Short Communication

Relationship of Job Stress with Nicotine Dependence of Smokers
—A Cross-Sectional Study of Female Nurses in a General Hospital

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Key words: Job stress, Nicotine dependence, Nurse, Smoking, the Fagerstrom Test for Nicotine Dependence (FTND), the Job Content Questionnaire (JCQ), the Tobacco Dependence Screener (TDS)

The degree of nicotine dependence is an important predictor of successful cessation of smoking among smokers1,2,3,4. Some investigators reported a possible relationship between reducing job stress and successful smoking cessation5,6. This may be attributable to the effect of job stress on nicotine dependence. That is, high levels of job stress could produce and/or maintain high levels of nicotine dependence among smokers, and could result in difficulty in smoking cessation. If this hypothesis were true, workplace smoking cessation programs should take account of the influence of job stress on nicotine dependence, and measures to curb nicotine dependence resulting from coping with job stress should be introduced into the programs. There are, however, few reports that deal with the influence of job stress on the nicotine dependence of smokers in the workplace.

Tobacco dependence is a multi-dimensional addiction that includes psychological and behavioral aspects of dependence on smoking or nicotine as well as physiological dependence4,7,8. It is important to measure various aspects of nicotine dependence separately. Two short and easy-to-apply self-reporting questionnaires are frequently used to screen for nicotine dependence. They are the Fagerstrom Test of Nicotine Dependence (FTND)1,2 and the Tobacco Dependence Screener (TDS)3,4. They evaluate different aspects of nicotine dependence. The FTND assesses the physiological aspects of nicotine dependence and is positively associated with the number of cigarettes smoked per day and the plasma level of nicotine and cotinine1,2,9,10. On the other hand, the TDS is closely correlated with the psychological aspects of nicotine dependence; a TDS score of 6 or greater indicates nicotine dependence diagnosed according to the International Classification of Diseases, 10th revision (ICD-10)11, and the Diagnostic and Statistical Manual of Mental Disorders, third edition revised (DSM-III-R)12, with sensitivity values of 95% and 79%, and specificity values of 81% and 66%, respectively4. In addition, previous studies reported a poor concordance between the FTND score and the DSM-III-R diagnosis13-14; Moolchan et al.14 showed that the highest kappa (at a cutoff of the FTND=7 or greater) was .205.

The objective of this cross-sectional study was to examine the relationship between perceived job stress and nicotine dependence assessed with two self-reporting questionnaires (i.e., the FTND and TDS) completed by workers who smoked tobacco. Nurses were chosen as subjects in this study. They are health professionals with a reportedly high prevalence of smoking15,16; in addition, they are expected to act as role models for patients with a desire to quit smoking. Elkind17 has reported that certain peculiar characteristics associated with the hospital environment and the nursing process may contribute to the smoking habits of nurses. Nurses deserve special attention in developing a smoking cessation program which considers the influence of job stress on the smoking habit.

Subjects and Methods

Subjects
A cross-sectional survey was performed in O prefecture in Japan at a private general hospital employing a total of 408 nurses. For this study, nurses included registered nurses (RNs) and licensed practical nurses (LPNs). All 408 nurses were asked to answer the questionnaire. The chief nurse of each department distributed the questionnaire to the 408 eligible nurses in early September 2001. Those participating remained anonymous. A total of 395 replied to the survey. Of the respondents, three male nurses were rejected. Of the 392 female nurses, 60 were rejected due to incomplete responses (18 for smoking status, 3 for age, 48 for job stress items). Finally, 332 female nurses completed the questionnaire. They consisted of 39 current smokers (11.7%) and 293 nonsmokers (88.3%).

Informed consent
A statement at the top of the questionnaire explained that the results were to be used exclusively for this study and that the identities of the participants would be protected when reporting the results. Those who chose not to answer the questionnaire were allowed to keep it.

Received Sep 1, 2003; Accepted March 3, 2004
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**Questionnaire and measurements**

The nurses were asked about age, smoking status, and job stress. The current smokers were asked about their degree of nicotine dependence. Smoking status was evaluated by the response to the following question:

- Do you currently smoke tobacco products?
  - 1. I am not currently smoking and have never smoked.
  - 2. I smoked in the past, but I am not currently smoking.
  - 3. I am currently smoking.

Those who chose answer number 3 were defined as the current smokers, while those who chose answers 1 and 2 were defined as nonsmokers.

