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Original Article

The effect of long-term sickness absence on coworkers in the same work unit

Yuichi FUKUDA[1]*, Shinichi IWASAKI[1], Yasuhiko DEGUCHI[1], Koichiro OGAWA[1], Tomoko NITTA[1] and Koki INOUE[1]

[1]Department of Neuropsychiatry, Graduate School of Medicine, Osaka City University, Japan

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Abstract: After workers take long-term sickness absence due to mental disorders (LTSA-MD), the occupational stress of the coworkers in the same work unit might be affected. The aims of this study were to evaluate the effect of the incident of LTSA-MD on the coworkers' occupational stress. A retrospective cohort study of 16,032 public servants was conducted. The Brief Job Stress Questionnaire (BJSQ) was used, which was administered in 2011 and 2012. To analyze the amount of change in occupational stress, the difference between the scores of the BJSQ scales in 2011 and 2012 was calculated. After adjusting for the baseline BJSQ scales, sex, age, total number of workers, and social support, analysis of covariance of the difference between the BJSQ scales' scores showed that job stressors and stress responses worsened among the coworkers after the incident of LTSA-MD. Social support did not change among the coworkers. This study indicates that an incident of LTSA-MD in the same work unit adversely affects the coworkers' occupational stress. Focusing on the coworkers' mental state after an incident of LTSA-MD in the same work unit and an early intervention strategy are needed to prevent secondary mental illness and sickness absence in the coworkers.

Key words: Sickness absence, Coworkers, Public servant, Job stress, Mental disorder

Introduction

Mental disorders have become a major global burden of disease, accounting for 7.4% of the social burden of all diseases[1]. In Japan, in 2014, psychiatric and behavioral inpatient morbidity was 209 in 100,000 people and outpatient morbidity was 203 in 100,000 people[2], and there is a continuously increasing trend. Mental disorders often lead to work disability and decreased job productivity[3, 4]. In the United Kingdom, mental disorders are the cause of 40% of all sickness absences[5].

Long-term sickness absence due to mental disorders (LTSA-MD) in the workplace has become a global public health problem[6]. The Japanese Ministry of Health, Labour and Welfare reported that employees in about 10% of all companies took more than 1 month of sickness absence, or resigned, because of mental disorders[7]. A cohort study of 7,112 Spanish patients over two yr reported that older age, severe mental disorders, being self-employed, having a non-permanent contract, and working in the real estate and construction sectors were associated with an increased probability of LTSA-MD for more than 60 d[8]. A case-control study of 385 workers on sick leave for more than 15 d demonstrated that LTSA-MD was associated with high job strain and low social support at work, effort-reward imbalance, and high over-commitment to work[9]. Job control and role ambiguity were reported to be important predictors of LTSA-MD for 30 d or more due to depressive disorders among Japanese male employees[10]. However, importantly, these studies have investigated only the association between an individual's factors and their own sickness absence.

*To whom correspondence should be addressed.
E-mail: m2038957@med.osaka-cu.ac.jp

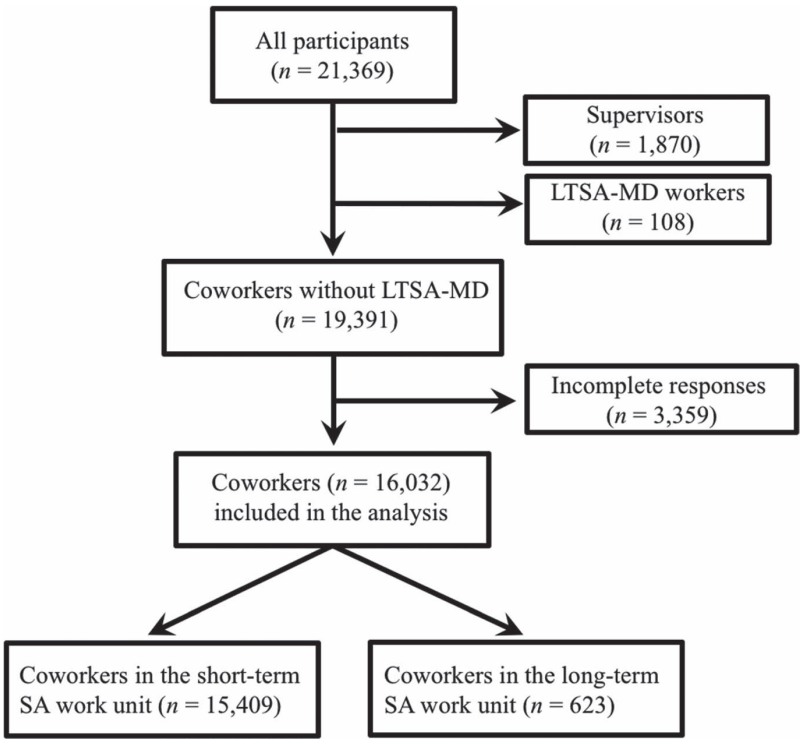

Fig. 1. Flow chart of the selection of the study population.
LTSA-MD: Long-term sickness absence due to mental disorders.
SA: Sickness absence.
Short-term SA: Total sickness absence period in the work unit is <12 months.
Long-term SA: Total sickness absence period in the work unit is ≥12 months.

