

Prevalence and Contributing Factors of Job Strain among Crane Operators in a Port Container Terminal in Malaysia

Nor Wahida Yakub,¹ Sherina Mohd Sidik²

¹Department of Environment and Occupational Health, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor

²Department of Psychiatry, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor

ABSTRACT

The information on job strain among crane operators in Malaysia is lacking. The aim of this study was to determine the prevalence and contributing factors of job strain among crane operators working in port container terminals. A cross sectional study was carried out at a port container terminal in Malaysia. Data was collected using validated self-administered questionnaires, which consisted of the Job Content Questionnaire (JCQ), and the Depression, Anxiety, and Stress Scale (DASS-21). All crane operators in the selected terminal participated in the study. Data was analyzed using SPSS version 19. Two-hundred-and-forty crane operators participated in the study. The prevalence of job strain determined from the JCQ was 43.8%. Job strain was significantly associated with psychological job demand, decision latitude, anxiety, physical isometric loads and muscle ache. The prevalence of job strain in this study was high. There is an urgent need to recognize the existence of this problem among crane operators by their respective management. Implementation of comprehensive stress management programs are recommended to reduce job strain among these workers.

Keywords: Job strain, Job-Content-Questionnaire, Crane Operators, Port container terminal, Malaysia

INTRODUCTION

The problems of stress at work are rising slowly as the burden of work increases. It is a psychosocial hazard that poses a threat to the health of workers as well as the organization.¹ The issue of job strain is of utmost importance to the public health community and working population where there are low levels of job satisfaction and high turnover rates. Adequate focus has not been given to crane operators as yet.

In the port industry, job strain relates to job tasks where focus on work is compulsory and high precision is crucial for every single movement.² The scope of a crane operator's job includes weighing, moving and stacking loads such as frozen goods, hazardous products and cargo using hoisting attachments like spreaders and slings. The challenges in their jobs are to ensure the loads safely land on the vessel or on the wharf. They need skills to adjust the loads to avoid any damage to the vessels and equipments. Crane operators must work with precision and keep up with a certain pace to achieve their daily productivity target, as well as ensure the safety of the containers and avoid any damage.² In Malaysia, there are four major ports, which are Port Klang, Penang, Tanjung Pelepas, and Johor. Malaysia was listed in the World Top Container Ranking in 2010. The ranking was measured by output of increasing total number of containers within two years. Among the ports, the highest output was achieved by Port Klang (21%), followed by Penang (15%), Tanjung Pelepas (9%) and Johor (4%).²

A Job Demand-Control-Support (JD-CS) model developed by Doef M & Maes S after a review of twenty years of research hypothesized that workers who are exposed to high psychological demands in combination with low decision latitude are prone to get high job strain.³ High psychological demands include working hard and working fast. Decision latitude means the ability to make work-related decisions. When workers can make decisions to the way they work, they are able to devise coping strategies that can mitigate the effects of stress.⁴ The job decision latitude model asserts that workers will experience adverse health consequences from their work when it makes high demands on them while allowing them little personal control.⁵ For those who are working in an environment of rapid change, increment in the intensity and volume of physical work together with psychological demands can have harmful effects on their health.⁶

As crane operators are subjected to this kind of work environment on a daily basis, it is important to understand how work-associated job strain affects them, and what the causal factors are. This study was undertaken to determine the prevalence and contributing factors of job strain among crane operators in a port container terminal in Malaysia.

*Corresponding author: Prof. Dr. Sherina Mohd Sidik
sherina@upm.edu.my

MATERIAL AND METHODS

A cross sectional study was carried out in a port container terminal in Malaysia. Among the four major ports in Malaysia, this port was selected based on simple random sampling. Data were collected from 12 January 2012 to 17 February 2012, via validated self-administered questionnaires. The study population was all crane operators working in the selected port, and sample size was calculated to be 238 respondents.

Questionnaires

Standardized and validated questionnaires in “Bahasa Malaysia” were used in this study. Permission to use the Malay versions of the Job Content Questionnaire (JCQ)⁷ and the Depression Anxiety Stress Scale (DASS-21)⁸ were obtained from their respective authors. Socio-demographic information on age, ethnicity, marital status, level of education, monthly income and duration of employment were also obtained from the respondents.

Job Content Questionnaire (JCQ)

The validated Malay version of the Job Content Questionnaire (JCQ) was used to measure job strain and the related organizational job-factors.⁷ Four organizational job-factors based on the JCQ (which were [i] decision latitude, [ii] psychological job demand, [iii] job insecurity, and [iv] social support) were chosen as dependent variables in this study. Specific job factors, such as toxic exposure, physical isometric load and muscle ache from the JCQ were also analysed as independent variables in this study.

