

Prevalence and risk factors of job strain among laboratory technicians in Hospital Universiti Sains Malaysia

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ABSTRACT

Introduction: Several sources of job stress exist. Some of these stressors are intrinsic to the job, while some are related to psychosocial and other factors.

Methods: A cross-sectional study of the prevalence and risk factors of job strain in 84 laboratory technicians in Hospital Universiti Sains Malaysia (HUSM) (response rate 82.4 percent) was conducted between September 2001 and February 2002. A Malay version of the validated Karasek's Job Content Questionnaire was used as the research instrument in this study. There were five scales in the questionnaire. Two scales were used to define job strain, namely: decision latitude and psychological demands.

Results: The prevalence of high job strain in laboratory technicians in HUSM was 33.3 percent. Job insecurity (adjusted OR 2.4; 95 percent CI 1.2-5.7), physical exertion (adjusted OR 1.7; 95 percent CI 1.1-2.9), and total psychological stressors (adjusted OR 3.6; 95 percent CI 1.8-7.1) were significantly associated with job strain.

Conclusion: A high proportion of laboratory technicians in HUSM experienced high job strain and psychosocial factors in the workplace posed significant risks of job strain in these workers.

Keywords: Job Content Questionnaire, job strain, risk factors, laboratory technicians, psychosocial factors

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INTRODUCTION

Job stress (job strain) is becoming an increasingly important occupational health problem and a significant cause of economic loss. Job strain may produce overt psychological and physiologic disability. However, it may also have more subtle effects on personal well-being and productivity⁽¹⁾. The issue of job strain is of utmost importance to the public health community and working populations since the economic

costs of job strain are difficult to estimate and could be as high as several hundred billion dollars per year⁽²⁾. Job strain can be defined as the harmful physical and emotionally responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker. In general, the combination of high demand in a job and a low amount of control over the situation can lead to job strain⁽³⁾.

No job is free from stress and all types of work bring responsibilities, problems, demands and pressures. In normal circumstances, it is an unavoidable part of working life. Workers are paid to work and a reasonable amount of pressure is to be expected. However, not all pressures are negative, and workers are often kept motivated by challenges and difficulties⁽⁴⁾. Common complaints from workers are too much responsibility and too little authority, unfair labour practices, and inadequate job descriptions. Every employee should have a specific, written and clear job description, with the employee's expectations spelt out. Employees can counteract these pressures through workers' unions, organisations, grievance or personnel offices or, more commonly, by direct negotiations with their immediate supervisors⁽⁵⁾.

Kalimo and Mejman in 1987⁽⁶⁾ showed that the sources of job strain can only be adequately investigated by using a multidisciplinary approach, i.e. examining the whole spectrum of psychological, sociological, and physiological problems that make demands on an individual in their working environment. Use of a multidisciplinary approach acknowledges also that stressors in the working environment can affect an individual at home and his social environment, and vice versa. Thus, when studying the sources and manifestations of stress in a specific occupational group, e.g. personnel in hospitals, it is essential to be aware of the importance of extra-organisational sources of stress that can affect the performance and mental and physical health of the individual at work. Several sources of job stress exist, some of these stressors are intrinsic to the job, while some are related to other factors⁽⁷⁾. The purpose of the present study

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was to determine the prevalence and risk factors of job strain in laboratory technicians in Hospital Universiti Sains Malaysia (HUSM) in Kelantan, Malaysia. It is hypothesised that psychosocial job factors are associated with job strain.

METHODS

Study design

A cross-sectional study of job strain among laboratory technicians was conducted in HUSM, Kelantan, Malaysia. Recruitment of subjects was done through the list of laboratory technicians in each laboratory in HUSM. Subjects were met at their worksite during working hours between September 2001 and February 2002, in a room especially set aside for data collection. We estimated the sample size using the single proportion formula with 95% confidence interval. Sample size calculation was based on the 23.7% prevalence of job strain among nurses in Kelantan⁽⁸⁾. We set the precision at 10% and the calculated sample size was 88. A sampling frame of all laboratory technicians in HUSM was constructed, based on inclusion and exclusion criteria. Each laboratory technician was a primary sampling unit, and universal sampling was used to select study subjects. The inclusion criteria include laboratory technicians aged between 18 to 55 years and placed into the grade U8 job category. The exclusion criteria include a diagnosis of any psychiatric illness.