After workers leave a work unit on LTSA-MD, many problems occur in the same work unit. For example, the workload and undesired overtime work may increase for the coworkers in the same work unit to compensate for the absent worker[11] (in this study, the term "coworkers" refers to the coworkers without LTSA-MD in the same unit). These problems could lead to a conflict between the coworkers and absent worker; as such, the workplace environment could deteriorate. In terms of the possible problems in the work unit, staffing coordination problems could increase and productivity could decrease[11]. In this way, these various problems can affect the condition of the coworkers.

However, no study has evaluated the association between the incident of LTSA-MD and its effect on the coworkers of the absent workers. Therefore, the aims of this study were to evaluate the effect of the incident of LTSA-MD on the coworkers' occupational stress (e.g., job stressors, stress responses, and social support), by using a brief stress questionnaire, and to clarify the effect of the incident of LTSA-MD on the coworkers. We hypothesized that the coworkers might be influenced by the incident of LTSA-MD in the same work unit and that their occupational stress might worsen, which might lead to secondary future mental illness and sickness absence in the coworkers.

Subjects and Methods

Participants

This study was a retrospective cohort study that examined the effect of the incident of LTSA-MD on the coworkers in the same work unit. In City A in the Kinki region in Japan, 21,369 public servants belonged to the municipal office or the ward office during 2011 and 2012. They completed the Brief Job Stress Questionnaire (BJSQ) as part of a periodic medical examination every year. Participants answered the BJSQ in both July 2011 and September 2012, and we set this term as the study period. We excluded 1,870 supervisors from the analysis to reduce any bias arising from the effect of the supervisors' support (the rank of supervisor was defined as managers and supervisors beyond deputy manager class). No supervisor took LTSA-MD during the study period. After the LTSA-MD workers

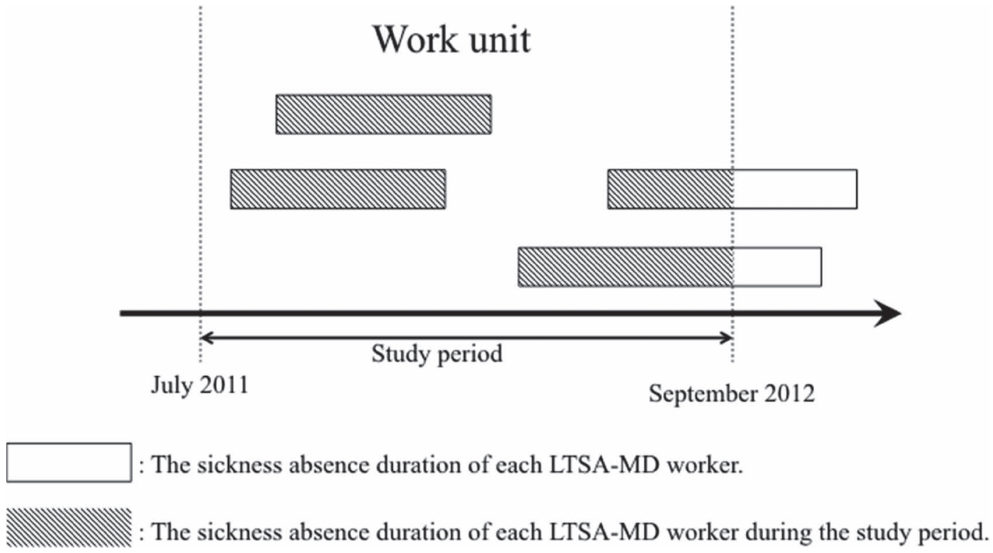

Fig. 2. Diagram of the duration of long-term sickness absence due to mental disorders in this study.
LTSA-MD: Long-term sickness absence due to mental disorders. Participants answered the Brief Job Stress Questionnaire in both July 2011 and September 2012. The LTSA-MD was defined as sickness absence due to mental disorders for more than 90 d. We calculated the total duration of sickness absence of all LTSA-MD workers in each work unit. An LTSA-MD worker may have had multiple episodes during the study period, with each episode lasting for more than 90 d.

