1.41) for those with an initial consultation only and 1.57 (95% CI 1.31–1.88) for those with repeated consultations (Table 2). Similar associations were observed in the unadjusted model. Evaluation of the proportional hazards assumption using Schoenfeld residuals suggested some deviations for occupational category, age, and sex, whereas no significant violation was observed for LBP consultation status (global test: $P<0.001$; LBP consultation status: $P=0.053$). No significant interaction was observed between LBP consultation status and occupational category (P for interaction=0.15).

Discussion

In this multicompany cohort of young Japanese workers, healthcare consultations for LBP after entering employment were associated with subsequent job turnover. Workers with repeated consultations for LBP had a greater risk of job turnover than those without a recorded LBP consultation. To our knowledge, this is one of the first cohort studies to demonstrate an association between LBP-related healthcare utilization identified from medical claims data and subsequent job turnover among workers shortly after entering employment.

These findings extend those of previous studies that have mainly focused on LBP onset (10), sickness absence (13), and employment exit among middle-aged and older workers (8). They also complement recent evidence showing poorer labor market participation among individuals with LBP (18). Consistent with these studies, these findings suggest that repeated healthcare consultations for LBP shortly after entering employment may serve as early markers of subsequent job turnover. Therefore, early prevention and management of LBP in the workplace might help reduce job turnover risk and support continued employment among young workers.

This study had several limitations. First, LBP severity data were unavailable, and healthcare consultations may not accurately reflect LBP severity. Second, unmeasured workplace psychosocial factors and comorbidities may have introduced confounding, precluding causal interpretation. Third, job turnover was defined by health insurance withdrawal, but reasons for withdrawal were unavailable. Some withdrawals may not have reflected actual job turnover, potentially resulting in outcome misclassification. Fourth, the proportional hazards assumption was violated for some covariates, although not significantly for LBP consultations; thus, hazard ratios should be interpreted cautiously because associations may vary over time. Finally, the findings may not generalize beyond young Japanese workers. Nevertheless, the multicompany database, objectively recorded healthcare utilization, and time-dependent analyses are strengths of this study.

Repeated LBP consultations shortly after entry into employment may be an early indicator of job turnover. These findings suggest the potential importance of addressing LBP in workplace strategies aimed at supporting continued employment among young workers.

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Conflict of interest

Authors declare no conflicts of interest.

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