Job Strain among Rubber-Glove-Factory Workers in Central Thailand

Muang Muang SEIN¹, Nopporn HOWTEERAKUL²*, Nawarat SUWANNAPONG² and Jirachai JIRACHEWEE³

¹Malteser (Germany), 60 Tharyarwaddy Street, Bahan Township, Yangon, Myanmar
²Department of Epidemiology, Faculty of Public Health, Mahidol University, 420/1 Rajvithi Road, Bangkok 10400, Thailand
³Office of the Permanent Secretary, Ministry of Public Health, Thailand

Received April 17, 2008 and accepted December 15, 2009

Abstract: Job strain has become a major concern because of its potential impacts on worker well-being and performance. This cross-sectional study aimed to assess the prevalence of, and examine factors associated with, job strain among workers in a rubber-glove factory, in a central province of Thailand. A total of 200 workers aged 18–55 yr, who had worked at the factory for at least 6 months, completed the Job Content Questionnaire (JCQ) (Thai Version). Two of 5 scales in the JCQ were used to measure job strain, i.e.; job control and psychological job demand. The prevalence of job strain was 27.5%. Multiple logistic regression analysis indicated two variables significantly associated with job strain: low supervisor social support (adjusted OR=3.08; 95% CI: 1.38–6.91) and high job insecurity (adjusted OR=2.25; 95% CI: 1.04–4.88). Effective training for supervisors, to create good relationships among workers and supervisors, and ensuring steady and secure jobs for good employees, are necessary.

Key words: Job strain, Rubber glove, Factory workers, Occupational health, Psychosocial work factor, Thailand

Introduction

Factory workers develop a wide variety of occupational illnesses during their working lives, manifested in physical and psychological stress. Several studies have linked job strain (stress) to hypertension and coronary heart disease¹⁻⁶. High job strain increases the healthcare costs of organizations and leads to decreased organizational productivity, with frequent accidents, absenteeism, and increased turnover rates⁷⁻¹¹. Among many instruments used for the assessment of psychosocial work factors, the Job Content Questionnaire (JCQ), based on Karasek’s demand-control model, has been the most popular. The model emphasizes the interaction of 2 factors: high psychological job demands and low job control, which result in psychological strain¹². The model has been redefined by the addition of workplace social support. Jobs were considered most hazardous when high job strain combined with low workplace social support⁵, ¹², ¹³.

Over the past 2 decades, Thailand has developed into an industrialized country. Many thousands of people are now working in industrial estates. During these rapid economic and cultural changes, job strain among factory workers has become particularly serious and needs to be assessed. Rubber-glove manufacture is an important industry in Thailand in terms of both employment and exports. In 2004, the export value of rubber gloves was estimated at US$ 486.1 million which was about a 2.4% increase over the previous year¹⁴. Due to markedly increased efforts to prevent the transmission of many infectious diseases to healthcare workers, the demand and usage of gloves is increasing dramatically. The factory that participated in this study was fitted out with modern machinery, using manual and semi-automatic systems. The machines were regularly checked and maintained by qualified quality-control experts.
The manufacture of rubber-gloves is a labor-intensive and complex. The four main production stages for the high-quality gloves are dipping, leaching, vulcanization and quality control.

Most workers are production and quality control operators and about 95% have educational levels below bachelor degree. The workers in rubber-glove factory are suspected to be at high risk of job strain since during the manufacturing process, they are exposed to a work environment contaminated with dust, talcum powder, chemical byproducts, noise, repetitive motion, frequent lifting, and shift work which may lead to the development of jobstrain. Some workers feel intense psychological pressure because the supervisors are quite critical. In addition, extensive restructuring of the labor market, the increased demand for skilled workers and competition pressures that demand higher productivity levels, put workers at increased risk of exposure to high psychological job demands and job insecurity.

At present, very little information exists on job strain in Thai factories, and its effects on worker health and wellbeing. Only 2 published literatures reported the use of 14 JCQ questions on separated scores of psychological job demand and work control and psychological and physical job demands. The first study examined the effect of heavy maternal workload which included the use of 14 items of Karasek’s JCQ on fetal growth retardation and preterm delivery among women attending antenatal clinic of two hospitals in southern Thailand. The second study assessed whether psychological and physical demands were the significant predictors of exercise participation among female hospital nurses. Therefore, this study aimed to assess the prevalence of, and factors associated with, job strain using a 27-item questionnaire from JCQ among workers in a rubber-glove factory, in a central province of Thailand.