($n=108$) were excluded, 19,391 coworkers remained. We then excluded questionnaires with incomplete responses ($n=3,359$). Finally, the data of 16,032 coworkers (82.2%) were analyzed (Fig. 1).

Long-term sickness absence due to mental disorders

The LTSA-MD was defined as sickness absence due to mental disorders for more than 90 d. The reason for LTSA-MD was confirmed with a medical certificate issued by a doctor. The International Classification of Diseases, Tenth Revision (ICD-10) codes[12] were used to diagnose and classify the mental disorders (F code) that resulted in the LTSA-MD. Each LTSA-MD began after the baseline point (July 2011). On the other hand, the end points of each LTSA-MD episode may have occurred outside of the study period. Any sickness absence period of the LTSA-MD episode must have overlapped the study period (Fig. 2). An LTSA-MD worker may have had multiple episodes during the study period, with each episode lasting for more than 90 d.

We summed the sickness absence duration of each LTSA-MD worker during the study period. A work unit was defined as a specific part of a large organization in which both supervisors and general employees work together. Then, we calculated the total duration of sickness absence of all LTSA-MD workers in each work unit during the study period, and defined this as the total sickness absence period. The work units were separated into two categories as follows: a long-term sickness absence (SA) work unit, in which the total sickness absence period was 12 months or more, and a short-term SA work unit, in which the total sickness absence period was shorter than 12 months. The short-term SA work units included work units without any sickness absence. Participants were categorized into two groups according to the type of work unit to which they belonged. The criterion for splitting the work units into long-term SA and short-term SA work units was 12 months; this was used in order to consider whether there was always nearly one employee on leave from a work unit during the study period.

Measurements

Demographic and occupational variables

The demographic variables were sex and age. The occupational variable was the total number of workers in a participant's work unit.

The Brief Job Stress Questionnaire

The BJSQ was originally created from questions in the Job Content Questionnaire and the Generic Job Stress Questionnaire of the National Institute for Occupational Safety and Health (NIOSH)[13]. A large-scale investigation has confirmed the reliability and validity of the BJSQ and

that it is a useful measure of the mental health of Japanese workers[14]. It is an established and widely used method for assessing job stress and it has sufficient reliability and validity in Japan[15]. The BJSQ contains 57 items and uses a 4-point Likert-type scale ranging from "agree" (4) to "disagree" (1) to measure job stressors (17 items), stress responses (29 items), social support (nine items), and work and life satisfaction (two items). Job stressors are psychological stressors related to work (e.g., job demands and job control), stress responses are psychological and physiological stress reactions (e.g., depression and vigor), and social support is social support in the workplace (e.g., supervisor support and coworker support). In this study, we focused on three scales of the BJSQ: job stressor, stress response, and social support. Higher scores of the three scales indicate greater stress, and reverse scoring was used where necessary. The Cronbach's alpha coefficient for each scale was as follows: 0.764, 0.936, and 0.863 (in 2011), and 0.757, 0.938, and 0.862 (in 2012).

Ethics statement

The Human Subjects Review Committee of Osaka City University approved the protocol of this study (authorization number: 2969). As the data already existed, the review committee did not require the participants' written informed consent. Before we obtained the data, the staff in City A had anonymized and de-identified the participants' data. We acquired the anonymous BJSQ data of the workers (with encrypted identification) and a list of workers on LTSA-MD, which the healthcare center of City A had collected as part of an annual mental health checkup to evaluate and improve the psychological work environment.

Statistical analysis

To analyze the amount of change in occupational stress, the differences between the BJSQ scales' scores in 2011 and 2012 (ΔBJSQ scales) were calculated. To examine the effect of LTSA-MD, analysis of covariance (ANCOVA) of the baseline BJSQ scales, sex, age, total number of workers in a participant's work unit, and social support was performed for the ΔBJSQ scales. The ANCOVA model was calculated using IBM SPSS Statistics for Windows version 24 (IBM Corp., Armonk, NY, USA).

Results

Participants' characteristics

During the study period, 108 workers took LTSA-MD. The ICD-10 diagnostic code used most frequently in the classification of workers with LTSA-MD was F3 mood disorders (85 workers; 78.7%); the second most frequent code was F4 stress-related and somatoform disorders (18 workers; 16.7%), and this was followed by "others" (five workers; 4.6%).