Research protocol and instrument

The study protocol was reviewed and approved by the Research and Ethics Committee, School of Medical Sciences, Universiti Sains Malaysia, Kelantan Health Campus. Data collection was done using a self-administered questionnaire which was the validated Malay version of the Job Content Questionnaire (JCQ). Pre-testing for reliability was done among school teachers using a similar questionnaire⁽⁸⁾. We found that the questionnaire was comprehensible to an average educated person, such as a teacher, and we postulated that other job categories would have similar understanding. We have back-translated the JCQ to make sure that the original content of the JCQ was still maintained.

The research instrument was Karasek's JCQ⁽⁹⁾. JCQ is a questionnaire-based instrument designed to measure the content of a work task. The job strain measure is derived from the JCQ 1.7 (Revised 1997), and included added scales and extensions of original scales for Framingham version. This is a 42-item questionnaire, based in part on questions drawn from the US Department of Labor/University of Michigan quality of employment surveys. JCQ contains five

scales. Two scales were used to define job strain, namely: decision latitude and psychological demands.

The first scale, decision latitude, is defined as the sum of two subscales: skill discretion, measured by six items (keep learning new things, can develop skills, job requires skills, task variety, repetitious, and job requires creativity), and decision authority, measured by three items (have freedom to make decisions, choose how to perform work, and have a lot of say on the job). The second scale is psychological job demand, defined by five items (excessive work, conflicting demand, insufficient time to work, work fast, and work hard). All questions were scored on a Likert scale of 1 to 4 (strongly disagree, disagree, agree, and strongly agree). Psychological demand scores range between 12 and 48 while those of decision latitude, between 24 and 96. Decision latitude is the primary measure of the concept of control and is defined as the combination of job decision-making authority and use of skills on the job.

The other three scales are social support, physical demands, and job insecurity. The third scale, social support, is the sum of two subscales: support from coworkers, measured by four items (coworkers competent, coworkers interested in me, friendly coworkers, and coworkers helpful) and support from supervisor, measured by four items (supervisor shows concern, supervisor pays attention, supervisor is helpful, and supervisor is a good organiser). The primary hypothesis of social support is that jobs which are high in demand, low in control, and also low in social support at work carry the highest risk of illness, and has been empirically successful in a number of chronic disease studies. The fourth scale is physical demands, measured by a single item only (much physical effort). The last scale is job insecurity, measured by three items (steady work, job security, and future layoff).

Robert Karasek originally developed and provided evidence for the "job strain" concept and model. Over the last 15 years, this model has highlighted two key elements of stressors, and has been supported by a growing body of evidence. He produced a graphical representation of a model, indicating his theory as an interaction between job demands and job decision latitude⁽¹⁰⁾. This model summarises the four types of jobs that may result from the different combination of job demands and job decision latitude (job control). The model seems to capture some important stressful job circumstances: the low control, high demand tasks, particularly in combination with low social support. The vertical dimension of decision latitude (increasing towards the top) and the horizontal dimension of psychological job demand (increasing to the right)

Table I. Differences in psychosocial job factors, and occupational and sociodemographical factors in HUSM laboratory technicians.

Variable	High strain		Non-high strain ^a		p value ^b
	Mean (SD)	No. (%)	Mean (SD)	No. (%)	
Psychosocial job factors:					
Job insecurity	6.2 (1.8)		5.6 (2.3)		0.25
Coworker support	12.0 (2.2)		12.5 (1.1)		0.21
Supervisor support	12.4 (6.0)		12.6 (4.1)		0.83
Social support	24.4 (6.9)		25.1 (4.3)		0.55
Physical exertion	2.7 (0.6)		2.5 (0.7)		0.26
Hazardous conditions	4.5 (2.9)		3.9 (2.3)		0.36
Toxic exposures	3.9 (2.0)		3.3 (1.5)		0.12
Total psychological stressors	42.2 (3.8)		35.8 (4.4)		0.01
Total physical hazard	8.4 (4.6)		7.2 (3.6)		0.21
Total physical stressors	11.0 (4.7)		9.7 (3.9)		0.18
Occupational and socio-demographical factors:					
Average duration of work (hr)	49.3 (15.3)		43.6 (13.0)		0.08
Duration of employment (mth)	106.6 (89.6)		97.1 (93.4)		0.66
Total duration of employment (yr)	10.7 (8.8)		9.2 (8.7)		0.48
Age (yr)					
18 – 34		15 (53.6)	30 (53.6)		0.72
35 – 44		11 (39.3)	19 (33.9)		
45 – 55		2 (7.1)	7 (12.5)		
Sex					
Female		18 (64.3)	28 (50.0)		0.22
Male		10 (35.7)	28 (50.0)		
Ethnic group					
Non-Malay		4 (14.3)	11 (19.6)		0.55
Malay		24 (85.7)	45 (80.4)		
Marital status					
Non-married		11 (39.3)	19 (33.9)		0.63
Married		17 (60.7)	37 (66.1)		
Education level					
Non-university		0 (0.0)	2 (3.6)		0.55 ^c
University		28 (100.0)	54 (96.4)		
Income per month (in ringgit)					
700 – 1300		11 (39.3)	27 (48.2)		0.54
1301 – 1700		9 (32.1)	12 (21.4)		
1701 – 3000		8 (28.6)	17 (30.4)		

