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**Original Article**

# Assessment of psychosocial risk factors for the development of non-specific chronic disabling low back pain in Japanese workers—findings from the Japan Epidemiological Research of Occupation-related Back Pain (JOB) study

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**Abstract: To investigate the associations between psychosocial factors and the development of chronic disabling low back pain (LBP) in Japanese workers. A 1 yr prospective cohort of the Japan Epidemiological Research of Occupation-related Back Pain (JOB) study was used. The participants were office workers, nurses, sales/marketing personnel, and manufacturing engineers. Self-administered questionnaires were distributed twice: at baseline and 1 yr after baseline. The outcome of interest was the development of chronic disabling LBP during the 1 yr follow-up period. Incidence was calculated for the participants who experienced disabling LBP during the month prior to baseline. Logistic regression was used to assess risk factors for chronic disabling LBP. Of 5,310 participants responding at baseline (response rate: 86.5%), 3,811 completed the questionnaire at follow-up. Among 171 eligible participants who experienced disabling back pain during the month prior to baseline, 29 (17.0%) developed chronic disabling LBP during the follow-up period. Multivariate logistic regression analysis implied reward to work (not feeling rewarded, OR: 3.62, 95%CI: 1.17–11.19), anxiety (anxious, OR: 2.89, 95%CI: 0.97–8.57), and daily-life satisfaction (not satisfied, ORs: 4.14, 95%CI: 1.18–14.58) were significant. Psychosocial factors are key to the development of chronic disabling LBP in Japanese workers. Psychosocial interventions may reduce the impact of LBP in the workplace.**

**Key words:** Chronic disabling low back pain, Nonspecific low back pain, Psychosocial factors, Risk factors, Japanese workers

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## Introduction

Individuals commonly experience low back pain (LBP) at some stage during their life. Most LBP cases are classified as non-specific[1], which is not attributable to any identifiable pathology in the spine[2]. It is well-acknowledged that those who had LBP once tend to have subsequent episodes within a year[3–6], while each LBP episode can be resolved within a few weeks to 3 months[7, 8]. Despite the resolving nature of LBP, a small proportion of individuals with LBP (2–7%) develop chronic pain[8] which persists for 12 wk or longer[2]. In fact, LBP was found to be the leading specific cause of years lived with disability[9]. Not surprisingly, Western research has indicated that LBP, especially chronic LBP entailing disability, accounts for substantial economic loss at the workplace as well as in the healthcare system[2, 10].

An earlier Japanese study reported a lifetime LBP prevalence of over 80%[11]. Not surprisingly, the Ministry of Health, Labour and Welfare of Japan (MHLW) reported that LBP is the first and second most common health complaint in 2013 among Japanese men and women, respectively[12]. Since LBP is common in the Japanese population, the economic loss caused at the workplace and in the healthcare system is presumably as large as in Western countries.

In previous research, individual factors as well as ergonomic factors related to work have been well-investigated. In recent decades, an increasing body of evidence, however, has revealed that psychosocial factors play an important role in chronic non-specific LBP. In particular, distress (i.e., psychological distress, depressive mood, and depressive symptoms)[13, 14], low job satisfaction[14–16], emotional trauma in childhood such as abuse[17], and pain level[18] affect the development of chronic LBP.

Although the proportion of individuals suffering from chronic LBP is small according to Western studies, it is important to identify potential risk factors since the small proportion accounts for large loss. Little, however, is known concerning chronic disabling LBP in relation to psychosocial factors in Japanese workers. The objective of the present study was to investigate the associations between psychosocial factors and the development of chronic disabling LBP in Japanese workers.

## Subjects and Methods

*Data source*

Data were drawn from a 1-yr prospective cohort of the Japan Epidemiological Research of Occupation-related Back Pain (JOB) study. Ethical approval was obtained from the review board of the MLHW. Participants for the JOB study were recruited at 16 local offices of the participating organizations in or near Tokyo. The occupations of the participating workers were diverse (e.g., office workers, nurses, sales/marketing personnel, and manufacturing engineers). Baseline questionnaires were distributed to employees by the board of each participating organization. Participants provided written informed consent and returned completed self-administered questionnaires with their name and mailing address for the purpose of follow-up directly to the study administration office. At a year after the baseline assessment, the follow-up questionnaire was distributed to the participants.