The Malay version of the JCQ⁷ was developed based on the recommended format of 81 items from the original scales of the JCQ Framingham version⁹. Each item was scored on a Likert scale of 1 to 4 (strongly disagree, disagree, agree and strongly agree). Each job-factor was calculated using the formulae for Job Content instrument scale construction provided in the Job Content Questionnaire and User Guide.¹⁰ The median cut-off point for each organizational job-factor was used to determine whether the respondents had high or low: [i] decision latitude, [ii] psychological job demand, [iii] job insecurity, and [iv] social support.

The combination of two of the organizational job-factors, which were psychological job demand and decision latitude, was used to determine the presence or absence of job strain. Job strain (high strain) was determined by the combination of high psychological demand and low decision latitude. The “non-high strain” meant that the respondents did not have job strain, and were further divided into three categories (low strain, active job and passive job). “Low strain” was determined by the combination of low psychological demand and high decision latitude, where as “active job” was determined by high psychological demand and high decision latitude. “Passive job” was determined by low psychological demand and low decision latitude.

In summary, jobs can be categorized into four types based on the Karasek-Demand-Control Model of Job Stress¹¹ which are:

1. High strain jobs (which is the most risky type of job, with high psychological demands and low levels of control)
2. Low strain jobs (low psychological demands and high levels of control)
3. Active jobs (high psychological demands and high / sufficient control over job activities)
4. Passive jobs (low psychological demands and low levels of control)

The Malay version of the JCQ was validated by Edimansyah (2006) and had good reliability for decision latitude (0.75), psychological job demand (0.61) and social support (0.84).⁷ This validated Malay version of the JCQ has been used to determine job strain among assembly automotive factory workers in Malaysia.

Depression Anxiety Stress Scale (DASS)

The Depression Anxiety Stress Scale (DASS) Scale is a self-report scale designed to measure the negative emotional states of stress.¹² The Malay validated version of the Depression Anxiety Stress Scales 21-item (DASS-21) was used in this study.⁸ This Malay version had very good Cronbach’s alpha values of 0.81, 0.85, and 0.85, respectively for depression, anxiety, and stress subscales.¹³ It consists of 21 items scored according to the Likert scale of 0 to 3.

Data analysis

Statistical analysis was carried out using SPSS version 19. The Pearson's chi-square (χ^2) test was used to determine the association between categorical variables. Continuous variables were presented as means and standard deviation. Multivariate analysis was performed using multiple logistic regression. The dependant variable was job strain and the independent variables were socio-demographic factors (age, education level, ethnicity, marital status, level of education, monthly income, and duration of employment), organizational factors (decision latitude, psychological job demands, social support and job insecurity), psychological factors (depression, anxiety and stress), and specific job factors (toxic exposure, physical isometric load and muscle ache).

The independent variables found to be significantly associated with job strain from chi-square analysis were further analysed using the backward logistic regression method. The predicting factors were controlled for their significant association with job strain, where variables which did not significantly contribute to job strain based on the chi-square analysis were excluded from the backward logistic regression model. The final steps in the regression model for job strain were selected, where only significant variables (based on $p < 0.05$ and 95% CI values) were included as main predicting factors for job strain. Results of the logistic regression analysis were expressed as odds ratio and 95% CI. A p -value of < 0.05 was considered as statistically significant.

Ethical Approval

Approval from the Medical Research Ethics Committee of the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia was obtained. Informed consent was also obtained from each respondent during data collection.

RESULTS

Socio-demographic Characteristics

Two-hundred-and-forty crane operators completed the questionnaires (response rate 100%). Table 1 shows the socio-demographic characteristics of the crane operators. The age of the respondents ranged from 38 to 52 years old, and the mean age was 45 ± 6 years. Majority were Malays (92.5%), married and more than half (56.3%) had completed at least upper secondary education, which meant that they had finished a minimum of 11 years school education. The mean duration of employment was 8 ± 5 years, whereas the mean monthly income was Malaysian Ringgit MYR 1985 \pm 414. The range of total monthly income was MYR 1260 to MYR 2500.

Table 1: Socio-demographic characteristics of the respondents (N=240)

| Socio-demographic characteristics | n (%) |
|-----------------------------------|------------|
| Ethnicity | |
| Malay | 222 (92.5) |
| Chinese | 1 (0.4) |
| Indian | 17 (7.1) |
| Marital Status | |
| Single | 2 (0.8) |
| Married | 238 (99.2) |
| Level of Education | |
| Primary | 2 (0.8) |
| Lower Secondary | 103 (42.9) |
| Upper Secondary | 129 (53.8) |
| Tertiary | 6 (2.5) |

Job strain

Table 2 shows the prevalence of job strain among the crane operators. The prevalence of job strain was 43.8%.

