Original Article

Analysis of stress, musculoskeletal disorders, and fatigue among broadcasting actors

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Abstract. [Purpose] The purpose of the study was to assess the health effects of broadcasting actors through a comprehensive research on their job stress, psychosocial stress, and fatigue and to investigate those factors having an impact on their health condition to present a basis for comparative studies and effective human resource management in the future. [Subjects and Methods] A survey was performed to analyze the relevance of the general features, job stress, psychosocial stress, and fatigue. [Results] Analysis of job stress, one of the characteristics of individuals, revealed that 32.4% of the subjects with less than 5 years of service, 55.5% of those with 6 to 10 years of service, and 52.4% of those with more than 10 years of service showed a high level of stress. Analysis of psychosocial stress, another characteristic of individuals, revealed that 13.4% of the nonsmokers had a high level of psychosocial stress, while 37.7% of smokers had a high level of psychosocial stress based on analysis of chronic disease and psychosocial health. [Conclusion] Based on this study of the stress and fatigue of broadcasting actors, it is expected that improvements can be made to promote their mental health conditions and, organizational safety and to promote effective human resource management.

Key words: Broadcasting actors, Stress, Fatigue

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INTRODUCTION

Today’s society is evolving from an industrial one based on manufacturing to an information-oriented one based on the service industry, with the cultural content industry forming the core. Since 2010, the phenomenon referred to as the “Korean Wave” has been spreading all over the world, placing entertainers in the cultural content industry in the spotlight. However, the more attention they receive, the higher the level of stress they experience. Therefore, entertainers are more likely to suffer from depression and panic disorder. Treatment of these issues in entertainers may start with physical therapy, exercise, stress reduction techniques, and cognitive-behavioral therapy. Chronic occupational stress and fatigue are the main factors that threaten their physical and mental health, and they have been studied in several occupations in Korea and other countries. The working patterns of broadcasting actors are very irregular and change their biological rhythms, so they are forced to adjust to conditions, which puts pressure on their health. Stage performers experience such psychological pressure and insecurity in their work. When people have a job environment that does not suit their motivation and abilities, they tend to feel occupational stress. The work performed by a broadcasting actor is considered their occupation. This is why studies on their individual characteristics, such as their job environment, job conditions, attitude towards their job, and stress, are necessary. Therefore, the purpose of this study is to assess the health effects of broadcasting actors through a comprehensive research on job stress, psychosocial stress fatigue and to investigate those factors having an impact on their health to present
the basis for comparative studies and effective human resource management in the future.

SUBJECTS AND METHODS

For this study, a survey was conducted from January 1, 2014, to May 10, 2014, among broadcasting actors who belonged to entertainment management companies in Seoul, South Korea. All participants signed a written informed consent form approved by the Institutional Review Board at Gyeongsan University College.

The questionnaire examined general features such as individual characteristics, job characteristics, and life characteristics, as well as 4 other areas; general features, job stress, psychosocial stress, and fatigue. The survey then analyzed the relevance of the general features, job stress, psychosocial stress, and fatigue.

The tools employed to investigate occupational stress were designed to fit Korean characteristics. The study used the KOSS (Korean Occupational Stress Scale) and employed a questionnaire consisting of 43 items with 8 sub-measures, including the environment, job requirements, insufficient job autonomy, relational conflict, job insecurity, organizational structure, insufficient compensation, and job culture. Each item in the questionnaire was scored using a 4-point scale; the scale ranges from 1 to 4, with 1 representing a low occupational stress level and 4 representing a high occupational stress level. The actual score was converted to a score out of 100, and the following formula was used to obtain the closest value based on a normal distribution.

- Converted score for each sub-measure = (actual score – the number of questionnaire) × 100/
  the highest possible score – the number of questionnaire

- Total score of occupational stress = (sum of all 8 sub-measures)/8

This study used a survey tool called the PWI-SF (Psychosocial Well-being Index Short Form), which is a shortened version of the PWI of Chang. This survey consisted of 18 items and used a 4-points scale of responses including “highly unlikely,” “unlikely,” “likely,” and “highly likely”; the scale ranges from 0 to 3, with 0 representing a low level of stress and 3 representing a high level of stress.