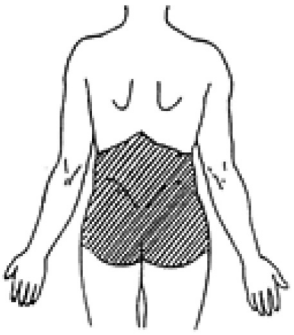

**Fig. 1. Diagram showing pain area for low back provided in the baseline and follow-up questionnaires.**

The baseline questionnaires contained questions on the presence of LBP, severity of LBP, individual characteristics (e.g., gender, age, obesity, smoking habit), ergonomic work demands (e.g., manual handling at work, frequency of bending, twisting), and work-related psychosocial factors (e.g., interpersonal stress at work, job control, reward to work, depression, somatization). LBP was defined in the questionnaire as pain localized between the costal margin and the inferior gluteal folds[10]. A diagram showing these areas was provided in the questionnaire to facilitate workers' understanding of the LBP area (Fig. 1). To evaluate the severity of LBP, Von Korff's grading[19] was used in the following manner: grade 0 was defined as no LBP; grade 1 as LBP that does not interfere with work; grade 2 as LBP that interferes with work but no absence from work; and grade 3 as LBP that interferes with work, leading to sick-leave. For the assessment of the psychosocial factors, the Brief Job Stress Questionnaire (BJSQ) developed by the MLHW[20, 21] was used. The BJSQ contains 57 ques-

tions and assesses 19 work-related stress factors: mental workload both quantitative- and qualitative-wise, physical workload, interpersonal stress at work, workplace environment stress, job control, utilization of skills and expertise, job fitness, reward to work, vigor, anger, fatigue, anxiety, depressed mood, somatic symptoms, supports by supervisors, supports by coworkers, supports by family or friends, and daily-life (work and life) satisfaction. These work-related factors were rated on a 5-point Likert scale ranging from the lowest score of 1 to the highest of 5.

The BJSQ incorporates questions from various standard questionnaires such as the Job Content Questionnaire (JCQ)[22], the National Institute for Occupational Safety and Health (NIOSH)[23], the Profile of Mood States (POMS)[24], the Center for Epidemiologic Studies Depression Scale (CES-D)[25], the State-trait Anxiety Inventory (STAI)[26], the Screener for Somatoform Disorders (SSD)[27] and the Subjective Well-being Inventory (SUBI)[28]. Standardized scores were developed for the 19 individual factors based on the sample of approximately 10,000 Japanese workers. The BJSQ has been shown to have internal consistency reliability and criterion validity with respect to the JCQ and NIOSH[29].

The follow-up questionnaire contained questions about the severity of LBP during the previous year, length of sick-leave because of LBP, medical care seeking, pain duration, and onset pattern. LBP severity was assessed using Von Korff's grading in the same manner as baseline.

*Data analysis*

The outcome of our interest was the development of chronic disabling LBP during the 1-yr follow-up period. In the present study, chronic disabling LBP was defined if a participant experienced LBP that interfered with work, with or without sick-leave due to LBP, corresponding to grade 2 or 3 in Von Korff's grading, during the month prior to baseline and experienced LBP with the same grades for 3 months or longer during the 1-yr follow-up period. Absence from work is often used as the outcome measurement for disability in Western studies. The present study, however, defined chronic disabling LBP as LBP that interfered with work for 3 months or longer, regardless of sick leave because our early international epidemiological study indicated that the proportion of Japanese workers who both took time off work and did not due to musculoskeletal disorders is almost equal to that of British workers who took time off work from the same reason[30]. This finding may be a result of cultural differences in attitude toward one's work. For this reason, the present study defined chronic disabling LBP as LBP that interfered with work for 3 months or longer, regardless of sick leave.

Incidence was calculated for the participants who experienced disabling LBP (grade 2 or 3) during the month prior to the baseline survey. Participants were excluded from the analysis if they changed their job for reasons other than LBP or developed LBP due to accident, a tumor, including metastasis, infection, or fracture.

