Journal of Affective Disorders 227 (2018) 443–449

Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Research paper

Sickness absence indicating depressive symptoms of working population in South Korea

Cheolmin Shin[a], Young-Hoon Ko[a], Seoyoung Yoon[b], Sang Won Jeon[c], Chi-Un Pae[d], Yong-Ku Kim[a], Ashwin A. Patkar[e], Changsu Han[a,*]

[a] Department of Psychiatry, Korea University Ansan Hospital, Korea University College of Medicine, Seoul, Republic of Korea
[b] Department of Psychiatry, Daegu Catholic University Medical Center, Daegu, Republic of Korea
[c] Department of Psychiatry, Sungkyunkwan University School of Medicine, Seoul, Republic of Korea
[d] Department of Psychiatry, College of Medicine, The Catholic University of Korea, Seoul, Republic of Korea
[e] Department of Psychiatry and Behavioral Sciences, Duke University Medical Center, Durham, NC, USA

ARTICLE INFO

Keywords:
Depressive symptoms
Depression
Sickness absence
Sick leave
Korea National Health and Nutrition Examination Survey
General working population

ABSTRACT

Background: Sickness absence has been regarded as an important indicator of workers' health and work productivity. This study is aimed to evaluate the association between depressive symptoms and sickness absence in workers of South Korea.

Methods: We used nationwide cross-sectional survey data from 2889 individuals in the working population aged over 19 years in South Korea. Depressive symptoms were measured using Patient Health Questionnaire-9 (PHQ-9). Those respondents who scored above 10 on PHQ-9 were regarded as having depressive symptoms. Sickness absence was considered a binary variable with an absence of at least 1 day in the past month. The survey instrument contained questions about sociodemographic factors, lifestyle, work-related factors, and chronic illnesses. Logistic regression models were used to find odds ratios and confidence intervals.

Results: The prevalence of sickness absence was found to be overall 4.6%. The adjusted odds ratio of sickness absence with depressive symptoms (PHQ-9 score ≥ 10) was 3.63 (Confidence Interval: 2.13–6.20) after controlling of possible confounders. Compared to minimal depressive symptoms (PHQ-9 < 5), the differences between other types of severity of depressive symptoms (mild, moderate, and moderately severe) in terms of mean of all sickness absences were more significant.

Limitation: The sickness absence based on the memory of the respondent in this study may result in a recall bias.

Conclusions: Incidence of at least 1 day of sickness absence per month increased the risk of depressive symptoms after controlling for the possible confounding factors in general working population. It may be necessary to consider strategies for assessing depression in the workers who take sick leaves.

1. Introduction

Depression is a common illness with a high prevalence rate in the general population and can cause functional impairment. According to the World Health Organization, it is the leading cause of disability worldwide in terms of years lived with disability (Ferrari et al., 2013). Previous studies have suggested that depression in the workplace causes a significant economic burden on companies and individuals (Goetzel et al., 2002; Rost et al., 2014). Workers with depression are more likely to use health care services (Simon et al., 1995) and are more likely to have a disability in terms of work productivity (Broadhead et al., 1990; Judd et al., 2000). Judd et al. reported that workplace disability is related to the severity of depressive symptoms in the course of unipolar major depressive disorder (Judd et al., 2000). In this study with 371 participants, monthly ratings of impairment in social relationships and functioning showed stepwise increase with the severity of the depressive symptoms. Impairment in social functioning due to depression is associated with decrease in productivity in the workplace and increase in absenteeism from work. In the study with 2980 participants with a 1 year follow-up exploring the relationship of depression and depressive symptoms with the number of days lost from work, participants were identified as having 4.78 times greater risk of disability in major depression and 1.55 times greater risk of disability in minor depression with mood disturbance (Broadhead et al., 1990).

Sickness absence, which usually means absence from work due to illness or accident, is an important indicator of workers' health and

* Corresponding author.
E-mail address: hancs@korea.ac.kr (C. Han).

https://doi.org/10.1016/j.jad.2017.11.030
Received 17 May 2017; Received in revised form 6 September 2017; Accepted 8 November 2017
Available online 11 November 2017
0165-0327/

work productivity (D'Souza et al., 2006; Marmot et al., 1995). Mental illnesses are consistently associated with sickness absence. Among mental illnesses, depression has been reported to be a common contributor of sickness absence (Knudsen et al., 2013; Koopmans et al., 2008). An observational study in a city of the United States showed that employees with depression had almost 28 times higher risk of missing work due to emotional reasons than employees without depression (Kouzis and Eaton, 1994). Koopmans et al. reported that depression with anxiety was a significant risk factor for sickness absence, while depression without anxiety was not a risk factor. In their study with a Dutch working population, they found that workers with depressive symptoms tended to have more days of sickness absence (Koopmans et al., 2008). Compared to the Western countries that conduct large-scale population studies, there are only a few small-scale population studies on sickness absence and depression in Korea. A recent study has shown that the sick absence due to depression is considerably less in Korea than in European countries (Hong et al., 2015). There is a lack of awareness that depression can be used as a basis for taking sick leave in Korea. Therefore, it is necessary to examine the association between depression and sickness absence in the Korean population.