Fatigue was assessed using the MFS (Multidimensional Fatigue Scale) which was invented by Chang based on the FAI (Fatigue Assessment Inventory) developed by Schwartz and others. The MFS consists of 19 items with covering 3 domains, including overall fatigue level (8 items), dysfunctions in daily life (6 items) and situational fatigue (5 items). The subjects of the study were asked to respond about their fatigue level over the past two weeks with the 1-2-3-4-5-6-7 calculation method and classified into the highest fatigue level group (over 93 points, Q4), and 3 normal groups (up to 72 points Q1, from 73 to 82 Q2, from 83 to 92 Q3). Out of the 250 questionnaires distributed to entertainment management companies in Seoul, South Korea, 235 questionnaires were returned; the return rate was 94.0%. However, only 210 questionnaires were used for the actual proof analysis, as 25 questionnaires were excluded that contained inappropriate answers or questions that were not answered. PASW Statistics 18.0 (SPSS Inc., Chicago, IL, USA) was used to process the data as follows: First, descriptive statistics were used to analyze the general characteristics of the subjects. Second, the percentage and frequency were evaluated by conducting a frequency analysis on the general characteristics of the subjects. Third, the Pearson chi-square test was conducted to analyze the correlation among the general characteristics, occupational stress, psychosocial stress, and fatigue of the subjects. Fourth, the cross-ratio of the effect of high occupational stress and 95% of accuracy intervals were converted by using a multiple logistic regression analysis after determination of the cross-ratio cross ratio.

RESULTS

The results of the frequency analysis on the 3 general features of the subjects, individual characteristics, job characteristics, and life characteristics, were as follows: When analyzing the individual characteristics by age, 44.2% of the subjects were in their 30s, 34.2% were in their 20s, and 21.4% were in their 40s. When analyzing the individual characteristics by gender, 53.8% of the subjects were male and 46.1% were female. When analyzing them, by marital status, 73.3% of the subjects were single and 26.7% were married. Finally, when analyzing them by education level, 45.2% of the subjects were university graduates, and 54.8% were college graduates.

Regarding job characteristics, 52.3% of the subjects had been working for over 10 years, 32.3% had been working for 6 to 10 years, and 15.2% had been working for less than 5 years. Regarding life characteristics, 60.0% of the subjects were smokers, 70.4% were drinkers, 83.8% were drivers, 34.3% worked out regularly, and 50.1% suffered from disease (Table 1). When comparing the level of occupational stress with the median of the reference values for occupational stress in males as determined by males on the KOSS, the level of stress regarding job requirements was relatively relatively high, and the levels of stress regarding job insecurity and insufficient compensation were relatively low; there was little difference between the level of occupational stress of the male subjects and the mean reference values for other characteristics. Job requirements also put the highest pressure on the broadcasting actors among the subordinate rankings of occupational stress, followed by job insecurity and organizational structure (Table 2).
The overall average ± standard deviation for the PWI-SF was and that for the MFS, which was used for the fatigue level analysis, was 80.98 ± 17.65; up to 92, which means that 75% of the percentile were classified as ‘normal’ and over 92 were classified as ‘high-risk’. The distribution of occupational stress, psychosocial stress, and fatigue is described below.

In the case of occupational stress, the stress level ratios from most of the subordinate stress categories did not show much difference. However, it was found that 62.3% of the subjects had low job autonomy stress and that 37.7% of the subjects had high job autonomy stress. Regarding job insecurity stress, 62.9% of the subjects had low stress and 37.1% had high stress. In the case of psychosocial health, 4.0% of the subjects were classified into the healthy group, 77.9% were classified into the potentially at risk group, and 18.1% were classified in the high-risk group. In the case of fatigue75.6% of the subjects were classified in the normal group, while 24.4% were classified into the high-risk group (Table 3). In the analysis of occupational stress by individual characteristics, age, gender, marriage, and education were not relevant (p>0.05). However, marriage was relevant at a level of significance of 0.1 (p<0.1).