For data analysis, the following factors were initially included: (1) individual characteristics, (2) ergonomic work demands, and (3) work-related psychosocial factors. Individual characteristics included age, sex, obesity (body mass index: BMI $\geq$25 kg/m$^2$), smoking habit (Brinkman index $\geq$400), education, flexibility, hours of sleep, experience at current job, working hours per wk ($\geq$60 h per week of uncontrolled overtime), work shift, emotional trauma in childhood, and pain level (NRS $\geq$8 as painful). Ergonomic work demands included manual handling at work; bending, twisting ($\geq$half of the day as frequent); and hours of desk work ($\geq$half of the day as frequent). Psychosocial factors were assessed with BJSQ. The 5-point Likert scale was reclassified into 2 categories: the "not feeling stressed" category, where low, slightly low, and moderate were combined, and the "feeling stressed" category, where slightly high and high were combined. Pain level was scaled on the Numerical Rating Scale, ranging from 0 to 11.

To assess smoking habit, the Brinkman Index was calculated based on the total number of cigarettes smoked per day multiplied by duration of smoking in year[31]. A Brinkman Index value of 400 or higher indicated that a respondent was a heavy smoker, whereas a value of less than 400 indicated that a respondent was a non-heavy smoker. Workers were defined as flexible if their wrists could reach beyond their knees but without their fingertips touching their ankles, and not flexible if their wrists could not reach beyond their knees[32].

In addition to descriptive statistics, univariate and multivariate logistic regression analyses were conducted to examine the associations between risk factors and the development of chronic disabling LBP. Results of logistic regression analyses were summarized by odds ratios (ORs) and the respective 95% confidence intervals (CI). To assess potential risk factors, crude ORs were initially computed. Subsequently, all factors with $p<0.1$ in univariate logistic regression analyses were entered into the multivariate logistic regression model, significance levels of $p<0.05$ for entry and $p>0.1$ for removal. The stepwise method was used to select variables with statistical significance at $p<0.05$. All tests were 2-tailed. The software

package STATA 9.0 (StataCorp, LP, College Station, TX) was used for all statistical analyses.

## Results

*Baseline characteristics of the follow-up vs. drop-out group*

The baseline questionnaire was distributed to 6,140 workers and had a response rate of 86.5% (5,310 workers). Of these participants, 3,811 workers successfully completed and returned 1-yr follow-up questionnaires (follow-up rate: 71.8%).

The characteristics of the 3,811 participants who provided follow-up data (follow-up group) did not appear to be much different from those who did not (drop-out group). The mean [standard deviation (SD)] age of the follow-up group was 42.9 (10.1) yr, compared to 38.0 (10.2) yr in the drop-out group. The majority were men in both groups (80.6% and 82.8%, respectively). The mean (SD) BMI of the follow-up group and drop-out group were similar [23.1 (3.3) and 22.9 (4.1), respectively]. In the follow-up group, 78.6% of the participants engaged in the manual handling of objects <20 kg, or not manually handling any objects at work, 17.8% engaged in manually handling objects ≥20 kg or worked as a caregiver, and data was missing for 3.6%. The respective values for the drop-out group were 75.5%, 18.9%, and 5.6%. In both the follow-up and drop-out groups, the most common occupational fields were office workers engaging in the manual handling of objects <20 kg or not manually handling any objects and nurse engaging in manual handling of objects ≥20 kg or caregiver.

*Baseline characteristics of the study participants*

Of the 3,811 workers, 171 reported LBP and experiencing work interferences with or without sick-leave during a month prior to baseline (Fig. 2). The mean (SD) age of 171 participants was 41.5 (10.2) yr and the majority were men (n=122; 71.4%). The mean (SD) BMI of the participants was 23.0 (3.6; n=170) kg/m$^2$. About half of the participants did not engage in manually handling heavy objects at work (n=79; 48.8%). Those workers who manually handled objects of less than 20 kg accounted for 17.9% (n=29) and those who manually handled heavy objects 20 kg or heavier or worked as a caregiver accounted for 33.3% (n=54). Desk work and sales, manufacturing, and nurses were the major occupations in the categories of non-manually handling work, manually handling work of less than 20 kg, and manually handling work of 20 kg or heavier, respectively.