Table 2: Prevalence of job strain among the respondents (N=240)

| Job strain Levels* | n (%) |
|------------------------|------------|
| High Strain | 105 (43.8) |
| Non-High Strain | |
| • Low strain | 36 (15.0) |
| • Active Job | 47 (19.6) |
| • Passive Job | 52 (21.6) |

* all variables were calculated according to Job Contents Questionnaire (JCQ) scoring formula for decision latitude and psychological job demands

Prevalence of Depression, Anxiety and Stress

Table 3 shows the prevalence of depression, anxiety and stress based on the DASS-21 scores. Almost half of the respondents were depressed (49.2%), and a very high percentage (90.4%) had mild to extremely severe anxiety. However, two-thirds of them did not have stress (69.6%).

Table 3: Prevalence of depression, anxiety and stress among the respondents (N=240)

| Psychological factors | Severity of Psychological Factors based on the DASS-21 | | | | |
|-----------------------|--|---------------|-------------------|-----------------|---------------------------|
| | Normal n (%) | Mild n (%) | Moderate n (%) | Severe n (%) | Extremely Severe n (%) |
| Depression | 122 (50.8) | 64(26.7) | 46(19.2) | 8(3.3) | 0(0) |
| Anxiety | 23(9.6) | 11(4.6) | 62(25.8) | 53(22.1) | 91(37.9) |
| Stress | 167(69.6) | 39(16.3) | 32(13.3) | 2(0.8) | 0(0) |

Factors associated with Job strain

None of the socio-demographic factors were found to have significant association with job strain ($p > 0.05$). Among the organizational job-factors, the significant factors associated with job strain were decision latitude and psychological job demand ($p < 0.001$). Respondents with low decision latitude had a high prevalence of job strain (56.9%). High psychological job demand (61.4%) was also associated with job strain. As for the psychological factors, only anxiety was significantly associated with job strain ($p < 0.05$), while depression and stress were not associated with job strain ($p > 0.05$). For the specific job factors, toxic exposure, physical isometric load and muscle ache were significantly associated with job strain ($p < 0.05$). (Table 4)

Results from the multiple logistic regression analysis (Table 5) showed that job strain was significantly associated with psychological job demands ($p < 0.001$), decision latitude ($p < 0.001$), anxiety ($p < 0.05$), physical isometric load ($p < 0.05$), and muscle ache ($p < 0.05$).

Table 4: Relationship between organizational, psychological and job factors, with job strain among the respondents (N=240)

| Variables | Job strain | | No Job strain | | Total | p-value |
|---------------------------------|------------|------|---------------|------|-------|---------|
| | n | % | n | % | | |
| Decision latitude | | | | | | |
| High | 18 | 20.6 | 69 | 79.4 | 87 | 0.00* |
| Low | 87 | 56.9 | 66 | 43.1 | 153 | |
| Psychological job demand | | | | | | |
| High | 70 | 61.4 | 44 | 38.6 | 114 | 0.00* |
| Low | 35 | 27.8 | 91 | 72.2 | 126 | |
| Social support | | | | | | |
| High | 66 | 45.8 | 78 | 54.2 | 144 | 0.43 |
| Low | 39 | 40.6 | 57 | 59.4 | 96 | |
| Job insecurity | | | | | | |
| High | 92 | 44.9 | 113 | 55.1 | 205 | 0.40 |
| Low | 13 | 37.1 | 22 | 62.9 | 35 | |
| Depression | | | | | | |
| Yes | 59 | 50.0 | 59 | 50.0 | 118 | 0.06 |
| No | 46 | 37.7 | 76 | 62.3 | 122 | |
| Anxiety | | | | | | |
| Yes | 98 | 45.2 | 119 | 54.8 | 217 | 0.01* |
| No | 7 | 30.4 | 16 | 69.6 | 23 | |
| Stress | | | | | | |
| Yes | 28 | 38.4 | 45 | 61.6 | 73 | 0.27 |
| No | 77 | 46.1 | 90 | 53.9 | 167 | |
| Toxic Exposure | | | | | | |
| High | 65 | 50.8 | 63 | 49.2 | 128 | 0.02* |
| Low | 40 | 35.7 | 72 | 64.3 | 112 | |
| Physical Isometric Loads | | | | | | |
| High | 74 | 49.0 | 77 | 51.0 | 151 | 0.03* |
| Low | 31 | 34.8 | 58 | 65.2 | 89 | |
| Muscle ache | | | | | | |
| High | 57 | 50.9 | 55 | 49.1 | 112 | 0.04* |
| Low | 48 | 37.5 | 80 | 62.5 | 128 | |