In addition, in the analysis of the occupational stress by job characteristics, 32.4% of the people who had worked for less

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**Table 1. General characteristics**

| Variables                  | Characteristics | Classification | Frequency (%) |
|----------------------------|-----------------|----------------|---------------|
| Age                        | 20s             | 72 (34.2)      |
|                            | 30s             | 93 (44.2)      |
|                            | >40s            | 45 (21.4)      |
| Gender                     | Male            | 113 (53.8)     |
|                            | Female          | 97 (46.1)      |
| Marital status             | Unmarried       | 154 (73.3)     |
| Educational background     | Married         | 56 (26.7)      |
|                            | Junior college graduate | 115 (54.8) |
|                            | College graduate or higher | 95 (45.2) |
| Years of employment        | 6–10 yrs        | 68 (32.3)      |
|                            | Over 10 yrs     | 110 (52.3)     |
| Smoking                    | No              | 126 (60.0)     |
|                            | Yes             | 84 (40.0)      |
| Alcohol consumption        | No              | 62 (29.6)      |
|                            | Yes             | 386 (70.4)     |
| Driving                    | No              | 34 (16.2)      |
|                            | Yes             | 176 (83.8)     |
| Exercise                   | No              | 138 (65.7)     |
|                            | Yes             | 72 (34.3)      |
| Existence of a disease     | No              | 103 (49.0)     |
|                            | Yes             | 107 (50.1)     |

**Table 2. Comparison of reference levels of job stress with those of broadcasting actors**

| Variables                  | KOSS Median | Mean ± SD | Broadcasting actors Median | Ranking |
|----------------------------|-------------|-----------|---------------------------|---------|
| Total                      | 50.8        | 48.96 ± 10.20 | 48.98                     |         |
| Physical environment       | 44.5        | 48.38 ± 20.60 | 45.34                     | 5       |
| Job demand                 | 50.1        | 55.43 ± 14.24 | 55.28                     | 1       |
| Insufficient job control   | 53.4        | 44.83 ± 13.17 | 53.23                     | 7       |
| Interpersonal conflict     | 33.4        | 41.33 ± 14.65 | 34.33                     | 8       |
| Job insecurity             | 50.1        | 53.90 ± 16.244 | 45.44                     | 2       |
| Organization system        | 52.4        | 52.79 ± 16.16 | 53.38                     | 3       |
| Lack of reward             | 66.7        | 49.46 ± 15.67 | 51                        | 4       |
| Occupational climate       | 41.7        | 46.21 ± 16.95 | 42.68                     | 6       |
than 5 years, showed a high occupational stress level, 55.5% of those who had worked for 6 to 10 years, showed a high occupational stress level, and of those who had worked for 10 years, 52.4% showed a high occupational stress level ($\chi^2=11.142$) ($p<0.05$).

From analysis of the characteristic of life and chronic disease, subjects who did not work out regularly had a high occupational stress level (68.6%) as compared with those who did work out regularly (43.8%) ($\chi^2=15.983$) ($p<0.05$). Smoking, drinking, driving, and chronic disease were not relevant ($p>0.05$) (Table 4). In the analysis of psychosocial stress according to the general characteristics, age, gender, marriage, and education were not relevant ($p>0.05$).

Analysis of the characteristics of life and chronic disease also revealed that, 13.4% of the nonsmokers showed a high risk of psychosocial stress, while the rate was 37.7% in the smokers ($\chi^2=22.487$) ($p<0.05$). In addition, 30.2% of those who did not work out regularly showed a high risk of psychosocial stress, whereas the rate was 14.2% in those who did work out regularly ($\chi^2=12.700$) ($p<0.05$). Furthermore, 13.3% of those who did not have chronic disease were highly stressed psychosocially, while 20.6% of those who did have a chronic disease were highly stressed psychosocially ($\chi^2=11.055$) ($p<0.05$). Drinking was found to be irrelevant, as was driving ($p>0.05$) (Table 5). In the analysis of fatigue according to the general characteristics age, gender, marriage, and education were not found to be relevant ($p>0.05$). In the analysis of fatigue related to the characteristics of life and chronic disease, 20.4% of the nonsmokers and 40.6% of the smokers showed a high risk of fatigue ($\chi^2=12.240$) ($p<0.05$), while 36.0% of those who did not work out regularly and 20.6% of those who did work out regularly showed a high risk of fatigue ($\chi^2=14.280$) ($p<0.05$). Drinking, driving, and chronic disease were not relevant ($p>0.05$) (Table 6).