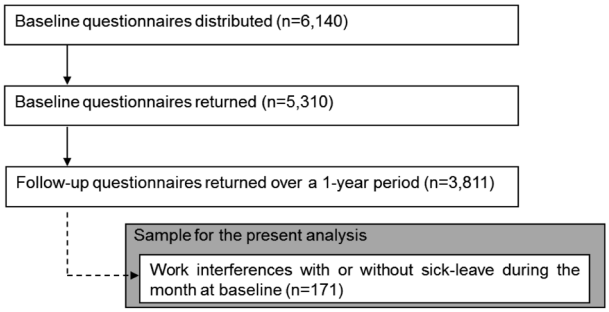


**Fig. 2. Flow chart of the sample selection for the present analysis.**

*Incidence of chronic disabling LBP*

Of a total of 171 eligible participants, 29 (17.0%) developed chronic disabling LBP during a year prior to the follow-up period (5 missing cases).

*Association between chronic disabling LBP and potential risk factors*

Crude and adjusted ORs for the development of chronic disabling LBP and their 95% CIs are shown in Tables 1 and 2. The univariate logistic regression analysis showed that job fitness, reward to work, vigor, anger, fatigue, anxiety, depressed mood, supports by supervisors, daily-life satisfaction, work shift, emotional trauma in childhood, and pain level were potentially associated with the development of chronic disabling LBP (ORs of 2.00–7.93; $p$<0.1 for all) (Table 1). In the multivariate logistic regression analysis, these 12 factors were entered into the model. As a result, 3 psychosocial factors were selected: reward to work (OR: 3.62, 95%CI: 1.17–11.19), anxiety (OR: 2.89, 95%CI: 0.97–8.57), and daily-life satisfaction (OR: 4.14, 95%CI: 1.18–14.58) (Table 2), indicating that a combination of psychosocial factors can play a key role in the development of chronic disabling LBP. A supplemental analysis was conducted to examine a combination effect of psychosocial factors: reward to work and daily-life satisfaction, which were at $p$<0.05 in the multiple logistic regression model (Table 3). Consequently, ORs increased with the level of dissatisfaction in a combination of daily-life satisfaction and reward to work. The results suggested that when both daily-life satisfaction and reward to work were not satisfied with an approximately 8-fold higher risk of developing chronic disabling LBP.

## Discussion

Results suggest that exposure to multiple psychosocial factors potentially predisposes the development of