*p<0.05

Table 5: Contributing factors of job strain among the respondents (N=240)

| Variables | Odds Ratio | B | Wald | p-Value | 95% CI (Lower; Upper) |
|---------------------------|------------|--------|--------|---------|-----------------------|
| Constant | | | 13.616 | 0.00* | |
| Psychological Job Demands | 4.137 | 1.420 | 21.134 | 0.00* | 2.258; 7.579 |
| Decision Latitude | 0.248 | -1.396 | 16.710 | 0.00* | 0.127; 0.484 |
| Anxiety | 1.622 | 0.839 | 6.990 | 0.01* | 1.242; 4.311 |
| Physical Isometric Load | 1.902 | 0.643 | 4.413 | 0.04* | 1.044; 3.463 |
| Muscle Ache | 1.761 | 0.566 | 2.721 | 0.04* | 1.899; 3.449 |
| Toxic Exposure | 1.602 | 0.471 | 1.612 | 0.204 | 0.774; 3.316 |
| Age | 1.205 | 0.186 | 0.362 | 0.548 | 0.656; 2.213 |

*p<0.05

95% CI = 95% confidence interval for Odds Ratio

DISCUSSION

The prevalence of job strain among crane operators in this study was 43.8%, which is almost similar to the prevalence of 45.8% reported by Noor Hassim (2010).¹⁴ However, the study by Noor Hassim was conducted among a different group of workers who were correctional officers in Kedah. The high prevalence of job strain found in this study could be due to the fact that crane operators are exposed to high psychological job demands and low decision latitude as found in this study. This association has been supported by various studies.³⁻⁶ In addition, crane operators are among the intermediate educated part of the society in Malaysia and are probably not exposed to more information about job strain compared to the general population. As found in this study, only half the respondents (53.8%) completed their secondary education. In terms of their job requirements, no specific training courses on management of job strain were ever provided.²

In this study, job strain was found to be significantly associated with psychological job demand and decision latitude. High psychological demands were associated with four times the risk of having job strain (OR 4.137, 95% CI 2.258 to 7.579), whereas high decision latitude was associated with reduction in risk of having job strain (OR 0.248, 95% CI 0.127 to 0.484). These findings correspond to several studies which found that jobs characterized by high quantitative demands in combination with low decision latitude adversely affect health.^{11,15,16} Self-reported high psychological demands and low decision latitude were also significantly associated with increased depression symptoms.¹⁷ Another occupational study demonstrated that high levels of role conflict, low job control, and low safety-specific leadership were associated with increased worker strain.^{18,19}

Anxiety was found to be a main predictor for job strain in this study, where respondents with anxiety had almost twice the risk of suffering from job strain (OR 1.622, 95% CI 1.242 to 4.311). This finding corresponds to that of a longitudinal study by Kyriacou (2001) which also found that the susceptibility to develop anxiety among teachers was approximately equal to the rate of reported job strain.¹⁹

This study found that physical isometric loads were significantly associated with job strain (OR 1.902, 95% CI 1.044 to 3.463). The presence of muscle aches was also significantly associated with job strain (OR 1.761, 95% CI 1.899 to 3.449). International studies have shown that musculoskeletal disorders of the arm, neck, shoulder and lower back are common among crane operators and associated with job strain.^{20,21} The working conditions of crane workers expose them to physical demands which put them at risk of musculoskeletal discomfort such as sustained and constrained arm and hand postures, in conjunction with repetitive head and neck flexion movements.²⁰ These physical isometric loads eventually lead to muscle aches which are classified under musculoskeletal disorders. As crane operators are subjected to prolonged sitting everyday for up to four hours without any breaks, it is not surprising that they would eventually suffer from musculoskeletal disorders which would lead to job strain.

Study Strength and limitation

This study used well-validated and published Malay versions of the JCQ and DASS-21 questionnaires to determine job strain, organizational job-factors, specific job factors, depression, anxiety and stress among its respondents. However, this study was conducted only at one container terminal port and therefore does not represent all crane operators in other terminal ports Malaysia.

CONCLUSION AND RECOMMENDATION

As a conclusion, crane operators have a high prevalence of job strain. There was significant association between job strain and decision latitude, psychological job demand, anxiety, physical isometric load, and muscle ache. This study's findings can be used as baseline data to conduct larger and more in-depth studies on job strain among crane operators working in port container terminals.