**DISCUSSION**

Stress is relevant to almost all diseases including physical ones. According to this study, occupational stress has a negative influence on physical, mental, behavioral, and emotional factors, and aggravates disease as well as risk factors. Occupational stress can be caused by the interaction between organizational characteristics and personal attributes. That is, stress is an experience of personal dimension under a given organizational situation. Therefore, occupational stress affects one’s achievements, causing conflict and disturbing corporate goals and achievement. In other words, occupational stress

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**Table 3. Frequency of occupational stress, psychosocial distress, and fatigue**

| Variables | Classification | Frequency (%) |
|-----------|----------------|---------------|
| Physical environment | Low | 114 (54.4) |
| | High | 96 (45.6) |
| Job demand | Low | 124 (58.9) |
| | High | 86 (41.1) |
| Insufficient job control | Low | 131 (62.3) |
| | High | 79 (37.7) |
| Interpersonal conflict | Low | 109 (52.1) |
| | High | 101 (47.9) |
| Occupational Stress | Low | 78 (37.1) |
| | High | 121 (57.8) |
| Organization system | Low | 89 (42.2) |
| | High | 127 (60.3) |
| Lack of reward | Low | 83 (39.7) |
| | High | 113 (53.8) |
| Occupational climate | Low | 97 (46.2) |
| | High | 106 (50.1) |
| Total | Low | 104 (49.9) |
| | Healthy | 8 (4.0) |
| Psychosocial distress | Potentially at risk | 164 (77.9) |
| | Healthy | 38 (18.1) |
| Fatigue | Normal | 159 (75.6) |
| | High Risk | 51 (24.4) |

**Table 4. Analysis of the relationship between general characteristics and job stress**

| Variables | Classification | Frequency (%) |
|-----------|----------------|---------------|
| | Low | 20s | 33 (45.2) |
| | High | 39 (54.8) |
| | Low | 30s | 43 (46.5) |
| | High | 50 (53.5) |
| | Low | >40s | 23 (51.8) |
| | High | 22 (48.2) |
| Gender | Male | 51 (45.3) |
| | Female | 62 (54.7) |
| Marital status | Single | 107 (69.6) |
| | Married | 47 (30.4) |
| | Low | Education level | 59 (51.7) |
| | High | 56 (48.3) |
| | Low | ≥University | 48 (50.0) |
| | High | 47 (49.8) |
| | Low | 5 yrs or less | 22 (67.6) |
| | High | 32 (32.4) |
| | Low | 6–10 yrs | 30 (44.5) |
| | High | 38 (55.5) |
| | Low | 10 yrs | 52 (47.6) |
| | High | 52 (52.4) |
| Smoking | No | 64 (50.5) |
| | High | 62 (49.5) |
| Alcohol consumption | No | 33 (52.7) |
| | High | 29 (47.3) |
| Driving | No | 14 (41.7) |
| | High | 20 (58.3) |
| Exercise | No | 89 (50.8) |
| | High | 87 (49.2) |
| Chronic disease | No | 55 (53.3) |
| | High | 48 (46.7) |
| | Low | Exercise | 52 (48.5) |
| | High | 55 (51.5) |
### Table 5. Analysis of the relationship between general characteristics and psychosocial stress