**Table 1. Crude odds ratios of baseline factors for chronic disabling LBP**

| Risk factor | n | % | Odds ratio | 95%CI | *p* value |
|---|---|---|---|---|---|
| Age (yr) | 171 | | | | |
| <40 | 78 | 45.6 | 1.00 | | |
| 40–49 | 51 | 29.8 | 0.95 | 0.36–2.48 | 0.909 |
| ≥50 | 42 | 24.6 | 1.17 | 0.44–3.12 | 0.746 |
| Sex | 171 | | | | |
| Male | 122 | 71.4 | 1.00 | | |
| Female | 49 | 28.7 | 1.26 | 0.53–3.03 | 0.601 |
| Obesity[a] | 169 | | | | |
| < BMI 25 kg/m$^2$ | 129 | 76.3 | 1.00 | | |
| ≥ BMI 25 kg/m$^2$ (obesity) | 40 | 23.7 | 0.85 | 0.32–2.28 | 0.748 |
| Smoking habit | 153 | | | | |
| Heavy smoker | 112 | 73.2 | 1.00 | | |
| Not heavy smoker | 41 | 26.8 | 1.80 | 0.72–4.52 | 0.211 |
| Education | 165 | | | | |
| College/Junior college | 105 | 63.6 | 1.00 | | |
| High school/Junior high school | 60 | 36.4 | 0.44 | 0.17–1.18 | 0.103 |
| Flexibility | 162 | | | | |
| Flexibility | 98 | 60.5 | 1.00 | | |
| Not flexible | 64 | 39.5 | 0.57 | 0.23–1.41 | 0.225 |
| Manual handling at work | 162 | | | | |
| No manual handling (desk work) | 79 | 48.8 | 1.00 | | |
| Manual handling of <20-kg objects | 29 | 17.9 | 1.40 | 0.43–4.50 | 0.577 |
| Manual handling of ≥20-kg objects or working as a caregiver | 54 | 33.3 | 1.84 | 0.72–4.72 | 0.203 |
| Bending | 169 | | | | |
| Not frequent | 121 | 71.6 | 1.00 | | |
| Frequent | 48 | 28.4 | 1.40 | 0.58–3.40 | 0.454 |
| Twisting | 168 | | | | |
| Not frequent | 140 | 83.3 | 1.00 | | |
| Frequent | 28 | 16.7 | 1.24 | 0.42–3.65 | 0.690 |
| Hours of desk work | 167 | | | | |
| Not frequent | 111 | 66.5 | 1.00 | | |
| Frequent | 56 | 33.5 | 0.74 | 0.30–1.81 | 0.510 |
| Mental workload (quantitative aspect) | 170 | | | | |
| Not stressed | 66 | 38.8 | 1.00 | | |
| Stressed | 104 | 61.2 | 1.08 | 0.47–2.46 | 0.859 |
| Mental workload (qualitative aspect) | 170 | | | | |
| Not stressed | 71 | 41.8 | 1.00 | | |
| Stressed | 99 | 58.2 | 0.63 | 0.28–1.42 | 0.267 |
| Physical workload | 171 | | | | |
| Not stressed | 75 | 43.9 | 1.00 | | |
| Stressed | 96 | 56.1 | 1.62 | 0.70–3.73 | 0.260 |
| Interpersonal stress at work | 171 | | | | |
| Not stressed | 118 | 69.0 | 1.00 | | |
| Stressed | 53 | 31.0 | 1.15 | 0.49–2.68 | 0.745 |
| Workplace environment stress | 171 | | | | |
| Not stressed | 102 | 59.7 | 1.00 | | |
| Stressed | 69 | 40.4 | 1.95 | 0.87–4.38 | 0.105 |
| Job control | 169 | | | | |
| Controlled | 4 | 32.0 | 1.00 | | |
| Not controlled | 115 | 68.1 | 1.81 | 0.69–4.79 | 0.230 |
| Utilization of skills and expertise | 170 | | | | |
| Utilization of skills and expertise | 131 | 77.1 | 1.00 | | |
| No utilization of skills and expertise | 9 | 22.9 | 1.59 | 0.66–3.85 | 0.304 |
| Job fitness | 171 | | | | |
| Feeling fit | 114 | 66.7 | 1.00 | | |
| Not feeling fit | 7 | 33.3 | 2.04 | 0.91–4.60 | 0.086 |