Job stress was evaluated by the Job Content Questionnaire (JCQ)\(^{18, 19}\). With the JCQ, the work conditions can be evaluated objectively with four scales on the following subjects: psychological demand, decision latitude, supervisor support, and coworker support. Kawakami et al.\(^{20}\) developed a short-form Japanese version of the JCQ, which consists of the 22 items that we adopted for this study. Its reliability and validity were tested in two studies\(^{20, 21}\).

Nicotine dependence was measured by the FTND\(^1, 2\) and TDS\(^4\). In both measurements, a greater score suggests more dependence. The TND consists of six items. The total score ranges from 0 to 10. The TDS consists of ten yes/no questions and is scored according to the number of affirmative answers.

**Statistical analyses**

Among current smokers, Spearman rank correlation coefficients were computed, and a multiple linear regression analysis was performed to examine the associations of the JCQ job stress scales with the FTND and TDS. A significant level of .05 was adopted for all statistical tests. SPSS 11.0J for Windows\(^{22}\) was used for the statistical analyses.

**Table 1.** Mean (standard deviation) of each study variable by smoking status

<table>
<thead>
<tr>
<th>Study variables</th>
<th>Current smokers (n=39)</th>
<th>Nonsmokers (n=293)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>26.5 (5.0)</td>
<td>30.9 (9.7)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Nicotine dependence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TDS</td>
<td>5.7 (2.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FTND</td>
<td>3.4 (1.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JCQ score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychological demand</td>
<td>37.4 (4.0)</td>
<td>37.3 (4.5)</td>
<td>.439</td>
</tr>
<tr>
<td>Decision latitude</td>
<td>68.9 (7.2)</td>
<td>68.5 (6.4)</td>
<td>.394</td>
</tr>
<tr>
<td>Supervisor support</td>
<td>11.1 (1.9)</td>
<td>11.4 (2.2)</td>
<td>.291</td>
</tr>
<tr>
<td>Coworker support</td>
<td>11.8 (1.3)</td>
<td>12.0 (1.6)</td>
<td>.550</td>
</tr>
</tbody>
</table>

Note. TDS: the Tobacco Dependence Screener, FTND: the Fagerstrom Test for Nicotine Dependence, JCQ: the Job Content Questionnaire. p values were calculated by t-test for age, and by age-adjusted analysis of covariance for the JCQ job stress scales.

**Table 2.** Spearman’s correlation coefficients between nicotine dependence scores and job stress scales among current smokers (n=39)

<table>
<thead>
<tr>
<th></th>
<th>TDS</th>
<th>FTND</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological demand</td>
<td>.538(^a)</td>
<td>−.295</td>
</tr>
<tr>
<td>Decision latitude</td>
<td>.257</td>
<td>−.058</td>
</tr>
<tr>
<td>Supervisor support</td>
<td>−.031</td>
<td>.046</td>
</tr>
<tr>
<td>Coworker support</td>
<td>−.041</td>
<td>−.058</td>
</tr>
</tbody>
</table>

\(^a\): p<.001. Note. TDS: the Tobacco Dependence Screener, FTND: the Fagerstrom Test for Nicotine Dependence. Coefficients with no annotation mean insignificant correlation.

**Results**

The demographic characteristics of the subjects of this study are summarized in Table 1. The 39 current smokers were significantly younger than the 293 nonsmokers. There was no significant difference in all four JCQ job stress scales between current smokers and nonsmokers.

There was no correlation between the TDS score and the FTND score among the 39 current smokers (Spearman’s correlation coefficient=.023, p=.892). Table 2 shows Spearman’s correlation coefficients between job stress factor scores and nicotine dependence scores among the 39 current smokers. The psychological-demand scale was differently related with the TDS and the FTND score. The psychological-demand scale had a significantly positive correlation with the TDS score (Spearman’s correlation coefficient=.538, p<.001). The psychological demand was negatively correlated with the FTND score, but significance was at the borderline (Spearman’s correlation coefficient=−.295, p=.068). Even after controlling for age and other job-stress scales, the psychological-demand scale was positively correlated...
with the TDS score (standardized beta=.417, p=.009, Table 3). No other job-stress scales (i.e., decision latitude, supervisor support, and coworker support) were associated with the TDS or the FTND score.

Discussion

The present study revealed an association between perceived job demand and self-reported nicotine dependence.