| Variables          | Classification | Frequency (%) |
|--------------------|----------------|---------------|
|                    | Healthy        | Potentially at risk | High risk |
| Age group          |                |               |            |
| 20s                | 5 (6.5)        | 53 (74.2)     | 14 (19.4)  |
| 30s                | 4 (4.2)        | 73 (78.9)     | 16 (16.9)  |
| >40s               | 2 (3.6)        | 35 (78.1)     | 8 (18.3)   |
| Gender             |                |               |            |
| Male               | 5 (4.3)        | 66 (58.0)     | 43 (37.7)  |
| Female             | 4 (3.8)        | 73 (75.0)     | 21 (21.3)  |
| Marital status     |                |               |            |
| Single             | 7 (4.3)        | 134 (87.0)    | 13 (8.7)   |
| Married            | 2 (3.9)        | 43 (77.3)     | 11 (18.8)  |
| Education level    |                |               |            |
| Junior college     | 4 (3.3)        | 95 (82.5)     | 16 (14.2)  |
| ≥University        | 5 (5.5)        | 70 (73.4)     | 20 (21.1)  |
| 5 yrs or less      | 1 (2.7)        | 26 (81.1)     | 5 (16.2)   |
| Years worked       |                |               |            |
| 6–10 yrs           | 4 (5.5)        | 53 (78.1)     | 11 (16.4)  |
| Over 10 yrs        | 3 (2.8)        | 82 (74.1)     | 25 (23.1)  |
| Smoking            |                |               |            |
| No                 | 5 (7.3)        | 48 (78.2)     | 9 (14.5)   |
| Yes                | 4 (4.3)        | 49 (58.0)     | 32 (37.7)  |
| Alcohol consumption|                |               |            |
| No                 | 5 (3.4)        | 115 (77.9)    | 28 (18.8)  |
| Yes                | 5 (4.2)        | 26 (75.0)     | 7 (20.8)   |
| Driving            |                |               |            |
| No                 | 7 (4.0)        | 137 (78.1)    | 32 (17.9)  |
| Yes                | 2 (1.2)        | 95 (68.6)     | 42 (30.2)  |
| Exercise           |                |               |            |
| No                 | 4 (4.9)        | 58 (80.9)     | 10 (14.2)  |
| Yes                | 9 (8.3)        | 81 (78.3)     | 14 (13.3)  |
| Chronic disease    |                |               |            |
| No                 | 2 (1.7)        | 83 (77.7)     | 22 (20.6)  |

### Table 6. Analysis of the relationship between general characteristics and fatigue

| Variables          | Classification | Frequency (%) |
|--------------------|----------------|---------------|
|                    | Normal         | High Risk     |
| Age group          |                |               |
| 20s                | 46 (64.5)      | 26 (35.5)     |
| 30s                | 71 (76.1)      | 22 (23.9)     |
| >40s               | 35 (76.9)      | 10 (23.1)     |
| Gender             |                |               |
| Male               | 64 (57.0)      | 49 (43.0)     |
| Female             | 61 (62.8)      | 36 (37.2)     |
| Marital status     |                |               |
| Single             | 134 (87.0)     | 20 (13.0)     |
| Married            | 42 (74.8)      | 14 (25.2)     |
| Education level    |                |               |
| Junior college     | 86 (75.0)      | 29 (25.0)     |
| ≥University        | 73 (76.6)      | 22 (23.4)     |
| 5 yrs or less      | 26 (81.1)      | 6 (18.9)      |
| Years worked       |                |               |
| 6–10 yrs           | 50 (74.0)      | 18 (26.0)     |
| Over 10 yrs        | 80 (72.7)      | 30 (27.3)     |
| Smoking            |                |               |
| No                 | 100 (79.6)     | 26 (20.4)     |
| Yes                | 50 (59.4)      | 34 (40.6)     |
| Alcohol consumption|                |               |
| No                 | 48 (78.2)      | 14 (21.8)     |
| Yes                | 111 (75.2)     | 37 (24.8)     |
| Driving            |                |               |
| No                 | 27 (79.2)      | 7 (20.8)      |
| Yes                | 133 (75.4)     | 43 (24.6)     |
| Exercise           |                |               |
| No                 | 88 (64.0)      | 50 (36.0)     |
| Yes                | 87 (79.4)      | 15 (20.6)     |
| Chronic disease    |                |               |
| No                 | 83 (80.8)      | 20 (19.2)     |
| Yes                | 78 (73.0)      | 29 (27.0)     |
is the stress caused by emotional labor.

The relation between emotional labor and occupational stress was demonstrated in previous studies and confirmed by Mann’s study. It was found that sentimental work itself could be the cause of high occupational stress. In particular, emotional workers are more sensitive to occupational stress, because they are often put in a situation where they have to hide their true feelings, so that they can express appropriate emotion, while performing their tasks, for which they usually receive insufficient compensation. In this study, the occupational stress of the broadcasting actors was 47.96 ± 9.2 points. In a study performed by Kim with the shortened version of the KOSS, the occupational stress of police officers was 60.02 ± 2.49 points, while in the study of Son et al., who also used the KOSS, the average score was 2.42 points out of 4, which is equivalent to 60.5 out of 100 points. The differences between these studies are related to the characteristics of the subjects. Regarding the PWI-SF of the broadcasting actors in the present study, the overall average ± standard deviation score was 21.34 ± 6.61. In addition, analysis of fatigue level with the MSF revealed that the overall average ± standard deviation score was 80.98 ± 17.65.