Till date, there has been limited research on sickness absence and depressive symptoms of working populations. First, most such studies target populations from a certain region or company that do not represent the entire country. Second, most studies are performed with paid workers, and there are fewer studies with self-employed workers and unpaid family workers. Third, little is known about the difference in the degree of sickness absence according to the severity of depressive symptoms.

Based on data from a nationally representative population of South Korea (hereafter referred to as “Korea”), we aimed to investigate the association between sickness absence and depressive symptoms in the working population. Moreover, this study aimed to investigate the relationship between the duration of sickness absence and symptom severity of depression.

2. Methods

2.1. Study population

Korea National Health and Nutrition Examination Survey (KNHANES) is a cross-sectional, nationwide, and population-based survey monitoring the health and nutrition status of the non-institutionalized Korean population. It consists of a health questionnaire, physical/laboratory examinations, and nutrition survey. The health questionnaire included questions about days lost from work per month. In a time sequence, phase I (1998), II (2001), III (2005), IV (2007–2009), V (2010–2012), and VI (2013–2015) surveys were conducted by the Korea Centers for Disease Control and Prevention of the Korean Ministry of Health and Welfare. A stratified multistage probability sampling design was used, and selections were made from sampling units on the basis of geographical area, sex, and age using household registries.

This study was based on the data from the sixth KNHANES, which used PHQ-9 as a screening instrument for depression for the first time in the KNHANES. We conducted health surveys across a year with 6891 subjects aged 19 years and above out of the 7550 eligible subjects who represented Korea in 2014. The number of respondents who had jobs, except for students, was 2930. Finally, a total of 2889 participants were included in this study, excluding 41 respondents who did not answer PHQ-9 (Fig. 1).

2.2. Ethics

This study was approved by the Korea University Institutional Review Board, and all participants provided written informed consent before their enrollment in the survey.

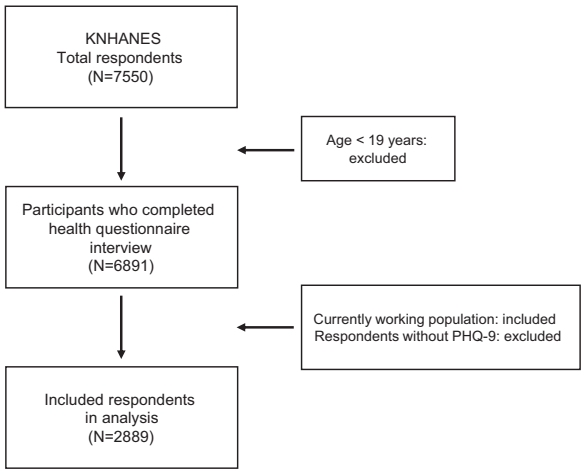

Fig. 1. Flow chart of enrollment of participants. (KNHANES: Korea National Health and Nutrition Examination Survey).

2.3. Study instruments

2.3.1. Patient Health Questionnaire-9 (PHQ-9)

The Patient Health Questionnaire-9 (PHQ-9) consists of 9 items, and is used to screen, diagnose, monitor, and measure the severity of depression (Kroenke et al., 2001; Lowe et al., 2004). Each item is rated on a scale from 0 to 3. Sum of scores can range from 0 to 27. It is already widely used in primary care settings in the field of psychiatry (Pinto-Meza et al., 2005). In addition, validation for this as a screening tool for the general population was conducted through a couple of studies (Kocalevent et al., 2013; Martin et al., 2006). As a tool to detect depressive symptoms in general population of various ethnicities, a PHQ-9 score of 10 or more met 88% sensitivity and 88% specificity of depressive symptoms (Kroenke et al., 2001). PHQ-9 was reported to be useful for the measuring the severity of depressive symptoms. Kroenke et al. suggested that mild, moderate, moderately severe, and severe depression were represented by the PHQ-9 scores 5, 10, 15, and 20, respectively (Kroenke et al., 2001).