The management was provided with the report and results of this study. Based on the findings, it was highlighted that there is an urgent need to recognize the existence of job strain and its contributing factors among crane operators by their respective management, and comprehensive stress management programs were recommended to reduce job strain among these workers.

ACKNOWLEDGEMENT

We would like to thank the Department of Environmental & Occupational Health, Faculty of Medicine & Health Sciences, Universiti Putra Malaysia, the management department of the participating port, and all crane operators for their contribution in this study. We are sincerely grateful to the Dean, Faculty of Medicine & Health Sciences, Universiti Putra Malaysia and the participating port for permission to publish this study.

REFERENCES

1. National Institutes of Occupational Safety and Health, NIOSH. Stress at work. <http://www.cdc.gov/niosh/jobstrss.html>. Accessed 10 May, 2012.
2. Northport. Core Business (Container Handling). <http://www.northport.com.my/core1a.php#top> Accessed 10 May, 2012
3. Doef M, Maes S. The Job Demand-Control (Support) Model and psychological well-being: a review of 20 years of empirical research. *Work & Stress* 1999; 13(2): 87-114.
4. Halpern DF. How time-flexible work policies can reduce stress, improve health, and save money. *Stress and Health* 2005; 21: 157-168.
5. Ganster DC, Fox ML, Dwyer DJ, Explaining employees' health care costs: a prospective examination of stressful job demands, personal control, and physiological reactivity. *Journal of Applied Psychology* 2001; 86: 954-964.
6. Kramer D. The changing world of health care. *Infocus*. 2001;22: 1-4.
7. Edimansyah BA, Rusli BN, L Naing, M Mazalisah. Reliability and construct validity of the Malay version of the Job Content Questionnaire (JCQ). *Southeast Asian Journal Tropical Medical Public Health* 2006; 37(2): 412.
8. Ramli M, Ariff MF, Zaini Z. Translation, validation and psychometric properties of Bahasa Malaysia version of the Depression Anxiety and Stress Scales (DASS). *ASEAN Journal of Psychiatry* 2007;8(2): 82-89.
9. Karasek R, Brisson C, Kawakami N, Houtman I, Bongers P, Amick B. The Job Content Questionnaire (JCQ): An instrument for internationally comparative assessments of psychosocial job characteristics. *Journal Occupational Health Psychology* 1998;3: 322-355.
10. Karasek R. *Job Content Questionnaire and User's Guide*. Los Angeles: University of Southern California Press, 1985.
11. Schnall PL, Landsbergis PA, Baker D. Job Strain and Cardiovascular Disease. *Annual Review of Public Health* 2001; 15: 381-411.
12. Lovibond PF, Lovibond SH. *Manual for the Depression Anxiety Stress Scales*. Sydney: University of New South Wales Press, 1995.
13. Musa RA. Validation and psychometric properties of Bahasa Malaysia version of the depression anxiety and stress scales (DASS) among diabetic patients. *Malaysian Journal of Psychiatry* 2009; 18 (2): 1-6.
14. Mohd Zukri I, Noor Hassim I. A study of occupational stress and coping strategies among correctional officers in Kedah, Malaysia. *Malaysian Journal of Community Health* 2010; 16(2).

15. Isabelle G, France K, Yves C, Johannes S. A prospective study of cumulative job stress in relation to mental health. *BioMed Central Public Health* 2005;5: 67.
16. Stuart EH, Jarvis A, Daniel K. A ward without walls? District nurses' perceptions of their workload management priorities and job satisfaction. *Journal of Clinical Nursing* 2008; 17: 3012–3020.
17. Kolstad HA, Marie H, Jane FT, Linda K, Sigurd JM. Job Strain and the Risk of Depression: Is Reporting Biased? *American Journal of Epidemiology* 2010; 173: 94–102.
18. Chang EM, Hancock KM, Johnson A, Daly J, Jackson D. Role stress in nurses: Review of related factors and strategies for moving forward. *Nursing and Health Sciences* 2005; 7: 57–65.
19. Kyriacou C. Teacher Stress: Directions for Future Research. *Educational Review* 2001; 53 (1):27-35.
20. Edwin M, Alexander S. Musculoskeletal discomfort in crane and forklift operators in a New Zealand port. *New Zealand: Port Nelson Health and Safety Advisor*, 2009.
21. Linton SJ. A review of psychological risk factors in back and neck pain. *Spine* 2000; 25(9): 1148–1156.