**Table 1. Continued**

| Risk factor | n | % | Odds ratio | 95%CI | *p* value |
|---|---|---|---|---|---|
| Reward to work | 171 | | | | |
| Feel rewarded | 120 | 70.2 | 1.00 | | |
| Not feeling rewarded | 51 | 29.8 | 3.59 | 1.57–8.20 | 0.002 |
| Vigor | 170 | | | | |
| Vigorous | 123 | 72.4 | 1.00 | | |
| Not vigorous | 47 | 27.7 | 2.12 | 0.92–4.88 | 0.078 |
| Anger | 170 | | | | |
| Not angry | 75 | 44.1 | 1.00 | | |
| Angry | 95 | 55.9 | 2.79 | 1.12–6.97 | 0.028 |
| Fatigue | 171 | | | | |
| No fatigue | 69 | 40.4 | 1.00 | | |
| Fatigue | 102 | 59.7 | 2.45 | 0.98–6.11 | 0.055 |
| Anxiety | 171 | | | | |
| Not anxious | 95 | 55.6 | 1.00 | | |
| Anxious | 76 | 44.4 | 2.75 | 1.19–6.35 | 0.018 |
| Depressed mood | 169 | | | | |
| Not feeling depressed | 79 | 46.8 | 1.00 | | |
| Depressed | 90 | 53.3 | 2.16 | 0.92–5.08 | 0.078 |
| Somatic symptoms | 168 | | | | |
| Not somatic symptoms | 58 | 34.5 | 1.00 | | |
| Somatic symptoms | 110 | 65.5 | 1.81 | 0.72–4.55 | 0.206 |
| Supports by supervisors | 167 | | | | |
| Supported | 103 | 61.7 | 1.00 | | |
| Not supported | 64 | 38.3 | 2.00 | 0.88–4.55 | 0.098 |
| Supports by coworkers | 168 | | | | |
| Supported | 93 | 55.4 | 1.00 | | |
| Not supported | 75 | 44.6 | 0.97 | 0.43–2.18 | 0.946 |
| Supports by family or friends | 169 | | | | |
| Supported | 128 | 75.7 | 1.00 | | |
| Not supported | 41 | 24.3 | 1.13 | 0.44–2.90 | 0.801 |
| Daily-life satisfaction | 171 | | | | |
| Satisfied | 96 | 56.1 | 1.00 | | |
| Not satisfied | 75 | 43.9 | 4.98 | 1.99–12.47 | 0.001 |
| Hours of sleep | 168 | | | | |
| ≤5 h | 151 | 89.9 | 1.00 | | |
| >5 h | 17 | 10.1 | 1.56 | 0.47–5.21 | 0.466 |
| Experience of current job | 171 | | | | |
| <5 yr | 55 | 32.2 | 1.00 | | |
| ≥5 yr | 116 | 67.8 | 1.02 | 0.43–2.42 | 0.970 |
| Working hours per wk | 171 | | | | |
| <60 h | 131 | 76.6 | 1.00 | | |
| ≥60 h | 40 | 23.4 | 0.63 | 0.22–1.78 | 0.385 |
| Work shift | 171 | | | | |
| Daytime shift | 115 | 67.3 | 1.00 | | |
| Nighttime shift | 56 | 32.8 | 2.90 | 1.28–6.58 | 0.011 |
| Emotional trauma in childhood | 143 | | | | |
| No | 136 | 95.1 | 1.00 | | |
| Yes | 7 | 4.9 | 7.93 | 1.64–38.26 | 0.010 |
| Pain level | 155 | | | | |
| Not painful (NRS >8) | 140 | 90.3 | 1.00 | | |
| Painful (NRS ≤8) | 15 | 9.7 | 4.11 | 1.31–12.85 | 0.015 |

LBP: low back pain; CI: confidence interval; BMI: body mass index; NRS: numerical rating scale.
BMI ≥25 kg/m$^2$ is defined as obesity in Japan

**Table 2. Stepwise logistic regression results of baseline factors for chronic disabling LBP**

| Risk factor | Odds ratio | 95%CI | *p* value |
|---|---|---|---|
| Reward to work | | | |
| Feel rewarded | 1.00 | | |
| Not feeling rewarded | 3.62 | 1.17–11.2 | 0.025 |
| Anxiety | | | |
| Not anxious | 1.00 | | |
| Anxious | 2.89 | 0.97–8.57 | 0.056 |
| Daily-life satisfaction | | | |
| Satisfied | 1.00 | | |
| Not satisfied | 4.14 | 1.18–14.58 | 0.027 |

LBP: low back pain; CI: confidence interval; BMI: body mass index.

chronic disabling LBP in Japanese workers, especially office workers, nurses, sales/marketing personnel, and manufacturing engineers. Similarly, an increasing body of evidence, mostly in Western countries, has indicated that psychosocial factors affect the development of chronic disabling LBP[13–17].