The Korean version of the PHQ-9 was validated by several studies (Choi et al., 2007; Han et al., 2008). Among them, translated with authorized permission, the Korean version of Han et al. was verified for its validity and reliability measures in the community-based cohort study. This version of PHQ-9 was employed in this study.

2.3.2. Sickness absenteeism

The health questionnaire of KNHANES had sickness absenteeism questions, including “Have you been absent at work due to illness or injury in the past month?” and “If so, for how many days?” With those questions, the presence and duration of sickness absence were investigated, respectively.

2.3.3. Demographic, lifestyle, and clinical characteristics

The analyzed sociodemographic characteristics included age, gender, marital status, education level (high school or lower/university or higher), and household income. For health-related characteristics, we included history of smoking and consuming alcohol.

The investigated chronic illnesses were hypertension, dyslipidemia, stroke, myocardial infarction, angina, arthritis, rheumatoid arthritis, pulmonary hypertension, asthma, diabetes mellitus, benign thyroid disease, atopic dermatitis, allergic rhinitis, chronic renal disease, chronic hepatitis B, chronic hepatitis C, liver cirrhosis, gastric cancer, hepatic cancer, colon cancer, breast cancer, cervical cancer, lung cancer, and thyroid cancer.

2.3.4. Work-related characteristics

In this study, work-related characteristics included status of work (employee, self-employed, and unpaid family workers), working time [day, evening (14:00–24:00), night (21:00–8:00) shifts, regular 12 h shift, regular 24 h shift, split shift, irregular shift, and others], working hours per week (below 40 h, 40–48 h, over 48 h) and type of job (manager, professional, clerical, service/sales, skilled/operative, unskilled and other).

2.4. Statistical analysis

The association between depressive symptoms and variables including sickness absence, demographic factors, lifestyle, health and work related factors were tested using chi-square and Fisher's exact test. The significant variables (P-value < 0.2) associated with depressive symptoms were analyzed using multiple logistic regression analyses. We estimated odds ratio (OR) and 95% confidence interval for depressive symptoms.

The severity of depressive symptoms was categorized into five groups: minimal (≤ 4), mild (5 − 9), moderate (10 − 14), moderately severe (15 − 19), and severe (≥ 20) (Kroenke et al., 2001). The difference between the mean number of days of sickness absence in each group was examined using the Kruskal-Wallis test.

All statistical analyses were performed using SPSS version 20 (IBM). A 2-sided P-value < 0.05 was considered significant.

3. Results

3.1. Characteristics of study population

The demographic characteristics of the population are shown in Table 1. Data of 2889 participants aged 19 years and above were included from the 2014 KNHANES. Ages ranged from 19 to 84 years, with a mean of 47.85 years. The participants included 1484 male and 1405 female workers. Majority of the participants had over 11 years of education (44.4%) and were married (74.7%). In terms of lifestyle, about a quarter of respondents were current smokers and about 75% currently consumed alcohol.

We investigated diagnoses of various illnesses given by doctors, which are presented in Table 2. Among them, stroke, arthritis, pulmonary tuberculosis, asthma, breast cancer, and chronic renal disease were statistically significant enough to include in the multiple regression model (P < 0.2).

In terms of work-related characteristics, about two third of participants were employees, about 30% were self-employed, and the rest were unpaid family workers. With respect to working hours, majority (83.1%) engaged in daytime work. The respondents who worked for under 40 h per week formed the majority (37.1%) and 31.6% worked for over 48 h per week. The three major job categories were manager/professional/clerical (40.7%), service/sales (22.3%), and skilled/operative (29.1%). Working time per week and type of job were significant enough to be included in the multiple regression model (P < 0.2). The details of work-related characteristics are described in Table 3.

3.2. Sickness absence and depressive symptoms

The incidence of sickness absence was found to be overall 4.6%. In the groups with and without depressive symptoms, the incidence of sickness absence was identified as 18.6% and 3.9%, respectively. As presented in Table 4, the OR after adjusting for age, sex, education level, marriage, household income, consuming alcohol, and smoking was 3.67 (95% CI: 2.19—6.16). Additional adjustment for the presence of diagnosed diseases slightly attenuated the OR. Likewise, after further controlling work-related factors (type of job), the OR slightly reduced in size but remained significant (OR = 3.63; 95% CI: 2.13—6.20).

Table 1
Demographic, lifestyle, and health-related characteristics of the population.