Regarding the sickness absence period, 41 workers (38.0%) were on leave for less than 6 months, 34 workers (31.5%) were on leave for 6 to 8 months, 20 workers (18.5%) were on leave for 9 to 11 months, and 13 workers (12.0%) were on leave for 12 months or more. Regarding the work units, there were 810 short-term SA work units and 16 long-term SA work units.

Of the 16,032 coworkers, 11,178 (69.7%) were male and 4,854 (30.3%) were female, with a mean age of 42.0 ± 9.5 yr. Of the 15,409 participants in the short-term SA work units, 10,770 (69.9%) were male and 4,639 (30.1%) were female, with a mean age of 42.1 ± 9.5 yr. Of the 623 participants in the long-term SA work units, 408 (65.5%) were male and 215 (34.5%) were female, with a mean age of 40.9 ± 9.3 yr.

The scores of the Brief Job Stress Questionnaire's scales by year and the differences between the scales' scores in 2011 and 2012

Table 1 shows the BJSQ scales' scores by year and the differences between the BJSQ scales' scores in 2011 and 2012. Table 2 presents the results of the ANCOVA of the differences between the BJSQ scales' scores in 2011 and 2012 among the short-term and long-term SA work units. After adjusting the baseline BJSQ scales' scores, sex, age, total number of workers in a participant's work unit and social support using ANCOVA, it was found that job stressors ($p=0.000$) and stress responses ($p=0.009$) worsened among the coworkers in the long-term SA work units compared with the coworkers in the short-term SA work units after the incident of LTSA-MD. Social support ($p=0.342$) did not change significantly among the workers in both groups after the incident of LTSA-MD.

Discussion

In this study, we evaluated the changes in the coworkers' occupational stress after the incident of LTSA-MD in the same work unit. The current study is the first to investigate the effect of an incident of LTSA-MD on the coworkers in the same workplace. It was found that, after the incident of LTSA-MD, job stressors and stress responses worsened among the coworkers. However, contrary to our hypothesis, social support did not change significantly after the

Table 1. The Brief Job Stress Questionnaire scales' scores by year and the differences between the scales in 2011 and 2012

	BJSQ scales' score in 2011			BJSQ scales' score in 2012			ΔBJSQ scales (2012–2011)		
	Whole (n = 16,032)	Short-term SA (n = 15,409)	Long-term SA (n = 623)	Whole (n = 16,032)	Short-term SA (n = 15,409)	Long-term SA (n = 623)	Whole (n = 16,032)	Short-term SA (n = 15,409)	Long-term SA (n = 623)
Job stressor (17–68)	42.2 ± 6.5	42.2 ± 6.5	42.0 ± 6.7	42.6 ± 6.4	42.5 ± 6.4	43.3 ± 6.7	0.4 ± 5.8	0.3 ± 5.8	1.3 ± 5.8
Stress response (29–116)	57.0 ± 14.7	57.0 ± 14.7	56.5 ± 14.6	58.0 ± 15.2	57.9 ± 15.2	58.9 ± 16.0	1.0 ± 12.4	0.9 ± 12.3	2.4 ± 13.3
Social support (9–36)	19.2 ± 5.1	19.2 ± 5.1	19.1 ± 5.0	19.6 ± 5.1	19.5 ± 5.1	19.7 ± 5.3	0.4 ± 4.6	0.4 ± 4.6	0.5 ± 4.7

BJSQ: Brief Job Stress Questionnaire.
SA: Sickness absence.
ΔBJSQ scales: Calculated value of the differences between the BJSQ scales in 2011 and 2012.

Table 2. The results of the statistical differences between coworkers in short-term and long-term sickness absence work units, using analysis of covariance for the differences between the Brief Job Stress Questionnaire scales' scores in 2011 and 2012

The BJSQ scales	Type III sum of squares	*df*	Mean square	*F*-value	*p*-value	
Job stressor	474.915	1	474.915	18.132	0.000	*
Stress response	885.351	1	885.351	6.751	0.009	*
Social support	15.204	1	15.204	0.902	0.342	

BJSQ: Brief Job Stress Questionnaire.
Adjusted for baseline Brief Job Stress Questionnaire scales' scores, sex, age, total number of workers in a participant's work unit and social support.

incident of LTSA-MD.

In general, after the incident of sickness absence in the work unit, the coworkers may have to do additional work. Moreover, accidents might occur when the coworkers are confronted with unfamiliar work[11]. If any of these negative consequences occur, it is likely to lead to conflict between the coworker and the absent worker, and coworkers might develop negative beliefs about the work environment although they are not absent[11].