^a Three other job strain categories: low strain, active, and passive.

^b Significance for group difference (Independent t-test for all psychosocial job factors, average duration of work, duration of employment, and total duration of employment; χ^2 for all others).

^c Fisher's exact test.

Table II. Risk factors of job strain in 84 HUSM laboratory technicians.

Risk factors	Crude OR ^a	Adjusted OR ^b	95% CI	p value ^c
Job insecurity	1.1	2.4	1.2 – 5.7	<0.01
Physical exertion	1.4	1.7	1.1 – 2.9	0.03
Total psychological stressors	1.5	3.6	1.8 – 7.1	<0.01
Hazardous conditions	1.1	1.5	0.9 – 2.1	0.06

^a Simple logistic regression.

^b Multiple logistic regression.

^c Likelihood-ratio (LR) test, $\alpha < 0.05$.

OR: odds ratio, CI: confidence interval.

create four quadrants and the model describes four types of work, namely: high strain jobs, low strain jobs, active work and passive work⁽¹¹⁾.

Statistical analysis

Data entry and analysis was done using Statistical Package for Social Sciences (SPSS) version 10.0. Means and standard deviations were calculated for continuous variables, and frequency and percentages for categorical variables. Independent t-test was used to compare mean differences and chi square test for categorical data between two groups (“high strain” and “non-high strain”) with the level of statistical significance set at 0.05.

The prevalence of job strain was determined by using the median of the psychological job demand and decision latitude scores as cut-off points. Those above the median was considered high, and those below was low for both scales. According to Karasek’s job strain model, “high strain” was characterised by high psychological job demands and low decision latitude, “active” was characterised by high psychological job demands and high decision latitude, “passive” was characterised by low psychological job demands and low decision latitude, and “low strain” was characterised by low psychological job demands and high decision latitude. To determine the difference between the groups in terms of job strain categories, the chi square test was used with level of statistical significance set at 0.05.

The association between job strain and the psychosocial job characteristics, occupational and socio-demographic factors as risk factors was examined by multiple logistic regression analysis adjusted for possible confounding aetiological factors, such as age, sex, ethnic group, marital status, education level, and income per month. The final model of risk factors of job strain using multiple logistic regression was checked for fitness using Hosmer-Lemeshow goodness-of-fit test. The p value was not significant, thus the model had fit. The main effect of the model

was also checked for interactions by using two-way interactions test and if this was not significant, there were no significant interactions between each variable in the final model.

RESULTS

Out of 102 subjects enrolled, 84 consented to participate in the study, giving a response rate of 82.4%. The majority of laboratory technicians were classified under the passive group (36.9%). A high proportion (33.3%) of laboratory technicians in HUSM belonged to the high strain group. Differences in psychosocial job characteristics, and occupational and demographical factors in 28 “high strain” and 56 “non-high strain” laboratory technicians in HUSM are shown in Table I.

The risk factors of job strain in 84 laboratory technicians in HUSM are shown in Table II. Controlling for age, sex, ethnic group, marital status, educational level, and income per month, the risk factors for job strain in 84 laboratory technicians in HUSM were job insecurity (adjusted OR 2.4, 95% CI 1.2-5.7), physical exertion (adjusted OR 1.7, 95% CI 1.1-2.9), and total psychological stressors (adjusted OR 3.6, 95% CI 1.8-7.1).