	Total, n (%)	No depressive Symptoms, n (%)	Depressive symptoms (PHQ ≥ 10), n (%)	P
Gender	2889			< 0.001
Male	1484 (51.4)	1436 (96.8)	48 (3.2)	
Female	1405 (48.6)	1313 (93.5)	92 (6.5)	
Age (years)				< 0.001
19–34	604 (20.9)	556 (92.1)	48 (7.9)	
35–60	1668 (57.7)	1610 (96.5)	58 (3.5)	
61 +	617 21.4)	583 (94.5)	34 (5.5)	
Education				0.003
< 6	435 (15.1)	400 (92.0)	35 (8.0)	
≥ 6, < 12	1170 (40.5)	1121 (95.8)	49 (4.2)	
≥ 12	1284 (44.4)	1228 (95.6)	56 (4.4)	
Marital status				< 0.001
Married	2157 (74.7)	2075 (96.2)	82 (3.8)	
S/D/W	266 (9.2)	242 (91.0)	24 (9.0)	
Unmarried	464 (16.1)	430 (92.7)	34 (7.3)	
No answer	2			
Household income				< 0.001
Low	345 (11.9)	304 (88.1)	41 (11.9)	
Middle-low	698 (24.2)	664 (95.1)	34 (4.9)	
Middle-high	909 (31.5)	876 (96.4)	33 (3.6)	
High	929 (32.2)	897 (96.6)	32 (3.4)	
Consuming alcohol				0.02
Non-consumer	631 (21.8)	604 (93.6)	41 (6.4)	
1—4 times/month	1455 (50.4)	1400 (96.2)	55 (3.8)	
≥ 2 times/week	763 (26.4)	720 (94.4)	43 (5.6)	
No answer	16			
Smoking				0.002
Never smokes	1553 (53.8)	1479 (95.2)	74 (4.8)	
Former smoker	584 (20.2)	569 (97.4)	15 (2.6)	
Current smoker	723 (25.0)	674 (93.2)	49 (6.8)	
No answer	29			

Abbreviation: S/D/W, Separated/divorced/widowed.

Table 2
Clinical characteristics of study sample.

	Total, n (%)	No depressive symptoms, n (%)	Depression (PHQ ≥ 10), n (%)	P
Hypertension	2889			0.571
No	2403 (83.2)	2289 (96.8)	114 (3.2)	
Yes	486 (16.8)	460 (94.7)	26 (5.3)	
Dyslipidemia				0.977
No	2561 (88.6)	2437 (95.2)	124 (4.8)	
Yes	328 (11.4)	312 (95.1)	16 (4.9)	
Stroke				0.175
No	2859 (99.0)	2722 (95.2)	137 (4.8)	
Yes	30 (1.0)	27 (90.0)	3 (10.0)	
Myocardial infarction or Angina				0.742
No	2836 (98.2)	2699 (95.2)	137 (4.8)	
Yes	53 (1.8)	50 (94.3)	3 (5.7)	
Arthritis				0.003
No	2635 (91.2)	2517 (95.5)	118 (4.5)	
Yes	254 (8.8)	232 (91.3)	22 (8.7)	
Pulmonary Tuberculosis				0.053
No	2773 (96.0)	2643 (95.3)	130 (4.7)	
Yes	116 (4.0)	106 (91.4)	10 (8.6)	
Asthma				< 0.001
No	2814 (97.4)	2686 (95.5)	128 (4.5)	
Yes	75 (2.6)	63 (84.0)	12 (16.0)	
Diabetes Mellitus				0.401
No	2718 (94.1)	2584 (95.1)	134 (4.9)	
Yes	171 (5.9)	165 (96.5)	6 (3.5)	
Benign thyroid disease				> 0.999
No	2803 (97.0)	2667 (95.1)	136 (4.9)	
Yes	86 (3.0)	82 (95.3)	4 (4.7)	
Gastric cancer				0.628
No	2865 (99.2)	2725 (95.1)	140 (4.9)	
Yes	24 (0.8)	24 (100.0)	0 (0.0)	
Hepatic cancer				> 0.999
No	2882 (99.8)	2742 (95.1)	140 (4.9)	
Yes	7 (0.2)	7 (100.0)	0 (0.0)	
Colon cancer				0.258
No	2883 (99.8)	2744 (95.2)	139 (4.8)	
Yes	6 (0.2)	5 (83.3)	1 (16.7)	
Lung cancer				> 0.999
No	2886 (99.9)	2746 (95.1)	140 (4.9)	
Yes	3 (0.1)	3 (100.0)	0 (0.0)	
Thyroid cancer				> 0.999
No	2869 (99.3)	2730 (95.2)	139 (4.8)	
Yes	20 (0.7)	19 (95.0)	1 (5.0)	
Atopic dermatitis				> 0.999
No	2814 (97.4)	2677 (95.1)	137 (4.9)	
Yes	75 (2.6)	72 (96.0)	3 (4.0)	
Allergic rhinitis				0.323
No	2533 (87.7)	2414 (95.3)	119 (4.7)	
Yes	356 (12.3)	335 (94.1)	21 (5.9)	
Chronic renal disease				0.031
No	2883 (99.8)	2745 (95.2)	138 (4.8)	
Yes	6 (0.2)	4 (66.7)	2 (33.3)	
Chronic hepatitis B				0.679
No	2855 (98.8)	2717 (95.2)	138 (4.8)	
Yes	34 (1.2)	32 (94.1)	2 (5.9)	
Chronic hepatitis C				0.294
No	2882 (99.8)	2743 (95.2)	139 (4.8)	
Yes	7 (0.2)	6 (85.7)	1 (14.3)	
Liver cirrhosis				> 0.999
No	2880 (99.7)	2740 (95.1)	140 (4.9)	
Yes	9 (0.3)	9 (100.0)	0 (0.0)	