The present study suggests that exposure to not one, but a combination of psychosocial factors, such as daily-life satisfaction and reward to work, may trigger the development of chronic disabling LBP with an 8-fold increased risk, compared to those who were satisfied with psychosocial aspects. Given that daily-life satisfaction in the BJSQ consists of the extent of being content with not only life, but also work, the results in the present study are consistent with Western studies indicating that job dissatisfaction predisposes the development of chronic disabling LBP[14–16, 33–35]. Another psychosocial factor, reward to work, can also be considered to be relevant to the magnitude in job satisfaction. The association between chronic disabling LBP and a combination of such psychosocial factors may possibly be explained by dysfunction in mesolimbic dopaminergic activity. In recent years, there has been an assumption that exposure to chronic, rather than acute, stress could result in a state of hyperalgesia in the body due to the inhabitation of mesolimbic dopaminergic mechanisms where both pain and pleasure are controlled[36, 37]. Hyperalgesia resulting from chronic stress due to not being content with life and work, for example, may lead to the development of chronic disabling LBP.

In the past, the occupational health of the Japanese worker has mainly focused on an ergonomic approach in the management and prevention of LBP. Consistent with Western studies, the present study suggests, however, that we should be more alert to a psychosocial approach to reduce the risk of developing chronic disabling LBP. Although our earlier prospective study indicated that both ergonomic and work-related psychosocial factors were associated with new-onset of disabling LBP in symptom-free Japanese workers[38], no ergonomic factors seemingly affect the development of chronic disabling LBP in the present study probably because workers who already experienced disabling LBP at baseline were the focus of the present study. The results are consistent with the guidelines stating that the development of chronic pain and disability results more from work-related psychosocial issues than from physical features[34].

There are several limitations to the study. First, generalization of the results of the present study is limited. The majority of the study participants were males. The study cohort was also not a representative sample of all Japanese workers in terms of area as well as range of occupations. Second, the sample size for the present analysis is small. Future research with a larger sample size should be conducted for further identification of potential risk factors of chronic disabling LBP. Third, the context of cognitive and emotional aspects, such as fear-avoidance belief and physician's attitudes, was not considered in the present study despite being known to affect the development of serious disability. As of the time of data collection, scales measuring fear avoidance were not available in the Japanese language. Since the author developed the Japanese versions of the Fear-Avoidance Beliefs Questionnaire (FABQ)[39]

**Table 3. Odds ratios for chronic disabling LBP in relation with a combination of daily-life satisfaction and reward to work**

| Risk factor | | Chronic disabling LBP | | Odds ratio | 95%CI |
|---|---|---|---|---|---|
| Daily-life satisfaction | Reward to work | Yes (%) | No (%) | | |
| Satisfied | Feel rewarded | 6 (7.7%) | 72 (92.3%) | - | - |
| | Not feeling rewarded | 1 (7.7%) | 12 (92.3%) | 1.00 | 0.11–9.06 |
| Not satisfied | Feel rewarded | 7 (18.9%) | 30 (81.1%) | 2.80 | 0.87–9.03 |
| | Not feeling rewarded | 15 (39.5%) | 23 (60.5%) | 7.83 | 2.72–22.52 |

LBP: low back pain; CI: confidence interval.

and the Tampa Scale of Kinesiophobia (TSK)[40, 41] after the JOB survey, both are currently available. These scales should also be included in future research. Fourth, misclassification, to some extent, is inevitable. Responses that rely on subjective measurement may be distorted and missing values cannot be avoided due to the nature of a self-assessment survey. Moreover, the possibility for recall bias towards retrospective questions should be kept in mind. Fifth, the present study focuses on the baseline factors affecting the development of chronic disabling LBP under the assumption that workers retained the same status quo as the baseline during the follow-up period. The status in some factors could possibly fluctuate during the period. Such fluctuation in factors was not taken into consideration in the present study. Finally, there may be alternative methods for the selection of potential risk factors prior to conducting multivariate analysis. It should be noted that a more complicated model may offer a better explanation of the data although the results are consistent with Western studies. Further research is needed to identify a full range of potential risk factors for inclusion in future studies.

In conclusion, the present study suggests that psychosocial factors could play a key role in the development of chronic disabling LBP in Japanese workers. Therefore, the occupational health of the Japanese worker should be focused not only on ergonomic interventions but also on psychosocial ones to reduce the impact on the workplace from the repercussions of developing chronic disabling LBP.

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