A study by Chang and others on worker fatigue in Korea indicated the fatigue level to be an average of 78 ± 19.0 when assessed with the MSF. The fatigue level of the broadcasting actors was slightly higher than that of these Korean workers.

The present study found no correlation among age, occupational stress, psychosocial stress, and fatigue. This is because of the different distribution standard compared with previous studies. In particular, the present study had more subjects distributed in the 20 to 30 years of age range, and data collection was limited to a single location. A previous study using the KOSS to assess lifestyle and health-related behavior and to investigate the occupational stress of people working in retail found that nonsmokers, nondrinkers, and those getting regular exercise showed a low stress level, whereas the present study found that only exercise is relevant to occupational stress. Previous studies of the social psychological features revealed that occupational stress, smoking, and social psychological stress have a very close relationship, and that habitual smoking and coffee drinking have a positive relationship with chronic stress. Cha et al. also demonstrated the existence of such a correlation when it comes to smoking. Smoking has nothing to do with occupational stress factors, but smokers showed a high stress level in terms of social psychological stress. Regarding fatigue, Chang et al. found that regular exercise has a high correlation with a lowering of the fatigue level, other studies have shown that smokers are more likely to have difficulty waking up in the morning, and some reports have stated that smoking has nothing to do with fatigue. This study showed the same pattern as those studies showing the existence of such correlations, as the smokers and subjects who did not get regular exercise in this study showed significantly higher levels of social psychological stress and fatigue than the nonsmokers and those who did get regular exercise. In particular, even though smoking had nothing to do with occupational stress, it showed a statistical relation to social psychological stress, which is the same result as that of Cha’s study. The present study confirmed that stress and fatigue are health-threatening factors. This study has some limitations. First, there were some indications that the study tool we used, the KOSS, which was also used by Chang et al. to investigate the occupational stress of Korean workers, was not able to understand the characteristics of the broadcasting actors’ organizational structures due to their occupational characteristics.

Second, previous studies have investigated the correlations between the cardiovascular system (hypertension, hyperlipidemia, and smoking) and occupational stress, and found that occupational stress has a close relationship with the outbreak of cardiovascular disorders.

Considering the fact that a previous study found that workers in a hypertonic group were more likely to have cardiovascular disorders, it would be very helpful to manage the human resources of the broadcasting actors if the present study were to be extended to investigate the correlation between occupational stress and cardiovascular disorders among broadcasting actors, who are considered to represent one of the most hypertonic groups. Nevertheless, this study was significant in that it studied the stress level of broadcasting actors by using the KOSS, PWI-SF, and MFS, which have been proven to be trustworthy and reasonable and actually used by several research groups. Besides, considering that the effects of occupational stress and fatigue appear to differ depending on the occupation, the present study is meaningful in that it involved a proper investigation of such correlations, because it was only focused on one occupation, the broadcasting actor, and gathered even population from national units and other parts by allocating randomly. Based on this study of the stress and fatigue of broadcasting actors, it is expected that improvements can be made to promote their mental health conditions and organizational safety and to promote effective human resource management. The study is also expected to be useful in the prevention and early management of job-related disease.

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REFERENCES

1) Roh H, Lee D, Kim Y: Prevalence of work-related musculoskeletal symptoms and their associations with job stress in female caregivers living in South Korea. J Phys Ther Sci, 2014, 26: 665–669. [Medline] [CrossRef]

2) de Croon EM, Blonk RW, de Zwart BC, et al.: Job stress, fatigue, and job dissatisfaction in Dutch lorry drivers: towards an occupation specific model of job demands and control. Occup Environ Med, 2002, 59: 356–361. [Medline] [CrossRef]

3) Lee KH, Koh SB, Kang D, et al.: Job stress and self-perceived fatigue in Korean farmers. Korean J Occup Environ Med, 2011, 23: 213–224.