The mean number of days of sickness absence is indicated in Fig. 2. Compared to minimal depressive symptoms, the differences between other types of severity of depressive symptoms (mild, moderate, and moderately severe) and mean of all sickness absences were significant ($P < 0.01$, Kruskal-Wallis test). There was no significant difference in the mean number of days of sickness absence between the groups with severe and minimal depressive symptoms.

4. Discussion

This study suggests that sickness absenteeism can be associated with the coexistence of clinically significant depressive symptoms. This finding was significant after adjusting clinical factors and demographic factors that may be confounding variables affecting sickness absence. In addition, the more severe the symptom of depression, greater was the duration of sickness absence.

This study was in line with previous observational studies reporting that depressive symptoms are associated with sickness absenteeism.

Table 3
Work-related characteristics of study population.

	Total, n (%)	No depressive symptoms, n (%)	Depressive symptoms, n (%)	P
Status of workers				0.372
Employee	1875 (64.9)	1785 (95.2)	90 (4.8)	
Self-employed	824 (28.5)	787 (95.5)	37 (4.5)	
Unpaid family worker	188 (6.5)	175 (93.1)	13 (6.9)	
Pattern of working time				0.264
Day	2401 (83.1)	2290 (95.4)	111 (4.6)	
Evening (14:00–24:00)	264 (9.1)	244 (92.4)	20 (7.6)	
Night (21:00–8:00)	63 (2.2)	58 (92.1)	5 (7.9)	
Regular 12 h shift	76 (2.6)	74 (97.4)	2 (2.6)	
Regular 24 h shift	34 (1.2)	34 (100.0)	0	
Split shift	21 (0.7)	20 (95.2)	1 (4.8)	
Irregular shift	16 (0.6)	16 (100.0)	0	
Other	4 (0.1)	4 100.0)	0	
Not answered	10			
Working hours per week				0.072
< 40	1073 (37.1)	1016 (94.7)	57 (5.3)	
40–48	893 (30.9)	862 (96.5)	31 (3.5)	
> 48	913 (31.6)	862 (94.4)	51 (5.6)	
Type of job				0.001
Manager, professional, Clerical	1175 (40.7)	1136 (96.7)	39 (3.3)	
Service/Sales	643 (22.3)	593 (92.2)	50 (7.8)	
Skilled, operative	840 (29.1)	803 (95.6)	37 (4.4)	
Unskilled	216 (7.5)	203 (94.0)	13 (6.0)	
Other	13 (0.4)	12 (92.3)	1 (7.7)	
Not answered	2			

Table 4
Adjusted odds ratio's (95% confidence intervals) of respondents having depressive symptoms (PHQ-9 ≤ 10) and the incidence of sickness absence.

Sickness absence	B	Adjusted odds ratio (95% CI)	p-value
Model 1			< 0.001
No		REFERENCE	
Yes	1.300	3.67 (2.19–6.16)	
Model 2			< 0.001
No		REFERENCE	
Yes	1.281	3.60 (2.12–6.12)	
Model 3			< 0.001
No		REFERENCE	
Yes	1.290	3.63 (2.13–6.20)	

Model 1 = adjusted for sex, age, education level, marriage, household income, consuming alcohol and smoking.
Model 2 = adjusted for (Model 1) and diagnosed diseases (stroke, Arthritis, pulmonary tuberculosis, asthma and chronic kidney disease).
Model 3 = adjusted for (Model 2) and work-related factor (type of job).