**Subjects and Methods**

**Participants**

This cross-sectional study was conducted in a medium-sized factory (area 17,600 square meters; personnel 300) producing examination and surgical gloves in a central province of Thailand. Rubber glove manufacture is an important industry in the province studied. Baseline data of occupational stress among workers were needed to identify any potential need for a stress management program in the workplace. The study subjects were recruited using universal sampling. Sample size was estimated using the single proportion formula, with 95% confidence interval. A sample size of 193 cases was calculated, based on a rate of 23.6% job strain among workers in an electronics factory. Precision was set at 6.0%. With an assumption of 10% non-response, the final sample size was 213. Inclusion criteria were factory workers—aged 18–55 yr who had worked in the factory under study for at least 6 months before conduct of this survey; still working in the factory during the survey; and willing to participate in the study. Workers who were diagnosed with mental-health disorders were excluded.

In the study, supervisors were asked to distribute self-administered questionnaires to their workers during a rest hour. A small souvenir was given to each worker returning a completed questionnaire. A total of 203 (response rate 95.3%) study subjects returned questionnaires. After excluding 3 incomplete questionnaires, the final response was 200 cases. The Ethics Committee of the Faculty of Public Health, Mahidol University, approved the research protocol. Permission to conduct the study was obtained from the factory manager. All study subjects provided verbal informed consent.

**Instrumentation**

The survey instrument was a three-part questionnaire. Part I comprised 9 closed-ended questions about the respondent’s general characteristics, including sex, age, education level, marital status, number of children, job experience, job rank, chronic disease or other illness and perceived work environment. Part II was concerned with lifestyle factors, including shift work, working hours, smoking, alcohol consumption, and exercise. Part III dealt with psychosocial work factors. This part was a 27-item questionnaire from the Job Content Questionnaire. The questionnaire was translated into Thai with minor modifications to assess 5 major JCQ scales—job control, psychological job demand, workplace social support, physical job demand, and job insecurity. Job control and psychological job demand scales were used to measure job strain (Table 1). The job-control scale was the sum of two subscales, skill discretion, measured by 6 items, and decision authority, measured by 3 items. The psychological job demand scale was measured by 5 items. The workplace social support scale was the sum of 2 subscales, support from supervisors and support from co-workers, each measured by 4 items. The physical job demand scale was measured by 2 items and the job insecurity scale by 3 items. For each item, the response was recorded on a 4-point Likert-type scale, ranging from 1 (strongly disagree), 2 (disagree), 3 (agree), to 4 (strongly agree). For each scale, a sum of weighted item scores was calculated. Calculation formulas and possible scores are shown in Table 1. The Cronbach’s alpha coefficient for scales and sub-scales ranged between 0.319–0.894.
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All 22 items of the 4 scales of supervisor support, co-worker support, job control and psychological job demand were included for analyzing explanatory factors. The first factor was highly associated with the supervisor support scale with a loading range of 0.67–0.87. The second factor was associated with co-worker support with a loading range of 0.77–0.86. The third factor was associated with job control scale with a loading range of 0.31–0.77. The item in Q2 “Repetitive work” did not have a loading >0.30 for any factors. The item in Q3 “Requires creativity” that might reflect factor four. The fourth factor was associated with psychological job demand scale with a loading ranged from –0.54 to 0.58. The item in Q10 “Work fast” did not have a loading >0.30 for any factor. The item in Q11 “Work hard” that might reflect factor one.

Data analysis

Data entry and analysis were performed using SPSS for Windows Version 11.524). Descriptive statistics, i.e., frequency, percentage, mean, and median, were used to describe all studied variables. To determine the prevalence of job strain (high psychological job demand and low job control) in the personnel, job control and psychological job demand scores were dichotomized by median cut-off points to obtain “high (≥median score)” and “low (<median score)” values for each scale. Based on Karasek’s model7, 12), the interaction of job control and psychological job demand resulted in 4 types of jobs: active jobs (high psychological job demand and high job control), high strain jobs (high psychological job demand and low job control), passive jobs (low psychological job demand and low job control), and low stress jobs (low psychological job demand and high job control).

Associations were expressed as odds ratios (ORs) and 95% confidence intervals (CI). In the analysis, job strain was dichotomized into, “high job strain” and “non-high job strain25)”. All variables with p value ≤0.05 in univariate analysis and biological plausibility were simultaneously analyzed by multiple logistic regressions. The multivariate model included, age, sex, education, marital status, chronic diseases/other illness, perceived physical environment, working hours per day, smoking, alcohol drinking, physical exercise, job insecurity, supervisor support, co-worker support and physical demand. Shift work was not entered into the final regression model due to its colinearity with working hours. The level of significance was set at p≤0.05.