4) Kim YS: Psychological measure research of job stress of model and distilling the stage fear. J Kor Model, 2008, 2: 21–46.

5) Chang SJ, Koh SB, Kang D, et al.: Developing an occupational stress scale for Korean employees. Korean J Occup Environ Med, 2005, 17: 297–317.

6) Chang S: Stress. The Korean society of preventive medicine, standardization and measurement of health. Gyechosook Press. Seoul; 2000.

7) Schwartz JE, Jandorf L, Krupp LB: The measurement of fatigue: a new instrument. J Psychosom Res, 1993, 37: 753–762. [Medline] [CrossRef]

8) Chang S: Fatigue: The Korean society of preventive medicine, standardization and measurement of health. Gyechosook Press. Seoul; 2000.

9) Cordes CL, Dougherty TW: A review and an integration of research on job burnout. Acad Manage Rev, 1993, 18: 621–656.

10) Latack JC, Kinicki AJ, Prussia GE: An integrative process model of coping with job loss. Acad Manage Rev, 1995, 20: 311–342.

11) Mann S: People-work: emotion management, stress and coping. Br J Guid Counc, 2004, 32: 205–221. [CrossRef]

12) Lee JY, Hj MW: Relation among emotional laborors job stress, role conflict, ego-resilience and job turnover. The Korea Contents Association, 2012, 12: 191–200.

13) Kim HR: The relationship between job stress and family function of police officers. Korean J Occup Environ Med, 2012, 20: 105–111.

14) Son YJ, Song YA, Choi EY: The relationship between occupational stress and exhaustion in the police. Korean J Occup Environ Med, 2008, 16: 225–231.

15) Chang SJ, Koh SB, Kang MG, et al.: [Correlates of self-rated fatigue in Korean employees]. J Prev Med Public Health, 2005, 38: 71–81. [Medline]

16) Yoon HY, Park JF: A study on job stress of workers at distribution industry. J Ind Eng Chem, 2008, 31: 41–48.

17) Epstein LH, Perkins KA: Smoking, stress, and coronary heart disease. J Consult Clin Psychol, 1988, 56: 342–349. [Medline] [CrossRef]

18) Conway TL, Vickers RR Jr, Ward HW, et al.: Occupational stress and variation in cigarette, coffee, and alcohol consumption. J Health Soc Behav, 1981, 22: 155–165. [CrossRef]

19) Cha BS, Chang SJ, Park JK, et al.: Effects of cigarette smoking on psychosocial distress and occupational risks. Korean J Prev Med, 1997, 30: 540–554.

20) Åkerstedt T, Knutsson A, Westerholm P, et al.: Sleep disturbances, work stress and work hours: a cross-sectional study. J Psychosom Res, 2002, 53: 741–748. [Medline] [CrossRef]

21) Pieper C, LaCroix AZ, Karasek RA: The relation of psychosocial dimensions of work with coronary heart disease risk factors: a meta-analysis of five United States data bases. Am J Epidemiol, 1989, 129: 483–494. [Medline] [CrossRef]

22) Schnall PL, Schwartz JE, Landsbergs PA, et al.: Relation between job strain, alcohol, and ambulatory blood pressure. Hypertension, 1992, 19: 488–494. [Medline] [CrossRef]

23) Theorell T, Ahlberg-Hulten G, Jodko M, et al.: Influence of job strain and emotion on blood pressure in female hospital personnel during workhours. Scand J Work Environ Health, 1993, 19: 313–318. [Medline] [CrossRef]

24) Karasek RA, Theorell T, Schwartz JE, et al.: Job characteristics in relation to the prevalence of myocardial infarction in the US Health Examination Survey (HES) and the Health and Nutrition Examination Survey (HANES). Am J Public Health, 1988, 78: 910–918. [Medline] [CrossRef]

25) Ishizaki M, Tsurutani I, Noborisaka Y, et al.: Relationship between job stress and plasma fibrinolytic activity in male Japanese workers. Int Arch Occup Environ Health, 1996, 68: 315–320. [Medline] [CrossRef]