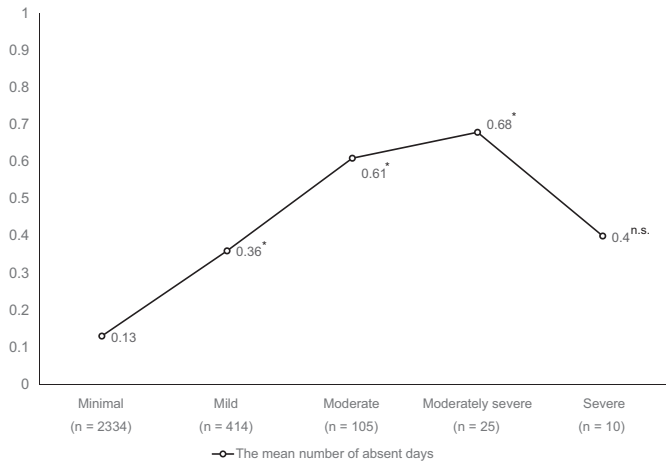

Fig. 2. The mean number of absent days in the past month according to the severity of depressive symptoms assessed by PHQ-9. *: P < 0.001 versus minimal depressive symptoms. n.s.: not significant versus minimal depressive symptoms.

Kouzis et al. reported that in major depression, the odds of absence for at least a day were 27.8, which is remarkably higher than our findings and is considered to be probably due to the limitation in terms of the use of emotional concerns as a reason for absence (Kouzis and Eaton, 1994). In the study based on two national surveys in the United States, workers with depression reported 1.5–3.2 more work-disability days because of problems with physical or mental health in a thirty-day period than workers without depression (Kessler et al., 1999).

To our knowledge, this is the first study to reveal the association between depressive symptoms and sickness absence in a nationally representative working population of Korea. Until now, the studies on this subject in Korea were limited to a small population and few in number. An observational study in Korea reported that workers with depression (n = 106) have lost more days from work than those without depression (n = 106) (Kim et al., 2007). Korean workers report relatively lower cases of sickness absence due to diagnosed depression. Studies have shown that sickness absence is greater among the Brazilian and European than the Korean working population, and that sickness absence tended to be greater among individuals with a diagnosis of depression in Korea than Brazil and Europe (Henderson et al., 2013; Hong et al., 2015; Wang and Gorenstein, 2014). This may be because the stigma about a psychiatric diagnosis is still prevalent in Korea (Cho et al., 2009; Park et al., 2015); hence, there is a possibility that the diagnosis of depression is not used for a sickness absence. In the western countries, the attitudes towards psychiatric diagnoses have changed and the sickness absence based on mental health concerns seems to have increased (Hensing et al., 2006; Stansfeld et al., 1995). Nonetheless, according to our study, workers with depressive symptoms were over three times more likely to be unable to work because of sickness, citing various reasons apart from depression. This could imply that the incidence of sickness absence has increased among Korean working population with depressive symptoms even though the reasons cited often do not include medically certified depression diagnoses. Therefore, it is important to identify the presence of depression among workers in Korea because of its association with sickness absence.

This study showed that the duration of sickness absence tended to increase according to the severity of depression. However, since the sample size of the group with severe depressive symptoms was relatively small, no statistically significant results were found in the mean

comparison analysis with the group with minimal depressive symptoms. The small sample size of the group with severe depressive symptoms also may have affected the mean of the days of sickness absence among the group with severe depressive symptoms, which was lower than those of the moderately severe and the moderate groups. In addition, the lower mean of the days of sickness absence among the group with severe depressive symptoms may have been because the covariate of the baseline was not adjusted in the univariate analysis. Although the relationship between depressive symptoms and sickness absence is well established, the effect of the severity of depressive symptoms on the duration of sickness absence is relatively less known. There are two observational studies that demonstrated a positive relationship between depression evaluated using PHQ-9 and presenteeism and absenteeism measured using the Work Productivity and Activity Impairment (WPAI) Questionnaire. In a study with depressed employees visiting the primary care unit in the United States, the percentage of work time missed or impairment at work measured using WPAI increased according to the increase in the PHQ-9 score (Beck et al., 2011). Jain et al. reported that absenteeism estimated by WPAI was significantly and positively associated with severity of depression which was classified into categories of no depressive symptoms, mild depression, moderate depression, moderately severe depression, and severe depression (Jain et al., 2013).

Previous studies have largely focused on paid employees; however, considering the high proportion of self-employed workers in the Korean working population (OECD, 2011), we included self-employed workers and unpaid family workers in the study sample. In our analysis, there was no statistically significant difference among job statuses in accordance with the existence of depressive symptoms. Although self-employed people can be as stressed as an employed worker and have mental health problems (Leignel et al., 2014; Parslow* et al., 2004), few studies have focused on the depression of self-employed workers. In this study, the prevalence of depression among unpaid family workers as a type of self-employed worker (OECD, 2011) was high, although it was not statistically significant. Further studies are needed to reveal the relationship between the depression and the employment type using the data accumulated through the subsequent KNHANES.