DISCUSSION

High job stress (job strain) is a combination of high job demand and low decision latitude or control. According to Karasek’s job strain model, job demand and decision latitude need to occur simultaneously in order to produce psychological strain⁽¹¹⁾. This model also proposes that high job demand-low decision latitude will cause high job strain and may inevitably lead towards illness. Based on this model, the prevalence of high job strain in laboratory technicians in HUSM was 33.3%. Another 11.9% of laboratory technicians in HUSM was categorised as “active”, 17.9% as “low strain” while the majority (36.9%) belonged to the “passive” group. These findings were similar among Korean workers. According to this model, laboratory technicians were supposed to be classified under the high job strain group⁽¹¹⁾. However, our results indicated that the laboratory technicians in HUSM were mainly in the passive group (36.9%) and high strain group (33.3%).

In this study, we found that the “high strain” group of laboratory technicians in HUSM had significantly higher total psychological stressors and longer average duration of work (hour) compared to the “non-high strain” group. These findings were supported by those of Theorell and Karasek in 1996⁽¹²⁾ in their proposed dominant “job strain” model of psychosocial job characteristics. There are many sources of job

stress for the laboratory technicians in their working environment. Psychosocial, chemical, and physical exposures at the workplace represent a major health burden on the workers⁽¹³⁾. Kalimo and Mejman in 1981⁽⁶⁾ showed that exposure to chemicals or adverse physical conditions in the working environment plays a role in shaping the psychosocial environment and quite often, the existence of adverse working conditions leads to combined, and probably aggravated effects on the worker's health.

We found that the significant risk factors of job strain in laboratory technicians in HUSM were job insecurity, physical exertion, and total psychological stressors. The odds of having job strain for laboratory technicians in HUSM with high physical exertion was 1.7 higher compared to low physical exertion. Some jobs may require physical strength beyond the worker's capacity or set unreasonably high quotas. The assembly line may keep moving no matter how strained or fatigued the worker is, and all these factors contribute towards job strain⁽¹⁴⁾. It has been shown that physical over-activity, such as increased loading during working, considerably enhances cortisol, adrenaline, and noradrenaline secretion levels. It has been shown that corticosteroid and catecholamine secretion levels increased in people doing hard physical work⁽⁶⁾.

The odds of having job strain for laboratory technicians in HUSM with high total psychological stressors was 3.6 higher compared to low total psychological stressors. Even though psychological stressor is characterised as a subjective phenomenon, some predisposing factors can be determined, and there can be appropriate intervention in the psychosocial work environment. Karasek's job strain model predicts that the greatest risk to physical and mental health from stress will occur among workers facing high psychological workload demands or pressures combined with low control or decision latitude in meeting those demands. Psychological stressors have operationally been defined as having components of time pressure, deadline stress, excessive workloads, and conflicting demands which result in psychological arousal, consistent with measures of overload used by several job stress researchers⁽¹⁵⁾.

This study also showed that job insecurity was a significant risk factor of job strain in laboratory technicians in HUSM. Job insecurity was faced by the employee with the threat or reality of job termination. The psychological stress of job insecurity has been hypothesised to be associated with illness incidence in a number of studies, using a variety of methodologies. Research using macro-level data on unemployment, but without social class control, has been done⁽¹⁵⁾.

Lack of control over work, the work place, and employment status have been identified both as sources of stress and as a critical health risk for some workers. Employees who are unable to exert control over their lives at work are more likely to experience job strain, and are therefore more likely to have impaired health⁽¹⁶⁾. In general, job control is the ability to exert influence over one's environment so that the environment becomes more rewarding and less threatening. Individuals who have job control have the ability to influence the planning and execution of work tasks. Although stress experience is individualised, certain stimuli are almost universally considered unpleasant and the psychosocial job characteristics approach holds that aspects of the job itself cause job strain. Though this approach does consider how personality moderates or heightens stress, it asserts that the psychosocial job characteristics are the dominant cause of job stress.

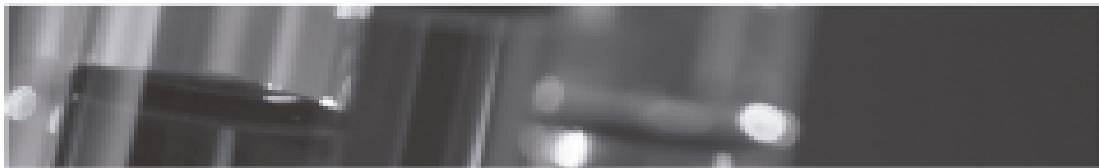
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