Results

Of the 200 respondents, 75.5% were female. 51.0% were aged >35 yr. 70.0% had finished secondary school or lower. 66.0% were married, and 38.0% had one child. 42.0% had work experience <5 yr. 83.0% did not have chronic diseases or other illness; 8.0% had hypertension; others included diabetes 1.5%, heart disease 0.5%, and hepatitis 0.5%. 53.5% perceived that the work environment was too warm or poorly ventilated (Table 4). In terms of lifestyle and psychological work factors, 46.0% of the respondents did shift work. 77.5% worked 7–8 h per day. 15.0% were current smokers. 19.0% were current alcohol drinkers. 10.5%

### Table 1. Calculation formulas and possible scores for the JCQ

<table>
<thead>
<tr>
<th>Scale (No. of items)</th>
<th>Formula</th>
<th>Possible score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job control (9)</td>
<td>skill discretion + decision authority</td>
<td>24–96</td>
</tr>
<tr>
<td>Skill discretion (6)</td>
<td>[Q1+Q3+Q5+Q7+Q9+(5–Q2)]×2</td>
<td>12–48</td>
</tr>
<tr>
<td>Decision authority (3)</td>
<td>[Q4+Q6+(5–Q8)]×4</td>
<td>12–48</td>
</tr>
<tr>
<td>Psychological job demand (5)</td>
<td>3×(Q10+Q11+2×[15–(Q12+Q13+Q14)])</td>
<td>12–48</td>
</tr>
<tr>
<td>Workplace social support (8)</td>
<td>supervisor support + co-worker support</td>
<td>8–32</td>
</tr>
<tr>
<td>Supervisor support (4)</td>
<td>Q20+Q21+Q22+Q23</td>
<td>4–16</td>
</tr>
<tr>
<td>Co-worker support (4)</td>
<td>Q24+Q25+Q26+Q27</td>
<td>4–16</td>
</tr>
<tr>
<td>Physical job demand (2)</td>
<td>Q15+Q16</td>
<td>2–8</td>
</tr>
<tr>
<td>Job insecurity (3)</td>
<td>Q19+10–(Q17+Q18)</td>
<td>3–12</td>
</tr>
</tbody>
</table>

### Table 2. Mean values, standard deviations (SD), ranges and Cronbach’s alpha coefficients (α) of the JCQ subscale (n=200)

<table>
<thead>
<tr>
<th>Scale (No. of items)</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>Cronbach’s α coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job control (9)</td>
<td>63.7</td>
<td>7.4</td>
<td>32–86</td>
<td>0.669</td>
</tr>
<tr>
<td>Skill discretion (6)</td>
<td>32.4</td>
<td>3.8</td>
<td>16–42</td>
<td>0.594</td>
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<tr>
<td>Decision authority (3)</td>
<td>31.3</td>
<td>4.6</td>
<td>16–44</td>
<td>0.415</td>
</tr>
<tr>
<td>Psychological job demand (5)</td>
<td>33.0</td>
<td>3.3</td>
<td>19–45</td>
<td>0.505</td>
</tr>
<tr>
<td>Workplace social support (8)</td>
<td>21.9</td>
<td>3.7</td>
<td>10–32</td>
<td>0.855</td>
</tr>
<tr>
<td>Supervisor support (4)</td>
<td>10.6</td>
<td>2.5</td>
<td>4–16</td>
<td>0.894</td>
</tr>
<tr>
<td>Co-worker support (4)</td>
<td>11.3</td>
<td>2.0</td>
<td>4–16</td>
<td>0.861</td>
</tr>
<tr>
<td>Physical job demand (2)</td>
<td>5.9</td>
<td>0.9</td>
<td>2–8</td>
<td>0.470</td>
</tr>
<tr>
<td>Job insecurity (3)</td>
<td>6.5</td>
<td>2.0</td>
<td>3–11</td>
<td>0.319</td>
</tr>
</tbody>
</table>
reported exercising ≥3 times per week. 57.0% had high workplace social support. 37.5% perceived job insecurity. 81.5% reported high physical job demand (Table 5).

Prevalence of job strain
The prevalence of high job strain was 27.5%. Among the non-high strain group, 41.0% were in active, and 17.0% in passive, jobs (Table 5).