4.1. Limitations

This study has several limitations to be noted. First, the sickness absence used in this study is not medically certified but based on the memory of respondents. Although the relatively short-term recall is well suited to the sickness absence record (Revicki et al., 1994), recall bias may have influenced the findings. Second, the limitation of this study is that depressive symptoms were assessed using the Patient Health Questionnaire (PHQ-9), which is neither the gold standard, nor a structured diagnostic interview. Third, the measurement of sickness absence was not made on a structured scale such as WPAI. Finally, the cross-sectional design limits the identification of a causal relationship between the variables including sickness absence and other factors and depression.

5. Conclusions

To conclude, this cross-sectional study provides evidence suggesting that the workers with high sickness absence are at a risk for depression. Therefore, psychological evaluation of a worker with high sickness absence may be necessary. In the future, scientific research is needed to determine whether recurrent use of sickness absence is related to the presence of depression.

Acknowledgements

None.

Role of the funding source

This research was supported by a grant of the Korea Health Technology R&D Project through the Korea Health Industry Development Institute (KHIDI), funded by the Ministry of Health & Welfare, Republic of Korea (HC15C1405).

References

Beck, A., Crain, A.L., Solberg, L.I., Unutzer, J., Glasgow, R.E., Maciosek, M.V., Whitebird, R., 2011. Severity of depression and magnitude of productivity loss. Ann. Fam. Med. 9, 305–311.

Broadhead, W.E., Blazer, D.G., George, L.K., Tse, C.K., 1990. Depression, disability days, and days lost from work in a prospective epidemiologic survey. JAMA 264, 2524–2528.

Cho, S.J., Lee, J.Y., Hong, J.P., Lee, H.B., Cho, M.J., Hahm, B.J., 2009. Mental health service use in a nationwide sample of Korean adults. Soc. Psychiatry Psychiatr. Epidemiol. 44, 943.

Choi, H.S., Choi, J.H., Park, K.H., Joo, K.J., Ga, H., Ko, H.J., Kim, S.R., 2007. Standardization of the Korean version of Patient Health Questionnaire-9 as a screening instrument for major depressive disorder. J. Korean Acad. Fam. Med. 28, 114–119 (Korean).

D'Souza, R.M., Strazdins, L., Broom, D.H., Rodgers, B., Berry, H.L., 2006. Work demands, job insecurity and sickness absence from work. how productive is the new, flexible labour force? Aust. N. Z. J. Public Health 30, 205–212.

Ferrari, A.J., Charlson, F.J., Norman, R.E., Patten, S.B., Freedman, G., Murray, C.J., Vos, T., Whiteford, H.A., 2013. Burden of depressive disorders by country, sex, age, and year: findings from the global burden of disease study 2010. PLoS Med. 10, e1001547.

Goetzel, R.Z., Ozminkowski, R.J., Sederer, L.I., Mark, T.L., 2002. The business case for quality mental health services: why employers should care about the mental health and well-being of their employees. J. Occup. Environ. Med. 44, 320–330.

Han, C., Jo, S.A., Kwak, J.H., Pae, C.U., Steffens, D., Jo, I., Park, M.H., 2008. Validation of the Patient Health Questionnaire-9 Korean version in the elderly population: the Ansan Geriatric study. Compr. Psychiatry 49, 218–223.

Henderson, C., Williams, P., Little, K., Thornicroft, G., 2013. Mental health problems in the workplace: changes in employers' knowledge, attitudes and practices in England 2006–2010. Br. J. Psychiatry (Suppl. 55), S70–S76.

Hensing, G., Andersson, L., Brage, S., 2006. Increase in sickness absence with psychiatric diagnosis in Norway: a general population-based epidemiologic study of age, gender and regional distribution. BMC Med. 4, 19.

Hong, J.P., Lee, D., Sim, Y., Kim, Y.H., 2015. Awareness, attitude and impact of perceived depression in the workplace in Korea. J. Korean Neuropsychiatr. Assoc. 54, 188–201 (Korean).

Jain, G., Roy, A., Harikrishnan, V., Yu, S., Dabbous, O., Lawrence, C., 2013. Patient-reported depression severity measured by the PHQ-9 and impact on work productivity: results from a survey of full-time employees in the United States. J. Occup. Environ. Med. 55, 252–258.