In the present study, the job stressors of the coworkers in the long-term SA work units worsened compared to those in the short-term SA work units. After workers take LTSA-MD, the coworkers in the same work unit may have to deal with work in addition to their own original work to compensate for the absent worker. These changes might lead to higher job demands, lower job control, unfairness, or the deterioration of the workplace environment among the coworkers. In addition, in the present study, the stress responses among the group of coworkers in the long-term SA work units worsened more than in the short-term SA work units. A previous study reported that high levels of stress response have a significant relationship with the onset of depression among Japanese employees in a software company[16]. Our earlier study showed that the BJSQ scale of stress response can effectively predict the occurrence of workers with LTSA-MD[17]. Furthermore, the NIOSH job stress model proposes that stress reactions are affected by job stressors[18]. The negative emotions toward the absent workers, work content, and working environment might cause more psychological and physiological stress reactions among the coworkers.

Social support did not change significantly among the coworkers after the incident of LTSA-MD. In general, after the incidents of LTSA-MD, absent workers are rarely substituted with new employees. Hence, the coworkers and supervisors usually have to do additional work and may not be able to help others. Therefore, we expected the social support to get worse due to the incident of LTSA-MD. However, the results were not what we had expected, which might be because the coworkers helped each other more than before and, as a result, this positive change compensated for the negative change due to the incident of LTSA-MD. As social support, which is considered a buffer factor in the NIOSH job stress model, did not change among the coworkers in this study, it can be thought that the deterioration of the job stressors directly caused the deterioration of the stress responses in this study.

The significance of this research is that it demonstrates that an incident of LTSA-MD in the same work unit can adversely affect the coworkers' occupational stress. It is important for occupational health services to pay more attention to the coworkers' mental health after an incident of LTSA-MD in the same work unit. Early countermeasures are necessary, such as personnel recruitment or the fair distribution of additional work to the coworkers.

Previous studies have shown that worker participation in intervention programs improved some job stressors or stress responses and prevented workers' sickness absence due to mental disorders[19, 20]. It is also important for occupational health services to provide mental health programs for the coworkers with higher job stress. After an incident of LTSA-MD in the work unit, the promotion of early intervention and the coworkers' participation in a mental

healthcare program by occupational health staff will prevent secondary future mental illness and sickness absence in the coworkers.

It is assumed that there are potential biases and residual confounding factors besides the items investigated in this study. The magnitude of workload or responsibility which LTSA-MD workers had before they took LTSA-MD affects the degree of changes in coworkers' occupational stress after they took LTSA-MD. If LTSA-MD workers had high workload before they took LTSA-MD, the coworkers would work on behalf of LTSA-MD workers, and experience high occupational stress. Additionally, the seriousness of an illness of LTSA-MD workers affects work performance before they took LTSA-MD. Serious illnesses may make cause high presenteeism among them before they took LTSA-MD. It may have had an impact on the coworkers before and after the incident of LTSA-MD. Several previous studies reported that presenteeism accounts for the majority of the work productivity impairment, compared with absenteeism[21, 22]. It is supposed that coworkers' occupational stress caused by higher presenteeism of LTSA-MD workers before they took LTSA-MD decreased after they took LTSA-MD. We could not obtain data on these factors in this study, which is one of the limitations of this study.

This study has other limitations. First, the data were obtained from public servants in one city in Japan. Therefore, it may be difficult to generalize the findings to other regions, countries, and job categories. Second, we defined LTSA-MD as taking leave from work for more than 90 d; however, many other studies define LTSA-MD as a period of absence shorter than 60 d. The mental state of the workers on sick leave in our study might be more severe than that in other studies and thus they may require a longer period of absence. Third, the length of time between the completion of the questionnaires and taking sickness absence was not considered strictly. In this study, we could obtain only annual mental health checkup data. Therefore, we could not align the length of the period between the start or end points of LTSA-MD and the time of administering the second questionnaire. Additionally, several work units had multiple LTSA-MD workers. In order to reduce the influence, we calculated the total duration of sickness absence of LTSA-MD workers in each work unit during the study period. Fourth, the differences between the work units were not considered. Differences in the work content and atmosphere of each work unit may affect the coworkers' occupational stress. Fifth, there may be differences depending on the year; the present study period was only for the two years of 2011 and 2012. Sixth, all of the data were collected by self-report; thus, the results may be influenced by personality differences or response tendencies. Further studies are needed to examine other occupational categories, work units, locations, and years.

Conclusion

The present study indicated that an incident of LTSA-MD in the same work unit could adversely affect the coworkers' occupational stress. Focusing on the mental state of the coworkers after an incident of LTSA-MD in the same work unit and an early countermeasure strategy are needed to prevent secondary future mental illness and sickness absence in the coworkers.

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