Factors associated with job strain
All variables in Tables 4 and 5 were dichotomized; univariate analysis revealed 3 variables were statistically associated with job strain: supervisor social support, co-worker social support, and job insecurity (data not shown). In addition, variables with p value ≤0.05 in the univariate analysis and biological plausibility were simultaneously analyzed by multiple logistic regressions. Table 7 shows that workers with low supervisor social support and high job insecurity were more likely to develop job strain (the age and sex adjusted OR=3.36; 95%CI: 1.75–6.48 for supervisor support and age and sex adjusted OR=3.05; 95%CI: 1.60–5.81 for job insecurity). Almost the same results were seen with Model 2 which included additional potentially confounding factors. In Model 3 the adjusted ORs were decreased after additionally including life style and psychosocial work factors in the model (adjusted OR=3.08; 95%CI: 1.38–6.91 for supervisor support and adjusted OR=2.25; 95%CI: 1.04–4.88 for job insecurity).

Discussion
Job strain has become a major concern in recent years because of its potential impacts on both worker well-being and performance. In this study, the prevalence of job strain among workers was 27.5%. Due to the limited number of prior studies into job strain in Thailand. It was not possible to locate literature using the same criteria to define “job strain” to permit a meaningful comparison with the results of the present study. The means and standard deviations of Thai JCQ job control and psychological job demand scales were similar to the results for Taiwanese workers in four private factories, especially for men. However, the mean
scores for supervisor support and the co-worker support scales were slightly lower than those for the Taiwanese workers\(^26\).

The results also showed that workers with low supervisor social support were 3.08 times more likely to develop job strain than those with high supervisor social support. Two possible explanations were: the supervisor may place greater emphasis on the product and have little consideration for the workers; and/or, supervisors may not possess appropriate supervisory skills, and inflexibility may cause the workers to suffer increased anxiety about criticism and punishment. In such conditions, workers may feel insecure in the job position, leading to job strain. The results confirmed the findings of Vermeulen and Mustard (2000)\(^27\), who reported that supervisor/co-worker support was significantly related to low perceived work stressors and low psychological distress. Bültman et al. (2002)\(^28\), in the Maastrict Cohort Study, found that conflict with supervisors was significantly associated with psychological distress.
Park and Wilson (2003) reported that relationship with supervisor and co-workers was a significant predictive factor for level of psychological strain among Korean factory workers. The findings also indicated that workers with high job insecurity were 2.25 times more likely to develop job strain than those with low job insecurity. This result was consistent with the findings of Aziah et al. (2004), who reported that the odds of hospital laboratory technicians’ having job strain was 2.4 times higher than those with low job insecurity. Job insecurity can cause psychological tension, fear and anxiety among workers, eventually leading to job strain and illness.

D’Souza et al. (2003) showed that insecure employment and high job strain had independent, consistent, and strong associations with physical and mental health. Chen et al. (2005) suggested that perceived job insecurity itself was an important source of job strain, even with adjustment of exposure to other adverse psychological work conditions, i.e., lower job control, higher job demand, and poor social support at work. Bartley et al. (2004) reported that secure and favorable working conditions considerably reduced the incidence and prevalence of limiting illness.

This study had 5 major limitations: 1) the self-reported psychosocial work factors were measured at only one time-point. Therefore, misclassification of the exposure variables was possible; 2) job strain was defined by dichotomizing the job control and psychological job demand scale scores. The prevalence of job strain might differ from defining job strain by demand-control ratio scale. Dichotomizing the continuous variables also induced loss of statistical power; 3) the cross-sectional study design limited the ability to make valid causal interpretations of the findings; 4) since the sources of stress are multiple, other stressors, such as organizational factors and non-job factors (home environment, support from family and marital relationship), financial stress, and personality factors, cannot be excluded. In addition, other stress buffering factors, such as good coping styles and job satisfaction, play an important role in determining an individual’s psychological and physical well-being; 5) the factory workers were selected from a rubber-glove factory in a central region province. The results may not be representative to other working people in the same industry in Thailand.

In conclusion, the prevalence of job strain among rubber-glove-factory workers was 27.5%. Workers with low supervisor social support and insecure positions were more likely to report high job strain. As the labor market become more globalized and competitive, workers are more likely to encounter job strain and insecurity. Therefore, effective training to create a good work environment, good relationships among workers and supervisors, and ensuring steady and secure employment for good employees, are needed. In addition, the Thai version of JCQ also needs to be further developed and investigated with larger samples from a wider range of occupations to improve the reliability and validity of the questionnaire.

### Acknowledgements

The authors would like to thank Prof. Robert A. Karasek for permission to use the JCQ. Thanks also to all the factory workers who participated in this study. The results reported here are parts of the first author’s MPH thesis from Mahidol University, Thailand. This study was partially supported by the China Medical Board (CMB), Faculty of Public Health, Mahidol University.
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