Judd, L.L., Akiskal, H.S., Zeller, P.J., Paulus, M., Leon, A.C., Maser, J.D., Endicott, J., Coryell, W., Kunovac, J.L., Mueller, T.I., Rice, J.P., Keller, M.B., 2000. Psychosocial disability during the long-term course of unipolar major depressive disorder. Arch. Gen. Psychiatry 57, 375–380.

Kessler, R.C., Barber, C., Birnbaum, H.G., Frank, R.G., Greenberg, P.E., Rose, R.M., Simon, G.E., Wang, P., 1999. Depression in the workplace: effects on short-term disability. Health Aff. (Millwood) 18, 163–171.

Kim, W., Hwang, T.Y., Ham, B.J., Lee, J.S., Choi, B.H., Kim, S.J., Seo, Y.J., Kang, E.H., Woo, J.M., 2007. The impact of major depressive disorder on productivity in workers: a preliminary study using WHO-HPQ (health and work performance Questionnaire). J. Korean Neuropsychiatr. Assoc. 46, 587–595 (Korean).

Knudsen, A.K., Harvey, S.B., Mykletun, A., Overland, S., 2013. Common mental disorders and long-term sickness absence in a general working population. The Hordaland Health Study. Acta Psychiatr. Scand. 127, 287–297.

Kocalevent, R.D., Hinz, A., Brahler, E., 2013. Standardization of the depression screener patient health questionnaire (PHQ-9) in the general population. Gen. Hosp. Psychiatry 35, 551–555.

Koopmans, P.C., Roelen, C.A.M., Groothoff, J.W., 2008. Sickness absence due to depressive symptoms. Int. Arch. Occup. Environ. Health 81, 711–719.

Kouzis, A.C., Eaton, W.W., 1994. Emotional disability days: prevalence and predictors. Am. J. Public Health 84, 1304–1307.

Kroenke, K., Spitzer, R.L., Williams, J.B., 2001. The PHQ-9: validity of a brief depression severity measure. J. Gen. Intern. Med. 16, 606–613.

Leignel, S., Schuster, J.-P., Hoertel, N., Poulain, X., Limosin, F., 2014. Mental health and substance use among self-employed lawyers and pharmacists. Occup. Med. kqt173.

Lowe, B., Unutzer, J., Callahan, C.M., Perkins, A.J., Kroenke, K., 2004. Monitoring depression treatment outcomes with the patient health questionnaire-9. Med. Care 42, 1194–1201.

Marmot, M., Feeney, A., Shipley, M., North, F., Syme, S.L., 1995. Sickness absence as a measure of health status and functioning: from the UK Whitehall II study. J. Epidemiol. Community Health 49, 124–130.

Martin, A., Rief, W., Klaiberg, A., Braehler, E., 2006. Validity of the Brief Patient Health Questionnaire Mood Scale (PHQ-9) in the general population. Gen. Hosp. Psychiatry 28, 71–77.

OECD, 2011. Self-employment. In: OECD Factbook 2011–2012: Economic, Environmental

and Social Statistics. OECD Publishing, Paris.
Park, J.E., Cho, S.-J., Lee, J.-Y., Sohn, J.H., Seong, S.J., Suk, H.W., Cho, M.J., 2015. Impact of stigma on use of mental health services by elderly Koreans. Social. Psychiatry Psychiatr. Epidemiol. 50, 757–766.
Parslow*, R.A., Jorm, A.F., Christensen, H., Rodgers, B., Strazdins, L., D'souza, R.M., 2004. The associations between work stress and mental health: a comparison of organizationally employed and self-employed workers. Work Stress 18, 231–244.
Pinto-Meza, A., Serrano-Blanco, A., Penarrubia, M.T., Blanco, E., Haro, J.M., 2005. Assessing depression in primary care with the PHQ-9: can it be carried out over the telephone? J. Gen. Intern. Med. 20, 738–742.
Revicki, D.A., Irwin, D., Reblando, J., Simon, G.E., 1994. The accuracy of self-reported disability days. Med. Care 32, 401–404.
Rost, K.M., Meng, H., Xu, S., 2014. Work productivity loss from depression: evidence from an employer survey. BMC Health Serv. Res. 14, 597.
Simon, G.E., VonKorff, M., Barlow, W., 1995. Health care costs of primary care patients with recognized depression. Arch. Gen. Psychiatry 52, 850–856.
Stansfeld, S., Feeney, A., Head, J., Canner, R., North, F., Marmot, M., 1995. Sickness absence for psychiatric illness: the Whitehall II Study. Soc. Sci. Med. 40, 189–197.
Wang, Y.P., Gorenstein, C., 2014. Attitude and impact of perceived depression in the workplace. Int. J. Environ. Res. Public Health 11, 6021–6036.