Psychological job demand showed a significantly positive correlation with the TDS score. This relationship may be attributed to the associations between psychological demands and psychological distress\(^23, 24\). The symptoms of mental distress associated with high psychological demand are similar to nicotine withdrawal symptoms including a dysphoric or depressed mood, insomnia, irritability, frustration, anger, anxiety, difficulty concentrating, or restlessness\(^25\). To diminish such symptoms, nurses with increased levels of high psychological demand may crave tobacco, smoke, and become psychologically more dependent on smoking.

This mechanism is partly supported by a survey by Kawakami and colleagues\(^26\). In that study, male workers feeling more frequent exhaustion after work showed a significantly higher rate of tobacco withdrawal symptoms diagnosed according to the *DSM*, third edition\(^27\). The study suggested that psychological distress, such as exhaustion after work, might play a role in developing tobacco withdrawal symptoms. Smokers with increased levels of high psychological demand would possibly choose tobacco smoking to relieve such symptoms, and would become psychologically more dependent on smoking.

The FTND showed no significant association with job stress in this study. No previous report has shown an association between job stress and an FTND score. An FTND score is likely to have a positive correlation with the number of cigarettes smoked\(^2\). Conflicting results have been presented on the associations between job stress and the number of cigarettes smoked per day. Two previous reports showed a null correlation between job stress and the number of cigarettes smoked per day\(^28, 29\). On the other hand, Hellerstedt and Jeffery\(^30\) showed a positive correlation between psychological job demand and the number of cigarettes smoked per day among women, which indicates the possibility of a positive

### Table 3. Results of multiple linear regression analysis to examine the associations between the scores of the Tobacco Dependence Screener (TDS) and job stress scales while controlling for age (n=39)

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>The TDS score (Independent variable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standardized beta</td>
</tr>
<tr>
<td>Age</td>
<td>-.174</td>
</tr>
<tr>
<td>Psychological demand</td>
<td>.417</td>
</tr>
<tr>
<td>Decision latitude</td>
<td>.242</td>
</tr>
<tr>
<td>Supervisor support</td>
<td>-.205</td>
</tr>
<tr>
<td>Coworker support</td>
<td>.030</td>
</tr>
<tr>
<td><strong>R square</strong></td>
<td>.316</td>
</tr>
</tbody>
</table>

### Table 4. Results of multiple linear regression analysis to examine the associations between the scores of the Fagerstrom Test for Nicotine Dependence (FTND) and job stress scales while controlling for age (n=39)

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>The FTND score (Independent variable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standardized beta</td>
</tr>
<tr>
<td>Age</td>
<td>.153</td>
</tr>
<tr>
<td>Psychological demand</td>
<td>-.199</td>
</tr>
<tr>
<td>Decision latitude</td>
<td>-.113</td>
</tr>
<tr>
<td>Supervisor support</td>
<td>.100</td>
</tr>
<tr>
<td>Coworker support</td>
<td>.054</td>
</tr>
<tr>
<td><strong>R square</strong></td>
<td>.092</td>
</tr>
</tbody>
</table>
The relationship between psychological job demand and the FTND score. More studies are needed to examine the effect of job stress on the FTND score.

There was no correlation between the TDS and FTND scores. Furthermore, the present study showed that the TDS and FTND had different relationships to psychological job demand; the TDS had a significantly positive correlation with psychological job demand, whereas the FTND had an insignificant one. These findings support the multi-dimensional nature of nicotine dependence. The FTND and TDS capture different aspects of nicotine dependence.

The current study, the percentage of nurses who smoked was lower than figures reported in other studies. The prevalence of current smokers in the study site was 22.9%. The low prevalence of current smokers in the present study might be a way of stress management would not look for other measures to reduce their stress. And, this might emphasize the relationship between psychological job demand and nicotine dependence. Smoking years should be also addressed as a study variable in future studies because of the possible effect on nicotine dependence.

If our hypothesis were true, stress management would be a useful element of smoking cessation programs that target nurses who smoke and are dependent on tobacco. Nurses might be able to reduce the withdrawal symptoms of nicotine dependence by learning appropriate methods for managing psychological demands, or their administrators might assist them by relieving them of their perceived psychological demands.

**Conclusion**

In this study, among nurses who smoke tobacco products, there was an association between the perceived psychological levels of job demands and the psychological aspects of nicotine dependence. Smoking cessation programs that target nurses should include methods for coping with the psychological demands of the job.

**References**

29) C Brisson, B Larocque, J Moisan, M Vezina and GR Dagenais: Psychosocial factors at work, smoking, sedentary behavior, and body mass index; a prevalence study among 6995 white collar workers. JOEM 42, 40–46 (2000)